233, 237, 241, and 245 Dunlop Street West, Barrie , Ontario

Preliminary Hydrogeological Investigation

Prepared For:

Trinity Consultants Ontario Inc.

Prepared By:

Norbert M. Woerns M.Sc. P.Geo

January 31, 2018

Norbert M Woerns M.Sc. P.Geo.
98 Myles Drive, Tobermory, Ontario, N0H 2R0
Ph. (519) 596-2967: Email; nwoerns@eastlink.ca

January 31, 2018

Trinity Consultants Ontario Inc.
885 Don Mills Road, Suite 106
Toronto, Ontario
M3C 1V9

Attention : Brian Schuyler (by email: bschuyler@trinityconsultants.com)

Re: 233,237, 241, and 245 Dunlop Street, Barrie Ontario
Proposed Site Re-development
Preliminary Hydrogeological Investigations

I am pleased to provide the following preliminary hydrogeological investigation results in support of the above noted proposed development. Included are a description of study methodology, site characterization, with conclusions and recommendations with respect to the potential impact of the proposed development on the local groundwater system and local private and municipal wells. This investigation has been completed from available information including maps and reports containing local and regional hydrogeological information. Details are provided in the following report.

Yours Very Truly

Norbert M. Woerns M.Sc. P.Geo.

Attach.

Table of Contents

Letter of Transmittal

List of Figures

List of Tables

Appendices

1.0 Introduction

1.1 Background

It is proposed to construct a nine floor condominium complex on existing properties on the south side of Dunlop Street West. The property includes four (4) existing single residence lots on the south side of Dunlop Street West and three (3) single residential lots north of Perry Street. The property is shown on Figure 1. The location of the existing on-site boreholes and one monitoring well completed by Alston Associates (2016) are also shown on Figure 1.

As part of the development application for site plan approval, supporting studies have been requested by the City of Barrie. This includes a geotechnical/hydrogeological investigation report which must address groundwater levels and any impact those levels may have on the proposed development. The report will further confirm that the proposed development will not impact any proposed wells within a 300m radius of the subject property` (City of Barrie, Engineering Department Memorandum, by Nadine Rush, September 14, 2016).

The Lake Simcoe Protection Plan Policy 4.6 DP requires that pre-development recharge is maintained for any major development that exceeds 500m^2. The proposed condominium development will have a building footprint area of 1229.53 m^2 . Therefore the Lake Simcoe Protection Plan Policy 4.8 DP will apply. This is addressed with the completion of a water balance for the proposed development with conclusions and recommendations for design, construction, and maintenance practices to maintain pre-development recharge.

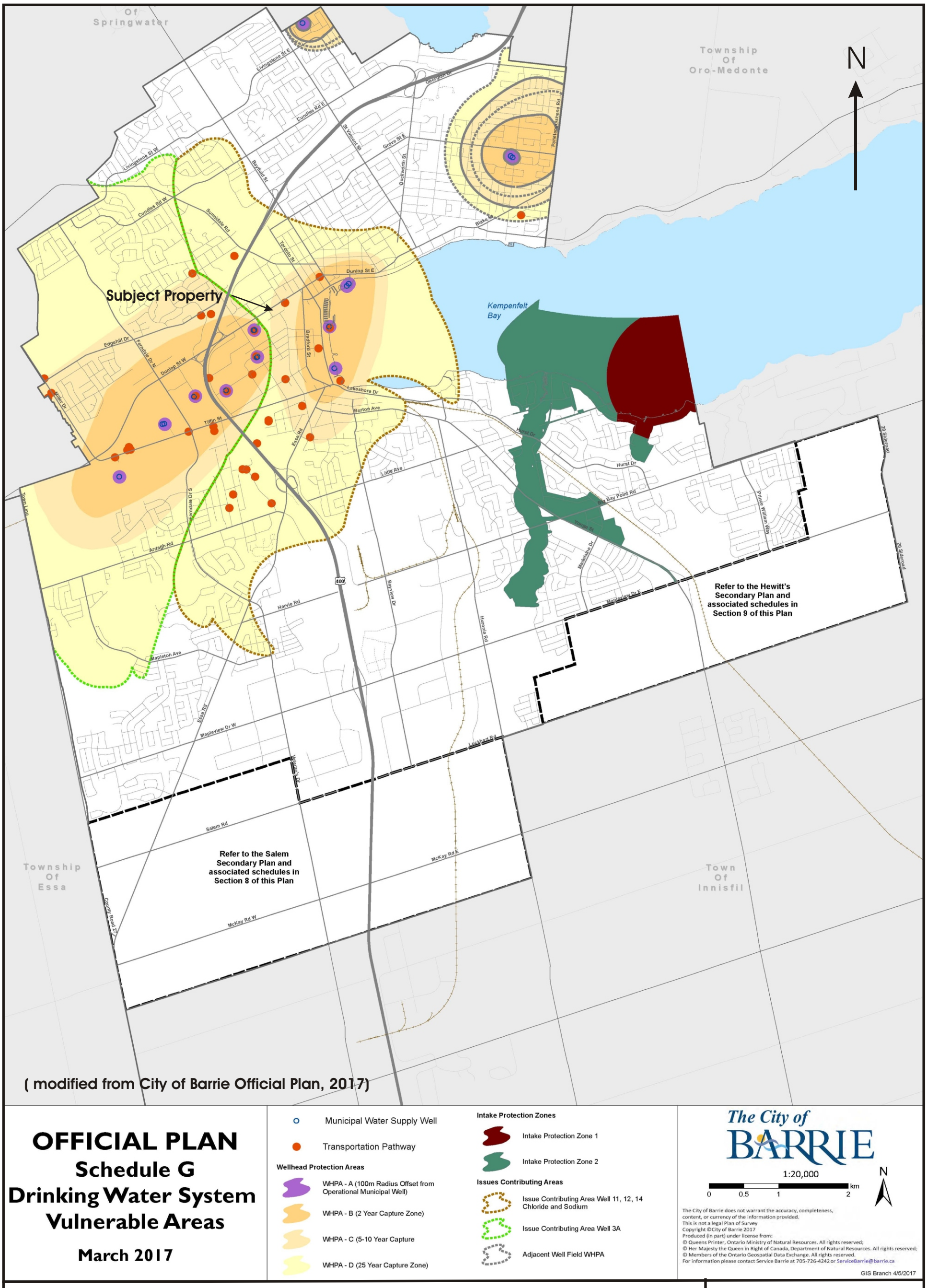
1.2 Local and Site Description

The subject property includes an area of 6930m^2. It is located on the south side of Dunlop Street West east of Boys Street South. Most of the property is vacant. It previously contained four individual properties fronting onto Dunlop Street West. Three of the four residential buildings have been removed at 233, 237 and 241 Dunlop Street West. These three properties were the focus of a geotechnical investigation by Alston Associates (2017) and a Phase 2 Environmental Site Assessment by Trinity Consultants. A residential building remains on 245 Dunlop Street West. The back half of the property includes three lots which include the wooded valley sides and bottom of Bunkers Creek. The adjacent properties along Dunlop Street west consist of a single family residential building to the east and a small commercial building to the west at the corner of Boys Street South and Dunlop Street West.

The property is serviced by municipal sewer and water services. It is located within a Well Head Protection Area for the municipal wells of the City of Barrie and is also located within an area of high Aquifer Vulnerability. A Tier Three Water Budget and Local Area Risk Assessment have been completed by Aqua Resource (2013) in support of the Source Water Protection Plan for the source protection area including the City of Barrie. The Tier Three Water Budget and Risk Assessment have identified sodium and chloride as an issue for an area including the property. The wellhead protection areas and groundwater vulnerability issues are identified in Schedule G of the City of Barrie Official Plan as shown on Figure 2.

(Image from Google Maos, January, 2018)

Norbert M. Woerns 98 Myles Drive Tobermory, Ontario N0H 2R0 Ph: (519) 596-2967	231,237,241,245 Dunlop Street Location Map Preliminary Hydrogeological Investigation	Figure 1 January 2018



Dunlop St Preliminary Hydrogeological Investigation

Figure 2

Norbert M. Woerns
98 Myles Dr., Tobermory, Ontario N0H 2R0
Ph: (519) 596-2967; email: nwoerns@eastlink.ca

January 2018

2.0 Study Objectives

The proposed residential condominium development exceeds 500 m^2 for ground floor area which constitutes a 'major development'. The Lake Simcoe Protection Plan policy 4.8-DP requires that an application for major development be accompanied by a stormwater management plan that demonstrates:

'through an evaluation of anticipated changes in the water balance between pre-development and post-development, how such changes shall be minimized'

The objectives of this preliminary hydrogeological investigation are:

1) Identify the potential for impact of the proposed development on the local groundwater resources from both an quantity and quality perspective,
2) Provide recommendations for minimizing impact on the groundwater system and wells within 300m of the subject property, and
3) Quantify the potential changes in groundwater recharge from the proposed development compared to pre-development conditions and provide conclusions and recommendations for minimizing the reduction in groundwater recharge.

3.0 Study Results

3.1 Physical Setting

As noted above the subject property is located on the south side of Dunlop Street West east of Boys Street South. It lies within a sand plain within the Simcoe Lowlands physiographic region as defined by Chapman and Putnam (1984). The topography of the site is relatively flat in the northern portion of the property and slopes steeply toward Bunkers Creek at the southern end of the property. Surface drainage is generally to the south toward Bunkers Creek which drains into Lake Simcoe. Surface elevations range from about 228 mASL in the northern portion of the property to about 222 mASL along Bunkers Creek in the southern portion of the property. The area near Dunlop Street was previously occupied by single family residential buildings. Three residential buildings have been removed and the site has been leveled in this area. One residential building at 245 Dunlop Street West still remained on-site during a reconnaissance site visit January 10th, 2018. The back portion of the property is wooded adjacent to Bunkers Creek.

3.2 Surficial Geology

The surficial geology of the area has been mapped on a regional basis by the Ontario Geological Survey (Barnett, 1997) as shown on Figure 3. The mapped surficial deposits on the subject property consist of fine to medium grained sand of glacial lacustrine origin. Boreholes completed for the Phase 2 and Geotechnical investigations encountered silty sand to sand to the bottom of the boreholes to depths of about 9.6m. Locally the sand is overlain by sandy fill materials up to about 1.5m deep. Borehole logs from the geotechnical report by Alston Associates Ltd (2017) report are included in Appendix A.

3.3 Bedrock Geology

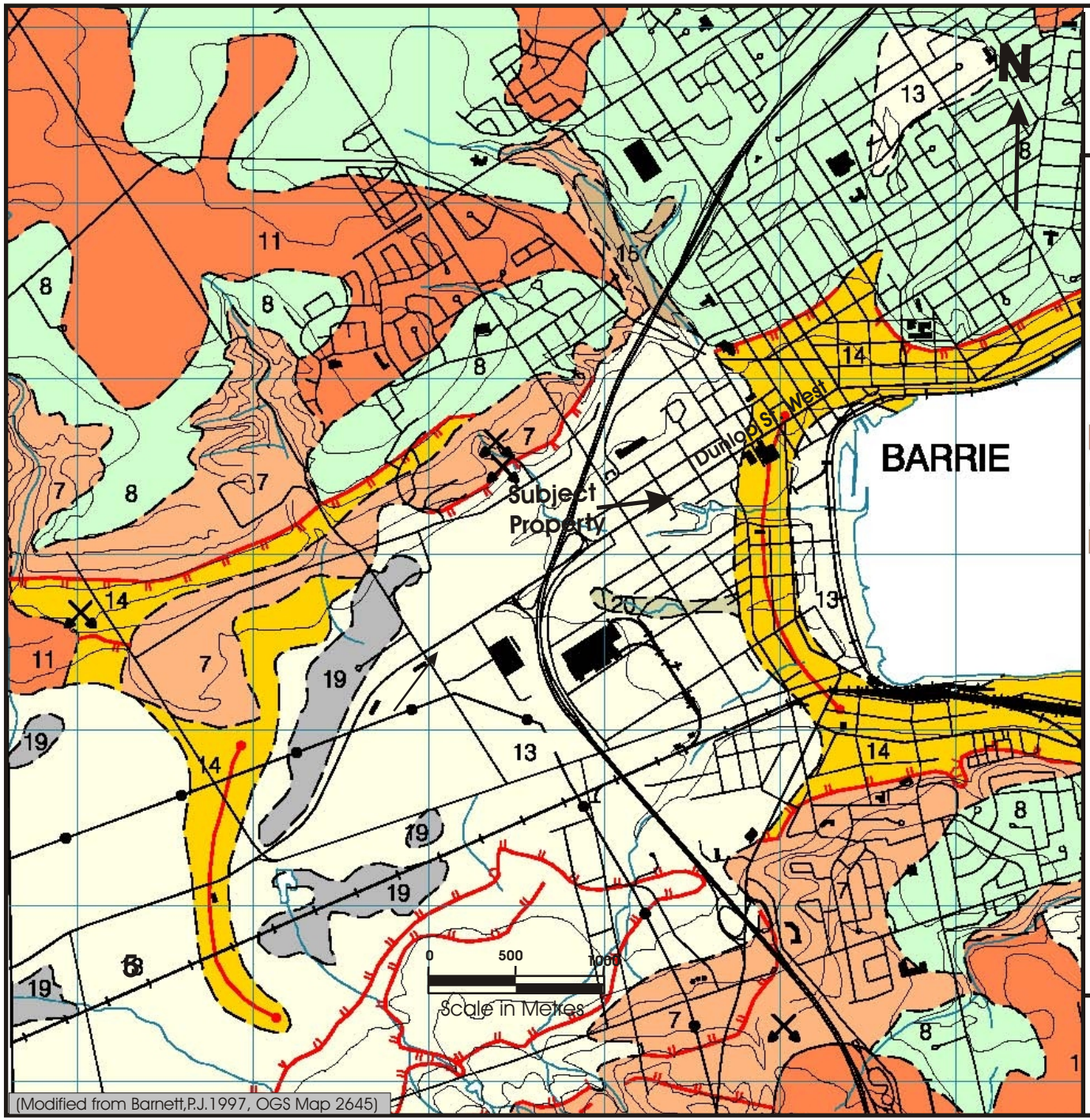
The underlying bedrock is buried under great thickness of overburden materials. Local wells have been drilled up to depths of over 122 m (400ft) without encountering bedrock. No bedrock has been encountered in any local well records which indicate that the bedrock surface occurs at depths in excess of 122m. Regional bedrock mapping indicate that the underlying bedrock is interpreted to consist of the limestone, dolostone, shale , arkose, and sandstone of the Ottawa Group, Simcoe Group, and Shadow Lake Formation of middle Ordovician age. (Ontario Geological Survey, Map 2544 - 1991).

3.4 Hydrogeological Setting

The hydrogeological setting of the vicinity of the subject property has been investigated using available geological mapping and Ministry of the Environment and Climate Change (MOECC) water well records. MOECC well records were plotted within 300m of the property. Locations have been plotted as shown on Figure 4. Selected well records are provided in Appendix B. Subsurface conditions are shown on hydrogeological cross – section Figure 5 that is taken from the Tier Three Water Budget and Local Area Risk Assessment (AquaResource, 2013). The following description of the hydrostratigraphic units in the vicinity of the subject property is taken from this reference.

There are four major water producing or aquifer zones beneath the city of Barrie. These are shown on Figure 4 as A1, A2, A3, and A4 in order of increasing depth. These zones are separated by non-water producing zones or aquitards identified as C1, C2, C3, and C4.

The three closest municipal wells to the subject property are wells 3A, 4, and 5. Municipal Well 4 is closest to the property located about 200m east and south of the property. This well was reported to be off-line in the Aqua Resources (2013) City of Barrie Tier Three Water Budget and Local Risk Assessment (Table 3.1). Local well records No. 7164608 shows that Municipal Well No. 4 was decommissioned in 2011. Well Record No. 7151274 suggests that a replacement well for Municipal Well 4 was constructed in 2010. Municipal wells closest to the subject property, Wells 3A and 4 obtain water supplies from aquifers A3 and A4 at depths in the order of 40 to 100m from surface. The top of the well screens in these two municipal wells are at 96.4m and 44.0 m respectively. The top of the aquifer is 62.4m and 41.6 m from surface in municipal wells 3A and 4 respectively. Two over lying aquitards C1 and C2 provide protective layers over



Surficial Geology

233,237,241,& 245 Dunlop St. W
Hydrogeological Investigation

Legend

- 20 — **Fluvial Sediments:** very fine- to coarse-grained sand, gravel, silt and clay
- 19 — **Wetland Sediments:** peat, muck and marl
- 14 — **Glaciolacustrine Beach and Bar Sediments:** gravel, sandy gravel and gravelly sand.
- 13 — **Glaciolacustrine Coarse-Grained Sediments:** very fine- to medium-grained sand, silt, minor clay.
- 11 — **Glaciofluvial Ice-Contact Stratified Sediments:** fine- to very coarse-grained sand, gravelly sand and gravel, minor amounts of silt, clay and flowtill.
- 8 — **Till:** Moderately stony to stony, silty sand to sand
- 7 — **Glaciofluvial Ice-Contact Stratified Sediments:** fine- to very coarse-grained sand, gravelly sand and gravel, minor amounts of silt, clay and flowtill

Base of terraced escarpment (glaciolacustrine, abandoned shore bluff)

Abandoned beach, bar or spit

Sand and gravel pit

Norbert M. Woerns
98 Myles Drive
Tobermory, Ontario
N0H 2R0
Ph: (519) 596-2967

Figure 3

January 2018

233,237,243,245 Dunlop Street Well Locations

Legend

- 5700238 — Well Location and MOECC Well Number
- 3A — Municipal Well Location and Well Number
- (d) — Decommissionned Well
- (dw) — Dewatering Well
- (m) — Monitoring Well
- (mu) — Municipal Well
- (nd) — No Data
- (o) — Other Use
- (t) — Test Well

Norbert M. Woerns
98 Myles Drive
Tobermory, Ontario
N0H 2R0
Ph: (519) 598-2967

Figure 4

January 2018

7262774 (d)
7262776(d)
7262773(d), 7262775(d)
Wells 11 and 14
Eccles Street
7122264 (m)
5700238
7188954(nd)
5736428(d)
7153430(d)
7147418(dw)
Dunlop Street West
Subject Property
Perry Street
7183973(m),7197565(nd)
300m radius from property boundary
5700253(t)
7041131(t)
7112477(d)
(23 Dewatering wells)
7180077 (m)
7180074 (m)
7203227(d)
7197568 (nd)
7198641(m)
7151274(mu), 5700248(t), Well 4; 7164608(d)
7197567 (nd)
Well 15
7250165 (m)
7180075 (m)
7280992 (o)
7043230(m)
7280990 (nd)
7197566 (nd)
5700242(m)
5700279
7209099(m)
7209088(m)
Vespra Street
LOT
CON
Well 3A
5728346(m)
BARRIE
Anne Street
John Street
HWY 400
Well 12
Well 7
Well 5
0
250
500
Scale in Metres
(Topographic Base from First Base Solutions)

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

South Georgian Bay
Lake Simcoe
Source Protection Region

Hydrostratigraphic Cross Section

Figure 3.8-4

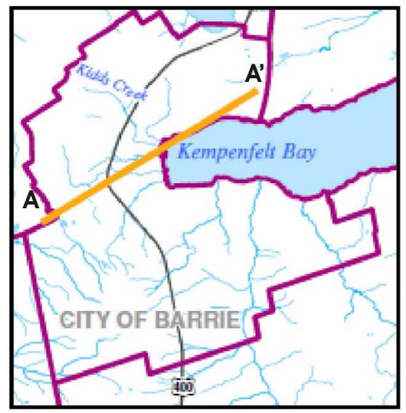
Created by: LSRCA Date: 2013-11-20

This map was produced by the Lake Simcoe Region Conservation Authority, lead agency of the South Georgian Bay Lake Simcoe Region Source Protection Region. Base data have been compiled from various sources, under data sharing agreements. While every effort has been made to accurately depict the base data, errors may exist.

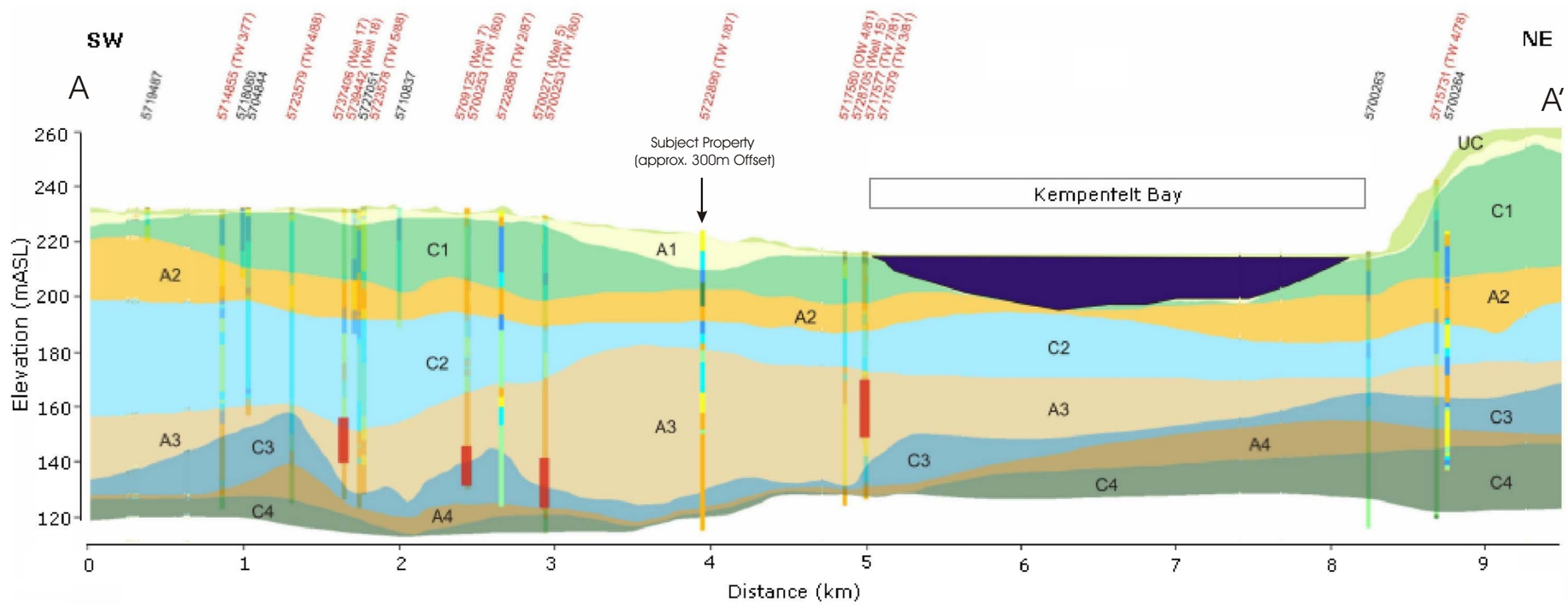
Ontario

AquaResource
A Division of Matrix Solutions Inc.

Nottawasaga Valley Conservation Authority



233,237,241,245
Dunlop Street
Cross-Section A-A'



(modified from Aqua Resource, 2013)

Norbert M. Woerns
98 Myles Drive
Tobermory, Ontario
N0H 2R0
Ph: (519) 598-2967

Figure 5

January 2018

these aquifers. The shallow aquifer, A1 underlying the property does not appear to be used by local wells. Aquifer A1 is an unconfined aquifer and is therefore susceptible to contamination.

The groundwater table was measured at 4.4m below surface in monitoring well MW4 on March 25, 2017. Caving of the soil at about 3.5m below surface was observed within boreholes BH1, BH2, and BH3 suggesting the groundwater table was at or below this level within these boreholes. These boreholes were completed to depths of between 8.2m and 9.6m from surface. Boreholes BH5, BH6, and BH7 were dry upon completion with no caving of the soil. These boreholes were completed to depths of about 2.1m. This information indicates that the groundwater table on the property lies between 3.5 and 4.4m below surface.

All wells within the area have been completed within and obtain water supplies from granular layers or zones within the overburden materials. These are described in more detail in Section 4.1 below.

Static water levels recorded in well records for most wells vary, between about 1.5m to about 10m. Static water levels in the nearest Municipal wells 3A, 4 and 5 are reported to be 7.8m, 8.0m 11.2m respectively (AquaResource, 2010, Appendix D). These represent water levels in the deeper aquifer A4 for wells 3A and 5, and aquifer A3 for well 4. These aquifers occur at depths in excess of 60m for municipal wells 3 and 5. Well 4 is completed into the shallower aquifer A3 which occurs below a depth of about 41 m. The groundwater table in the shallow aquifer A1 below the subject property has been observed at 4.4m in monitoring well MW4 as noted above. This suggests a slight downward hydraulic gradient from the shallow to the deeper system. The regional groundwater flow direction within the City of Barrie is generally toward Lake Simcoe as indicated in Figure 3.1.24 of the South Georgian Bay Lake Simcoe Source Protection Region, Approved Assessment Report, Chapter 3.

4.0 Groundwater Vulnerability

The City of Barrie Official Plan (March 2017) indicates that the subject property lies within the 25 year Capture Zone (WHPA-D Well Head Protection Area of the City of Barrie municipal well field. It is also located within the Issue Contributing Area Well 11, 12, and 14, Chloride and Sodium as shown on Schedule G of the City of Barrie Official Plan as shown on Figure 2 above. The nearest municipal wells are Well 4, about 200 m southwest of the property boundary and Well 3A located about 500m south of the property as shown on Figure 4.

There are a number of MOECC well records within 300m of the property. Most of these are related to the municipal well field as test wells or observation wells and wells related to previous dewatering activities within the area. Most of the latter were installed for short term dewatering activities on behalf of sewer and water infrastructure for the City of Barrie. These were typically shallow wells of about 6m or les in depth and have been decommissioned. The original Municipal Well 4 was decommissioned June 16, 2011 (MOECC Well No. 7164608) and was replaced by Well Record No. 7151274 August 10, 2010.

4.1 Well Interference Potential

The proposed development consists of a multiple story residential condominium development with some street level retail commercial space. The exact depth of excavation has not yet been established. The development concept shows no underground parking. Therefore the depth of excavation is anticipated to be limited and expected to be within a few metres of surface. This will need to be confirmed through a detailed geotechnical study for detailed design purposes. The anticipated impact to local groundwater resources may need to be reevaluated subject to confirmation of the depth of excavation.

The majority of wells in the vicinity of the proposed development were completed on behalf of the City of Barrie and are related to the municipal well field or to dewatering projects. Two well records Well No. 5700238, completed in 1953, and Well No. 5700279 completed in 1964 appear to be private wells. Most of the information on Well Record No. 5700238 is faded and difficult to see. This well appears to be completed to a depth in excess of 30m with a static water level of 0.9m It is located about 300m to the northeast of the subject property on Eccles Street. Well Record No. 5700278 is located on Vespra Street about 250 m south of the property. It is completed to a depth of 25.6 m. Given the age of these wells and the fact that the area is municipally serviced with sewer and water services, it is anticipated that these wells are most likely no longer used as a source of water. This was confirmed in the Peto MacCallum Hydrogeoloogical Site Investigation (2007) which includes a survey of MOE Well Records within 500m of a proposed sewer upgrade along Boyes Street and followed up by a door to door well survey.

The subject of the hydrogeological site assessment completed by Peto MaCallum Ltd. in 2007 was storm sewer up-grades along Boys Street between Henry Street and Bunkers Creek. The storm sewer upgrades were located to within about 50m west of the property. A pumping test was conducted to assess the dewatering requirements for the storm sewer upgrade construction in support of a Permit-To-Take-Water. The storm sewer installation was three to five metres below surface and up to about two meters below groundwater table. Lowering of the groundwater table was recommended to about one meter below the bottom of the storm sewer excavation to maintain dry working conditions. Groundwater lowering of between 0.5m to 2.9m was anticipated. The results of the hydrogeological analysis estimated the zone of dewatering influence to extend 21 to 50m on either side of the sewer trench excavation. No groundwater level fluctuations were observed in monitoring wells MW1, MW3 or the nearby municipal well during the two days of pumping during the pumping test.

The anticipated level of potential groundwater lowering for construction of the proposed condominium development is comparable to that of the storm sewer upgrades. Groundwater lowering of the shallow water table is therefore anticipated to be localized within close proximity of the building excavation. No impacts are anticipated on the deep municipal wells and the deep municipal aquifers. Detailed hydrogeological analysis may be required to confirm the amount of dewatering required for purposes of construction design and for obtaining a Permit-To-Take-Water if applicable.

4.2 Groundwater Quality

The nearest municipal wells are protected from surface contamination due to the depth of the deep aquifers which are in excess of 40 m from surface, and the presence of overlying aquitards, C1 and C2 as illustrated in the regional Cross–Section, Figure 5.

The proposed residential condominium development with ground floor commercial retail space is not anticipated to represent a significant threat to groundwater quality. This type of development does not constitute a potential water quality threat under the Clean Water Act. The property lies within a sodium and chloride groundwater issue to the underlying aquifers. The storage, management and application of deicing material should be controlled and minimized. On-site storage of deicing salts should be minimized or eliminated if possible. The City of Barrie Official Plan (2017) Policy 3.5.2.3.5.1b. i) states that ' Development, site alteration and proposed lands uses that involve the storage or manufacture of pathogens, chemicals or dense aqueous phase liquids shall be prohibited in vulnerable areas identified on Schedule G, where they would constitute a significant risk.' It is not anticipated that the above described land uses will be associated with the proposed development.

The Phase II Environmental Site Assessment completed by Trinity Consultants Ontario Inc. (Trinity) completed chemical testing of on-site soil and groundwater samples. Based upon the soil and groundwater analytical results, Trinity concluded that, 'there does not appear to be environmental concern at the Site. Shallow impacted soil at BH5 is anticipated to be localized and easily managed during development.' (Trinity Consultants Ontario Inc. 2017, page, 8). Construction activities on the subject property are therefore not considered to represent a threat to groundwater quality.

Transportation pathways have been identified in the vicinity of the subject property as shown on Schedule G of the Official Plan, Figure 2, above. These are considered to be anthropogenic in origin including private wells, unused wells, abandoned wells, construction of underground services, subsurface excavations, and pits and quarries. These features are thought to contribute to increasing groundwater and aquifer vulnerability. Details of these features and their identification is provided in Chapter 8 of the Lake Simcoe and Couchiching-Black River Source Protection Area, Part 1, Approved Assessment Report (2015) and in Golder 2010. The nearest transportation pathway to the property is located about 200m to the southwest at the City of Barrie Municipal Well No. 4. Apart from the on-site monitoring well, there are no known preciously constructed wells on the subject property. The proposed development is not considered to be a source of contamination or threat to the underlying aquifers via the nearby transportation pathways.

5.0 Water Balance Analysis

5.1 Methodology

The potential for impact of the proposed development on groundwater recharge has been assessed using a water balance analysis. A pre- and post-development water balance analysis was completed using climatic data obtained from Environment Canada, Meteorological Service of Canada for the nearest climate station with the longest period of record. This analysis used climatic data from the Barrie WPCC Climate Station with data for the years 1973 to 2017 and is based upon Thornthwaite's soil moisture approach. Soil moisture retention from 75 mm/yr for shallow rooted plants (lawns) in a sandy soil to 250 mm/yr for forested areas in a sandy soil were used in the pre-development water balance analysis. Monthly climatic water balance summaries for the different soil moistures used in the water balance analysis are presented in Appendix C.

5.2 Pre- and Post -Development Conditions

The subject property consists mostly of an open area containing grasses and meadow plants closest to Dunlop Street West. The back portion of the property is covered with a regenerating forest that covers the valley slopes extending to the edge of Bunkers creek and associated wetland areas. Bunkers Creek occupies a flat bottomed creek valley and drains in an easterly direction into Lake Simcoe. The bottom of the creek valley includes Bunkers Creek as well as associated wetland areas. An existing residential building occupies the western edge of the property at 245 Dunlop St West.

For water balance purposes pre-development conditions are considered to be typical residential development even though three residential buildings have been removed. Open areas adjacent to the residential buildings are assumed to be manicured lawns with shallow rooted plants. An area of old field meadow plants is assumed to exist in the back lots adjacent the forest areas. These are considered to be medium rooted plant communities for purposes of the water balance analysis. The forested areas have deep rooted plants for purposes of the water balance. The post-development open areas include manicured areas around the proposed building and around the parking areas. The areas of old field meadow plants will be replaced with parking facilities and forest areas will be encroached upon. It is assumed that there will be a about a five (5) meter buffer of existing trees between the proposed development and the top of bank. Setbacks for development are subject to LSRCA requirements and approval. No information has been provided in regard to natural heritage features on the subject property and setback requirements from these features. The City of Barrie Official Plan Schedule F indicates that a 30m buffer is required from the edge of Bunkers Creek. It is assumed that the proposed development plan has incorporated the required setbacks.

A summary of the climatic water balance for various site conditions is provided in Table 1 below and summarized in Appendix C. This table shows average conditions from the meteorological data.

The mean annual precipitation of 940 mm/yr is used to estimate long term changes to the water balance from the proposed development. The total annual surplus is the amount of water available after evapotranspiration (ET) has occurred. Evapotranspiration, the largest component of the water balance, increases with increasing depth of plant roots and represents between 57% to 64% of total precipitation. Of the remaining surplus water, between 45% and 60% will infiltrate in pervious areas and the remainder will runoff.

Table 1. Climatic Water Balance Summary
Barrie WPCC (1973 – 2017)

Cover Type	Soil Moisture mm/yr	Precipitation (mm/yr)	Potential ET (mm/yr)	Actual ET (mm/yr)	Surplus (mm/yr)
Lawn areas	**75**	**940**	**606**	**538**	**402**
Fields//shrubs	**150**	**940**	**606**	**580**	**360**
Forest	**250**	**940**	**606**	**600**	**340**
Wetland		**940**	**746***	**746***	**102**

Note : Data from Meteorological Service of Canada, 2018
ET – Evapotranspiration
**- Evaporation data from Bowmanville representative of open water*
Numbers rounded off

The potential evapotranspiration is the amount of evapotranspiration that could take place if there was sufficient precipitation available during the drier summer months. Potential evapotranspiration becomes relevant where runoff from impervious surfaces is directed to pervious areas under post-development conditions as discussed below. Pan evaporation data from Bowmansville was obtained for the wetland features on the property.

5.3 Infiltration Factors

The partitioning of the water surplus between runoff and infiltration depends upon soil type, topography and cover type. Water infiltrates relatively easily through sands compared to clay. Flatter slopes tend to promote infiltration over steeper slopes. Naturally vegetated areas such as trees and mature shrubs with deep roots promote infiltration to a slightly higher degree over shorter rooted plants such as in cultivated areas and turf grass.

Infiltration factors were calculated according to a method cited in MOEE (1995), and MOE (2003). Infiltration factors were calculated by summing individual sub-factors representative of the topography, soil type, and cover conditions and are summarized in Table 2 below.

Most of the property is relatively flat with moderate slopes along the creek valley walls. The property slopes is a southerly direction toward Bunkers Creek. The majority of the property has

a topographic infiltration sub-factor of 0.25 for relatively flat land. The sloping valley walls will have a topographic infiltration sub-factor of 0.15.

The predominant silty sand soil will provide an infiltration sub-factor of 0.3. The hydraulic conductivity of silty sand soil is estimated from grain size analysis (Alston, 2017) to be in the range of 1.0 E-02 to 1.0 E-03 cm/s. This is consistent with Freeze and Cherry, 1979, Table 2-2 p.29. The equivalent soil percolation rate for the predominant silty sand soil type (soil classification SP) is estimated to be in the range of 75 to 300 mm/hr (2 to 8 min/cm) for the sandy silt soil as per Supplementary Guide SG-6 of the Ontario Building Code 1997 (Appendix D). Infiltration trenches and pervious pipe infiltration systems require a minimum percolation rate of 15mm/hr (MOE, 2003). The silty sand surficial soil types are considered to be well suited for infiltration trenches and pervious pipe infiltration systems. These conditions are typical of most of the property. Site specific soil testing will be required to confirm suitability for and design of infiltration trenches and pervious pipe infiltration systems.

Landscaped areas and lawns are expected to experience compaction of the soil due to heavy equipment movement. This may reduce the infiltration capability of the surficial soil. Over time weathering processes and the action of roots from vegetation may restore the pre-development conditions. As a conservative measure, a slightly lower infiltration sub-factor for the soil component of 0.15 has been selected to account for the reduced infiltration capacity for manicured lawns under post-development conditions. The change in cover type from fields to manicured lawns will result in an increase in runoff and a reduced infiltration cover type sub-factor from 0.30 for fields to 0.25 for manicured lawns. The sum of the post-development infiltration sub-factors for manicured lawns is 0.55 under post-development conditions. This incorporates the impacts of soil compaction and the change in cover materials from cultivated field to manicured lawns. The forest areas remain unchanged for the most part with minor alteration and are modeled to have an infiltration factor of 0.75 for flat areas to 0.65 for sloped areas along the creek valley walls. Infiltration factors for various cover types, soil conditions, and slope conditions are summarized below in Table 2.

Table 2. Average Infiltration Factors

	Sub Factors			**Infiltration**
Cover Type	**Topography**	**Soil (silty sand)**	**Cover**	**Factor**
Meadow/ field	0.25	0.3	0.1	0.65
Forest (flat areas)	0.25	0.3	0.2	0.75
Forest (sloped areas)	0.15	0.3	0.2	0.65
Manicured Lawns	0.25	0.25*	0.05	0.55

** Represents Compaction under Post Development Conditions*

5.4 Post-development Water Balance

The distribution of water under post-development conditions was modeled for the proposed development within the subject property. Areas of various land uses were identified and measured by ISM Architects (Figure 6). Post-development conditions were compared to pre-development conditions specifically with respect to changes in infiltration, runoff, evapotranspiration and evaporation. The water balance analysis also addresses measures that will promote infiltration and maintenance of groundwater recharge under post-development conditions. The results of this analysis are provided in Appendix E.

5.4.1 Proposed Land Uses

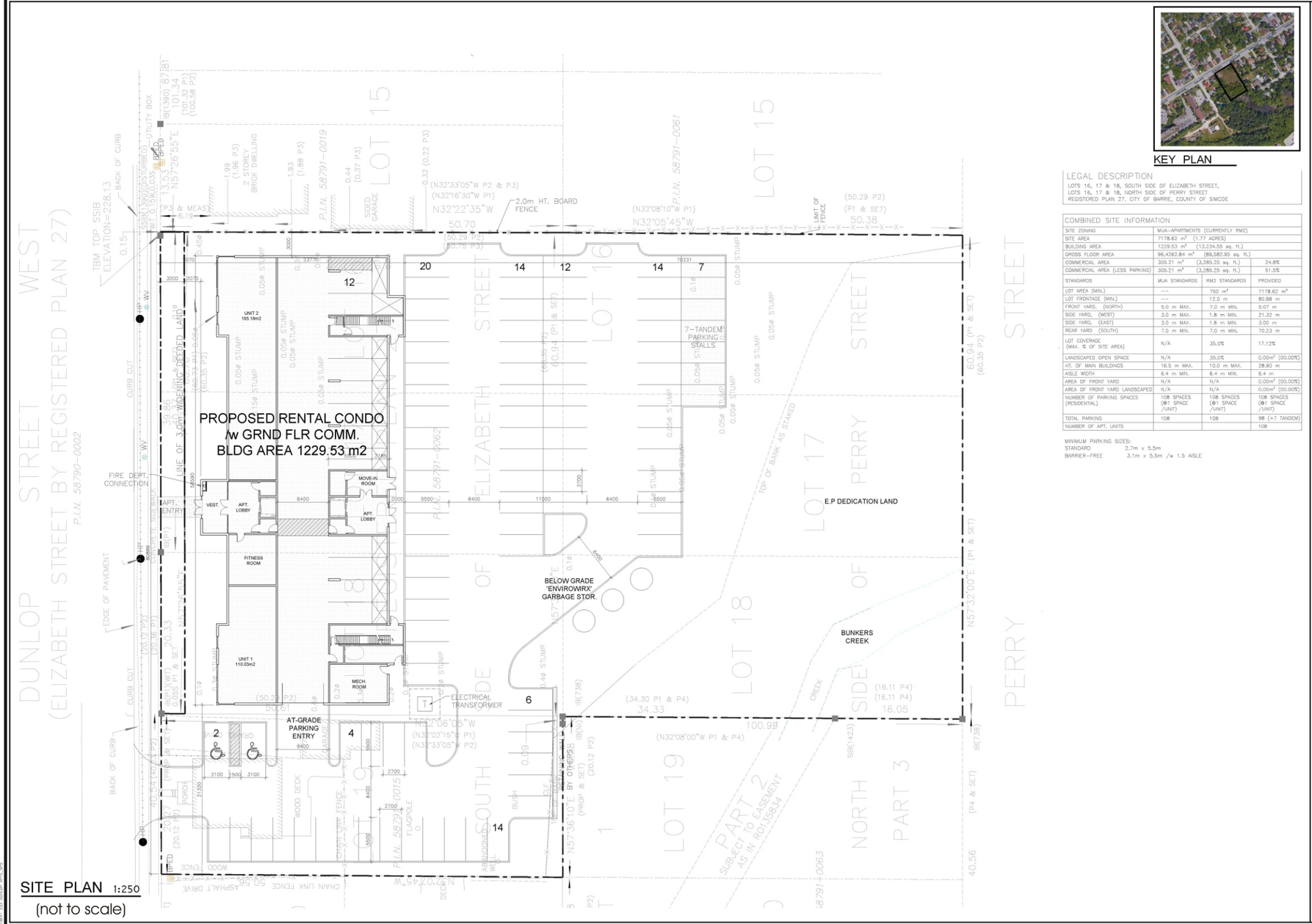
The proposed development includes a multi-storey condominium residence with associated parkway and landscaped areas. The existing forest will remain unchanged for the most part with a minor reduction in area and the field/meadow will be replaced with parking areas. The existing residence at 245 Dunlop St. West will be removed and will become part of the parking areas. About 70m^2 will be removed from the property for road widening purposes.

5.4.2 Water Movement from Impervious Surfaces

The change in land use with the proposed development will result in the creation of additional impervious surfaces including building roof and outdoor parking areas. This will affect the water balance by redistributing the infiltration, runoff and evapotranspiration. The runoff will increase while the infiltration and evapotranspiration will decrease. In order to account for the movement of water on the property under post-development conditions, it is necessary to consider whether storm water is directed to surface drainage features through pipes or confined channels or over pervious areas prior to discharge to surface drainage features. The latter may include passive facilities such as grassed swales or gently sloped lawn areas and/or active infiltration systems such as infiltration trenches or swales designed specifically for infiltration. Due to the sensitive hydrogeological nature of the area, passive runoff from roads and parking areas should be carefully managed so to minimize road salt contamination of the groundwater system. Mitigation measures should be part of the storm water management system for the property.

Within pervious areas it is assumed that the surplus water will either runoff or infiltrate according to the appropriate infiltration factors. Runoff from pervious surfaces resulting from large storm events will be controlled though a storm water management system prior to discharging into local drainage ditches or streams. Impervious surfaces such as parking areas, roadways, and driveways are typically connected to or drain directly into a storm water management system. Low Impact Development (LID) measures such as grassed swales, vegetated filter strips, and infiltration trenches are normally considered where there are no concerns with respect to groundwater quality protection. The property lies within a vulnerable wellhead protection areas with water quality issues as identified in Schedule G of the City of Barrie Official Plan (Figure 2). Infiltration of parking lot runoff should be managed to reduce or eliminate road salt contamination of surface runoff prior to infiltrating this water.

233,237,243,245 Dunlop Street Site Plan



SITE PLAN 1:250
(not to scale)

KEY PLAN

LEGAL DESCRIPTION

LOTS 16, 17 & 18, SOUTH SIDE OF ELIZABETH STREET,
LOTS 16, 17 & 18, NORTH SIDE OF PERRY STREET
REGISTERED PLAN 27, CITY OF BARRIE, COUNTY OF SIMCOE

COMBINED SITE INFORMATION

SITE ZONING	MUA–APARTMENTS (CURRENTLY RM2)		
SITE AREA	7178.62 m² (1.77 ACRES)		
BUILDING AREA	1229.53 m² (13,234.55 sq. ft.)		
GROSS FLOOR AREA	96,4262.84 m² (89,582.95 sq. ft.)		
COMMERCIAL AREA	305.21 m² (3,285.29 sq. ft.)		24.8%
COMMERCIAL AREA (LESS PARKING)	305.21 m² (3,285.29 sq. ft.)		51.5%
STANDARDS	MUA STANDARDS	RM2 STANDARDS	PROVIDED
LOT AREA (MIN.)	---	750 m²	7178.62 m²
LOT FRONTAGE (MIN.)	---	12.0 m	80.88 m
FRONT YARD, (NORTH)	5.0 m MAX.	7.0 m MIN.	5.07 m
SIDE YARD, (WEST)	3.0 m MAX.	1.8 m MIN.	21.32 m
SIDE YARD, (EAST)	3.0 m MAX.	1.8 m MIN.	3.00 m
REAR YARD (SOUTH)	7.0 m MIN.	7.0 m MIN.	70.23 m
LOT COVERAGE (MAX. % OF SITE AREA)	N/A	35.0%	17.12%
LANDSCAPED OPEN SPACE	N/A	35.0%	0.00m² (00.00%)
HT. OF MAIN BUILDINGS	16.5 m MAX.	10.0 m MAX.	28.90 m
AISLE WIDTH	6.4 m MIN.	6.4 m	
AREA OF FRONT YARD	N/A	N/A	0.00m² (00.00%)
AREA OF FRONT YARD LANDSCAPED	N/A	N/A	0.00m² (00.00%)
NUMBER OF PARKING SPACES (RESIDENTIAL)	108 SPACES (@1 SPACE /UNIT)	108 SPACES (@1 SPACE /UNIT)	108 SPACES (@1 SPACE /UNIT)
TOTAL PARKING	108	108	98 (+7 TANDEM)
NUMBER OF APT. UNITS			108

MINIMUM PARKING SIZES:
STANDARD 2.7m x 5.5m
BARRIER-FREE 3.1m x 5.5m /w 1.5 AISLE

ISM ARCHITECTS
174 Bayfield Street
Barrie, ON L4M 3B5
T: 705.726.3342
E: ism@ismarchitects.ca

NO.	ISSUED REVISION	DATE
1	CLIENT REVIEW	JUN 19/17
2	NEW TOPO	AUG 18/17
3	ISSUE FOR SUBMISSION	SEPT 01/17

STAMP
ONTARIO ASSOCIATION OF ARCHITECTS
IAN S. BLACOMB
LICENCE 2853

ORIENTATION

CLIENT
MUSKOKA D & M CORP.
190 HOTCHKISS ST.,
GRAVENHURST, ON.
DOUG GRAY
dgray@granitecondos.com

PROJECT
60 RENTAL CONDOMINIUMS
233 DUNLOP STREET WEST,
BARRIE, ON

PROJECT INFORMATION
PROJECT No.: 173941
DRAWN BY: MM JB
CHECKED BY: ISM
DATE: 08.11.2017
SCALE: AS NOTED

DRAWING
SITE PLAN

DRAWING No.
A100

Norbert M. Woerns
98 Myles Drive
Tobermory, Ontario
N0H 2R0
Ph: (519) 598-2967

Figure 6

January 2018

(from ISM Architects, January 2018)

The surplus water for both pervious and impervious surfaces is partitioned for the various land uses and cover types in the post-development water balance. Paved surfaces such as driveways , walkways, and parking area shed water relatively rapidly. These are relatively flat surfaces with very gentle slopes. A runoff factor of 0.85 is used for these areas to account for minor depression storage of water and evaporation. The remaining 15% is assumed to be lost to evaporation. Sloped roofs of residential buildings will have less opportunity for depression storage and more rapid runoff of precipitation. Sloped roofs are therefore given a runoff coefficient of 0.9 with the remaining 10% lost to evaporation. No sloped roofs are anticipated for the proposed development. Runoff factors for impervious areas are consistent with commonly accepted runoff coefficients for urban areas (Ontario Ministry of Transportation and Communications, Drainage Manual, 1984).

Within pervious areas, infiltration and runoff are partitioned according to soil type, topography, and land cover as described in Section 5.3 and summarized in Table 2 above. The precipitation and evapotranspiration as well as wetland evaporation components are provided by Meteorological Service of Canada (MSC). Where runoff from roof areas is directed onto pervious areas, there will be additional water available for infiltration, runoff, and evapotranspiration. Due to groundwater vulnerability within this area roof runoff is assumed to be directed to the stormwater drainage system. Where roof runoff is directed onto pervious surfaces the additional roof runoff added to the normal precipitation and partitioned according to the infiltration factors typical for the pervious areas receiving this water. This is considered reasonable where the roof run off can be metered out over a period of time to optimize the amount of infiltration.

5.4.3 Post-development Water Balance Results

The water balance analysis for post-development conditions for the proposed development concept was completed by considering two development scenarios, Scenario 1 without mitigation measures and Scenario 2 with mitigation measures. The result of this analysis is presented in spreadsheets in Appendix E. The scenario without mitigation assumes that runoff from impervious surfaces is conveyed directly to nearby surface drainage along confined drainage channels with little opportunities for infiltration prior to discharge into stormwater management facilities. Scenario 2, includes directing runoff from impervious surfaces into an infiltration trench or pervious pipe infiltration system located beneath the proposed parking area.

Roof runoff directed toward pervious surfaces is assumed to infiltrate according to the infiltration factors as discussed in Section 5.3. As noted above, Scenarios 2 takes into account the slightly reduced infiltration potential of the pervious lawn areas due to soil compaction from construction activities. Impervious areas represent 54% of the property (ISM Architects Inc., via email January 10, 2018).

<u>Scenario 1</u>

It is assumed that under worst case conditions, all runoff from roofs and impervious surfaces would be directed to local drainage channels with little opportunity for infiltration. This scenario

also assumes that walkways will be impervious. The results of this analysis indicated a loss of infiltration of about 619 m3/yr, a decrease from pre-development infiltration of about 48.6%. Infiltration is reduced from about 1,273 to 654 m3/yr (19.3 to 9.90 % of total precipitation respectively). The loss of infiltration is equivalent to a flow of 0.020 L/sec. The loss of infiltration is due primarily to the creation of impervious surfaces. Evapotranspiration was also reduced about 30.9% from 3,523 to 2,433 m^3/yr., (53.58 to 37.0% of total precipitation respectively). These changes result in a 95.7 % increase in runoff from 1,784 m^3/yr to about 3,493 m^3/yr (27.1 to 53.1% of total precipitation respectively).

Scenario 2

Scenario 2 of the water balance analysis includes directing of roof runoff to an infiltration trench/pervious pipe infiltration system located beneath the parking area. This scenario assumes that all of the roof runoff can be infiltrated within the proposed infiltration system. Runoff from impervious roads and paved areas will be directed to the stormwater management system for discharge into local drainage channels. The use of pervious areas for infiltration form parking areas and roads should only be considered if an acceptable salt management plan has been provided to reduce or eliminate the potential for salt contamination of local groundwater resources. The calculated result of infiltrating roof runoff indicates that there will be a significant improvement in the groundwater infiltration under post-development conditions. Infiltration is calculated to increase 364 m3/yr from 1,273 to 1,637 m^3/yr. This is an increase of about 28.6% over pre-development conditions and is equivalent to 0.012 L/sec. Evapotranspiration decreases by 1,089 m^3/yr or about 30.9% from 3523 m^3/yr to 2,433 m^3/yr. Runoff increases about 726 m^3/yr or about 40.7% from 1,784 m^3/yr to 2,510 m^3/yr. The increase in post-development runoff is reduced significantly from Scenario 1 where no mitigation is implemented.

The resulting change in infiltration between pre- and post-development conditions is summarized in Table 3 below. Detailed results for the water balance are presented in Appendix E.

Table 3. Infiltration Summary - Water Balance Analysis

	Description	**Infiltration Change Post-development Conditions**			**Infiltration % of Total Ppt.**
		(m^3/yr)	L/s	% Change	
Pre-development		0	0	0	19.3
Scenario 1	Runoff to Drainage Channels (No mitigation)	-619	-0.020	-48.6	9.9
Scenario 2	Runoff to infiltration Trench/ pervious pipe sys.	+364	+0.012	+28.60	24.9

Note : Ppt. = Precipitation

The calculated post-development infiltration varies from a loss of about 619 m3/yr to a net gain of about 364 m^3/yr from Scenario 1 and 2 respectively, from pre-development conditions. This assumes that all of the captured roof runoff will be directed to the infiltration trench/pervious

pipe infiltration system and is infiltrated. The soil conditions beneath the subject property are considered to be more than adequate to infiltrate total roof runoff from the proposed building. Site specific investigations will be required for detailed design of the infiltration system

Infiltration Options

As noted above the sandy silt soil type underlying the property, is well suited for infiltration measures. Seasonally high groundwater table level and soil hydraulic conductivity will need to be confirmed through site specific hydrogeological investigated for design of infiltration trench/pervious pipe infiltration system. Depending upon the location of the infiltration system, a slope stability study may be required to ensure stability of the valley walls of Bunkers Creek as the shallow groundwater flow direction is anticipated to be towards Bunkers Creek.

Infiltrating runoff from the propped parking lot, access roads, and impervious walkways may be considered subject to the development of a salt management program that will ensure there is little or no risk of salt contamination of groundwater from winter maintenance programs.

6.0 Conclusions

The following conclusions are provided:

1) The subject property is underlain by sandy soils that are considered well suited for infiltration measures such as infiltration trenches and pervious pipe infiltration systems.
2) The Phase II Environmental Site Assessment completed by Trinity Consultants, Ontario, Inc (2017) has concluded `there does not appear to be environmental concern at the site. `This is from soils and groundwater sampling and analysis covering most of the development property with the exception of 245 Dunlop St West. From these results it is concluded that portion of the development property subject to the Phase II Environmental Site Assessment by Trinity Consultants Ontario, Inc. does not pose a significant risk to the local groundwater system.
3) Environmental Site conditions beneath the existing residential building and property at 245 Dunlop Street West have not been considered in this report.
4) The proposed multi story condominium development will have no underground levels. Therefore no deep excavations beyond a few metres are anticipated. Little or no disruption or impact is anticipated to the groundwater table that occurs at depths of between 3.5 to 4.4m from surface. Impacts if any are anticipated to be localized to the directly adjacent areas.
5) Municipal groundwater supplies are provided locally from deep buried aquifer zones A3 and A4 which occur at depths of between 40 to 100 m below surface. Overlying aquitard zones C1 and C2 are considered to provide a level of protection to the major municipal aquifers. The proposed condominium development is essentially residential use with limited commercial space. This is not considered to represent a significant threat to groundwater quality.

6) The proposed condominium development has the potential to significantly reduce groundwater recharge from pre-development conditions without the implementation of mitigation measures.
7) Water Balance analysis has shown that directing roof runoff into an infiltration trench and/or pervious pipe system located beneath the proposed parking area has the potential to result in the maintenance and enhancement of groundwater recharge over pre-development conditions.
8) Transportation (contaminant) pathways have been identified locally within the City of Barrie Official Plan. A survey of local well records indicates there are no potential transportation pathways on/or directly adjacent the property. The nearest transportation pathways are associated with the City of Barrie municipal well system.
9) The site water balance analysis was completed with the assumption that the proposed site plan, Revision 3, dated September 1, 2017, has incorporated the required setbacks from the Top of Bank of Bunkers Creek.

8.0 Recommendations

The following recommendations are submitted for consideration:

1) Mitigation measures including an infiltration trench and/or pervious pipe infiltration system are recommended for infiltration of roof runoff in order to maintain and/or enhance groundwater recharge on the subject property.
2) Site specific hydrogeological investigations are required to confirm site conditions for detailed design of an infiltration trench and/or pervious pipe infiltration system beneath the proposed parking area. The infiltration system should be designed to infiltrate all of the roof runoff from the proposed building.
3) Depending upon the location of the infiltration trench/pervious pipe infiltration system, a slope stability study may be required to ensure stability of the valley walls of Bunkers Creek near the southern portion of the property.
4) A winter salt management program designed to reduce or eliminate deicing salt should be developed for the maintenance of the proposed development as the property lies within a hydrogeologically vulnerable area.
5) Directing runoff from impervious walkways, roads, and parking areas is not recommended without the completion of a winter salt deicing management plan for the property that provides assurances that there will be little or no impacts on groundwater quality and no adverse effects.
6) The conclusions of this report are subject to confirmation of the depth of excavation required for the proposed development. Should the confirmed depth of excavation not be consistent with the assumptions of this report, a re-evaluation of the potential impact of the proposed development on the groundwater system may be required.
7) The use of the commercial space within the proposed condominium should be limited to those activities that are not prescribed Drinking Water Threats as defined under The Clean Water Act.(Ontario Regulation 287/07).

8) The City of Barrie should confirm the presence or absence of Transportation pathways within this area and in all hydrogeologically vulnerable areas throughout the City of Barrie for the protection of the municipal aquifers. Within this area there appear to be two old private wells, Well No. 5700238 and 5700279 which could potentially serve as transportation pathways to the underlying aquifers. These wells have locations removed from the subject property. The locations and status of these wells should be confirmed through an investigation and appropriate actions taken to protect the underlying aquifers.
9) All on-site wells that are no longer in use or required for monitoring purposes should be decommissioned according to Ontario Regulation 903 as amended.

I trust the above information meets your needs at this time. Please contact the undersigned should you have any questions or require additional information.

Regards

Norbert Woerns

Norbert M. Woerns, M.Sc., P.Geo.

Attach:

9.0 References

Alston Associates , 2017: Geotechnical Investigation Report Proposed Residential Development 233,237, and 241 Dunlop Street, Barrie, Ontario.

AquaResource, 2013: City of Barrie Tier Three Water Budget and Local Area Risk Assessment, Prepared for Lake Simcoe Region Conservation Authority.

Barnett, P.J.,1997:Quaternary Geology, Eastern Half of the Barrie and Elmvale Areas; Ontario Geological Survey Map 2645, Scale 1:50,000.

Chapman L. J., and D.F. Putnam, 1984: The Physiography of Southern Ontario, Third Edition, Ontario Geological Survey Special Volume 2, 270 p., Accompanied by Map P.2715 (coloured), scale 1:600,000.

City of Barrie, (no date) : Infiltration Low Impact Development Screening Process

City of Barrie ,2017 : City of Barrie Official Plan, March 2017.

Freeze, R.A., and J.A. Cherry, 1979: Groundwater, Prentice Hall, Inc., 604 p.

Golder Associates, 2010: City of Barrie, Source Water Protection Threat Assessment, Appendix B, South Georgian Bay - Lake Simcoe Source Protection Region, 2015 : Approved Assessment Report: Lake Simcoe and Couchiching-Black River Source Protection Area.

Lake Simcoe Region Conservation Authority, 2014: Lake Simcoe and Couchiching – Black River Source Protection Area, July 2014 Updated Assessment Report, Part I Lake Simcoe Watershed.

Lake Simcoe Region Conservation Authority, 2015: Approved South Georgian Bay Lake Simcoe Source Protection Plan.

Ontario Building Code,1997 : Supplementary Guideline to the Ontario Building Code , 1997, SG-6, Percolation Time and Soil Description.

Ontario Department of Mines and Northern Affairs, 1984: Physiography of the South Central Portion of Southern Ontario, Map 22126, Scale, 1:253,440.

Ontario Geological Survey, 1991: Bedrock Geology of Ontario, southern sheet, Ontario Geological Survey Map 2544, scale 1:1,000,000.

Ontario Ministry of the Environment, 1987: Water Wells and Groundwater Supplies in Ontario, revised 1987.

Ontario Ministry of the Environment (MOE), 2003: Stormwater Management Planning and Design Manual, Queen's Printer for Ontario, PIBS 4329e, with Appendices.

Ontario Ministry of the Environment, 2006: Technical Support Document for the Ontario Drinking Water Quality Standards, Objectives and Guidelines, PIBS 4449e01, June 2003, revised June 2006.

Ontario Ministry of the Environment, 2008: Design Guidelines for Drinking-Water Systems.

Ontario Ministry of the Environment, 2008: Design Guidelines for Sewage Works. PIBS 6879.

Ontario Ministry of the Environment and Energy (MOEE), 1995: MOEE Hydrogeological Technical Information Requirements for Land Development Applications, with Appendices.

Ontario Ministry of Transportation and Communications, 1984: MTC Drainage Manual Chapter 8, Design Flood Estimation for Small Watersheds by J.D. Harris, Drainage and Hydrology Section, Highway Design Office, Ontario Ministry of Transportation and Communications, Downsview, Ontario.

PetoMacCallum Ltd., 2007: Hydrogeological Site Assessment for Permit-To-Take-Water (PTTW) Phase 1 Storm Sewer Upgrades Milligan Pond to Henry Street Bunkers Creek Northeast Branch Storm Sewer, Barrie, Ontario, prepared for the Corporation of the City of Barrie, February 21, 2007.

South Georgian Bay and Lake Simcoe Source Protection Region, 2009: Tier 1 Water Budget and Water Quantity Stress Assessment, August 2009.

South Georgian Bay - Lake Simcoe Source Protection Region, 2015: Approved Assessment Report: Lake Simcoe and Couchiching-Black River Source Protection Area.

Trinity Consultants Ontario Inc., 2017: Phase II Environmental Site Assessment and Geotechnical Investigation, 233, 237 and 241 Dunlop Street West, Barrie Ontario. Prepared for Muskoka D&M Corp.

APPENDICES

Appendix A – Borehole Logs (Alston Associates 2017)

Appendix B - MOECC Well Records

Appendix C – Climatic Water Balance

Appendix D – Soil Percolation Rates OBC Guide SG-6

Appendix E – Site Water Balance

APPENDIX A

Borehole Logs
Alston Associates, 2017

CLIENT: Trinity Consultants Ontario Inc	METHOD: Split Spoon Sampling		**BH No.: BH1**
PROJECT: 233, 237, and 241 Dunlop Street West	PROJECT ENGINEER: VN	ELEV. (m) 99.15	
LOCATION: Barrie, Ontario	NORTHING:	EASTING:	PROJECT NO.: 17-048

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT (N)	Well Construction	REMARKS
		Crusher Run Limestone	0	99	15		1A		15		Borehole cave-in at 3.5 m below ground surface.
		damp, dark brown, sand, trace silt (FILL)	0.5				1B				
		loose	1	98.5	6		1C				
			1.5	98			2		6		
		damp	2	97.5	18		3		18		
		compact	2.5	97	18		4		18		
			3	96.5							
		moist	3.5	96	27		5A		27		
		brown (with black stained layering) SILTY SAND to SAND, trace silt	4	95.5			5B				
			4.5	95	28		6		28		Wet spoon on retrieval of sample 6.
			5	94.5	56		7A		56		
		wet	5.5	94			7B				
		very dense	6	93.5							
			6.5	93	79		8		79		
			7	92.5							
			7.5	92							
			8	91.5	55		9		55		
		END OF BOREHOLE		91							

alston associates
geotechnical division of TERRAPEX

LOGGED BY: SA	DRILLING DATE: May 24, 2017
REVIEWED BY: VN	Page 1 of 1

CLIENT: Trinity Consultants Ontario Inc	METHOD: Split Spoon Sampling		**BH No.: BH2**
PROJECT: 233, 237, and 241 Dunlop Street West	PROJECT ENGINEER: VN	ELEV. (m) 99.06	
LOCATION: Barrie, Ontario	NORTHING:	EASTING:	PROJECT NO.: 17-048

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) ▲ 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT (N)	Well Construction	REMARKS
	TOP SOIL (150 mm)	0	99	10	12	1A				Borehole cave-in at 3.5 m below ground surface.
		0.5	98.5		4	1B		10		
		1	98	6	5	2		6		
	loose / damp	1.5	97.5	6	6	3		6		
		2	97	13	8	4A		13		
		2.5	96.5		15	4B				
		3	96							
	compact / moist			19	22	5		19		
		3.5	95.5							
		4	95	30	22	6		30		Wet spoon on retrieval of sample 6.
	brown (with black stained layering) SILTY SAND to SAND, trace silt	4.5	94.5							
		5	94	42	20	7		42		
	dense	5.5	93.5							
	wet	6	93							
		6.5	92.5	49	18	8		49		
		7	92							
		7.5	91.5							
		8	91	30	21	9		30		
	compact	8.5	90.5							
		9	90							
		9.5	89.5	24	22	10		24		
	END OF BOREHOLE									

alston associates
geotechnical division of TERRAPEX

LOGGED BY: SA | DRILLING DATE: May 25, 2017
REVIEWED BY: VN | Page 1 of 1

CLIENT: Trinity Consultants Ontario Inc	METHOD: Split Spoon Sampling		**BH No.: BH3**
PROJECT: 233, 237, and 241 Dunlop Street West	PROJECT ENGINEER: VN	ELEV. (m) 98.96	
LOCATION: Barrie, Ontario	NORTHING:	EASTING:	PROJECT NO.: 17-048

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) / N-Value (Blows/300mm)	Water Content (%) PL W.C. LL	SAMPLE NO.	SAMPLE TYPE	SPT(N)	Well Construction	REMARKS
	Crusher Run Limestone	0								Borehole cave-in at 3.6 m below ground surface.
	loose, damp	0.5	98.5	14	4, 5	1A, 1B		14		
		1	98	7	5	2		7		
		1.5	97.5	7	6	3		7		
		2	97							
		2.5	96.5	5	11	4		5		
		3	96							
	moist	3.5	95.5	19	20	5		19		Slightly Wet spoon on retrieval of sample 5.
	compact	4	95	28	22	6		28		Wet spoon on retrieval of sample 6.
		4.5	94.5							
	dense	5	94	36	20	7		36		
	brown (with black stained layering) SILTY SAND to SAND, trace silt	5.5	93.5							
	wet	6	93							
		6.5	92.5	61	19	8		61		
	very dense	7	92							
		7.5	91.5							
		8	91	50/150	20	9		50/150		
		8.5	90.5							
	dense	9	90							
		9.5	89.5	32	24	10		32		
	END OF BOREHOLE									

alston associates
geotechnical division of TERRAPEX

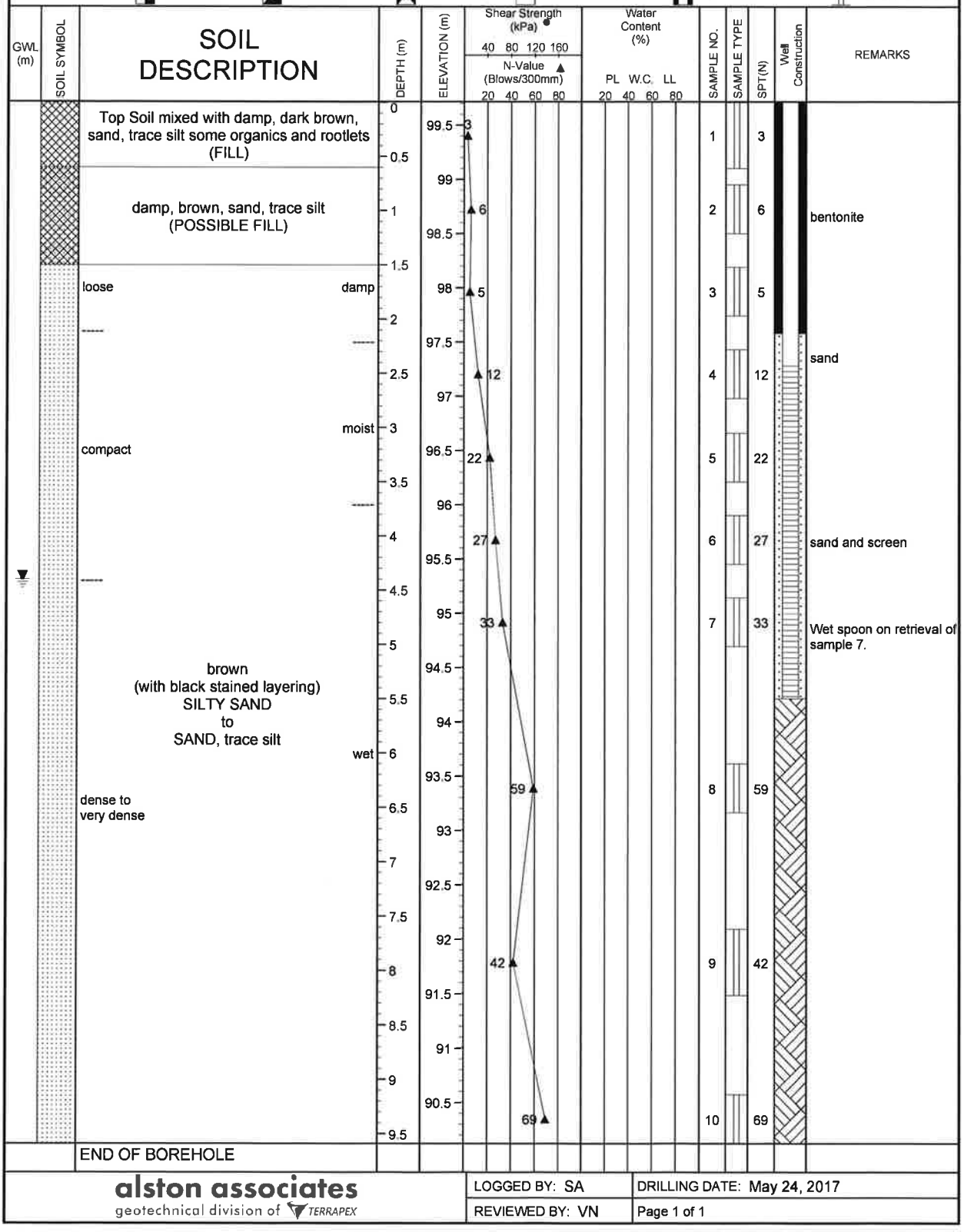
LOGGED BY: SA	DRILLING DATE: May 24, 2017
REVIEWED BY: VN	Page 1 of 1

CLIENT: Trinity Consultants Ontario Inc	METHOD: Split Spoon Sampling	
PROJECT: 233, 237, and 241 Dunlop Street West	PROJECT ENGINEER: VN	ELEV. (m) 99.71
LOCATION: Barrie, Ontario	NORTHING:	EASTING:

BH No.: MW4

PROJECT NO.: 17-048

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON



alston associates
geotechnical division of TERRAPEX

LOGGED BY: SA | DRILLING DATE: May 24, 2017

REVIEWED BY: VN | Page 1 of 1

CLIENT: Trinity Consultants Ontario Inc	METHOD: Split Spoon Sampling		**BH No.: BH5**
PROJECT: 233, 237, and 241 Dunlop Street West	PROJECT ENGINEER: VN	ELEV. (m) 98.71	
LOCATION: Barrie, Ontario	NORTHING:	EASTING:	PROJECT NO.: 17-048

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT(N)	Well Construction	REMARKS
		TOP SOIL (300 mm)	0	98.5	8		1A		8		Borehole open and dry on completion.
		loose damp, brown (with black stained layering) SILTY SAND to SAND, trace silt	0.5	98			1B				
			1	97.5	7		2		7		
		compact	1.5	97	11		3		11		
			2								
		END OF BOREHOLE									

alston associates
geotechnical division of TERRAPEX

LOGGED BY: SA | DRILLING DATE: May 25, 2017
REVIEWED BY: VN | Page 1 of 1

CLIENT: Trinity Consultants Ontario Inc	METHOD: Split Spoon Sampling		**BH No.: BH6**
PROJECT: 233, 237, and 241 Dunlop Street West	PROJECT ENGINEER: VN	ELEV. (m) 98.78	
LOCATION: Barrie, Ontario	NORTHING:	EASTING:	PROJECT NO.: 17-048

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT (N)	Well Construction	REMARKS
		TOP SOIL (300 mm)	0	98.5	11	10	1A		11		Borehole open and dry on completion.
		compact	0.5			6	1B				
		loose damp, brown (with black stained layering) SILTY SAND to compact SAND, trace silt	1	98	5	5	2		5		
			1.5	97.5							
			2	97	19	6	3		19		
		END OF BOREHOLE									

	LOGGED BY: SA	DRILLING DATE: May 25, 2017
	REVIEWED BY: VN	Page 1 of 1

CLIENT: Trinity Consultants Ontario Inc	METHOD: Split Spoon Sampling		**BH No.: BH7**
PROJECT: 233, 237, and 241 Dunlop Street West	PROJECT ENGINEER: VN	ELEV. (m) 98.79	
LOCATION: Barrie, Ontario	NORTHING:	EASTING:	PROJECT NO.: 17-048

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT(N)	Well Construction	REMARKS
		TOP SOIL (300 mm)	0	98.5	6		1A		6		Borehole open and dry on completion.
		loose damp, brown (with black stained layering) SILTY SAND	0.5				1B				
		----- to SAND, trace silt	1	98			2		5		
		compact	1.5	97.5	5						
			2	97	12		3		12		
		END OF BOREHOLE									

alston associates
geotechnical division of TERRAPEX

LOGGED BY: SA | DRILLING DATE: May 25, 2017
REVIEWED BY: VN | Page 1 of 1

APPENDIX B

MOECC Well Records

UTM 17 Z 603679 E
9 R 4915406 N
Elev. 9 R 07A5
Basin 22

ONTARIO

RECEIVED
DEC - 4 1953
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

57 No. 288

The Well Drillers Act

Department of Mines, Province of Ontario

Water Well Record

County or Territorial District... Simcoe ... Township, Village, Town or City... Barrie

Con.... Lot.... Street and Number (if in Village, Town or City)...

Owner... [redacted] ...Address... Barrie

Date Completed... 21 (day) Nov. (month) 53 (year) ...Cost of Well (excluding pump)...

Pipe and Casing Record	Pumping Test
Casing diameter(s)...	Date...
Length(s) of casing(s)...	Static level... 3'
Type of screen...	Pumping level...
Length of screen...	Pumping rate...
Distance from top of screen to ground level...	Duration of test...
Is well a gravel-wall type?...	Distance from cylinder or bowls to ground level...

Water Record

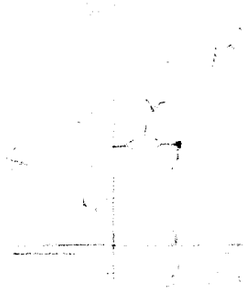
	Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rise
Kind (fresh or mineral)...			
Quality (hard, soft, contains iron, sulphur, etc.)...			
Appearance (clear, cloudy, coloured)...	175		
For what purpose(s) is the water to be used?...			
...			
How far is well from possible source of contamination?...			
What is the source of contamination?...			
Enclose a copy of any mineral analysis that has been made of water...			

Well Log

Overburden and Bedrock Record	From	To
	0 ft.	...ft.

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... Address...

Date... Licence Number...

...
Signature of Licensee

FORM 5

CSS.88

UTM 17 Z 610312 E
9 R 4914767 N
Elev. 9 R 0760
Basin 22

ONTARIO

The Well Drillers Act
Department of Mines, Province of Ontario

57 No 242

Water Well Record

County or Territorial District. SIMCOE ~~Township, Village~~, Town ~~City~~ BARRIE
Con. ..... Lot ..... Street and Number (if in Village, Town or City) .....
Owner. Public Utilities Commission Address. Barrie Ont.
Date Completed. 31 (day) Oct (month) 1955 (year) Cost of Well (excluding pump) .....

Pipe and Casing Record

Casing diameter(s). 2"
Length(s) of casing(s). 189'
Type of screen. SLOTTED PIPE
Length of screen. 21'
Distance from top of screen to ground level. 189'
Is well a gravel-wall type? YES

Pumping Test

Date. Oct. 28/55
Static level. 2'6" B.G.L.
Pumping level. 6'8"
Pumping rate. 45 I.G.P.M.
Duration of test. Oct. 28/55
Distance from cylinder or bowls to ground level .....

Water Record

Kind (fresh or mineral). Fresh
Quality (hard, soft, contains iron, sulphur, etc.). Hard
Appearance (clear, cloudy, coloured). Clear
For what purpose(s) is the water to be used? Municipal supply
How far is well from possible source of contamination? None
What is the source of contamination?
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
Hardness	291	ppm
Alkalinity	248	ppm
Iron	0.2	ppm
pH	7.3	

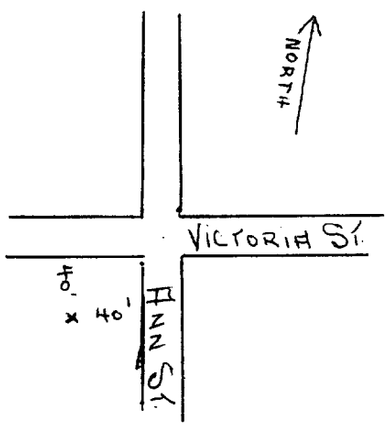
Well Log

Overburden and Bedrock Record	From	To
	0 ft.	..1..ft.
TOP SOIL	1	12
FINE BROWN SAND	12	42
DIRTY SAND & A LITTLE GRAVEL	42	96
SANDY GREY CLAY	96	141
PACKED SAND & CLAY	141	149
COARSE GRAVEL & SAND	149	156
PACKED GRAVEL & SAND	156	171
PACKED GRAVEL SAND & CLAY WITH CEMENTED STREAKS	171	212
COARSE GRAVEL & SAND	212	218
PACKED GRAVEL & SAND		

Location of Well

BW

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? UPLAND
Drilling Firm. INTERNATIONAL WATER SUPPLY LTD.
Address. 12 MAITLAND ST., LONDON
Name of Driller. F. BARNHARDT Address. KITCHENER
Date. NOV. 14/55 Licence Number. 558

F. Barnhardt
Signature of Licensee

FORM 5

CSS.S8

UTM [RECEIVED] 603320 E
9 R 491 447 N
SEP- 9 1959
Elev. INTERNATIONAL WATER SUPPLY LIMITED
Basin 12 1

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

57 No 248

Water-Well Record

County or Territorial District Simcoe, Vespra ~~Township, Village, Town~~ or City Barrie, ~~Ont.~~
Con. — Lot — Street and Number (if in Village, Town or City)
Owner P. U. C. Barrie Address Barrie, Ont.
Date completed 6 (day) 7 (month) 1959. (year)

Pipe and Casing Record

Casing diameter(s) 2"
Length(s) 189'-7"
Type of screen Slotted pipe
Length of screen 15'-6"

Pumping Test

Static level 10'-2 1/8"
Pumping rate 42 I. G. M.
Pumping level 11'-3 7/8"
Duration of test 4 hrs.

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
Silty sand	0'	31'			
Blue clay	31'	48'			fresh
Sandy clay	48'	55'			
Silty sand gravel	55'	61'	55'		
Dirty ~~sand~~ gravel a little sand	61'	71'			
Dirty gravel & sand	71'	86'			
Blue clay	86'	95'			
Silt, sand, ~~gravel~~ & clay ~~boulders~~	95'	130'			
Silt, sand, gravel, & gravel & clay boulders	130'	141'			
Dirty gravel	141'	163'			
Hard clay & gravel boulders	163'	165'			
Blue clay	165'	167'			
Gravel, sand, a very little clay	167'	189'			
Clay & gravel with streaks of gravel	189'	242'			

For what purpose(s) is the water to be used? Test hole
municipal water supply
Is water clear or cloudy? clear
Is well on upland, in valley, or on hillside? Upland

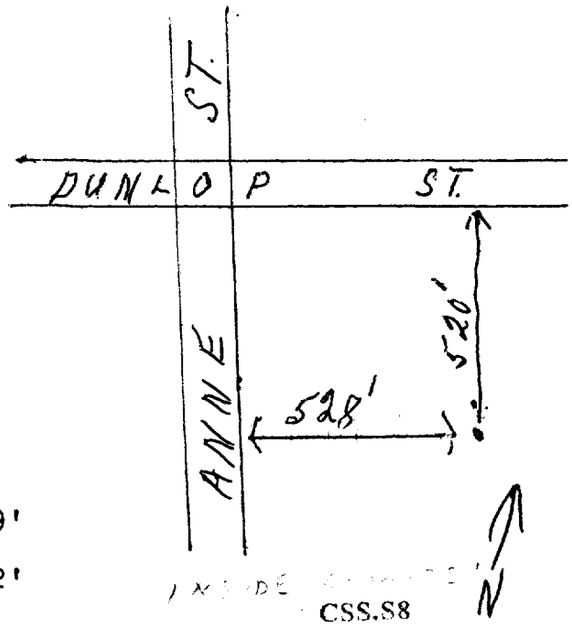
Drilling firm International Water Supply Ltd.,
Address 12 Maitland Street
London, Ont.
Name of Driller G. R. Scott
Address 12 Maitland Street,
London, Ont.
Licence Number 1118.

I certify that the foregoing statements of fact are true.

Date Aug 22/59 G. R. Scott
Signature of Licensee

Location of Well

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



Form 5

CSS.S8

UTM Z 60 30316 E
N 4915047 N
Elev. R
Basin 22 54

GROUND WATER BRANCH
JAN 17 1961
ONTARIO WATER RESOURCES COMMISSION
No. 253

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

Page

ANS.

County or District Simcoe Township, Village, Town or City Barrie

Con. Lot Date completed 29 (day) 9 (month) 60 (year)

Owner Barrie P.U.C. (print in block letters) Address Barrie Ont.

Casing and Screen Record

Inside diameter of casing 2"

Total length of casing 306'-11"

Type of screen Slotted

Length of screen 43'-9"

Depth to top of screen 306'-11"

Diameter of finished hole 2"

Pumping Test

Static level 14-5

Test-pumping rate 30 G.P.M.

Pumping level 15-3½"

Duration of test pumping 2½ hrs

Water clear or cloudy at end of test clear

Recommended pumping rate TEST G.P.M.

with pumping level of

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
Sand & gravel	0	6			
Sandy clay	6	15			
Blue clay	15	25			
Silty clay	25	40			
Sandy blue clay	40	63'			
Silty clay & clay streaks	63'	65			
Blue clay	65	82'			Fresh.
Blue clay & streaks of silt	82'	89'			
Sandy blue clay	89'	100			
Sandy clay & fine gravel	100'	126'			
Sandy gravel & clay	126	129'			
Boulders, gravel & sand packed	129	132'			
Gravel, boulders sand & clay	132	137'			
Blue clay & small gravel streaks	137'	163'	223-351.	209'	
Fine sand & clay	163'	192'			

For what purpose(s) is the water to be used?

TH for Mun. W.S.

Is well on upland, in valley, or on hillside? upland

Drilling Firm International water supply Ltd.

Address 12 Maitland St

London Ont

Licence Number 121

Name of Driller C. Magee

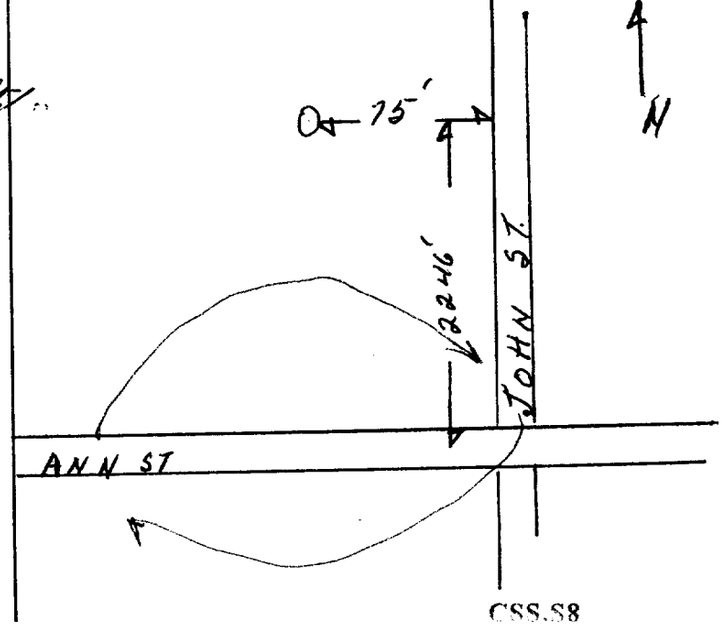
Address London Ont.

Date Oct 15-60

C. Magee
(Signature of Licensed Drilling Contractor)

Location of Well

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



CSS.S8

Form 5
15M-58-4149

B Test

Page 2 of 3

RECEIVED
NOV [illegible]
INTERNATIONAL [illegible]

The Ontario Water Resources Commission Act, 1957

GROUND WATER BRANCH
JAN 17 1961
ONTARIO WATER RESOURCES COMMISSION

WATER WELL RECORD

County or District Simcoe Township, Village, Town or City Barrie

Con. Lot Date completed 29 9 60
(day) (month) (year)

Owner Barrie Pit Co. (print in block letters) Address Barrie Ont.

Casing and Screen Record

Inside diameter of casing

Total length of casing

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole

Pumping Test

Static level

Test-pumping rate G.P.M.

Pumping level

Duration of test pumping

Water clear or cloudy at end of test

Recommended pumping rate G.P.M.

with pumping level of

Well Log

Overburden and Bedrock Record	From ft.	To ft.
Broken gravel & boulders & lyte	192'	201'
Clay & sand hard packed		
Sand gravel & clay	201'	206'
Boulders	206'	207'
Squaly clay & gravel streaks	207'	223'
Sandy & gravelly & clay streaked	223'	271'
& sandy & clay streaked		
Sand gravel & morrow & boulders	271'	285'
Gravel sand & boulders hard packed	285'	286'
Coarse gravel & sand	286'	292'
Boulders gravel hard packed	292'	297'
Squaly blue clay & gravel streaks	297'	305'
Sandy gravel & morrow streaks	305'	333'
Boulders gravel sand & morrow streaked	333'	351'

Water Record

Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
Water becomes S.W.H. - 14'-5"		Fresh.

For what purpose(s) is the water to be used?

Is well on upland, in valley, or on hillside?

Drilling Firm

Address

Licence Number

Name of Driller

Address

Date Dec 14 1960

INTERNATIONAL WATER SUPPLY LTD.
(Signature of Licensed Drilling Contractor)
LONDON — ONTARIO

Location of Well

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

Form 5
15M-58-4149

CSS.S8

Barrie PUC John St. well

UTM 17 Z 601875 E
19 R 4911407 N

Elev. 19 R 107601

Basin 21 21

GROUND WATER BRANCH
FEB 17 19[illegible]
ONTARIO WATER RESOURCES COMMISSION

57 No B 71

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District SIMCOE Township, Village, Town or City BARRIE ONT.

Con. — NA Lot NA Date completed 6 (day) NOV. (month) 1963 (year)

Owner BARRIE P.U.C (print in block letters) Address BARRIE ONT.

Casing and Screen Record

Inside diameter of casing 12" 22"

Total length of casing 290'-5" 180'

Type of screen LAYNE SHUTTER S. STEEL

Length of screen 60'

Depth to top of screen 290'-5"

Diameter of finished hole 12"

Pumping Test

Static level 21-50 BELOW GROUND

Test-pumping rate 1000 I G.P.M.

Pumping level 30-96' AT 24 HRS.

Duration of test pumping 24 HRS.

Water clear or cloudy at end of test CLEAR.

Recommended pumping rate 1000 I G.P.M.

with pump setting of 60' feet below ground surface

Well Log

WELL #5

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
SAND GRAVEL	0	6		
SILTY SANDY CLAY	6	15		
SAND CLAY STREAKS	15	34		
SILTY GREY CLAY	34	79		
GREY CLAY GRAVEL	79	109		
SILT SAND GRAVEL CLAY	109	216	M.B	FRESH
SAND GRAVEL ODD BOULDER	216	297	"	
SAND GRAVEL SANDY CLAY STREAKS	297	307	"	
SAND GRAVEL ODD BOULDER	307	351	"	
BOULDERS CLAY	351			

For what purpose(s) is the water to be used? DOMESTIC

Is well on upland, in valley, or on hillside? ~~UPLAND~~ VALLEY

Drilling or Boring Firm INT. WATER SUPPLY LTD

Address 12 MAITLAND ST LONDON ONT. Box 535 OAKVILLE ONTARIO.

Licence Number

Name of Driller or Borer T. TIMMAPAUGH

Address 736 GROSVENOR ST

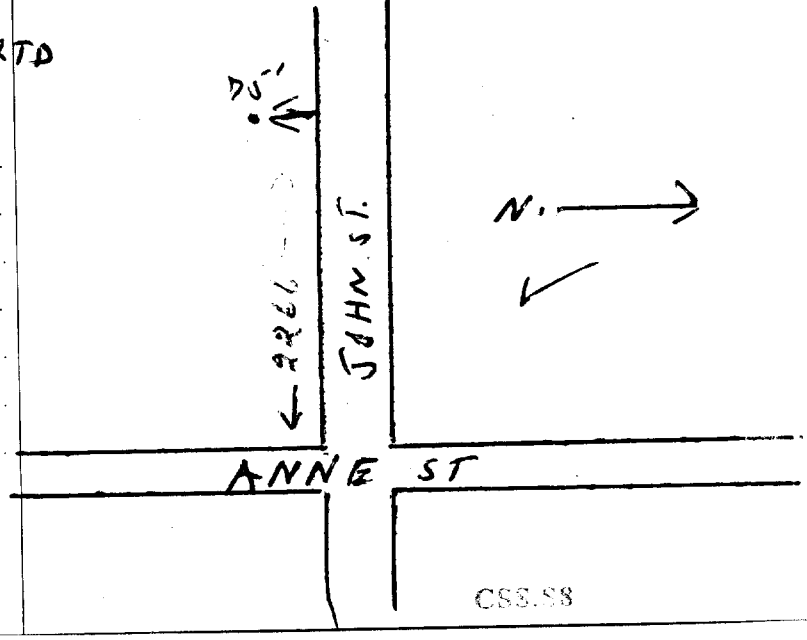
Date NOV 6TH / 1963

R.D. Gillespie

(Signature of Licensed Drilling or Boring Contractor)

Location of Well

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



rm 7 10M-62-1152

VRC COPY

CSS.SS

UTM 17 Z 602499 E
19 R 4913886 N
Elev. 19 R 07601

Basin 22

WATER WELL RECORD

The Ontario Water Resources Commission Act

57 No. B 276

County or District Simcoe. Township, Village, Town or City Barrie.

Con. Lot Date completed 13 (day) 7 (month) 1965 (year)

Owner Barrie ~~Water Comm.~~ PUC (print in block letters) Address Barrie

Casing and Screen Record

Inside diameter of casing 2"

Total length of casing 220'

Type of screen 1/8" slotted

Length of screen 11'

Depth to top of screen 220'-

Diameter of finished hole 2"

OBSERVATION WELL ONLY

Pumping Test

Static level 21.00 AUG 11/65

Test-pumping rate NONE G.P.M.

Pumping level

Duration of test pumping

Water clear or cloudy at end of test

Recommended pumping rate G.P.M.

with pump setting of feet below ground surface

Well Log 1/65

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Grey clay sandy	0	34		
Fine sand, silt & clay streaks	34	68	34	NA.
Fine sand, silt & fine gravel	68	74		
Fine sand silt & clay streaks	74	87		
Gravel streaks	87'	88		
Fine sand, silt & clay streaks	88	96		
Sand, silt, & gravel	96	107'		
Fine sand silt & clay streaks	107	138'		
Sand, fine sand, silt & clay streaks	138'	185		
Sand, fine sand & boulders	185	190		
Fine sand, silt & gravel streaks	190	204		

continued page 2

For what purpose(s) is the water to be used? NA.

Is well on upland, in valley, or on hillside? ~~Hillside~~ VALLEY

Drilling or Boring Firm International Water Supply Ltd

Address 12 Maitland St Toronto Ont

Licence Number

Name of Driller or Borer C. Magee

Address Same.

Date Aug 19-65

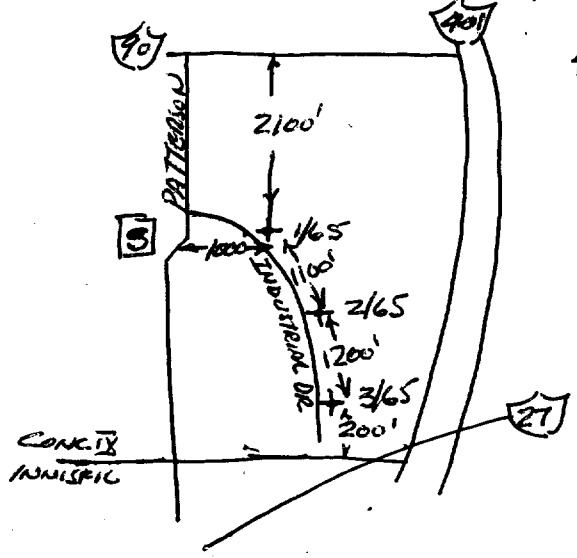
(Signature of Licensed Drilling or Boring Contractor)

Form 7 10M-62-1152

OWRC COPY

Location of Well

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



CSS.S8

The Ontario Water Resources Commission Act

WATER WELL RECORD

WATER RESOURCES DIVISION
NOV 29 1965
ONTARIO WATER RESOURCES COMMISSION

County or District Simcoe Township, Village, Town or City Barrie

Con. ..... Lot ..... Date completed 13 (day) 7 (month) 65 (year)

Owner Barrie water commn (print in block letters) Address .....

Casing and Screen Record

Inside diameter of casing .....

Total length of casing .....

Type of screen .....

Length of screen .....

Depth to top of screen .....

Diameter of finished hole .....

Pumping Test

Static level .....

Test-pumping rate ..... G.P.M.

Pumping level .....

Duration of test pumping .....

Water clear or cloudy at end of test .....

Recommended pumping rate ..... G.P.M.

with pump setting of ..... feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Sand gravel, boulders & fine sand streaks	204	209'		
Fine sand, silt & gravel streaks	209	238		

For what purpose(s) is the water to be used? .....

.....

Is well on upland, in valley, or on hillside? .....

Drilling or Boring Firm .....

.....

Address .....

.....

Licence Number .....

Name of Driller or Borer .....

Address .....

Date .....

.....
(Signature of Licensed Drilling or Boring Contractor)

Form 7 10M-62-1152

OWRC COPY

Location of Well

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

CSS.S8

UTM | 17 Z | 602290 E
| 9 R | 4913959 N

Elev. | 9 R | 01760

Basin | 12 | 12 | 1 | SIMCOE.

57 No 277

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District SIMCOE. Township, Village, Town or City BARRIE

Con. Lot Date completed 20 (day) 7 month 1965 year)

Owner Barrie PUC (print in block letters) Address Barrie Ont

Casing and Screen Record

5" ϕ ROTARY

Inside diameter of casing

Total length of casing

Type of screen Rotary point

Length of screen

Depth to top of screen

Diameter of finished hole

Pumping Test

Static level

Test-pumping rate G.P.M.

Pumping level NONE

Duration of test pumping

Water clear or cloudy at end of test

Recommended pumping rate G.P.M.

with pump setting of feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Sandy clay	0	6		
Sandy grit clay	6	17'		
Fine sand, silt & clay streaks	17'	64		
Sand gravel & brown clay streaks	64	70		
Brown clay & sand, gravel streaks	70	84		
Sandy silty clay & gravel	84	89	NA	NA
Sand gravel & boulders	89	109		
Sandy clay & gravel packed	109	115'		
Grey clay hard	115'	128		
Fine sand silt & clay streaks	128	158		
Grey clay fairly hard"	158	206		

continued page 2

For what purpose(s) is the water to be used? NA

Is well on upland, in valley, or on hillside?

Drilling or Boring Firm INTERNATIONAL WATER

Box 535

Address ORILLIA

Licence Number

Name of Driller or Borer C. MAGEE

Address SAME

Date

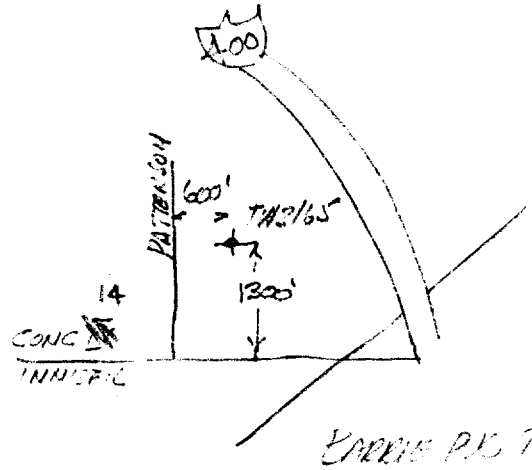
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

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



ENTER PUC TWP 165
LOT 1/2

CSS.S8

D

WATER RESOURCES DIVISION
NOV 29 1965
ONTARIO WATER RESOURCES COMMISSION

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District ..... Township, Village, Town or City Barrie

Con. ..... Lot ..... Date completed 20 (day) 7 (month) 1965 (year)

Owner Barrie P.U.C. (print in block letters) Address Barrie Ont

Casing and Screen Record

Inside diameter of casing .....

Total length of casing .....

Type of screen .....

Length of screen .....

Depth to top of screen .....

Diameter of finished hole .....

Pumping Test

Static level .....

Test-pumping rate ..... G.P.M.

Pumping level .....

Duration of test pumping .....

Water clear or cloudy at end of test .....

Recommended pumping rate ..... G.P.M.

with pump setting of ..... feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Fine sand silt & clay streaks	206'	250'		
Grey clay	250	259		
Fine sand, silt & clay streaks?	259'	296'		
Grey clay "	296'	321		
Sandy clay "hard"	321'	329'		
Cemented sand & gravel & clay streaks very hard	329	380		
Sandy clay & sand streaks "hard"	380	403'		
Shale	403	413'		

For what purpose(s) is the water to be used?

Is well on upland, in valley, or on hillside? Hillside

Drilling or Boring Firm International water Supply Ltd

Address 12 Maitland St. London ont

Licence Number .....

Name of Driller or Borer A. Magee

Address Same

Date Aug 19-65

(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

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

BARRIE PR TW2/65 R.212

CSS.58

UTM 17 Z 603413 E

5 R 4914762 N

Elev. 5 R 0740

Basin 21

The Ontario Water Resources Commission Act

WATER WELL RECORD

57 No 279

County or District Simcoe .... Township, Village, Town or City

Con. .... Lot .... Date completed 18 (day) Aug (month) 65 (year)

[redacted] ess Vespra ST Barrie

Casing and Screen Record

Inside diameter of casing 6 3/8

Total length of casing 84

Type of screen Stainless Steel # 14

Length of screen 8 FT

Depth to top of screen 76

Diameter of finished hole 5"

Pumping Test

Static level 7

Test-pumping rate 70 G.P.M.

Pumping level 35

Duration of test pumping 4 hr

Water clear or cloudy at end of test clear

Recommended pumping rate 70 G.P.M.

with pump setting of 80 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
brown sand	0	17	84	
silt	17	70		
dirty sand	70	73		
clear sand	73	84		

For what purpose(s) is the water to be used? Factory

Is well on upland, in valley, or on hillside?

Drilling or Boring Firm Douglas S Loughead Drilling Co. Ltd

Address 10th Newmarket

Licence Number 1694

Name of Driller or Borer D Johnstone

Address Bowmanville

Date Oct. 5

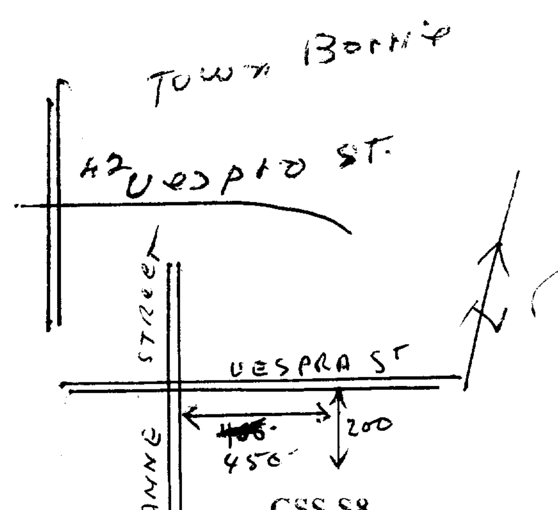
D S Loughead
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

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



CSS.S8

2.

UTM 17 602524 E
19 R 4913922 N

Elev. 19 R 07601

Basin 22 County or District SIMCOE

Con. ____ Lot ____

The Ontario Water Resources Commission Act

WATER WELL RECORD

WATER RESOURCES DIVISION
NOV 29 1965
ONTARIO WATER RESOURCES COMMISSION

57 N9 280

Township, Village, Town or City BARRIE

Date completed 12 (day) 8 month 1965 year

Owner Barrie PUC (print in block letters)

Address Barrie ont.

Casing and Screen Record

Inside diameter of casing 2"
Total length of casing 208'-3"
Type of screen 1/8" slotted
Length of screen 11'
Depth to top of screen 208'
Diameter of finished hole 2"

Pumping Test

Static level 21.50
Test-pumping rate 37.5 G.P.M.
Pumping level 38.19
Duration of test pumping 5 HRS.
Water clear or cloudy at end of test CLEAR
Recommended pumping rate NA. G.P.M.
with pump setting of ____ feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Top soil	0	6		
Sandy grey clay & silt	6'	23'		
Grey Jelly	23'	42'		
Fine sand silt & clay stubs	42'	68'		
Sand, fine sand, silt & gravel stubs	68	71'		
Sand & fine gravel	71'	93'		
Fine sand silt & clay stubs	93'	99'		
Sand fine gravel & boulders	99'	110'		
Sandy Clay	110'	139'		
Grey clay sandy & hard.	139'	180'		

continued page 2

For what purpose(s) is the water to be used?

Is well on upland, in valley, or on hillside? Valley.

Drilling or Boring Firm International Water Supply Ltd.

Address 12 Maitland St. London ont.

Licence Number ____

Name of Driller or Borer L. Magee

Address Sarnia

Date Sept. 13-65

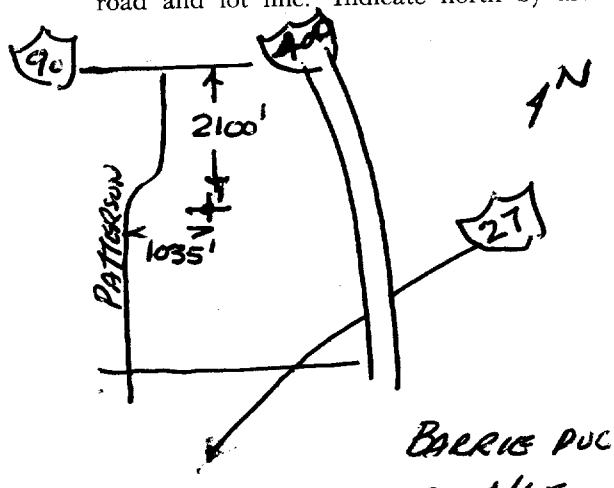
(Signature of Licensed Drilling or Boring Contractor)

Form 7 10M-62-1152

OWRC COPY

Location of Well

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



BARRIE PUC
TW 4/65 AG 1/2

UTM 17 Z 602433 E
RECEIVED
491 395-1 N
Elev. DEC 6 1960
Basin

57 No 1702

GROUND WATER BRANCH
JAN 17 1961
ONTARIO WATER RESOURCES COMMISSION

The Ontario Water Resources Commission Act, 1957

INTERNATIONAL WATER SUPPLY LIMITED

ANS.

WATER WELL RECORD

BARRIE
INNISFIL

County or District Simcoe
Township, Village, Town or City
Con. XIV Lot 5
Date completed 22 (day) 11 (month) 60 (year)
Owner Barrie P.U.C. (print in block letters)
Address Barrie Ont

Casing and Screen Record

Inside diameter of casing 2"
Total length of casing ~~275'~~ 315'
Type of screen 1/4" Slotted
Length of screen 19'
Depth to top of screen ~~275'~~ 315'
Diameter of finished hole 6 3/4" Drilled hole (rotary)

Pumping Test

Static level 22'-0 1/2"
Test-pumping rate HH IG PM. G.P.M.
Pumping level 25'-5 1/2"
Duration of test pumping 5 & 1/2 hrs. Stop. & starting
Water clear or cloudy at end of test Clear.
Recommended pumping rate G.P.M.
with pumping level of

Well Log 3/60

Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
Sand & gravel	0	9			
Sandy blue clay	9	18			
Blue clay	18	97'			
Blue clay & streaks of gravel	97	114'			
Gravel, sand, boulders & white clay	114'	126'			
Boulders gravel sand & white clay	126	130'			
Blue clay	130'	153'			
Sand & fine gravel	153	157'	315' W-bearing	293' - see above.	Fresh.
Fine sand	157'	172'			
Fine sand fine gravel & white clay	172'	182'			Fresh.
Gravel sand & boulders white clay	182	188			
Sand	188	190			
Boulders gravel & sand & white clay	190	199'			

For what purpose(s) is the water to be used?
T/t for Mun. W.S.

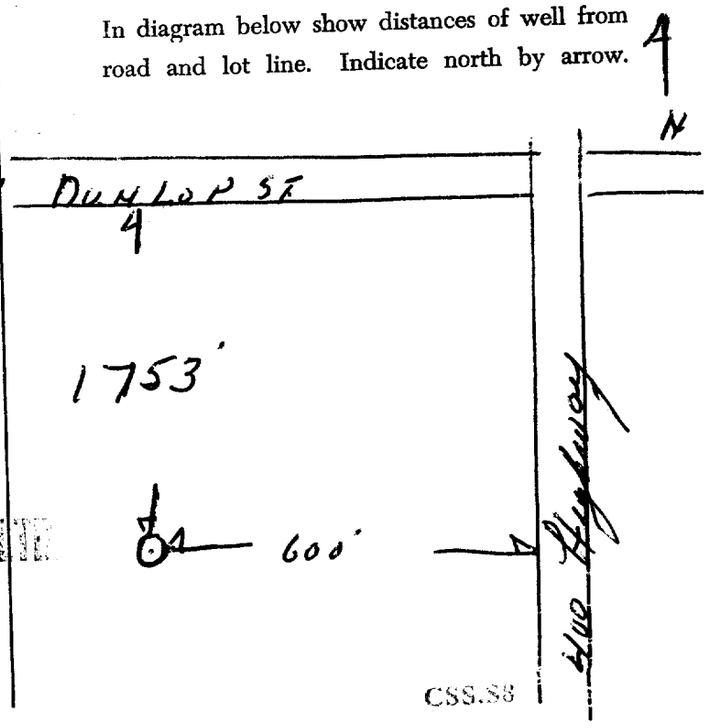
Is well on upland, in valley, or on hillside? upland

Drilling Firm International Water Supply Ltd
Address 12 Maitland St
London Ont.
Licence Number 121
Name of Driller L. Magee
Address 12 Maitland St. London
Date DW Harvey
(Signature of Licensed Drilling Contractor)

INTERNATIONAL WATER SUPPLY LTD
LONDON ONTARIO

Location of Well

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



Form 5
15M-58-4149

CSS.88

RECEIVED
DEC 6
INTERNATIONAL WATER SUPPLY LIMITED

The Ontario Water Resources Commission Act, 1957

GROUND WATER BRANCH
JAN 17 1961
ONTARIO WATER RESOURCES COMMISSION

ANS. _____

WATER WELL RECORD

County or District Simcoe Township, Village, Town or City Barrie (Innisfil)

Con. XIV Lot 5 Date completed 22 11 60 (day, month, year)

Owner Barrie PUC (print in block letters) Address Barrie Ont

Casing and Screen Record

Inside diameter of casing

Total length of casing

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole

Pumping Test

Static level

Test-pumping rate G.P.M.

Pumping level

Duration of test pumping

Water clear or cloudy at end of test

Recommended pumping rate G.P.M.

with pumping level of

Well Log

Overburden and Bedrock Record	From ft.	To ft.
Sandy blue clay	199	204'
Sand & gravel & sandy blue white	204'	272'
Shale		
Sand & gravel, boulders & white clay streaked	272'	299'
Gravel & boulders & sand, streaked & hard packed & white clay	299	312'
Sand, gravel & white clay	312'	324'
Boulders gravel sand & white clay	324'	334'

Water Record

Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
– probably w-bearing – not tested.		

For what purpose(s) is the water to be used?

Is well on upland, in valley, or on hillside?

Drilling Firm

Address

Licence Number

Name of Driller

Address

Date

D. W. Harvey
(Signature of Licensed Drilling Contractor)

INTERNATIONAL WATER SUPPLY LTD
LONDON ONTARIO

Location of Well

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

Form 5
15M-58-4149

H4

31D/5E

The Ontario Water Resources Commission Act

WATER WELL RECORD

Water management in Ontario

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

11

5709125 P — MUNICIP. 57501 — CON.

COUNTY OR DISTRICT: SIMCOE
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: BARRIE
CON., BLOCK, TRACT, SURVEY, ETC.: Tiffin ST.
LOT:
OWNER (SURNAME FIRST): BARRIE P.U.C.
ADDRESS: BARRIE ONT.
DATE COMPLETED: DAY 25 MO 09 YR 72

21 — UTM — ZONE: 17 — EASTING: 602380 — NORTHING: 4914112 — RC: 4 — ELEVATION: 0760 — RC: 5 — BASIN CODE: 23

BARRIE P.U.C LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FROM	DEPTH TO
BROWN	TOP SOIL		LOOSE	0	1
"	GRAVEL	SAND	"	1	4
"	SAND	GRAVEL	"	4	21
"	CLAY	GRAVEL	DENSE	21	25
GREY	CLAY	STONE	"	25	63
"	"	GRAVEL	"	63	81
BROWN	ME-FINE SAND	GRAVEL	LOOSE	81	105
"	SAND	GRAVEL	"	105	127
"	SAND	GRAVEL, BOULDERS	"	127	134
"	CLAY	BOULDERS	DENSE	134	153
BROWN	SILTY SAND	CLAY	"	153	177
GREY	SILTY CLAY		"	177	179

31 — 0001602 | 0004611128 | 0021628 | 0035605 | 0063205 12 | 0081205 17
32 — 0145608 | 0127628 | 0134628 | 0153605 13 | 0177628 0605 | 0179205 06

41 WATER RECORD

WATER FOUND AT — FEET	KIND OF WATER
218	1 ☑ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH FROM	DEPTH TO
30"	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	3/8"	+1.6'	221.6'
16"	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	3/16"	182'6	280'6"
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.): 7 — DIAMETER: 16 INCHES — LENGTH: 50 FEET
MATERIAL AND TYPE: STAINLESS STEEL SHUTTER — DEPTH TO TOP OF SCREEN: 280-6 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: 1200 GPM. — DURATION OF PUMPING: 25 HOURS 0 MINS.

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
36.41 FEET	47.4 FEET	43.15 FEET	43.49 FEET	43.70 FEET	44.02 FEET

1 ☑ PUMPING 2 ☐ RECOVERY

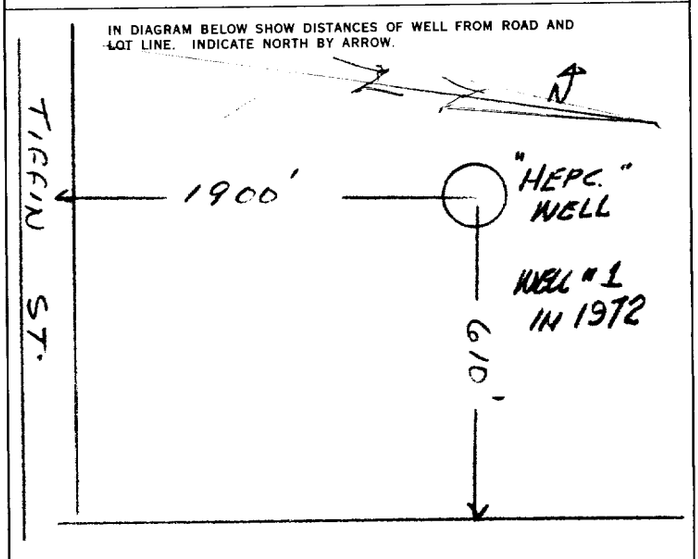
IF FLOWING, GIVE RATE: GPM. — PUMP INTAKE SET AT: 74 FEET — WATER AT END OF TEST: 1 ☑ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP — RECOMMENDED PUMP SETTING: 100 FEET — RECOMMENDED PUMPING RATE: 1000 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 (54)
1 ☑ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE (55-56)
1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☑ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF DRILLING (57)
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: INTERNATIONAL WATER SUPPLY — LICENCE NUMBER: 2801
ADDRESS: Box 310 BARRIE ONT.
NAME OF DRILLER OR BORER: KEITH Mc CUTCHEN — LICENCE NUMBER:
SIGNATURE OF CONTRACTOR:
SUBMISSION DATE: DAY 29 MO 09 YR 72

OWRC COPY

OFFICE USE ONLY

DATA SOURCE (58) — CONTRACTOR (59-62) — DATE RECEIVED: 290972 (63-68)
DATE OF INSPECTION: NOV. 13/74 — INSPECTOR: P/J.B.
REMARKS:

CSS.96

42

Page 2 of # 5709125

The Ontario Water Resources Commission Act

WATER WELL RECORD

310 SE

Water management in Ontario

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

11

MUNICIP. (10-14) CON. (15-22 23 24)

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT (25-27)
SIMCOE	BARRIE		

OWNER (SURNAME FIRST) (28-47)	ADDRESS	DATE COMPLETED (48-53)
BARRIE PUC POE	BARRIE ONT.	DAY 29 MO. 9 YR. 72

21

UTM ZONE (10-12) EASTING (12-17) NORTHING (18-24) RC. (25) ELEVATION (26-30) RC. (30) BASIN CODE (31-47) I II III IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	DEPTH – FEET TO
BROWN	SAND,	GRAVEL, CLAY	LOOSE	179	183
"	SAND,	GRAVEL	"	183	188
GREY	SILTY CLAY	GRAVEL	DENSE	188	189
"	CLAY	GRAVEL, SAND	"	189	191
BROWN	SAND	CLAY BOULDERS	"	191	199
"	SILTY SAND	WHITE CLAY	"	199	218
"	SAND	GRAVEL, CLAY	"	218	240
"	FINE GRAVEL		LOOSE	240	248
"	GRAVEL		"	248	265
"	SAND	GRAVEL, BOULDERS	"	265	298
WHITE	SAND	GRAVEL CLAY	DENSE	298	302
BROWN	SAND	GRAVEL	LOOSE	302	321

33 01836281105 | 01886281111 | 01892050611 | 01911205111 28 | 01996280513 | 02186220605 | 1

34 02406281105 | 02486111 | 02656111 | 02986281113 | 03021281105 | 03211628111 | 1

(10 14 15 21 32 43 54 65 75 80)

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
218	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☒ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH – FEET FROM	DEPTH – FEET TO
30"	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	3/8	+1.6'	221.6'
16"	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	3/8	182.6'	280.6'
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
7	16 INCHES	50 FEET

MATERIAL AND TYPE: STAINLESS STEEL SHUTTER

DEPTH TO TOP OF SCREEN: 280'-6" FEET

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☒ PUMP 2 ☐ BAILER	1200 GPM.	2 HOURS 0 MINS.

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
36.41 FEET	47.4 FEET	FEET	FEET	FEET	FEET

1 ☐ PUMPING 2 ☐ RECOVERY

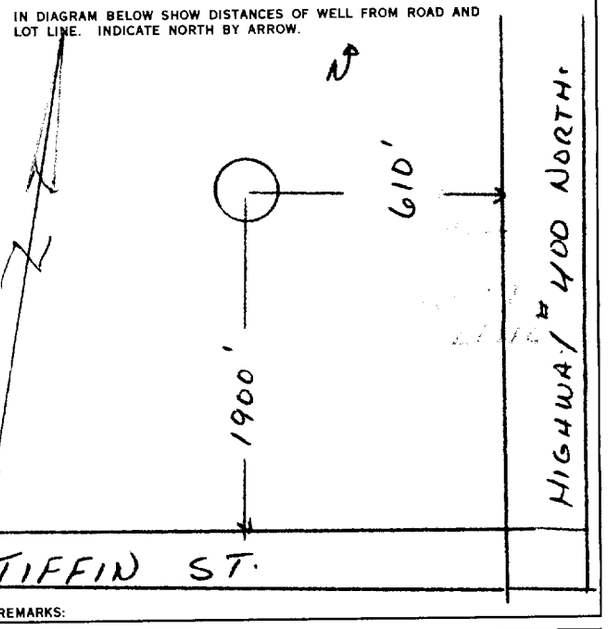
IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM.	74' FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☐ DEEP	FEET	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

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

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: INTERNATIONAL WATER SUPPLY — LICENCE NUMBER

ADDRESS: Box 310 BARRIE ONT.

NAME OF DRILLER OR BORER: K. McCUTCHEON — LICENCE NUMBER

SIGNATURE OF CONTRACTOR — SUBMISSION DATE: DAY 29 MO. 09 YR. 72

OFFICE USE ONLY

DATA SOURCE (58) CONTRACTOR (59-62) DATE RECEIVED 290972 (63-68) (80)

DATE OF INSPECTION: Nov. 18/74 INSPECTOR

REMARKS: P/J-B

CSS.88

RC COPY

#2

Page 3 of # 5709125

310/5E

The Ontario Water Resources Commission Act

WATER WELL RECORD

Water management in Ontario

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

11

MUNICIP. (10-14) CON. (15-22 23 24)

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT (25-27)
SIMCOE	BARRIE		

OWNER (SURNAME FIRST) (28-47)	ADDRESS	DATE COMPLETED (48-53)
BARRIE PUC	BARRIE ONT	DAY 25 MO. 9 YR. 72

21 (1-2) UTM ZONE (10-12) EASTING (12-17) NORTHING (18-24) RC. (25) ELEVATION (26-30) RC. (30) BASIN CODE (31-47) I II III IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	DEPTH – FEET TO
BROWN	SAND	GRAVEL, CLAY	HARD	321	322
"	GRAVEL	BOULDERS SAND	HARD	322	329
"	GRAVEL	CLAY	HARD	329	—

35 03226281105 03296111328 03306109

32 (1-2, 10, 14-15, 21, 32, 43, 54, 65, 75, 80)

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
0218	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
30"	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	3/8	+1.6	0222 ~~221.6~~
16"	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	3/8	182.6	0281 ~~280.6~~
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
007	16.000 INCHES	50 FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN
STAINLESS STEEL SHUTTER	0281 ~~280.6~~ FEET

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☒ PUMP 2 ☐ BAILER	1200 GPM.	25 HOURS 00 MINS.

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
036 36.41 FEET	~~047.46~~ FEET	1 ☒ PUMPING 2 ☐ RECOVERY	043 FEET	043 FEET	044 FEET	044 FEET

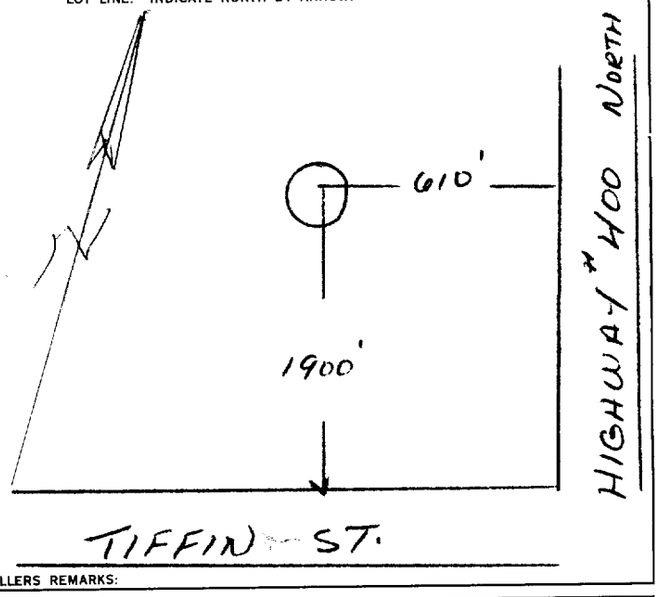
IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM.	74 FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	100 FEET	1000 GPM.

50-53 ____ 09.1 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 (54)

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

WATER USE (55-56) 56

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

METHOD OF DRILLING (57)

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: INTERNATIONAL WATER SUPPLY LTD — LICENCE NUMBER: 2801

ADDRESS: Box 310 BARRIE ONT

NAME OF DRILLER OR BORER: K. McCUTCHEN — LICENCE NUMBER:

SIGNATURE OF CONTRACTOR

SUBMISSION DATE: DAY 29 MO. 09 YR. 72

OFFICE USE ONLY

DATA SOURCE (58): 1 — CONTRACTOR (59-62): 3801 — DATE RECEIVED (63-68): 290972

DATE OF INSPECTION: Nov 13/74 — INSPECTOR:

REMARKS: P/S

C COPY

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 — 5728346 — SHEET 1 OF 2 — MUNICIP 5,7,5,0,1 — CON.

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC.	LOT 25-27
SIMCOE	BARRIE		

OWNER (SURNAME FIRST) 28-47	ADDRESS	DATE COMPLETED 48-53
BARRIE P.U.C	55 PATTERSON RD. Barrie	DAY 22 MO July YR 91

21 — UTM ZONE 10 — EASTING 12-17 — NORTHING 18-24 — RC 25 — ELEVATION 26-29 — RC 30 — BASIN CODE 31 — II III IV 47

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Sand			0	8
"	"	Gravel		8	50
Grey	Sand	Silty Clay, Gravel		50	66
Grey	Silty Clay	sand & Gravel	Packed	66	88
Grey	Clay		Hard	88	110
Grey	Clay Silty		Soft	110	127
Grey	Clay			127	186
Grey	Silty Clay		Soft	186	214
	Sand (fine)	Gravel (fine)		214	220
	Sand (fine)	Gravel (fine-med)	PKd.	220	232
	Gravel	Boulder, Sand (fine), some Clay	Packed	232	246
	"	" " " " "	Hard	246	256

31

32 — 10 14 15 21 32 43 54 65 75 80

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
214-365	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
2	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC		(+) 1.5	334.5
1 1/4	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC		(+) 1.5	350.5
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
(±) 0.125"	2" INCHES	27' FEET

MATERIAL AND TYPE: STEEL S.P.
DEPTH TO TOP OF SCREEN: 334.5' FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER — AIR
PUMPING RATE: 50 GPM
DURATION OF PUMPING: 6 HOURS — MINS

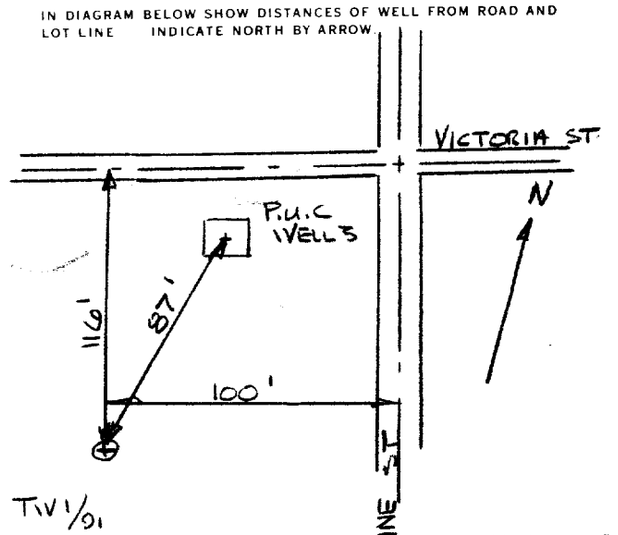
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
29.98 FEET	35.60 FEET	30.46 FEET	30.72 FEET	— FEET	31.54 FEET

IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
— GPM	— FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☐ DEEP
RECOMMENDED PUMP SETTING: — FEET
RECOMMENDED PUMPING RATE: — GPM

LOCATION OF WELL 1/91

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



88628

DRILLERS REMARKS

Page 1/2

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 ☐ DEWATERING

WATER USE

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

METHOD OF CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: INTERNATIONAL WATER SUPPLY LTD
WELL CONTRACTOR'S LICENCE NUMBER: 2801
ADDRESS: PO BOX 310 BARRIE ONT L4M4T5
NAME OF WELL TECHNICIAN: H. PETERMAN
WELL TECHNICIAN'S LICENCE NUMBER: T0116
SIGNATURE OF TECHNICIAN/CONTRACTOR
SUBMISSION DATE: DAY 30 MO Aug YR 91

OFFICE USE ONLY

DATA SOURCE 58 — CONTRACTOR 59-62: 2801 — DATE RECEIVED 63-68: SEP 05 1991
DATE OF INSPECTION — INSPECTOR
REMARKS

CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 5728346 SHEET 2 OF 2

MUNICIP 5,7,5,0,1 CON.

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON	BLOCK, TRACT, SURVEY, ETC	LOT
SIMCOE	BARRIE			

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
BARRIE P.U.C.	55 PATTERSON RD BARRIE	DAY 29 MO July YR 91

21 UTM ZONE | EASTING | NORTHING | RC | ELEVATION | RC | BASIN CODE I II III IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	Boulder			256	258
	Gravel	Sand, Mark(some), Clay(some)	Hard Packed	258	291
	Gravel	Sand, Boulder(odd)	Hd Packed, Loose Stks	291	309
	Sand	Gravel, Clay	Packed	309	313
	Sand	Gravel		313	365

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
15-18	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
20-23	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
25-28	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
30-33	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
10-11	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			13-16
17-18	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			20-23
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			27-30

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33	DIAMETER 34-38 INCHES	LENGTH 39-40 FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN 41-44 FEET	80

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	80

71 PUMPING TEST

PUMPING TEST METHOD 10 (1 ☐ PUMP 2 ☐ BAILER)	PUMPING RATE 11-14 GPM	DURATION OF PUMPING 15-16 HOURS 17-18 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	25 WATER LEVELS DURING (1 ☐ PUMPING 2 ☐ RECOVERY)			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
19-21 FEET	22-24 FEET	26-28 FEET	29-31 FEET	32-34 FEET	35-37 FEET

IF FLOWING, GIVE RATE 38-41 GPM	PUMP INTAKE SET AT FEET	WATER AT END OF TEST 42 (1 ☐ CLEAR 2 ☐ CLOUDY)
RECOMMENDED PUMP TYPE ☐ SHALLOW ☐ DEEP	RECOMMENDED PUMP SETTING 43-45 FEET	RECOMMENDED PUMPING RATE 46-49 GPM

50-53

LOCATION OF WELL

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

SEE PAGE 1

Page 2/2

88654

DRILLERS REMARKS

FINAL STATUS OF WELL 54	1 ☐ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED ☐ DEWATERING
WATER USE 55-56	1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED
METHOD OF CONSTRUCTION 57	1 ☐ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
INTERNATIONAL WATER SUPPLY LTD	2801

ADDRESS: PO Box 310 BARRIE ONT L4M 4T5

NAME OF WELL TECHNICIAN	WELL TECHNICIAN'S LICENCE NUMBER
H. PETERMAN	T0116

SIGNATURE OF TECHNICIAN/CONTRACTOR: H. Peterman

SUBMISSION DATE: DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE 58	CONTRACTOR 59-62	DATE RECEIVED 63-68 80
	2801	SEP 05 1991

DATE OF INSPECTION | INSPECTOR

REMARKS: CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ontario Ministry of the Environment

Well Ta... (Place sticker and print number below)
A 050238
A 050238

7043230

Well Record

Regulation 903 Ontario Water Resources Ac

page ___ of ___

Instructions for Completing Form

- For use in the **Province of Ontario** only. This document is a permanent **legal** document. Please retain for future reference.
- All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Help Desk (Toll Free) at 1-888-396-9355.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only

[redacted]

Ontario L9S 4W3

Address of Well Location (County/District/Municipality)
10 Anne st S. SIMCOE

Township | Lot | Concession

RR#/Street Number/Name

City/Town/Village
Barrie

Site/Compartment/Block/Tract etc.

GPS Reading | NAD 8 3 | Zone 17 | Easting 600346.0 | Northing 4911491.0

Unit Make/Model
Garmin Etrex

Mode of Operation: ☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To
Brn	Fill	Gravel	loosely packed	0	.91
light brn	Sand	Gravel	Saturated dry coarse Sand	.91	3.35
wet brn	Sand	silt / fine gravel	Saturated coarse Sand	3.35	4.88

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)
0	4.88	8.89

Water Record

Water found at ___ Metres / Kind of Water

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

After test of well yield, water was
☐ Clear and sediment free
☐ Other, specify

Chlorinated ☐ Yes ☐ No

Construction Record

Casing

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To (Metres)
3.81	☐ Steel ☐ Fibreglass ☑ Plastic ☐ Concrete ☐ Galvanized	0.25	0	1.83
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			

Screen

Outside diam	Material	Slot No.	Depth From	Depth To (Metres)
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	10	1.83	4.88

No Casing or Screen

☐ Open hole

Test of Well Yield

Pumping test method	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Pump intake set at - (metres)	Static Level			
Pumping rate - (litres/min)	1		1	
Duration of pumping ___hrs +___ min	2		2	
Final water level end of pumping ___metres	3		3	
Recommended pump type. ☐ Shallow ☐ Deep	4		4	
Recommended pump depth. ___metres	5		5	
Recommended pump rate. (litres/min)	10		10	
If flowing give rate - (litres/min)	15		15	
If pumping discontinued, give reason.	20		20	
	25		25	
	30		30	
	40		40	
	50		50	
	60		60	

Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	.31	Flushmount / concrete	
.31	1.22	Benseal	
1.22	4.88	Sand	

Method of Construction

☐ Cable Tool ☐ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☐ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving geoprobe

Water Use

☐ Domestic ☐ Industrial ☐ Public Supply ☐ Other monitoring well
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

☐ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☒ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering monitoring well
☒ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor: STRATA SOIL SAMPLING | Well Contractor's Licence No.: 7241

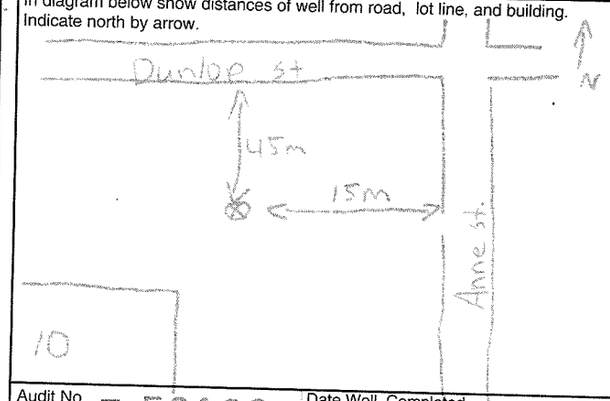
Business Address (street name, number, city etc.): 117 W Beaver creek Richmond Hill ON

Name of Well Technician (last name, first name): Beatty, Brian | Well Technician's Licence No.: 1796

Signature of Technician/Contractor: X | Date Submitted YYYY MM DD: 2007 05 05

Location of Well

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



Audit No. Z 58182 | Date Well Completed YYYY MM DD: 2007 05 05

Was the well owner's information package delivered? ☐ Yes ☐ No | Date Delivered YYYY MM DD

Ministry Use Only

Data Source | Contractor 7241

Date Received YYYY MM DD: MAY 07 2007 | Date of Inspection YYYY MM DD

Remarks | Well Record Number

0506E (08/2006)

Contractor's Copy

Cette formule est disponible en français

Ontario — Ministry of the Environment

7151274

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Measurements recorded in: ☑ Metric ☐ Imperial

Well Tag No. *(Place Sticker and/or Print Below)* A011255 A011255

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	CITY OF BARRIE	cityinfo@barrie.ca	

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
70 COLLIER ST., Box 400	BARRIE	ON	L4M4T5	7057276424 2

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
PERRY STREET	VESPRA	24	5

County/District/Municipality	City/Town/Village	Province	Postal Code
SIMCOE	BARRIE	Ontario	L4N1B8

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	603324	4915140		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	FINE SAND			ϕ	9.14
GREY	CLAY				13.72
	CLAY				15.24
	FINE SAND				18.29
	SAND	FINE GRAVEL, CLAY			24.69
GREY	CLAY	SAND	LAYERED		31.09
	FINE SAND	CLAY	LAYERED		36.88
	CLAY	SAND, SOME GRAVEL			41.55
	GRAVEL	SAND AND BOULDERS			55.17

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
53.34	37.4m	#3 SILICA GRAVEL	4.2 m³
41.56	ϕ	CEMENT GROUT	21 m³

Method of Construction

☑ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☑ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify*

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☑ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify*

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
54cm	STEEL	0.95cm	+0.9m	41.56m
39cm	STEEL	0.95cm	+0.8m	43.7m

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
35.6cm	S/S	50	44.03	53.34

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
	☑ Fresh ☐ Untested	☐	
	☐ Fresh ☐ Untested	☐	
	☐ Fresh ☐ Untested	☐	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
ϕ	9.1m	107cm
9.1	41.56m	94cm
41.56	53.4m	56cm

Results of Well Yield Testing

After test of well yield, water was:
☑ Clear and sand free
☐ Other, *specify*

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

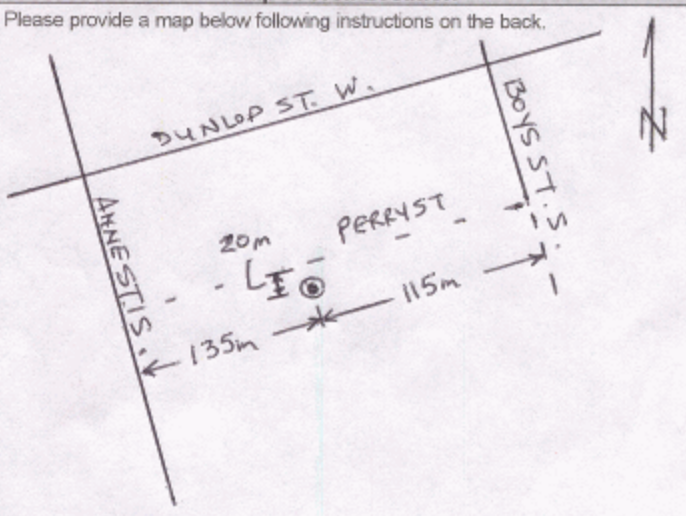
Well production (l/min / GPM)

Disinfected? ☑ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	9.40m		22.99
1		1	
2	20.50	2	11.89
3		3	
4	20.58	4	11.74
5		5	
10	20.72	10	11.53
15	20.84	15	11.44
20	20.93	20	11.36
25	21.00	25	11.29
30	21.06	30	11.25
40	21.14	40	11.16
50	21.22	50	11.09
60	21.30	60	11.03

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
INTERNATIONAL WATER SUPPLY LTD	2801

Business Address (Street Number/Name)	Municipality
342 BAYVIEW DRIVE	BARRIE

Province	Postal Code	Business E-mail Address
ON	L4N4Y8	iwse iws.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
7057330111	NOBES ROBERT

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0115	T Bow	2010 08 10

Well owner's information package delivered: ☐ Yes ☑ No

Date Package Delivered: Y Y Y Y M M D D

Date Work Completed: 2010 07 07

Ministry Use Only

Audit No. z115267

Received SEP 16 2010

0506E (2007/12) © Queen's Printer for Ontario, 2007

Ministry's Copy

Ontario — Ministry of the Environment

Well Tag No. *(Place Sticker and/or Print Below)*: 7164608

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☑ Metric ☐ Imperial

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	CITY OF BARRIE	cityinfo@barrie.ca	

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
70 COLLIER ST., BOX 400	BARRIE	ON	L4M4T5	7057264242

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
PERRY STREET	VESPRA	24	5

County/District/Municipality	City/Town/Village	Province	Postal Code
SIMCOE	BARRIE	Ontario	L4N1B8

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	603332	4915147		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	DECOMMISSION PERRY ST. WELL NO4		PEA GRAVEL	57.0	50.3
			MORIE #3 GRAVEL	50.3	49.4
		400 mm	HOLEPLUG	49.4	48.5
			CEMENT GROUT	48.5	ø
		660 mm	HOLEPLUG	28.5	27.1
			CEMENT GROUT	27.1	ø

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

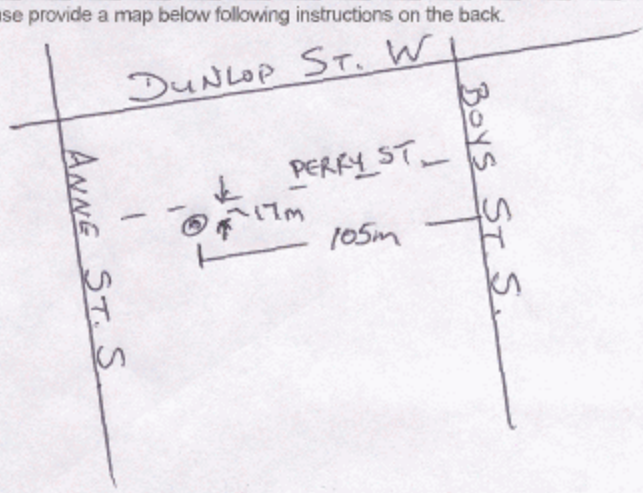
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

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

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
INTERNATIONAL WATER SUPPLY	2801

Business Address (Street Number/Name)	Municipality
342 BAYVIEW DRIVE	BARRIE

Province	Postal Code	Business E-mail Address
ON	L4N4Y8	iws@iws.ca

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
7057330111	DUNN, WAYNE

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0118	T A Brown	2011 06 16

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☑ No	YYYY MM DD	2011 05 25

Ministry Use Only

Audit No. z115276

Received JUN 29 2011

Ministry's Copy

APPENDIX C

Climatic Water Balance

Climatic Water Balance
Barrie WPCC Climate Station (1973-2017)
Soil moisture 75 mm/year

Month	Temperature (Degrees C)	Precipitation (mm)	Potential ET (mm)	Actual ET (mm)	Deficit (mm)	Surplus (mm)
January	-7.9	84	1	1	0	36
February	-7.4	59	1	1	0	35
March	-2.1	62	7	7	0	114
Aprilo	5.5	66	31	31	0	79
May	12.4	78	76	76	0	17
June	17.6	88	111	106	-5	5
July	20.4	77	132	101	-31	0
August	19.5	90	116	91	-25	0
September	15.1	91	77	71	-7	8
October	8.6	83	39	38	-1	15
November	2.6	84	13	13	0	48
December	-3.9	80	2	2	0	45
Total	**6.8***	**940**	**606**	**538**	**-69**	**402**

Notes:
ET - Evapotranspiration
Data from Meteorological Sevice of Canada
** - Average Value*
Numbers Rounded off

Climatic Water Balance
Barrie WPCC Climate Station (1973-2017)
Soil moisture 150 mm/year

Month	Temperature	Precipitation (mm)	Potential ET (mm)	Actual ET (mm)	Deficit (mm)	Surplus (mm)
January	-7.9	84	1	1	0	31
February	-7.4	59	1	1	0	34
March	-2.1	62	7	7	0	114
Aprilo	5.5	66	31	31	0	79
May	12.4	78	76	76	0	18
June	17.6	88	111	111	0	5
July	20.4	77	132	126	-6	0
August	19.5	90	116	102	-14	0
September	15.1	91	77	71	-6	7
October	8.6	83	39	39	0	8
November	2.6	84	13	13	0	32
December	-3.9	80	2	2	0	32
Total	**6.8***	**940**	**606**	**580**	**-26**	**360**

Notes:
ET - Evapotranspiration
Data from Meteorological Sevice of Canada
** - Average Value*
Numbers Rounded off

Climatic Water Balance
Barrie WPCC Climate Station (1973-2017)
Soil moisture 250 mm/year

Month	Temperature (degrees C)	Precipitation (mm)	Potential ET (mm)	Actual ET (mm)	Deficit (mm)	Surplus (mm)
January	-7.9	84	1	1	0	25
February	-7.4	59	1	1	0	31
March	-2.1	62	7	7	0	110
Aprilo	5.5	66	31	31	0	79
May	12.4	78	76	77	0	18
June	17.6	88	111	111	0	5
July	20.4	77	132	131	-1	0
August	19.5	90	116	112	-4	0
September	15.1	91	77	75	-3	8
October	8.6	83	39	39	0	6
November	2.6	84	13	13	0	27
December	-3.9	80	2	2	0	31
Total	6.8	940	606	600	-8	340

Notes:
ET - Evapotranspiration
Data from Meteorological Sevice of Canada
** - Average Value*
Numbers Rounded off

APPENDIX D

Soil Percolation Rates OBC Guide SG-6

SG-6 Percolation Time and Soil Descriptions

ESTIMATION OF PERCOLATION TIME (Referenced in Article 8.2.1.2.)

(a) The purpose of this Section and the associated Tables and Charts is to provide assistance to those who must decide on the percolation time(s) to be used in design. Suggested relationships between percolation time, coefficient of permeability and soils of various types are given. IT MUST BE EMPHASIZED THAT, PARTICULARLY FOR FINE GRAINED SOILS, THERE IS NO CONSISTENT RELATIONSHIP DUE TO THE MANY FACTORS INVOLVED. The following guidance is presented for the soil types outlined in the Unified Soil Classification System (Table 1). In order to assess a particular soil.
   (i) Table 2 and Table 3 - Approximate relationship of soil types to permeability and percolation time.
   (ii) Charts 1 to 14 - Typical grain size distribution curves for soil types in the Unified Soil Classification System.

(b) In Table 2 and Table 3, a range of values of "K" and of "T" are given for various soil descriptions. The principal modifiers which will influence selection of a "T" value within the range given are:
   (i) The structure - "massive" fine-grained soils have high values of "T".
   (ii) The density - For a given soil higher density produces a higher value of "T".
   (iii) The percentage of clay - the higher the percentage the higher the value of "T".
   (iv) The mineralogy of the clay portion - The more it "swells" the higher the value of "T".
   (v) The plasticity of the soil - The higher the plasticity index the higher the value of "T".
   (vi) Liquid Limit - the higher the liquid limit the higher the value of "T".
   (vii) Organic content - The presence of fine organic particles, detectable by colouration and odour, can significantly reduce the permeability and raise the value of "T".

TABLE 1
Unified Soil Classification

Coarse - Grained Soils		Fine - Grained Soils	
Group Symbols	Typical Names	Group Symbols	Typical Names
GW	Well-graded gravels, gravel-sand mixtures, little or no fines	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines	CL	Inorganic clays of fow to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
GM	Silty gravels, gravel-sand-silt mixtures	OL	Organic silts and organic silty clays of low plasticity
GC	Clayey gravels, gravel-sand-clay mixtures	MH	Inorganic silts, micoceous or diatomaceous fine sandy or silty soils, elastic silts
SW	Well-graded sands, gravelly sands, little or no fines	CH	Inorganic clays of high plasticity, fat clays
SP	Poorly-graded sands, gravelly sands, little or no fines	OH	Organic clays of medium to high plasticity, organic silts
SM	Silty sands, sand-silt mixtures		
SC	Clayey sands, sand-clay mixtures	PT (highly organic soils)	Peat and other highly organic soils

TABLE 2
APPROXIMATE RELATIONSHIP OF SOIL TYPES TO PERMEABILITY AND PERCOLATION TIME

SOIL TYPE (unified soil classification)	Coefficient of Permeability K - cm/sec.	Percolation Time- T mins/cm.	Comment
COARSE GRAINED - MORE THAN 50% LARGER THAN #200			
G.W. - Well graded gravels, gravel-sand mixtures, little or fines.	10^{-1}	< 1	very permeable unacceptable
G.P. - Poorly graded gravels, gravel-sand mixtures, little or no fines.	10^{-1}	< 1	very permeable unacceptable
G.M. - Silty gravels, gravel sand-silt mixtures.	10^{-2} - 10^{-4}	4 - 12	Permeable to medium permeable depending on amount of silt.
G.C. - Clayey gravels, gravel-sand-clay mixtures.	10^{-4} - 10^{-6}	12 - 50	Important to estimate amount of silt and clay
S.W. - Well graded sands, gravelly sands little or no fines.	10^{-1} - 10^{-4}	2 - 12	medium permeability
S.P. - Poorly graded sands gravelly sand, little or no fines.	10^{-1} - 10^{-3}	2 - 8	medium permeability
S.M. - Silty sands, sand-silt mixtures.	10^{-3} - 10^{-5}	8 - 20	medium to low permeability
S.C. - Clayey sands, sand-clay mixtures.	10^{-4} - 10^{-6}	12 - 50	medium to low permeability (depends on amount of clay

TABLE 3
APPROXIMATE RELATIONSHIP OF SOIL TYPES
TO PERMEABILITY AND PERCOLATION TIME

SOIL TYPE (unified soil classification)	Coefficient of Permeability K - cm/sec.	Percolation Time- T mins/cm.	Comment
FINE GRAINED - MORE THAN 50% PASSING #200			
M.L. - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, clayey silts with slight plasticity	10^{-5} - 10^{-6}	20 - 50	medium to low permeability
C.L. - Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	10^{-6} and less	over 50	unacceptable
O.L. - Organic silts, organic silty clays of low plasticity; liquid limit less than 50	10^{-5} and less	20 - over 50	acceptable depends on clay content.
M.H. - Inorganic silts, micareaous or diatomageous fine sandy or silty soils, elastic silts	10^{-6} and less	over 50	unacceptable
C.H. - Inorganic clays of medium to high plasticity, organic silts	10^{-7} and less	over 50	unacceptable
O.H. - Organic clays of medium to high plasticity-organic silt; liquid limit over 50	10^{-6} and less	over 50	unacceptable

SELECTION OF "T" TIME FROM THE ABOVE TABULATION

A range of "T" times for each soil type is shown above. Select from within this range by determining if the soil is within the low, middle or high part of the range considering the soil identifiers and soil characteristics. Consider structure, density, colour, prevalence or organics, the clay content and minerology, the plasticity index and liquid limit and the functioning of existing systems in similar soils in the area.

Note: The following Ministry of the Environment Reports provide further information on the relationship between grain size, coefficient or permeability and percolative time.

- "Study on the Feasibility of Correlating Percolation Time with Laboratory Permeability" - 1975 - Research Report No. S56 by H. T. Chan, PhD., P.Eng.
- "Study of Conventional Tile Fields in Fine-Grained Soils" - 1979 Research Report 74 by H. T. Chan, PhD., P.Eng.

APPENDIX E

Site Water Balance

Dunlop Street, Barrie, Ontario, Water Balance Analysis

Dunlop Street West , Barrie Ontario		**Scenario 1 - Roof Runoff to Surface Drainage / Impervious Walkways**										
		Shallow rooted plants		**Medium rooted plants**		**Deep rooted plants**		**Water Feature/**	**Impervious Area**	**Roads & Flat Roofs**	**Pervious Walkways**	**Deep Rooted Plants**
		(lawns)		**(field/meadow)**		**(trees- flat areas)**		**Wetland**	**Roof - Sloped**	**Walkways**		**(trees-sloped areas**
Climate Data from Barrie WPCC			**(mm)**		**(mm)**		**(mm)**	**(mm)**	**(mm)**	**(mm)**	**(mm)**	**(mm)**
(1973 to 2017)		Soil Moisture	75	Soil Moisture	150	Soil Moisture	250	N/A	NA	NA		250
Evaporation Data from Bowmanville		Total Precip.	940	Total Precip.	940	Total Precip.	940	940	940	940	940	940
		Evapotrans.	538	Evapotrans.	580	Evapotrans.	600	746	94	141	141	600
		Surplus	402	Surplus	360	Surplus	340	194	846	799	799	340
		Pot Evapotr	606									
		Post-development		**Post-development**		**Pre/post-development**						
		Infiltrn factor	0.55	Infiltrn Factor	0.65	Infiltrn factor	0.75	0.0	0	0	0.85	0.65
		Runoff factor	0.45	Runoff factor	0.35	Runoff factor	0.25	1.0	0.9	0.85	0.15	0.35
Pre-development Water Balance												
Areas	**Total**	**Pervious**	**Pervious**	**Impervious**	**Impervious**	**Perv. Infil.**	**Perv. R/O**	**Perv. ET**	**Imperv Infil**	**Imper R/O**	**Imperv ET**	**Total**
	(m²)	**%**	**Area (m2)**	**%**	**Area (m2)**	**(m3)**	**(m3)**	**(m3)**	**(m3)**	**(m3)**	**(m3)**	**(m3)**
Open Space (meadow /cultivated field)	320	100	320			75	40	186				301
Open Space Forest -sloped	1,305	100	1,305			288	155	783				1,227
Open Space Forest - flat	1,060	100	1,060			270	90	636				996
Wetland	315			100	315					61	235	296
Open Space lawns (4 X 723m²)	2,892	100	2,892			639	523	1,556				2,718
Driveway (4X72m²)	288			100	288					230	41	271
House & Garage (4 X 155m²)	620			100	620					525	58	583
Patio/Sidewalks (4X 50m²)	200			100	200					160	28	188
Total	**7,000**		**5,577**		**1,223**	**1,273**	**809**	**3,160**		**976**	**362**	**6,580**
Volume check(area X precip)												6,580
Percent Error												- 0
Total lot area (7 x 1000m²)	7,000											
Post-development Water Balance												
Scenario 1-Runoff to surface drainage												
Open Space (meadow /cultivated field)	0	100	0			-	-	-				-
Open Space Forest -sloped	1,305	100	1,305			288	155	783				1,227
Open Space Forest - flat	345	100	345			88	29	207				324
Wetland	315	100	315							61	235	296
Open Space lawns	1,255	100	1,255			277	227	675				1,180
Paved areas/walkways	2,550			100	2,550					2,037	360	2,397
Building	1,230			100	1,230					983	173	1,156
Total												
Column Check												6,580
Total	**7,000**		**3,220**		**3,780**	**654**	**412**	**1,665**	**-**	**3,081**	**768**	**6,580**
Volume Check (area X precip.)												**6,580**
Percent Error												**-**
Volume Difference (m3/yr)												**0**
% Change Pre to Post-dev						**Pre-dev**	**Post-dev**	**%Change**	**(m3/yr)**	**(L/sec)**	**% of total precip**	**% of total precip**
						(m3/yr)	`				**pre-development**	**post-development**
Infiltration						1,273	654	**- 48.6**	- 619	- 0.020	**19.3**	**9.9**
Evapotransporation						3,523	2,433	**- 30.9**	- 1,089		53.5	37.0
Runoff						1,784	3,493	**95.7**	1,709		27.1	53.1
Total						6,580	6,580				100.0	100.0

Dunlop Street, Barrie, Ontario, Water Balance Analysis

Dunlop Street West , Barrie Ontario		**Scenario 2 - Roof Runoff to Infiltration Trench/Bed**										
		Shallow rooted plants		**Medium rooted plants**		**Deep rooted plants**		**Water Feature/**	**Impervious Area**	**Roads & Flat Roofs**	**Pervious Walkways**	**Deep Rooted Plants**
		(lawns)		**(field/meadow)**		**(trees- flat areas)**		**Wetland**	**Roof - Sloped**	**Walkways**		**(trees-sloped areas**
Climate Data from Barrie WPCC			**(mm)**		**(mm)**		**(mm)**	**(mm)**	**(mm)**	**(mm)**	**(mm)**	**(mm)**
(1973 to 2017)		Soil Moisture	75	Soil Moisture	150	Soil Moisture	250	N/A	NA	NA		250
Evaporation Data from Bowmanville		Total Precip.	940	Total Precip.	940	Total Precip.	940	940	940	940	940	940
		Evapotrans.	538	Evapotrans.	580	Evapotrans.	600	746	94	141	141	600
		Surplus	402	Surplus	360	Surplus	340	194	846	799	799	340
		Pot Evapotr	606									
		Post-development		**Post-development**		**Pre/post-development**						
		Infiltrn factor	0.55	Infiltrn Factor	0.65	Infiltrn factor	0.75	0.0	0	0	0.85	0.65
		Runoff factor	0.45	Runoff factor	0.35	Runoff factor	0.25	1.0	0.9	0.85	0.15	0.35
Pre-development Water Balance												
Areas	**Total**	**Pervious**	**Pervious**	**Impervious**	**Impervious**	**Perv. Infil.**	**Perv. R/O**	**Perv. ET**	**Imperv Infil**	**Imper R/O**	**Imperv ET**	**Total**
	(m²)	**%**	**Area (m2)**	**%**	**Area (m2)**	**(m3)**	**(m3)**	**(m3)**	**(m3)**	**(m3)**	**(m3)**	**(m3)**
Open Space (meadow /cultivated field)	320	100	320			75	40	186				301
Open Space Forest -sloped	1,305	100	1,305			288	155	783				1,227
Open Space Forest - flat	1,060	100	1,060			270	90	636				996
Wetland	315			100	315					61	235	296
Open Space lawns (4 X 723m²)	2,892	100	2,892			639	523	1,556				2,718
Driveway (4X72m²)	288			100	288					230	41	271
House & Garage (4 X 155m²)	620			100	620					525	58	583
Patio/Sidewalks (4X 50m²)	200			100	200					160	28	188
Total	**7,000**		**5,577**		**1,223**	**1,273**	**809**	**3,160**		**976**	**362**	**6,580**
Volume check(area X precip)												6,580
Percent Error												- 0
Total lot area (7 x 1000m²)	7,000											
Post-development Water Balance												
Scenario 1-Runoff to surface drainage												
Open Space (meadow /cultivated field)	0	100	0			-	-	-				0
Open Space Forest -sloped	1,305	100	1,305			288	155	783				1,227
Open Space Forest - flat	345	100	345			88	29	207				324
Wetland	315	100	315							61	235	296
Open Space lawns	1,255	100	1,255			277	227	675				1,180
Paved areas/walkways	2,550			100	2,550					2,037	360	2,397
Building	1,230			100	1,230				983		173	173
Total												
Column Check												5,597
Total	**7,000**		**3,220**		**3,780**	**654**	**412**	**1,665**	**983**	**2,099**	**768**	**6,580**
Volume Check (area X precip.)												**6,580**
Percent Error												**0**
Volume Difference (m3/yr)												**0**
% Change Pre to Post-dev						**Pre-dev**	**Post-dev**	**%Change**	**(m3/yr)**	**(L/sec)**	**% of total precip**	**% of total precip**
						(m3/yr)	`				**pre-development**	**post-development**
Infiltration						1,273	1,637	**28.6**	364	0.012	**19.3**	**24.9**
Evapotransporation						3,523	2,433	**- 30.9**	- 1,089		53.5	37.0
Runoff						1,784	2,510	**40.7**	726		27.1	38.1
Total						6,580	6,580				100.0	100.0