2020 Annual Report, Galway Waste Disposal Site (Closed)

Provisional Certificate of Approval No. A341205

March 5, 2021

Prepared for:
The Corporation of the Municipality of Trent Lakes

Cambium Reference: 10520-007

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Executive Summary

The Galway Waste Disposal Site operates under the Provisional Certificate of Approval No. A341205. The Site is on Lot 19, Concession 13, geographic Township of Galway, Municipality of Trent Lakes. The Site is on Galway Road, approximately 14 km southeast of Kinmount and east of County Road 121. The Site operated as a natural attenuation landfill from the early 1970s until closure in 2001.

It is inferred that a component of radial groundwater flow travels west and north from the waste mound due to the competent bedrock and topography. Groundwater flow direction was determined to be primarily to the north in the area west of the waste mound.

All down-gradient monitors demonstrated stable conditions when compared to the background monitor. Impacts were only identified immediately adjacent the waste mound. Impacted groundwater was expected to discharge to surface west and northwest of the waste mound. The Galway waste disposal site complied with Ministry of the Environment, Conservation and Parks Reasonable Use Concept.

The surface water quality down-gradient and downstream of the waste mound was not adversely impacted by the site in 2020.

The site was operated in compliance with the Provisional Certificate of Approval.

Recommendations have been made regarding the future operation of the Galway waste disposal site and work to be completed in 2021.

Respectfully submitted,

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1.0 Introduction

The Corporation of the Municipality of Trent Lakes (Municipality) retained Cambium Inc. (Cambium) to complete the 2020 annual monitoring program for the Galway closed waste disposal site (Site). The Site operates under Ontario Ministry of the Environment, Conservation and Parks (Ministry) Provisional Certificate of Approval (PC of A) No. A341205, most recently amended January 21, 1982 (Appendix A).

To aid in the understanding of the history and development of the Site, the following information is included digitally in the report package:

- Historic Water Quality (1997 - 2010) (WSP, 2017)

1.1 Site Location

The Site is on Lot 19, Concession I3, geographic Township of Galway, Municipality of Trent Lakes, County of Peterborough (Figure 1). The Site is on Galway Road, approximately 14 km southeast of Kinmount and east of County Road 121. The Universal Transverse Mercator (UTM) coordinates for the site entrance are Zone 17T, 695262m east, 496057m north.

1.2 Site Description

The Site is a natural attenuation landfill and is owned by the Municipality. The Site was in operation from the early 1970s until closure in 2001. When the Site was operating, it was approved as a landfill for the disposal of solid, non-hazardous domestic waste, scrap metal, and brush in accordance with PC of A No. A341205. The Site was approved for a total area of 1.2 ha.

Figure 2 illustrates the site layout and approved waste disposal footprint, as well as the property boundary. Existing site conditions are on Figure 3.

1.3 Scope of Work

The scope of the 2020 work program was based on the results of the 2019 monitoring program (Cambium, 2020) and included:

- Groundwater elevation monitoring
- Surface water and groundwater sampling and analysis
- Evaluation of groundwater quality at select monitoring wells against the Provincial Water Quality Objectives (PWQO)
- Evaluation of surface water quality against the PWQO and calculated surface water trigger values
- Preparation of this annual report

This report presents the results of the 2020 work program, provides an assessment of the current landfill impact of the Site on the surrounding groundwater and surface water environments, and a summary of the operational activities at the Site. Cambium has provided recommendations for the 2021 monitoring program and site operations based on the 2020 results and assessment.

2.0 Methodology

The 2020 work program was completed to maintain compliance with the ECA and Ministry requirements. As such, the environmental monitoring work program was completed consistent with *Guidance Manual for Landfill Sites Receiving Municipal Waste* (MOEE, 1993) and *Monitoring and Reporting for Waste Disposal Sites, Groundwater and Surface Water, Technical Guidance Document* (MOE, 2010).

Field tasks were completed following Cambium's Standard Operating Procedures developed from recognized standard procedures such as those listed above and *Guidance on Sampling and Analytical Methods for use at Contaminated Sites in Ontario* (MOEE, 1996). A health and safety program was developed for site-specific conditions and all Cambium personnel working on the project were familiarized and required to follow the identified protocol.

Surface water and groundwater samples were stored in coolers with freezer packs and maintained at less than 10°C during transport to Caduceon Environmental Laboratories (Caduceon) in Kingston, Ontario. Caduceon is accredited by the Canadian Association for Laboratory Accreditation Inc. for specific environmental tests listed in the scope of accreditation. Groundwater and surface water samples were submitted for analysis of the parameters outlined in Table 1.

2.1 Groundwater Monitoring Program

The following tasks were completed as part of the 2020 groundwater monitoring program:

- Prior to sampling, water levels were measured at each monitoring well using an electronic water level tape.
- The purge volume was calculated on-site during each monitoring event using the measured water level, well depth, and the borehole diameter. Each groundwater monitoring well to be sampled was purged of approximately three well bore volumes. For wells with low recovery, at least one saturated borehole volume was purged prior to sampling. Purged water was disposed on-site, down-gradient of each respective well.

- Samples were collected using dedicated polyethylene tubing equipped with inertial-lift foot valves.
- Groundwater samples for metals and dissolved organic carbon (DOC) analysis were field filtered.
- Field measurements were recorded for pH, conductivity, temperature, dissolved oxygen (DO), and oxygen reduction potential (ORP).

Groundwater samples were collected on April 21 and November 12 from the on-site monitoring wells listed below, with the following exceptions:

- DP2 was frozen in the spring
- DP5R was inaccessible in spring and autumn
- DP6 had insufficient volume for sample collection during the spring and autumn

Monitoring wells included in the groundwater monitoring program are shown on Figure 3. The UTM coordinates for the monitoring locations are in Table 2. Groundwater results are discussed in Section 4.2. Field data sheets are in Appendix B. Laboratory Certificates of Analysis are in Appendix C. Photographs of each monitoring location are in Appendix D.

- DP1R
- DP2
- DP3
- DP4
- DP5R
- DP6
- DP7

Blind duplicate groundwater samples were collected from DP4 in the spring and DP7 in the autumn as part of the Quality Assurance/Quality Control (QA/QC) program. As these field duplicates equate to at least 10% of the total samples collected, this is an adequate QA/QC program for groundwater. In addition to these samples, the laboratory completes internal QA/QC. The results of the QA/QC program are presented in Section 4.1.

2.2 Surface Water Monitoring Program

The following tasks were completed as part of the 2020 surface water monitoring program:

- Surface water samples were collected by immersing the sample container into the water body.
- When sample bottles were prefilled with preservatives, a clean bottle was used to collect and decant the water directly into the sample bottle.
- Surface water samples for mercury (0.45 µm) analysis were filtered by the laboratory.
- Field measurements including pH, conductivity, temperature, DO, and ORP were recorded at each sample location.
- Where possible, depth, width, and flow velocity measurements were collected at each surface water location.

Surface water samples were collected from SW1, SW2, SW3, SW4, SW5, and SW6 on April 21 and November 12, with the following exceptions:

- SW6 was dry in April and November
- SW2 was dry in November

Surface water sampling locations are shown on Figure 2. The UTM coordinates for the monitoring locations are in Embedded Table 1. Surface water results are discussed in Section 4.3. Field data sheets are in Appendix B. Laboratory Certificates of Analysis provided by Caduceon are in Appendix C. Photographs of each surface water sample location are in Appendix D.

Blind duplicate surface water samples were collected from station SW3 in April and November as part of the QA/QC program. As these field duplicates equate to 10% of the total samples obtained, this is an adequate QA/QC program for surface water. The results of the QA/QC program are presented in Section 4.1.

2.3 Landfill Gas Monitoring Program

Landfill gas (LFG) is not actively managed at the Site. The large, open site area and isolated location from the public supports passive landfill gas management, which allows generated

landfill gas to naturally disperse through the waste and naturally-permeable cover soil to the atmosphere.

Landfill gas monitoring is conducted on a yearly basis. The purpose of the monitoring is to assess compliance with Section 4.10 of *Landfill Standards, A Guideline on the Regulatory and Approval Requirements for New and Expanding Landfilling Sites* (MOEE, 1998), which states the concentration of methane gas in the subsurface may not exceed 2.5% by volume at the property boundary. If elevated methane concentrations are recorded, the LFG monitoring program should be expanded to include additional monitoring wells closer to the property boundary.

Landfill gas measurements were recorded at all groundwater monitors in 2020 with the exception of DP2 in April and DP5R in April and November. Landfill gas monitoring results are discussed in Section 4.4.

2.4 Site Review and Operations Overview

Site conditions were observed during site visits completed in April and November 2020. During these visits, the items listed below were inspected on accessed areas of the Site and observations noted in the field file. Site inspection results are presented in Section 5.0.

- Cover material condition
- Condition of access roads and access gates
- Status of monitoring well security

3.0 Geological and Hydrogeological Context

3.1 Topography and Drainage

The Site is in the Gull tertiary watershed. The land surrounding the landfill is mostly forested and unevaluated wetlands. An unnamed watercourse flows from southwest of Galway Road, across the western portion of the Site, flowing northeast and joining an unnamed tributary to Union Creek, 520 m northeast of the Site. The tributary discharges into Union Creek 800 m northeast of the Site. Union Creek flows west and eventually discharges into Burnt River and Cameron Lake. There are no provincially significant or evaluated wetlands within 500 m of the Site (Figure 2).

The topography at the Site is relatively flat and ranges from 320 m (southeast) to 315 m (northwest) above sea level (ASL). The surface water drainage systems on and near the Site can generally be characterized as stagnant, with intermittent flows of low volume occurring during periods of increased precipitation.

There are six surface water sampling locations in the approved surface water monitoring program (Table 1).

- SW3 is the background monitoring location. It is south of Galway Road and upstream of SW4 and SW5 on the same unnamed tributary. All three monitoring stations are off-site.
- SW1 is north of the waste mound and is primarily groundwater discharge.
- SW2 is in a low-lying wetland, east of the unnamed tributary flowing through the western portion of the Site.
- SW6 is a seep initially identified in 2012 at the toe of the waste mound between sampling stations SW1 and SW2.

The geospatial coordinates (NAD 83) for the surface water monitoring stations are in Embedded Table 1. Flow and discharge rates measured during the monitoring events are in Appendix B.

Embedded Table 1 Coordinates of Surface Water Stations

Surface Water Station	Northing	Easting
SW1	695255	4960699
SW2	695194	4960632
SW3	695151	4960538
SW4	695193	4960678
SW5	695289	4960755
SW6	695224	4960657

3.1.1 Precipitation Data

A review of the 2020 precipitation data for Sprucedale (Government of Canada, 2020) in comparison to the average precipitation data for 1981 to 2010 for Haliburton station (Government of Canada, 2015) indicated that the annual precipitation was normal; however, varied month to month. August and October received significantly more precipitation than normal, while February, May, June, and November received significantly less. The monthly precipitation, as well as the amount of precipitation during and in the three days prior to the sampling events is summarized in Embedded Table 2. Refer to Appendix B for field sheets and climate data.

Embedded Table 2 Historical and 2020 Precipitation Data

Sampling Date	Average Monthly Precipitation (mm) (1981 – 2010)	2020 Precipitation (mm)	Precipitation During and Prior to Sampling (mm)
April 21	75.6	73	17
November 12	116.4	74	12

3.2 Hydrogeology

The regional stratigraphy in the area of the Site consists of Precambrian bedrock overlain by till plain. The underlying Precambrian bedrock is composed of carbonate metasedimentary rocks.

Drive point piezometers DP1 through DP5 were assumed to be installed in early 2002 and were reportedly shallow, installed in the overburden. Based on measured depths of these piezometers, the overburden thickness is greater than 4.3 m in the western portion of the Site.

DP1 and DP5 were reported to be destroyed in 2011 and were replaced with drive-point piezometers DP1R and DP5R in 2016. No installation details or borehole logs were provided in previous annual reports for DP1 through DP5R.

Due to the lack of background water quality information available for the Site, two background monitoring wells were installed by WSP in 2016 (DP6 and DP7) (WSP, 2017). Based on the borehole logs for these wells (Appendix E), the overburden thickness is 4.0 m in the southeast portion of the Site (DP6) and greater than 5.5 m in the southwest portion of the Site (DP7), corresponding to the topographic high and lows at the Site, respectively.

The overburden materials were reported to be fine sand with gravel and boulders on top of the hill (east), with a component of silt and organics (wood fragments noted) in the low-lying area west of the landfill. The bedrock encountered at monitor DP6 was reported to be hard marble. Since installation, this well has been dry or had insufficient volumes to sample indicating there is limited if any shallow bedrock aquifer intercepted by this well.

Based on a recent search of the available Ministry water well record database (Cambium, 2019), six water well records were identified within 500 m of the waste mound. Two of these records were for on-site test wells DP6 and DP7. The remaining four wells were domestic supply wells, were cross-gradient (northeast and southwest) of the waste mound, and ranged in depths from 35 m to 95 m below ground surface (mbgs). Water well records indicated that the overburden in the area was some combination of sand, stones, and topsoil, only 0.3 to 3.0 m thick. The bedrock was identified as white, black, and/or grey granite in all cases, with fractures only identified in one well at 90 mbgs. The adjacent water well records indicated that an aquifer suitable for water supply is not connected to the shallow overburden aquifer.

Five monitors installed at the Site are sampled as part of the groundwater monitoring program. Available borehole logs and monitoring well records are included in Appendix E.

- Monitoring well DP6 is southeast of the waste mound adjacent the property boundary and Galway Road. This monitoring well is installed in the bedrock and represents background.

- Monitoring well DP7 is installed in the overburden and represents background. DP7 is in the southwest corner of the property, west of the waste mound, and adjacent the property boundary and Galway road.
- DP5R is adjacent to the northwest toe of the waste footprint. Historically, monitoring well DP5 was used to represent leachate characteristics at the Site. This monitor was destroyed in 2011 and replacement monitor DP5R was installed in 2016.
- DP1, north of the waste mound, was destroyed in 2011 and the replacement monitor DP1R was installed in 2016.
- Monitoring well DP2 is northwest of the waste mound between surface water monitoring stations SW2 and SW4, west of the on-site watercourse.
- Drive-point piezometer DP3 is west of the waste mound, west of the on-site watercourse, and southwest of piezometer DP2.
- Drive-point piezometer DP4 is southwest of the waste mound, south of piezometer DP5R, and east of the on-site watercourse.

3.2.1 Groundwater Flow Direction

The inferred direction of groundwater flow was through the shallow overburden primarily to the west and northwest of the Site (WSP, 2017). A well survey was completed in 2019 as recommended in the 2017 report (Cambium, 2019). All piezometers and wells were surveyed and the elevations are in Table 2. Groundwater elevations over time are shown in Figure 4.

Groundwater flow direction was determined to be primarily to the north in the area west of the waste mound. North horizontal hydraulic gradients were estimated to be an average of 0.003 m/m in this area. Given the competent bedrock and topography, it was still inferred that there was a component of radial groundwater flow that travelled west and north from the waste mound.

Although no multi-level monitoring wells are installed on-site to determine vertical groundwater gradients, given the limited overburden, noted low permeable bedrock, shallow groundwater

elevations (i.e., close to surface), topography, and the presence of saturated soils/ponded water down-gradient of the waste mound for at least part of the year, it is speculated that shallow impacted groundwater will discharge to surface down-gradient of the landfill.

3.2.2 Conceptual Site Model

The Site is underlain by be fine sand with gravel, with a component of silt and organics. These materials are underlain by bedrock encountered at monitor DP6, reported to be hard marble.

It has inferred that the shallow overburden flow at the Site will travel north-northwest following the topography and overland surface flow. Given the lack of a shallow bedrock aquifer, it was inferred that the surface of bedrock is not fractured or connected to the overburden which ultimately restricts the vertical migration of leachate impacted groundwater. Furthermore, given the areas observed to be persistently wet in the low-lying western portion of the Site, groundwater is interpreted to discharge to surface north and northwest of the waste mound.

Based on this conceptual model, primary receptors of leachate impacted water are surface water and overburden (till) aquifer groundwater users. As such, the primary receptors of site-related impact are the unnamed watercourse that traverses the Site and ultimately Union Creek.

4.0 Results and Discussion

Water quality results from the monitoring program are used to assess the existence, extent, and degree of impacts to the groundwater and surface water environments related to waste disposal site activities at the Site.

To ensure appropriate actions are in place to respond to degradation in surface water or groundwater quality beyond an acceptable level, site-specific trigger levels and contingency measures aid in the assessment of impacts from leachate contamination and help to prevent adverse impacts to the environments surrounding the waste disposal site.

This section presents the results of the 2020 monitoring program.

4.1 Quality Assurance / Quality Control

Results from the analyses completed on the blind duplicate QA/QC samples were evaluated. Parameter concentrations were considered significantly different if the relative percent difference (RPD) between the duplicate and the parent samples was greater than 30% when at least one result was greater than five times the reported detection limit (RDL).

The duplicate groundwater and surface water analyses were compared to the originals. Overall, the duplicate samples correlated well with the parent samples and met the data quality objective of 30%. Exceptions noted included:

- Iron at DP4 and SW3 in April
- COD at SW3 in November

Considering the low variation between the parent and samples, the groundwater and surface water results were interpreted with confidence.

4.2 Groundwater Quality

Groundwater analysis data for 2011 to 2020 are in Table 3 and Table 4. Data from 2002 to 2010 is included digitally with the report package.

To assess water quality impacts related to landfill site operations, the analytical results for groundwater samples collected on-site were compared to background water quality and historical data, and site compliance was assessed using the RUC (MOEE, 1994a). Furthermore, as shallow groundwater discharges to surface on-site, the results from all monitoring wells were also compared against the PWQO (MOEE, 1994b).

4.2.1 Background Groundwater Quality

When evaluating the impact of any waste disposal site on a groundwater resource, a reference point or value must be established to assist in determining the magnitude of the impact. In this respect, the quality of the groundwater that is not impacted by the waste disposal site operation (background water quality) should be used for comparison purposes. Given the locations of DP6 and DP7 Figure 3, the groundwater results for these monitoring wells represent background water quality at the Site.

Due to dry conditions and/or insufficient water volumes and no recovery, no samples have been collected from monitor DP6 to date.

Samples were first collected from well DP7 in 2017. In the preliminary assessment, road salt impacts were evident at this monitor (i.e., elevated concentrations of conductivity, total dissolved solids (TDS), chloride, and sodium). Elevated concentrations of metals were also attributed to road salt impacts (e.g., barium, arsenic, copper, lead, etc.). Salt influences the chemistry of the soil in which it infiltrates and can release metals and base cations (Health Canada, 2001). Elevated concentrations of some parameters were attributed to the presence of saturated organic soils such as DOC, chemical oxygen demand (COD), iron, manganese, and total phosphorus.

Water quality remained stable in 2020, with some minor seasonal fluctuation in parameter concentrations.

4.2.2 Leachate Characteristics

Historically, monitoring well DP5 was used to represent leachate characteristics at the Site. This monitor was destroyed in 2011 and replacement monitor DP5R was installed in 2016.

Although some parameter concentrations were similar between the two piezometers, some variations were noted such as decreased sulphate and increased lead concentrations. Variations were attributed to the time since Site closure and the disturbance of the overburden during installation.

Groundwater monitoring well DP5R was not sampled in 2020, as it was damaged and inaccessible. In 2019, the monitor was frozen during both spring and autumn sampling events. In 2018, water quality was generally stable. Notably, decreased concentrations of DOC and lead and increased concentrations of zinc were recorded in 2018.

Historically, no leachate indicator parameters (LIPs) were identified for the Site. An initial assessment of piezometer DP5R compared to the background piezometer DP7, indicated the water quality at this down-gradient monitor exhibited only minor impacts from leachate. The following parameters were slightly elevated: alkalinity, conductivity, TDS, hardness, calcium, and zinc. Conversely, the following concentrations were lower: barium, iron, and total phosphorus.

The down-gradient piezometer DP1R was installed in November 2018 to assess water quality down-gradient of the waste mound the north. Since installation, this monitor has had elevated concentrations of many typical leachate parameters compared to all other monitors on-site, including DP5R. Elevated parameters have included barium, boron, calcium, iron, manganese, magnesium, zinc, alkalinity, hardness, TDS, and conductivity. As such, this monitor is a better representation of the quality and strength of leachate at the Site. Results in 2020 were consistent with historic results.

4.2.3 Down-Gradient Groundwater Quality

The down-gradient water quality is monitored by piezometers DP2, DP3, and DP4.

Water quality at DP2 and DP3 have been very similar to each other and stable overtime despite some seasonal fluctuations. These monitors have exhibited elevated concentrations of iron, manganese, and DOC attributed to the wetland soils in which they are installed. Water quality at these locations have generally been comparable to or of better quality than

background monitor DP7 (no road salt impacts). This confirms that leachate impacted groundwater at piezometers DP1R and DP5R flows north-northeast or discharges to surface prior to reaching these locations. It is likely the tributary running through the property is a hydraulic divide and restricts lateral flow of impacted water west of the watercourse.

DP4 is cross-gradient to the waste mound. The water quality at this monitor has been similar to piezometers DP2, DP3, and DP7. Water quality at this monitor has been stable; this continued in 2020.

Overall, the assessment completed in 2020 indicated only piezometers DP1R and DP5R (assumed) were impacted by the Site. This confirms that the leachate impacted groundwater does not travel laterally much beyond the waste mound before being attenuated or discharging to surface. As it is inferred leachate impacted groundwater discharges to surface west and/or northwest of the waste mound, impacts are monitored by surface water locations SW2 and SW4 (Section 4.3).

4.2.4 Volatile Organic Compounds (VOCs)

Volatile organic compounds (VOCs) analysis is completed annually during the spring sampling event at monitor DP2. A VOC analysis was not completed at monitor DP2 in 2020, as the monitor was frozen during the sampling event. VOC concentrations have been less than the RDLs since at least 2016 (Table 4). Moving forward, VOC analysis should be completed at DP1R given that this well is impacted and DP2 is not.

4.2.5 Groundwater Compliance Assessment

The Ministry RUC (MOEE, 1994a) applies to operating waste disposal sites and sites closed post-1986. As the Site closed in 2001, the RUC applies to the Site.

Based on the existing hydrogeological model of the Site, shallow leachate impacted groundwater discharges to the surface water systems on-site. As dictated by the RUC, where groundwater provides baseflow to a surface water feature, this is the recognized reasonable use of the groundwater. Therefore, management approaches should be focused on the

receiving surface water feature. As such, compliance with Ministry policies for the protection of the environment should be focused to the surface water systems. Refer to Section 4.3.

4.2.6 Provincial Water Quality Objectives Assessment

As the hydrogeological conceptual model for the Site indicates that groundwater discharges to the surface for at least part of the year, the water quality at monitors DP1R, DP2, DP3, and DP4 were compared to the PWQO (MOEE, 1994b) This comparison aids in detecting potential impact to the surrounding surface water environments from leachate impacted groundwater.

A summary of the PWQO criteria exceedances in April and November at the down-gradient piezometers is included in Embedded Table 3; monitor DP7 was included for reference. Full water quality data is provided in Table 3.

Embedded Table 3 Summary of Groundwater PWQO Exceedances

Monitor	April	November
DP1R	iron, lead, zinc, DO (low)	iron, lead, zinc, DO (low)
DP2	-	iron
DP3	iron	DO (low)
DP4	none	none
DP7 (Background)	iron, DO (low)	iron, DO (low)

With the exception of DP1R, all down-gradient concentration exceedances in 2020 were either consistent with or less than those in the up-gradient monitor DP7, indicating potential surface water impacts from the Site were unexpected west and southwest of the waste mound.

As discussed, piezometer DP1R was impacted and best represents leachate quality at the Site. Given the proximity to the waste mound and the groundwater flow direction, this was not unexpected. Impacts to adjacent surface water systems are monitored by station SW2 and discussed in Section 4.3.

Comparison of the groundwater results to the PWQO and assessment of potential impacts related to groundwater discharge to surface water should continue.

4.3 Surface Water Quality

The 2011 to 2020 surface water quality data are in Table 5. Data between 1997 and 2010 is included digitally in the report package. The surface water data have been compared with background water quality and historical data, and compliance was assessed using the PWQO (MOEE, 1994b).

4.3.1 Background Surface Water Quality

SW3 is on the north side of Galway Road, upstream of the Site, on an unnamed tributary. The water quality at this location is representative of background surface water conditions at the Site.

The water quality at SW3 has been characterized by low concentrations of most parameters with the occasional PWQO exceedances of iron, total phosphorus, and DO (low). Intermittent seasonal fluctuations have occurred at this monitoring station related to increased volumes of run-off influenced by above average precipitation.

Parameter concentrations were within historical ranges in 2020. This location continued to represent background water quality for the Site.

4.3.2 Downstream Surface Water Quality

Downstream surface water locations sampled in 2020 included SW1, SW2, SW4, and SW5.

SW1 is directly north and downslope of the waste mound and up-gradient of the unnamed watercourse that flows through the Site. SW1 is ponded, stagnant, and poorly drained, likely not connected to the low-lying wet area or watercourse on-site.

Water quality at this location was extremely variable prior to 2017, in many cases ranging by an order of magnitude, seasonally and annually. Since 2017, the water quality at this location has been more stable and generally low to moderate concentrations, typically comparable to SW3. Historically, similarities between the water quality at this location and piezometer DP1R confirmed the connectivity between the shallow groundwater and ponded surface water adjacent the waste mound. In 2020, SW1 did not exhibit the same elevated concentrations of

parameters such as boron, chloride, iron, and zinc at DP1R. Additionally, all parameters met the PWQO at SW1.

SW2 is northwest and down-gradient of the waste mound, in a poorly drained ponded area, between piezometer DP1R and the on-site watercourse. Historic results indicated that concentrations of most parameters at SW2 were similar to the background concentrations at SW3. Occasionally elevated parameter concentrations were attributed to low flow conditions (e.g., iron, total phosphorus, occasional trace metal, DO (low), pH). Parameter concentrations were within historical ranges in 2020. Total phosphorus and iron exceeded the PWQO in April 2020.

SW4 is north and down-gradient of the waste mound and northern property boundary. The monitoring station is downstream of background sampling location SW3, on the same unnamed watercourse. Station SW4 monitors the on-site watercourse and whether impacts are migrating off site.

Water quality at SW4 exhibited water quality consistent with historic results with seasonal fluctuation in phosphorus and iron concentrations. Total phosphorus and iron exceeded the PWQO in April 2020.

SW5 is the farthest downstream and down-gradient sampling location from the waste mound. This location is on the same unnamed watercourse as background location SW3 and eventually discharges into a tributary to Union Creek. The water quality at monitoring location SW5 has been consistent with stations SW3 and SW4; this continued in 2020. All parameter concentrations met the PWQO criteria in 2020.

SW6 was an identified seep at the toe of the waste mound and was between SW1 and SW2. The seep was first observed in 2012 and was added to the monitoring program in 2013. Only one sample has been collected from this monitoring station since identified. A small seep was observed during the April monitoring event northeast of monitor DP1R in the general area of where SW6 was previously identified. Insufficient water was present at the seep to collect a sample. Annual inspections should continue to monitor this location. If a seep reappears, it should be sampled fi sufficient volume is present.

In the past, the only surface water sampling location exhibiting impacts from the Site was station SW1. Given that station SW1 is poorly drained and ponded, it is not expected that this location is connected to the downstream surface water systems. Water quality at this location has generally improved since 2017 and the concentrations at station SW1 generally met the PWQO indicating adverse harm to aquatic ecosystems was not expected downstream of the Site. Water quality remained stable and within historical concentration ranges in 2020 at all locations.

4.4 Landfill Gas Monitoring

LFG, specifically methane and carbon dioxide, is derived from the decomposition of organic wastes. Production of LFG from landfilled wastes normally reaches a maximum rate approximately two years after placement and may continue at this rate for many years. The biological decomposition process results in the generation of LFG until some period, likely decades, after the landfilling of that waste ceases.

Landfill gas measurements were recorded at accessible on-site drive point piezometers in conjunction with April and November 2020 monitoring program.

The monitoring results are presented in Table 6. LFG concentrations did not exceed 0.05% methane by volume with the exception of DP7 which measured 2% methane by volume. Given that DP7 is the background well and separated from the waste mound by saturated soils, the reading at this location was not attributed to the Site. Regardless, this is only the second time that a monitor has recorded greater than 0.05% methane by volume since methane monitoring began in 2018.

Overall results indicate minimal LFG generation at the Site. LFG monitoring should be conducted on a yearly basis.

4.5 Adequacy of Monitoring Program

In an effort to have a refined and concise monitoring program at the Site, the existing monitoring program is reviewed annually to determine if it sufficiently monitors impacts at the Site. Following an assessment of the monitoring program in 2020, the monitoring program

continued to effectively characterize Site conditions, groundwater and any groundwater discharges from the Site, and includes data that relates to background water conditions. At the Site, in whole or in part:

- All fieldwork for groundwater and surface water investigations was done in accordance with the established SOPs (including internal/external QA/QC).
- All groundwater and surface water sampling for the monitoring period was successfully completed in accordance with the PC of A.
- The Site has an adequate buffer, contaminant attenuation zone (CAZ), and contingency plans in place.
- Design and operational measures, including size and configuration of the CAZ, were adequate to prevent potential human health impacts and impairments of the environment.
- The Site generally met compliance and assessment criteria.

The following recommendations were made following inclusion of the 2020 monitoring results.

Monitoring well DP5R is inaccessible for sampling due to a cross threaded cap. This well should be repaired in 2021 to provide access for monitoring.

VOC analysis should be completed at DP1R during subsequent monitoring events as it represents worst case leachate impacts at the Site.

5.0 Site Operations

The Site was closed to waste disposal operations in 2001. This section presents a summary of the site inspections performed in 2020.

5.1 Monitoring Well Security

As part of the 2020 groundwater monitoring program, all monitoring wells and piezometers listed in Table 1 complied with R.R.O. 1990 Regulation 903: Wells (Reg. 903) with the exception of DP5R. The well cap for DPR5 should be repaired or replaced in 2021 to permit access to the well. Photographs of the monitoring wells are included in Appendix D.

5.2 Final Cover Integrity

Inspections completed by Cambium staff during the 2020 site visits indicated the cover material was in good condition and no signs of erosion were present from the locations observed. A small seep was observed during the April monitoring event northeast of monitor DP1R. Insufficient water was present at the seep to collect a sample.

5.3 Compliance with Provisional Certificate of Approval

The Municipality managed the Site in compliance with the PC of A in 2020.

6.0 Conclusions and Recommendations

Based on the 2020 monitoring program, Cambium offers the following conclusions regarding the Galway waste disposal site.

- The inferred direction of groundwater flow direction was radially through the shallow overburden to the west and northwest from the waste mound to the low-lying wet area. Flow from this unevaluated wetland was northerly.
- The down-gradient monitors demonstrated stable conditions. Only piezometers DP1R and DP5R were impacted by the Site. Leachate impacted groundwater does not travel laterally much beyond the waste mound before being attenuated or discharging to surface.
- All down-gradient monitors were compared to the PWQO. Results indicated that discharging groundwater will not cause adverse impacts to the surface water systems west and down-gradient of the Site.
- The Site complied with the Ministry Reasonable Use Policy.
- Surface water quality at the down-gradient and downstream locations were not adversely impacted by the Site.
- The waste mound was in good condition from the locations observed.
- A small seep was present north east of DPR1 in the vicinity of SW6 in the spring.
- The Municipality operated the Site in compliance with the PC of A.

Based on the results of the 2020 monitoring program, Cambium recommends the following:

- The groundwater and surface water monitoring program should continue as approved and outlined in Table 1; however, VOC analysis should be completed at DP1R given that this well is impacted and DP2 is not.
- The seep northeast of DPR1 (SW6) should be monitored and sampled if sufficient volume of water is present.
- DP5-R should be repaired.

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Glossary of Terms

Active Face/Area
The portion of the landfill facility where waste is currently being deposited, spread and/or, compacted prior to the placement of cover material.

Adverse Environmental Impact
Any direct or indirect undesirable effect on the environment resulting from an emission or discharge that is caused or likely to be caused by human activity.

Annual Report
Report documenting the results of water quality, environmental quality, and operations monitoring for the year, or for a period as prescribed in the Certificate of Approval.

Approved Design and Operations Plan
The design of a landfill site and its facilities which have been submitted along with the application documents for which formal Ministry approval has been issued through the Certificate of Approval.

Approved Site or Facility
A landfill site/facility for which there is an existing and current Certificate of Approval.

Aquifer
A geologic unit (soil or rock) that contains sufficient saturated permeable material to yield measurable quantities of water to wells and springs.

Attenuation
Natural process through which the concentrations of landfill generated contaminants are reduced to safe levels.

Borehole
A hole drilled for soil sampling purposes.

Buffer Area
An area of land situated within the peripheral area surrounding an active filling area, but limited in extent to the property boundary, assigned to provide space for remedial measures, contaminant control measures, and for the reduction or elimination of adverse environmental impact caused by migrating contaminants.

Certificate of Approval
The license or permit issued by the Ministry for the operation of a landfill site. Issued to the owner of the site with conditions of compliance stated therein.

Contaminant
A compound, element, or physical parameter, usually resulting from human activity, or found at elevated concentrations that have or may have a harmful effect on public health or the environment.

Contaminant Migration Path
Route by which a contaminant will move from the site into adjacent properties or the natural environment. Usually a route that offers the least resistance to movement.

Contamination Attenuation Zone
The zone beneath the surface, located beyond the landfill site boundary, where contaminants will be naturally attenuated to predetermined levels. Also, see Reasonable Use Policy.

Contingency Plan
A documented plan detailing a co-ordinated course of action to be followed to control and remediate occurrences such as a fire, explosion, or release of contaminants in an uncontrolled manner that could threaten the environment and public health.

Cover Material
Material approved by the Ministry that is used to cover compacted solid waste. Usually, a soil with suitable characteristics for specific end-use.

Site Development Plan and Operations Report
Development and Operations Plan or Report is a document detailing the planned sequence of activities through the landfill site's active life, the control systems, site facilities and monitoring systems that are necessary. This document is required for obtaining a Certificate of Approval.

Design Capacity
The maximum amount of waste that is planned to be disposed of at a landfill site.

Detection Limit
Concentration under which a parameter cannot be quantitatively measured.

EAA or EA Act
Environmental Assessment Act, Revised Statutes of Ontario, 1990. One of the primary acts of legislation intended to protect, conserve, and wisely manage Ontario's environment through regulating planning and development.

Environmental Compliance Approval
The license or permit issued by the Ministry for the operation of a landfill site. Issued to the owner of the site with conditions of compliance stated therein.

EPA
Environmental Protection Act, Revised Status of Ontario, 1990. EPA is another of the primary pieces of Provincial legislation governing the protection of the natural environment of the Province.

Evapotranspiration
The evaporation of all water from soil, snow, ice, vegetation and other surfaces, including the water absorbed by plants, that is released to the atmosphere as vapour.

Fill Area
The area of a landfill site designed and designated for the disposal of waste.

Final Cover
Soil material or soil in combination with synthetic membranes, overlain by vegetation in a planned landscape, placed over a waste cell that has reached the end of its active life.

Groundwater
Subsurface water that occurs beneath the water table in soils and rocks that are fully saturated.

Hydraulic Conductivity
The rate of flow of water through a cross-section under a specific hydraulic gradient. It is a property of the geologic formation and the fluid, in hydrogeologic applications where the fluid is water (Units of m/day or cm/s).

Hydraulic Gradient
The head drop per unit distance in the direction of flow, the driving force for groundwater flow.

Hydrogeology
The study of subsurface waters and related geologic aspects of surface waters.

Impermeable Fill
Soil material that is placed as filling material that is sufficiently cohesive and fine grained to impede and restrict the flow of water through it.

In situ Testing
Testing done on-site, in the field, of material or naturally occurring substances in their original state.

Landfill Gas
Combustible gas (primarily methane and carbon dioxide) generated by the decomposition of organic waste materials.

Landfill Site
A parcel of land where solid waste is disposed of in or on land for the purposes of waste management.

Leachate
Water or other liquid that has been contaminated by dissolved or suspended particles due to contact with solid waste.

Leachate Breakout
Location where leachate comes to the ground surfaces; a seep or spring.

Limit of Filling
The outermost limit at which waste has been disposed of, or approved or proposed for disposal at a landfill.

Ministry
Ontario Ministry of the Environment, Conservation and Parks.

Monitoring
Regular or spontaneous procedures used to methodically inspect and collect data on the performance of a landfill site relating to environmental quality (i.e., air, leachate, gas, ground or surface water, unsaturated soils, etc.).

Monitoring Well
The constructed unit of casing (riser and screen) installed in a borehole.

Multi-Level Monitoring Well
More than one monitoring well installed at a given test well location.

Native Soil
Soil material occurring naturally in the ground at a location.

Natural Attenuation
Where contaminants are reduced to acceptable concentration levels by natural mechanisms (dilution, absorption onto the soil matrix, etc.), biological action, and chemical interaction.

Occupational Health and Safety Act
The primary act of legislation enacted by Ontario Ministry of Labour to regulate and control the safety in the workplace; also Occupational Health and Safety Act, Revised Statutes of Ontario, 1990.

Odour Control
Minimizing or eliminating the nuisance and undesirable impact of objectionable or unpleasant odours arising from waste disposal operations.

Open Burning
Burning any matter whereby the resultant combustion products are emitted directly to the atmosphere without passing through an adequate stack, duct, or chimney.

Operations Plan
A document detailing the waste disposal operations in a planned, and if necessary, a staged manner, that ensure compliance with regulatory provisions concerning the operations of a landfill site.

Operator (Site Operator)/Attendant
The individual or organization who, through ownership or under contract, manages and operates a landfill site for the purpose of waste disposal.

Owner
A person, persons, organization, or municipal authority who own a landfill facility or part of a landfill facility, and in whose name the Certificate of Approval for the site is issued.

Percolation
The movement of infiltrating water through soil.

Permeability
Often used interchangeable with hydraulic conductivity, but not strictly correct. Permeability is a property of the porous media only. Dependent upon media properties that affect flow, diameter, sphericity, roundness, and packing of the grains.

Piezometer
A well that intersects a confined aquifer.

Provisional Certificate of Approval (Provisional C of A)
Same as Certificate of Approval.

Reasonable Use Policy
A policy developed by the Ministry to stipulate limits to the level of groundwater quality impairment that may be permitted to occur at site property boundaries, to allow the reasonable use of adjacent properties or land without adversely affecting public health and the environment.

Recharge Zone
An area where precipitation or surface run-off infiltrates into the ground and then, through natural percolation enters an aquifer.

Recycling
Sorting, collecting or processing waste materials that can be used as a substitute for the raw materials in a process or activity for the production of (the same or other) goods. For example, the "Blue Box" system, in-plant scrap handling, or raw material recovery systems. Recycling is also the marketing of products made from recycled or recycled materials.

Reduction (of waste or component of 3Rs program)
Those actions, practices, or processes that result in the production or generation of less waste.

Remedial Action
Corrective action taken to clean-up or remedy a spill, an uncontrolled discharge of a contaminant, or a breach in a facility or its operations, in order to minimize the consequent threat to public health and the environment.

Representative Sample
A small portion of soil, water, etc. which can be subjected to testing and analysis, that is expected to yield results that will reliably represent the identical characteristics of the source of the material or of a larger body of material.

Reuse (component of 3Rs program)
The use of an item again in its original form, for a similar purpose as originally intended, or to fulfil a different function.

Run-off
The part of precipitation (rainwater, snowmelt) that flows overland and does not infiltrate the surface material (soil or rock).

Saturated Zone
The zone of a subsurface soil where all voids are filled with water.

Sedimentation
The deposition of fine grained soil in an undesirable location, caused by the scouring, erosion and transportation of earth materials by surface run-off.

Sensitive Land Use
A land use where humans or the natural environment may experience an adverse environmental impact.

Settlement
The subsidence of the top surface and underlying waste of a landfill or waste cell as a result of densification under its own weight.

Site Capacity
The maximum amount of waste that is planned to be disposed (design capacity) or that has been disposed of at a landfill site.

Site Closure
The planned and approved cessation or termination of landfilling activities at a landfill site upon reaching its site capacity.

Site Life
The period from its inception through active period of waste disposal, to the time when a landfill site reaches its' site capacity, when it ceases to receive any further waste, including and up to closure.

Solid Waste
Any waste matter that cannot be characterized by its physical properties as a liquid waste product.

Solid Waste Disposal Site or Facility
A site or facility such as a landfill site where solid waste is disposed of.

Source Separation
The separation of various wastes at their point of generation for the purposes of recycling or further processing.

Standpipe
A monitoring well that intersects the water table aquifer.

Storm water
Run-off that occurs as a direct result of a storm event or thaw.

Storm water Detention
Control of storm water by the construction of impoundments of structures for the purpose of regulating storm water flows during high intensity rainfall events that would otherwise transport excessive amounts of sediment, cause soil erosion or cause flooding.

Stratigraphy
The geologic sub-structuring, usually layered with different distribution, deposition and age.

Surface Run-off (Drainage)
See Run-off.

Surface Water
Water that occurs at the earth's surface (ponds, streams, rivers, lakes, oceans).

Sub-Soil
Soil horizons below the topsoil.

Test hole
A hole drilled for soil sampling purposes.

Topsoil
The uppermost layer of the soil containing appreciable organic materials in mineral soils. Adequate fertility to support plant growth.

Unsaturated Zone
The zone (also vadose zone) in a porous sub-soil, where the voids are not completely water-filled, but contain some air-filled voids. Limited above by the land surface and below by the water table.

Vector
A disease carrier and transmitter; usually an insect or rodent.

VOC
Volatile organic compounds are those compounds that will readily volatilize (convert from liquid to gas phase) at conditions normally found in the environment.

Waste
Ashes, garbage, refuse, domestic waste, industrial waste, or municipal refuse and other used products as are designated or interpreted by the provisions of the Environmental Protection Act.

Waste Disposal Site (Facility)
Any land or land covered by water upon, into, in or through which, or building or structure in which, waste is deposited or processed and any machinery or equipment or operation required for the treatment or disposal of waste.

Waste Management System
All facilities, equipment and operations for the complete management of waste, including the collection, handling, transportation, storage, processing and disposal thereof, and may include one or more waste disposal sites.

Water Table
The water level attained in a monitoring well, which screens the surficial unconfined aquifer.

Water Balance
Amounts of water to various components in a system so that water entering the system equals the amount of water contained within and discharged out of a system.

Water Level
The level of water in a well.

Well Casing
The pipe that is used to construct a well.

Well Screen
A filtering device used to keep sediment from entering a well.

Wetlands
Areas where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrolytic vegetation, and which have soils indicative of wet conditions.

Abbreviations

RFP	Request For Proposal	**ha**	hectare
Ministry	Ontario Ministry of the Environment, Conservation and Parks	**tonne**	metric ton
MNRF	Ontario Ministry of Natural Resources and Forestry	**t**	metric tonne
ECA	Environmental Compliance Approval	**µS**	microSiemens
EPA	Environmental Protection Act	**ODWQS**	Ontario Drinking Water Quality Standards
EAA	Environmental Assessment Act	**PC of A**	Provisional Certificate of Approval
MW	monitoring well	**PWQO**	Provincial Water Quality Objectives
masl	metres above sea level	**TOC**	Total Organic Carbon
pg	picogram	**VOC**	Volatile Organic Compound
ng	nanogram	**BTU**	British Thermal Unit
µg	microgram	**°C**	temperature in degrees Celsius
g	gram	**N/A**	not available
kg	kilogram	**%**	percent
L	Litre	**cfm**	cubic feet per minute
mg/L	milligrams per litre	**ppmdv**	part per million by dry volume
mm	millimetre	**ppmv**	part per million by volume
m	metre	**ppm**	part per million
km	kilometre	**min**	minimum
m^3	cubic metre	**max**	maximum
m^2	square metre		

Standard Limitations

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A site assessment is created using data and information collected during the investigation of a site and based on conditions encountered at the time and particular locations at which fieldwork is conducted. The information, sample results and data collected represent the conditions only at the specific times at which and at those specific locations from which the information, samples and data were obtained and the information, sample results and data may vary at other locations and times. To the extent that Cambium's work or report considers any locations or times other than those from which information, sample results and data was specifically received, the work or report is based on a reasonable extrapolation from such information, sample results and data but the actual conditions encountered may vary from those extrapolations.

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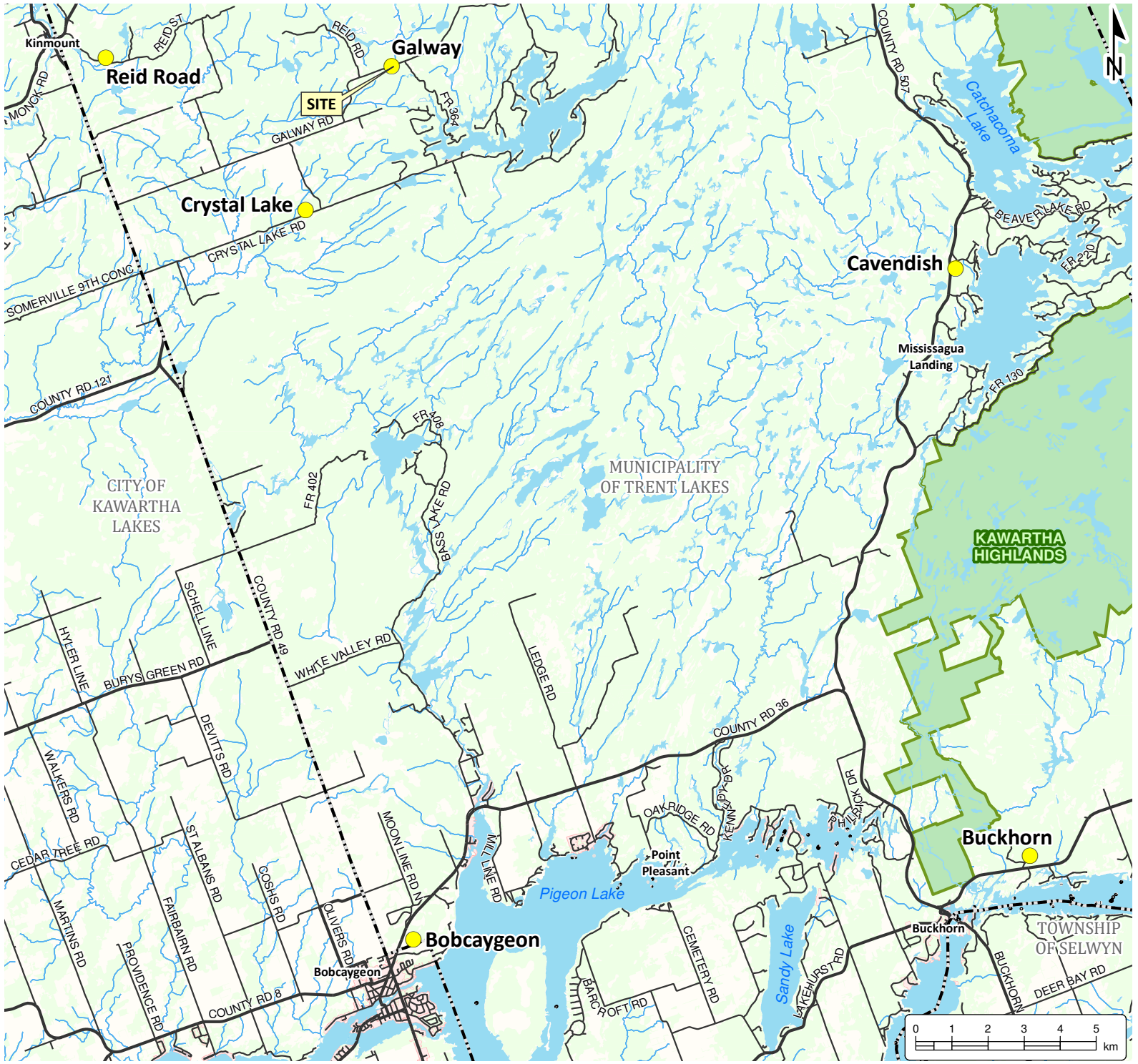
Appended Figures



GALWAY WASTE DISPOSAL SITE (CLOSED)

LOT 19, CONCESSION 13, GALWAY ROAD
Trent Lakes, Ontario
Municipality of Trent Lakes

LEGEND

- Trent Lakes Waste Disposal Sites
- Major Road
- Minor Road
- Watercourse
- Water Area
- Provincial Park
- Wooded Area
- Built Up Area
- Lower Tier Municipality

Notes:
- Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
- Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

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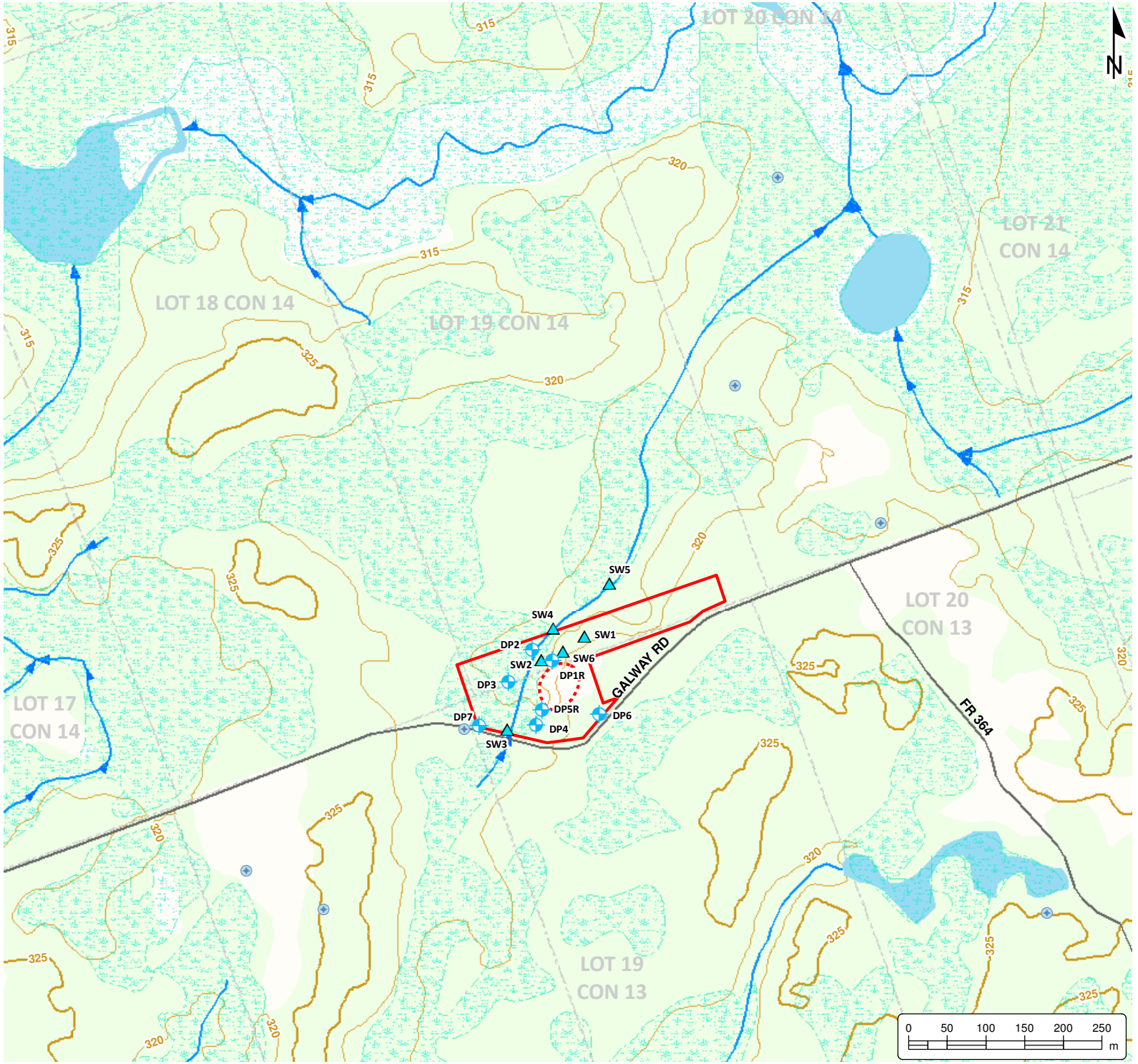
REGIONAL LOCATION PLAN

Project No.: 10520-007		Date: March 2021	Rev.:
Scale: 1:150,000		Projection: NAD 1983 UTM Zone 17N	
Created by: TLC	Checked by: SNR	Figure: 1	

O:\GIS\MXDs\10500-10999\10520-007 MTL - Galway AMP\2021-02-23 FIG 1 - Regional Location Plan.mxd

GALWAY WASTE DISPOSAL SITE (CLOSED)

LOT 19, CONCESSION 13, GALWAY ROAD
Trent Lakes, Ontario
Municipality of Trent Lakes



LEGEND

- Select Water Wells
- Surface Water Location
- Monitoring Well Location
- Minor Road
- Watercourse, Permanent
- Contour 5m Interval (Major)
- Contour 5m Interval (Minor)
- Lot / Concession
- Unevaluated Wetlands
- Water Area
- Wooded Area
- Assumed Limit of Waste
- Site (2.87 ha.)

Notes:
- Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
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LOCAL TOPOGRAPHY PLAN

Project No.: 10520-007		Date: March 2021	Rev.:
Scale: 1:7,000		Projection: NAD 1983 UTM Zone 17N	
Created by: TLC	Checked by: SNR	Figure: 2	

O:\GIS\MXDs\10500-10999\10520-007 MTL - Galway AMP\2021-02-23 FIG 2 - Local Topography Plan.mxd

GALWAY WASTE DISPOSAL SITE (CLOSED)

LOT 19, CONCESSION 13, GALWAY ROAD
Trent Lakes, Ontario
Municipality of Trent Hills

N

SW4
SW1
SW6
SW2
SW3

(315.09)
DP2

315.13
(315.06)
DP1R

315.14
(315.24)
DP3

315.47
(315.26)
DP7

315.41
(315.38)
DP4

DP5R

DP6

315.1
315.2
315.3
315.5

323.5
324
324.5
325

Attendant Shelter

Culvert

GALWAY ROAD

GRAPHIC SCALE
(IN METRES)
10 0 10 20 3(

1 : 750

LEGEND

- Surface Water Sample Location
- Historical Surface Water Sample Location
- Overburden Monitoring Well
- Bedrock Monitoring Well
- 315.51 (315.09) Groundwater Elevation April 21, 2020 (November 12, 2020)
- Gate
- Topographic Contour Line
- Groundwater Contour
- Site (2.87 ha.)
- Assumed Limit of Waste
- Watercourse
- Fence
- On-site Road
- Approximate Tree Line
- Groundwater Flow Direction
- Inferred Groundwater Flow Direction
- Low Lying Wet Area

Notes:
1. Waste Disposal Site Features are approximate and were obtained from Coe Fisher Cameron Land Surveyors AutoCAD Drawing CFC11436, Reference Number 14-17-066-00, Dated 01/21/15.
2. Base mapping features are © Queen's Printer of Ontario, 2010 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
3. Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.

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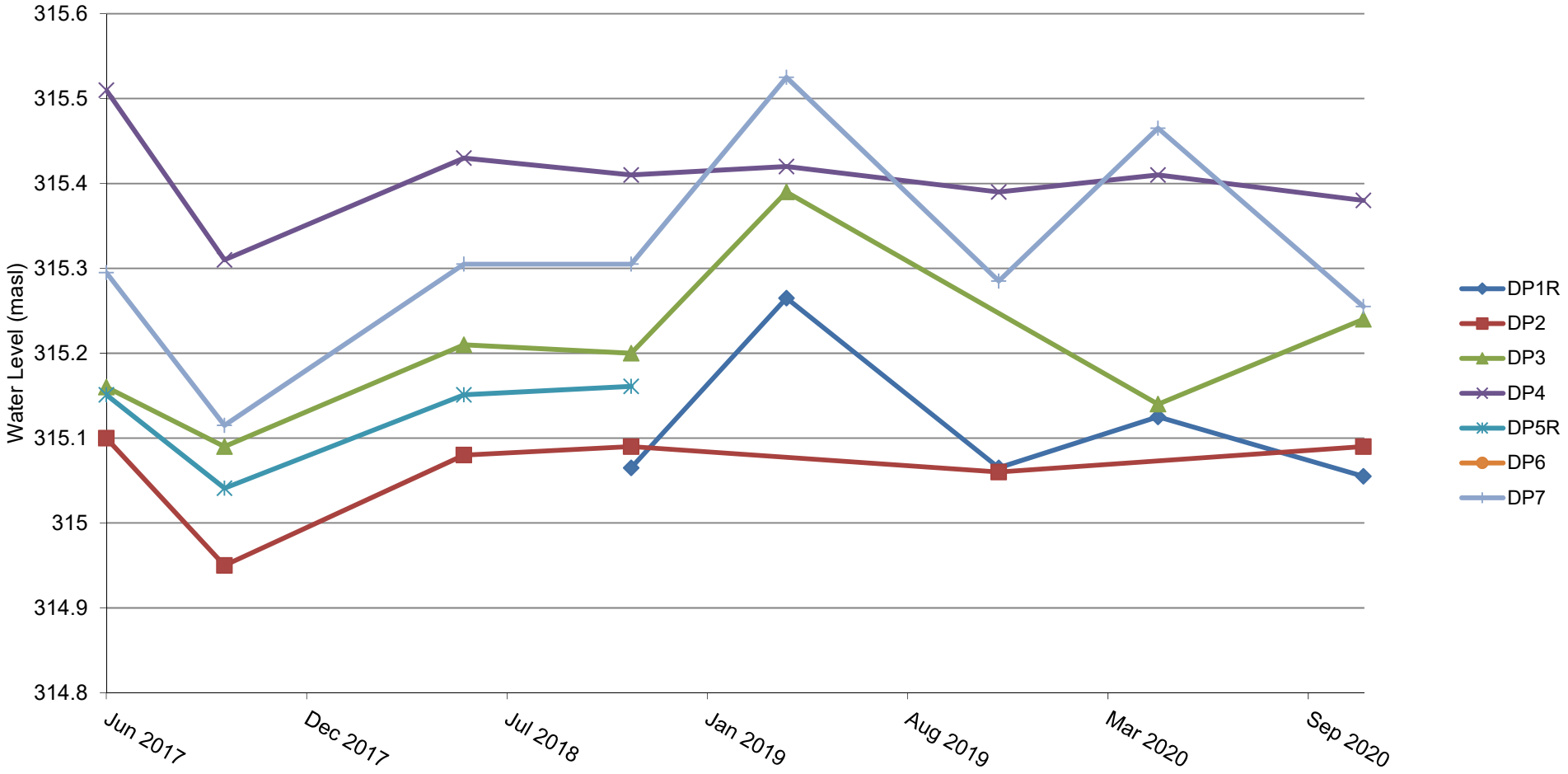
EXISTING CONDITIONS

Project No.: 10520-007		Date: March 2021 Rev.:
Horizontal Scale: 1:750		Projection: UTM Zone 17N
Drawn By: TLC	Checked By: SNR	Figure: 3



Groundwater Elevations

2020 Annual Report, Galway Waste Disposal Site
Lot 19, Concession 13, Galway Road, Trent Lakes
The Corporation of the Municipality of Trent Lakes

Figure:	**4**
Date:	Mar-21
Project Manger:	Stephanie Reeder
Project No.:	10520-007

CAMBIUM

Appended Tables

Table Notes

RDL - reported detection limit for the current year

RUC - Reasonable Use Criteria

CWQG - Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2011)

ODWQS - Ontario Drinking Water Quality Standards, O.Reg. 169/03

PWQO - Water Management, Policies, Guidelines, Provincial Water Quality Objectives (MOEE, 1994b)

PWQO for beryllium, cadmium, copper, and lead depend on hardness

PWQO for aluminum depends on pH and background concentration

NV - No Value

"-" Parameter not analyzed or measured

Unionized ammonia calculated using total ammonia and field data for pH and conductivity

Table 1 Environmental Monitoring Program

Location	Task	Frequency	Parameters
GROUNDWATER			
DP1R, DP2, DP3, DP4, DP5R, DP6 DP7 1 QA/QC Duplicate	• Measure groundwater levels • Groundwater sampling • Field Measurements (pH, temperature, conductivity, dissolved oxygen, ORP)	Twice (Spring and Autumn)	Alkalinity, Ammonia, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Chloride, Conductivity, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nitrate, Nitrite, TKN, pH, Phenols, Phosphorus by ICP, Potassium, Sodium, TDS, Sulphate, Zinc, COD, DOC, Hardness
DP2	• Groundwater sampling	Twice (Spring and Autumn)	BOD, TSS
DP2	• Groundwater sampling	Once (Spring)	Benzene, 1,4- Dichlorobenzene, Dichloromethane, Toluene, Vinyl Chloride
All existing monitors	Measure combustible gas % by volume	Twice (Spring and Autumn)	Methane
SURFACE WATER			
SW1, SW2, SW3, SW4, SW5, SW6 1 QA/QC Duplicate	• Surface water sampling • Flow estimates • Field measurements (pH, temperature, conductivity, dissolved oxygen and ORP)	Twice (Spring and Autumn)	Alkalinity, Ammonia, Arsenic, Barium, Boron, Cadmium, Chloride, Chromium, Conductivity, Copper, Iron, Lead, dissolved mercury, Nitrate, Nitrite, TKN, pH, Total Phosphorous, Zinc, TSS, TDS, Sulphate, BOD, COD, Phenols, Hardness

**Dissolved mercury to be lab filtered with a 0.45 micron filter for all surface water samples*

Table 2 - Groundwater Elevation Data

Monitor	DP1R	DP2	DP3	DP4	DP5R	DP6	DP7
Northing Easting	695211 4960647	695187 4960659	695138 4960615	695191 4960572	695198 4960580	695279 4960598	695110 4960557
Original Ground Elevation (masl)	315.60	315.43	315.43	315.42	315.25	323.21	316.07
Stick Up (m)	0.55	0.93	0.71	1.40	0.76	0.69	0.74
Depth (m)	2.08	5.20	4.60	4.49	1.71	10.70	6.20
Measuring Point (masl)	316.15	316.36	316.14	316.82	316.01	323.90	316.81
6-Jun-17	-	315.10	315.16	315.51	315.15	-	315.30
2-Oct-17	-	314.95	315.09	315.31	315.04	-	315.12
29-May-18	-	315.08	315.21	315.43	315.15	INS	315.31
12-Nov-18	315.07	315.09	315.20	315.41	315.16	INS	315.31
16-Apr-19	315.27	-	315.39	315.42	-	INS	315.53
14-Nov-19	315.07	315.06	-	315.39	-	INS	315.29
21-Apr-20	315.13	-	315.14	315.41	-	INS	315.47
12-Nov-20	315.06	315.09	315.24	315.38	-	INS	315.26

Elevations are geodetic.
Zone 17, accurate to +/- 5.0 metres
Shaded cells indicate monitors installed in the bedrock
INS means insufficient volumes to sample; no recovery

Table 3 - Groundwater Quality

	Unit	RDL	PWQO	DP1R 2018-11-12	DP1R 2019-04-16	DP1R 2019-11-14	DP1R 2020-04-21	DP1R 2020-11-12
Metals								
Arsenic (Filtered)	µg/L	0.1	**5**	**6**	3.6	2.5	2	1.9
Barium (Filtered)	µg/L	1		185	163	167	166	178
Boron (Filtered)	µg/L	5	**200**	79	84	110	96	136
Calcium (Filtered)	µg/L	20		182,000	170,000	189,000	166,000	186,000
Cadmium (Filtered)	µg/L	0.015	**0.1|0.5**	0.025	0.069	0.039	0.048	0.022
Chloride	µg/L	500		5900	3300	3900	4600	6300
Chromium (III+VI) (Filtered)	µg/L	1	**8.9**	<1	<1	<1	<1	<1
Copper (Filtered)	µg/L	0.1	**1|5**	0.2	0.1	1	0.8	3
Iron (Filtered)	µg/L	5	**300**	**6330**	**27,100**	**26,300**	**29,300**	**44,200**
Lead (Filtered)	µg/L	0.02	**1|3|5**	1.97	**15.1**	2.62	**6.6**	**5.57**
Manganese (Filtered)	µg/L	1		1610	2360	2050	2120	1710
Magnesium (Filtered)	µg/L	20		11,400	8110	9710	8710	10,900
Mercury	µg/L			<0.02	<0.02	<0.02	-	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	<0.02	<0.02
Phosphorus total (P2O5)	µg/L		**30**	**1970**	**40**	-	-	-
Phosphorus (Filtered)	µg/L	100		-	-	<100	<100	<100
Potassium (Filtered)	µg/L	100		6100	4500	5300	4300	5300
Sodium (Filtered)	µg/L	200		13,500	9300	11,200	9700	11,600
Zinc (Filtered)	µg/L	5	**20**	**28,300**	**39,800**	**51,700**	**41,000**	**30,400**
Inorganics								
Alkalinity (as CaCO3)	mg/L	5		549	496	494	445	445
Hardness (as CaCO3) (Filtered)	mg/L	1		502	458	512	451	510
Solids - Total Dissolved (TDS)	mg/L	3		518	493	479	443	460
Solids - Total Suspended (TSS)	mg/L	3		-	-	-	-	-
Oxygen Demand - Chemical (COD)	mg/L	5		389	219	201	146	107
Organic Carbon - Dissolved (DOC) (Filtered)	mg/L	0.2		19	18.9	16	17.6	13
Oxygen Demand - Biological (BOD)	mg/L	3		-	-	-	-	-
Phenols (4AAP)	mg/L	0.002	**0.001**	**0.004**	<0.02	<0.002	<0.002	<0.002
Sulphate (Filtered)	mg/L	1		1	<1	<1	<1	<1
Ammonia	mg/L	0.01		1.37	0.61	0.53	0.28	0.35
Nitrate (as N)	mg/L	0.05		0.06	0.07	<0.05	0.06	0.08
Nitrite (as N)	mg/L	0.05		<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		9.3	3.6	1.9	1.6	1.1
Conductivity (lab)	µS/cm	1		972	928	904	841	870
pH (Lab)	-		**6.5-8.5**	7.71	7.29	7.47	7.44	7.54
Field								
DO (Field)	mg/L		**5-50**	8.71	**4.72**	8.53	**3.64**	**4.77**
Redox Potential (Field)	mV			138	164	13	68	206
Temp (Field)	°C			5.2	4	5.8	4	9.3
Conductivity (field)	µS/cm			920	950	1080	630	834
pH (Field)	-		**6.5-8.5**	6.85	6.9	7.68	6.75	6.85

Table 3 - Groundwater Quality

	Unit	RDL	PWQO	DP2 2011-05-01	DP2 2012-05-01	DP2 2012-11-01	DP2 2013-05-27	DP2 2013-11-13	DP2 2014-06-01	DP2 2014-11-11	DP2 2015-04-13	DP2 2015-10-30	DP2 2016-04-27	DP2 2016-10-25
Metals														
Arsenic (Filtered)	µg/L	0.1	**5**	-	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Barium (Filtered)	µg/L	1		73	78	75	70	70	71	71	76	65	73	80
Boron (Filtered)	µg/L	5	**200**	<10 - 20	<10	<10	<10	12	<10	<10	<10	<10	<10	10
Calcium (Filtered)	µg/L	20		84,000 - 85,000	84,700	87,500	87,600	81,000	85,200	88,300	87,400	86,600	81,700	85,700
Cadmium (Filtered)	µg/L	0.015	**0.1|0.5**	<0.1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1
Chloride	µg/L	500		2000	1290	1640	1600	1220	1690	1520	1800	1820	1840	1380
Chromium (III+VI) (Filtered)	µg/L	1	**8.9**	<5	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Copper (Filtered)	µg/L	0.1	**1|5**	<1	<3	<3	<3	<2	<2	<2	<2	<2	<2	<3
Iron (Filtered)	µg/L	5	**300**	**1000 - 1500**	**591**	**354**	**945**	**356**	**345**	**488**	**303**	171	**495**	**450**
Lead (Filtered)	µg/L	0.02	**1|3|5**	<0.5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Manganese (Filtered)	µg/L	1		100 - 110	110	97	93	29	83	85	102	83	86	80
Magnesium (Filtered)	µg/L	20		4500	4520	4470	4510	4300	4620	4660	4490	4450	4220	4390
Mercury	µg/L			-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L		**30**	-	**130**	**100**	**140**	**100**	**130**	**150**	**130**	**100**	**140**	**80**
Phosphorus (Filtered)	µg/L	100		-	-	-	-	-	-	-	-	-	-	-
Potassium (Filtered)	µg/L	100		-	3370	3430	3590	3470	3380	3440	3480	3320	3240	3270
Sodium (Filtered)	µg/L	200		-	3500	3440	3650	3550	3380	3600	3640	3240	3100	3200
Zinc (Filtered)	µg/L	5	**20**	<5	<5	<5	<5	16	8	<5	5	<5	<5	<5
Inorganics														
Alkalinity (as CaCO3)	mg/L	5		243 - 244	257	247	246	243	241	241	251	255	246	251
Hardness (as CaCO3) (Filtered)	mg/L	1		230	230	237	237	220	232	240	237	235	221	232
Solids - Total Dissolved (TDS)	mg/L	3		-	266	254	272	276	280	274	258	260	250	272
Solids - Total Suspended (TSS)	mg/L	3		-	-	-	-	-	13	10	<10	<10	<10	24
Oxygen Demand - Chemical (COD)	mg/L	5		-	15	29	42	16	26	27	15	29	11	12
Organic Carbon - Dissolved (DOC) (Filtered)	mg/L	0.2		5.4 - 5.9	6.9	7.1	10.2	7.5	6.3	6.6	11.7	5.6	6.7	6.3
Oxygen Demand - Biological (BOD)	mg/L	3		-	-	-	-	-	6	13	7	9	<5	<5
Phenols (4AAP)	mg/L	0.002	**0.001**	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulphate (Filtered)	mg/L	1		<1	0.22	0.67	0.58	0.27	0.16	0.12	0.32	0.24	0.14	0.36
Ammonia	mg/L	0.01		3.1 - 3.5	3.42	3.5	3.78	3.49	3.7	3.66	3.54	3.46	2.97	2.88
Nitrate (as N)	mg/L	0.05		<0.1	<0.05	0.09	<0.1	<0.05	0.07	<0.05	0.05	<0.1	0.06	0.06
Nitrite (as N)	mg/L	0.05		-	-	-	-	-	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		4.9 - 5	4.27	5.02	4.34	3.5	4.5	3.81	3.93	4.08	3.48	3.58
Conductivity (lab)	µS/cm	1		472 - 473	455	430	495	461	463	467	481	477	435	482
pH (Lab)	-		**6.5-8.5**	7.84 - 7.94	8.04	7.96	7.68	7.84	7.84	7.61	7.76	7.95	8.14	8.05
Field														
DO (Field)	mg/L		**5-50**	-	-	-	-	-	-	-	-	-	8.4	7.74
Redox Potential (Field)	mV			-	-	-	-	-	-	-	-	-	-	-
Temp (Field)	°C			-	-	-	-	-	-	-	-	-	6.5	7.4
Conductivity (field)	µS/cm			-	-	-	-	-	-	-	-	-	487	573
pH (Field)	-		**6.5-8.5**	-	-	-	-	-	-	-	-	-	7.9	8

Table 3 - Groundwater Quality

	Unit	RDL	PWQO	DP2 2017-06-06	DP2 2017-10-02	DP2 2018-05-29	DP2 2018-11-12	DP2 2019-11-14	DP2 2020-11-12
Metals									
Arsenic (Filtered)	µg/L	0.1	**5**	<0.7	<0.1	<0.1	<0.1	<0.1	<0.1
Barium (Filtered)	µg/L	1		79	79	80	77	81	80
Boron (Filtered)	µg/L	5	**200**	9	8	14	8	5	8
Calcium (Filtered)	µg/L	20		89,600	85,300	85,200	84,200	91,300	90,600
Cadmium (Filtered)	µg/L	0.015	**0.1|0.5**	<0.014	<0.014	<0.015	<0.015	<0.015	<0.015
Chloride	µg/L	500		3400	1200	1400	1800	<500	1800
Chromium (III+VI) (Filtered)	µg/L	1	**8.9**	<1.1	<1	<1	<1	<1	<1
Copper (Filtered)	µg/L	0.1	**1|5**	<0.3	0.4	1.9	<0.1	0.2	0.4
Iron (Filtered)	µg/L	5	**300**	**878**	256	293	255	**330**	**335**
Lead (Filtered)	µg/L	0.02	**1|3|5**	<0.05	0.04	0.15	<0.02	<0.02	0.05
Manganese (Filtered)	µg/L	1		100	60	94	89	92	98
Magnesium (Filtered)	µg/L	20		4950	4970	4700	4690	4730	4770
Mercury	µg/L			<0.02	<0.02	<0.02	<0.02	<0.02	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	-	<0.02
Phosphorus total (P2O5)	µg/L		**30**	**150**	**130**	**120**	**120**	-	-
Phosphorus (Filtered)	µg/L	100		-	-	-	-	<100	<100
Potassium (Filtered)	µg/L	100		3300	3300	3300	3300	3400	3300
Sodium (Filtered)	µg/L	200		3700	3700	3600	3500	3400	3400
Zinc (Filtered)	µg/L	5	**20**	<5	5	6	<5	6	9
Inorganics									
Alkalinity (as CaCO3)	mg/L	5		252	246	237	250	232	223
Hardness (as CaCO3) (Filtered)	mg/L	1		244	234	232	230	248	246
Solids - Total Dissolved (TDS)	mg/L	3		266	262	244	238	237	238
Solids - Total Suspended (TSS)	mg/L	3		26	28	24	5	23	23
Oxygen Demand - Chemical (COD)	mg/L	5		44	32	50	19	33	26
Organic Carbon - Dissolved (DOC) (Filtered)	mg/L	0.2		7.7	8.6	7	9.2	7.8	6.3
Oxygen Demand - Biological (BOD)	mg/L	3		7	2	5	7	3	<3
Phenols (4AAP)	mg/L	0.002	**0.001**	**0.005**	<0.001	<0.001	**0.004**	<0.002	<0.002
Sulphate (Filtered)	mg/L	1		2	<1	<1	<1	<1	<1
Ammonia	mg/L	0.01		3.33	3	3.4	3.46	3.82	3.16
Nitrate (as N)	mg/L	0.05		0.15	0.28	0.08	<0.05	<0.05	<0.05
Nitrite (as N)	mg/L	0.05		0.31	<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		4	3.5	4.2	3.9	3.8	3.8
Conductivity (lab)	µS/cm	1		484	477	471	461	458	461
pH (Lab)	-		**6.5-8.5**	7.73	7.64	7.97	7.58	7.95	7.65
Field									
DO (Field)	mg/L		**5-50**	11.12	**3.31**	5.24	**2.91**	9.19	6.27
Redox Potential (Field)	mV			-4	151	84	163	48	178
Temp (Field)	°C			9.8	8.1	8	6.4	4.7	7.7
Conductivity (field)	µS/cm			480	520	420	510	560	326
pH (Field)	-		**6.5-8.5**	7.28	7.55	7.07	6.89	7.91	7.25

Table 3 - Groundwater Quality

	Unit	RDL	PWQO	DP3 2011-05-01	DP3 2012-05-01	DP3 2012-11-01	DP3 2013-05-27	DP3 2013-11-13	DP3 2014-06-01	DP3 2014-11-01	DP3 2015-10-30	DP3 2016-04-27	DP3 2016-10-25	DP3 2017-06-06	DP3 2017-10-02
Metals															
Arsenic (Filtered)	µg/L	0.1	**5**	-	<3	<4	<3	<3	<3	<3	<3	<3	<3	<0.7	<0.1
Barium (Filtered)	µg/L	1		63	69	66	66	59	61	61	55	66	66	68	65
Boron (Filtered)	µg/L	5	**200**	<10	<10	14	<10	12	11	<10	<10	<10	12	12	13
Calcium (Filtered)	µg/L	20		70,000	72,100	73,500	75,800	71,200	72,600	75,800	70,700	73,700	71,100	73,500	73,700
Cadmium (Filtered)	µg/L	0.015	**0.1|0.5**	<0.1	<2	<3	<2	<1	<1	<1	<1	<1	<1	<0.014	<0.014
Chloride	µg/L	500		2000	1440	1760	1800	1190	1470	1480	1840	1880	1600	3300	1100
Chromium (III+VI) (Filtered)	µg/L	1	**8.9**	<5	<3	<3	<3	<3	<3	<3	<3	<3	3	7.6	<1
Copper (Filtered)	µg/L	0.1	**1|5**	<1	<3	<3	<3	<2	<2	<2	<2	<2	<3	<0.3	0.1
Iron (Filtered)	µg/L	5	**300**	**2700**	**2790**	**2830**	**2910**	**922**	**2740**	**1640**	**1780**	**3900**	**3160**	**3570**	**2140**
Lead (Filtered)	µg/L	0.02	**1|3|5**	<0.5	<2	<3	<2	<2	<2	<2	<2	<2	<2	<0.05	<0.02
Manganese (Filtered)	µg/L	1		130	136	118	129	118	115	104	103	136	123	132	112
Magnesium (Filtered)	µg/L	20		4500	4540	4570	4780	4620	4690	4740	4350	4550	4400	4880	5160
Mercury	µg/L			-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L		**30**	-	**170**	**150**	**170**	**100**	**180**	**150**	**170**	<50	**180**	**510**	**170**
Phosphorus (Filtered)	µg/L	100		-	-	-	-	-	-	-	-	-	-	-	-
Potassium (Filtered)	µg/L	100		-	2390	2380	2740	2390	2350	2500	2340	2460	2340	2200	2300
Sodium (Filtered)	µg/L	200		-	3940	3830	4460	3830	3780	4030	3780	3760	3790	4200	4000
Zinc (Filtered)	µg/L	5	**20**	<5	<5	13	<5	<5	<5	<5	<5	7	<5	<5	<5
Inorganics															
Alkalinity (as CaCO3)	mg/L	5		205	223	215	215	210	209	218	220	226	220	218	217
Hardness (as CaCO3) (Filtered)	mg/L	1		190	199	200	209	197	201	209	194	203	196	204	205
Solids - Total Dissolved (TDS)	mg/L	3		-	266	200	250	246	254	250	244	234	240	233	232
Solids - Total Suspended (TSS)	mg/L	3		-	-	-	-	-	19	17	21	26	24	-	-
Oxygen Demand - Chemical (COD)	mg/L	5		-	18	39	45	16	15	19	13	15	11	44	30
Organic Carbon - Dissolved (DOC) (Filtered)	mg/L	0.2		4.7	9.4	7.1	5.7	6.4	5.3	6	6.3	7.1	6.6	7.5	10.3
Oxygen Demand - Biological (BOD)	mg/L	3		-	-	-	-	-	7	8	5	5	9	-	-
Phenols (4AAP)	mg/L	0.002	**0.001**	-	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.003**	<0.001
Sulphate (Filtered)	mg/L	1		<1	0.14	<0.11	<0.2	0.12	0.15	<0.1	<0.1	0.93	<0.1	<1	<1
Ammonia	mg/L	0.01		2.5	2.8	2.73	2.88	2.57	2.83	2.73	3.14	2.84	2.75	2.73	2.68
Nitrate (as N)	mg/L	0.05		0.1	<0.05	<0.06	<0.1	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	mg/L	0.05		-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	0.32	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		3.2	3.47	4.12	3.18	2.66	3.35	2.83	3.36	3.04	3.76	6.2	3.1
Conductivity (lab)	µS/cm	1		402	394	378	426	401	412	402	410	393	422	424	422
pH (Lab)	-		**6.5-8.5**	7.9	8.02	7.89	7.79	7.8	7.78	7.93	7.88	8.18	8.02	7.79	7.9
Field															
DO (Field)	mg/L		**5-50**	-	-	-	-	-	-	-	-	9.4	8.7	11.65	10.2
Redox Potential (Field)	mV			-	-	-	-	-	-	-	-	-	-	61	144
Temp (Field)	°C			-	-	-	-	-	-	-	-	6.4	7.6	9	8.9
Conductivity (field)	µS/cm			-	-	-	-	-	-	-	-	433	397	430	460
pH (Field)	-		**6.5-8.5**	-	-	-	-	-	-	-	-	8	8.1	7.59	7.77

Table 3 - Groundwater Quality

	Unit	RDL	PWQO	DP3 2018-05-29	DP3 2018-11-12	DP3 2019-04-16	DP3 2020-04-21	DP3 2020-11-12
Metals								
Arsenic (Filtered)	µg/L	0.1	**5**	<0.1	<0.1	<0.1	<0.1	0.2
Barium (Filtered)	µg/L	1		60	64	62	64	63
Boron (Filtered)	µg/L	5	**200**	19	9	13	12	12
Calcium (Filtered)	µg/L	20		64,400	71,900	74,000	68,400	77,300
Cadmium (Filtered)	µg/L	0.015	**0.1|0.5**	<0.015	<0.015	<0.015	<0.015	<0.015
Chloride	µg/L	500		1000	2100	1400	1600	1800
Chromium (III+VI) (Filtered)	µg/L	1	**8.9**	<1	<1	<1	<1	<1
Copper (Filtered)	µg/L	0.1	**1|5**	0.1	<0.1	0.1	0.9	2
Iron (Filtered)	µg/L	5	**300**	**2220**	**1710**	**3400**	**3470**	107
Lead (Filtered)	µg/L	0.02	**1|3|5**	<0.02	<0.02	<0.02	0.03	0.08
Manganese (Filtered)	µg/L	1		114	120	124	120	65
Magnesium (Filtered)	µg/L	20		4550	4780	4780	4350	4850
Mercury	µg/L			<0.02	<0.02	<0.02	-	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	<0.02	<0.02
Phosphorus total (P2O5)	µg/L		**30**	**160**	**150**	**60**	-	-
Phosphorus (Filtered)	µg/L	100		-	-	-	200	<100
Potassium (Filtered)	µg/L	100		2200	2300	2300	2000	2400
Sodium (Filtered)	µg/L	200		3800	4000	3900	3400	3900
Zinc (Filtered)	µg/L	5	**20**	<5	<5	<5	5	<5
Inorganics								
Alkalinity (as CaCO3)	mg/L	5		203	215	204	194	195
Hardness (as CaCO3) (Filtered)	mg/L	1		180	199	205	189	213
Solids - Total Dissolved (TDS)	mg/L	3		209	207	212	205	206
Solids - Total Suspended (TSS)	mg/L	3		-	-	-	-	-
Oxygen Demand - Chemical (COD)	mg/L	5		28	19	166	105	338
Organic Carbon - Dissolved (DOC) (Filtered)	mg/L	0.2		6.8	8.2	9	7.1	6.4
Oxygen Demand - Biological (BOD)	mg/L	3		-	-	-	-	-
Phenols (4AAP)	mg/L	0.002	**0.001**	<0.001	**0.003**	<0.002	<0.002	<0.002
Sulphate (Filtered)	mg/L	1		<1	<1	<1	<1	<1
Ammonia	mg/L	0.01		2.55	2.73	2.79	2.68	3.14
Nitrate (as N)	mg/L	0.05		0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	mg/L	0.05		<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		3	3.2	6.8	7.9	3.1
Conductivity (lab)	µS/cm	1		406	402	411	398	400
pH (Lab)	-		**6.5-8.5**	8.04	7.82	7.54	7.67	7.67
Field								
DO (Field)	mg/L		**5-50**	**4.59**	**0.72**	**2.91**	6.96	**3.65**
Redox Potential (Field)	mV			98	157	161	75	214
Temp (Field)	°C			9.7	13.4	4	4.2	7.9
Conductivity (field)	µS/cm			370	440	480	390	298
pH (Field)	-		**6.5-8.5**	7.23	7.04	7.3	7.22	7.18

Table 3 - Groundwater Quality

	Unit	RDL	PWQO	DP4 2011-05-01	DP4 2012-05-01	DP4 2012-11-01	DP4 2013-05-27	DP4 2013-11-13	DP4 2014-06-01	DP4 2014-11-01	DP4 2015-10-30	DP4 2016-04-27	DP4 2016-10-25	DP4 2017-06-06	DP4 2017-10-02
Metals															
Arsenic (Filtered)	µg/L	0.1	**5**	-	<3	<3	<3	<3	<3	<3	<3	<3	<3	<0.7	0.4
Barium (Filtered)	µg/L	1		55	59	56	56	56	57	56	41	59	68	61	59
Boron (Filtered)	µg/L	5	**200**	10	<10	17	<10	<10	12	10	<10	10	14	12	15
Calcium (Filtered)	µg/L	20		77,000	76,800	83,800	83,600	76,300	79,700	83,400	82,300	80,100	86,400	83,700	76,000
Cadmium (Filtered)	µg/L	0.015	**0.1|0.5**	<0.1	<2	<2	<2	<1	<1	<1	<1	<1	<1	-	<0.014
Chloride	µg/L	500		19,000	18,300	23,700	19,100	18,400	17,900	19,700	20,800	23,400	17,800	15,000	14,400
Chromium (III+VI) (Filtered)	µg/L	1	**8.9**	<5	<3	<3	<3	<3	<3	<3	<3	<3	<3	<1.1	5
Copper (Filtered)	µg/L	0.1	**1|5**	<1	<3	<3	<3	<2	<2	<2	<2	<2	<3	<0.3	0.3
Iron (Filtered)	µg/L	5	**300**	100	110	41	18	<10	<10	<10	<10	<10	137	<5	36
Lead (Filtered)	µg/L	0.02	**1|3|5**	<0.5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<0.05	0.03
Manganese (Filtered)	µg/L	1		38	45	33	31	2	17	18	16	27	40	25	20
Magnesium (Filtered)	µg/L	20		6000	6070	5910	6180	5840	6240	6330	5940	5980	5860	6620	6100
Mercury	µg/L			-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L		**30**	-	<50	<50	<50	**50**	<50	<50	<50	<50	<50	**40**	**40**
Phosphorus (Filtered)	µg/L	100		-	-	-	-	-	-	-	-	-	-	-	-
Potassium (Filtered)	µg/L	100		-	3970	3330	4250	4240	3940	4220	3820	4200	3530	3900	3300
Sodium (Filtered)	µg/L	200		-	5340	8810	6180	5630	5400	5770	6510	5890	9620	7100	8500
Zinc (Filtered)	µg/L	5	**20**	<5	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	<5
Inorganics															
Alkalinity (as CaCO3)	mg/L	5		198	214	171	210	201	206	213	219	222	222	216	191
Hardness (as CaCO3) (Filtered)	mg/L	1		220	217	234	234	215	225	234	230	225	240	237	215
Solids - Total Dissolved (TDS)	mg/L	3		-	268	234	250	258	272	260	270	250	272	271	254
Solids - Total Suspended (TSS)	mg/L	3		-	-	-	-	-	21	<10	<10	<10	18	-	-
Oxygen Demand - Chemical (COD)	mg/L	5		-	7	45	36	14	37	18	12	5	12	26	25
Organic Carbon - Dissolved (DOC) (Filtered)	mg/L	0.2		3.5	4.5	9.2	4	6.1	4.3	4.7	4.2	4.3	7.1	4.8	8.1
Oxygen Demand - Biological (BOD)	mg/L	3		-	-	-	-	-	<5	<5	<5	<5	<5	-	-
Phenols (4AAP)	mg/L	0.002	**0.001**	-	**0.004**	**0.004**	**0.009**	**0.012**	<0.001	**0.002**	<0.001	0.001	<0.001	**0.004**	<0.001
Sulphate (Filtered)	mg/L	1		9	7.42	50.1	9.12	14.2	6.62	3.09	7.24	7.18	16.6	6	16
Ammonia	mg/L	0.01		0.58	0.66	0.43	0.72	0.58	0.63	0.65	3.14	0.58	0.42	0.66	0.45
Nitrate (as N)	mg/L	0.05		<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.25	<0.05	<0.05
Nitrite (as N)	mg/L	0.05		-	-	-	-	-	<0.05	<0.05	<0.1	<0.05	<0.25	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		1.6	1.13	1.99	1.35	1.54	1.05	0.76	1.21	0.83	1.01	1	0.8
Conductivity (lab)	µS/cm	1		462	443	471	483	459	466	464	490	456	523	493	462
pH (Lab)	-		**6.5-8.5**	7.85	8.01	7.84	7.73	7.79	7.83	7.92	7.91	8.13	8.01	7.77	7.82
Field															
DO (Field)	mg/L		**5-50**	-	-	-	-	-	-	-	-	7	6.7	5.26	5.82
Redox Potential (Field)	mV			-	-	-	-	-	-	-	-	-	-	76	124
Temp (Field)	°C			-	-	-	-	-	-	-	-	8.2	7.8	7.9	9.1
Conductivity (field)	µS/cm			-	-	-	-	-	-	-	-	505	639	610	460
pH (Field)	-		**6.5-8.5**	-	-	-	-	-	-	-	-	7.9	7.7	7.17	7.33

Table 3 - Groundwater Quality

	Unit	RDL	PWQO	DP4 2018-05-29	DP4 2018-11-12	DP4 2019-04-16	DP4 2019-11-14	DP4 2020-04-21	DP4 2020-11-12
Metals									
Arsenic (Filtered)	µg/L	0.1	**5**	0.1	0.1	0.1	0.2	0.1	0.3
Barium (Filtered)	µg/L	1		58	60	51	62	60	64
Boron (Filtered)	µg/L	5	**200**	16	12	10	13	16	14
Calcium (Filtered)	µg/L	20		77,400	80,500	81,400	84,600	84,400	85,200
Cadmium (Filtered)	µg/L	0.015	**0.1|0.5**	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Chloride	µg/L	500		21,100	19,600	18,700	21,200	19,700	18,600
Chromium (III+VI) (Filtered)	µg/L	1	**8.9**	<1	<1	<1	<1	<1	<1
Copper (Filtered)	µg/L	0.1	**1|5**	0.2	<0.1	<0.1	0.1	0.1	0.6
Iron (Filtered)	µg/L	5	**300**	38	92	76	50	55	118
Lead (Filtered)	µg/L	0.02	**1|3|5**	<0.02	<0.02	<0.02	<0.02	<0.02	0.04
Manganese (Filtered)	µg/L	1		19	21	20	18	18	24
Magnesium (Filtered)	µg/L	20		6320	6320	6320	6080	6990	6230
Mercury	µg/L			<0.02	<0.02	<0.02	<0.02	-	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	<0.02	<0.02
Phosphorus total (P2O5)	µg/L		**30**	30	**120**	30	<100	-	-
Phosphorus (Filtered)	µg/L	100		-	-	-	-	<100	<100
Potassium (Filtered)	µg/L	100		4000	4000	3900	3500	4000	3800
Sodium (Filtered)	µg/L	200		6500	7100	7100	8800	7300	8500
Zinc (Filtered)	µg/L	5	**20**	<5	<5	<5	<5	<5	<5
Inorganics									
Alkalinity (as CaCO3)	mg/L	5		204	210	203	166	203	188
Hardness (as CaCO3) (Filtered)	mg/L	1		219	227	229	236	240	239
Solids - Total Dissolved (TDS)	mg/L	3		246	245	245	237	245	237
Solids - Total Suspended (TSS)	mg/L	3		-	-	-	-	-	-
Oxygen Demand - Chemical (COD)	mg/L	5		48	141	56	90	52	82
Organic Carbon - Dissolved (DOC) (Filtered)	mg/L	0.2		4.7	6.4	5.6	7.5	5.2	5.1
Oxygen Demand - Biological (BOD)	mg/L	3		-	-	-	-	-	-
Phenols (4AAP)	mg/L	0.002	**0.001**	<0.001	**0.003**	<0.002	<0.002	<0.002	<0.002
Sulphate (Filtered)	mg/L	1		7	8	6	36	8	11
Ammonia	mg/L	0.01		0.58	0.64	0.65	0.57	0.63	0.61
Nitrate (as N)	mg/L	0.05		<0.05	0.05	<0.05	<0.05	0.07	<0.05
Nitrite (as N)	mg/L	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		1.1	3.3	1.6	0.9	1.4	1
Conductivity (lab)	µS/cm	1		476	473	474	459	474	458
pH (Lab)	-		**6.5-8.5**	7.94	7.65	7.6	7.77	7.74	7.61
Field									
DO (Field)	mg/L		**5-50**	**4.52**	**2.83**	**3.78**	**3.49**	11.66	5.33
Redox Potential (Field)	mV			99	129	149	62	56	167
Temp (Field)	°C			7.4	6.7	4	6.4	3.7	8.4
Conductivity (field)	µS/cm			440	530	520	560	530	338
pH (Field)	-		**6.5-8.5**	7.26	7.01	7.26	8.11	7.74	7.12

Table 3 - Groundwater Quality

	Unit	RDL	PWQO	DP5R 2017-06-06	DP5R 2017-10-02	DP5R 2018-05-29	DP5R 2018-11-12	DP7 2017-06-06	DP7 2017-10-02	DP7 2018-05-29	DP7 2018-11-12	DP7 2019-04-16	DP7 2019-11-14	DP7 2020-04-21	DP7 2020-11-12
Metals															
Arsenic (Filtered)	µg/L	0.1	**5**	<0.7	0.4	0.6	0.6	**9.02**	4.3	1.3	0.9	0.4	0.8	0.6	1
Barium (Filtered)	µg/L	1		61	74	68	73	131	132	123	124	102	126	117	124
Boron (Filtered)	µg/L	5	**200**	<5	5	9	<5	8	10	14	5	9	5	10	<5
Calcium (Filtered)	µg/L	20		81,000	87,100	88,100	90,700	69,700	70,100	68,100	70,200	68,900	76,200	70,700	70,800
Cadmium (Filtered)	µg/L	0.015	**0.1|0.5**	-	0.023	<0.015	<0.015	-	0.018	<0.015	<0.015	<0.015	<0.015	0.016	<0.015
Chloride	µg/L	500		15,900	17,000	19,800	19,400	12,600	17,800	23,500	23,500	18,200	21,600	21,300	20,800
Chromium (III+VI) (Filtered)	µg/L	1	**8.9**	<1.1	<1	<1	<1	1.3	<1	**19**	<1	1	<1	1	1
Copper (Filtered)	µg/L	0.1	**1|5**	0.8	0.1	0.1	0.1	0.6	2.2	0.1	0.1	0.1	0.3	0.9	0.9
Iron (Filtered)	µg/L	5	**300**	59	168	159	210	**2470**	**2650**	**2220**	**2060**	**1900**	**2030**	**2260**	**403**
Lead (Filtered)	µg/L	0.02	**1|3|5**	**14.9**	**11.2**	**7.16**	**5.56**	0.83	2.22	0.67	0.19	0.1	0.17	0.97	0.13
Manganese (Filtered)	µg/L	1		64	71	100	109	123	119	115	116	108	114	116	101
Magnesium (Filtered)	µg/L	20		6640	6820	6440	5960	4970	5310	4920	4890	4580	4950	4920	4820
Mercury	µg/L			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02
Phosphorus total (P2O5)	µg/L		**30**	**70**	**70**	**150**	**80**	**1250**	**840**	**730**	**620**	**70**	**100**	-	-
Phosphorus (Filtered)	µg/L	100		-	-	-	-	-	-	-	-	-	-	100	<100
Potassium (Filtered)	µg/L	100		2700	2600	2500	2300	1800	1900	1800	1800	1700	1800	1800	2000
Sodium (Filtered)	µg/L	200		14,400	11,800	14,500	12,800	9300	9500	10,900	12,000	10,700	10,800	11,200	11,200
Zinc (Filtered)	µg/L	5	**20**	**5810**	**7980**	**15,700**	**31,700**	<5	9	<5	<5	<5	<5	<5	<5
Inorganics															
Alkalinity (as CaCO3)	mg/L	5		214	254	269	286	186	184	179	187	173	184	174	173
Hardness (as CaCO3) (Filtered)	mg/L	1		230	246	247	251	195	197	190	196	191	211	197	197
Solids - Total Dissolved (TDS)	mg/L	3		271	298	296	301	229	234	216	219	211	222	216	220
Solids - Total Suspended (TSS)	mg/L	3		-	-	-	-	-	-	-	-	-	-	-	-
Oxygen Demand - Chemical (COD)	mg/L	5		292	152	225	97	443	372	166	164	60	74	49	179
Organic Carbon - Dissolved (DOC) (Filtered)	mg/L	0.2		19.6	14	6.5	9	12.9	13.9	10.9	13.3	11.8	12.2	12.5	10
Oxygen Demand - Biological (BOD)	mg/L	3		-	-	-	-	-	-	-	-	-	-	-	-
Phenols (4AAP)	mg/L	0.002	**0.001**	**0.006**	<0.001	<0.001	<0.002	**0.005**	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002
Sulphate (Filtered)	mg/L	1		<1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
Ammonia	mg/L	0.01		1.43	1.37	1.3	1.3	1.2	1.19	1.15	1.24	1.14	1.41	1.16	1.36
Nitrate (as N)	mg/L	0.05		<0.05	<0.05	0.1	0.08	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	mg/L	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		2.2	2.5	5.4	2.7	4.5	3.7	1.9	2.7	2.4	1.6	1.8	1.8
Conductivity (lab)	µS/cm	1		493	542	571	580	416	426	419	424	409	431	419	427
pH (Lab)	-		**6.5-8.5**	8.04	7.88	7.97	7.74	7.31	7.28	7.61	7.25	7.14	7.37	7.31	7.24
Field															
DO (Field)	mg/L		**5-50**	11.04	9.84	6.59	7.88	**1.14**	**1.62**	**1.15**	**1.87**	**1.93**	**3.17**	**2.72**	**4.03**
Redox Potential (Field)	mV			66	134	90	138	43	143	55	135	162	78	56	259
Temp (Field)	°C			11.1	8.6	9	6	9.3	8.9	10.2	8.4	7	7.7	7.2	8.8
Conductivity (field)	µS/cm			450	570	490	660	430	480	370	470	480	490	490	324
pH (Field)	-		**6.5-8.5**	7.79	7.4	7.57	6.89	6.54	6.86	**6.39**	6.82	6.92	7.85	7.16	6.69

Table 4 - Groundwater Quality - VOC

	Unit	RDL	ODWQS	Locati	DP2	DP2	DP2	DP2	DP3	DP3	DP4	DP4
				Date	2016-04-27	2016-10-25	2017-06-06	2018-05-29	2016-04-27	2016-10-25	2016-04-27	2016-10-25
BTEX												
Benzene	µg/L		1		<0.2	<0.2	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
Toluene	µg/L		60		<0.2	<0.2	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2
VOCs												
Dichlorobenzene, 1,4-	µg/L		5		<0.1	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1
Methylene chloride	µg/L		50		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Vinyl chloride	µg/L		1		<0.17	<0.17	<0.2	<0.2	<0.17	<0.17	<0.17	<0.17

Table 5 - Surface Water Quality

	Unit	RDL	PWQO	SW1 2011-04-26	SW1 2011-10-05	SW1 2012-04-23	SW1 2012-07-12	SW1 2012-11-05	SW1 2013-05-13	SW1 2013-08-22	SW1 2013-10-02	SW1 2014-05-13	SW1 2014-10-14	SW1 2015-05-19	SW1 2015-11-02	SW1 2016-05-11
Metals																
Arsenic	µg/L	0.1	**5**	<1	<1	<1	<1	<1	<3	<3	<3	<3	<3	<3	<3	<1
Barium	µg/L	1		27	210	36	18	120	112	19	165	118	193	152	86	158
Boron	µg/L	5	**200**	<10	**360**	11	<10	**550**	103	<10	**295**	146	**206**	92	148	56
Cadmium	µg/L	0.015	**0.1|0.5**	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloride	µg/L	500		9000	120,000	18,000	2000	180,000	99,200	2960	164,000	95,600	170,000	121,000	111,000	139,000
Chromium (III+VI)	µg/L	1	**8.9**	<5	<5	<5	<5	<5	<3	<3	<3	<3	5	3	<3	1
Copper	µg/L	0.1	**1|5**	<1	2	<1	<1	2.8	<2	<2	<2	<2	<2	<2	<2	0.7
Iron	µg/L	5	**300**	200	**1100**	**380**	290	220	**2010**	**310**	**1010**	**1640**	**1290**	**2530**	270	**5080**
Lead	µg/L	0.02	**1|3|5**	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<2	<2	<2	<2	0.2
Mercury	µg/L			-	-	-	-	-	-	-	-	-	-	-	-	<0.1
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	10	**30**	-	-	9	20	19	<20	**30**	**40**	**30**	**40**	**30**	<20	<10
Zinc	µg/L	5	**20**	<5	13	<5	<5	<5	<5	<5	<5	<5	<5	<5	10	<5
Inorganics																
Alkalinity (as CaCO3)	mg/L	5		48	229	80	28	-	205	37	151	313	278	328	106	259
Hardness (as CaCO3)	mg/L	1		56	480	90	31	440	283	29.9	341	340	482	370	282	298
Solids - Total Dissolved (TDS)	mg/L	3		88	854	128	44	808	468	58	720	518	852	608	272	-
Solids - Total Suspended (TSS)	mg/L	3		<10	15	<10	<10	<10	<10	<10	23	11	<10	23	<10	35
Oxygen Demand - Chemical (COD)	mg/L	5		17	17	15	19	56	27	17	53	41	47	41	30	60
Oxygen Demand - Biological (BOD)	mg/L	3		<2	<2	<2	<2	<2	<5	<5	5	<5	<5	5	<5	2
Phenols (4AAP)	mg/L	0.002	**0.001**	-	-	-	-	-	<0.001	**0.001**	**0.002**	<0.001	<0.001	<0.001	<0.001	**0.001**
Sulphate (Filtered)	mg/L	1		3	200	7	5	180	20.4	4.38	122	5	65.8	<0.5	120	4
Ammonia, Unionized (as N)	mg/L		**0.02**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006
Ammonia	mg/L	0.01		<0.05	<0.05	0.05	<0.05	<0.05	<0.02	0.03	<0.02	0.12	<0.02	0.22	<0.02	0.39
Nitrate (as N)	mg/L	0.05		<0.1	<0.1	<0.1	<0.1	<0.1	0.94	0.07	<0.25	<0.25	<0.25	<0.25	<0.25	<0.1
Nitrite (as N)	mg/L	0.05		<0.01	<0.01	<0.01	<0.01	<0.01	<0.25	<0.05	<0.25	<0.25	<0.25	<0.25	<0.25	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		0.3	0.8	0.71	0.39	0.96	0.56	0.43	1.09	<0.1	0.68	1.5	0.12	1
Conductivity (lab)	µS/cm	1		133	1180	230	74	1300	764	76	1060	870	1340	964	785	918
pH (Lab)	-		**6.5-8.5**	7.09	7.73	7.73	7.46	6.87	8.08	6.85	7.97	7.88	8.18	7.82	7.21	7.2
Field																
DO (Field)	mg/L		**5-**	6.94	0.8	9.28	7.79	2.07	4.01	7.79	2.51	8.44	6.84	1.95	6.68	9.7
Redox Potential (Field)	mV			-	-	-	-	-	-	-	-	-	-	-	-	-
Temp (Field)	°C			7.9	15.9	7	21.4	3.2	5.9	20.2	15.9	13	11.2	16.5	8.9	5
Conductivity (field)	µS/cm			126	120	262	68	739	535	61	994	804	117	958	435	247
pH (Field)	-		**6.5-8.5**	**8.8**	6.99	7.25	8.3	6.75	**6.42**	6.82	8.21	7.58	6.86	7.02	7.05	8.1

Table 5 - Surface Water Quality

	Unit	RDL	PWQO	SW1 2016-10-28	SW1 2017-06-06	SW1 2018-05-29	SW1 2018-11-12	SW1 2020-04-21	SW1 2020-11-12
Metals									
Arsenic	µg/L	0.1	**5**	<5	0.6	1.7	0.6	0.3	0.5
Barium	µg/L	1		124	67	131	57	42	59
Boron	µg/L	5	**200**	**268**	23	36	9	13	40
Cadmium	µg/L	0.015	**0.1|0.5**	<0.5	<0.014	0.08	<0.015	<0.015	<0.015
Chloride	µg/L	500		209,000	6700	13,100	12,100	11,000	10,900
Chromium (III+VI)	µg/L	1	**8.9**	<5	<1	5	<1	<1	<1
Copper	µg/L	0.1	**1|5**	<2.5	0.2	4.4	0.5	0.3	0.3
Iron	µg/L	5	**300**	**825**	89	**461**	131	28	49
Lead	µg/L	0.02	**1|3|5**	<0.5	0.15	1.55	0.19	0.04	0.02
Mercury	µg/L			<0.1	<0.02	<0.02	<0.02	-	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	<0.02	<0.02
Phosphorus total (P2O5)	µg/L	10	**30**	**60**	**30**	**80**	20	<10	<10
Zinc	µg/L	5	**20**	-	**61**	**28**	**25**	5	**20**
Inorganics									
Alkalinity (as CaCO3)	mg/L	5		204	166	165	150	114	181
Hardness (as CaCO3)	mg/L	1		305	166	167	162	126	194
Solids - Total Dissolved (TDS)	mg/L	3		-	191	184	170	140	211
Solids - Total Suspended (TSS)	mg/L	3		22	18	30	10	<3	8
Oxygen Demand - Chemical (COD)	mg/L	5		78	33	38	34	18	21
Oxygen Demand - Biological (BOD)	mg/L	3		12	<2	<2	4	<3	<3
Phenols (4AAP)	mg/L	0.002	**0.001**	**0.03**	**0.004**	<0.001	**0.003**	<0.002	<0.002
Sulphate (Filtered)	mg/L	1		77	3	1	7	6	11
Ammonia, Unionized (as N)	mg/L		**0.02**	-	<0.005	<0.005	<0.005	<0.005	<0.005
Ammonia	mg/L	0.01		0.04	<0.01	0.05	0.03	0.02	0.28
Nitrate (as N)	mg/L	0.05		<0.1	<0.05	<0.05	<0.05	0.12	<0.05
Nitrite (as N)	mg/L	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		1.1	0.5	1	0.4	0.3	0.7
Conductivity (lab)	µS/cm	1		914	347	357	331	273	409
pH (Lab)	-		**6.5-8.5**	7.2	7.99	8.06	7.8	7.69	7.94
Field									
DO (Field)	mg/L		**5-**	-	8.54	4.62	12.44	8.8	5.45
Redox Potential (Field)	mV			-	2	73	148	60	196
Temp (Field)	°C			-	11.9	15.9	0.8	0.8	6.5
Conductivity (field)	µS/cm			-	330	330	370	310	279
pH (Field)	-		**6.5-8.5**	-	7.93	7.51	7.43	7.78	7.42

Table 5 - Surface Water Quality

	Unit	RDL	PWQO	SW2 2011-04-26	SW2 2011-07-12	SW2 2011-10-05	SW2 2012-04-23	SW2 2012-07-12	SW2 2012-10-09	SW2 2013-05-13	SW2 2013-08-22	SW2 2013-10-02	SW2 2014-05-13	SW2 2014-10-14	SW2 2015-05-19	SW2 2015-11-02
Metals																
Arsenic	µg/L	0.1	**5**	<1	<1	<1	<1	<1	<1	<3	<3	<3	<3	<3	<3	<3
Barium	µg/L	1		25	24	26	37	19	18	32	16	20	35	21	36	23
Boron	µg/L	5	**200**	<10	<10	<10	<10	<10	<10	<10	<10	20	<10	<10	<10	<10
Cadmium	µg/L	0.015	**0.1|0.5**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloride	µg/L	500		7000	7000	9000	17,000	2000	4000	13,500	1730	7830	16,400	7570	18,800	11,900
Chromium (III+VI)	µg/L	1	**8.9**	<5	<5	<5	<5	<5	<5	<3	<3	<3	<3	<3	<3	<3
Copper	µg/L	0.1	**1|5**	1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2
Iron	µg/L	5	**300**	200	**300**	**300**	**320**	**310**	170	260	140	200	220	**300**	290	250
Lead	µg/L	0.02	**1|3|5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<2	<2	<2	<2
Mercury	µg/L			-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	10	**30**	-	-	-	10	16	6	<20	<20	<20	<20	**30**	<20	<20
Zinc	µg/L	5	**20**	<5	<5	<5	<5	<5	<5	<5	<5	<5	7	<5	<5	<5
Inorganics																
Alkalinity (as CaCO3)	mg/L	5		48	41	48	76	28	29	66	25	38	67	39	74	44
Hardness (as CaCO3)	mg/L	1		55	44	52	87	31	31	73.2	28.3	42.9	76.1	43.8	83.3	53.3
Solids - Total Dissolved (TDS)	mg/L	3		80	76	94	136	34	40	110	46	72	120	62	126	86
Solids - Total Suspended (TSS)	mg/L	3		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Oxygen Demand - Chemical (COD)	mg/L	5		16	22	7	17	19	23	19	15	<5	16	12	13	14
Oxygen Demand - Biological (BOD)	mg/L	3		<2	<2	<2	<2	<2	<2	<5	<5	<5	<5	<5	<5	<5
Phenols (4AAP)	mg/L	0.002	**0.001**	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulphate (Filtered)	mg/L	1		4	4	5	7	5	5	4.96	4.2	4.22	4.65	3.66	4.18	5.95
Ammonia, Unionized (as N)	mg/L		**0.02**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ammonia	mg/L	0.01		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
Nitrate (as N)	mg/L	0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	mg/L	0.05		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		0.4	0.5	0.5	0.5	0.76	0.37	0.52	0.24	0.46	<0.1	0.21	0.28	0.33
Conductivity (lab)	µS/cm	1		130	117	129	220	75	78	193	65	120	197	109	213	139
pH (Lab)	-		**6.5-8.5**	7.22	7.81	7.8	7.59	7.35	6.65	7.89	6.84	7.55	7.93	7.29	7.85	7.16
Field																
DO (Field)	mg/L		**5-**	9.31	2.3	1.19	9.35	7.58	9.92	9.21	7.02	7.24	7.56	6.84	7.78	9.73
Redox Potential (Field)	mV			-	-	-	-	-	-	-	-	-	-	-	-	-
Temp (Field)	°C			8.3	23.3	12.6	8.1	21.1	8.25	9.5	21.5	16.7	14.6	11.2	18.1	7.3
Conductivity (field)	µS/cm			121	106	135	211	69	54	146	56	112	97	117	208	98
pH (Field)	-		**6.5-8.5**	**8.63**	7.4	7.83	7.26	7.54	7.6	7.26	7.12	**8.57**	8.21	6.86	7.1	7.56

Table 5 - Surface Water Quality

	Unit	RDL	PWQO	SW2 2016-05-11	SW2 2016-10-28	SW2 2017-06-06	SW2 2019-04-16	SW2 2020-04-21
Metals								
Arsenic	µg/L	0.1	**5**	<1	<5	**5.7**	0.5	0.6
Barium	µg/L	1		31	172	151	42	46
Boron	µg/L	5	**200**	<10	**261**	39	7	24
Cadmium	µg/L	0.015	**0.1|0.5**	<0.1	<0.5	0.173	0.022	<0.015
Chloride	µg/L	500		16,000	84,000	9500	19,700	19,500
Chromium (III+VI)	µg/L	1	**8.9**	<1	<5	3	<1	<1
Copper	µg/L	0.1	**1|5**	0.7	<2.5	**10.9**	0.9	0.4
Iron	µg/L	5	**300**	**436**	**4570**	**13,100**	191	**1010**
Lead	µg/L	0.02	**1|3|5**	<0.1	<0.5	**5.12**	0.09	0.18
Mercury	µg/L			<0.1	<0.1	<0.02	<0.02	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	<0.02
Phosphorus total (P2O5)	µg/L	10	**30**	<10	**100**	**330**	**250**	**60**
Zinc	µg/L	5	**20**	<5	<25	**45**	**24**	<5
Inorganics								
Alkalinity (as CaCO3)	mg/L	5		64	181	248	124	158
Hardness (as CaCO3)	mg/L	1		66	283	242	151	170
Solids - Total Dissolved (TDS)	mg/L	3		-	-	278	170	195
Solids - Total Suspended (TSS)	mg/L	3		6	151	150	3	14
Oxygen Demand - Chemical (COD)	mg/L	5		<10	83	89	8	19
Oxygen Demand - Biological (BOD)	mg/L	3		<2	43	6	<3	4
Phenols (4AAP)	mg/L	0.002	**0.001**	**0.013**	**0.008**	**0.01**	<0.002	<0.002
Sulphate (Filtered)	mg/L	1		5	102	2	4	4
Ammonia, Unionized (as N)	mg/L		**0.02**	0.0052	<0.005	<0.005	<0.005	<0.005
Ammonia	mg/L	0.01		0.08	0.1	0.25	0.03	0.1
Nitrate (as N)	mg/L	0.05		0.9	<0.1	<0.05	<0.05	0.07
Nitrite (as N)	mg/L	0.05		<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		0.3	1.2	1.4	0.3	0.6
Conductivity (lab)	µS/cm	1		243	787	506	330	379
pH (Lab)	-		**6.5-8.5**	7.4	7.4	7.59	7.58	7.62
Field								
DO (Field)	mg/L		**5-**	8	7.7	6.52	7.06	7.85
Redox Potential (Field)	mV			-	-	64	152	56
Temp (Field)	°C			3.4	6	12.3	6	4.6
Conductivity (field)	µS/cm			307	1379	570	350	470
pH (Field)	-		**6.5-8.5**	**8.8**	8	7.17	7.45	7.51

Table 5 - Surface Water Quality

	Unit	RDL	PWQO	SW3 2011-04-26	SW3 2011-07-12	SW3 2011-10-05	SW3 2012-04-23	SW3 2012-07-12	SW3 2012-10-09	SW3 2013-05-13	SW3 2013-08-22	SW3 2013-10-02	SW3 2014-05-13	SW3 2014-10-14	SW3 2015-05-19	SW3 2015-11-02
Metals																
Arsenic	µg/L	0.1	**5**	<1	<1	<1	<1	<1	<1	<3	<3	<3	<3	<3	<3	<3
Barium	µg/L	1		25	24	24	40	19	17	34	16	21	35	20	80	22
Boron	µg/L	5	**200**	<10	<10	<10	11	<10	<10	15	<10	10	10	<10	63	<10
Cadmium	µg/L	0.015	**0.1|0.5**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloride	µg/L	500		8000	7000	9000	18,000	2000	4000	13,500	1760	7950	16,500	7510	40,900	12,200
Chromium (III+VI)	µg/L	1	**8.9**	<5	<5	<5	<5	<5	<5	<3	<3	<3	<3	<3	<3	<3
Copper	µg/L	0.1	**1|5**	2	<1	1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2
Iron	µg/L	5	**300**	200	**400**	**300**	**320**	280	160	280	130	220	170	260	**2110**	190
Lead	µg/L	0.02	**1|3|5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<2	<2	<2	<2
Mercury	µg/L			-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	10	**30**	-	-	-	9	10	3	<20	<20	<20	<20	**30**	<20	<20
Zinc	µg/L	5	**20**	7	<5	<5	<5	<5	<5	**100**	<5	<5	<5	<5	<5	<5
Inorganics																
Alkalinity (as CaCO3)	mg/L	5		49	41	47	77	27	30	64	24	38	66	36	157	52
Hardness (as CaCO3)	mg/L	1		55	44	52	87	31	30	74.1	28.1	42.3	75.1	44	166	54.7
Solids - Total Dissolved (TDS)	mg/L	3		80	76	100	142	40	24	106	52	66	114	76	240	86
Solids - Total Suspended (TSS)	mg/L	3		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Oxygen Demand - Chemical (COD)	mg/L	5		16	22	17	18	12	25	16	21	12	15	13	27	14
Oxygen Demand - Biological (BOD)	mg/L	3		<2	<2	<2	<2	<2	<2	<5	<5	<5	<5	<5	<5	<5
Phenols (4AAP)	mg/L	0.002	**0.001**	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulphate (Filtered)	mg/L	1		4	4	5	6	5	5	4.94	4.17	4.3	4.64	3.66	1.97	6.7
Ammonia, Unionized (as N)	mg/L		**0.02**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ammonia	mg/L	0.01		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	0.02	<0.02	0.03	<0.02
Nitrate (as N)	mg/L	0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2
Nitrite (as N)	mg/L	0.05		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		0.3	0.4	0.3	0.52	0.53	0.48	0.32	0.44	0.51	<0.1	0.22	0.8	0.33
Conductivity (lab)	µS/cm	1		130	117	130	220	74	78	192	65	119	196	110	423	141
pH (Lab)	-		**6.5-8.5**	7.37	7.78	7.81	7.62	7.45	6.88	7.83	6.77	7.47	7.84	7.37	7.81	7.18
Field																
DO (Field)	mg/L		**5-**	8.18	4.16	1.14	9.18	8.38	9.67	8.02	8.47	8.01	9.82	6.97	2.97	8.66
Redox Potential (Field)	mV			-	-	-	-	-	-	-	-	-	-	-	-	-
Temp (Field)	°C			8.3	23.4	13.5	8.2	20.1	8.29	10	22	16.5	14.3	11.6	17	7.8
Conductivity (field)	µS/cm			122	71	142	232	62	54	132	60	113	214	118	389	102
pH (Field)	-		**6.5-8.5**	**8.51**	7.44	7.69	7.32	7.72	7.48	7.11	7.17	8.41	8.19	6.72	7.02	7.53

Table 5 - Surface Water Quality

	Unit	RDL	PWQO	SW3 2016-05-11	SW3 2016-10-28	SW3 2017-06-06	SW3 2017-10-02	SW3 2018-05-29	SW3 2018-11-12	SW3 2019-04-16	SW3 2020-04-21	SW3 2020-11-12
Metals												
Arsenic	µg/L	0.1	**5**	<1	<5	0.8	1.4	2.4	0.4	0.3	0.4	0.7
Barium	µg/L	1		36	25	61	101	91	53	50	47	65
Boron	µg/L	5	**200**	<10	<50	5	9	15	<5	5	5	6
Cadmium	µg/L	0.015	**0.1|0.5**	<0.1	<0.5	<0.014	<0.014	0.039	<0.015	<0.015	<0.015	<0.015
Chloride	µg/L	500		15,000	10,000	4600	17,400	5700	6700	7700	5600	6300
Chromium (III+VI)	µg/L	1	**8.9**	<1	<5	7	<1	<1	<1	<1	<1	<1
Copper	µg/L	0.1	**1|5**	0.5	<2.5	0.2	0.9	3.7	0.3	0.4	0.3	0.4
Iron	µg/L	5	**300**	**352**	<200	<5	**403**	254	14	37	27	42
Lead	µg/L	0.02	**1|3|5**	<0.1	<0.5	<0.02	0.07	0.38	<0.02	<0.02	<0.02	0.03
Mercury	µg/L			<0.1	<0.1	0.03	<0.02	<0.02	<0.02	<0.02	-	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	-	-	-	<0.02	<0.02
Phosphorus total (P2O5)	µg/L	10	**30**	<10	<10	20	**40**	**30**	<10	**250**	<10	10
Zinc	µg/L	5	**20**	<5	<25	<5	5	18	<5	13	<5	11
Inorganics												
Alkalinity (as CaCO3)	mg/L	5		63	47	144	176	144	132	117	105	137
Hardness (as CaCO3)	mg/L	1		66	44	135	184	148	145	134	124	160
Solids - Total Dissolved (TDS)	mg/L	3		-	-	161	237	153	145	139	121	158
Solids - Total Suspended (TSS)	mg/L	3		<2	5	10	12	32	<3	<3	<3	<3
Oxygen Demand - Chemical (COD)	mg/L	5		<10	<10	<5	37	32	21	5	11	23
Oxygen Demand - Biological (BOD)	mg/L	3		<2	2	<2	<2	4	3	<3	<3	<3
Phenols (4AAP)	mg/L	0.002	**0.001**	<0.001	**0.002**	**0.007**	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002
Sulphate (Filtered)	mg/L	1		5	5	<1	11	<1	7	4	6	9
Ammonia, Unionized (as N)	mg/L		**0.02**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ammonia	mg/L	0.01		0.08	0.03	<0.01	0.05	0.05	0.03	0.04	<0.01	0.03
Nitrate (as N)	mg/L	0.05		<0.1	0.2	<0.05	<0.05	0.08	<0.05	0.08	0.11	<0.05
Nitrite (as N)	mg/L	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		0.3	0.3	0.3	0.6	0.7	0.4	0.2	0.2	0.6
Conductivity (lab)	µS/cm	1		188	151	292	430	298	283	272	236	307
pH (Lab)	-		**6.5-8.5**	7.6	7.5	7.85	7.97	7.87	7.67	7.57	7.61	7.68
Field												
DO (Field)	mg/L		**5-**	-	5	3.77	5.73	3.15	7.22	8.12	7.56	5.11
Redox Potential (Field)	mV			-	-	28	138	69	127	176	57	252
Temp (Field)	°C			5.6	6	11.9	7	16.5	3.3	0.7	1.4	7.4
Conductivity (field)	µS/cm			256	1297	300	470	270	320	310	270	225
pH (Field)	-		**6.5-8.5**	7.9	8	7.12	7.43	7.28	7.27	7.38	7.7	6.92

Table 5 - Surface Water Quality

	Unit	RDL	PWQO	SW4 2011-04-26	SW4 2011-07-12	SW4 2011-10-05	SW4 2012-04-23	SW4 2012-07-12	SW4 2012-10-09	SW4 2013-05-13	SW4 2013-08-22	SW4 2013-10-02	SW4 2014-05-13	SW4 2014-10-14	SW4 2015-05-19	SW4 2015-11-02
Metals																
Arsenic	µg/L	0.1	**5**	<1	<1	<1	<1	<1	<1	<3	<3	<3	<3	<3	<3	<3
Barium	µg/L	1		28	24	27	41	20	17	34	16	20	34	22	37	22
Boron	µg/L	5	**200**	<10	<10	20	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium	µg/L	0.015	**0.1|0.5**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloride	µg/L	500		9000	7000	8000	18,000	2000	4000	15,000	2360	8120	17,100	7760	25,500	12,700
Chromium (III+VI)	µg/L	1	**8.9**	<5	<5	<5	<5	<5	<5	<3	<3	<3	<3	<3	<3	<3
Copper	µg/L	0.1	**1|5**	1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2
Iron	µg/L	5	**300**	200	**300**	**400**	**350**	**390**	170	280	150	240	200	**320**	**540**	230
Lead	µg/L	0.02	**1|3|5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<2	<2	<2	<2
Mercury	µg/L			-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus total (P2O5)	µg/L	10	**30**	-	-	-	9	24	4	<20	<20	<20	<20	**60**	<20	<20
Zinc	µg/L	5	**20**	<5	6	<5	6.4	<5	<5	<5	<5	<5	<5	<5	<5	<5
Inorganics																
Alkalinity (as CaCO3)	mg/L	5		50	41	47	78	27	28	71	26	38	65	38	79	51
Hardness (as CaCO3)	mg/L	1		57	45	52	87	31	30	76.1	28.8	43.1	76.1	44.1	88.5	54.6
Solids - Total Dissolved (TDS)	mg/L	3		90	72	90	136	32	42	104	54	72	124	68	138	82
Solids - Total Suspended (TSS)	mg/L	3		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Oxygen Demand - Chemical (COD)	mg/L	5		16	23	20	17	17	25	17	23	10	9	15	11	14
Oxygen Demand - Biological (BOD)	mg/L	3		<2	<2	<2	<2	<2	<2	<5	<5	<5	<5	<5	<5	<5
Phenols (4AAP)	mg/L	0.002	**0.001**	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulphate (Filtered)	mg/L	1		4	4	5	7	4	4	5.06	4.29	4.29	4.63	3.74	4.24	6.01
Ammonia, Unionized (as N)	mg/L		**0.02**	0.006	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01
Ammonia	mg/L	0.01		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02
Nitrate (as N)	mg/L	0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07
Nitrite (as N)	mg/L	0.05		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		0.4	0.4	0.4	0.58	0.49	0.41	0.22	0.33	0.5	<0.1	0.26	0.34	0.32
Conductivity (lab)	µS/cm	1		136	117	128	230	74	78	199	68	121	198	112	243	142
pH (Lab)	-		**6.5-8.5**	7.29	7.77	7.75	7.92	7.43	6.64	7.85	6.72	7.46	7.83	7.38	7.76	7.23
Field																
DO (Field)	mg/L		**5-**	3.38	4.91	1.18	4.56	-	9.3	8.89	13.61	7.14	10.88	7.06	8.05	8.88
Redox Potential (Field)	mV			-	-	-	-	-	-	-	-	-	-	-	-	-
Temp (Field)	°C			8.4	23.2	13	7.4	-	8.19	9.4	21.5	16.2	14.5	11	17.4	7.2
Conductivity (field)	µS/cm			63	112	146	259	-	55	142	56	118	224	136	540	106
pH (Field)	-		**6.5-8.5**	**8.92**	7.94	7.87	7.32	-	7.7	7.16	6.88	**8.79**	8.08	7.19	6.73	**9.83**

Table 5 - Surface Water Quality

	Unit	RDL	PWQO	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW4	SW5	SW5	SW5	SW5	SW5
				2016-05-11	2016-10-28	2017-06-06	2018-05-29	2018-11-12	2019-04-16	2020-04-21	2020-11-12	2017-06-06	2018-05-29	2018-11-12	2020-04-21	2020-11-12
Metals																
Arsenic	µg/L	0.1	**5**	<1	<5	0.7	4.2	0.4	0.3	1.1	0.4	0.8	1.4	0.4	0.3	0.6
Barium	µg/L	1		32	46	74	142	47	50	66	63	35	52	27	26	39
Boron	µg/L	5	**200**	<10	<50	10	16	<5	<5	6	5	6	14	<5	5	6
Cadmium	µg/L	0.015	**0.1|0.5**	<0.1	<0.5	0.08	0.093	<0.015	<0.015	0.053	<0.015	<0.014	0.032	<0.015	<0.015	<0.015
Chloride	µg/L	500		17,000	26,000	5300	7300	8200	10,200	19,400	8300	4200	3400	4900	4100	5000
Chromium (III+VI)	µg/L	1	**8.9**	<1	<5	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper	µg/L	0.1	**1|5**	0.5	<2.5	4.5	4.6	0.3	0.3	0.8	0.7	0.1	3.2	0.2	0.3	0.4
Iron	µg/L	5	**300**	**314**	**875**	83	**1430**	25	55	**500**	35	48	204	40	38	126
Lead	µg/L	0.02	**1|3|5**	<0.1	<0.5	1.17	3.08	<0.02	0.05	1.8	<0.02	0.02	0.24	<0.02	<0.02	0.06
Mercury	µg/L			-	-	<0.02	<0.02	<0.02	<0.02	-	-	<0.02	<0.02	<0.02	-	-
Mercury (Filtered)	µg/L	0.02	**0.2**	-	-	-	-	-	-	<0.02	<0.02	-	-	-	<0.02	<0.02
Phosphorus total (P2O5)	µg/L	10	**30**	**300**	**500**	20	**70**	<10	**230**	**60**	<10	**30**	20	<10	<10	20
Zinc	µg/L	5	**20**	7	<25	**44**	**37**	**21**	13	16	11	8	17	17	5	10
Inorganics																
Alkalinity (as CaCO3)	mg/L	5		64	58	143	139	122	114	97	137	119	115	94	78	106
Hardness (as CaCO3)	mg/L	1		-	-	155	154	128	132	123	162	108	121	107	87	128
Solids - Total Dissolved (TDS)	mg/L	3		-	-	161	143	139	141	116	162	134	124	104	92	123
Solids - Total Suspended (TSS)	mg/L	3		<0.01	0.03	6	50	<3	10	76	4	9	<3	<3	<3	<3
Oxygen Demand - Chemical (COD)	mg/L	5		<10	14	19	39	29	9	50	30	25	40	35	14	30
Oxygen Demand - Biological (BOD)	mg/L	3		<2	3	<2	<2	4	<3	<3	<3	<2	<2	4	<3	<3
Phenols (4AAP)	mg/L	0.002	**0.001**	**7.6**	**7.2**	**0.006**	<0.001	**0.004**	<0.002	<0.002	<0.002	**0.004**	<0.001	**0.002**	<0.002	<0.002
Sulphate (Filtered)	mg/L	1		5	7	2	<1	7	4	4	10	<1	<1	4	5	6
Ammonia, Unionized (as N)	mg/L		**0.02**	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ammonia	mg/L	0.01		0.06	0.05	<0.01	0.03	0.03	0.02	<0.01	0.03	<0.01	0.03	0.03	<0.01	0.17
Nitrate (as N)	mg/L	0.05		<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	0.07	<0.05
Nitrite (as N)	mg/L	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1		-	-	0.3	0.9	0.4	0.3	0.8	0.5	0.4	0.5	0.5	0.2	0.7
Conductivity (lab)	µS/cm	1		196	227	292	279	271	275	228	316	243	243	204	181	240
pH (Lab)	-		**6.5-8.5**	7.6	7.2	7.86	8.01	7.67	7.61	7.61	7.86	7.89	7.98	7.6	7.58	7.77
Field																
DO (Field)	mg/L		**5-**	-	-	7.45	5.89	9.04	7.18	9.15	7.67	6.76	7.23	11.85	10.16	5.87
Redox Potential (Field)	mV			-	-	2	73	152	155	51	159	2	72	128	50	207
Temp (Field)	°C			4.9	-	12	18.6	2	1	1.5	7.2	11.6	16.7	0.6	1.8	6.9
Conductivity (field)	µS/cm			165	-	330	280	320	320	280	240	250	230	240	230	172
pH (Field)	-		**6.5-8.5**	7.9	-	7.49	7.31	7.26	7.59	7.99	7.37	7.37	7.39	7.4	7.87	7.34

Table 6 - Landfill Gas Monitoring Data

	percent methane by volume						
Date	**DP1R**	**DP2**	**DP3**	**DP4**	**DP5R**	**DP6**	**DP7**
Top of Screen Elevation (m)	315.02	313.28	313.88	313.98	315.04	315.562	312.915
Water Level (m)[1]	315.12	315.06	315.20	315.41	315.13	-	315.32
Screen Saturated	yes	yes	yes	yes	yes	N/A	yes
29-May-18	-	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05
12-Nov-18	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
16-Apr-19	-	-	-	< 0.05	-	< 0.05	< 0.05
16-Apr-19	-	-	-	< 0.05	-	< 0.05	< 0.05
21-Apr-20	< 0.05	-	< 0.05	< 0.05	-	< 0.05	2
12-Nov-20	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05

Notes:

1. Average water elevation since June 2017.

1.5 m length assumed for DP1R and DP5R due to unavailable information.

3.05 m screen length assumed for DP2, DP3 and DP4, due to unavailable information.

DP6 and DP7 have known and recorded screen lengths of 3.05 m.

Appendix A

Provisional Certificate of Approval No. A341205

Ministry of the Environment
Ontario

REVISED
Provisional Certificate No. A 341205

PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE

Under the Environmental Protection Act and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Township of Galway & Cavendish,
Municipal Office,
Kinmount, Ontario.

for the use and operation **of a Modified Landfill**

all in accordance with the following plans and specifications:

1. **Application and Supporting Information dated March 19, 1981**

Located: **Lot 19, Conc. 13,**
Township of Galway,
County of Peterborough.

which includes the use of the site only for the **disposal** of the following categories of waste (NOTE: Use of the site for additional categories of wastes requires a new application and amendments to the Provisional Certificate of Approval) **domestic**

and subject to the following conditions:

CERTIFIED TRUE COPY
By: K Miller
Date: April 18/2012

Dated this 21st day of January, 1982.

Director, Section 38
Environmental Protection Act

Appendix B
Field and Precipitation Data

LOCATION: Galway WDS DATE: April 21, 2020 WEATHER (SAMPLE DAY): -5°C Overcast 8°C

PROJECT NUMBER: 10520-007 SAMPLED BY: M. Pion and N. Morin WEATHER (PREVIOUS DAY): 8°C Sun

FIELD SHEET – GROUNDWATER DEVELOPMENT & SAMPLING

Sample Location	Water Level	B.H. Depth (m)	B.H. Dia. (mm)	Stick – Up (m)	Purge Volumes (L)		Temp (°C)	pH (units)	Cond. (µS/cm)	DO (mg/L)	ORP (mV)	LFG (ppm)	Observations				
					Needed	Actual							Clarity	Colour	Odour	Sheen	Other
DP1R	1.02	1.93	38.1	0.55	3	0.75	4.0	6.75	630	3.64	68	<5	Cloudy	Brown	None	None	
DP2	-	5.20	50.8	0.93	-	-	-	-	-	-	-	-	-	-	-	-	Frozen
DP3	1.00	4.60	50.8	0.71	22	Dry x 1 8	4.2	7.22	390	6.96	75	<5	Cloudy	Brown	None	None	
DP4	1.41	4.49	50.8	1.40	19	Dry x 1 15	3.7	7.74	530	11.66	56	<5	Clear	None	None	None	QA/QC, Needs cap
DP5R	-	1.71	38.1	0.76	-	-	-	-	-	-	-	-	-	-	-	-	Damaged
DP6	10.29	10.70	38.1	0.69	-	-	-	-	-	-	-	<5	-	-	-	-	Insufficient Volumes
DP7	1.34	6.20	38.1	0.74	17	17	7.2	7.16	490	2.72	56	20000	Clear	None	Sulphur	None	

LOCATION: Galway WDS DATE: November 12, 2020 WEATHER (SAMPLE DAY): -1°C Sun 8°C

PROJECT NUMBER: 10520-007 SAMPLED BY: N. Morin + M. Pion WEATHER (PREVIOUS DAY): 22°C Sun

FIELD SHEET – GROUNDWATER DEVELOPMENT & SAMPLING

Sample Location	Water Level	B.H. Depth (m)	B.H. Dia. (mm)	Stick – Up (m)	Purge Volumes (L)		Temp (°C)	pH (units)	Cond. (µS/cm)	DO (mg/L)	ORP (mV)	LFG (ppm)	Observations				
					Needed	Actual							Clarity	Colour	Odour	Sheen	Other
DP1R	1.09	1.85	38.1	0.55	2.5	Dry x1 1	9.3	6.85	834	4.77	206	<5	Cloudy	Brown	None	None	
DP2	1.27	5.20	50.8	0.93	24	Dry x 1 9	7.7	7.25	326	6.27	178	<5	Cloudy	None	Sulphur	None	Needs cap
DP3	0.90	4.60	50.8	0.71	23	Dry x 1 8	7.9	7.18	298	3.65	214	<5	Opaque	Brown	None	None	
DP4	1.44	4.49	50.8	1.40	19	Dry x 1 7	8.4	7.12	338	5.33	167	<5	Clear	None	Sulphur	None	
DP5R	-	1.71	38.1	0.76	-	-	-	-	-	-	-	-	-	-	-	-	Well Inaccessible
DP6	10.17	10.70	38.1	0.69	1.75	0.25	-	-	-	-	-	<5	-	-	-	-	Insufficient Volumes for Sample Collection
DP7	1.55	6.20	38.1	0.74	16	16	8.8	6.69	324	4.03	259	<5	Opaque	Brown	None	None	QA/QC, Shortened well by 0.23m post sampling

LOCATION: Galway WDS DATE: April 21, 2020 WEATHER (SAMPLE DAY): -5°C Overcast 8°C

PROJECT NUMBER: 10520-007 SAMPLED BY: M. Pion and N. Morin WEATHER (PREVIOUS DAY): 8°C Sun

FIELD SHEET – SURFACE WATER SAMPLING

Sample Location	Depth (m)	Width (m)	Velocity (m/s)	Discharge (m^3/s)	Temp (°C)	pH (units)	Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Observations				
										Clarity	Colour	Odour	Sheen	Other
SW1	0.08	Ponded - No Observable Flow			0.8	7.78	310	8.80	60	Clear	None	None	None	Area partially frozen
SW2	0.13	0.40	Ponded - No Observable Flow		4.6	7.51	470	7.85	56	Clear	None	None	None	
SW3	0.15	Ponded - No Observable Flow			1.4	7.70	270	7.56	57	Clear	None	None	None	QA/QC
SW4	0.15	0.40	Ponded - No Observable Flow		1.5	7.99	280	9.15	51	Cloudy	None	None	None	
SW5	0.12	2.50	< 0.10	< 0.030	1.8	7.87	230	10.16	50	Clear	None	None	None	Area flooded
SW6	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry

LOCATION: Galway WDS DATE: November 12, 2020 WEATHER (SAMPLE DAY): -1°C Sun 8°C

PROJECT NUMBER: 10520-007 SAMPLED BY: M. Pion + N. Morin WEATHER (PREVIOUS DAY): 22°C Sun

FIELD SHEET – SURFACE WATER SAMPLING

Sample Location	Depth (m)	Width (m)	Velocity (m/s)	Discharge (m^3/s)	Temp (°C)	pH (units)	Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Observations				
										Clarity	Colour	Odour	Sheen	Other
SW1	0.05	Ponded - No Observable Flow			6.5	7.42	279	5.45	196	Clear	None	None	None	
SW2	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
SW3	0.12	Ponded - No Observable Flow			7.4	6.92	225	5.11	252	Clear	Yellow	None	None	QA/QC
SW4	0.05	Ponded - No Observable Flow			7.2	7.37	240	7.67	159	Clear	None	None	None	
SW5	0.08	Ponded - No Observable Flow			6.9	7.34	172	5.87	207	Clear	None	None	None	
SW6	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry

Government of Canada / Gouvernement du Canada

Daily Data Report for April 2020

SPRUCEDALE
ONTARIO
Current Station Operator: CCN

Latitude:	45°25'30.000" N	**Longitude:**	79°29'15.000" W	**Elevation:**	337.10 m	
Climate ID:	6117981	**WMO ID:**		**TC ID:**		

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01 †						0.0	0.0	0.0	9		
02 †						0.0	T	0.0	4		
03 †						6.0	0.0	6.0	0		
04 †						0.2	0.0	0.2	T		
05 †						0.0	0.0	0.0	T		
06 †						0.0	0.0	0.0	T		
07 †						0.8	0.0	0.8	T		
08 †						0.0	0.4	0.4	0		
09 †						0.0	1.0	1.0	4		
10 †						0.0	0.0	0.0	3		
11 †						0.0	0.0	0.0	T		
12 †						6.0	0.0	6.0	T		
13 †						0.0	1.8	0.0	T		
14 †						0.0	1.0	0.0	T		
15 †						0.0	1.8	1.8	T		
16 †						0.0	T	0.0	T		
17 †						0.0	0.0	0.0	T		
18 †						3.4	0.0	3.4	0		
19 †						1.6	T	1.6	T		
20 †						0.0	9.2	10.0	T		
21 †						0.0	2.2	2.0	10		
22 †						0.0	0.0	0.0	7		
23 †						0.0	0.8	0.8	T		
24 †						0.0	0.0	0.0	T		
25 †						0.0	0.0	0.0	0		
26 †						0.0	0.0	0.0	T		
27 †						0.0	0.0	0.0	0		
28 †						0.8	0.0	0.8	0		
29 †						19.6	0.0	19.6	0		
30 †						16.4	0.0	16.4	0		
Sum						54.8	18.2	70.8			
Avg											

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
Xtrm											

Summary, average and extreme values are based on the data above.

Legend

- A = Accumulated
- C = Precipitation occurred, amount uncertain
- E = Estimated
- F = Accumulated and estimated
- L = Precipitation may or may not have occurred
- M = Missing
- N = Temperature missing but known to be > 0
- S = More than one occurrence
- T = Trace
- Y = Temperature missing but known to be < 0
- [empty] = Indicates an unobserved value
- ^ = The value displayed is based on incomplete data
- † = Data that is not subject to review by the National Climate Archives

Date modified:

2020-09-17

Government of Canada / Gouvernement du Canada

Daily Data Report for November 2020

SPRUCEDALE
ONTARIO
Current Station Operator: CCN

Latitude:	45°25'30.000" N	**Longitude:**	79°29'15.000" W	**Elevation:**	337.10 m		
Climate ID:	6117981	**WMO ID:**		**TC ID:**			

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01 †						1.4	1.4	2.8	0		
02 †						1.4	1.4	2.8	0		
03 †						T	0.0	T	0		
04 †						T	0.0	T	0		
05 †						T	0.0	T	0		
06 †						T	0.0	T	0		
07 †						0.0	0.0	0.0	0		
08 †						T	0.0	T	0		
09 †						0.0	0.0	0.0	0		
10 †						11.6	0.0	11.6	0		
11 †						0.4	0.0	0.4	0		
12 †						0.0	0.0	0.0	0		
13 †						2.4	0.0	2.4	0		
14 †						3.2	0.0	3.2	0		
15 †						20.2	0.0	20.2	0		
16 †						0.0	0.4	0.0	0		
17 †						T	T	T	T		
18 †						0.0	T	0.0	T		
19 †						T	0.0	T	T		
20 †						T	0.0	T	0		
21 †						0.0	0.4	0.0	0		
22 †						0.0	5.8	5.8	T		
23 †						0.0	1.8	1.0	11		
24 †						0.0	0.0	0.0	9		
25 †						0.4	0.0	0.4	7		
26 †						6.6	0.0	6.6	4		
27 †						0.0	1.0	0.0	T		
28 †						T	0.0	T	T		
29 †						1.0	0.0	1.0	0		
30 †						4.0	9.2	8.0	0		
Sum						52.6	21.4	66.2			
Avg											

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
Xtrm											

Summary, average and extreme values are based on the data above.

Legend

- A = Accumulated
- C = Precipitation occurred, amount uncertain
- E = Estimated
- F = Accumulated and estimated
- L = Precipitation may or may not have occurred
- M = Missing
- N = Temperature missing but known to be > 0
- S = More than one occurrence
- T = Trace
- Y = Temperature missing but known to be < 0
- [empty] = Indicates an unobserved value
- ^ = The value displayed is based on incomplete data
- † = Data that is not subject to review by the National Climate Archives

Date modified:

2020-09-17

Appendix C

Laboratory Certificates of Analysis

CADUCEON™ ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G93145 **REPORT No. B20-10491**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 22-Apr-20
DATE REPORTED: 30-Apr-20
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10520-007
WATERWORKS NO.

			Client I.D.		DP1R	DP3	DP7	DP4
			Sample I.D.		B20-10491-1	B20-10491-2	B20-10491-3	B20-10491-4
			Date Collected		21-Apr-20	21-Apr-20	21-Apr-20	21-Apr-20
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	24-Apr-20/O	445	194	174	203
Conductivity @25°C	µmho/cm	1	SM 2510B	24-Apr-20/O	841	398	419	474
pH @25°C	pH Units		SM 4500H	24-Apr-20/O	7.44	7.67	7.31	7.74
Total Dissolved Solids	mg/L	3	SM 2540D	27-Apr-20/O	443	205	216	245
Dissolved Organic Carbon	mg/L	0.2	EPA 415.2	25-Apr-20/O	17.6	7.1	12.5	5.2
COD	mg/L	5	SM 5220D	24-Apr-20/O	146	105	49	52
Phenolics	mg/L	0.002	MOEE 3179	23-Apr-20/K	< 0.002	< 0.002	< 0.002	< 0.002
Chloride	mg/L	0.5	SM4110C	24-Apr-20/O	4.6	1.6	21.3	19.7
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	23-Apr-20/K	0.28	2.68	1.16	0.63
Sulphate	mg/L	1	SM4110C	24-Apr-20/O	< 1	< 1	< 1	8
Nitrite (N)	mg/L	0.05	SM4110C	24-Apr-20/O	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (N)	mg/L	0.05	SM4110C	24-Apr-20/O	0.06	< 0.05	< 0.05	0.07
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	23-Apr-20/K	1.6	7.9	1.8	1.4
Mercury	mg/L	0.00002	SM 3112 B	28-Apr-20/O	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Hardness (as CaCO3)	mg/L	1	SM 3120	24-Apr-20/O	451	189	197	240
Arsenic	mg/L	0.0001	EPA 200.8	27-Apr-20/O	0.0020	< 0.0001	0.0006	0.0001
Barium	mg/L	0.001	SM 3120	24-Apr-20/O	0.166	0.064	0.117	0.060
Boron	mg/L	0.005	SM 3120	24-Apr-20/O	0.096	0.012	0.010	0.016
Cadmium	mg/L	).000015	EPA 200.8	27-Apr-20/O	0.000048	< 0.000015	0.000016	< 0.000015
Calcium	mg/L	0.02	SM 3120	24-Apr-20/O	166	68.4	70.7	84.4
Chromium	mg/L	0.001	EPA 200.8	27-Apr-20/O	< 0.001	< 0.001	0.001	< 0.001
Copper	mg/L	0.0001	EPA 200.8	27-Apr-20/O	0.0008	0.0009	0.0009	0.0001
Iron	mg/L	0.005	SM 3120	24-Apr-20/O	29.3	3.47	2.26	0.055
Lead	mg/L	0.00002	EPA 200.8	27-Apr-20/O	0.00660	0.00003	0.00097	< 0.00002
Magnesium	mg/L	0.02	SM 3120	24-Apr-20/O	8.71	4.35	4.92	6.99
Manganese	mg/L	0.001	SM 3120	24-Apr-20/O	2.12	0.120	0.116	0.018
Phosphorus	mg/L	0.1	SM 3120	24-Apr-20/O	< 0.1	0.2	0.1	< 0.1

Michelle Dubien
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G93145 **REPORT No. B20-10491**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 22-Apr-20
DATE REPORTED: 30-Apr-20
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10520-007
WATERWORKS NO.

			Client I.D.		DP1R	DP3	DP7	DP4
			Sample I.D.		B20-10491-1	B20-10491-2	B20-10491-3	B20-10491-4
			Date Collected		21-Apr-20	21-Apr-20	21-Apr-20	21-Apr-20
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Potassium	mg/L	0.1	SM 3120	24-Apr-20/O	4.3	2.0	1.8	4.0
Sodium	mg/L	0.2	SM 3120	24-Apr-20/O	9.7	3.4	11.2	7.3
Zinc	mg/L	0.005	SM 3120	24-Apr-20/O	41.0	0.005	< 0.005	< 0.005

Michelle Dubien
Lab Manager

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Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 22-Apr-20
DATE REPORTED: 30-Apr-20
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10520-007
WATERWORKS NO.

			Client I.D.		GW QA/QC			
			Sample I.D.		B20-10491-5			
			Date Collected		21-Apr-20			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	24-Apr-20/O	199			
Conductivity @25°C	µmho/cm	1	SM 2510B	24-Apr-20/O	473			
pH @25°C	pH Units		SM 4500H	24-Apr-20/O	7.75			
Total Dissolved Solids	mg/L	3	SM 2540D	27-Apr-20/O	245			
Dissolved Organic Carbon	mg/L	0.2	EPA 415.2	25-Apr-20/O	5.3			
COD	mg/L	5	SM 5220D	24-Apr-20/O	47			
Phenolics	mg/L	0.002	MOEE 3179	23-Apr-20/K	0.003			
Chloride	mg/L	0.5	SM4110C	24-Apr-20/O	19.6			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	23-Apr-20/K	0.60			
Sulphate	mg/L	1	SM4110C	24-Apr-20/O	8			
Nitrite (N)	mg/L	0.05	SM4110C	24-Apr-20/O	< 0.05			
Nitrate (N)	mg/L	0.05	SM4110C	24-Apr-20/O	0.06			
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	23-Apr-20/K	1.4			
Mercury	mg/L	0.00002	SM 3112 B	28-Apr-20/O	< 0.00002			
Hardness (as CaCO3)	mg/L	1	SM 3120	24-Apr-20/O	247			
Arsenic	mg/L	0.0001	EPA 200.8	27-Apr-20/O	0.0001			
Barium	mg/L	0.001	SM 3120	24-Apr-20/O	0.060			
Boron	mg/L	0.005	SM 3120	24-Apr-20/O	0.013			
Cadmium	mg/L	).000015	EPA 200.8	27-Apr-20/O	< 0.000015			
Calcium	mg/L	0.02	SM 3120	24-Apr-20/O	87.3			
Chromium	mg/L	0.001	EPA 200.8	27-Apr-20/O	< 0.001			
Copper	mg/L	0.0001	EPA 200.8	27-Apr-20/O	< 0.0001			
Iron	mg/L	0.005	SM 3120	24-Apr-20/O	0.033			
Lead	mg/L	0.00002	EPA 200.8	27-Apr-20/O	< 0.00002			
Magnesium	mg/L	0.02	SM 3120	24-Apr-20/O	6.98			
Manganese	mg/L	0.001	SM 3120	24-Apr-20/O	0.018			
Phosphorus	mg/L	0.1	SM 3120	24-Apr-20/O	< 0.1			

Michelle Dubien
Lab Manager

R.L. = Reporting Limit
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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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Final Report

C.O.C.: G93145 **REPORT No. B20-10491**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 22-Apr-20
DATE REPORTED: 30-Apr-20
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10520-007
WATERWORKS NO.

			Client I.D.		GW QA/QC			
			Sample I.D.		B20-10491-5			
			Date Collected		21-Apr-20			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Potassium	mg/L	0.1	SM 3120	24-Apr-20/O	4.1			
Sodium	mg/L	0.2	SM 3120	24-Apr-20/O	7.3			
Zinc	mg/L	0.005	SM 3120	24-Apr-20/O	< 0.005			

Michelle Dubien
Lab Manager

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Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G93145 **REPORT No. B20-10492**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 22-Apr-20
DATE REPORTED: 29-Apr-20
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10520-007
WATERWORKS NO.

			Client I.D.		SW1	SW3	SW5	SW QA/QC
			Sample I.D.		B20-10492-1	B20-10492-2	B20-10492-3	B20-10492-4
			Date Collected		21-Apr-20	21-Apr-20	21-Apr-20	21-Apr-20
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	24-Apr-20/O	114	105	78	104
Conductivity @25°C	µmho/cm	1	SM 2510B	24-Apr-20/O	273	236	181	235
pH @25°C	pH Units		SM 4500H	24-Apr-20/O	7.69	7.61	7.58	7.62
Total Dissolved Solids	mg/L	3	SM 2540D	27-Apr-20/O	140	121	92	120
Total Suspended Solids	mg/L	3	SM2540D	23-Apr-20/K	< 3	< 3	< 3	3
BOD(5 day)	mg/L	3	SM 5210B	23-Apr-20/K	< 3	< 3	< 3	< 3
COD	mg/L	5	SM 5220D	24-Apr-20/O	18	11	14	12
Phenolics	mg/L	0.002	MOEE 3179	23-Apr-20/K	< 0.002	< 0.002	< 0.002	< 0.002
Chloride	mg/L	0.5	SM4110C	27-Apr-20/O	11.0	5.6	4.1	5.5
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	23-Apr-20/K	0.02	< 0.01	< 0.01	< 0.01
Sulphate	mg/L	1	SM4110C	27-Apr-20/O	6	6	5	6
Nitrite (N)	mg/L	0.05	SM4110C	27-Apr-20/O	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (N)	mg/L	0.05	SM4110C	27-Apr-20/O	0.12	0.11	0.07	0.08
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	24-Apr-20/K	0.3	0.2	0.2	0.2
Mercury	mg/L	0.00002	SM 3112 B	27-Apr-20/O	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Hardness (as CaCO3)	mg/L	1	SM 3120	27-Apr-20/O	126	124	87	115
Arsenic	mg/L	0.0001	EPA 200.8	27-Apr-20/O	0.0003	0.0004	0.0003	0.0004
Barium	mg/L	0.001	SM 3120	27-Apr-20/O	0.042	0.047	0.026	0.044
Boron	mg/L	0.005	SM 3120	27-Apr-20/O	0.013	0.005	0.005	< 0.005
Cadmium	mg/L	).000015	EPA 200.8	27-Apr-20/O	< 0.000015	< 0.000015	< 0.000015	< 0.000015
Chromium	mg/L	0.001	EPA 200.8	27-Apr-20/O	< 0.001	< 0.001	< 0.001	< 0.001
Copper	mg/L	0.0001	EPA 200.8	27-Apr-20/O	0.0003	0.0003	0.0003	0.0004
Iron	mg/L	0.005	SM 3120	27-Apr-20/O	0.028	0.027	0.038	0.019
Lead	mg/L	0.00002	EPA 200.8	27-Apr-20/O	0.00004	< 0.00002	< 0.00002	< 0.00002
Phosphorus-Total	mg/L	0.01	E3199A.1	24-Apr-20/K	< 0.01	< 0.01	< 0.01	< 0.01
Zinc	mg/L	0.005	SM 3120	27-Apr-20/O	0.005	< 0.005	0.005	< 0.005

Michelle Dubien
Lab Manager

R.L. = Reporting Limit
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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G93145 **REPORT No. B20-10492**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 22-Apr-20
DATE REPORTED: 29-Apr-20
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10520-007
WATERWORKS NO.

			Client I.D.		SW4	SW2		
			Sample I.D.		B20-10492-5	B20-10492-6		
			Date Collected		21-Apr-20	21-Apr-20		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	24-Apr-20/O	97	158		
Conductivity @25°C	µmho/cm	1	SM 2510B	24-Apr-20/O	228	379		
pH @25°C	pH Units		SM 4500H	24-Apr-20/O	7.61	7.62		
Total Dissolved Solids	mg/L	3	SM 2540D	27-Apr-20/O	116	195		
Total Suspended Solids	mg/L	3	SM2540D	23-Apr-20/K	76	14		
BOD(5 day)	mg/L	3	SM 5210B	23-Apr-20/K	< 3	4		
COD	mg/L	5	SM 5220D	24-Apr-20/O	50	19		
Phenolics	mg/L	0.002	MOEE 3179	23-Apr-20/K	< 0.002	< 0.002		
Chloride	mg/L	0.5	SM4110C	27-Apr-20/O	19.4	19.5		
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	23-Apr-20/K	< 0.01	0.10		
Sulphate	mg/L	1	SM4110C	27-Apr-20/O	4	4		
Nitrite (N)	mg/L	0.05	SM4110C	27-Apr-20/O	< 0.05	< 0.05		
Nitrate (N)	mg/L	0.05	SM4110C	27-Apr-20/O	0.06	0.07		
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	24-Apr-20/K	0.8	0.6		
Mercury	mg/L	0.00002	SM 3112 B	27-Apr-20/O	< 0.00002	< 0.00002		
Hardness (as CaCO3)	mg/L	1	SM 3120	27-Apr-20/O	123	170		
Arsenic	mg/L	0.0001	EPA 200.8	27-Apr-20/O	0.0011	0.0006		
Barium	mg/L	0.001	SM 3120	27-Apr-20/O	0.066	0.046		
Boron	mg/L	0.005	SM 3120	27-Apr-20/O	0.006	0.024		
Cadmium	mg/L	).000015	EPA 200.8	27-Apr-20/O	0.000053	< 0.000015		
Chromium	mg/L	0.001	EPA 200.8	27-Apr-20/O	< 0.001	< 0.001		
Copper	mg/L	0.0001	EPA 200.8	27-Apr-20/O	0.0008	0.0004		
Iron	mg/L	0.005	SM 3120	27-Apr-20/O	0.500	1.01		
Lead	mg/L	0.00002	EPA 200.8	27-Apr-20/O	0.00180	0.00018		
Phosphorus-Total	mg/L	0.01	E3199A.1	24-Apr-20/K	0.06	0.06		
Zinc	mg/L	0.005	SM 3120	27-Apr-20/O	0.016	< 0.005		

Michelle Dubien
Lab Manager

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G099365 **REPORT No. B20-35877**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Nov-20
DATE REPORTED: 27-Nov-20
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10530-007
WATERWORKS NO.

			Client I.D.		DP7	GW QA/QC	DP4	DP3
			Sample I.D.		B20-35877-1	B20-35877-2	B20-35877-3	B20-35877-4
			Date Collected		12-Nov-20	12-Nov-20	12-Nov-20	12-Nov-20
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	17-Nov-20/O	173	173	188	195
Conductivity @25°C	µmho/cm	1	SM 2510B	17-Nov-20/O	427	424	458	400
pH @25°C	pH Units		SM 4500H	17-Nov-20/O	7.24	7.25	7.61	7.67
Total Dissolved Solids	mg/L	3	SM 2540D	18-Nov-20/O	220	219	237	206
Total Suspended Solids	mg/L	3	SM2540D	17-Nov-20/K				
Dissolved Organic Carbon	mg/L	0.2	EPA 415.2	18-Nov-20/O	10.0	10.1	5.1	6.4
BOD(5 day)	mg/L	3	SM 5210B	13-Nov-20/K				
COD	mg/L	5	SM5220C	16-Nov-20/K	179	171	82	338
Chloride	mg/L	0.5	SM4110C	17-Nov-20/O	20.8	20.7	18.6	1.8
Phenolics	mg/L	0.002	MOEE 3179	25-Nov-20/K	< 0.002	< 0.002	< 0.002	< 0.002
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	18-Nov-20/K	1.36	1.33	0.61	3.14
Sulphate	mg/L	1	SM4110C	17-Nov-20/O	< 1	< 1	11	< 1
Nitrite (N)	mg/L	0.05	SM4110C	17-Nov-20/O	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (N)	mg/L	0.05	SM4110C	17-Nov-20/O	< 0.05	< 0.05	< 0.05	< 0.05
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	24-Nov-20/K	1.8	1.7	1.0	3.1
Mercury	mg/L	0.00002	SM 3112 B	17-Nov-20/O	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Hardness (as CaCO3)	mg/L	1	SM 3120	17-Nov-20/O	197	195	239	213
Arsenic	mg/L	0.0001	EPA 200.8	20-Nov-20/O	0.0010	0.0010	0.0003	0.0002
Barium	mg/L	0.001	SM 3120	17-Nov-20/O	0.124	0.127	0.064	0.063
Boron	mg/L	0.005	SM 3120	17-Nov-20/O	< 0.005	< 0.005	0.014	0.012
Cadmium	mg/L	0.000015	EPA 200.8	20-Nov-20/O	< 0.000015	< 0.000015	< 0.000015	< 0.000015
Calcium	mg/L	0.02	SM 3120	17-Nov-20/O	70.8	70.2	85.2	77.3
Chromium	mg/L	0.001	EPA 200.8	20-Nov-20/O	0.001	0.001	< 0.001	< 0.001
Copper	mg/L	0.0001	EPA 200.8	20-Nov-20/O	0.0009	0.0008	0.0006	0.0020
Iron	mg/L	0.005	SM 3120	17-Nov-20/O	0.403	0.453	0.118	0.107
Lead	mg/L	0.00002	EPA 200.8	20-Nov-20/O	0.00013	0.00014	0.00004	0.00008
Magnesium	mg/L	0.02	SM 3120	17-Nov-20/O	4.82	4.79	6.23	4.85

Michelle Dubien
Lab Manager

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G099365 **REPORT No. B20-35877**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Nov-20
DATE REPORTED: 27-Nov-20
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10530-007
WATERWORKS NO.

			Client I.D.		DP7	GW QA/QC	DP4	DP3
			Sample I.D.		B20-35877-1	B20-35877-2	B20-35877-3	B20-35877-4
			Date Collected		12-Nov-20	12-Nov-20	12-Nov-20	12-Nov-20
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Manganese	mg/L	0.001	SM 3120	17-Nov-20/O	0.101	0.098	0.024	0.065
Sodium	mg/L	0.2	SM 3120	17-Nov-20/O	11.2	11.3	8.5	3.9
Phosphorus	mg/L	0.1	SM 3120	17-Nov-20/O	< 0.1	< 0.1	< 0.1	< 0.1
Potassium	mg/L	0.1	SM 3120	17-Nov-20/O	2.0	1.9	3.8	2.4
Zinc	mg/L	0.005	SM 3120	17-Nov-20/O	< 0.005	< 0.005	< 0.005	< 0.005

Michelle Dubien
Lab Manager

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Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Nov-20
DATE REPORTED: 27-Nov-20
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10530-007
WATERWORKS NO.

			Client I.D.		DP1-R	DP2		
			Sample I.D.		B20-35877-5	B20-35877-6		
			Date Collected		12-Nov-20	12-Nov-20		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	17-Nov-20/O	445	223		
Conductivity @25°C	µmho/cm	1	SM 2510B	17-Nov-20/O	870	461		
pH @25°C	pH Units		SM 4500H	17-Nov-20/O	7.54	7.65		
Total Dissolved Solids	mg/L	3	SM 2540D	18-Nov-20/O	460	238		
Total Suspended Solids	mg/L	3	SM2540D	17-Nov-20/K		23		
Dissolved Organic Carbon	mg/L	0.2	EPA 415.2	18-Nov-20/O	13.0	6.3		
BOD(5 day)	mg/L	3	SM 5210B	13-Nov-20/K		< 3		
COD	mg/L	5	SM5220C	16-Nov-20/K	107	26		
Chloride	mg/L	0.5	SM4110C	17-Nov-20/O	6.3	1.8		
Phenolics	mg/L	0.002	MOEE 3179	25-Nov-20/K	< 0.002	< 0.002		
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	18-Nov-20/K	0.35	3.16		
Sulphate	mg/L	1	SM4110C	17-Nov-20/O	< 1	< 1		
Nitrite (N)	mg/L	0.05	SM4110C	17-Nov-20/O	< 0.05	< 0.05		
Nitrate (N)	mg/L	0.05	SM4110C	17-Nov-20/O	0.08	< 0.05		
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	24-Nov-20/K	1.1	3.8		
Mercury	mg/L	0.00002	SM 3112 B	17-Nov-20/O	< 0.00002	< 0.00002		
Hardness (as CaCO3)	mg/L	1	SM 3120	17-Nov-20/O	510	246		
Arsenic	mg/L	0.0001	EPA 200.8	20-Nov-20/O	0.0019	< 0.0001		
Barium	mg/L	0.001	SM 3120	17-Nov-20/O	0.178	0.080		
Boron	mg/L	0.005	SM 3120	17-Nov-20/O	0.136	0.008		
Cadmium	mg/L	).000015	EPA 200.8	20-Nov-20/O	0.000022	< 0.000015		
Calcium	mg/L	0.02	SM 3120	17-Nov-20/O	186	90.6		
Chromium	mg/L	0.001	EPA 200.8	20-Nov-20/O	< 0.001	< 0.001		
Copper	mg/L	0.0001	EPA 200.8	20-Nov-20/O	0.0030	0.0004		
Iron	mg/L	0.005	SM 3120	17-Nov-20/O	44.2	0.335		
Lead	mg/L	0.00002	EPA 200.8	20-Nov-20/O	0.00557	0.00005		
Magnesium	mg/L	0.02	SM 3120	17-Nov-20/O	10.9	4.77		

Michelle Dubien
Lab Manager

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G099365 **REPORT No. B20-35877**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Nov-20
DATE REPORTED: 27-Nov-20
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10530-007
WATERWORKS NO.

			Client I.D.		DP1-R	DP2		
			Sample I.D.		B20-35877-5	B20-35877-6		
			Date Collected		12-Nov-20	12-Nov-20		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Manganese	mg/L	0.001	SM 3120	17-Nov-20/O	1.71	0.098		
Sodium	mg/L	0.2	SM 3120	17-Nov-20/O	11.6	3.4		
Phosphorus	mg/L	0.1	SM 3120	17-Nov-20/O	< 0.1	< 0.1		
Potassium	mg/L	0.1	SM 3120	17-Nov-20/O	5.3	3.3		
Zinc	mg/L	0.005	SM 3120	17-Nov-20/O	30.4	0.009		

Michelle Dubien
Lab Manager

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G099365 **REPORT No. B20-35879**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Nov-20
DATE REPORTED: 27-Nov-20
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10530-007
WATERWORKS NO.

			Client I.D.		SW3	SW QA/QC	SW4	SW1
			Sample I.D.		B20-35879-1	B20-35879-2	B20-35879-3	B20-35879-4
			Date Collected		12-Nov-20	12-Nov-20	12-Nov-20	12-Nov-20
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	17-Nov-20/O	137	138	137	181
Conductivity @25°C	µmho/cm	1	SM 2510B	17-Nov-20/O	307	306	316	409
pH @25°C	pH Units		SM 4500H	17-Nov-20/O	7.68	7.77	7.86	7.94
Total Dissolved Solids	mg/L	3	SM 2540D	18-Nov-20/O	158	157	162	211
Total Suspended Solids	mg/L	3	SM2540D	16-Nov-20/K	< 3	< 3	4	8
BOD(5 day)	mg/L	3	SM 5210B	13-Nov-20/K	< 3	< 3	< 3	< 3
COD	mg/L	5	SM5220C	16-Nov-20/K	23	32	30	21
Chloride	mg/L	0.5	SM4110C	17-Nov-20/O	6.3	6.3	8.3	10.9
Phenolics	mg/L	0.002	MOEE 3179	25-Nov-20/K	< 0.002	< 0.002	< 0.002	< 0.002
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	18-Nov-20/K	0.03	0.05	0.03	0.28
Sulphate	mg/L	1	SM4110C	17-Nov-20/O	9	9	10	11
Nitrite (N)	mg/L	0.05	SM4110C	17-Nov-20/O	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (N)	mg/L	0.05	SM4110C	17-Nov-20/O	< 0.05	< 0.05	< 0.05	< 0.05
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	24-Nov-20/K	0.6	0.6	0.5	0.7
Mercury	mg/L	0.00002	SM 3112 B	18-Nov-20/O	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Hardness (as CaCO3)	mg/L	1	SM 3120	17-Nov-20/O	160	164	162	194
Arsenic	mg/L	0.0001	EPA 200.8	26-Nov-20/O	0.0007	0.0006	0.0004	0.0005
Barium	mg/L	0.001	SM 3120	17-Nov-20/O	0.065	0.066	0.063	0.059
Boron	mg/L	0.005	SM 3120	17-Nov-20/O	0.006	0.005	0.005	0.040
Cadmium	mg/L	).000015	EPA 200.8	26-Nov-20/O	< 0.000015	< 0.000015	< 0.000015	< 0.000015
Chromium	mg/L	0.001	EPA 200.8	26-Nov-20/O	< 0.001	< 0.001	< 0.001	< 0.001
Copper	mg/L	0.0001	EPA 200.8	26-Nov-20/O	0.0004	0.0005	0.0007	0.0003
Iron	mg/L	0.005	SM 3120	17-Nov-20/O	0.042	0.053	0.035	0.049
Lead	mg/L	0.00002	EPA 200.8	26-Nov-20/O	0.00003	0.00009	< 0.00002	0.00002
Phosphorus-Total	mg/L	0.01	E3199A.1	24-Nov-20/K	0.01	< 0.01	< 0.01	< 0.01
Zinc	mg/L	0.005	SM 3120	17-Nov-20/O	0.011	0.018	0.011	0.020

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G099365 **REPORT No. B20-35879**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Nov-20
DATE REPORTED: 27-Nov-20
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.: Galway WDS
P.O. NUMBER: 10530-007
WATERWORKS NO.

			Client I.D.		SW 5			
			Sample I.D.		B20-35879-5			
			Date Collected		12-Nov-20			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	17-Nov-20/O	106			
Conductivity @25°C	µmho/cm	1	SM 2510B	17-Nov-20/O	240			
pH @25°C	pH Units		SM 4500H	17-Nov-20/O	7.77			
Total Dissolved Solids	mg/L	3	SM 2540D	18-Nov-20/O	123			
Total Suspended Solids	mg/L	3	SM2540D	16-Nov-20/K	< 3			
BOD(5 day)	mg/L	3	SM 5210B	13-Nov-20/K	< 3			
COD	mg/L	5	SM5220C	16-Nov-20/K	30			
Chloride	mg/L	0.5	SM4110C	17-Nov-20/O	5.0			
Phenolics	mg/L	0.002	MOEE 3179	25-Nov-20/K	< 0.002			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	18-Nov-20/K	0.17			
Sulphate	mg/L	1	SM4110C	17-Nov-20/O	6			
Nitrite (N)	mg/L	0.05	SM4110C	17-Nov-20/O	< 0.05			
Nitrate (N)	mg/L	0.05	SM4110C	17-Nov-20/O	< 0.05			
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	24-Nov-20/K	0.7			
Mercury	mg/L	0.00002	SM 3112 B	18-Nov-20/O	< 0.00002			
Hardness (as CaCO3)	mg/L	1	SM 3120	17-Nov-20/O	128			
Arsenic	mg/L	0.0001	EPA 200.8	26-Nov-20/O	0.0006			
Barium	mg/L	0.001	SM 3120	17-Nov-20/O	0.039			
Boron	mg/L	0.005	SM 3120	17-Nov-20/O	0.006			
Cadmium	mg/L	).000015	EPA 200.8	26-Nov-20/O	< 0.000015			
Chromium	mg/L	0.001	EPA 200.8	26-Nov-20/O	< 0.001			
Copper	mg/L	0.0001	EPA 200.8	26-Nov-20/O	0.0004			
Iron	mg/L	0.005	SM 3120	17-Nov-20/O	0.126			
Lead	mg/L	0.00002	EPA 200.8	26-Nov-20/O	0.00006			
Phosphorus-Total	mg/L	0.01	E3199A.1	24-Nov-20/K	0.02			
Zinc	mg/L	0.005	SM 3120	17-Nov-20/O	0.010			

Michelle Dubien
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Appendix D
Photographs

Photograph 1: Monitor DP1R, April 2020

Photograph 2: Monitor DP1R, April 2020

Photograph 3: Monitor DP2, April 2020

Photograph 4: Monitor DP2, November 2019

Photograph 5: Monitor DP3, April 2020

Photograph 6: Monitor DP3, November 2020

Photograph 7: Monitor DP4, April 2020

Photograph 8: Monitor DP4, November 2020

Photograph 9: Monitor DP5R, November 2020

Photograph 10: Monitor DP5R, November 2019

Photograph 11: Monitor DP6, April 2020

Photograph 12: Monitor DP6, November 2019

Photograph 13: Monitor DP7, April 2020

Photograph 14: Monitor DP7, May 2018

Photograph 15: Surface water monitoring station SW1, April 2020

Photograph 16: Surface water monitoring station SW1, November 2020

Photograph 17: Surface water monitoring station SW2, April 2020

Photograph 18: Dry - Surface water monitoring station SW2, November 2020

Photograph 19: Surface water monitoring station SW3, April 2020

Photograph 20: Surface water monitoring station SW3, November 2020

Photograph 21: Surface water monitoring station SW4, April 2020

Photograph 22: Surface water monitoring station SW4, November 2020

Photograph 23: Surface water monitoring station SW5, April 2020

Photograph 24: Surface water monitoring station SW5, November 2020

Photograph 25: Surface water monitoring station SW6, November 2018

Photograph 26: Surface water monitoring station SW6, November 2019

Appendix E
Well Records

DP6

Ontario — Ministry of the Environment and Climate Change

W Tag#: A 211290 (Below)

A211290

Well Record

Regulation 903 Ontario Water Resources Act

S-19284 Page ____ of ____

Measurements recorded in: ☐ Metric ☑ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Municipality of Trent Lakes		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
760 Peterborough County Rd 36	Trent Lakes	ON	K0M 2A0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
Galway Rd			

County/District/Municipality	City/Town/Village	Province	Postal Code
	Kinmount	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	695274	4960576		

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
BRN	Fine sand	gravel, boulders	Soft, loose	0	14
white	Marble		hard	14	33

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
-3	1	monument, casing	
1	22	bentonite	
22	33	filter sand	

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	Depth (m/ft) To
1.610	PVC	.145	-3	23

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
1900	PVC	10	23	33

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	14	4.5
14	33	3

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)

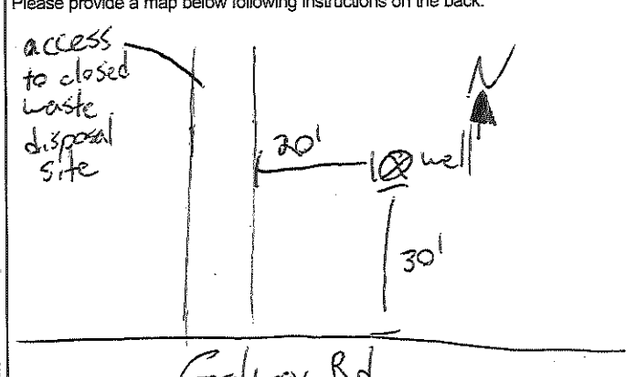
Well production (l/min / GPM)

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: WSP General Contractors

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Strata Drilling Group	7241

Business Address (Street Number/Name)	Municipality
165 Shields Court	Markham

Province	Postal Code	Business E-mail Address
ON	L3R 8V2	wrecords@stratasoil.com

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
905 764 9304	Beatty, Brian

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3616		2016 10 24

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☐ No		2016 10 17

Ministry Use Only

Audit No. Z233087

NOV 22 2016

Received

DP7

Ontario — Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag #: A 211291 (below) A211291

Well Record

Regulation 903 Ontario Water Resources Act

S-19284 Page _____ of _____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Municipality	of Trent Lakes		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
760 Peterborough County Rd 36	Trent Lakes	On	K0M1A0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
Galway Rd			

County/District/Municipality	City/Town/Village	Province	Postal Code
	Kinmount	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	17	6915097	4960558		

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
Grey	Gravel	Sand Silt	Soft loose	0	3
Blk	Sand (fine)	Silt Gravel	wood fragments, soft	3	7
Blk	Fine Sand	Silt Gravel	Soft	7	18

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
-3	1	monument casing	
1	7	bentonite	
7	18	Filter Sand	

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	Depth (m/ft) To
1610	PVC	.145	-3	5

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
1900	PVC	10	15	18

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	18	4.5

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)

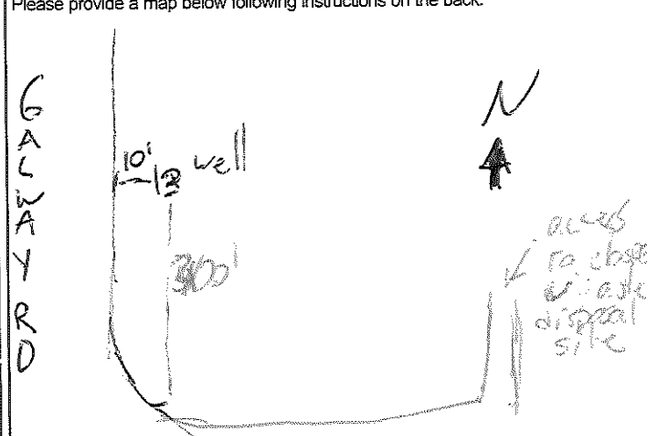
Well production (l/min / GPM)

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: WSP General Contractors

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Strata Drilling Group	7241

Business Address (Street Number/Name)	Municipality
165 Shields Court	Markham

Province	Postal Code	Business E-mail Address
On	L3R8V2	wrecords@stratagl.com

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
9057649304	Beatty Brian

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3161		2016 10 24

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

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

Date Work Completed: 2016 09 27

Ministry Use Only

Audit No. Z237979

NOV 22 2016

Received

0506E (2014/11)

Ministry's Copy

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*
A133824
A133824

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Dharma Centre of Canada		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
1886 Galway Road	Kinmount	On	K0M2A0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1886 Galway Road	Harvey Galway Cavendish	1886	Galway Road

County/District/Municipality	City/Town/Village	Province	Postal Code
Peterborough	Kinmount	Ontario	K0M2A0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	17	695447	4976102		

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
Brown	Sand			0	1'
White/Black	Granite			1'	300'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	20'	Bensegal	½

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	Depth (m/ft) To
6¼"	Steel	.188	0	22'

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) 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	Kind of Water	Depth (m/ft) From	Depth (m/ft) To	Hole Diameter (cm/in)
230' (m/ft) ☐ Gas	☒ Fresh ☐ Untested ☐ Other, *specify*	0	20'	8 ¾"
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*	20'	300'	6"
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*			

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)*: 250'

Pumping rate *(l/min / GPM)*: 2 gpm

Duration of pumping: 1 hrs + _____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*: 295'

Recommended pump rate *(l/min / GPM)*: 2 gpm

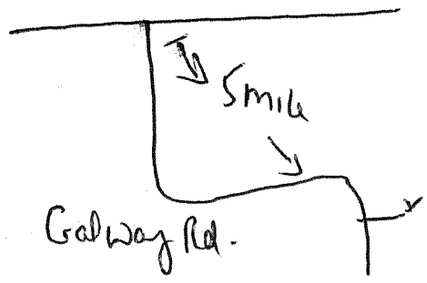
Well production *(l/min / GPM)*: 1½ gpm

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		25'		
1		26'	1	84'6"
2		27'	2	84'
3		29'	3	83'6"
4		29'	4	83'
5		30'	5	82'6"
10		35'	10	80'
15		40'	15	77'6"
20		45'	20	75'
25		50'	25	72'6"
30		55'	30	69'
40		65'	40	60'
50		75'	50	50'
60		85'	60	40'

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.
Earl Baldwin Well Drilling	1312

Business Address (Street Number/Name)	Municipality
481 Cty Rd 41	CKL

Province	Postal Code	Business E-mail Address
On	K0M2A0	

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
705 454 4100	Baldwin, Earl

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
TB00	Earl Baldwin	OCT 11 2012

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☐ No		2012/08/20

Ministry Use Only

Audit No. Z153265

Received OCT 15 2012

Ministry's Copy

Ministry of the Environment

Ontario

The Ontario Water Resources Act

WATER WELL RECORD

3 10/5E

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

(11) 5110620 MUNICIP. 51010 CON. CON 13

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC	LOT
[redacted]	GALWAY	XIII 20	018
	...INMOUNT	DATE COMPLETED	DAY 10 MO 05 YR 82

...THING 960100 RC 5 ELEVATION 1050 RC 6 BASIN CODE 2A

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BROWN	SAND	STONES	SAND	0'	2½'
GREY	GRANITE	WHITE GRANITE	SOLID	2½	295
GREY	GRANITE		LOOSE	295	295½
GREY	GRANITE		SOLID	295½	300
		3783.00			
		3500.00			

(31) 0003 2812 | 0295 221 | 0296 221 77 | 0300 221

(32)

(41) WATER RECORD	
WATER FOUND AT - FEET	KIND OF WATER
0295	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	TO
06 6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	0015
06 6⅛	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE	00	15	0300
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

300

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

(61) PLUGGING & SEALING RECORD		
DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

(71) PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☐ PUMP 2 ☒ BAILER	0004 GPM	00 HOURS 30 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING 1 ☒ PUMPING 2 ☐ RECOVERY: 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
060' FEET	FEET	200 FEET	200 FEET	FEET	FEET

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

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	200 FEET	0003 GPM

3 GPM AT 200 ft

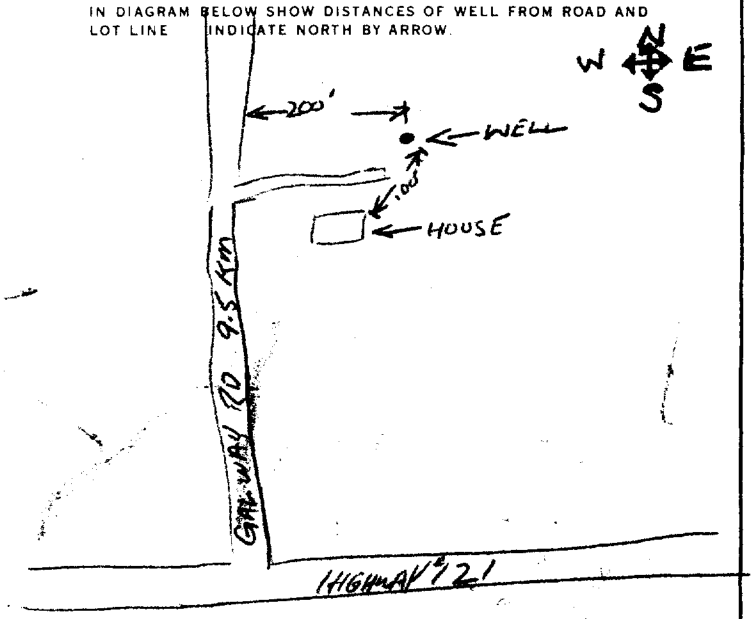
FINAL STATUS OF WELL 1
1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE 01
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 5
1 ☐ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☒ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

LOCATION OF WELL

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



DRILLERS REMARKS 103.024 01

CONTRACTOR

NAME OF WELL CONTRACTOR	LICENCE NUMBER
BALDWIN WELL DRILLING	1312
ADDRESS: RR#1 KIRKFIELD	
NAME OF DRILLER OR BORER: GORD BAILEY & CARL BALDWIN	1369
SIGNATURE OF CONTRACTOR: Carl Baldwin	SUBMISSION DATE DAY 10 MO Jan YR 83

OFFICE USE ONLY

DATA SOURCE	CONTRACTOR	DATE RECEIVED
1	1312	14 01 83
DATE OF INSPECTION	INSPECTOR	
REMARKS: CSS.ES		

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506-4-77

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

Ontario

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

11 5109654 MUNICIP. 51010 CON. CON 13 31015E

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]		13	017

[redacted] 9 Brymrey Rd

DATE COMPLETED DAY 10 MO 07 YR 79

[redacted] 60150 ... ELEVATION 1057 RC 6 BASIN CODE 24

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BK	TOPSOIL	STONES		0	10
BK, RD	GRANITE			10	185

31 | 0010602121 | 0185821

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0182	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	TO
06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	0012
6	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 0001 GPM
DURATION OF PUMPING: 01 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
033 FEET	185 FEET	178 FEET	171 FEET	164 FEET	157 FEET

WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY

IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: 185 FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 180 FEET
RECOMMENDED PUMPING RATE: 0002 GPM
GPM./FT. SPECIFIC CAPACITY

FINAL STATUS OF WELL 1

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

WATER USE 01

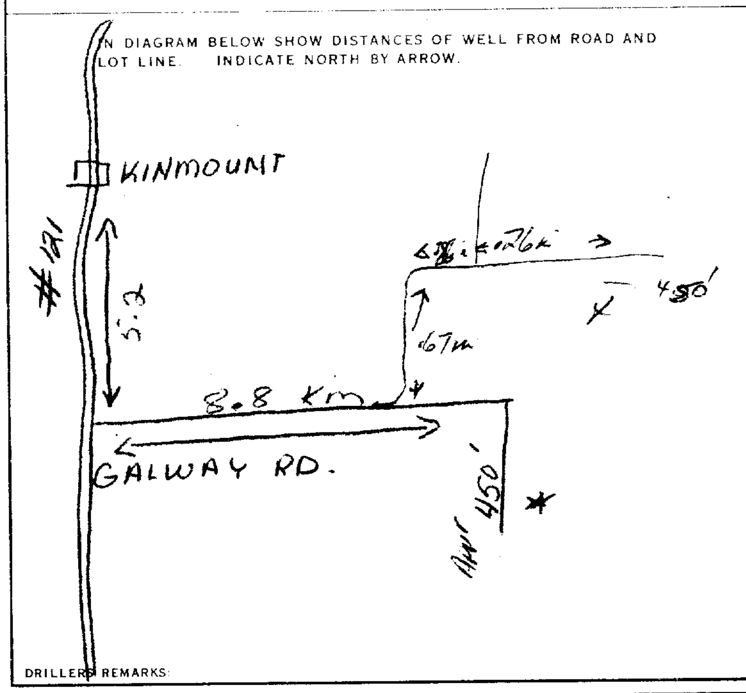
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING 5

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

LOCATION OF WELL

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



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR: U Kohler Drilling — LICENCE NUMBER 1748
ADDRESS: Box 46 Gooderham, Ont
NAME OF DRILLER OR BORER: U Kohler — LICENCE NUMBER 1748
SIGNATURE OF CONTRACTOR: [signature]
SUBMISSION DATE DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 1748 | DATE RECEIVED 150180
DATE OF INSPECTION 04/1/80 | INSPECTOR
REMARKS: Unflooded capped sealed properly. Card up
P
WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07-091

The Ontario Water Resources Commission Act

WATER WELL RECORD

3D15E

Water management in Ontario

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

11 | 5105832 | MUNICIP. 51910 | CON. CON 14

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Peterborough	GALWAY.	14	21 020

[redacted] LWAY. KINMOUNT - ONT.

DATE COMPLETED: DAY 17 MO. 12 YR. 71

[redacted] 60600 | RC. 4 | ELEVATION 1050 | RC. 5 | BASIN CODE 2A

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	TO
SANDY	LOAM - BROWN.			0	11
GREY	GRANITE ROCK.			11	114

31 | 0001 60209 | 0114221

32 |

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
0114	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	TO
06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	0012
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		12	0114
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER | PUMPING RATE 0003 GPM | DURATION OF PUMPING 04 HOURS 20 MINS.

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
020 FEET	100 FEET	070	055	030	020 FEET

WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY

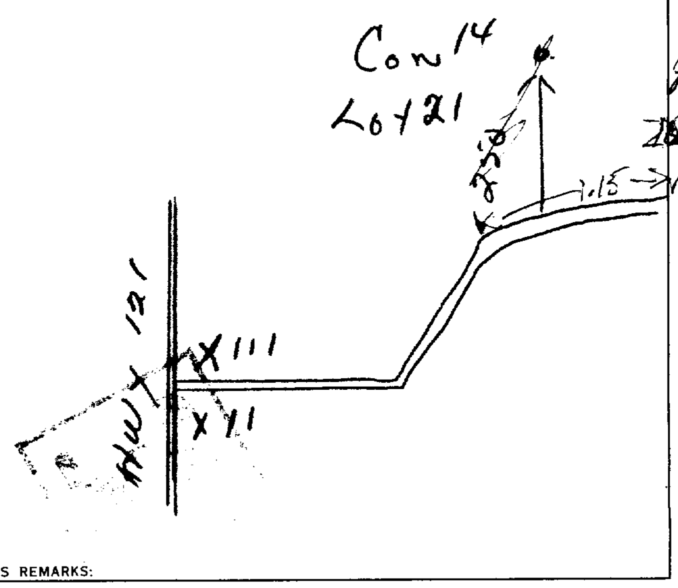
IF FLOWING, GIVE RATE: GPM. | PUMP INTAKE SET AT 110 FEET | WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP | RECOMMENDED PUMP SETTING 110 FEET | RECOMMENDED PUMPING RATE 0003 GPM.

0000 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 01: 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: 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: G. F. Henderson Ltd. | LICENCE NUMBER 2518

ADDRESS: 75 Durham St. W. Lindsay.

NAME OF DRILLER OR BORER: Howard Buckley. | LICENCE NUMBER

SIGNATURE OF CONTRACTOR: [signature] | SUBMISSION DATE DAY 12 MO. JAN YR. 72

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 2518 | DATE RECEIVED 240172

DATE OF INSPECTION | INSPECTOR

REMARKS: | P 1L | WI J.B.

OWRC COPY