

HYDROGEOLOGICAL IMPACT ASSESSMENT

794047 COUNTY RD. 124

**VILLAGE OF SINGHAMPTON
COUNTY OF SIMCOE**

PREPARED FOR:

JKI CANADA UTILITIES INC.

PREPARED BY:

**C.F. CROZIER & ASSOCIATES INC.
2800 HIGH POINT DRIVE, SUITE 100
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JUNE 2021

CFCA FILE NO. 1836-5489

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by JKI Canada Utilities Inc. to complete a Hydrogeological Impact Assessment related to a proposed development located at 794047 County Rd. 124 in the Village of Singhampton of the Township of Clearview in the Simcoe County.

This report documents the work completed to understand the hydrogeological conditions at the site and the immediate area as well as to assess if the proposed development will have any impacts on nearby private wells. An assessment of the site as it pertains to the regional groundwater system is also addressed in this report and has been updated to address the first submission comments to the Township of Clearview.

1.1 Background

The subject property covers an area of approximately 0.53 ha and is legally described as part Lot 17, Concession 12, Township of Clearview, County of Simcoe. The property currently consists of a single building, housing a convenience store and gas station as well as a motel. The property is surrounded by commercial highway lands to the north, rural lands to the east and agricultural lands to the south within Clearview Township. To the west of the site within the Township of Grey Highlands, the lands are designated primarily development and rural with some hazard lands to the north west of the property along the Mad River. The subject property is currently accessed via two entrance/exit locations along County Road 124. Figure 1 displays the site location.

1.2 Proposed Development

The proposed development, based on the DRAFT Site Plan Figure C100 dated December 8, 2020, will involve the demolition of a portion of the motel building and repurposing of the remainder of the building to house a drive through Tim Hortons. There will also be a small addition to the rear of the existing building which will be required to facilitate the drive through portion of the development. There will be no change to the gas station operation as part of the redevelopment of this property. The development will be serviced via a drilled water supply well (new or existing) and an onsite septic system.

1.3 Study Approach

It is proposed that water will be provided to the development from groundwater supplied by either the existing drilled well on the site, or a newly drilled water supply should the existing well be deemed not suitable for increased use. This study will address changes to the groundwater system and identify changes which may have the potential to impact existing groundwater users in the area.

This report consists of a desktop review of a number of sources coupled with existing knowledge of the study area and familiarity with the hydrogeological setting. Information from the following sources was also reviewed and utilized in the creation of this report:

- Review of the Ministry of Environment, Conservation and Parks (MECP) Water Well Database
- Source Protection Information Atlas, MECP
- South Georgian Bay Lake Simcoe Source Protection Plan and Assessment Reports

- Review of available geologic mapping from Ontario Geological Survey (OGS), Ministry of Northern Development and Mines (MNDM), Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)
- Review of Hydrogeological Assessment Submissions – Conservation Authority Guidelines for Development Applications (2013)

2.0 Environmental Setting

2.1 Physiography

The site is located in the Horseshoe Moraines physiographic region of Ontario as per Chapman and Putnam (1984). Immediately to the east is the Niagara Escarpment Region and to the West are the Dundalk Till Plains. Figure 2 displays the physiography of the area.

The Horseshoe Moraines is a horseshoe shaped region flanking the region to the west of the Niagara Escarpment covering a total of approximately 5,590 square kilometers. The toe of this region lies on the highest part of the upland south of Georgian Bay at an elevation of 520 m asl (compared to an elevation of 240 m asl at the two heels). In the area near the site, the moraines lie along the brow and slopes of the escarpment extending from Singhampton south towards Caledon.

Immediately west of the site you will find the Dundalk Till Plain which is generally characterized by swamps and bogs and poorly drained soils. Despite this, in the area of Singhampton, it is characterized by shallow deposits of outwash which vary from sand and gravel to fine sand. The surface is blanketed with deep deposits of uniform aeolian silt which results locally in well drained soils. Chapman and Putnam speculate that this is also likely aided by vertical drainage into cracks in the bedrock, which is a feature of the Niagara Escarpment, located immediately east of the subject property.

2.2 Topography and Drainage

The site is approximately 17.5 km southwest of Georgian Bay within the Nottawasaga River Watershed. It is located near a regional high point which drains to the lower lying areas to the north and east eventually draining to Georgian Bay. Local runoff from the site flows north to Mad River which in turn meanders to the east approaching the Escarpment east of County Road 124. Within the Escarpment zone (World Biosphere Reserve), the Mad and Noisy Rivers cascade through deep, well-forested valleys, converging west of Creemore. From Creemore through Avening, the Mad River flows through a broad agricultural plain. Near Glencairn, the river enters a forested valley system that extends downstream to Angus. Flowing north, the Mad River enters the Minesing Wetlands where it discharges to the Nottawasaga River. Figure 3 displays the general topography and local drainage channels near the subject property.

2.3 Land Use

The site is located on the east side of County Road 124 approximately 500 m north of County Road 4 and 240 m south of the Mad River. There are a number of different land uses within 500 m of the subject property including residential hamlet (RS), Institutional (IN), rural (RU), agricultural (AG) and environmental (EP) within Clearview and development (D), residential (R), hazard (H) and highway service/commercial (C2) on the west side of County Road 124 which is Grey Highlands Township within Grey County.

The subject property is located approximately 290 m north of the nearest EP zoned lands within Clearview Township and approximately 100 m east of the nearest H zoned lands within Grey

Highlands Township. In their Official Plan (2015), Grey Highlands defines the intent of the H zoning designation as;

"The purpose of the Hazard Lands designation is to identify lands having inherent environmental hazard such as: floodplains, steep or erosion prone slopes, organic or unstable soils, poorly drained areas or lands that have seasonally and/or permanently high groundwater table, or other physical conditions which are severe enough to pose a risk to property or potential loss of life if the lands were to be developed."

2.4 Regional Geology

The bedrock of the subject property is indicated by OGS mapping as sandstone, dolostone and shale of the Amabel Formation. North east of the site, limestone and red shales of the Queenston Formation are the prominent bedrock type. Clays, silts, sands and gravel material of deposited by paleochannels of the Mad River overlay the bedrock on the subject property. Younger, modern fluvial deposits are found North of the site surrounding the current site of the Mad River. Further north and to the south of the site, stone poor, clayey silty till is the dominant surficial material. Figures 4 and 5 display the bedrock geology and surficial geology of the site respectively.

OGS Drift thickness mapping for the area indicates that the thickness of the overburden sediments in the area is approximately 5 – 10 m (300 ft) in the immediate area and remains relatively constant to the east, west and north. The site is located within high bedrock ridge that extends east towards Glen Huron.

2.4.1 Regional Hydrogeology

Regional hydrostratigraphy along the Niagara Escarpment is primarily comprised of the following aquifer units in stratigraphic order: A1, Guelph-Amabel and Clinton-Cataract. The A1 unit is an unconfined overburden aquifer characterized by coarse grained glacial sediments with interbedded silt clay till aquitards. This unit is thin and discontinuous in the area and often discharges to surface along steep slopes and precipices. The Guelph-Amabel aquifer unit is a confined regional bedrock aquifer characterized by porous, buff coloured fossiliferous dolostone. The primary aquifer unit within the subject area is the Clinton-Cataract aquifer. This weak aquifer unit is characterized by porous sandstones and dolostone.

Regional groundwater studies describe shallow and deep groundwater flow to generally follow surface topography and drainage within the Nottawasaga Valley Watershed. Groundwater migrates north towards Georgian Bay via the Mad River and its tributaries. Similarly, groundwater is interpreted to flow south to north across the subject property following topography.

2.5 Soil Profile

The soil profile for the area, based on the well records identified, show that the area is primarily underlain by clay sediments with abundant stoney material from near surface to a depth of at least 3.0 m. Limestone and shale is located beneath the overburden material in most cases.

This is supported by a geotechnical investigation that was conducted in February 2021 by HLV2K Engineering Limited. HLV2K completed four boreholes for geotechnical purposes on the site and found a thin layer of topsoil overlying fill materials to a depth of 1.5 – 2.0 m below grade and then a fine layer of silty/clay materials overlying a gravelly sand material.

3.0 Water Supply

The site is thought to be serviced by one (1) drilled well identified by well ID 5706894. The supply well is a 127 mm diameter (5 inch) drilled well-constructed in 1969 to a total depth of 15.24 m. The Well Record indicates that the well contractor encountered a brown sand (fine, loose) from 0 – 1.22 m and was identified as fill. Below the sand fill was identified as till material with gravel and stones from 1.22 to 4.88 m. At 4.88 m, limestone was encountered and was screened within the limestone is interpreted to be hydraulically linked to the surficial material above. The well was tested for a duration of 4 hours at a rate of 75.7 L/min (20 lgpm) and the recommended pumping rate was 75.7 L/min (20 lgpm).

The material noted in the well record is consistent with OGS mapping for surficial materials. Mapping as shown in Figure 5 indicates that the surficial material on the site is primarily clay, silt, sand and gravel which generally matches the overburden description in the well record. However, the well record indicates that the material is "till" however mapping characterizes the material as "alluvial" which is more likely considering the site location to the Mad River.

A review of well record ID 5706894 indicates that the well complies with the minimum depth of casing below grade of at least 6.0 mbgs. The well was constructed in 1969 by a licensed well contractor under all applicable regulations at the time. No indications of any surface water impacts to the well are noted by the owner to date. It is the responsibility of the well owner to maintain the well in good working condition.

Unless there is an MECP order to a water quality issue related to the water supply on site, there is no strict obligation for the owner to upgrade the well. There is no evidence to suggest that the well cannot provide water to the future development of the site. Therefore, Crozier cannot support the recommendation to replace the well with a new well. In the opinion of Crozier, the existing well is likely to have 30 – 50 years of serviceable life remaining.

3.1 MECP Water Well Record Search

A search of the MECP Water Well Database was completed in order to identify wells located within 1 km of the site boundaries. A summary of the identified wells can be found in Appendix A. Figure 6 displays the wells within 1 km of the subject property.

There are 121 wells identified within 1 km of the subject property as shown in Figure 6. The majority of the wells were drilled for domestic purposes. Nine (9) of the wells were identified for monitoring purposes. Three (3) of the records were listed as abandonment records.

The majority of the wells in the area are constructed within a regionally extensive limestone bedrock unit located approximately 15 ft below the surface. Well ID (5722827), well ID (7120265), and well ID (7120267) are noted to be screened in localized a sand and gravel unconfined aquifer located north east of the subject property.

Well ID 5706894 is located behind the existing motel on the subject property as discussed previously. The well was constructed in 1970 for domestic purposes. No abandonment records for this location.

3.2 Door-to-Door Survey

As per recommendation by the Township Consulting Engineers Submission 1 comments, a door-to-door survey was completed to confirm the locations and details of nearby wells to the subject property. The door-to-door survey was conducted on June 25, 2021. A questionnaire was used to address the following about the wells on the adjacent properties:

- Property address
- Existence of a well on the property
- Well use, age, depth
- History of water quantity and quality

A copy of the questionnaire and obtained responses are included in Appendix B. Figure 7 displays the addresses visited during the door-to-door survey.

During the survey, twenty-one (21) properties within 500 m of the subject property were visited as shown in Figure 7. At the time of this report, only one (1) response had been obtained via phone call and is included in Appendix B. The owner of the property across Highway 124 located at 794058 Simcoe County 124 indicated a historic issue with gasoline contamination in their drinking water well and the neighbours wells 8 – 10 years ago. Crozier is unaware of any historical well contamination issues related to the operation of the gas station and does not note any exceedances of Provincial Water Quality Objectives (PWQO) in sampled water for parameters related to gasoline contamination. Further discussion of water quality is included in Section 3.3 and Appendix C.

A letter summarizing the full results of the door-to-door survey following the receipt of at least 10% of responses or 1 month past the survey date will be prepared and submitted to the Township for review.

3.3 Water Quality

One (1) water sample was collected from the inside tap located at the coffee station in the existing convenience store on the subject property on January 20th, 2021. The sample was obtained using standard sampling procedures and it was confirmed by the owner that no water treatment system other than a water softener is operational on site. The water sample was submitted to a licensed, third party laboratory for analysis for bacterial indicators (E. Coli, Heterotrophic Plate Count) polyaromatics hydrocarbons (PAHs), petroleum hydrocarbons (PHCs), volatile organic compounds (VOCs), metals, and inorganics.

No exceedances of the Ontario Drinking Water Quality Standards (O.Reg. 169/03) are noted. Please refer to Appendix C for the full certificate of analysis from the Laboratory.

3.4 On-Site Water Supply

3.4.1 Current Water Supply Requirements

The site currently consists of a gas bar and convenience store. No Permit to Take Water (PTTW) has been issued for the site and no water taking records are available therefore Crozier is assuming that the total water demand is less than the 50,000 L/d threshold required for a PTTW.

From sewage flow calculations conducted by Gunnell Engineering LTD. it was determined that two (2) water closets are currently located in the on-site building, each assumed to have one (1) sink each. One (1) sink is also noted to be located at the small coffee station in the building. The daily existing sewage flows were determined as shown in Table 1 using Ontario Building Code (OBC) (Table 8.2.1.3.B). Detailed calculations are shown in Appendix D.

Table 1: Existing Daily Sewage Flows & Water Demand (Gunnell, 2021)

Occupancy	Unit Flow	Number of Units	Total Daily Design Flow (L/day)
Gas Station and Store	560 L/pump	8	4,480
	950 L/water closet	2	2,460
Total Daily Existing Sanitary Sewage Flow:			6,940
Total Daily Existing Water Demand:			6,940

The existing daily sewage flow was determined to be 6,940 L/day and it can be assumed that the total water use of the existing facilities is approximately 6,940 L/day.

3.4.2 Proposed Water Supply Requirements

The daily sewage flow, as determined by Gunnell Engineering Ltd, was calculated using Table 8.2.1.3.B. of the OBC and is shown in Table 2 below. Detailed calculations are shown in Appendix D.

Table 2: Future Daily Sewage Flows & Water Demand (Gunnell, 2021)

Occupancy	Unit Flow	Number of Units	Total Daily Design Flow (L/day)
Tim Hortons Drive Thru	190 L/9.25 m ²	68 m ²	1,397
	75 L/8-hour shift x 2 shifts	6	900
Contingency Allowance	400 L	1	400
Office Space	75 L/9.3 m ²	34 m ²	274
Gas Station and Store	560 L/pump	8	4,480
	950 L/water closet	2	2,460
Total Daily Existing Sanitary Sewage Flow:			9,910
Total Daily Existing Water Demand:			9,910

Sanitary flows are calculated using maximum flows. Therefore, maximum day water demand is not expected to exceed 9,910 L/day and certainly not 50,000 L/day. Assuming that the water demand will be equal to the sewage flow requirements, the total water demand will be considered 9,910 L/day.

3.4.3 Water Supply Potential

Following construction of Well 5706894 on site in 1970 the well was test pumped for a total of 4 hours at a rate of 90.84 L/min. The reported static water level was 2.46 meters below grade (mbg) and the water level decreased a total of 0.30 m after 4 hours to 2.76 mbg. The well contractor recommended that the well could support a pumping rate of 90.8 L/min. It should be noted that the requirement for measuring water level and pumping rate at the time of construction were less well defined as they are now, so these results should be considered rough estimates.

Based on the estimate provided by the well contractor and the fact that there have been no reported issues with water supply from this well, Crozier is of the opinion that this well is suitable to provide water at a rate required for the future proposed development.

3.4.4 Potential Hydraulic Influence

The nearest offsite well record appearing within the MECP database to the site (Well 2512845) is located approximately 120 m to the north west of the site and is constructed in the same aquifer as the onsite water well. It should be noted that there are a number of residential properties closer than 120 m to the site, the nearest being a residential dwelling immediately adjacent to the site on the west side. The fact that the MECP well record database does not show any wells at these locations could mean that the wells are old, predating the database (older than 1960), that they are dug wells that were constructed without record, or that the records exist but were not plotted in their correct location.

The current well has been in operation since 1970 with no reported adverse effects to adjacent properties or wells. Since the water use is not anticipated to increase significantly, Crozier does not anticipate that there will be any future groundwater impacts observed off site.

4.0 Policy Areas

The subject lands are located within the Nottawasaga Valley Source Protection Area and are regulated under the South Georgian Bay Lake Simcoe Region (SGBLSR) Source Protection Plan. Upon reviewing the Source Protection Information Atlas, no wellhead protection areas, intake protection zones or issue contributing areas.

The subject lands are identified as a significant groundwater recharge area and overlies a highly vulnerable aquifer. This area is deemed "moderate" in terms of groundwater vulnerability by the SGBLSR Source Protection Plan with a vulnerability score of 6, suggesting surface contamination could potentially travel to the water source and precautions should be taken.

Based on the vulnerability score above, the following policies apply to the subject lands to protect water resources in the study area. The referenced SGBLSR Source Protection Plan policies are listed in bold:

- Operation and maintenance of a waste disposal site excluding hazardous and PCB waste material is permitted if a risk management plan outlining contemporary standards and practices for waste disposal sites in Ontario. Ministry approval is required under the Environmental Protection Act for the establishment of new waste disposal sites where the activity could be a significant drinking water threat (**WAST(b)-1, WAST(b)-2, WAST(b)-3, WAST(b)-4**).
- Operation, storage and maintenance of systems that collect, treat or transmit wastewater including stormwater management facilities, sanitary pipes and onsite sewage treatment systems is permitted with approval from the Ministry. Terms of the Environmental Compliance Approval (ECA) will outline conditions in which the system can cease to be a significant drinking water threat. Where approval is not required, a risk management plan must be prepared (**SEWG(a)-1, SEWG(b)-1, SEWG(b)-2, SEWG(b)-3, SEWG(b)-4**).
- Establishment of a new large on-site sewage system (>10,000 L) is prohibited where the operation, and maintenance of the system could be a significant drinking water threat. Existing large on-site sewage systems must maintain compliance with the ECA. Establishment, operation and maintenance of small (<10,000 L) on-site sewage systems are permitted with the application of contemporary best practices for on-site sewage systems (**SEWG(c)-1, SEWG(c)-2**).

- Handling, storage and application of agricultural source material (ASM) under Ontario Regulation of 267/03 is prohibited in WHPA-A. Use of ASM is permitted outside the WHPA-A if a risk management plan is prepared (**ASM(App)-1, ASM(App)-2, ASM(App)-3, ASM(App)-4, ASM(Store)-1, ASM(Store)-2, ASM(Store)-3, ASM(Store)-4**).
- Use of category 2 and category 3 non-agricultural source materials (NASM) under Schedule 4 of Ontario Regulation 267/03 including but limited to industrial organic food waste, culled crops, sewage biosolids and paunch manure is prohibited within the WHPA-A. Use of these materials outside of the WHPA-A is permitted if a risk management plan is prepared outlining best practices for handling, storage and application. Handling, storage and application of category 1 NASM within the WHPA-A is subject to an approval under the Nutrient Management Act (O.Reg 267/03) (**NASM(H&S)-1, NASM(H&S)-2, NASM (H&S)-3, NASM(App)-1, NASM(App)-2, NASM(App)-3, NASM(App)-4**).
- Application of commercial fertilizers and pesticides is permitted if a risk management plan for both fertilizers and pesticides is prepared and best contemporary practices are followed. The related policies require the consultation of a certified crop advisor, soil testing (nitrogen-phosphorous-potassium tests) to be completed and crop rotation techniques be applied. It is stated that the storage of liquid fertilizer be done in double-walled tanks or secondary containment facilities and dry fertilizers be stored on an impervious surface under shelter from the elements (**FERT(ICA)-1, FERT(App)-2, FERT(H&S)-1, FERT(H&S)-2, PEST(App)-1, PEST(H&S)-1, PEST(H&S)-2**).
- Excluding domestic usage, application of road salt is permitted if a risk management plan is prepared outlining best practices, management and terms of reduction salt application in the future (**SALT(App)-1, SALT(H&S)-1, SALT(H&S)-2**).
- Use of DNAPLs and organic solvents is only permitted in the area if a risk management plan is prepared outlining best practices for handling and storage of these materials according to contemporary standards (**DNAPL-1, SOLV-1**).

5.0 Conclusions

Based on the Hydrogeological Impact Assessment, Crozier has reached the following conclusions:

- There is no source of municipal water in the immediate area surrounding the site.
- The water demand for the proposed development is less than 50,000 L/d and is calculated to be approximately 9,910 L/day. Therefore, a PTTW will not be required.
- One (1) water supply well exists on site to a depth of 15.24 m and obtains water from the limestone bedrock aquifer. The aquifer is overlain by sand and gravel deposits.
- Regional shallow and deep groundwater flow is in the northern direction towards Georgian Bay and generally follows the surface topography in Simcoe County.
- The onsite well is theoretically capable of supplying water for the future proposed development.
- Crozier does not anticipate any impacts to the groundwater aquifer or offsite wells as a result of this development.

- The subject lands are identified as a significant groundwater recharge area and overlies a highly vulnerable aquifer. This area is deemed "moderate" in terms of groundwater vulnerability by the SGBLSR Source Protection Plan with a vulnerability score of 6, suggesting surface contamination could potentially travel to the water source and precautions should be taken.
- There would be no negative impacts to the local or regional aquifer resources due to the proposed water taking and development at this site.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



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APPENDIX A

Well Record Summary Table

MECP WATER WELL RECORDS							
Project Number: 1836 - 5489			Address: 794047 County Rd. 124, Singhampton				
Prepared by: Caitlyn MacPhee			Date completed: 2021-01-11				
Well ID	Diameter (cm)	Depth (m)	Static Level	Material	Aquifer ¹	Use	Notes
7337260	5.1	8.5	-	clay/sand/dolostone	-	monitoring	-
7050684	15.9	37.2	12.50	clay/stones/shale	BR	domestic	-
7120268	15.2	4.0	-	gravel/clay/sand	-	monitoring	-
5735655	15.9	42.1	12.20	clay/limestone/shale	BR	domestic	-
5722674	12.7	9.1	-	gravel/limestone	-	monitoring	-
2509064	15.9	30.5	4.90	clay/limestone/shale	BR	domestic	-
5724827	12.7	43.3	5.50	clay/stones/limestone/shale	BR	domestic	-
5710454	10.2	22.9	3.70	clay/gravel/limestone	BR	domestic	-
5722827	12.7	22.9	6.10	clay/stones/sand/gravel	OB	domestic	-
7140150	15.9	30.5	7.30	sand/limestone/shale	BR	domestic	-
5702603	10.2	29.0	13.40	-	-	domestic	geology described as 'rock'
5706015	10.2	19.8	6.70	clay/shale/limestone/shale	BR	domestic	-
5702599	10.2	21.6	5.20	clay/stones/limestone	BR	domestic	-
5735355	15.9	31.1	8.20	clay/limestone/shale	BR	domestic	-
5712783	12.7	27.4	6.10	clay/stones/limestone	BR	domestic	-
5739974	15.9	25.0	5.50	clay/stones/limestone	BR	domestic	-
2516467	15.2	17.7	1.50	sandy clay/gravel/limestone	BR	domestic	-
2505318	12.7	31.4	10.70	clay/stones/limestone	BR	domestic	-
2501830	10.2	15.2	4.60	clay/limestone/shale	BR	domestic	-
2501829	10.2	15.8	5.20	clay/shale/limestone	BR	domestic	-
7339032	15.9	29.9	3.80	clay/stones/limestone	BR	domestic	-
2504714	12.7	13.7	8.80	clay/stones/limestone	BR	domestic	-
5725590	15.9	30.5	6.10	limestone/shale	BR	domestic	-
5702601	10.2	18.6	4.30	limestone	BR	commercial	-
5736909	15.9	30.2	3.00	gravel/limestone/shale	BR	commercial	-
5702611	10.2	17.1	7.60	fill/shale/limestone	BR	domestic	-
5722673	12.7	5.8	-	gravel/limestone	-	monitoring	-
7235026	15.2	35.7	8.50	sand/gravel/limestone	BR	domestic	-
5706095	10.2	20.4	4.30	clay/shale/limestone	BR	domestic	-
2514388	15.9	37.2	10.70	clay/stones/limestone/shale	BR	domestic	-
7235025	10.2	-	-	-	-	-	abandoned
2512845	15.9	18.3	1.50	clay/gravel/limestone	BR	domestic	-
2501827	10.2	15.2	4.60	limestone	BR	domestic	-
5702600	10.2	16.8	3.00	clay/limestone	BR	domestic	-
5702597	15.2	21.3	4.90	clay/stones/limestone	BR	domestic	-
5718831	12.7	30.5	6.10	clay/gravel/limestone	BR	domestic	-
5702594	10.2	25.9	5.50	limestone	BR	public	-
2504223	15.2	35.0	5.50	clay/limestone	BR	domestic/ commerical	-
2506428	15.9	33.8	4.90	gravel/clay/shale/limestone	BR	domestic	-
5727331	15.2	18.3	9.10	clay/stones/limestone	BR	domestic	-
5733195	15.9	33.2	9.10	clay/limestone/shale	BR	domestic	-
2516434	13.0	-	8.20	-	-	-	abandoned
5702614	10.2	20.7	4.90	clay/limestone	BR	domestic	-
5722671	12.7	4.0	-	gravel/limestone	OB	monitoring	-
5713579	12.7	18.6	-	clay/gravel/limestone	BR	domestic	-
5702592	12.7	15.5	4.30	clay/limestone	BR	municipal	-
5741114	15.9	32.0	6.10	clay/limestone/shale	BR	domestic	-
5725589	15.2	30.5	6.40	limestone/shale	BR	domestic	-
5702595	10.2	20.4	6.10	limestone	BR	domestic	-
5718132	12.7	28.4	7.00	clay/gravel/limestone	BR	domestic	-
5709240	15.2	31.1	3.70	clay/stones/limestone/shale	BR	domestic	-
5708852	10.2	27.4	9.10	limestone	BR	domestic	-
5710012	12.7	30.5	4.30	limestone	BR	domestic	-
5708782	12.7	20.7	2.40	clay/sand/shale/limestone	OB	domestic	-
2509185	12.7	32.0	7.00	clay/gravel/limestone	BR	domestic	-
2504224	12.7	30.5	7.30	clay/limestone	BR	domestic	-
7120266	12.7	4.0	-	clay/sand/gravel/clay	OB	monitoring	-
5714235	15.2	26.5	7.30	clay/shale/limestone	BR	domestic	-
5702615	10.2	12.2	3.00	limestone	BR	domestic	-
5711041	12.7	26.5	4.60	clay/stones/shale/limestone	BR	domestic	-
2507366	15.2	37.5	10.40	clay/limestone	BR	domestic	-
5706949	10.2	21.3	6.10	clay/stones/limestone	BR	domestic	-
2503033	10.2	30.8	9.10	limestone	BR	domestic	-
5722496	12.7	22.6	11.30	clay/stones/limestone/shale	BR	domestic	-
5702616	10.2	18.9	2.40	limestone	BR	public	-
5702604	10.2	19.5	4.30	clay/stones/limestone	BR	domestic	-
5714315	15.2	22.9	4.60	limestone	BR	domestic	-
5711724	12.7	24.4	7.60	clay/stones/shale/limestone	BR	domestic	-
5702606	12.7	24.4	9.10	gravel/clay/limestone	BR	domestic	-
7120265	5.2	4.0	-	clay/sand/clay	OB	monitoring	-
2517052	15.9	37.2	10.70	clay/stones/limestone	BR	domestic	-
5710455	10.2	34.8	10.10	limestone/shale	BR	domestic	-
5702613	10.2	21.3	4.30	clay/stones/limestone	BR	domestic	-
2507256	12.7	15.2	-	gravel/clay/limestone	BR	domestic	-
2514019	15.9	33.5	8.20	clay/limestone/shale	BR	domestic	-
2513218	15.9	37.2	7.60	clay/stone/limestone/shale	BR	domestic	-
5702598	10.2	18.3	9.10	clay/limestone	BR	livestock	-
2501825	10.2	30.8	5.20	-	-	domestic	geology described as 'rock'

Well ID	Diameter (cm)	Depth (m)	Static Level	Material	Aquifer ¹	Use	Notes
5702607	10.2	29.3	9.10	clay/stones/sand/limestone	BR	domestic	-
5706950	12.7	29.3	11.00	clay/limestone	BR	domestic	-
7118872	15.9	60.4	10.40	gravel/limestone/shale	BR	commercial	-
5722672	12.7	9.1	-	gravel/limestone	-	testhole	-
5705523	10.2	22.9	4.3	limestone	BR	domestic	-
5706894	12.7	15.2	2.4	clay/stones/limestone	BR	domestic	-
2509186	12.7	30.5	7	clay/limestone/shale	BR	domestic	-
5724719	15.9	24.4	9.1	limestone	BR	domestic	-
5702602	10.2	15.2	10.7	clay/limestone	BR	domestic	-
5702596	10.2	25	5.8	limestone	BR	domestic	-
2501833	10.2	32	3	clay/shale/limestone	BR	domestic	-
5716702	15.2	36.6	2.7	clay/limestone/shale	BR	domestic	-
5706673	10.2	26.5	12.2	-	-	domestic	geology described as 'rock'
2504866	15.2	35.7	4.6	clay/stones/limestone/shale	BR	domestic	-
5706014	10.2	19.8	1.2	clay/limestone	BR	domestic	-
2504309	12.7	12.5	1.5	clay/stones/shale/limestone	BR	domestic	-
5706921	12.7	29.3	7.6	clay/stones/shale/limestone	BR	domestic	-
5702609	10.2	34.4	2.7	clay/shale/limestone	BR	domestic	-
7341685	15.2	35.4	11.4	sand/gravel/limestone	BR	domestic	-
7341764	15.2	53.6	11	silt/gravel/limestone/shale	BR	domestic	-
5732401	15.2	29.9	7.3	clay/limestone/shale	BR	domestic	-
5702593	10.2	18.3	6.1	limestone	BR	domestic	-
5702605	10.2	33.5	7.3	sand/limestone/shale	BR	domestic/ commercial	-
7299020	-	-	-	-	-	-	empty record
5725535	15.2	30.5	15.2	clay/limestone/shale	BR	domestic	-
2508693	12.7	30.8	6.4	clay/stones/limestone	BR	domestic	-
5724905	15.2	23.2	5.8	clay/gravel/limestone	BR	domestic	-
5734387	15.9	36	9.4	clay/stones/limestone/shale	BR	domestic	-
5702610	10.2	24.1	6.1	clay/shale/limestone	BR	domestic	-
7302610	15.9	5.5	5.6	clay/stones/limestone	BR	domestic	-
7053311	15.9	30.2	11	clay/stones/limestone	BR	domestic	-
5724891	15.2	23.8	14.6	clay/stones/gravel/limestone	BR	domestic	-
5716612	12.7	21.3	13.7	gravel/limestone	BR	domestic	-
7120267	5.2	4	-	clay/sand/gravel/clay	OB	monitoring	-
5706013	10.2	29	4.6	clay/limestone	BR	domestic	-
2508009	15.2	36.6	8.5	clay/shale/limestone	BR	domestic	-
5702608	10.2	20.7	6.1	gravel/limestone	BR	domestic	-
2501828	10.2	18.9	4.3	limestone	BR	domestic	-
5725592	15.2	30.5	6.4	clay/limestone/shale	BR	domestic	-
7278055	15.9	31.1	6.4	clay/stones/limestone/shale	BR	domestic	-
5712532	12.7	24.4	7.6	clay/shale/limestone	BR	domestic	-
5727483	15.2	36.6	-	clay/limestone/shale	BR	domestic	-
2501826	10.2	19.5	4.3	limestone	BR	domestic	-

Data Source: Ministry of the Environment, Conservation, and Parks, retrieved January 11th 2021.

1. OB = overburden aquifer BR = bedrock aquifer

APPENDIX B

Door-to-Door Survey Summary

JUNE 25, 2021

PROJECT NO: 1836 - 5489

SENT VIA: HAND DELIVERED

Attention: Property Owner/Tenant

**RE: DOOR TO DOOR WELL SURVEY
SINGHAMPTON, ONTARIO**

To whom it may concern,

We have been retained by the Owner of 794047 County Road 124, Singhampton to assist them with obtaining approvals for proposed drive thru coffee shop and associated improvements to the property. We are conducting a door to door well survey to determine the location and use of any private supply wells in the area. We would appreciate participation in this survey for our work.

Attached is a questionnaire concerning your property and private well (if applicable). Please review and provide your responses via email to cmacphee@cfcrozier.ca. Alternatively, please feel free to call our office to provide us with your Questionnaire responses. Rest assured, we will not share your contact information with any third parties.

If you do not use your well for drinking water, please consider decommissioning your well. The Grey Bruce Health Unit provides great resources on maintaining private wells and good water quality on your property and can be accessed at the following site:

<https://www1.publichealthgreybruce.on.ca/Your-Environment/Safe-Water/Private-Drinking-Water>

Should you have any questions or require any further information, please do not hesitate to contact the undersigned.

Sincerely,

CROZIER CONSULTING ENGINEERS



Caitlyn MacPhee, E.I.T./G.I.T.
Hydrogeology
CM/stm

Enclosure

J:\1800\1836-JKI Canada Utilities\5489_794047 County Rd. 124\Letters\5489_Well Survey Questionnaire\21.06.22 - Well Survey Letter and Questionnaire.docx

Door to Door Well Survey Questionnaire

1. What is your address?
2. Do you have a private well on your property?
3. Does your well supply your drinking water?
4. What is the age of your well?
5. Is it a dug or drilled well?
6. How deep is your well?
7. Do you have any records for the well?
8. Have you had any quantity or quality issues with your well?

If you are willing, please provide your contact information for any follow up questions we may have:

Reminder: Your contact information will not be shared with any third parties.

If you do not use your well for drinking water, please consider decommissioning your well.

Date 21.06.25

Project No: 1836

Prepared By: CM

Reviewed By: CG1

Project Singhampton - Tim Hortons

Subject Well Survey

time: 8:50am

Church St.

11 → left letter, no visible well on property

124 hwy

794075 → well out front, left letter

794071 → left letter

794090 → left letter

794096 → left letter, appears a concrete casing at front of house

Ultramar (the site)

→ took photos of well
→ informed of survey

station 5 fire hall (794055)

→ left letter, appears to have large diameter well see photos

794059 → well out front, left letter

Gershom St.

blue house → left letter, no visible well on property, propane tank in front

7 → left letter no well visible propane tank in front yard

white house → left letter talked to resident

5 → left letter, talked to resident

2 → left letter, talked to resident

Haijoi restaurant and bakery → well approx 10m from Gershom ~~see~~ see photo tag # A077386

(794077) settlement house → well in back see photo

Date 21.06.25 Project No: 1836-5489 Prepared By: CM Reviewed By: CG

Project Singhampton - Tim Hortons

Subject Well Survey

upwell st

101 → well hut located across upwell to house (observed)
left letter

may 24 → 102 → left letter, well hut out front (observed)

(794062)
blue house, upwell 124bury well visible from road
of upwell (see photo), observed leaching pond
in front, left letter

794060 → left letter

794046 → left letter, small well hut out front

794034 → left letter, well visible from road back
corner of property approx 60m from bury 124

794017 → left letter

Door to Door Well Survey Questionnaire

1. What is your address?

794058 Simcoe County Road 124

2. Do you have a private well on your property?

yes

3. Does your well supply your drinking water?

yes - assumed from conversation

4. What is the age of your well?

—

5. Is it a dug or drilled well?

—

6. How deep is your well?

—

7. Do you have any records for the well?

owner indicated that they have records
of MECP complaint

8. Have you had any quantity or quality issues with your well?

Indicated that problems have occurred in the last ten years
with gasoline contamination from and a complaint was filed
with the ministry of environment

If you are willing, please provide your contact information for any follow up questions we may have:

Garry Lipset
(705-994-5771)

Reminder: Your contact information will not be shared with any third parties.

If you do not use your well for drinking water, please consider decommissioning your well.

APPENDIX C

Certificate of Analysis

CLIENT NAME: CROZIER & ASSOCIATES
301-40 HURON STREET
COLLINGWOOD, ON L9Y4R3
905-875-0026

ATTENTION TO: Caitlyn Macphee

PROJECT: 1836-5489

AGAT WORK ORDER: 21T701864

MICROBIOLOGY ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

WATER ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer

DATE REPORTED: Jan 29, 2021

PAGES (INCLUDING COVER): 21

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

***Notes**

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T701864

PROJECT: 1836-5489

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: CROZIER & ASSOCIATES

SAMPLING SITE:

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

E. Coli (Using MI Agar)

DATE RECEIVED: 2021-01-20

DATE REPORTED: 2021-01-29

SAMPLE DESCRIPTION: SA1-5489-21

SAMPLE TYPE: Water

DATE SAMPLED: 2021-01-20
09:05

Parameter	Unit	G / S	RDL	1983126
Escherichia coli	CFU/100mL		1	ND

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

1983126 ND - Not Detected.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Nivine Basly



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T701864

PROJECT: 1836-5489

5835 COOPERS AVENUE
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<http://www.agatlabs.com>

CLIENT NAME: CROZIER & ASSOCIATES

SAMPLING SITE:

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

Heterotrophic Plate Count in Water

DATE RECEIVED: 2021-01-20

DATE REPORTED: 2021-01-29

SAMPLE DESCRIPTION: SA1-5489-21

SAMPLE TYPE: Water

DATE SAMPLED: 2021-01-20
09:05

Parameter	Unit	G / S	RDL	1983126
Heterotrophic Plate Count	CFU/1ml		5	ND

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

1983126 ND - Not Detected.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Nivine Basly



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T701864

PROJECT: 1836-5489

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FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: CROZIER & ASSOCIATES

SAMPLING SITE:

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

O. Reg. 153(511) - PAHs (Water)

DATE RECEIVED: 2021-01-20

DATE REPORTED: 2021-01-29

SAMPLE DESCRIPTION: SA1-5489-21

SAMPLE TYPE: Water

DATE SAMPLED: 2021-01-20
09:05

Parameter	Unit	G / S	RDL	1983126
Naphthalene	µg/L		0.20	<0.20
Acenaphthylene	µg/L		0.20	<0.20
Acenaphthene	µg/L		0.20	<0.20
Fluorene	µg/L		0.20	<0.20
Phenanthrene	µg/L		0.10	<0.10
Anthracene	µg/L		0.10	<0.10
Fluoranthene	µg/L		0.20	<0.20
Pyrene	µg/L		0.20	<0.20
Benzo(a)anthracene	µg/L		0.20	<0.20
Chrysene	µg/L		0.10	<0.10
Benzo(b)fluoranthene	µg/L		0.10	<0.10
Benzo(k)fluoranthene	µg/L		0.10	<0.10
Benzo(a)pyrene	µg/L		0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.20	<0.20
Dibenz(a,h)anthracene	µg/L		0.20	<0.20
Benzo(g,h,i)perylene	µg/L		0.20	<0.20
2-and 1-methyl Naphthalene	µg/L		0.20	<0.20
Sediment				No

Surrogate	Unit	Acceptable Limits	
Naphthalene-d8	%	50-140	96
Acenaphthene-d10	%	50-140	90
Chrysene-d12	%	50-140	112

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

1983126 Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&(j)Fluoranthene isomers because the isomers co-elute on the GC column. 2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
Sediment parameter is comment only based on visual inspection of the sample prior to extraction and is not an accredited test.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

N Popmukolof



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T701864

PROJECT: 1836-5489

5835 COOPERS AVENUE
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FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: CROZIER & ASSOCIATES

SAMPLING SITE:

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Water)

DATE RECEIVED: 2021-01-20

DATE REPORTED: 2021-01-29

SAMPLE DESCRIPTION: SA1-5489-21

SAMPLE TYPE: Water

DATE SAMPLED: 2021-01-20
09:05

Parameter	Unit	G / S	RDL	1983126
F1 (C6-C10)	µg/L		25	<25
F1 (C6 to C10) minus BTEX	µg/L		25	<25
F2 (C10 to C16)	µg/L		100	<100
F2 (C10 to C16) minus Naphthalene	µg/L		100	<100
F3 (C16 to C34)	µg/L		100	<100
F3 (C16 to C34) minus PAHs	µg/L		100	<100
F4 (C34 to C50)	µg/L		100	<100
Gravimetric Heavy Hydrocarbons	µg/L		500	NA
Sediment				No
Surrogate	Unit	Acceptable Limits		
Toluene-d8	% Recovery	50-140		101
Terphenyl	% Recovery	60-140		101

Comments:

1983126

RDL - Reported Detection Limit; G / S - Guideline / Standard

The C6-C10 fraction is calculated using toluene response factor.

C6-C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present. The chromatogram has returned to baseline by the retention time of nC50.

Total C6 - C50 results are corrected for BTEX and PAH contributions.

C>10 - C16 (F2- Naphthalene) is a calculated parameter. The calculated value is F2 - Naphthalene.

C>16 - C34 (F3-PAH) is a calculated parameter. The calculated value is F3-PAH (PAH: sum of Phenanthrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-c,d)pyrene and Pyrene).

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 + nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Sediment parameter is comment only based on visual inspection of the sample prior to extraction and is not an accredited test.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T701864

PROJECT: 1836-5489

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FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: CROZIER & ASSOCIATES

SAMPLING SITE:

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

Volatile Organic Compounds in Water (ug/L)

DATE RECEIVED: 2021-01-20

DATE REPORTED: 2021-01-29

SAMPLE DESCRIPTION: SA1-5489-21

SAMPLE TYPE: Water

DATE SAMPLED: 2021-01-20
09:05

1983126

Parameter	Unit	G / S	RDL
Dichlorodifluoromethane	µg/L	0.20	<0.20
Chloromethane	µg/L	0.40	<0.40
Vinyl Chloride	µg/L	0.17	<0.17
Bromomethane	µg/L	0.20	<0.20
Chloroethane	µg/L	0.20	<0.20
Trichlorofluoromethane	µg/L	0.40	<0.40
Acetone	µg/L	1.0	<1.0
1,1-Dichloroethylene	µg/L	0.2	<0.2
Methylene Chloride	µg/L	0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.20	<0.20
Methyl tert-butyl ether	µg/L	0.20	<0.20
1,1-Dichloroethane	µg/L	0.30	<0.30
Methyl Ethyl Ketone	µg/L	1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L	0.20	<0.20
Chloroform	µg/L	0.20	<0.20
1,2-Dichloroethane	µg/L	0.20	<0.20
1,1,1-Trichloroethane	µg/L	0.30	<0.30
Carbon Tetrachloride	µg/L	0.20	<0.20
Benzene	µg/L	0.20	<0.20
1,2-Dichloropropane	µg/L	0.20	<0.20
Trichloroethylene	µg/L	0.20	<0.20
Bromodichloromethane	µg/L	0.20	<0.20
cis-1,3-Dichloropropene	µg/L	0.20	<0.20
Methyl Isobutyl Ketone	µg/L	1.0	<1.0
trans-1,3-Dichloropropene	µg/L	0.30	<0.30
1,1,2-Trichloroethane	µg/L	0.20	<0.20
Toluene	µg/L	0.20	<0.20
2-Hexanone	µg/L	1.0	<1.0
Dibromochloromethane	µg/L	0.10	<0.10

Certified By:

N Popmukolof



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T701864

PROJECT: 1836-5489

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CLIENT NAME: CROZIER & ASSOCIATES

SAMPLING SITE:

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

Volatile Organic Compounds in Water (ug/L)

DATE RECEIVED: 2021-01-20

DATE REPORTED: 2021-01-29

SAMPLE DESCRIPTION: SA1-5489-21

SAMPLE TYPE: Water

DATE SAMPLED: 2021-01-20
09:05

1983126

Parameter	Unit	G / S	RDL
Ethylene Dibromide	µg/L		<0.10
Tetrachloroethylene	µg/L		<0.20
1,1,1,2-Tetrachloroethane	µg/L		<0.10
Chlorobenzene	µg/L		<0.10
Ethylbenzene	µg/L		<0.10
m & p-Xylene	µg/L		<0.20
Bromoform	µg/L		<0.10
Styrene	µg/L		<0.10
1,1,2,2-Tetrachloroethane	µg/L		<0.10
o-Xylene	µg/L		<0.10
1,3-Dichlorobenzene	µg/L		<0.10
1,4-Dichlorobenzene	µg/L		<0.10
1,2-Dichlorobenzene	µg/L		<0.10
1,2,4-Trichlorobenzene	µg/L		<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L		<0.30
Xylenes (Total)	µg/L		<0.20
n-Hexane	µg/L		<0.20

Surrogate	Unit	Acceptable Limits
Toluene-d8	% Recovery	50-140
4-Bromofluorobenzene	% Recovery	50-140

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

1983126 Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.

1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T701864

PROJECT: 1836-5489

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: CROZIER & ASSOCIATES

SAMPLING SITE:

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

Anion Scan (Water)

DATE RECEIVED: 2021-01-20

DATE REPORTED: 2021-01-29

SAMPLE DESCRIPTION: SA1-5489-21

SAMPLE TYPE: Water

DATE SAMPLED: 2021-01-20
09:05

Parameter	Unit	G / S	RDL	1983126
Fluoride	mg/L		0.05	<0.05
Chloride	mg/L		1.0	462
Nitrate as N	mg/L		0.25	1.80
Nitrite as N	mg/L		0.25	<0.25
Bromide	mg/L		0.25	<0.25
Sulphate	mg/L		0.50	19.4
Phosphate as P	mg/L		0.50	<0.50

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

1983126 Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Nivine Basly



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T701864

PROJECT: 1836-5489

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
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TEL (905)712-5100
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<http://www.agatlabs.com>

CLIENT NAME: CROZIER & ASSOCIATES

SAMPLING SITE:

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

O. Reg. 170/03 Schedule 23 - Metals

DATE RECEIVED: 2021-01-20

DATE REPORTED: 2021-01-29

SAMPLE DESCRIPTION: SA1-5489-21

SAMPLE TYPE: Water

DATE SAMPLED: 2021-01-20
09:05

Parameter	Unit	G / S	RDL	1983126
Total Antimony	µg/L		0.60	<0.60
Total Arsenic	µg/L		0.60	<0.60
Total Barium	µg/L		0.50	19.3
Total Boron	µg/L		10.0	17.5
Total Cadmium	µg/L		0.20	<0.20
Total Chromium	µg/L		0.60	<0.60
Total Selenium	µg/L		0.80	<0.80
Total Uranium	µg/L		0.20	0.23

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Nivine Basly

Quality Assurance

CLIENT NAME: CROZIER & ASSOCIATES

PROJECT: 1836-5489

SAMPLING SITE:

AGAT WORK ORDER: 21T701864

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

Microbiology Analysis

RPT Date: Jan 29, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE		MATRIX SPIKE	
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper

E. Coli (Using MI Agar)

Escherichia coli	1983126	1983126	ND	ND	NA	<1
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Heterotrophic Plate Count in Water

Heterotrophic Plate Count	1983126	1983126	ND	ND	NA	< 5
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Comments: ND - Not Detected, NA - % RPD Not Applicable

Certified By:



Quality Assurance

CLIENT NAME: CROZIER & ASSOCIATES

PROJECT: 1836-5489

SAMPLING SITE:

AGAT WORK ORDER: 21T701864

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

Trace Organics Analysis

RPT Date: Jan 29, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE		MATRIX SPIKE				
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - PAHs (Water)

Naphthalene		TW	< 0.20	< 0.20	NA	< 0.20	115%	50%	140%	96%	50%	140%	96%	50%	140%
Acenaphthylene		TW	< 0.20	< 0.20	NA	< 0.20	118%	50%	140%	85%	50%	140%	85%	50%	140%
Acenaphthene		TW	< 0.20	< 0.20	NA	< 0.20	117%	50%	140%	84%	50%	140%	74%	50%	140%
Fluorene		TW	< 0.20	< 0.20	NA	< 0.20	96%	50%	140%	72%	50%	140%	85%	50%	140%
Phenanthrene		TW	< 0.10	< 0.10	NA	< 0.10	85%	50%	140%	96%	50%	140%	102%	50%	140%
Anthracene		TW	< 0.10	< 0.10	NA	< 0.10	74%	50%	140%	74%	50%	140%	114%	50%	140%
Fluoranthene		TW	< 0.20	< 0.20	NA	< 0.20	75%	50%	140%	71%	50%	140%	117%	50%	140%
Pyrene		TW	< 0.20	< 0.20	NA	< 0.20	85%	50%	140%	72%	50%	140%	74%	50%	140%
Benzo(a)anthracene		TW	< 0.20	< 0.20	NA	< 0.20	81%	50%	140%	88%	50%	140%	75%	50%	140%
Chrysene		TW	< 0.10	< 0.10	NA	< 0.10	102%	50%	140%	85%	50%	140%	74%	50%	140%
Benzo(b)fluoranthene		TW	< 0.10	< 0.10	NA	< 0.10	115%	50%	140%	112%	50%	140%	71%	50%	140%
Benzo(k)fluoranthene		TW	< 0.10	< 0.10	NA	< 0.10	118%	50%	140%	115%	50%	140%	85%	50%	140%
Benzo(a)pyrene		TW	< 0.01	< 0.01	NA	< 0.01	96%	50%	140%	114%	50%	140%	88%	50%	140%
Indeno(1,2,3-cd)pyrene		TW	< 0.20	< 0.20	NA	< 0.20	85%	50%	140%	85%	50%	140%	74%	50%	140%
Dibenz(a,h)anthracene		TW	< 0.20	< 0.20	NA	< 0.20	84%	50%	140%	74%	50%	140%	105%	50%	140%
Benzo(g,h,i)perylene		TW	< 0.20	< 0.20	NA	< 0.20	70%	50%	140%	102%	50%	140%	85%	50%	140%

Volatile Organic Compounds in Water (ug/L)

Dichlorodifluoromethane	1991763	<0.20	<0.20	NA	< 0.20	117%	50%	140%	110%	50%	140%	125%	50%	140%
Chloromethane	1991763	<0.40	<0.40	NA	< 0.40	93%	50%	140%	87%	50%	140%	88%	50%	140%
Vinyl Chloride	1991763	2.1	1.8	11.7%	< 0.17	105%	50%	140%	104%	50%	140%	90%	50%	140%
Bromomethane	1991763	<0.20	<0.20	NA	< 0.20	124%	50%	140%	123%	50%	140%	82%	50%	140%
Chloroethane	1991763	<0.20	<0.20	NA	< 0.20	93%	50%	140%	96%	50%	140%	80%	50%	140%
Trichlorofluoromethane	1991763	<0.40	<0.40	NA	< 0.40	109%	50%	140%	102%	50%	140%	125%	50%	140%
Acetone	1991763	<1.0	<1.0	NA	< 1.0	88%	50%	140%	84%	50%	140%	89%	50%	140%
1,1-Dichloroethylene	1991763	<0.2	<0.2	NA	< 0.2	84%	50%	140%	92%	60%	130%	75%	50%	140%
Methylene Chloride	1991763	<0.30	<0.30	NA	< 0.30	90%	50%	140%	100%	60%	130%	81%	50%	140%
trans- 1,2-dichloroethylene	1991763	3.4	3.4	0.6%	< 0.20	98%	50%	140%	121%	60%	130%	102%	50%	140%
Methyl tert-butyl ether	1991763	<0.20	<0.20	NA	< 0.20	84%	50%	140%	82%	60%	130%	103%	50%	140%
1,1-Dichloroethane	1991763	<0.30	<0.30	NA	< 0.30	75%	50%	140%	94%	60%	130%	83%	50%	140%
Methyl Ethyl Ketone	1991763	<1.0	<1.0	NA	< 1.0	87%	50%	140%	94%	50%	140%	88%	50%	140%
cis- 1,2-Dichloroethylene	1991763	25	21	15.3%	< 0.20	84%	50%	140%	87%	60%	130%	89%	50%	140%
Chloroform	1991763	<0.20	<0.20	NA	< 0.20	86%	50%	140%	102%	60%	130%	84%	50%	140%
1,2-Dichloroethane	1991763	<0.20	<0.20	NA	< 0.20	87%	50%	140%	102%	60%	130%	86%	50%	140%
1,1,1-Trichloroethane	1991763	<0.30	<0.30	NA	< 0.30	74%	50%	140%	83%	60%	130%	79%	50%	140%
Carbon Tetrachloride	1991763	<0.20	<0.20	NA	< 0.20	87%	50%	140%	122%	60%	130%	88%	50%	140%
Benzene	1991763	<0.20	<0.20	NA	< 0.20	76%	50%	140%	107%	60%	130%	76%	50%	140%
1,2-Dichloropropane	1991763	<0.20	<0.20	NA	< 0.20	90%	50%	140%	91%	60%	130%	109%	50%	140%
Trichloroethylene	1991763	9.2	8.1	12.9%	< 0.20	95%	50%	140%	108%	60%	130%	91%	50%	140%

AGAT QUALITY ASSURANCE REPORT (V1)

Page 11 of 21

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.

Results relate only to the items tested. Results apply to samples as received.

Quality Assurance

CLIENT NAME: CROZIER & ASSOCIATES

PROJECT: 1836-5489

SAMPLING SITE:

AGAT WORK ORDER: 21T701864

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jan 29, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Bromodichloromethane	1991763		<0.20	<0.20	NA	< 0.20	77%	50%	140%	108%	60%	130%	79%	50%	140%
cis-1,3-Dichloropropene	1991763		<0.20	<0.20	NA	< 0.20	75%	50%	140%	78%	60%	130%	77%	50%	140%
Methyl Isobutyl Ketone	1991763		<1.0	<1.0	NA	< 1.0	80%	50%	140%	89%	50%	140%	82%	50%	140%
trans-1,3-Dichloropropene	1991763		<0.30	<0.30	NA	< 0.30	100%	50%	140%	92%	60%	130%	91%	50%	140%
1,1,2-Trichloroethane	1991763		<0.20	<0.20	NA	< 0.20	97%	50%	140%	122%	60%	130%	94%	50%	140%
Toluene	1991763		<0.20	<0.20	NA	< 0.20	91%	50%	140%	119%	60%	130%	97%	50%	140%
2-Hexanone	1991763		<1.0	<1.0	NA	< 1.0	74%	50%	140%	96%	50%	140%	79%	50%	140%
Dibromochloromethane	1991763		<0.10	<0.10	NA	< 0.10	109%	50%	140%	110%	60%	130%	95%	50%	140%
Ethylene Dibromide	1991763		<0.10	<0.10	NA	< 0.10	94%	50%	140%	118%	60%	130%	91%	50%	140%
Tetrachloroethylene	1991763		<0.20	<0.20	NA	< 0.20	117%	50%	140%	122%	60%	130%	112%	50%	140%
1,1,1,2-Tetrachloroethane	1991763		<0.10	<0.10	NA	< 0.10	96%	50%	140%	91%	60%	130%	90%	50%	140%
Chlorobenzene	1991763		<0.10	<0.10	NA	< 0.10	101%	50%	140%	110%	60%	130%	97%	50%	140%
Ethylbenzene	1991763		<0.10	<0.10	NA	< 0.10	84%	50%	140%	115%	60%	130%	86%	50%	140%
m & p-Xylene	1991763		<0.20	<0.20	NA	< 0.20	93%	50%	140%	128%	60%	130%	92%	50%	140%
Bromoform	1991763		<0.10	<0.10	NA	< 0.10	104%	50%	140%	102%	60%	130%	113%	50%	140%
Styrene	1991763		<0.10	<0.10	NA	< 0.10	83%	50%	140%	111%	60%	130%	78%	50%	140%
1,1,2,2-Tetrachloroethane	1991763		<0.10	<0.10	NA	< 0.10	105%	50%	140%	121%	60%	130%	95%	50%	140%
o-Xylene	1991763		<0.10	<0.10	NA	< 0.10	95%	50%	140%	100%	60%	130%	92%	50%	140%
1,3-Dichlorobenzene	1991763		<0.10	<0.10	NA	< 0.10	103%	50%	140%	114%	60%	130%	117%	50%	140%
1,4-Dichlorobenzene	1991763		<0.10	<0.10	NA	< 0.10	102%	50%	140%	115%	60%	130%	118%	50%	140%
1,2-Dichlorobenzene	1991763		<0.10	<0.10	NA	< 0.10	104%	50%	140%	109%	60%	130%	118%	50%	140%
1,2,4-Trichlorobenzene	1991763		<0.30	<0.30	NA	< 0.30	87%	50%	140%	108%	60%	130%	87%	50%	140%
n-Hexane	1991763		<0.20	<0.20	NA	< 0.20	101%	50%	140%	86%	60%	130%	85%	50%	140%

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Water)

F1 (C6-C10)	1992571	<25	<25	NA	< 25	95%	60%	140%	97%	60%	140%	93%	60%	140%
F2 (C10 to C16)	1990802	< 100	< 100	NA	< 100	113%	60%	140%	91%	60%	140%	89%	60%	140%
F3 (C16 to C34)	1990802	< 100	< 100	NA	< 100	106%	60%	140%	86%	60%	140%	75%	60%	140%
F4 (C34 to C50)	1990802	< 100	< 100	NA	< 100	102%	60%	140%	112%	60%	140%	111%	60%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:



Quality Assurance

CLIENT NAME: CROZIER & ASSOCIATES

PROJECT: 1836-5489

SAMPLING SITE:

AGAT WORK ORDER: 21T701864

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

Water Analysis															
RPT Date: Jan 29, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 170/03 Schedule 23 - Metals

Total Antimony	1964394		<0.60	<0.60	NA	< 0.60	100%	70%	130%	98%	80%	120%	94%	70%	130%
Total Arsenic	1964394		0.92	<0.60	NA	< 0.60	103%	70%	130%	99%	80%	120%	103%	70%	130%
Total Barium	1964394		23.0	22.9	0.5%	< 0.50	102%	70%	130%	101%	80%	120%	100%	70%	130%
Total Boron	1964394		30.6	28.6	NA	< 10.0	105%	70%	130%	108%	80%	120%	102%	70%	130%
Total Cadmium	1964394		<0.20	<0.20	NA	< 0.20	101%	70%	130%	100%	80%	120%	97%	70%	130%
Total Chromium	1964394		<0.60	<0.60	NA	< 0.60	100%	70%	130%	100%	80%	120%	94%	70%	130%
Total Selenium	1964394		3.48	2.59	NA	< 0.80	104%	70%	130%	101%	80%	120%	99%	70%	130%
Total Uranium	1964394		0.31	0.31	NA	< 0.20	101%	70%	130%	98%	80%	120%	99%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate NA: results are under 5X the RDL and will not be calculated.

Anion Scan (Water)

Fluoride	1978075		<0.05	<0.05	NA	< 0.05	106%	90%	110%	101%	90%	110%	112%	85%	115%
Chloride	1978075		60.8	59.6	2.0%	< 0.10	107%	70%	130%	106%	80%	120%	112%	70%	130%
Nitrate as N	1978075		<0.25	<0.25	NA	< 0.05	106%	70%	130%	108%	80%	120%	120%	70%	130%
Nitrite as N	1978075		<0.25	<0.25	NA	< 0.05	101%	70%	130%	97%	80%	120%	108%	70%	130%
Bromide	1978075		<0.25	<0.25	NA	< 0.05	108%	90%	110%	110%	90%	110%	111%	85%	115%
Sulphate	1978075		123	121	1.6%	< 0.10	104%	70%	130%	106%	80%	120%	110%	70%	130%
Phosphate as P	1978075		<0.50	<0.50	NA	< 0.10	91%	70%	130%	97%	80%	120%	86%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:


Nivine Basily

Method Summary

CLIENT NAME: CROZIER & ASSOCIATES

PROJECT: 1836-5489

SAMPLING SITE:

AGAT WORK ORDER: 21T701864

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis			
Escherichia coli	MIC-93-7010	EPA 1604	Membrane Filtration
Heterotrophic Plate Count	MIC-93- 7020	SM 9215 C	INCUBATOR

Method Summary

CLIENT NAME: CROZIER & ASSOCIATES
PROJECT: 1836-5489
SAMPLING SITE:
AGAT WORK ORDER: 21T701864
ATTENTION TO: Caitlyn Macphee
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Fluorene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Anthracene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Pyrene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(a)anthracene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Chrysene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
2-and 1-methyl Naphthalene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5105	modified from EPA SW-846 3510C & 8270E	GC/MS
Acenaphthene-d10	ORG-91-5105	modified from EPA SW-846 3510C & 8270E	GC/MS
Chrysene-d12	ORG-91-5105	modified from EPA SW-846 3510C & 8270E	GC/MS
Sediment			
F1 (C6-C10)	VOL-91- 5010	modified from MOE PHC-E3421	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	modified from MOE PHC-E3421	P&T GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F3 (C16 to C34)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F3 (C16 to C34) minus PAHs	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F4 (C34 to C50)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	modified from MOE PHC-E3421	BALANCE
Terphenyl	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
Dichlorodifluoromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

Method Summary

CLIENT NAME: CROZIER & ASSOCIATES
PROJECT: 1836-5489
SAMPLING SITE:
AGAT WORK ORDER: 21T701864
ATTENTION TO: Caitlyn Macphee
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Chloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
trans- 1,2-dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
cis-1,3-Dichloropropene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
trans-1,3-Dichloropropene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
2-Hexanone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

Method Summary

CLIENT NAME: CROZIER & ASSOCIATES
PROJECT: 1836-5489
SAMPLING SITE:
AGAT WORK ORDER: 21T701864
ATTENTION TO: Caitlyn Macphee
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Ethylene Dibromide	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Bromoform	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2,4-Trichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

Method Summary

CLIENT NAME: CROZIER & ASSOCIATES

PROJECT: 1836-5489

SAMPLING SITE:

AGAT WORK ORDER: 21T701864

ATTENTION TO: Caitlyn Macphee

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Fluoride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Bromide	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Phosphate as P	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Barium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Uranium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS



AGAT

Laboratories

Mi-bi

5835 Coopers Avenue
Mississauga, ON
L4Z 1Y2

Laboratory Use Only

Arrival Condition: ☐ Good ☐ Poor (complete notes)

Arrival Temperature: 10.6 11.6 10.9

AGAT Job Number: 21T701864

Notes:

ICE Packs

Drinking Water Chain of Custody Record

P: 905.712.5100 • F: 905.712.5122 • TF: 1.800.856.6261

Client Information

Company: C.F. Crozier and Associates

Contact: Caitlyn MacPhee

Address: 2800 high point dr Suite 101
Milton, ON

Phone: 226-220 0965 Fax: _____

PO #: _____

Client Project #: 1836-5489

AGAT Quotation #: _____

Report Information

1. Name: Elaine Plewes

Email: eplewes@cfcrozier.ca

2. Name: Caitlyn MacPhee

Email: cmacphee@cfcrozier.ca

Facility Type (Check all that are applicable)

☐ Large OR ☒ Small
☐ Residential OR ☒ Non-Residential
☐ Municipal OR ☒ Non-Municipal

Report Format

☒ Single Sample per page
☐ Multiple Samples per page

+ Water Type

(Specify in column below)
Raw (R), Treated (TR),
Distribution (D), Tap (TP)
Private Well (P)

Requirements (Check one)

☐ O. Regulation 170 ☒ Not Applicable
☐ O. Regulation 243 ☐ Other (Please Specify)
☐ O. Regulation 318/319

IS THIS WATER BEING CONSUMED BY HUMANS?

☐ Yes ☒ No

DO THE RESULTS REQUIRE REPORTING TO THE MOECC'S DWIS OR MOH'S LRMA?

☐ Yes ☒ No

RAW WATER SAMPLES - CONSUMED BY HUMANS?

☐ Yes ☒ No

CLIENT IS RESPONSIBLE TO COMPLETE AND SUBMIT LAB SERVICE NOTIFICATION (LSN) FORM TO THE MOECC/PHU. FAILURE TO DO SO MAY DELAY REPORTING.

NOTIFICATION INFORMATION MUST BE COMPLETE BELOW UPON SUBMISSION OF SAMPLES. LABORATORY ANALYSIS WILL NOT COMMENCE UNTIL ALL INFORMATION HAS BEEN PROVIDED.

SAMPLE IDENTIFICATION/LOCATION	DATE SAMPLED	TIME SAMPLED	WATER TYPE *	# OF CONTAINERS	CHLORINE RESIDUAL (incl. Units)	STANDING	FLUSHED	COMMENTS/STANDING TIME (IN MINUTES)	Irorganics (Sch. 23)	Organics (Sch. 24)	Lead	Fluoride	Sodium	Turbidity	Nitrate, Nitrite	Trihalomet-anes	Eco1 Total Coliforms	PAH, FI-F4	BTEX	HPC
SA1-5489-21	21-01-20	9:05 AM	GW	12	—	—	—	—	✓								<	✓	✓	✓
		AM																		
		PM																		
		AM																		
		PM																		
		AM																		
		PM																		
		AM																		
		PM																		

Samples Taken By (Print Name and Sign):

* TAT is exclusive of weekends and statutory holidays. Prior arrangements must be made with the laboratory in order to submit Microbiology samples on Fridays

NOTIFICATION INFORMATION - (required to report adverse results as per the Safe Drinking Water Act) - Laboratory analysis will not commence until all information is received.

INFORMATION FOR ADVERSE REPORTING

Waterworks Name: _____ Phone: _____ Fax: _____
MOECC# (ie: Waterworks #): _____ After Hours Phone: _____
Contact: _____ Address/Location (if different from client above): _____
Email: _____

MEDICAL OFFICER OF HEALTH (MOH)

Region: _____
PHU Contact: _____
Phone: _____ Fax: _____
Email: _____

Samples Relinquished By (Print Name and Sign):

Caitlyn MacPhee CM

Date/Time

21-01-20 4:40 PM

Samples Received By (Print Name and Sign):

NEAL S ZST

Date/Time

Samples Relinquished By (Print Name and Sign):

Date/Time

Samples Received By (Print Name and Sign):

Date/Time

Pink Copy - Client

Yellow/Golden

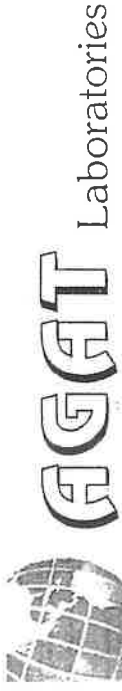
Copy - AGAT

White Copy- AGAT

Page

21 JAN 20 4:43 PM

No: **DW 59252**



Non-Reportable Drinking Water Sample Inquiry Form

This form is to ensure your water is tested and reported in accordance with Ontario Regulation 248/03 for testing of Drinking Water under the Safe Drinking Water Act. We require the information below to help uphold our high standard of regulatory compliance, for both AGAT as a laboratory and you, as our valued customer. Please ensure all information is filled out completely and accurately. If you have any questions, please do not hesitate to contact your AGAT Client Project Manager at 905-712-5100.

(1) What is the purpose for your testing? Please provide details below.

Water quality for hydrogeology report for zoning applications

(2) Please answer the following questions.

(a) Is there a request from a Public Health Inspector or a Ministry of Environment Drinking Water Inspector to complete this testing? ☐ Yes ☒ No

If Yes, please contact an AGAT Client Project Manager at 905-712-5100

(b) Is there a provincial order in effect for your water system? ☐ Yes ☒ No
If Yes, please provide details below including limit for the test parameter if not listed with a standard under O.Reg.169/03

(c) Does your facility have a drinking water system (DWS) number provided by either MECP or MOHLTC? ☐ Yes ☒ No

(ii) If yes, why is the sample not reportable to either MECP or MOHLTC? Please provide details below.

(ii) If yes, is the test for sodium and/or fluoride? ☐ Yes ☒ No

- If the test is for sodium and/or fluoride, was sodium and/or fluoride testing completed and reported to the **MECP** in the last 57 months or **MOHLTC** in the last 60 months? ☐ Yes ☐ No

As per the SWDA, Sodium and fluoride (if required by DWS) are required to be tested every 5 years (60 months) by the operator. The sodium and/or fluoride adverse are not required to be reported if two samples are less than 5 years apart.



(d) Is the water collected from a Federal building or property or reserve under Federal jurisdiction? ☐ Yes ☒ No

If Yes, please indicate this on the COC under Requirements

(3) If you are private home owner looking to test your drinking water, please answer the following questions:

- (i) Are you consuming this water from the point of sample collection? ☐ Yes ☒ No
- (ii) Do you have a water treatment unit installed in your system? ☐ Yes ☒ No
- (iii) Is your water collected before or after treatment? ☒ Before ☐ After ☐ Not Applicable
- (iv) Are you testing your water due to concerns regarding your plumbing? ☐ Yes ☒ No

If Yes, have you done any improvements to your plumbing recently? Please provide details below.

For further assistance, please contact the MECP at the following phone and email:

(1) For inquiries related to O.Reg.170 or O.Reg.318/319

Email: waterforms@ontario.ca

Phone Number: 1-866-793-2588

(2) For inquiries related to O.Reg.243 (Schools and Daycares)

Phone Number: 1-855-515-1331.

Company Name: C.F. Crozier & Associates

DWCOC#: (if applicable)

Name: Caitlyn MacPhee
(please print name)

Date: 2021/01/20
yyyy/mm/dd

Signature: CmacPhee

AGAT WorkOrder #: (To be entered by AGAT CPM)

APPENDIX D

Daily Water Demand Calculations

EXISTING WATER DEMAND ESTIMATE

Project Name: 794047 County Road 124, Singhampton

Project Number: 1836-5489

Date: 30-Jun-21

Designed By: CM

Checked By: CG

PRELIMINARY FLOW ESTIMATES

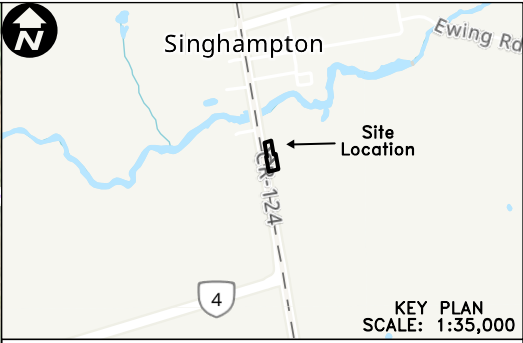
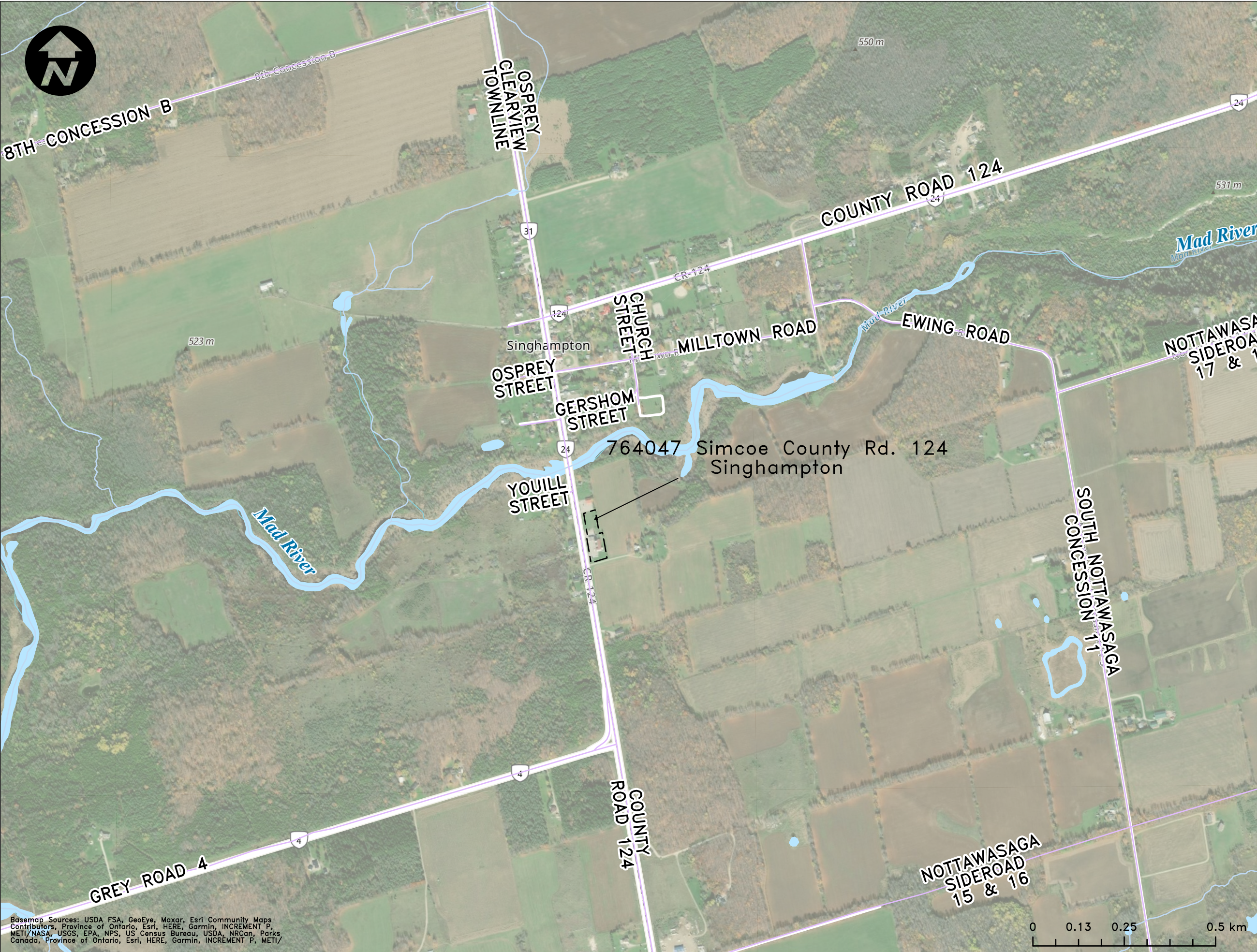
Project Title Singhampton Tim Hortons

	Description	Area (m²)	Unit	Unit Flow	Number of Units	Total Flow (L/day)
Existing Facilities						
	Gas Station	n/a	per fuel outlet	560	8	4480
	Convenience Store/LCBO	per w/c	1	1230	2	2460
	Convenience Store (area)	117.7	per m²	5	0	589
						0
						0
						0
				Total Sewage Flow:		6940 L/day
				Total Water Demand:		6940 L/day

*

J:\1800\1836-JKI Canada Utilities\5489_794047 County Rd. 124\Reports\Hydrogeology\Appendix D - Water Flow Calculations\[21.06.30 - Sewage Flows_Water Demand Calcs.xl

FIGURES



LEGEND

- Site
- Roads
- Watercourse

DRAWING NOTES:

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
**764047 SIMCOE COUNTY 124
TOWN OF SINGHAMPTON**

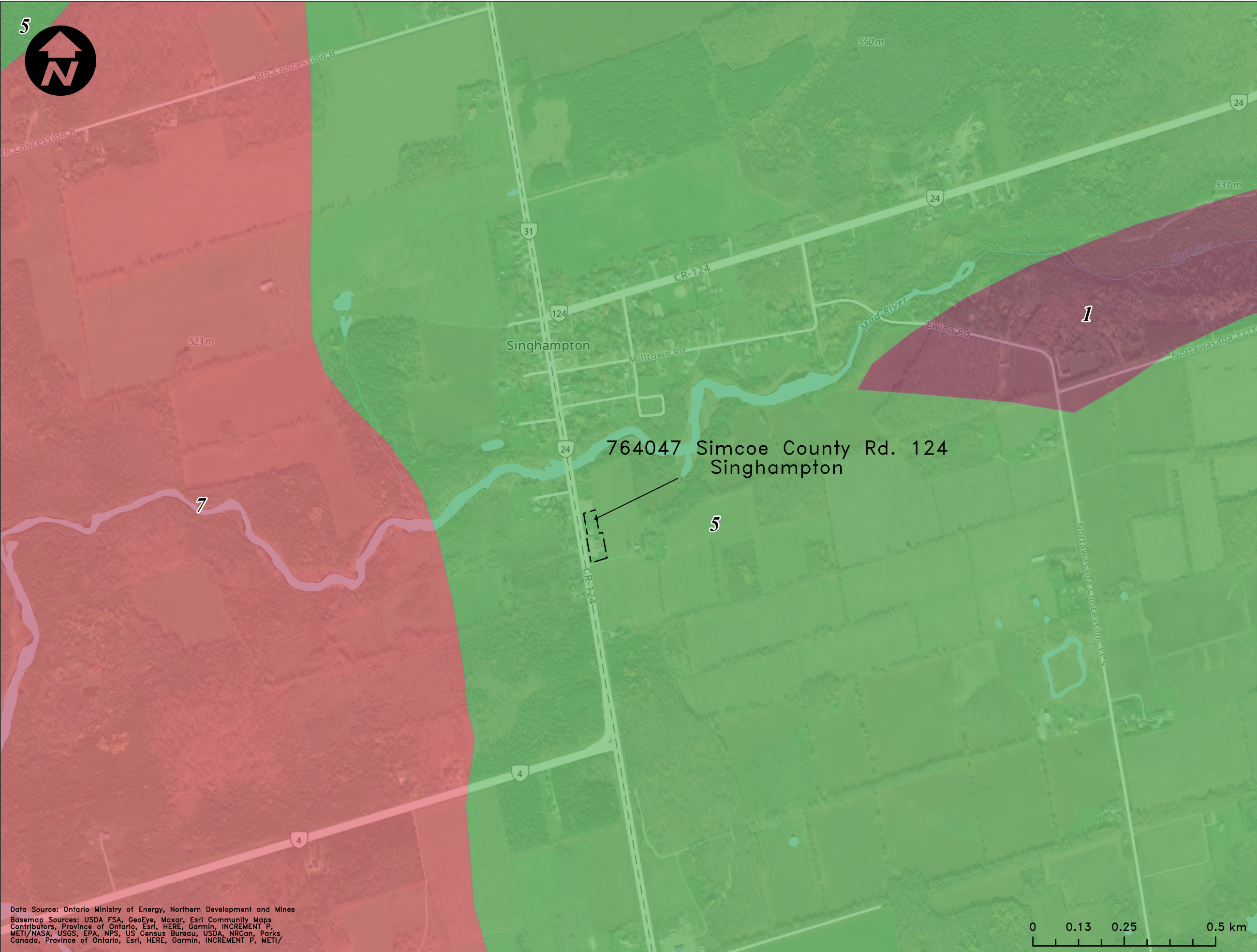
Drawing
SITE LOCATION

CROZIER
CONSULTING ENGINEERS

2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Drawn	C.M.	Design	C.G.	Project No.	1836-5489
Date	2021-03-12	Projection	EPSG:26917	Scale	1:10,000
				Dwg.	FIG. 1

Basemap Sources: USDA FSA, GeoEye, Maxar, Esri Community Maps Contributors, Province of Ontario, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCAN, Parks Canada, Province of Ontario, Esri, HERE, Garmin, INCREMENT P, METI/



- LEGEND
- Site
- Physiographic Regions
- 1: Niagara Escarpment
 - 5: Horseshoe Moraines
 - 7: Dundalk Till Plain

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Project

764047 SIMCOE COUNTY 124
TOWN OF SINGHAMPTON

Drawing

PHYSIOGRAPHY



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Drawn	C.M.	Design	C.G.	Project No.	1836-5489
Date	2021-03-12	Projection	EPSG:26917	Scale	1:10,000
				Dwg.	FIG. 2

Data Source: Ontario Ministry of Energy, Northern Development and Mines
Basemap Sources: USDA FSA, GeoEye, Maxar, Esri Community Maps
Contributors: Province of Ontario, Esri, HERE, Garmin, INCREMENT P,
METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCAN, Parks
Canada, Province of Ontario, Esri, HERE, Garmin, INCREMENT P, METI/



LEGEND

- [] Site
- Watercourse

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Project
**764047 SIMCOE COUNTY 124
TOWN OF SINGHAMPTON**

Drawing
TOPOGRAPHY

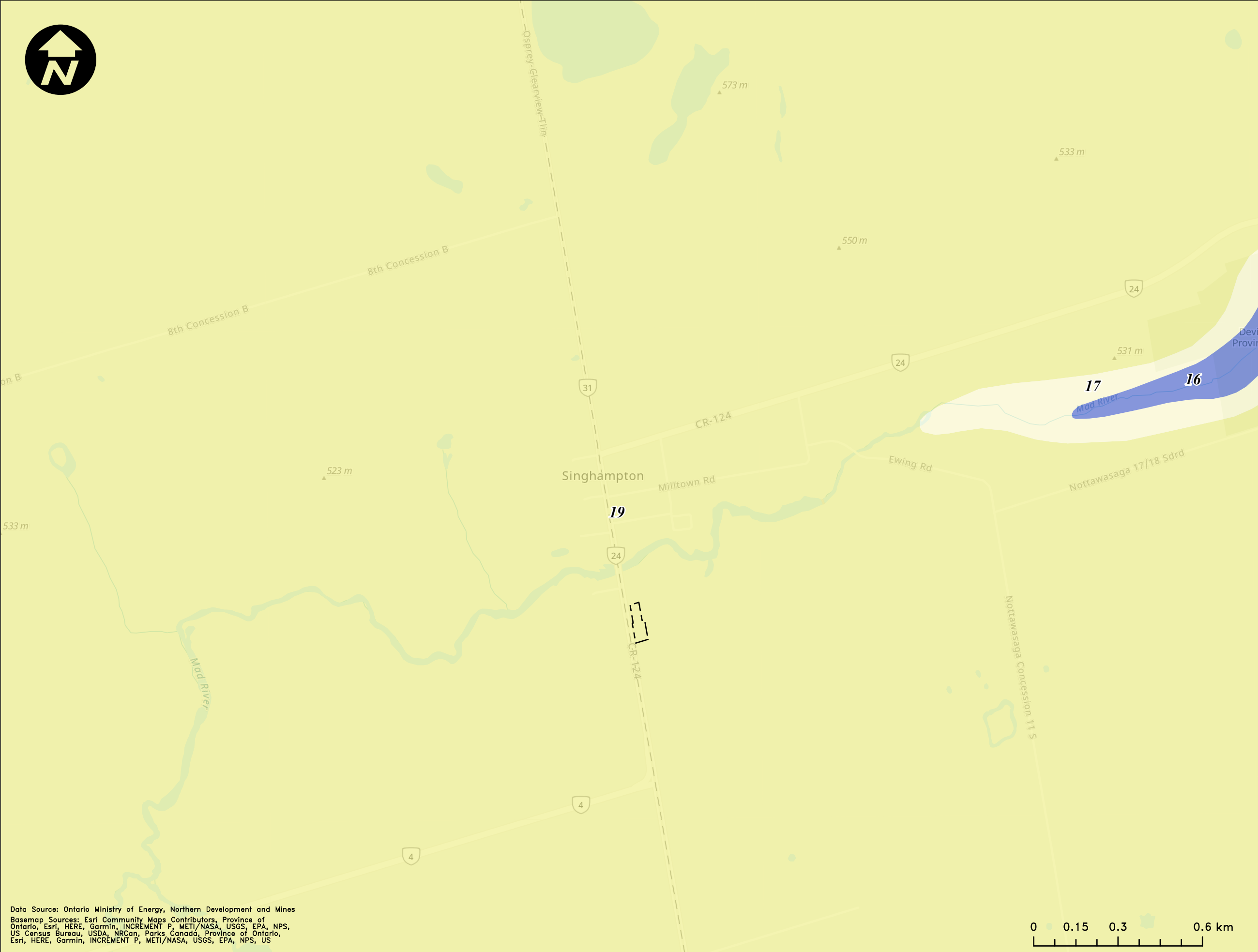
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Drawn	C.M.	Design	C.G.	Project No.	1836-5489
Date	2021-03-12	Projection	EPSG:26917	Scale	1:10,000
				Dwg.	FIG. 3

Basemap Sources: Esri Community Maps Contributors, Province of Ontario, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCAN, Parks Canada, Province of Ontario, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US





LEGEND

Site

Bedrock Geology

- 19 Amabel Formation: buff, thick bedded dolostone
- 17 Clinton-Cataract Group: arkose sandstone, dolostone, grey shale
- 16 Queenston Formation: red shale, siltstone, limestone interbeds

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
**764047 SIMCOE COUNTY 124
TOWN OF SINGHAMPTON**

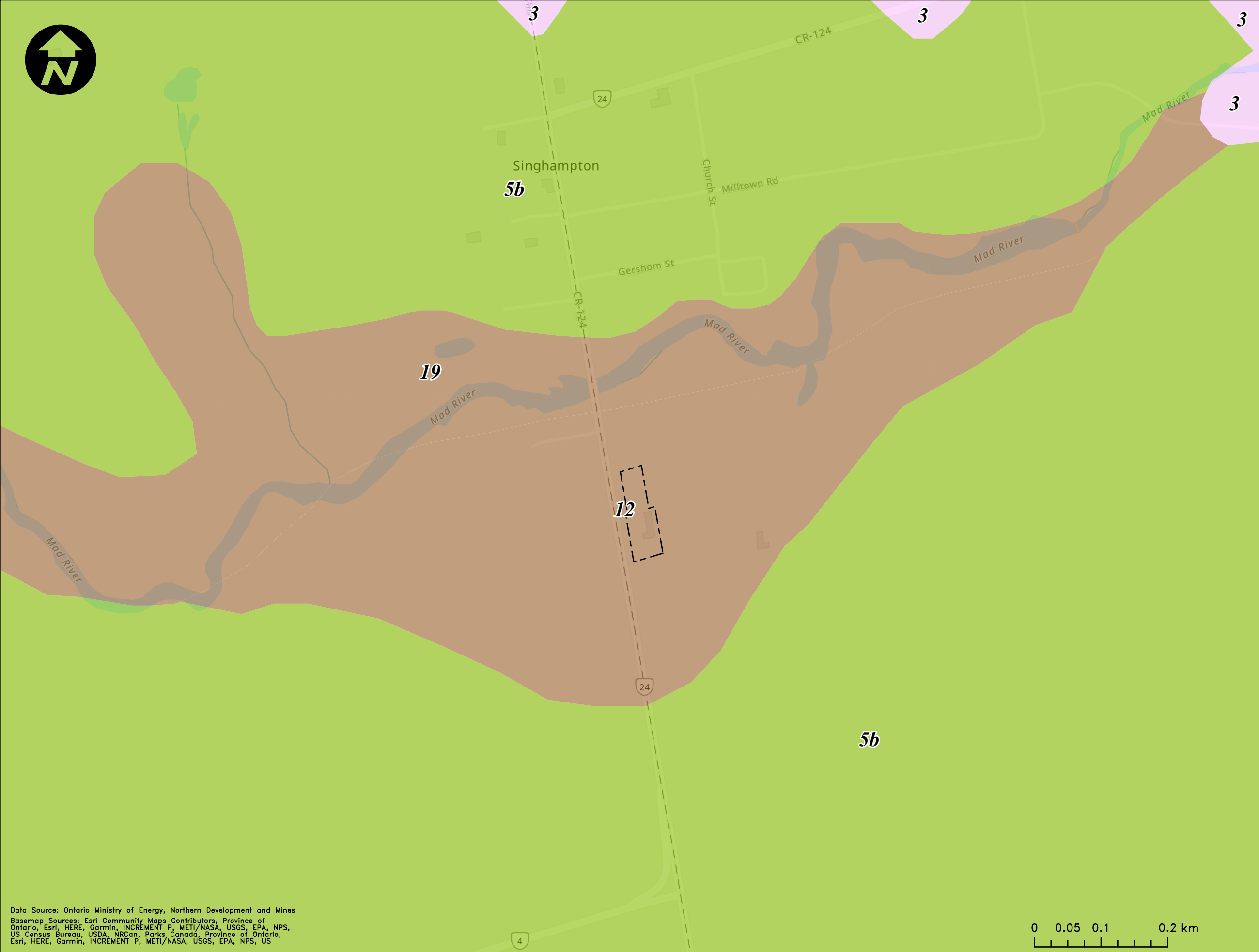
Drawing
BEDROCK GEOLOGY



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Drawn	C.M.	Design	C.G.	Project No.	1836-5489
Date	2021-03-12	Projection	EPSG:26917	Scale	1:13,007
				Dwg.	FIG. 4



LEGEND

- Site
- Surficial Geology
- 19: Sand, silt, clay (modern alluvial deposits)
 - 12: Sand, silt, clay (older alluvial deposits)
 - 5b: Silty to sandy till, trace gravels
 - 3: Sandstone, dolostone, shale

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
**764047 SIMCOE COUNTY 124
TOWN OF SINGHAMPTON**

Drawing
SURFICIAL GEOLOGY



CROZIER
CONSULTING ENGINEERS

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905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Drawn	C.M.	Design	C.G.	Project No.	1836-5489
Date	2021-03-12	Projection	EPSG:26917	Scale	1:5,500
				Dwg.	FIG. 5

Data Source: Ontario Ministry of Energy, Northern Development and Mines
Basemap Sources: Esri Community Maps Contributors, Province of Ontario, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada, Province of Ontario, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US





Singhampton

Ewing Rd

Site Location

KEY PLAN
SCALE: 1:35,000

LEGEND



Site



Well

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Project

764047 SIMCOE COUNTY 124
TOWN OF SINGHAMPTON

Drawing

EXISTING WELL LOCATIONS



CROZIER
CONSULTING ENGINEERS

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Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Drawn C.M.

Design C.G.

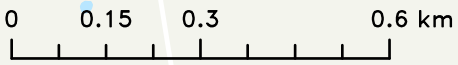
Project No. 1836-5489

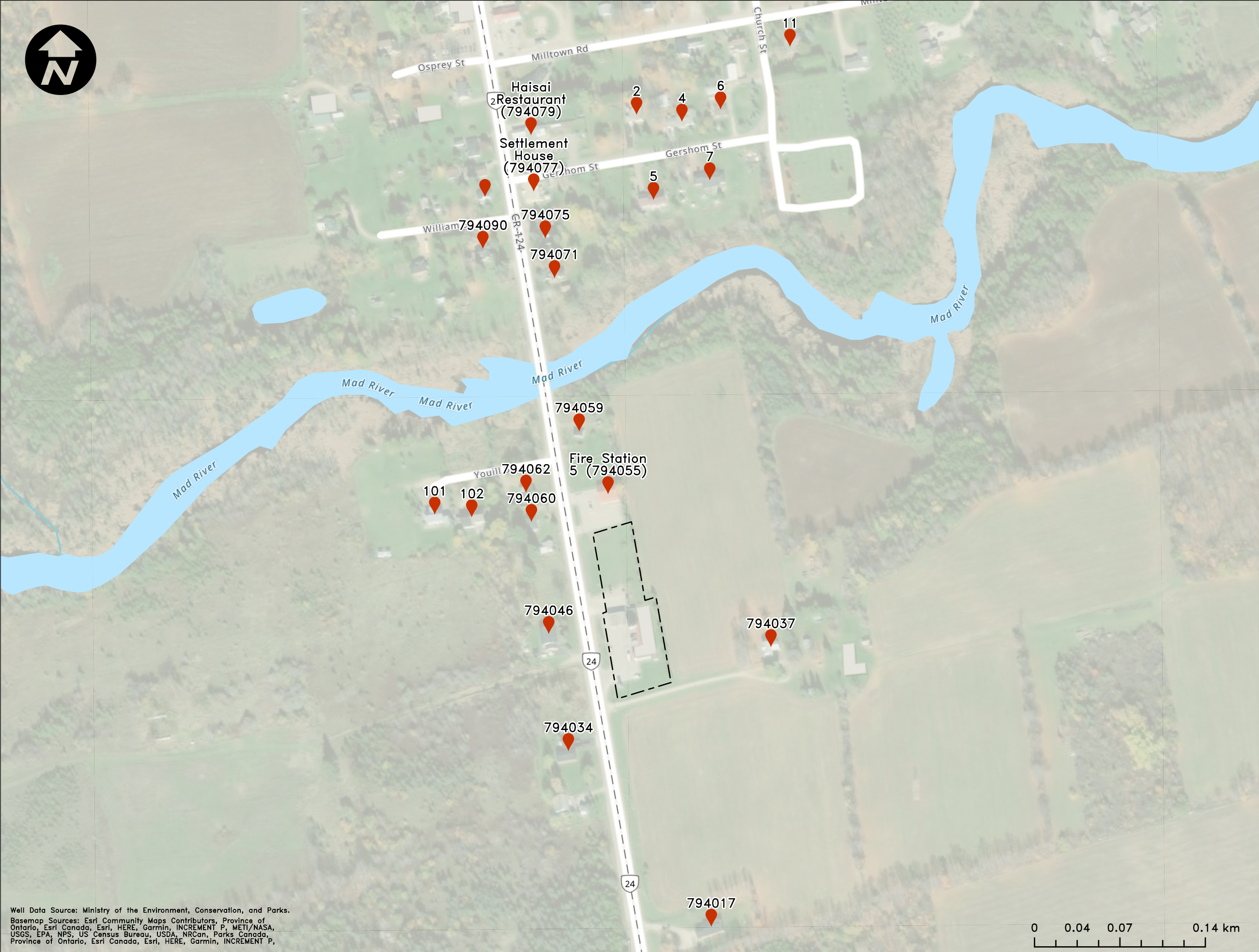
Date 2021-03-12

Projection EPSG:26917



Scale 1:12,000 Dwg. FIG. 6

Well Data Source: Ministry of the Environment, Conservation, and Parks.
Basemap Sources: Esri Community Maps Contributors, Province of Ontario, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada, Province of Ontario, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US





LEGEND

-  Survey Location
-  Site

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
**764047 SIMCOE COUNTY 124
TOWN OF SINGHAMPTON**

Drawing
DOOR-TO-DOOR SURVEY LOCATIONS

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Drawn	C.M.	Design	C.G.	Project No.	1836-5489
Date	2021-06-29	Projection	EPSG:26917	Scale	1:3,000
				Dwg.	FIG. 7

Well Data Source: Ministry of the Environment, Conservation, and Parks.
Basemap Sources: Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCAN, Parks Canada, Province of Ontario, Esri Canada, Esri, HERE, Garmin, INCREMENT P.

