Kollaard Associates
Engineers
210 Prescott Street
P.O. Box 189
Kemptville, Ontario K0G 1J0

Civil • Geotechnical •
Structural • Environmental •
Hydrogeology •

(613) 860-0923

FAX: (613) 258-0475

REPORT ON

HYDROGEOLOGICAL AND TERRAIN STUDY
PROPOSED LIGHT INDUSTRIAL BUILDINGS
151-159 WESCAR LANE
CITY OF OTTAWA
ONTARIO

Submitted to:

Sunbelt Rentals Inc.
2489 Sheffield Road
Ottawa, Ontario
K1B 3V6

DATE February 14, 2025

DISTRIBUTION

1 digital copy	City of Ottawa	
1 digital copy	Sunbelt Rentals Inc.	
1 copy	Kollaard Associates Inc.	230403

Table of Contents

Attachments:

Figure 1	- Key Plan
Table I	- Field Water Quality
Attachment A	- Well Record and Certificate of Well Compliance
Attachment B	- Pumping Test Data
Attachment C	- Well Water Laboratory Test Results and LSI/RSI
Attachment D	- Nitrate Dilution Calculations and Climate Data for infiltration
Attachment E	-Site Servicing Plans (DB Gray Engineering)

Kollaard Associates
Engineers
210 Prescott Street
P.O. Box 189
Kemptville, Ontario K0G 1J0

Civil • Geotechnical •
Structural • Environmental •
Hydrogeology •
(613) 860-0923
FAX: (613) 258-0475

February 14, 2025 230403

Sunbelt Rentals Inc.
2489 Sheffield Road
Ottawa, Ontario
K1B 3V6

RE: HYDROGEOLOGICAL AND TERRAIN STUDY
EXISTING SUPPLY WELL
PROPOSED LIGHT INDUSTRIAL BUILDINGS
151-159 WESCAR LANE
WEST CARLETON-MARCH WARD
CITY OF OTTAWA, ONTARIO

Dear Sir:

This report presents the results of an evaluation of the water quality and quantity for the well that will supply water for the above noted proposed light industrial development at 151-159 Wescar Lane in the City of Ottawa, Ontario (see Key Plan, Figure 1). It is understood that it is proposed to develop one building (Phase 1) and then eventually a second building (Phase 2) will be constructed. It is understood that each of the proposed light industrial buildings are to contain warehouse, office space and loading bays (storage space) associated with an equipment rental company. The preliminary Site Servicing Plan (prepared by DB Gray Engineering) is provided as Attachment E and outlines the locations and layout of the proposed buildings, well and septic system area, stormwater infiltration and provides hard surfaced areas.

The well in question was constructed by Saunders Well Drilling Ltd. of Braeside, Ontario on July 11, 2023. A Ministry of the Environment, Conservation and Parks (MECP) Well Record for the subject well (TW1) and a Compliance Certificate are provided as Attachment A.

A pumping test was carried out at the well, TW1, by a member of our engineering staff on July 25, 2023. The testing consisted of a 6 hour duration constant discharge rate pumping test. During the pumping test, water level measurements were made both manually and using a pressure transducer to monitor the drawdown of the water level in the well in response to pumping. Groundwater samples were collected from TW1 at about hour 3 and at hour 6 of the pumping test to characterize groundwater quality. After the pumping period, the pump was shut off and the recovery of the water level in the well was monitored for a period of time until at least 95 percent of the drawdown created during pumping had been recovered or for at least 24 hours, whichever was less.

1.0 Groundwater Supply Evaluation

1.1 Water Quantity

A. Water Demand

The water demand is calculated using the information from the sewage system daily design flow and peaking factors available in the City of Ottawa Water Distribution Guidelines, 2010. The sewage design flows are provided below, based on the sewage design information (provided by client).

Daily sewage design flow:

The daily sewage design flow is equal to a maximum daily demand for the site. The site is to be developed in two phases as follows, with the corresponding sewage design flows as provided by the sewage design consultant (DB Gray Engineering).

Phase I Building

Office: The greater of 30 employees x 75 L/day = 2,250 L/day OR
277.3 m^2 x 75 L/day per 9.3 m^2 = 2,236 L/day
Factory: 18 employees x 75 L/day = 1,350 L/day
Warehouse: 18 loading bays x 150 L/day = 2,700 L/day

Total Daily Sewage Design Flow (Phase I) = 6,300 L/day

Phase 2 Building

Office: The greater of 4 employees x 75 L/day = 300 L/day OR
45.3 m^2 x 75 L/day per 9.3 m^2 = 365 L/day
Factory: 8 employees x 75 L/day = 600 L/day
Warehouse: 9 loading bays x 150 L/day = 1,350 L/day

Total Daily Sewage Design Flow (Phase II) = 2,315 L/day

TOTAL DAILY SEWAGE DESIGN FLOW = 8,615 L/day

It is understood that the daily sewage design flow will be less than 10,000 litres per day. As such, a design flow of 8,615 litres per day is used for the purposes of this report.

Since sewage system design is based on the maximum expected daily use, it is equivalent to the Maximum Daily Demand (MDD). The MDD is based on an eight hour operation schedule (i.e. full day occurs over an eight hour period and not over 24 hours).

City of Ottawa calculates the Maximum Hour Demand (MHD) for a commercial or industrial demand to be 1.8 x MDD

MDD = 8,615 litres / day x 1 day / 8 hours x 1 hour / 60 minutes
= 18 litres / minute

MHD = 1.8 x MDD
= 1.8 x 18 litres / minute
= 32.3 litres / minute

The predicted water usage for MDD and MHD of 18 L/min and 32.3 L/min, respectively, are used.

The Maximum Hourly Demand (MHD) for the site based on its proposed use is expected to be about ~32.5 litres/minute, compared to the pumping test rate which was 38 litres/minute. This indicates that the pumping rate used for the test was appropriate as the peak water demand rate was met for the test. The MDD is 8,615 L/day. The test was carried out for 6 hours at the above noted rate and some ~13,680 Litres of water were removed from the well in that time. As such, the amount of water taking in six hours exceeds the expected maximum daily water taking for the full development.

B. Pumping Test

The well was pumped for six hours at a pumping rate of about 38 litres per minute. Over the course of the pumping test, the water level in the well dropped some 2.84 metres. At the end of the pumping test, about 12 minutes was required for 96 percent recovery of the total drawdown in the static water level created during pumping.

The pumping test drawdown and recovery data and plots for TW1 are provided as Attachment B. The drawdown and recovery data provided were measured with reference to the top of the well casing at the test well location.

The pumping test data for the test well was analyzed using the method of Cooper and Jacob (1946). Although the assumptions on which these equations are based are not strictly met, this method provides a reasonable estimate of the aquifer transmissivity.
Transmissivity was calculated using the following relationship:

$$T = \frac{2.3Q}{4\pi ds}$$

where Q is the pump rate, m^3/day
ds is the change in drawdown over one time log cycle, m
T is the transmissivity, m^2/day

Specific Capacity = Q / TD
= 54.6 m^3/day / 2.85 m
= 19 m^3/day/m

where Q = test pumping rate (m^3/day)
TD = total drawdown (m)

Based on the pumping test drawdown data the transmissivity of the aquifer is estimated to be about 100 m^2/day. Based on the recovery data the aquifer transmissivity is estimated to be about 8.5 m^2/day. It should be noted that pumping tests should typically be carried out for a period of between 24 hours or greater to establish transmissivity for a confined aquifer in order to assess boundary

conditions. Over the course of the six hour test, some ~13,600 litres of water were pumped from the well. As the expected maximum daily water demand is about 8,615 litres per day, the well is capable of meeting the expected daily water demand.

1.2 Well Interference

During the pumping test, the drawdown at the well was 2.84 metres. That drawdown was observed during pumping at a peak water demand rate. A review of several additional well records was carried out and indicated that area wells are typically 38 metres in depth or deeper. These wells are all sufficiently deep such that well interference is not an issue, with available drawdown of greater than 15 metres or more. There are 4 wells located near the site that are of older construction and are indicated to be shallower wells of depths of some 7 metres to 20 metres. The available drawdown in these wells based on the pump depths and the static water level indicated on the well records is between 2.4 metres and 13.6 metres. It is unlikely that the well would affect water levels by more than a few centimetres as even in the pumping well, drawdown was only 2.8 metres. There is sufficient available drawdown at these wells such that the use of the well will not interfere with the well performance in other offsite wells.

1.3 Water Quality

To determine the water quality of the groundwater supply, groundwater samples were obtained from the well during the pumping test and prepared/preserved in the field using appropriate techniques and submitted to Eurofins Environmental Testing in Ottawa, Ontario for the chemical, physical and bacteriological analyses listed in the MECP guideline entitled Procedure D-5-5, Technical Guideline for Private Wells: Water Supply Assessment, August 1996. The temperature, conductivity, pH, total dissolved solids, turbidity and residual chlorine levels of the groundwater were measured at periodic intervals during the pumping test. The results of the chemical, physical and bacteriological analyses of the water samples obtained from the test well and the field water quality are provided as Attachment C and in Table I, respectively.

The water quality as determined from the results of the analyses is acceptable. The water meets all the Ontario Drinking Water Standards (ODWS) health and aesthetic parameters tested for at the test well except for aesthetic objective for hardness, Iron, Manganese, TDS, Turbidity (lab measured) and Antimony. Sodium in the raw water supply exceeds the 20 mg/L medical advisory level for those on medically restricted low sodium diets.

A. Hardness

The water is considered to be hard by water treatment standards. Water with hardness above 80 to 100 milligrams per litre as $CaCO_3$ is often softened for domestic use. The hardness at the well is 336 to 339 milligrams per litre. Treatment consisting of water softening by conventional sodium ion exchange is effective to reduce scale formation associated with hardness. Ion exchange water softening may introduce relatively high concentrations of sodium into the drinking water which can also contribute a significant percentage to the daily sodium intake for a consumer on a sodium restricted diet. Where ion exchange water softeners are used, a separate unsoftened water supply could be used for drinking and culinary purposes. The untreated water had sodium levels that were less than the medical advisory level of 20 mg/l.

B. Manganese

The level of manganese was 0.15 mg/l after three and six hours. The ODWSOG aesthetic objective (AO) for manganese is 0.05 mg/l. The Health Canada Canadian Drinking Water Guideline has a proposed MAC (Maximum Allowable Concentration) of 0.12 mg/L and an AO of 0.02 mg/L. Manganese can stain laundry and fixtures black. The health objective of 0.12 mg/L is considered to be protective of neurological effects in infants, and is therefore also protective of older children and adults. Manganese can be effectively treated using a manganese greensand filter or some other proprietary filter for manganese removal. Information regarding manganese and different treatment options are provided herein as Attachment F. It is understood that the City of Ottawa will register the manganese exceedance on title for a health warning and water treatment considereation.

C. Iron

Iron was measured at a level of 1.58 mg/l, compared to the aesthetic objective of 0.3 mg/l. Excessive iron levels may cause brown or black discolouration of laundry and fixtures, affect the taste and colour of water, and iron precipitation in pipes and hot water tank can also promote the growth of iron bacteria. Iron can be effectively removed using conventional ion exchange water softeners. However, depending on the form that iron is in (reduced or oxidized) as well as the concentration and other factors, iron filters may be more effective in removing iron from the water supply.

D. Turbidity

The lab based measurement of turbidity was elevated in the three hour sample and six hour samples (23.2 and 20.2 NTU). The elevated turbidity was considered to be due to the elevated iron and manganese also possibly as part of well development as the well was recently constructed. The lab result for turbidity is not considered to be representative due to the iron and manganese precipitates which developed through sample handling, exposure to air and temperature changes between the time sampled and the lab testing.

The field reading for turbidity after three hours was 5.67 NTU and the final field reading for turbidity after six hours was 4.23 NTU. The turbidity generally declined throughout pumping and is considered to be associated with well development. Additional sampling was completed November 2, 2023 at the test well (due to antimony in the water supply well). At the time of additional sampling the well was pumped for 2.5 hours at 23 LPM, the field turbidity reading at the time was 1.87 NTU. Groundwater is considered to be acceptable for turbidity of up to 5 NTU, as measured at the point of consumption. There are no concerns with the noted laboratory results for turbidity as they are anticipated to be high at the laboratory due to elevated dissolved iron and manganese. The well is considered to be fully developed.

E. Total Dissolved Solids

Total dissolved solids (TDS) were slightly elevated above the aesthetic objective of 500 mg/l, about 515 to 522 mg/l. The Ryznar Stability Index (RSI) and Langelier Saturation Index (LSI) were calculated for both water samples. The RSI values for the water samples were 6.66 and 6.60 for the three and six hour samples, respectively. The LSI values for the water samples were 0.48 and 0.51 for the three and six hour samples, respectively. RSI values less than 6 indicate that the scale potential increases and values greater than 7 indicate that a calcium carbonate formation does not lead to a protective corrosion inhibiting film. In this case, the water is mildly scale forming and not corrosive. Positive values for LSI indicate that scale can form and calcium carbonate precipitation may occur, while values close to zero indicate borderline scale potential. In this case, the LSI values are positive, indicating borderline scale potential. Combined with the RSI values, it is likely that the water is slightly scale forming and not corrosive potential. According to the Support Document for the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG), the palatability of

drinking water with a TDS level less than 500 mg/l is generally considered to be good. The effect of elevated TDS levels on drinking water depends on the individual components, which are principally chlorides, sulphates, calcium, magnesium and bicarbonates. Depending on which parameters are elevated, TDS exceedances can include hardness, taste, mineral deposition or corrosion. In this case, the water samples had high hardness and calcium and magnesium are high. Sodium and chloride are both within the aesthetic objectives and are unlikely to significantly affect the taste of the water. Hardness generally increases the mineral deposition. However, in this case, the water is indicated to be only slightly scale forming. Based on the above noted information, it is considered that treatment to reduce hardness will reduce the potential for scale forming as it affects TDS.

F. Antimony

Antimony was measured at levels of 0.0015 and 0.0064 mg/L after three and six hours, respectively, compared to the maximum acceptable concentration of 0.006 mg/L. The noted antimony level is only marginally above the allowable limit, which was set to prevent long term chronic exposure. The standard is set to protect against increased blood cholesterol and decreased blood glucose, as well as prevention of nausea, vomiting and diarrhea upon short-term exposure. Antimony can cause nausea, vomiting and diarrhea when present at very high concentrations (>30 mg/L). The risk to human health is through ingestion only (drinking, cooking, teeth brushing). In water, antimony has no taste, smell, or colour. It can only be detected through a chemical test. On November 2, 2023, the well was sampled for antimony to confirm the previous results. The well was flushed for a period of time (~1-2 hours) until the field turbidity was recorded to be less than 5 NTU. Final turbidity reading was ~2 NTU. At that time, a water sample was obtained and field filtered using a 0.45 micron filter, then stored in a laboratory supplied bottle with the appropriate preservative and submitted for laboratory testing. The results of the additional testing indicate that the test well antimony level is <0.0005 mg/L. A neighbouring well that services a developed property at 144 Wescar Lane was also sampled on Nov 3, 2023 and Dec 21, 2023 with corresponding antimony levels of 0.0049 mg/L and <0.0005 mg/L, which is within the allowable limit of 0.006 mg/L. The initial water sample at 144 Wescar Lane was not field filtered, the second sample on Dec 21, 2023 was field filtered.

Based on the recent testing, the well water does not have antimony present above allowable limits. One area well has antimony present within allowable limits. It is noted that antimony could be present from plumbing materials within antimony-containing plumbing materials, rather than from the water supply.

The Provincial Groundwater Monitoring Network (PGMN) was consulted and there are no wells that are close to the site. The closest well that is in a bedrock formation is about 8 km to the south with antimony reported to be well within the limits.

Based on what is known about the wells in the area, it is unlikely that antimony is sourced in the groundwater as the recent result indicates that antimony was not present in dissolved form in either the test well (151-159 Wescar Lane) or the neighbouring well (144 Wescar Lane). It is more likely that antimony was due to suspended particles in the water rather than from the aquifer. Antimony is unlikely to be naturally present in groundwater at levels that are above the drinking water standards.

G. Nitrites and Nitrates

Nitrite and Nitrate were measured in the test well during the pumping test at 3 and 6 hours, both indicate levels of <0.1 mg/L. Additionally, ammonia and total kjeldahl nitrogen were measured at 0.127 and between 0.301 and 0.405 mg/L. Based on the lab results, the background levels of nitrates can be considered to be 0 mg/L.

2.0 TERRAIN STUDY

Soils information was obtained from geotechnical boreholes put down at the subject site. The field work for this investigation was carried out on May 29 and 30, 2023, at which time eleven boreholes were put down at the site, identified as BH1 to BH11. Five boreholes encountered about 1.0 to 1.5 metres of fill, consisting of sand, gravel and trace organics, overlying grey silt over silty and/or fine to medium sand followed by glacial till to depths of 6.3 to 8.3 metres. Six boreholes were drilled to 1.5 metres depth and encountered fill overlying silt. Where encountered, water was observed at about 1.3 to 3.8 metres below the ground surface.

2.1 GROUNDWATER IMPACT ASSESSMENT

The background conditions in the onsite water well include testing of nitrite, nitrate, Total Kjeldahl Nitrogen (TKN) and ammonia. Nitrates and nitrites were <0.1 mg/L for the 3 and 6 hour water samples. Additionally, ammonia and Total Kjeldahl Nitrogen (TKN) were measured at 0.127 and between 0.301 and 0.405 mg/L. Based on the lab results, the background nitrate levels can be considered to be <0.1 mg/L and total nitrogen is less than 1 mg/L, indicating there is no current impact from nitrogen on the water supply well at the site.

The MOE D-5-4 Predictive Assessment for commercial/industrial development is designed to determine minimum lot size and maximum allowable flows. The City of Ottawa developed additional guidance on the application of the MECP D-5-4 Guidelines in a memo dated September 27, 2016, entitled *Carp Road Corridor – Nitrate Impact Assessment Recommendations.* The City of Ottawa confirmed in the Phase 3 Pre-consultation: Review Feedback (PC2023-0247, page 9) for this application that the septic impact assessment was eligible for the modified approach outlined in the above noted memo for the Carp Road Corridor.

> *4)* ***The maximum allowable flow for each lot /block would be determined by the proponent as that which corresponds to a maximum number of users*** *(rather than 1,000 L/day, as per Section 5.6.2 and rather than a calculated number based on Section 5.6.3).*

The City of Ottawa has modified the predictive assessment in Section (4) (a) where the nitrate assessment using maximum allowable flow for each block/lot is determined through the maximum number of users where the OSSO indicates that the use of 75 L/day per employee is suitable.

As such, the predictive flow can be based on the maximum number of employees as follows. The proposed industrial development is anticipated to have a total of 60 employees once the two phases are constructed. The predicted sewage flow can be calculated as:

60 employees x 75 L/day = 4,500 L

Additionally, the City memo in Section (5) (a-d) indicates that the consideration of nitrogen reduction technology that is certified by a third party (CAN/BQN 3680-600 or NSF 245) allows the nitrate attenuation assessment to be predicted based on the (modified) minimum concentration of nitrate, for systems that reduce nitrate (as nitrogen) by a minimum of 50%.

So, to establish the sewage flow using the calculation in Section 5.6.3, the following calculations are provided (Attachment D).

Other infiltration factors that were used in the above noted calculations are provided below.

Infiltration is based on moisture surplus and incorporates factors including soils, topography, soil cover and impervious areas (infiltration reduction factors). For this calculation, the background nitrate was assumed to be 0.0 mg/L, as there is currently no development at the site.

The following provides the basis whereby the infiltration reduction factors for the site were chosen for the dilution calculations.

Topographic, soil and land cover infiltration factors were selected from *Table 2* of the MOE *Hydrological Technical Information Requirements for Land Development Applications*. The following is a discussion of each of the infiltration reduction factors chosen for the site.

The site is characterized by flat terrain, based on a topographical survey of the site and the post-development conditions indicate that slope is generally less than 6 percent. The topography factor that applies to the site is 0.30.

The type of land cover observed at the site at the time of site visits and by use of satellite imagery consists mostly of cultivated lands, with some mature trees on the southwest portion of the site. The land cover infiltration factor of 0.10 was selected, which corresponds to cultivated land.

A soil infiltration factor of 0.20 was chosen as the site is indicated to be underlain by silt and silty sand soils, which consist of the soils range from coarse (greater than 50% sand content) to fine textured silt (less than 50% coarse textured). The soil infiltration value that was used corresponds to combinations of clay and loam (glacial till), based on the expected med to low permeability of the soils encountered across the site.

In order to determine water surplus estimates for the site area, Environment Canada published values for Ottawa obtained for the years 1993 to 2003 was used. The expected moisture surplus or net potential infiltration for the site area was estimated 328 millimetres, for the sand to silt type soils that are expected for the site.

Hard Surfaced Area post-development was calculated as follows. The areas of the roofs of the buildings at the site occupy an area of some 3,566 square metres and are not available for infiltration. The parking area consists of asphaltic concrete surfaced areas (hard surfaces) of about 31,137 square metres. For asphalt, the runoff coefficient is 0.9. The gravel surfaced area occupies some 0 square metres with a corresponding runoff coefficient of 0.6. The Net Infiltration Area for the site was calculated as 14,677.7 square metres, which excludes all the expected hard surfaced areas.

The sewage system that is proposed for the development is an EcoFLO tertiary treatment system that is expected to reduce nitrates to 20 mg/L (50% denitrification).

The nitrate impact calculation, using a predicted actual sewage flow of 4,500 L/day indicates that the expected concentration of nitrate at the down gradient property boundary is some 8.4 mg/L, which is within the predicted impact of 10 mg/L. This level of sewage impact is based on a tertiary effluent quality of 20 mg/L $N\text{-}NO_3$. The maximum number of users, based on the long term impact being within 10 mg/L, would allow for a maximum number of employees of 83, which would result in

a combined impact of 9.99 mg/L N-NO_3. The resulting sewage dilution calculations for the actual number of employees (60) and the maximum number of employees (83) are provided in Attachment D.

Based on the above noted information, the expected impact at the down gradient property boundary of the site is expected to be within the allowable limits established by MECP, incorporating the sewage design considerations as discussed in the following section.

2.2 SEWAGE DESIGN CONSIDERATIONS

The sewage design for the site is shown on the D.B. Gray Engineering Drawing No. C-5 (rev. Feb.7, 2025) provided under separate cover as part of a Development Application with the City of Ottawa. The sewage design consists of the following: ECOFLO system with recirculation that provides denitrification.

The sewage design for the site must consist of a tertiary system capable of achieving at least 50% nitrogen removal through denitrification. The Ecoflo Coco Filter ECDn model with recirculation has been certified by a third party (such as CAN/BQN 3680-600 or NSF 245) to achieve a minimum of 50% reduction in nitrogen. The proposed sewage bed is located in the west portion of the site.

It is the responsibility of the owner to ensure that the certified denitrification sewage system is maintained indefinitely as is required by the City of Ottawa and the Ottawa Septic System Office (OSSO) and stipulated in the Carp Road Corridor Study memo as follows:

- A maintenance contract is required between the owner and a maintenance provider with the OSSO maintaining enforcement of these contracts; and
- Owner to contact OSSO regarding additional fees for monitoring and reporting requirements of the treatment system; and
- The City should include draft plan conditions that require the commendations of the nitrate attenuation assessment in the subdivision agreement such that future site plan control applications would also require nitrate reduction systems. In this case, as it is for SPC, this may involve the registering on title that the sewage system servicing of this property requires certified nitrate reduction systems (CAN/BQN 3680-600 or NSF 245).

3.0 WELLHEAD PROTECTION

During construction of the future building, the following is required to protect the integrity of the well casing:

- The well is shown to be within about 5 to 7 metres from the proposed building; and

- Well location shall be carefully marked to prevent any damage to the well casing. This could include the placement of temporary field stone/bollards and/or traffic cones; and

- During construction activities, wellhead protection measures should be in place to protect the annulus around the wellhead. This means that the excavation for the building shall be banked upwards to the well location to limit soil disturbance near the well. As the well casing is grouted to a depth of 12.5 metres, there is sufficient wellhead protection in place such that soil disturbance in the upper soils will not affect the sealing of the wellhead. Any disturbance of soils near the well must be immediately repaired and grading around the well should be regarded to ensure drainage away from the well.

After building construction, the grading around the wellhead shall be carried out as follows to comply with well siting requirements and be in accordance with the Ontario Regulation 903:

- The well casing must extend to greater than 400 millimetres above final finished grades around the well; and
- The ground surface shall be graded such that the well is the highest point on the ground surface within 3 metres radially from the exterior of the well casing and shall ensure that water does not collect or pond near the well head.

The supply well is located within the east portion of the site, close to the entrance while the location of the proposed septic system is within the west portion of the site, and is greater than 20 metres from the well location.

The well has been grouted and cased to a depth of about 12.5 metres below the existing ground surface, according to information provided on the well record (Attachment A). The well is physically separated from the driveway and parking lot by the building location. It is recommended that bollards or field stone are placed near the wellhead facing the parking lot to ensure well is physically protected from the access roadway. With these measures in place, it is considered that an adequate amount of wellhead protection is going to be in place to protect the water supply for the proposed light industrial use of the property. The well location is also appropriate for access in case of repairs and well maintenance.

Recommendations for wellhead protection include ensuring that potential contaminant sources are at least 15 metres or more from the well. Possible contaminant sources include; chemical storage, garage and related chemicals, such as antifreeze, gasoline, oils, vehicle/boat/equipment storage, sewer lines, septic systems, animal enclosures, manure or compost piles. If liquid chemicals, such as antifreeze, oil and gasoline/diesel, and their waste products, are to be stored at the site, they should be stored in containers approved for that purpose. The container(s) should be labelled with their contents. Secondary containment should be installed around all bulk liquid chemical or waste storage containers, to collect and contain leaks and spills from the tank and all connections. The sewage system and stormwater management areas must be greater than 15 metres from the well location.

Recommendations for well maintenance include; inspect wellhead annually to ensure that the casing is structurally sound, verify well cap is sealed and that surface water is not pooling around wellhead. The well is located such that it is easily accessible for maintenance/repairs. A lock on the well cap is useful to prevent vandalism.

Based on the results of this evaluation it is considered that the well in question should supply water of adequate quantity and quality for the proposed development with suitable treatment and wellhead protection as indicated above.

We trust this letter provides sufficient information for your purposes. If you have any questions concerning this letter, please do not hesitate to contact our office.

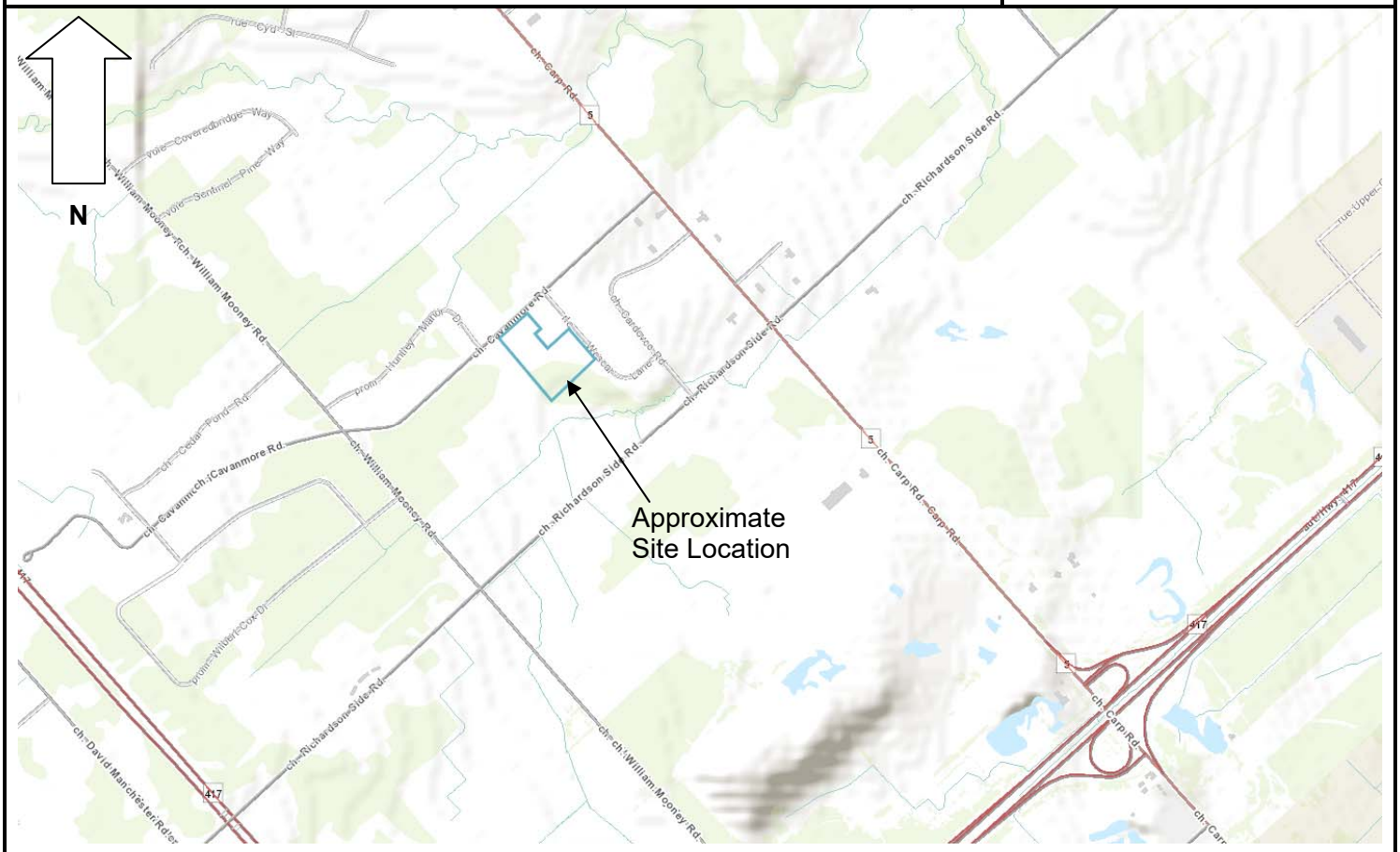
Yours truly,
Kollaard Associates Inc.

Colleen Vermeersch, P. Eng.

Attachments:

	Figure 1	- Key Plan
	Table I	- Field Water Quality
	Attachment A	- Well Record and Certificate of Well Compliance
	Attachment B	- Pumping Test Data
	Attachment C	- Well Water Laboratory Test Results and LSI/RSI
	Attachment D	- Nitrate Dilution Calculations and Climate Data for infiltration
	Attachment E	-Site Servicing Plan (DB Gray Engineering)
	Attachment F	- Ottawa Public Health Manganese Fact Sheet

KEY PLAN	FIGURE 1



NOT TO SCALE

Kollaard Associates
Engineers

Project No. 230403

Date August 2023

TABLE I

FIELD WATER QUALITY MEASUREMENTS
FOR TEST WELL 1

Time Since Pumping Test Started (min)	**Temperature** (^{0}C)	**pH**	**Turbidity** (NTU)	**Total Dissolved Solids** (ppm)	**Conductivity** (µS)	***Free Chlorine** (ppm)
60	12.9	7.82	14.4	382	753	0.0 +/- 0.03
120	13.2	7.66	13.2	375	742	-
180	12.9	7.62	5.67	371	749	0.0 +/- 0.03
240	13.0	7.66	5.31	370	731	-
300	13.0	7.56	4.79	380	751	-
360	13.1	7.64	4.23	375	746	0.0 +/- 0.03

*tolerance within 3%

ATTACHMENT A

MOE WELL RECORD FOR TW1
PROVIDED BY WELL DRILLER

Certificate of Well Compliance

TROY SAUNDERS DO HEREBY CERTIFY that I am licensed to drill wells in the Province of Ontario, and that I have supervised the drilling of a well on the property of SUNBELT RENTALS (name of landowner), located at 151 WESCAR LANE (Legal description, Lot/Plan No.) in the City of Ottawa (Geographic Township of OTTAWA).

Lot 6 , Concession 3 , Plan # _____ , S/L# _____

WE CERTIFY FURTHER that we are aware of the well drilling requirements, the guidelines, recommendations and regulations of the Ministry of the Environment governing well installations in the Province of Ontario, and the standards specified in any subdivision agreement and hydrogeological report applicable to the site and City Standards.

AND WE DO HEREBY CERTIFY THAT the said well has been drilled, cased, and grouted (cement or bentonite) as applicable and constructed in strict conformity with the standards required.

Signed this 25th day of JULY /23

Troy Saunders / SAUNDERS WELL DRILLING LTD

Well Driller/Company

The Engineer on behalf of the landowner set out above Certifies that he/she has inspected the well and it was constructed in accordance with the specifications in O.Reg.903, this report and the Hydrogeological Report with regards to casing length and grouting requirements.

Signed this 26th day of July, 2023

Engineer

Kollaard Associates
Engineers
P.O. Box 189
210 Prescott Street, Unit 1
Kemptville, Ontario K0G 1J0

Ontario — Ministry of the Environment, Conservation and Parks

Well Tag No. (Place Sticker and/or Print Below): A366326

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	SUNBELT RENTALS OF CANADA INC.		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2489 SHEFFIELD RD	OTTAWA	ONT.	K1T0A3	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
151 WESCAR LANE	OTTAWA	6	3

County/District/Municipality	City/Town/Village	Province	Postal Code
OTTAWA	OTTAWA	Ontario	K0A1L0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	423131	5015885		

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	GREY CLAY, SILT & STONES		0	8
GREY	SAND	LAYERS GREY CLAY & STONES		8	34½
GREY	CLAY	SAND, STONES	PACKED TILL	34½	38
GREY	LIMESTONE			38	160

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	31	BENTONITE GROUT	10.53 ft^3
31	41	NEAT CEMENT	3.51 ft^3

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
6¼	STEEL	.188	0 + 2½	41
6 1/16	OPEN HOLE		41	160

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water	Hole Diameter Depth From	To	Diameter (cm/in)
60-120	☐	☐ Fresh ☒ Untested ☐ Other, specify HYDROFRACKED	0	41	9⅜
100-160	☐	☐ Fresh ☒ Untested ☐ Other, specify HYDROFRACKED	41	160	6 1/16
	☐	☐ Fresh ☐ Untested ☐ Other, specify			

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft): 150

Pumping rate (l/min / GPM): 8

Duration of pumping: 2 hrs + 0 min

Final water level end of pumping (m/ft): 18.45

If flowing give rate (l/min/GPM)

Recommended pump depth (m/ft): 150

Recommended pump rate (l/min/GPM): 10

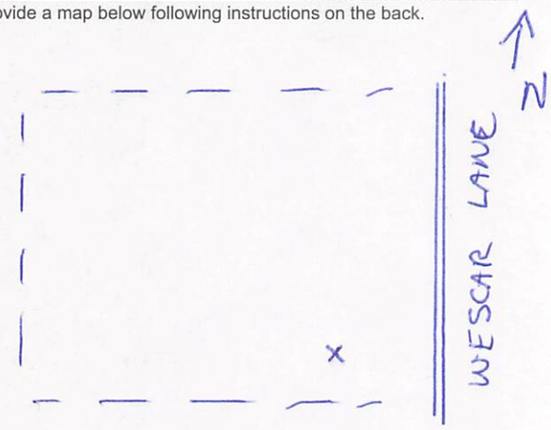
Well production (l/min/GPM)

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	6.60		
1	12.60	1	11.60
2	15.20	2	9.90
3	17.20	3	9.05
4	18.20	4	8.5
5	18.60	5	8.15
10	17.45	10	7.35
15	17.30	15	7.10
20	17.40	20	6.90
25	17.45	25	6.85
30	17.50	30	6.80
40	17.65	40	6.75
50	17.80	50	6.70
60	17.70	60	6.60

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
SAUNDERS WELL DRILLING LTD	4879

Business Address (Street Number/Name)	Municipality
1680 SCHEEL DR.	BRAESIDE

Province	Postal Code	Business E-mail Address
ONT.	K0A1G0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
613 229 8716	SAUNDERS TROY

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
T5117	Troy Saunders	2023 08 10

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☒ Yes ☐ No	2023 07 11	Audit No. Z399159
	Date Work Completed: 2023 07 11	Received

Ministry's Copy

ATTACHMENT B

PUMPING TEST DATA FOR TW1

Kollaard File 230403 Pump Rate 38 litres/minute

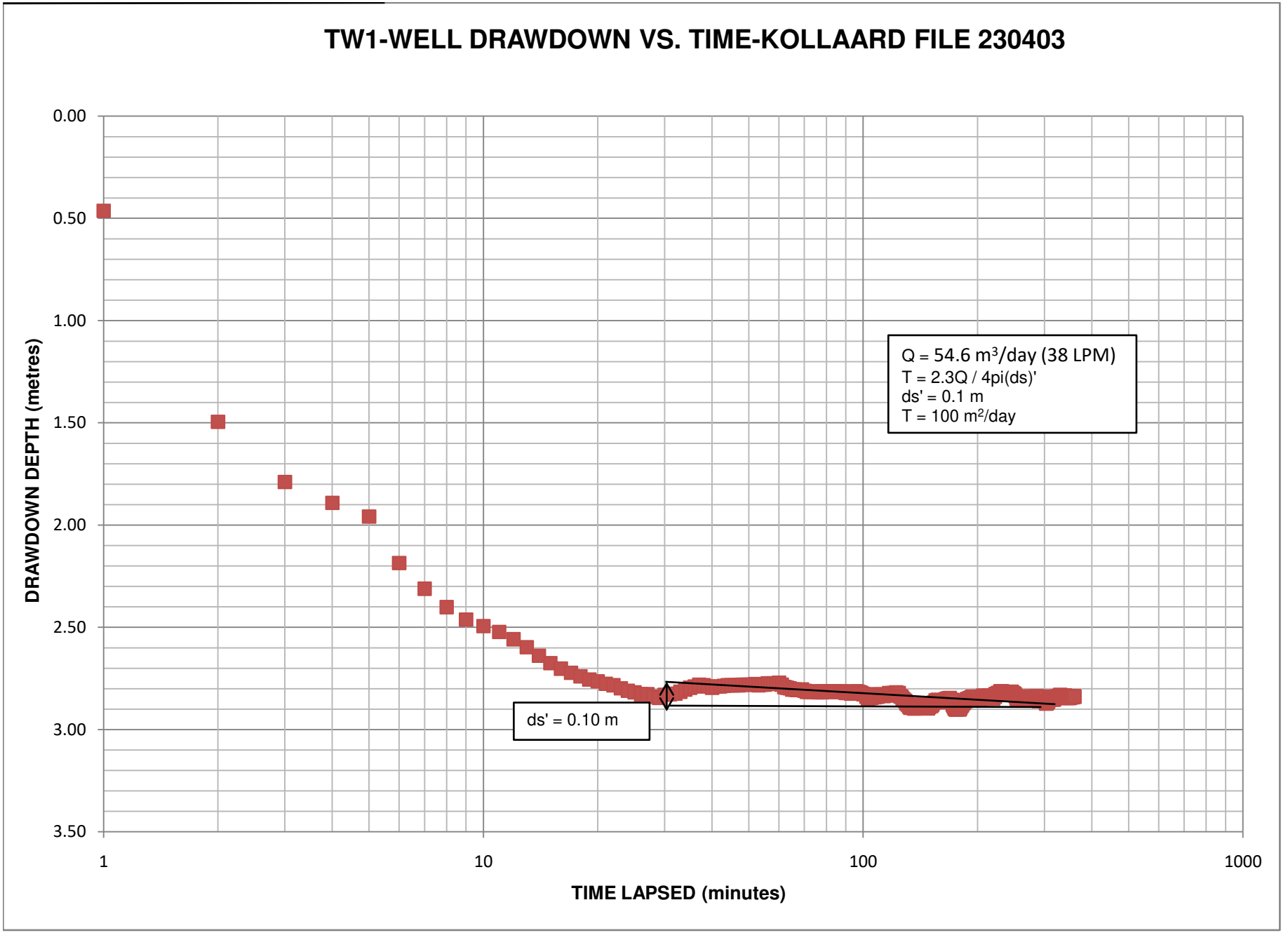
DRAWDOWN DATA TW1

Time Lapsed (minutes)	Abs Pres (kPa)	Temp (°C)	Water Level (m)	Drawdown (m)
0	414.732	10.063	-2.5	0.00
1	410.194	9.768	-2.963	0.46
2	400.069	9.472	-3.995	1.50
3	397.186	9.275	-4.289	1.79
4	396.184	9.176	-4.391	1.89
5	395.533	9.077	-4.458	1.96
6	393.303	8.978	-4.685	2.19
7	392.068	8.879	-4.811	2.31
8	391.184	8.779	-4.901	2.40
9	390.592	8.68	-4.962	2.46
10	390.27	8.68	-4.994	2.49
11	390	8.581	-5.022	2.52
12	389.649	8.581	-5.058	2.56
13	389.269	8.581	-5.097	2.60
14	388.853	8.481	-5.139	2.64
15	388.502	8.481	-5.175	2.68
16	388.239	8.481	-5.202	2.70
17	388.035	8.481	-5.222	2.72
18	387.86	8.481	-5.24	2.74
19	387.713	8.481	-5.255	2.76
20	387.626	8.481	-5.264	2.76
21	387.509	8.481	-5.276	2.78
22	387.443	8.382	-5.283	2.78
23	387.297	8.382	-5.298	2.80
24	387.18	8.382	-5.31	2.81
25	387.093	8.382	-5.318	2.82
26	387.005	8.382	-5.327	2.83
27	387.005	8.382	-5.327	2.83
28	386.888	8.382	-5.339	2.84
29	386.83	8.382	-5.345	2.85
30	386.976	8.382	-5.33	2.83
31	387.005	8.382	-5.327	2.83
32	387.034	8.382	-5.324	2.82
33	387.122	8.382	-5.315	2.82
34	387.239	8.382	-5.304	2.80
35	387.326	8.382	-5.295	2.80
36	387.385	8.382	-5.289	2.79
37	387.472	8.382	-5.28	2.78
38	387.443	8.382	-5.283	2.78
39	387.385	8.382	-5.289	2.79
40	387.326	8.382	-5.295	2.80
41	387.385	8.382	-5.289	2.79
42	387.385	8.382	-5.289	2.79
43	387.414	8.382	-5.286	2.79
44	387.443	8.382	-5.283	2.78
45	387.443	8.382	-5.283	2.78
46	387.443	8.382	-5.283	2.78
47	387.443	8.382	-5.283	2.78
48	387.472	8.382	-5.28	2.78
49	387.472	8.382	-5.28	2.78
50	387.472	8.382	-5.28	2.78
51	387.472	8.382	-5.28	2.78
52	387.502	8.382	-5.277	2.78
53	387.443	8.382	-5.283	2.78
54	387.472	8.382	-5.28	2.78
55	387.472	8.382	-5.28	2.78
56	387.531	8.382	-5.274	2.77
57	387.531	8.382	-5.274	2.77
58	387.531	8.382	-5.274	2.77
59	387.502	8.382	-5.277	2.78
60	387.56	8.382	-5.271	2.77
61	387.472	8.382	-5.28	2.78
62	387.355	8.382	-5.292	2.79
63	387.326	8.382	-5.295	2.80
64	387.297	8.382	-5.298	2.80
65	387.239	8.382	-5.304	2.80
66	387.239	8.382	-5.304	2.80
67	387.209	8.382	-5.307	2.81
68	387.209	8.382	-5.307	2.81
69	387.239	8.382	-5.304	2.80
70	387.18	8.382	-5.31	2.81
71	387.122	8.382	-5.315	2.82
72	387.122	8.382	-5.315	2.82
73	387.122	8.382	-5.315	2.82
74	387.122	8.382	-5.315	2.82
75	387.151	8.382	-5.312	2.81
76	387.093	8.382	-5.318	2.82
77	387.122	8.382	-5.315	2.82
78	387.093	8.382	-5.318	2.82
79	387.122	8.382	-5.315	2.82
80	387.151	8.382	-5.312	2.81
81	387.122	8.382	-5.315	2.82
82	387.151	8.382	-5.312	2.81
83	387.151	8.382	-5.312	2.81
84	387.151	8.382	-5.312	2.81
85	387.122	8.382	-5.315	2.82
86	387.122	8.382	-5.315	2.82

87	387.122	8.382	-5.315	2.82
88	387.151	8.382	-5.312	2.81
89	387.093	8.382	-5.318	2.82
90	387.063	8.382	-5.321	2.82
91	387.063	8.382	-5.321	2.82
92	387.122	8.382	-5.315	2.82
93	387.034	8.382	-5.324	2.82
94	387.093	8.382	-5.318	2.82
95	387.122	8.382	-5.315	2.82
96	387.151	8.382	-5.312	2.81
97	387.122	8.382	-5.315	2.82
98	387.093	8.382	-5.318	2.82
99	387.063	8.382	-5.321	2.82
100	387.005	8.382	-5.327	2.83
101	387.005	8.382	-5.327	2.83
102	386.888	8.382	-5.339	2.84
103	386.801	8.382	-5.348	2.85
104	386.83	8.382	-5.345	2.85
105	386.83	8.382	-5.345	2.85
106	386.888	8.382	-5.339	2.84
107	386.859	8.382	-5.342	2.84
108	386.976	8.382	-5.33	2.83
109	386.888	8.382	-5.339	2.84
110	387.005	8.382	-5.327	2.83
111	386.976	8.382	-5.33	2.83
112	386.947	8.382	-5.333	2.83
113	386.917	8.382	-5.336	2.84
114	386.947	8.382	-5.333	2.83
115	386.947	8.382	-5.333	2.83
116	386.976	8.382	-5.33	2.83
117	387.063	8.382	-5.321	2.82
118	387.034	8.382	-5.324	2.82
119	387.034	8.382	-5.324	2.82
120	387.063	8.382	-5.321	2.82
121	387.034	8.382	-5.324	2.82
122	387.093	8.382	-5.318	2.82
123	387.063	8.382	-5.321	2.82
124	387.063	8.382	-5.321	2.82
125	386.917	8.382	-5.336	2.84
126	386.888	8.382	-5.339	2.84
127	386.801	8.382	-5.348	2.85
128	386.742	8.382	-5.354	2.85
129	386.684	8.382	-5.36	2.86
130	386.567	8.382	-5.372	2.87
131	386.508	8.382	-5.378	2.88
132	386.421	8.382	-5.387	2.89
133	386.362	8.382	-5.393	2.89
134	386.421	8.382	-5.387	2.89
135	386.392	8.382	-5.39	2.89
136	386.333	8.382	-5.396	2.90
137	386.333	8.382	-5.396	2.90
138	386.392	8.382	-5.39	2.89
139	386.45	8.382	-5.384	2.88
140	386.421	8.382	-5.387	2.89
141	386.508	8.382	-5.378	2.88
142	386.508	8.382	-5.378	2.88
143	386.508	8.382	-5.378	2.88
144	386.479	8.382	-5.381	2.88
145	386.45	8.382	-5.384	2.88
146	386.421	8.382	-5.387	2.89
147	386.362	8.382	-5.393	2.89
148	386.333	8.382	-5.396	2.90
149	386.392	8.382	-5.39	2.89
150	386.45	8.382	-5.384	2.88
151	386.45	8.382	-5.384	2.88
152	386.508	8.382	-5.378	2.88
153	386.596	8.382	-5.369	2.87
154	386.625	8.382	-5.366	2.87
155	386.713	8.382	-5.357	2.86
156	386.713	8.382	-5.357	2.86
157	386.742	8.382	-5.354	2.85
158	386.713	8.382	-5.357	2.86
159	386.654	8.382	-5.363	2.86
160	386.625	8.382	-5.366	2.87
161	386.625	8.382	-5.366	2.87
162	386.654	8.382	-5.363	2.86
163	386.684	8.382	-5.36	2.86
164	386.713	8.382	-5.357	2.86
165	386.771	8.382	-5.351	2.85
166	386.771	8.382	-5.351	2.85
167	386.801	8.382	-5.348	2.85
168	386.801	8.382	-5.348	2.85
169	386.83	8.382	-5.345	2.85
170	386.742	8.382	-5.354	2.85
171	386.742	8.382	-5.354	2.85
172	386.508	8.382	-5.378	2.88
173	386.421	8.382	-5.387	2.89
174	386.333	8.382	-5.396	2.90
175	386.275	8.382	-5.402	2.90
176	386.275	8.382	-5.402	2.90
177	386.304	8.382	-5.399	2.90
178	386.304	8.382	-5.399	2.90
179	386.275	8.382	-5.402	2.90

180	386.333	8.382	-5.396	2.90
181	386.421	8.382	-5.387	2.89
182	386.479	8.382	-5.381	2.88
183	386.567	8.382	-5.372	2.87
184	386.596	8.382	-5.369	2.87
185	386.713	8.382	-5.357	2.86
186	386.684	8.382	-5.36	2.86
187	386.742	8.382	-5.354	2.85
188	386.771	8.382	-5.351	2.85
189	386.771	8.382	-5.351	2.85
190	386.801	8.382	-5.348	2.85
191	386.83	8.382	-5.345	2.85
192	386.83	8.382	-5.345	2.85
193	386.859	8.382	-5.342	2.84
194	386.888	8.382	-5.339	2.84
195	386.859	8.382	-5.342	2.84
196	386.859	8.382	-5.342	2.84
197	386.83	8.382	-5.345	2.85
198	386.801	8.382	-5.348	2.85
199	386.888	8.382	-5.339	2.84
200	386.771	8.382	-5.351	2.85
201	386.713	8.382	-5.357	2.86
202	386.742	8.382	-5.354	2.85
203	386.771	8.382	-5.351	2.85
204	386.801	8.382	-5.348	2.85
205	386.83	8.382	-5.345	2.85
206	386.83	8.382	-5.345	2.85
207	386.947	8.382	-5.333	2.83
208	386.83	8.382	-5.345	2.85
209	386.801	8.382	-5.348	2.85
210	386.83	8.382	-5.345	2.85
211	386.888	8.382	-5.339	2.84
212	386.801	8.382	-5.348	2.85
213	386.917	8.382	-5.336	2.84
214	386.947	8.382	-5.333	2.83
215	386.888	8.382	-5.339	2.84
216	386.947	8.382	-5.333	2.83
217	386.859	8.382	-5.342	2.84
218	386.83	8.382	-5.345	2.85
219	386.888	8.382	-5.339	2.84
220	386.801	8.382	-5.348	2.85
221	386.947	8.382	-5.333	2.83
222	386.888	8.382	-5.339	2.84
223	387.005	8.382	-5.327	2.83
224	387.005	8.382	-5.327	2.83
225	387.005	8.382	-5.327	2.83
226	387.063	8.382	-5.321	2.82
227	387.005	8.382	-5.327	2.83
228	387.034	8.382	-5.324	2.82
229	387.093	8.382	-5.318	2.82
230	387.151	8.382	-5.312	2.81
231	387.093	8.382	-5.318	2.82
232	387.151	8.382	-5.312	2.81
233	387.034	8.382	-5.324	2.82
234	387.093	8.382	-5.318	2.82
235	387.093	8.382	-5.318	2.82
236	387.093	8.382	-5.318	2.82
237	387.063	8.382	-5.321	2.82
238	387.093	8.382	-5.318	2.82
239	387.034	8.382	-5.324	2.82
240	387.063	8.382	-5.321	2.82
241	387.093	8.382	-5.318	2.82
242	387.034	8.382	-5.324	2.82
243	387.063	8.382	-5.321	2.82
244	387.005	8.382	-5.327	2.83
245	387.034	8.382	-5.324	2.82
246	387.122	8.382	-5.315	2.82
247	387.063	8.382	-5.321	2.82
248	387.063	8.382	-5.321	2.82
249	387.034	8.382	-5.324	2.82
250	387.034	8.382	-5.324	2.82
251	386.976	8.382	-5.33	2.83
252	386.917	8.382	-5.336	2.84
253	386.83	8.382	-5.345	2.85
254	386.771	8.382	-5.351	2.85
255	386.742	8.382	-5.354	2.85
256	386.713	8.382	-5.357	2.86
257	386.713	8.382	-5.357	2.86
258	386.713	8.382	-5.357	2.86
259	386.742	8.382	-5.354	2.85
260	386.771	8.382	-5.351	2.85
261	386.771	8.382	-5.351	2.85
262	386.801	8.382	-5.348	2.85
263	386.771	8.382	-5.351	2.85
264	386.801	8.382	-5.348	2.85
265	386.859	8.382	-5.342	2.84
266	386.888	8.382	-5.339	2.84
267	386.888	8.382	-5.339	2.84
268	386.888	8.382	-5.339	2.84
269	386.888	8.382	-5.339	2.84
270	386.83	8.382	-5.345	2.85
271	386.771	8.382	-5.351	2.85
272	386.742	8.382	-5.354	2.85

273	386.742	8.382	-5.354	2.85
274	386.801	8.382	-5.348	2.85
275	386.83	8.382	-5.345	2.85
276	386.859	8.382	-5.342	2.84
277	386.888	8.382	-5.339	2.84
278	386.83	8.382	-5.345	2.85
279	386.859	8.382	-5.342	2.84
280	386.859	8.382	-5.342	2.84
281	386.83	8.382	-5.345	2.85
282	386.859	8.382	-5.342	2.84
283	386.888	8.382	-5.339	2.84
284	386.888	8.382	-5.339	2.84
285	386.859	8.382	-5.342	2.84
286	386.888	8.382	-5.339	2.84
287	386.917	8.382	-5.336	2.84
288	386.801	8.382	-5.348	2.85
289	386.83	8.382	-5.345	2.85
290	386.684	8.382	-5.36	2.86
291	386.713	8.382	-5.357	2.86
292	386.771	8.382	-5.351	2.85
293	386.83	8.382	-5.345	2.85
294	386.771	8.382	-5.351	2.85
295	386.859	8.382	-5.342	2.84
296	386.859	8.382	-5.342	2.84
297	386.859	8.382	-5.342	2.84
298	386.888	8.382	-5.339	2.84
299	386.859	8.382	-5.342	2.84
300	386.888	8.382	-5.339	2.84
301	386.859	8.382	-5.342	2.84
302	386.654	8.382	-5.363	2.86
303	386.567	8.382	-5.372	2.87
304	386.567	8.382	-5.372	2.87
305	386.625	8.382	-5.366	2.87
306	386.625	8.382	-5.366	2.87
307	386.684	8.382	-5.36	2.86
308	386.742	8.382	-5.354	2.85
309	386.742	8.382	-5.354	2.85
310	386.83	8.382	-5.345	2.85
311	386.771	8.382	-5.351	2.85
312	386.859	8.382	-5.342	2.84
313	386.771	8.382	-5.351	2.85
314	386.771	8.382	-5.351	2.85
315	386.771	8.382	-5.351	2.85
316	386.771	8.382	-5.351	2.85
317	386.742	8.382	-5.354	2.85
318	386.771	8.382	-5.351	2.85
319	386.801	8.382	-5.348	2.85
320	386.859	8.382	-5.342	2.84
321	386.859	8.382	-5.342	2.84
322	386.83	8.382	-5.345	2.85
323	386.888	8.382	-5.339	2.84
324	386.859	8.382	-5.342	2.84
325	386.917	8.382	-5.336	2.84
326	386.859	8.382	-5.342	2.84
327	386.888	8.382	-5.339	2.84
328	386.917	8.382	-5.336	2.84
329	386.917	8.382	-5.336	2.84
330	386.976	8.382	-5.33	2.83
331	386.947	8.382	-5.333	2.83
332	386.917	8.382	-5.336	2.84
333	386.947	8.382	-5.333	2.83
334	386.888	8.382	-5.339	2.84
335	386.888	8.382	-5.339	2.84
336	386.888	8.382	-5.339	2.84
337	386.83	8.382	-5.345	2.85
338	386.888	8.382	-5.339	2.84
339	386.947	8.382	-5.333	2.83
340	386.947	8.382	-5.333	2.83
341	386.917	8.382	-5.336	2.84
342	386.859	8.382	-5.342	2.84
343	386.859	8.382	-5.342	2.84
344	386.917	8.382	-5.336	2.84
345	386.83	8.382	-5.345	2.85
346	386.83	8.382	-5.345	2.85
347	386.859	8.382	-5.342	2.84
348	386.83	8.382	-5.345	2.85
349	386.83	8.382	-5.345	2.85
350	386.83	8.382	-5.345	2.85
351	386.859	8.382	-5.342	2.84
352	386.859	8.382	-5.342	2.84
353	386.859	8.382	-5.342	2.84
354	386.888	8.382	-5.339	2.84
355	386.888	8.382	-5.339	2.84
356	386.859	8.382	-5.342	2.84
357	386.888	8.382	-5.339	2.84
358	386.888	8.382	-5.339	2.84
359	386.917	8.382	-5.336	2.84
360	386.888	8.382	-5.339	2.84

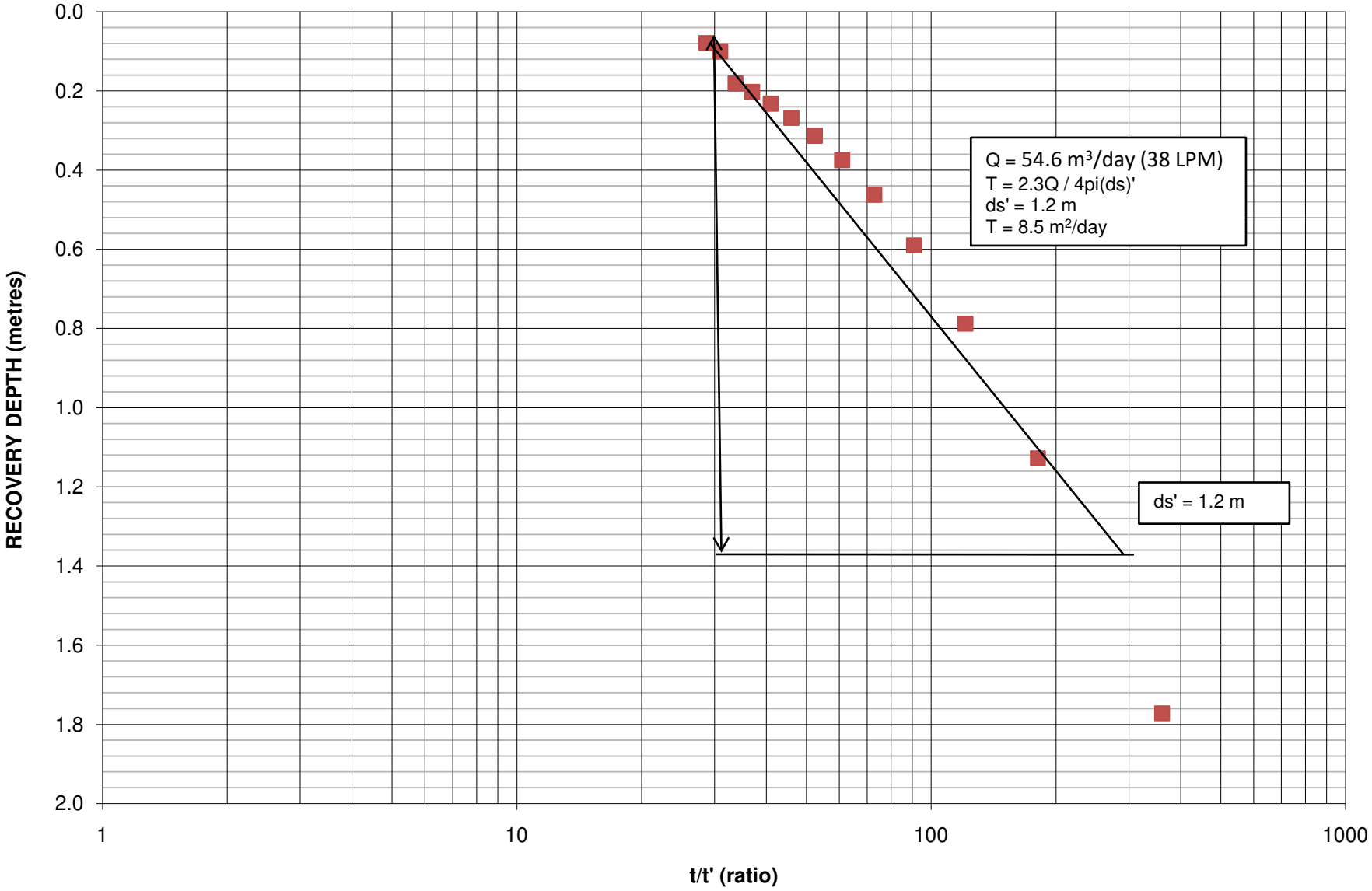

TW1-WELL DRAWDOWN VS. TIME-KOLLAARD FILE 230403
DRAWDOWN DEPTH (metres)
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
1
10
100
1000
TIME LAPSED (minutes)
Q = 54.6 m³/day (38 LPM)
T = 2.3Q / 4pi(ds)'
ds' = 0.1 m
T = 100 m²/day
ds' = 0.10 m

Kollaard File 230403

RECOVERY DATA TW-1

t'	t / t'	Abs Pres (kPa)	Temp (°C)	Water Level (m)	Drawdown (m)	Recovery (%)
1	361.0	397.351	8.382	-4.272	1.77	38%
2	181.0	403.671	8.382	-3.628	1.13	60%
3	121.0	407.009	8.382	-3.288	0.79	72%
4	91.0	408.942	8.382	-3.09	0.59	79%
5	73.0	410.201	8.382	-2.962	0.46	84%
6	61.0	411.051	8.382	-2.875	0.38	87%
7	52.4	411.666	8.382	-2.813	0.31	89%
8	46.0	412.106	8.382	-2.768	0.27	91%
9	41.0	412.457	8.382	-2.732	0.23	92%
10	37.0	412.75	8.382	-2.702	0.20	93%
11	33.7	412.955	8.382	-2.681	0.18	94%
12	31.0	413.755	8.481	-2.6	0.10	96%
13	28.7	413.96	8.481	-2.579	0.08	97%

TW1- WELL RECOVERY VS. TIME - KOLLAARD FILE 230403



ATTACHMENT C

RESULTS OF LABORATORY TESTING OF WELL WATER SAMPLES

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS : 3652844

WORK REQUEST : 100231719

Report Date : 2023-08-03

Kollaard Associates Inc.
210 Prescott St., Box 189
Kemptville, ON
K0G 1J0
Attention : Colleen Vermeersch

Reception Date : 2023-07-26
Project : 230403
Sampler : NA
PO Number : Not Applicable
Temperature : 13 °C

Analysis	Quantity	External Method
Alkalinity (Water, Automated)	2	Modified from SM 2320 B
Ammonia, Total (Water, Colorimetry)	2	Modified from EPA 350.1
Chloride (Water, IC)	2	Modified from SM 4110 B and C
Colour, Apparent (Water, Spectrophotometry)	2	Modified from SM 2120 C
Colour, True (Water, Spectrophotometry)	2	Modified from SM 2120 C
Conductivity (Water, Automated)	2	Modified from SM 2510 B
DOC (Water, IR)	2	Modified from SM 5310 B
Fluoride (Water, Auto/ISE)	2	Modified from SM 4500-F A and 4500-F C
Hardness (Water, Calculation Only)	2	SM 2340 B
Ion Balance (Water, Calculation)	2	Modified from SM1030 E
Lab Filtration (Water, Sample Preparation)	2	Lab Prep
Metals Scan (Water, ICP/MS)	2	Modified from EPA 200.8
Metals Scan (Water, ICP/OES)	2	Modified from SM 3120 B
Nitrate (Water, IC)	2	Modified from SM 4110 B and C
Nitrite (Water, IC)	2	Modified from SM 4110 B and C
pH (25°C) (Water, Automated)	2	Modified from SM 4500-H+ B
Phenols (Water, Colorimetry)	2	Modified from EPA 420.2
Sulphate (Water, IC)	2	Modified from SM 4110 B and C
Sulphide (Water, Colorimetry)	2	Modified from SM 4500-S2 D
* Tannins and Lignins (Subcontract)	2	
TDS (Estimated)	2	Modified from SM 2510 A
Total Kjeldahl Nitrogen (Water, Colorimetry)	2	Modified from EPA 351.2
Turbidity (Water, Turbidimeter)	2	Modified from SM 2130 B

Criteria :
A : Ontario Regulation 169/03 (Non-Regulated Drinking Water)

Sample status upon receipt :

7100668 7100669
Compliant

Certificate Comments :

7100668
S2- MRL was elevated for the samples in this BCDA report due to matrix interference, a dilution was done. Cl spk not available due to high native analyte concentration for all the samples in this BCDA report.

Notes :

- All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise stated.
- Eurofins Environment Testing Canada Inc. is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at https://directory.cala.ca/
- Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline or regulatory limits listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official guideline or regulation as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Legend :

RL : Reporting limit
QC : Reference material (QC)
N/A : Not applicable
1 : Results in annex
* : Analysis conducted by external subcontracting
^ : Analysis not accredited

OFFICIAL CERTIFICATE OF ANALYSIS - EXCEEDENCE SUMMARY

Client : Kollaard Associates Inc.
Project : 230403
Reception Date : 2023-07-26

Eurofins Sample No	Client Sample Identification	Analyte	Result	Units	Exceeded Criteria		
					A	B	C
Colour, Apparent (Water, Spectrophotometry)							
7100668	TW1-3 hrs	Colour (Apparent)	37	TCU	5		
7100669	TW1-6 hrs	Colour (Apparent)	27	TCU	5		
Hardness (Water, Calculation Only)							
7100668	TW1-3 hrs	Hardness as CaCO3 (Calculation)	336	mg/L	80-100		
7100669	TW1-6 hrs	Hardness as CaCO3 (Calculation)	339	mg/L	80-100		
Metals Scan (Water, ICP/MS)							
7100669	TW1-6 hrs	Antimony	0.0064	mg/L	0.006		
7100668	TW1-3 hrs	Iron	1.58	mg/L	0.3		
7100669	TW1-6 hrs	Iron	1.58	mg/L	0.3		
7100668	TW1-3 hrs	Manganese	0.15	mg/L	0.05		
7100669	TW1-6 hrs	Manganese	0.15	mg/L	0.05		
TDS (Estimated)							
7100668	TW1-3 hrs	TDS (Estimated)^	515	mg/L	500		
7100669	TW1-6 hrs	TDS (Estimated)^	522	mg/L	500		
Turbidity (Water, Turbidimeter)							
7100668	TW1-3 hrs	Turbidity	23.2	NTU	5		
7100669	TW1-6 hrs	Turbidity	20.2	NTU	5		

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-07-26

					Eurofins Sample No :	**7100668**	**7100669**			
					Matrix :	Drinking water	Drinking water			
					Sampling Date :	2023-07-25	2023-07-25			
					Client Sample Identification :	TW1-3 hrs	TW1-6 hrs			
Anions	**RL**	**Unit**	**Criteria A**	**B**	**C**					
Chloride	0.5	mg/L	250			52.3	54.3			
Nitrate (as Nitrogen)	0.1	mg/L	10.0			<0.1	<0.1			
Nitrite (as Nitrogen)	0.1	mg/L	1.0			<0.1	<0.1			
Sulphate	1	mg/L	500			35	36			

					Eurofins Sample No :	**7100668**	**7100669**			
					Matrix :	Drinking water	Drinking water			
					Sampling Date :	2023-07-25	2023-07-25			
					Client Sample Identification :	TW1-3 hrs	TW1-6 hrs			
Calculations	**RL**	**Unit**	**Criteria A**	**B**	**C**					
Hardness as CaCO3 (Calculation)	1	mg/L	80-100			336	339			
Ion Balance (Calculation)^	0.1					0.94	0.92			

					Eurofins Sample No :	**7100668**	**7100669**			
					Matrix :	Drinking water	Drinking water			
					Sampling Date :	2023-07-25	2023-07-25			
					Client Sample Identification :	TW1-3 hrs	TW1-6 hrs			
General Chemistry	**RL**	**Unit**	**Criteria A**	**B**	**C**					
Alkalinity (as CaCO3)	5	mg/L	500			343	357			
Colour (Apparent)	2	TCU	5			37	27			
Colour (True)	2	TCU				3	3			
Conductivity @ 25°C	5	µS/cm				793	803			
Dissolved Organic Carbon	0.5	mg/L	5			3.3	3.7			
Fluoride	0.1	mg/L	1.5			0.38	0.38			
pH @ 25°C	1		6.5-8.5			7.61	7.62			
Sulphide (S2-)	0.01	mg/L	0.05			<0.05	<0.05			
Tannins and Lignins*	0.5	mg/L				<0.5	<0.5			
Turbidity	0.1	NTU	5			23.2	20.2			

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-07-26

					Eurofins Sample No :	**7100668**	**7100669**			
					Matrix :	Drinking water	Drinking water			
					Sampling Date :	2023-07-25	2023-07-25			
					Client Sample Identification :	TW1-3 hrs	TW1-6 hrs			
Metals	**RL**	**Unit**	**Criteria A**	**B**	**C**					
Metals Scan (Water, ICP/MS)										
Aluminum	0.01	mg/L	0.1			<0.01	<0.01			
Antimony	0.0005	mg/L	0.006			0.0015	0.0064			
Arsenic	0.001	mg/L	0.01			<0.001	<0.001			
Barium	0.001	mg/L	1			0.283	0.287			
Beryllium	0.0005	mg/L				<0.0005	<0.0005			
Boron	0.01	mg/L	5			0.02	0.02			
Cadmium	0.0001	mg/L	0.005			<0.0001	0.0001			
Chromium	0.001	mg/L	0.05			<0.001	<0.001			
Cobalt	0.0002	mg/L				<0.0002	<0.0002			
Copper	0.001	mg/L	1			<0.001	<0.001			
Iron	0.03	mg/L	0.3			1.58	1.58			
Lead	0.001	mg/L	0.01			<0.001	<0.001			
Manganese	0.01	mg/L	0.05			0.15	0.15			
Mercury	0.0001	mg/L	0.001			<0.0001	<0.0001			
Molybdenum	0.005	mg/L				<0.005	0.005			
Nickel	0.005	mg/L				<0.005	<0.005			
Selenium	0.001	mg/L	0.05			<0.001	<0.001			
Silver	0.0001	mg/L				<0.0001	<0.0001			
Strontium	0.001	mg/L				0.496	0.493			
Thallium	0.0001	mg/L				0.0001	0.0005			
Uranium	0.001	mg/L	0.02			<0.001	0.002			
Vanadium	0.001	mg/L				<0.001	<0.001			
Zinc	0.01	mg/L	5			<0.01	<0.01			

					Eurofins Sample No :	**7100668**	**7100669**			
					Matrix :	Drinking water	Drinking water			
					Sampling Date :	2023-07-25	2023-07-25			
					Client Sample Identification :	TW1-3 hrs	TW1-6 hrs			
Metals, Water, ICP/OES	**RL**	**Unit**	**Criteria A**	**B**	**C**					
Metals Scan (Water, ICP/OES)										
Calcium	1	mg/L				92	93			
Magnesium	1	mg/L				25	26			
Potassium	1	mg/L				1	1			
Sodium	1	mg/L	200			41	42			

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-07-26

Eurofins Sample No :			7100668	7100669					
Matrix :			Drinking water	Drinking water					
Sampling Date :			2023-07-25	2023-07-25					
Client Sample Identification :			TW1-3 hrs	TW1-6 hrs					
Nutrients	**RL**	**Unit**							
Ammonia (Total, as Nitrogen)	0.02	mg/L	0.127	0.127					
Total Kjeldahl Nitrogen	0.1	mg/L	0.405	0.301					

Eurofins Sample No :			7100668	7100669					
Matrix :			Drinking water	Drinking water					
Sampling Date :			2023-07-25	2023-07-25					
Client Sample Identification :			TW1-3 hrs	TW1-6 hrs					
Phenols-4AAP	**RL**	**Unit**							
Phenols-4AAP	0.001	mg/L	<0.001	<0.001					

Eurofins Sample No :			7100668	7100669					
Matrix :			Drinking water	Drinking water					
Sampling Date :			2023-07-25	2023-07-25					
Client Sample Identification :			TW1-3 hrs	TW1-6 hrs					
Sample Preparation	**RL**	**Unit**							
Lab Filtration			<Y>	<Y>					

Eurofins Sample No :						7100668	7100669		
Matrix :						Drinking water	Drinking water		
Sampling Date :						2023-07-25	2023-07-25		
Client Sample Identification :						TW1-3 hrs	TW1-6 hrs		
Solids	**RL**	**Unit**	**Criteria A**	**Criteria B**	**Criteria C**				
TDS (Estimated)^	5	mg/L	500			515	522		

Approved by : R. Zafari
Raheleh Zafari,
Ottawa, Environmental Chemist, PhD

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-07-26

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Alkalinity (Water, Automated)									
Method : Alkalinity (water, titration to pH 4.5, automated). Internal method: OTT-I-AT-WI45398.									
Alkalinity (as CaCO3)	mg/L	5	<5	97	95-105			1	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-28 Analysis Date: 2023-07-31	
Ammonia, Total (Water, Colorimetry)									
Method : Ammonia (Water, Colorimetry). Internal method: OTT-I-NUT-WI46201.									
Ammonia (Total, as Nitrogen)	mg/L	0.02	<0.020	103	80-120	108	80-120	-	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-28 Analysis Date: 2023-07-28	
Chloride (Water, IC)									
Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.									
Chloride	mg/L	0.5	<0.5	96	88-112			3	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-31 Analysis Date: 2023-08-01	
Colour, Apparent (Water, Spectrophotometry)									
Method : Colour (Water, Spectrophotometric). Internal method: OTT-I-SPEC-WI45980.									
Colour (Apparent)	TCU	2	<2	103	90-110			4	0-40
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-31 Analysis Date: 2023-07-31	
Colour, True (Water, Spectrophotometry)									
Method : Colour (Water, Spectrophotometric). Internal method: OTT-I-SPEC-WI45980.									
Colour (True)	TCU	2	<2	103	90-110			-	0-40
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-31 Analysis Date: 2023-07-31	
Conductivity (Water, Automated)									
Method : Conductivity (Water, Autotitrator). Internal Method: OTT-I-AT-WI45398.									
Conductivity @ 25°C	uS/cm	5	<5	100	80-120			0	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-28 Analysis Date: 2023-07-31	
DOC (Water, IR)									
Method : Organic carbon (water, IR, combustion). Internal method: OTT-I-DEM-WI46148.									
Dissolved Organic Carbon	mg/L	0.5	<0.5	105	84-115	97	80-120	17	0-15
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-27 Analysis Date: 2023-07-28	
Fluoride (Water, Auto/ISE)									
Method : Fluoride by autotitrator, ion selective electrode. Internal method: OTT-I-AT-WI45398.									
Fluoride	mg/L	0.1	<0.10	105	80-120			3	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-28 Analysis Date: 2023-07-31	

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-07-26

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Metals Scan (Water, ICP/MS)									
Method : Metals (Water, ICP/MS). Internal method: AMMTFQE1.									
Aluminum	mg/L	0.01	<0.01	100	80-120	-	70-130	-	0-20
Antimony	mg/L	0.0005	<0.0005	87	80-120	83	70-130	-	0-20
Arsenic	mg/L	0.001	<0.001	92	80-120	102	70-130	-	0-20
Barium	mg/L	0.001	<0.001	100	80-120	104	70-130	-	0-20
Beryllium	mg/L	0.0005	<0.0005	101	80-120	107	70-130	-	0-20
Boron	mg/L	0.01	<0.01	100	80-120	106	70-130	-	0-20
Cadmium	mg/L	0.0001	<0.0001	99	80-120	107	70-130	-	0-20
Chromium	mg/L	0.001	<0.001	120	80-120	101	70-130	-	0-20
Cobalt	mg/L	0.0002	<0.0002	102	80-120	102	70-130	-	0-20
Copper	mg/L	0.001	<0.001	100	80-120	104	70-130	-	0-20
Iron	mg/L	0.03	<0.03	100	80-120	-	70-130	-	0-20
Lead	mg/L	0.001	<0.001	100	80-120	105	70-130	-	0-20
Manganese	mg/L	0.01	<0.01	100	80-120	-	70-130	-	0-20
Mercury	mg/L	0.0001	<0.0001	100	80-120	-	70-130	-	0-20
Molybdenum	mg/L	0.005	<0.005	90	80-120	92	70-130	-	0-20
Nickel	mg/L	0.005	<0.005	100	80-120	107	70-130	-	0-20
Selenium	mg/L	0.001	<0.001	94	80-120	102	70-130	-	0-20
Silver	mg/L	0.0001	<0.0001	117	80-120	93	70-130	-	0-20
Strontium	mg/L	0.001	<0.001	100	80-120	-	70-130	-	0-20
Thallium	mg/L	0.0001	<0.0001	101	80-120	104	70-130	-	0-20
Uranium	mg/L	0.001	<0.001	100	80-120	101	70-130	-	0-20
Vanadium	mg/L	0.001	<0.001	100	80-120	105	70-130	-	0-20
Zinc	mg/L	0.01	<0.01	100	80-120	109	70-130	-	0-20
Associated Samples : 7100668								Prep Date: 2023-07-31 Analysis Date: 2023-08-01	
Method : Metals (Water, ICP/MS). Internal method: AMMTFQE1.									
Aluminum	mg/L	0.01	<0.01	100	80-120	114	70-130	-	0-20
Antimony	mg/L	0.0005	<0.0005	87	80-120	87	70-130	-	0-20
Arsenic	mg/L	0.001	<0.001	92	80-120	108	70-130	-	0-20
Barium	mg/L	0.001	<0.001	100	80-120	89	70-130	1	0-20
Beryllium	mg/L	0.0005	<0.0005	101	80-120	111	70-130	-	0-20
Boron	mg/L	0.01	<0.01	100	80-120	118	70-130	-	0-20
Cadmium	mg/L	0.0001	<0.0001	99	80-120	104	70-130	-	0-20
Chromium	mg/L	0.001	<0.001	120	80-120	103	70-130	-	0-20
Cobalt	mg/L	0.0002	<0.0002	102	80-120	99	70-130	-	0-20
Copper	mg/L	0.001	<0.001	100	80-120	92	70-130	-	0-20
Iron	mg/L	0.03	<0.03	100	80-120	107	70-130	1	0-20
Lead	mg/L	0.001	<0.001	100	80-120	97	70-130	-	0-20
Manganese	mg/L	0.01	<0.01	100	80-120	106	70-130	5	0-20
Mercury	mg/L	0.0001	<0.0001	100	80-120	78	70-130	-	0-20
Molybdenum	mg/L	0.005	<0.005	90	80-120	103	70-130	-	0-20
Nickel	mg/L	0.005	<0.005	100	80-120	99	70-130	-	0-20
Selenium	mg/L	0.001	<0.001	94	80-120	106	70-130	-	0-20
Silver	mg/L	0.0001	<0.0001	117	80-120	87	70-130	-	0-20
Strontium	mg/L	0.001	<0.001	100	80-120	107	70-130	0	0-20
Thallium	mg/L	0.0001	<0.0001	101	80-120	98	70-130	-	0-20
Uranium	mg/L	0.001	<0.001	100	80-120	102	70-130	-	0-20

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-07-26

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Metals Scan (Water, ICP/MS)									
Method : Metals (Water, ICP/MS). Internal method: AMMTFQE1.									
Vanadium	mg/L	0.001	<0.001	100	80-120	110	70-130	-	0-20
Zinc	mg/L	0.01	<0.01	100	80-120	94	70-130	-	0-20
Associated Samples : 7100669								Prep Date: 2023-07-31 Analysis Date: 2023-08-01	
Metals Scan (Water, ICP/OES)									
Method : Metals (Water, ICP/OES). Internal method: OTT-I-MET-WI48491.									
Calcium	mg/L	1	<1	104	86-115	101	70-130	0	0-20
Magnesium	mg/L	1	<1	105	91-109	102	70-130	0	0-20
Potassium	mg/L	1	<1	105	87-113	105	70-130	-	0-20
Sodium	mg/L	1	<1	105	85-115	102	70-130	1	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-08-02 Analysis Date: 2023-08-02	
Nitrate (Water, IC)									
Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.									
Nitrate (as Nitrogen)	mg/L	0.1	<0.1	101	92-110	101	80-120	-	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-31 Analysis Date: 2023-08-01	
Nitrite (Water, IC)									
Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.									
Nitrite (as Nitrogen)	mg/L	0.1	<0.1	98	90-110	94	80-120	-	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-31 Analysis Date: 2023-08-01	
pH (25°C) (Water, Automated)									
Method : pH (Water, Automated Meter). Internal method: OTT-I-AT-WI45398.									
pH @ 25°C		1	5.79	100	97-103			1	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-28 Analysis Date: 2023-07-31	
Phenols (Water, Colorimetry)									
Method : Phenols (Water, Colorimetry). Internal method: OTT-I-4AAP-WI46150.									
Phenols-4AAP	mg/L	0.001	<0.001	104	77-125	103	70-130	-	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-31 Analysis Date: 2023-07-31	
Sulphate (Water, IC)									
Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.									
Sulphate	mg/L	1	<1	90	90-110	91	80-120	0	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-31 Analysis Date: 2023-08-01	
Sulphide (Water, Colorimetry)									
Method : Sulphide, S2- (Water, Colorimetry). Internal method: OTT-I-SPEC-WI45931.									
Sulphide (S2-)	mg/L	0.01	<0.01	93	80-120			-	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-31 Analysis Date: 2023-07-31	
Total Kjeldahl Nitrogen (Water, Colorimetry)									
Method : TKN (Water, colorimetry). Internal method: OTT-I-NUT-WI46201.									
Total Kjeldahl Nitrogen	mg/L	0.1	<0.100	114	70-130	97	70-130	9	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-28 Analysis Date: 2023-07-31	

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-07-26

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Turbidity (Water, Turbidimeter)									
Method : Turbidity (Water, Turbidimeter). Internal method: OTT-I-TUR-WI46288.									
Turbidity	NTU	0.1	<0.1	101	80-120			2	0-20
Associated Samples : 7100668, 7100669								Prep Date: 2023-07-27 Analysis Date: 2023-07-27	

Where RPD % is reported as "-" the calculation is not available because one or both of the duplicates is within 5 times the RL.

eurofins

DRINKING WATER CHAIN-OF-CUSTODY

146 Colonnade Road, Unit #8, Ottawa, ON, K2E 7Y1 - Phone: 613-727-5692, Fax: 613-727-5222

100231719

Printed On : 2023-07-26 15:59:40

CLIENT INFORMATION

Company: Kollaard Associates Inc.
Contact: Colleen Vermeersch
Address: 210 Prescott St, Kemptville, On K0G 1J0
Telephone: 613-860-0923 ext230 | Fax:
Email #1: | #2:
Project: 230403
PO #: | Quote #: 170314

WATERWORKS INFORMATIO

Waterworks Name:
Waterworks #:
Contact:
Address:
Telephone: | Fax:
Cell Phone:
Email #1: | #2:

REGULATION/GUIDELINE REQUIRED

- [ ] O. Reg 170
- [ ] O. Reg 170 15.1
- [x] ODWSOG
- [x] Private Well
- [ ] None
- [ ] O. Reg 318/319
- [ ] O. Reg 243
- [ ] GCDWQ
- [ ] Other:

TURN-AROUND TIME (Business Days)

- [ ] 1 Day* (100%)
- [ ] 2 Day** (50%)
- [ ] 3-5 Days (25%)
- [x] 5-7 Days (Standard)

Please contact the laboratory in advance to determine rush availability. Surcharges may apply to rush service. Note that some tests (i.e. O. Reg. 170 Schedule 24 pesticides may take up to 3 weeks to analyze). Please see notes (on reverse) about TAT policies.

The optimal temperature conditions during transport must be less than 10°C. Sample(s) cannot be frozen. Note that for drinking water samples, all exceedances will be reported where (and how) the application legislation requires.
The COC must be complete upon submission of the samples, there will be a $25 surcharge if required information is missing (required fields are shaded in grey).

Sample ID	Date/Time Collected	Sample Type Code (see below)	Resample? Y = Yes N = No	MDE/MOH Reportable? Y = Yes N = No	# of Containers	SPL Code/Watertrax	Sample Location (i.e. Kitchen, POE)	Subdivision parameters	Kollaard Subdivision bacteria	Kollaard Special Metals	true colour				Total Chlorine	Free Chlorine	Field Turbidity	Sample RN# (Lab Use Only)
TW1-3 hrs	07-25 / 12:30	PW	N	N	9		wellhead	✓	✓	✓	✓				-	0.00	5.7	700668
TW1-6 hrs	007-25 / 15:30	PW	N	N	9		wellhead	✓	✓	✓	✓				-	0.00	4.2	69

Sample Type Codes for Drinking Water: RW = Raw Water, TW = Treated Water at Point of Entry to distribution, TW-NT = Untreated Water at Point of Entry to distribution, DW = Distribution, RP = Residential Plumbing, NRP = Non-Residential Plumbing, S = Standing, F = Flushed, PW = Private Well

	PRINT	SIGN	DATE/TIME	TEMP (°C)
Sampled By:	Joey			
Relinquished By:				
Received By:		SM	7/26/23 1245	13

COMMENTS:
Sample for metals were field filtered using 0.45 micron filter

AFCOCDW.8

Copies: White - Laboratory, Yellow - Sampler

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS : 3646570

WORK REQUEST : 100231726

Report Date : 2023-07-28

Kollaard Associates Inc.
210 Prescott St., Box 189
Kemptville, ON
K0G 1J0
Attention : Colleen Vermeersch

Reception Date : 2023-07-26
Project : 230403
Sampler : NA
PO Number : Not Applicable
Temperature : 13 °C

Analysis	Quantity	External Method
E.Coli and Total Coliforms (DC Plate)	2	Modified from MECP E3407
Heterotrophic Plate Count (mHPC)	2	Modified from SM 9215 D

Criteria :
A : Ontario Regulation 169/03 (Non-Regulated Drinking Water)

Sample status upon receipt :

7100695 7100697
Compliant

Notes :

- All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise stated.
- Eurofins Environment Testing Canada Inc. is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at https://directory.cala.ca/
- Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline or regulatory limits listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official guideline or regulation as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Legend :

RL : Reporting limit
QC : Reference material (QC)
N/A : Not applicable
1 : Results in annex
* : Analysis conducted by external subcontracting
^ : Analysis not accredited

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-07-26

					Eurofins Sample No :	**7100695**	**7100697**			
					Matrix :	Drinking water	Drinking water			
					Sampling Date :	2023-07-25	2023-07-25			
					Client Sample Identification :	TW1-3 hrs	TW1-6 hrs			
Microbiology (DC Plate)	**RL**	**Unit**	**Criteria A**	**Criteria B**	**Criteria C**					
E.Coli and Total Coliforms (DC Plate)										
Escherichia coli (DC)	0	CFU/100mL	0			0	0			
Total Coliforms (DC)	0	CFU/100mL	0			0	0			

			Eurofins Sample No :	**7100695**	**7100697**				
			Matrix :	Drinking water	Drinking water				
			Sampling Date :	2023-07-25	2023-07-25				
			Client Sample Identification :	TW1-3 hrs	TW1-6 hrs				
Microbiology (mHPC Plate)	**RL**	**Unit**							
Heterotrophic Plate Count (mHPC)	0	CFU/1 mL	31	37					

Approved by : R. Zafari

Raheleh Zafari,
Ottawa, Environmental Chemist, PhD

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-07-26

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
E.Coli and Total Coliforms (DC Plate)									
Method : Total Coliforms and E.Coli by MF (Water, DC plate). Internal method: OTT-M-BAC-WI45296.									
Escherichia coli (DC)	CFU/100mL	0	0						-
Total Coliforms (DC)	CFU/100mL	0	0						-
Associated Samples : 7100695, 7100697								Prep Date: 2023-07-26 Analysis Date: 2023-07-27	
Method : Heterotrophic Plate Count by MF (mHPC Media). Internal method: OTT-M-BAC-WI45296.									
Heterotrophic Plate Count (mHPC)	CFU/1 mL	0	0					0	0-30
Associated Samples : 7100695, 7100697								Prep Date: 2023-07-26 Analysis Date: 2023-07-28	

Where RPD % is reported as "-" the calculation is not available because one or both of the duplicates is within 5 times the RL.

ALS Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2323228**	Page	: 1 of 6
Client	: **Kollaard Associates Inc.**	Laboratory	: ALS Environmental - Waterloo
Contact	: Colleen Vermeersch	Account Manager	: Costas Farassoglou
Address	: 210 Prescott Street Unit 1 Kemptville ON Canada K0G1J0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 613 860 0923	Telephone	: 613 225 8279
Project	: 230403	Date Samples Received	: 27-Jul-2023 09:45
PO	: 230403	Date Analysis Commenced	: 31-Jul-2023
C-O-C number	: ----	Issue Date	: 02-Aug-2023 09:50
Sampler	: CLIENT		
Site	: ----		
Quote number	: SOA 2022		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Sarah Birch	VOC Section Supervisor	VOC, Waterloo, Ontario

No Breaches Found

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

>: greater than.
<: less than.
Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	230403#2 151 WESCAR LANE	----	----	----	----	----	----
				Sampling date/time	26-Jul-2023 14:00	----	----	----	----	----	----
				Sub-Matrix	Water	----	----	----	----	----	----
				WT2323228-001	--------	--------	--------	--------	--------	--------	--------
Volatile Organic Compounds											
Acetone	67-64-1	E611D/WT			<20	----	----	----	----	----	----
Benzene	71-43-2	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Bromodichloromethane	75-27-4	E611D/WT			0.71	----	----	----	----	----	----
Bromoform	75-25-2	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Bromomethane	74-83-9	E611D/WT			<0.50	----	----	----	----	----	----
Carbon tetrachloride	56-23-5	E611D/WT	µg/L		<0.20	----	----	----	----	----	----
Chlorobenzene	108-90-7	E611D/WT			<0.50	----	----	----	----	----	----
Chloroform	67-66-3	E611D/WT	µg/L		18.0	----	----	----	----	----	----
Dibromochloromethane	124-48-1	E611D/WT			<0.50	----	----	----	----	----	----
Dibromoethane, 1,2-	106-93-4	E611D/WT	µg/L		<0.20	----	----	----	----	----	----
Dichlorobenzene, 1,2-	95-50-1	E611D/WT			<0.50	----	----	----	----	----	----
Dichlorobenzene, 1,3-	541-73-1	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Dichlorobenzene, 1,4-	106-46-7	E611D/WT			<0.50	----	----	----	----	----	----
Dichlorodifluoromethane	75-71-8	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Dichloroethane, 1,1-	75-34-3	E611D/WT			<0.50	----	----	----	----	----	----
Dichloroethane, 1,2-	107-06-2	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Dichloroethylene, 1,1-	75-35-4	E611D/WT			<0.50	----	----	----	----	----	----
Dichloroethylene, cis-1,2-	156-59-2	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Dichloroethylene, trans-1,2-	156-60-5	E611D/WT			<0.50	----	----	----	----	----	----
Dichloromethane	75-09-2	E611D/WT	µg/L		<1.0	----	----	----	----	----	----
Dichloropropane, 1,2-	78-87-5	E611D/WT			<0.50	----	----	----	----	----	----
Dichloropropylene, cis+trans-1,3-	542-75-6	E611D/WT	µg/L		<0.50	----	----	----	----	----	----
Dichloropropylene, cis-1,3-	10061-01-5	E611D/WT			<0.30	----	----	----	----	----	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D/WT	µg/L		<0.30	----	----	----	----	----	----
Ethylbenzene	100-41-4	E611D/WT			<0.50	----	----	----	----	----	----
Hexane, n-	110-54-3	E611D/WT	µg/L		0.51	----	----	----	----	----	----
Methyl ethyl ketone [MEK]	78-93-3	E611D/WT			<20	----	----	----	----	----	----
Methyl isobutyl ketone [MIBK]	108-10-1	E611D/WT	µg/L		<20	----	----	----	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D/WT			<0.50	----	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	----	----	----	----	----	----
				230403#2 151 WESCAR LANE	----	----	----	----	----	----
				Sampling date/time: 26-Jul-2023 14:00	----	----	----	----	----	----
				Sub-Matrix: Water	----	----	----	----	----	----
				WT2323228-001	--------	--------	--------	--------	--------	--------
Volatile Organic Compounds										
Styrene	100-42-5	E611D/WT	µg/L	<0.50	----	----	----	----	----	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611D/WT		<0.50	----	----	----	----	----	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D/WT	µg/L	<0.50	----	----	----	----	----	----
Tetrachloroethylene	127-18-4	E611D/WT		<0.50	----	----	----	----	----	----
Toluene	108-88-3	E611D/WT	µg/L	0.65	----	----	----	----	----	----
Trichloroethane, 1,1,1-	71-55-6	E611D/WT		<0.50	----	----	----	----	----	----
Trichloroethane, 1,1,2-	79-00-5	E611D/WT	µg/L	<0.50	----	----	----	----	----	----
Trichloroethylene	79-01-6	E611D/WT		<0.50	----	----	----	----	----	----
Trichlorofluoromethane	75-69-4	E611D/WT	µg/L	<0.50	----	----	----	----	----	----
Vinyl chloride	75-01-4	E611D/WT		<0.50	----	----	----	----	----	----
Xylene, m+p-	179601-23-1	E611D/WT	µg/L	0.54	----	----	----	----	----	----
Xylene, o-	95-47-6	E611D/WT		<0.30	----	----	----	----	----	----
Xylenes, total	1330-20-7	E611D/WT	µg/L	0.54	----	----	----	----	----	----
BTEX, total	----	E611D/WT		1.2	----	----	----	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611D/WT	%	97.6	----	----	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611D/WT		100	----	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Summary of Guideline Limits

Analyte	CAS Number	Unit	ONDWS AO/OG	ONDWS MAC					
Volatile Organic Compounds									
Acetone	67-64-1	µg/L	--	--					
Benzene	71-43-2	µg/L	--	**1 µg/L**					
Bromodichloromethane	75-27-4	µg/L	--	--					
Bromoform	75-25-2	µg/L	--	--					
Bromomethane	74-83-9	µg/L	--	--					
BTEX, total	----	µg/L	--	--					
Carbon tetrachloride	56-23-5	µg/L	--	**2 µg/L**					
Chlorobenzene	108-90-7	µg/L	**30 µg/L**	**80 µg/L**					
Chloroform	67-66-3	µg/L	--	--					
Dibromochloromethane	124-48-1	µg/L	--	--					
Dibromoethane, 1,2-	106-93-4	µg/L	--	--					
Dichlorobenzene, 1,2-	95-50-1	µg/L	**3 µg/L**	**200 µg/L**					
Dichlorobenzene, 1,3-	541-73-1	µg/L	--	--					
Dichlorobenzene, 1,4-	106-46-7	µg/L	**1 µg/L**	**5 µg/L**					
Dichlorodifluoromethane	75-71-8	µg/L	--	--					
Dichloroethane, 1,1-	75-34-3	µg/L	--	--					
Dichloroethane, 1,2-	107-06-2	µg/L	--	**5 µg/L**					
Dichloroethylene, 1,1-	75-35-4	µg/L	--	**14 µg/L**					
Dichloroethylene, cis-1,2-	156-59-2	µg/L	--	--					
Dichloroethylene, trans-1,2-	156-60-5	µg/L	--	--					
Dichloromethane	75-09-2	µg/L	--	**50 µg/L**					
Dichloropropane, 1,2-	78-87-5	µg/L	--	--					
Dichloropropylene, cis+trans-1,3-	542-75-6	µg/L	--	--					
Dichloropropylene, cis-1,3-	10061-01-5	µg/L	--	--					
Dichloropropylene, trans-1,3-	10061-02-6	µg/L	--	--					
Ethylbenzene	100-41-4	µg/L	**2.4 µg/L**	**140 µg/L**					
Hexane, n-	110-54-3	µg/L	--	--					
Methyl ethyl ketone [MEK]	78-93-3	µg/L	--	--					
Methyl isobutyl ketone [MIBK]	108-10-1	µg/L	--	--					
Methyl-tert-butyl ether [MTBE]	1634-04-4	µg/L	--	**15 µg/L**					
Styrene	100-42-5	µg/L	--	--					
Tetrachloroethane, 1,1,1,2-	630-20-6	µg/L	--	--					
Tetrachloroethane, 1,1,2,2-	79-34-5	µg/L	--	--					
Tetrachloroethylene	127-18-4	µg/L	--	**10 µg/L**					
Toluene	108-88-3	µg/L	**24 µg/L**	**60 µg/L**					
Trichloroethane, 1,1,1-	71-55-6	µg/L	--	--					
Trichloroethane, 1,1,2-	79-00-5	µg/L	--	--					

Analyte	CAS Number	Unit	ONDWS AO/OG	ONDWS MAC					
Volatile Organic Compounds - Continued									
Trichloroethylene	79-01-6	µg/L	--	**5 µg/L**					
Trichlorofluoromethane	75-69-4	µg/L	--	--					
Vinyl chloride	75-01-4	µg/L	--	**1 µg/L**					
Xylene, m+p-	179601-23-1	µg/L	--	--					
Xylene, o-	95-47-6	µg/L	--	--					
Xylenes, total	1330-20-7	µg/L	**300 µg/L**	**90 µg/L**					
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	%							
Difluorobenzene, 1,4-	540-36-3	%							

Please refer to the General Comments section for an explanation of any qualifiers detected.

Key:

ONDWS	Ontario Drinking Water Regulation (JAN, 2020)
AO/OG	Aesthetic Objective/Operational Guideline
MAC	Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2323228**	Page	: 1 of 5
Client	: **Kollaard Associates Inc.**	Laboratory	: ALS Environmental - Waterloo
Contact	: Colleen Vermeersch	Account Manager	: Costas Farassoglou
Address	: 210 Prescott Street Unit 1 Kemptville ON Canada K0G1J0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 613 860 0923	Telephone	: 613 225 8279
Project	: 230403	Date Samples Received	: 27-Jul-2023 09:45
PO	: 230403	Issue Date	: 02-Aug-2023 09:50
C-O-C number	: ----		
Sampler	: CLIENT		
Site	: ----		
Quote number	: SOA 2022		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
230403#2 151 WESCAR LANE	E611D	26-Jul-2023	31-Jul-2023	14 days	5 days	✓	31-Jul-2023	9 days	0 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	1063174	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	1063174	1	19	5.2	5.0	✓
Method Blanks (MB)							
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	1063174	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	1063174	0	19	0.0	5.0	×

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs (Eastern Canada List) by Headspace GC-MS	E611D ALS Environmental - Waterloo	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Waterloo	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.

QUALITY CONTROL REPORT

Work Order	: **WT2323228**	Page	: 1 of 8
Client	: Kollaard Associates Inc.	Laboratory	: ALS Environmental - Waterloo
Contact	: Colleen Vermeersch	Account Manager	: Costas Farassoglou
Address	: 210 Prescott Street Unit 1 Kemptville ON Canada K0G1J0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: 613 225 8279
Project	: 230403	Date Samples Received	: 27-Jul-2023 09:45
PO	: 230403	Date Analysis Commenced	: 31-Jul-2023
C-O-C number	: ----	Issue Date	: 02-Aug-2023 09:50
Sampler	: CLIENT 613 860 0923		
Site	: ----		
Quote number	: SOA 2022		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Sarah Birch	VOC Section Supervisor	Waterloo VOC, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Volatile Organic Compounds (QC Lot: 1063174)											
WT2323178-001	Anonymous	Acetone	67-64-1	E611D	20	µg/L	<20	<20	0	Diff <2x LOR	----
		Benzene	71-43-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Bromodichloromethane	75-27-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Bromoform	75-25-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Bromomethane	74-83-9	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Carbon tetrachloride	56-23-5	E611D	0.20	µg/L	<0.20	<0.20	0	Diff <2x LOR	----
		Chlorobenzene	108-90-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Chloroform	67-66-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dibromochloromethane	124-48-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dibromoethane, 1,2-	106-93-4	E611D	0.20	µg/L	<0.20	<0.20	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,3-	541-73-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorodifluoromethane	75-71-8	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethane, 1,1-	75-34-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethane, 1,2-	107-06-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, 1,1-	75-35-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, trans-1,2-	156-60-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611D	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropane, 1,2-	78-87-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloropropylene, cis-1,3-	10061-01-5	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Hexane, n-	110-54-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	<20	<20	0	Diff <2x LOR	----
		Methyl isobutyl ketone [MIBK]	108-10-1	E611D	20	µg/L	<20	<20	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,1,2-	630-20-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 1063174) - continued											
WT2323178-001	Anonymous	Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichloroethane, 1,1,1-	71-55-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichloroethane, 1,1,2-	79-00-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichlorofluoromethane	75-69-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Vinyl chloride	75-01-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611D	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1063174)						
Acetone	67-64-1	E611D	20	µg/L	<20	----
Benzene	71-43-2	E611D	0.5	µg/L	<0.50	----
Bromodichloromethane	75-27-4	E611D	0.5	µg/L	<0.50	----
Bromoform	75-25-2	E611D	0.5	µg/L	<0.50	----
Bromomethane	74-83-9	E611D	0.5	µg/L	<0.50	----
Carbon tetrachloride	56-23-5	E611D	0.2	µg/L	<0.20	----
Chlorobenzene	108-90-7	E611D	0.5	µg/L	<0.50	----
Chloroform	67-66-3	E611D	0.5	µg/L	<0.50	----
Dibromochloromethane	124-48-1	E611D	0.5	µg/L	<0.50	----
Dibromoethane, 1,2-	106-93-4	E611D	0.2	µg/L	<0.20	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,3-	541-73-1	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	<0.50	----
Dichlorodifluoromethane	75-71-8	E611D	0.5	µg/L	<0.50	----
Dichloroethane, 1,1-	75-34-3	E611D	0.5	µg/L	<0.50	----
Dichloroethane, 1,2-	107-06-2	E611D	0.5	µg/L	<0.50	----
Dichloroethylene, 1,1-	75-35-4	E611D	0.5	µg/L	<0.50	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	<0.50	----
Dichloroethylene, trans-1,2-	156-60-5	E611D	0.5	µg/L	<0.50	----
Dichloromethane	75-09-2	E611D	1	µg/L	<1.0	----
Dichloropropane, 1,2-	78-87-5	E611D	0.5	µg/L	<0.50	----
Dichloropropylene, cis-1,3-	10061-01-5	E611D	0.3	µg/L	<0.30	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	<0.30	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	<0.50	----
Hexane, n-	110-54-3	E611D	0.5	µg/L	<0.50	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	<20	----
Methyl isobutyl ketone [MIBK]	108-10-1	E611D	20	µg/L	<20	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611D	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611D	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	<0.50	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1063174) - continued						
Toluene	108-88-3	E611D	0.5	µg/L	<0.50	----
Trichloroethane, 1,1,1-	71-55-6	E611D	0.5	µg/L	<0.50	----
Trichloroethane, 1,1,2-	79-00-5	E611D	0.5	µg/L	<0.50	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	<0.50	----
Trichlorofluoromethane	75-69-4	E611D	0.5	µg/L	<0.50	----
Vinyl chloride	75-01-4	E611D	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	<0.30	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1063174)									
Acetone	67-64-1	E611D	20	µg/L	100 µg/L	97.9	70.0	130	----
Benzene	71-43-2	E611D	0.5	µg/L	100 µg/L	89.6	70.0	130	----
Bromodichloromethane	75-27-4	E611D	0.5	µg/L	100 µg/L	93.6	70.0	130	----
Bromoform	75-25-2	E611D	0.5	µg/L	100 µg/L	94.9	70.0	130	----
Bromomethane	74-83-9	E611D	0.5	µg/L	100 µg/L	97.7	60.0	140	----
Carbon tetrachloride	56-23-5	E611D	0.2	µg/L	100 µg/L	90.8	70.0	130	----
Chlorobenzene	108-90-7	E611D	0.5	µg/L	100 µg/L	89.6	70.0	130	----
Chloroform	67-66-3	E611D	0.5	µg/L	100 µg/L	92.3	70.0	130	----
Dibromochloromethane	124-48-1	E611D	0.5	µg/L	100 µg/L	87.7	70.0	130	----
Dibromoethane, 1,2-	106-93-4	E611D	0.2	µg/L	100 µg/L	88.2	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	100 µg/L	89.9	70.0	130	----
Dichlorobenzene, 1,3-	541-73-1	E611D	0.5	µg/L	100 µg/L	90.4	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	100 µg/L	88.8	70.0	130	----
Dichlorodifluoromethane	75-71-8	E611D	0.5	µg/L	100 µg/L	90.0	60.0	140	----
Dichloroethane, 1,1-	75-34-3	E611D	0.5	µg/L	100 µg/L	95.0	70.0	130	----
Dichloroethane, 1,2-	107-06-2	E611D	0.5	µg/L	100 µg/L	87.8	70.0	130	----
Dichloroethylene, 1,1-	75-35-4	E611D	0.5	µg/L	100 µg/L	99.0	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	100 µg/L	94.8	70.0	130	----
Dichloroethylene, trans-1,2-	156-60-5	E611D	0.5	µg/L	100 µg/L	105	70.0	130	----
Dichloromethane	75-09-2	E611D	1	µg/L	100 µg/L	92.8	70.0	130	----
Dichloropropane, 1,2-	78-87-5	E611D	0.5	µg/L	100 µg/L	93.4	70.0	130	----
Dichloropropylene, cis-1,3-	10061-01-5	E611D	0.3	µg/L	100 µg/L	82.7	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	100 µg/L	84.1	70.0	130	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	100 µg/L	95.4	70.0	130	----
Hexane, n-	110-54-3	E611D	0.5	µg/L	100 µg/L	103	70.0	130	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	100 µg/L	81.3	70.0	130	----
Methyl isobutyl ketone [MIBK]	108-10-1	E611D	20	µg/L	100 µg/L	78.3	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611D	0.5	µg/L	100 µg/L	92.0	70.0	130	----
Styrene	100-42-5	E611D	0.5	µg/L	100 µg/L	87.8	70.0	130	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611D	0.5	µg/L	100 µg/L	90.5	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	100 µg/L	98.1	70.0	130	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	100 µg/L	94.4	70.0	130	----
Toluene	108-88-3	E611D	0.5	µg/L	100 µg/L	93.3	70.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1063174) - continued									
Trichloroethane, 1,1,1-	71-55-6	E611D	0.5	µg/L	100 µg/L	91.2	70.0	130	----
Trichloroethane, 1,1,2-	79-00-5	E611D	0.5	µg/L	100 µg/L	90.7	70.0	130	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	100 µg/L	98.9	70.0	130	----
Trichlorofluoromethane	75-69-4	E611D	0.5	µg/L	100 µg/L	84.6	60.0	140	----
Vinyl chloride	75-01-4	E611D	0.5	µg/L	100 µg/L	98.5	60.0	140	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	200 µg/L	94.5	70.0	130	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	100 µg/L	94.8	70.0	130	----

VW-098

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 17 -

Page of

Environmental Division
Waterloo
Work Order Reference
WT2323228

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	Kollaard Associates (27196)
Contact:	Colleen Vermeersch
Phone:	613.860.0923, ext.230
	Company address below will appear on the final report
Street:	210 Prescott Street, Unit 1 P.O. Box 189
City/Province:	Kemptville, Ontario
Postal Code:	K0G 1J0
Invoice To	Same as Report To ☑ Y ☑ N
	Copy of Invoice with Report ☑ Y ☑ N
Company:	Kollaard Associates Inc.
Contact:	admin@kollaard.ca

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ Y ☐ N
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax colleen@kollaard.ca
Email 2
Email 3

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax admin@kollaard.ca
Email 2

Select Service Level Below - Contact your

Regular [R] ☑ Standard TAT if receive

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐
EMERGENCY: 1 Bus | Same | (Labo

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service le

Analy

Indicate Filtered (F), Preserved (P) or Filter

Project Information

ALS Account # / Quote #: Q71021
Job #:
PO / AFE: 230403
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#
Major/Minor Code: | Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only): WT2323228

ALS Contact: | Sampler:

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	VOCs	SAMPLES ON HOLD	Sample is hazardous (please provide I	NUMBER OF CONTAINERS
	230403#2 151 Wescar Lane	26-Jul-23	14:00	Water	✓			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Y ☑ N
Are samples for human consumption/ use? ☐ Y ☑ N

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

~~Ontario Regulation 153/04 - April 15, 2011 Standards~~
Ontario Drinking Water Standards
~~Table 6, Potable, Full depth residential standards, coarse grained soils~~

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
13.9				6.9			

SHIPMENT RELEASE (client use)

Released by: Hallett | Date: July 27/23 | Time:

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: LR | Date: 07/27/23 | Time: 9:45

FINAL SHIPMENT RECEPTION (lab use only)

Received by: AB | Date: 07128123 | Time: 10:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS : 3752603

WORK REQUEST : 100254385

Report Date : 2023-11-10

Kollaard Associates Inc.
210 Prescott St., Box 189
Kemptville, ON
K0G 1J0
Attention : Colleen Vermeersch

Reception Date :	2023-11-03
Project :	230403
Sampler :	NA
PO Number :	Not Applicable
Temperature :	8 °C

Analysis	Quantity	External Method
Metals Scan (Water, ICP/MS)	2	Modified from EPA 200.8

Criteria :
A : Ontario Regulation 169/03 (Non-Regulated Drinking Water)

Sample status upon receipt :
7351862 7351863
Compliant

Notes :
- All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise stated.
- Eurofins Environment Testing Canada Inc. is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at https://directory.cala.ca/
- Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline or regulatory limits listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official guideline or regulation as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Legend :

RL : Reporting limit	N/A : Not applicable	* : Analysis conducted by external subcontracting
QC : Reference material (QC)	1 : Results in annex	^ : Analysis not accredited

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-11-03

					Eurofins Sample No :	**7351862**	**7351863**			
					Matrix :	Drinking water	Drinking water			
					Sampling Date :	2023-11-02	2023-11-02			
					Client Sample Identification :	151 Wescar Lane-TW1	144 Wescar Lane			
Metals	**RL**	**Unit**	**Criteria**							
			A	**B**	**C**					
Antimony	0.0005	mg/L	0.006			<0.0005	0.0049			

Approved by : R. Zafari
Raheleh Zafari,
Ottawa, Environmental Chemist, PhD

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-11-03

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Metals Scan (Water, ICP/MS)									
Method : Metals (Water, ICP/MS). Internal method: AMMTFQE1.									
Antimony	mg/L	0.0005	<0.0005	94	80-120	108	70-130	-	0-20
Associated Samples : 7351862, 7351863								Prep Date: 2023-11-09 Analysis Date: 2023-11-03	

Where RPD % is reported as "-" the calculation is not available because one or both of the duplicates is within 5 times the RL.

eurofins

DRINKING WATER CHAIN-OF-CUSTODY

146 Colonnade Road, Unit #8, Ottawa, ON, K2E 7Y1 - Phone: 613-727-5692, Fax: 613-727-5222

Eurofins Workorder #: 100254385

Printed On: 2023-11-03 16:43:06

CLIENT INFORMATION		WATERWORKS INFORM	
Company: Kollaard Associates Inc.		Waterworks Name:	
Contact: Colleen Vermeersch		Waterworks #:	
Address: 210 Prescott St, Kemptville, On K0G 1J0		Contact:	
Telephone: 613-860-0923 ext230	Fax:	Address:	
Email #1:	#2:	Telephone:	Fax:
Project: 230403		Cell Phone:	
PO #:	Quote #: 170314	Email #1:	#2:

REGULATION/GUIDELINE REQUIRED

☐ O. Reg 170 ☐ O. Reg 170 15.1 ☑ ODWSOG ☑ Private Well ☐ None

☐ O. Reg 318/319 ☐ O. Reg 243 ☐ GCDWQ ☐ Other:

TURN-AROUND TIME (Business Days)

☐ 1 Day* (100%) ☐ 2 Day** (50%) ☐ 3-5 Days (25%) ☑ 5-7 Days (Standard)

Please contact the laboratory in advance to determine rush availability. Surcharges may apply to rush service. Note that some tests (i.e. O. Reg. 170 Schedule 24 pesticides may take up to 3 weeks to analyze). Please see notes (on reverse) about TAT policies.

The optimal temperature conditions during transport must be less than 10°C. Sample(s) cannot be frozen. Note that for drinking water samples, all exceedances will be reported where (and how) the application legislation requires.
The COC must be complete upon submission of the samples, there will be a $25 surcharge if required information is missing (required fields are shaded in grey).

Sample Details								Sample Analysis Required							Field Measurements			
Sample ID	Date/Time Collected	Sample Type Code (see below)	Resample? Y = Yes N = No	MOE/MOH Reportable? Y = Yes N = No	# of Containers	SPL Code/Watertrax	Sample Location (i.e. Kitchen, POE)	Antimony							Total Chlorine	Free Chlorine	Field Turbidity	Sample RN# (Lab Use Only)
151 Wescar Lane-TW1	Nov 2/23 12pm	PW	N	N	1		wellhead	✓										7351862
144 Wescar Lane	Nov 2/23 12pm	PW	N	N	1		wellhead	✓										63

Sample Type Codes for Drinking Water: **RW** = Raw Water, **TW** = Treated Water at Point of Entry to distribution, **TW-NT** = Untreated Water at Point of Entry to distribution, **DW** = Distribution, **RP** = Residential Plumbing, **NRP** = Non-Residential Plumbing, **S** = Standing, **F** = Flushed, **PW** = Private Well

	PRINT	SIGN	DATE/TIME	TEMP (°C)
Sampled By:	Connor Ibach			
Relinquished By:				
Received By:			Nov 3/23 @ 9:00	7.9

COMMENTS: Sample for metals were field filtered using 0.45 micron filter

Copies: White - Laboratory, Yellow - Sampler

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS : 3797058

WORK REQUEST : 100261741

Report Date : 2024-01-02

Kollaard Associates Inc.
210 Prescott St., Box 189
Kemptville, ON
K0G 1J0
Attention : Colleen Vermeersch

Reception Date :	2023-12-21
Project :	230403
Sampler :	NA
PO Number :	Not Applicable
Temperature :	14 °C

Analysis	Quantity	External Method
Metals Scan (Water, ICP/MS)	1	Modified from EPA 200.8

Criteria :
A : Ontario Regulation 169/03 (Non-Regulated Drinking Water)

Sample status upon receipt :

7448839
Compliant

Notes :

- All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise stated.
- Eurofins Environment Testing Canada Inc. is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at https://directory.cala.ca/
- Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline or regulatory limits listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official guideline or regulation as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Legend :

RL : Reporting limit	N/A : Not applicable	* : Analysis conducted by external subcontracting
QC : Reference material (QC)	1 : Results in annex	^ : Analysis not accredited

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-12-21

					Eurofins Sample No :	**7448839**				
					Matrix :	Drinking water				
					Sampling Date :	2023-12-21				
					Client Sample Identification :	144 Wescar Lane				
Metals	**RL**	**Unit**	**Criteria**							
			A	**B**	**C**					
Antimony	0.0005	mg/L	0.006			<0.0005				

Approved by :

Emma-Dawn Ferguson,
Enviromental Chemist

eurofins | Environment Testing
146 Colonnade Rd, Unit 8, Ottawa, ON K2E 7Y1 (613) 727-5692

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Kollaard Associates Inc.
Project : 230403

Reception Date: 2023-12-21

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Metals Scan (Water, ICP/MS)									
Method : Metals (Water, ICP/MS). Internal method: AMMTFQE1.									
Antimony	mg/L	0.0005	<0.0005	82	80-120	99	70-130	-	0-20
Associated Samples : 7448839								Prep Date: 2023-12-27 Analysis Date: 2024-01-02	

Where RPD % is reported as "-" the calculation is not available because one or both of the duplicates is within 5 times the RL.

eurofins

DRINKING WATER CHAIN-OF-CUSTODY

146 Colonnade Road, Unit #8, Ottawa, ON, K2E 7Y1 - Phone: 613-727-5692, Fax: 613-727-5222

100261741

Printed On : 2023-12-22 10:48:09

CLIENT INFORMATION		WATERWORKS INFORMATION	
Company: Kollaard Associates Inc.		Waterworks Name:	
Contact: Colleen Vermeersch		Waterworks #:	
Address: 210 Prescott St, Kemptville, On K0G 1J0		Contact:	
Telephone: 613-860-0923 ext230	Fax:	Address:	
Email #1:	#2:	Telephone:	Fax:
Project: 230403		Cell Phone:	
PO #:	Quote #: 170314	Email #1:	#2:

REGULATION/GUIDELINE REQUIRED

☐ O. Reg 170 ☐ O. Reg 170 15.1 ☑ ODWSOG ☑ Private Well ☐ None
☐ O. Reg 318/319 ☐ O. Reg 243 ☐ GCDWQ ☐ Other:

TURN-AROUND TIME (Business Days)

☐ 1 Day* (100%) ☐ 2 Day** (50%) ☐ 3-5 Days (25%) ☑ 5-7 Days (Standard)

Please contact the laboratory in advance to determine rush availability. Surcharges may apply to rush service. Note that some tests (i.e. O. Reg. 170 Schedule 24 pesticides may take up to 3 weeks to analyze). Please see notes (on reverse) about TAT policies.

The optimal temperature conditions during transport must be less than 10°C. Sample(s) cannot be frozen. Note that for drinking water samples, all exceedances will be reported where (and how) the application legislation requires.
The COC must be complete upon submission of the samples, there will be a $25 surcharge if required information is missing (required fields are shaded in grey).

Sample Details								Sample Analysis Required							Field Measurements			
Sample ID	Date/Time Collected	Sample Type Code (see below)	Resample? Y = Yes N = No	MOE/MOH Reportable? Y = Yes N = No	# of Containers	SPL Code/Watertrax	Sample Location (i.e. Kitchen, POE)	Subdivision parameters	Kollaard Subdivisionbacteria	Kollaard Special Metals	true colour	Antimony, Sb			Total Chlorine	Free Chlorine	Field Turbidity	Sample RN# (Lab Use Only)
144 Wescar Lane	12-21 /	PW	N	N	1		POE					✓			-		-	7448839
															-		-	

Sample Type Codes for Drinking Water: RW = Raw Water, TW = Treated Water at Point of Entry to distribution, TW-NT = Untreated Water at Point of Entry to distribution, DW = Distribution, RP = Residential Plumbing, NRP = Non-Residential Plumbing, S = Standing, F = Flushed, PW = Private Well

	PRINT	SIGN	DATE/TIME	TEMP (°C)
Sampled By:	Isaac Bacon			
Relinquished By:				
Received By:		SM	12/21/23	14

4.35

COMMENTS: Sample for metals were field filtered using 0.45 micron filter

Copies: White - Laboratory, Yellow - Sampler

Ryznar Stability Index

RSI = 2(pH_s) - pH

RSI << 6 → the scale tendency increases as the index decreases
RSI >> 7 → the calcium carbonate formation probably does not lead to a protective corrosion inhibitor film
RSI >> 8 → mild steel corrosion becomes an increasing problem

Langelier Saturation Index

LSI = pH - pH_s

If LSI is negative → no potential to scale, the water will dissolve $CaCO_3$

If LSI is positive → scale can form and $CaCO_3$ precipitation may occur

If LSI is close to zero → borderline scale potential, water quality or temperature change or evaporation could change the index

where pH measured from sample
pH_s = pH at saturation in calcite or calcium carbonate

$$pH_s = (9.3 + A + B) - (C + D)$$

$$A = \frac{\log_{10}[TDS] - 1}{10}$$

$$B = -13.12 \times \log_{10}(°C + 273) + 34.55$$

$$C = \log_{10}[Ca^{2+} as CaCO_3] - 0.4$$

$$D = \log_{10}[alkalinity as CaCO_3]$$

	TW1-3hr	TW1-6hr
pH	7.61	7.62
hardness [mg/l as $CaCo_3$]	336	339
Alkalinity [mg/l as $CaCo_3$]	343	357
total dissolved solids [mg/l]	515	552
temperature (°C)	12.9	13.1
→→ RSI	6.66	6.60
→→ LSI	0.48	0.51

ATTACHMENT D

SEWAGE EFFLUENT DILUTION CALCULATIONS
AND CLIMATE DATA

January 2025 230403

SEPTIC EFFLUENT DILUTION CALCULATIONS
USING PREDICTED NUMBER OF EMPLOYEES

Number of Lots	1	
Gross Site Area	46267	m^2
Env. Can. Water Surplus (NPI-glacial till)	328	mm

Hard Surface Area (Post-Development)

Building Area	3566	m^2
Run off from Hard (asphalt) surfaced areas (31,137 m2, C=0.9)	31,137	
gravel area (semi-pervious, C=0.6)	0	
	34703	

Net Infiltration Area = Gross Site Area - Hard Surface Area (Post-Development)

11564 m^2

Recharge = NIA x NPI	3792.992	m3/year
	10391.759	L/day

Number of employees	60	
Sewage Demand (for sewage impact considerations)	75	L/day/employee
Total actual average daily sewage flow	4500	L/day

Total average daily sewage flow 1,643 m^3/year

Infiltration Reduction Factor:

Topography (flat)	0.30
Soil (medium combination of clay and loam)	0.20
Cover (cultivated)	0.10
Total IRF	0.60

treated effluent nitrate level 20 mg/l

Typical Expected Nitrate Concentration using Average Daily Sewage Design Flow

$$\frac{\text{Volume of Effluent Per Year x Nitrate mg/L } NO_3}{\text{Number of Lots x Volume Effluent Per Year + (Net Infiltration Area x NPI x IRF)}} = 8.4 \text{ mg/L } NO_3\text{-N}$$

January 2025 230403

SEPTIC EFFLUENT DILUTION CALCULATIONS
USING MAXIMUM NUMBER OF EMPLOYEES

Number of Lots	1	
Gross Site Area	46267	m^2
Env. Can. Water Surplus (NPI-glacial till)	328	mm

Hard Surface Area (Post-Development)

Building Area	3566	m^2
Run off from Hard (asphalt) surfaced areas (31,137 m2, C=0.9)	31,137	
gravel area (semi-pervious, C=0.6)	0	
	34703	

Net Infiltration Area = Gross Site Area - Hard Surface Area (Post-Development)

11564 m^2

Recharge = NIA x NPI	3792.992	m3/year
	10391.759	L/day

Number of employees	83	
Sewage Demand (for sewage impact considerations)	75	L/day/employee
Total actual average daily sewage flow	6225	L/day

Total average daily sewage flow 2,272 m^3/year

Infiltration Reduction Factor:

Topography (flat)	0.30
Soil (medium combination of clay and loam)	0.20
Cover (cultivated)	0.10
Total IRF	0.60

treated effluent nitrate level 20 mg/l

Typical Expected Nitrate Concentration using Average Daily Sewage Design Flow

$$\frac{\text{Volume of Effluent Per Year x Nitrate mg/L } NO_3}{\text{Number of Lots x Volume Effluent Per Year + (Net Infiltration Area x NPI x IRF)}} = 10.0 \text{ mg/L } NO_3\text{-N}$$

WATER SURPLUS DATA (1983-2002)

Soil Type: Glacial Till
Water Holding Capacity: 200 millimetres

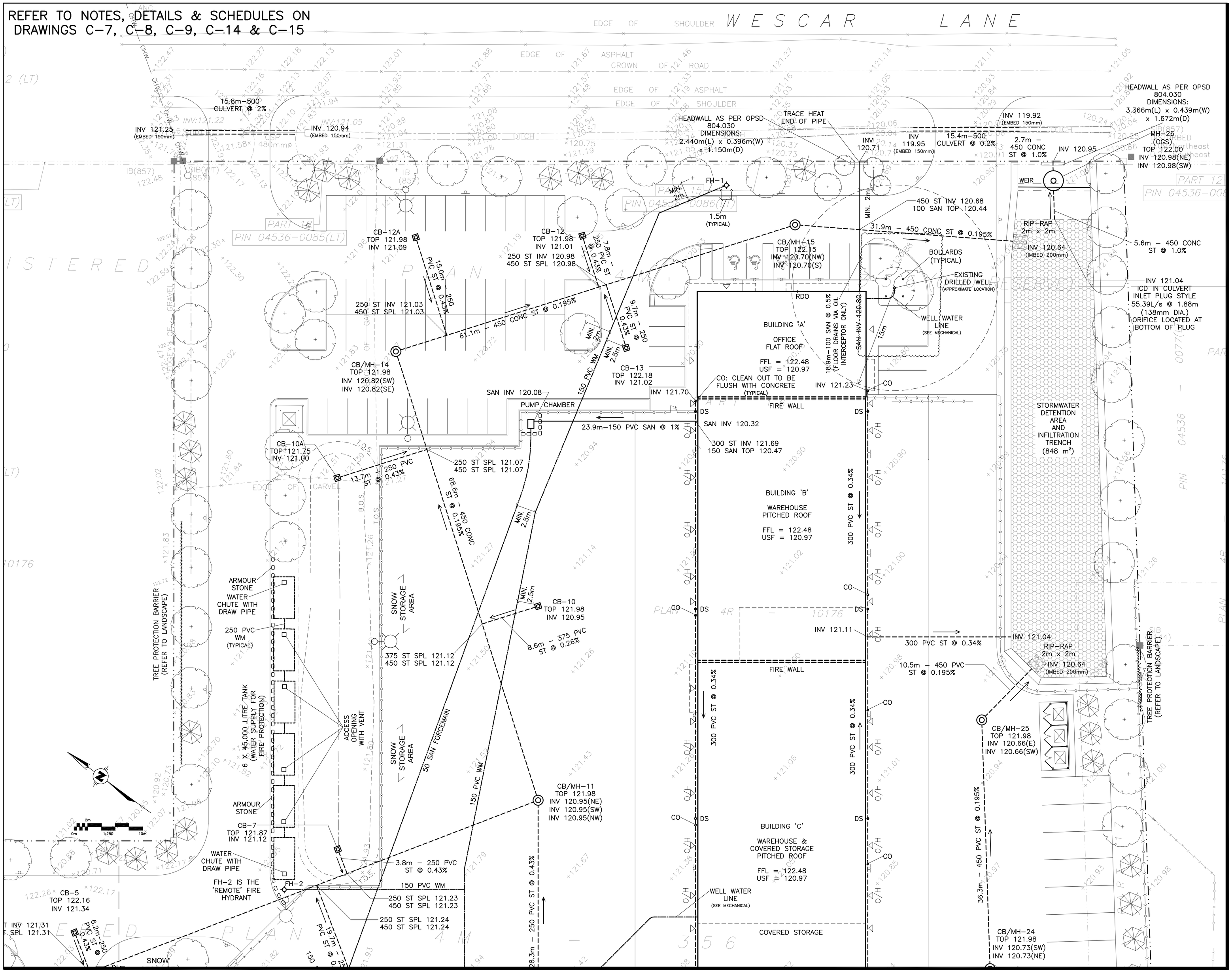
Year	Surplus (mm)
1983	379.0
1984	386.7
1985	268.4
1986	473.4
1987	240.6
1988	289.3
1989	269.7
1990	381.6
1991	335.8
1992	356.6
1993	472.1
1994	335.6
1995	300.4
1996	384.0
1997	341.1
1998	240.5
1999	199.6
2000	329.3
2001	222.2
2002	353.2

Avg. Surplus (mm) (1983-2003)	328.0
Avg. Surplus (mm) (1993-2003)	317.8

ATTACHMENT E

SITE SERVICING PLANS (DB GRAY ENGINEERING)

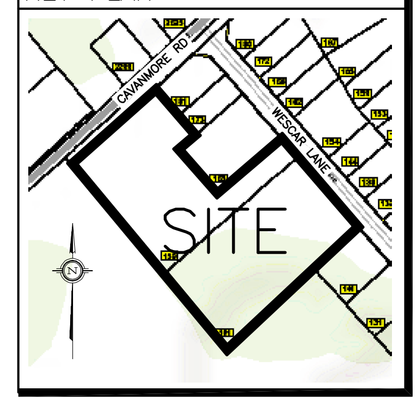
REFER TO NOTES, DETAILS & SCHEDULES ON DRAWINGS C-7, C-8, C-9, C-14 & C-15



LEGEND

FFL	FINISHED FLOOR ELEVATION
USF	UNDERSIDE OF FOOTING
	PROPERTY LINE
CB	CATCH-BASIN
MH	STORM MANHOLE
CB/MH	CATCH-BASIN/MANHOLE
SAN	SANITARY SEWER
SAN	SANITARY FORCEMAIN
ST	STORM SEWER
WL/WM	WELL WATER LINE/WATERMAIN
SPL	SPRINGLINE OF PIPE
INV	INVERT OF PIPE
T.O.S	TOP OF SLOPE
B.O.S	BOTTOM OF SLOPE
	CENTERLINE OF SWALE
	150mm BARRIER CURB

KEY PLAN



No.	DATE	REVISION
8	FEB 7-25	RE-ISSUED FOR APPROVAL
7	AUG 22-24	RE-ISSUED FOR APPROVAL
6	AUG 19-24	ISSUED TO OFS FOR APPROVAL OF FIRE TANKS & FHs LOCATION
5	JUL 10-24	ISSUED FOR BUILDING PERMIT
4	DEC 13-23	RE-ISSUED FOR APPROVAL
3	AUG 31-23	ISSUED FOR APPROVAL
2	AUG 16-23	ISSUED FOR COORDINATION
1	JUL 18-23	ISSUED FOR COORDINATION

D. B. GRAY ENGINEERING INC.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle 613-425-8044

Ottawa, Ontario d.gray@dbgrayengineering.com

Project

SUNBELT RENTALS INC.- EQUIPMENT MAINTENANCE FACILITY

CARP, ONTARIO

Drawing Title

SITE SERVICING PLAN (EAST AREA)

D07-12-24-0105 / #19219

Engineer's Seal

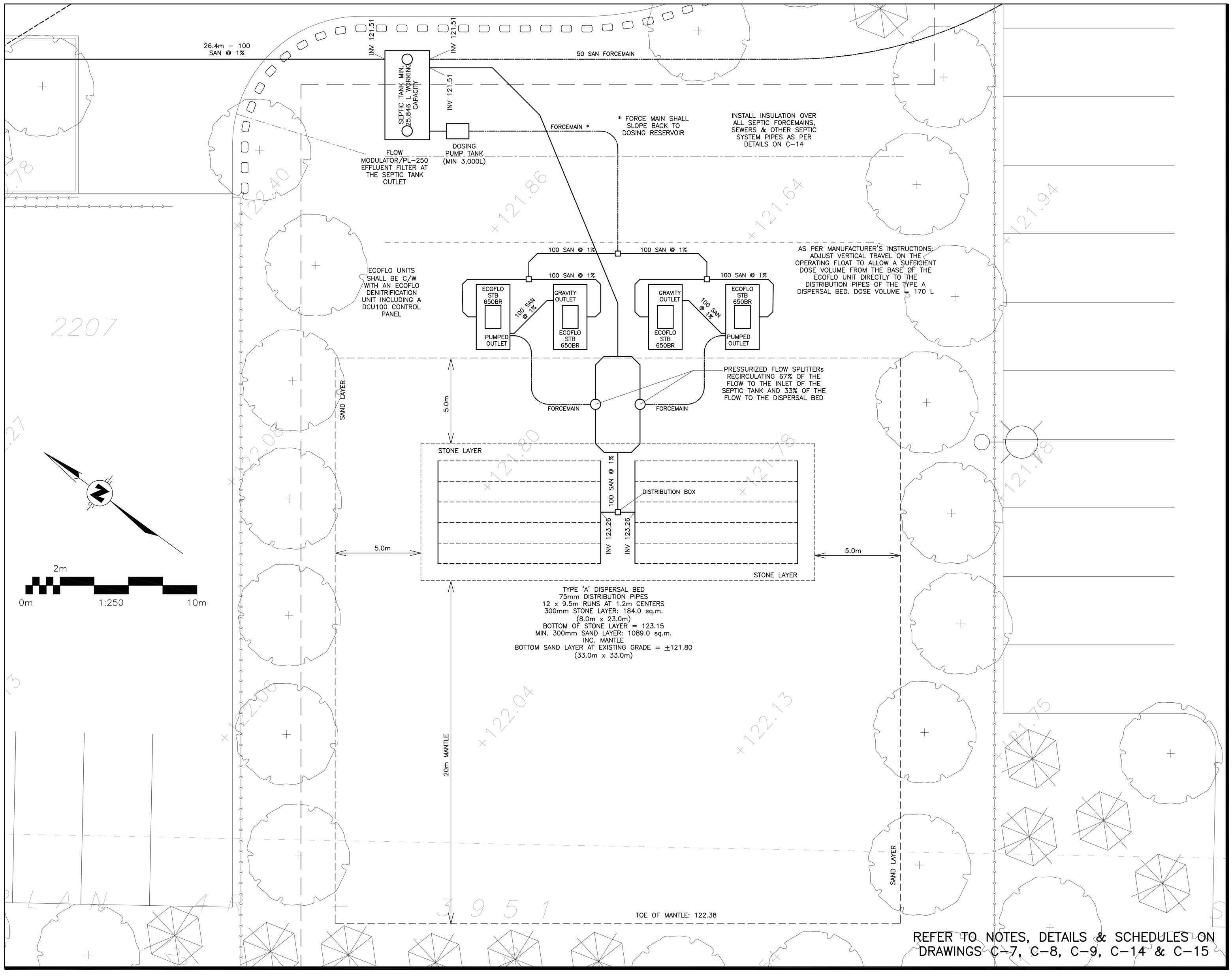
LICENSED PROFESSIONAL ENGINEER D.B. GRAY 17016502 FEB 7-25 PROVINCE OF ONTARIO

NOT VALID UNLESS SIGNED & DATED

Drawn	D.B.G
H. Scale	1:250
V. Scale	
Date	JUL 17-23
Job No.	22111

Drawing No.

C-2 of 17

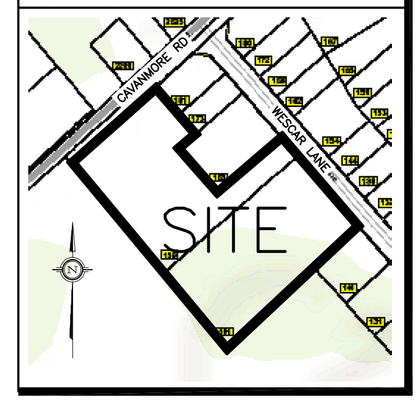


REFER TO NOTES, DETAILS & SCHEDULES ON DRAWINGS C–7, C–8, C–9, C–14 & C–15

LEGEND

FFL	FINISHED FLOOR ELEVATION
USF	UNDERSIDE OF FOOTING
	PROPERTY LINE
CB	CATCH–BASIN
MH	STORM MANHOLE
CB/MH	CATCH–BASIN/MANHOLE
SAN	SANITARY SEWER
SAN	SANITARY FORCEMAIN
ST	STORM SEWER
WL/WM	WELL WATER LINE/WATERMAIN
SPL	SPRINGLINE OF PIPE
INV	INVERT OF PIPE
T.O.S	TOP OF SLOPE
B.O.S	BOTTOM OF SLOPE
	CENTERLINE OF SWALE
	150mm BARRIER CURB

KEY PLAN



No.	DATE	REVISION
8	FEB 7–25	RE–ISSUED FOR APPROVAL
7	JAN 21–25	ISSUED TO OSSO FOR SEPTIC PERMIT
6	AUG 22–24	RE–ISSUED FOR APPROVAL
5	JUL 10–24	ISSUED FOR BUILDING PERMIT
4	DEC 13–23	RE–ISSUED FOR APPROVAL
3	AUG 31–23	ISSUED FOR APPROVAL
2	AUG 16–23	ISSUED FOR COORDINATION
1	JUL 17–23	ISSUED FOR COORDINATION

D. B. GRAY ENGINEERING INC.
Stormwater Management · Grading & Drainage · Storm & Sanitary Sewers · Watermains
700 Long Point Circle 613-425-8044
Ottawa, Ontario d.gray@dbgrayengineering.com

Project

SUNBELT RENTALS INC.– EQUIPMENT MAINTENANCE FACILITY

CARP, ONTARIO

Drawing Title

SEPTIC SYSTEM

Engineer's Seal

LICENSED PROFESSIONAL ENGINEER
D.B. GRAY
17016502
FEB 7–25
PROVINCE OF ONTARIO

NOT VALID UNLESS SIGNED & DATED

Drawn	D.B.G
H. Scale	1:100
V. Scale	
Date	JUL 17–23
Job No.	22111

Drawing No.

C–5
of 17

D07–12–24–0105 / #19219

ATTACHMENT F

OTTAWA PUBLIC HEALTH *MANGANESE IN DRINKING WATER FACT SHEET*

Manganese in Drinking Water Fact Sheet

WHAT IS MANGANESE?

Manganese is a naturally occurring element that is an essential nutrient for humans and animals. It is found in many foods, as well as in air, water, soil, and rocks.[1] Manganese makes up 0.1% of the Earth's crust, and can be found as a component of other minerals like sulfides, oxides, carbonates, and silicates.[2] Manganese is used in the manufacture of various products including iron and steel alloys, batteries, glass, fireworks, fertilizers, cosmetics, paints, and cleaning and disinfection products.[1,2] Manganese can also be purchased as a nutritional supplement.[2]

HOW DOES MANGANESE GET INTO DRINKING WATER?

Manganese is naturally occurring in many surface and ground waters. Manganese can also be dissolved from soils, sand and rocks to enter surface and ground waters.[1] Human activities like mining, industrial discharges, or landfills may also contribute to manganese in surface and ground waters.[1,2] In general, manganese can be found at higher concentrations in groundwater compared to surface water.[2] Some lakes and reservoirs can also have higher levels of manganese due to natural water chemistry.[2]

Permanganate, a compound that contains manganese, may also be added to water during the treatment of drinking water to remove other chemicals (e.g., for the removal of iron).[2,3]

HOW DOES MANGANESE INTAKE AFFECT MY HEALTH?

Too much or too little manganese in your body can lead to health problems.

Manganese deficiency: Manganese deficiency is rare and symptoms are not well defined. Health effects observed in individuals with diets very low in manganese include skin rashes, slow nail growth, reduced bone density, loss of pigmentation in hair, and low cholesterol levels.[2]

Manganese excess: There are few reports of adverse health effects from people who ingest too much manganese from food and water.[1] Recent evidence reviewed by Health Canada indicates that high levels of manganese in drinking water may impact memory and learning, behaviour, and fine motor control in infants and young children.[2,4] Formula-fed infants may be more susceptible to health risks if water with high concentrations of manganese is used to prepare formula. This is because infant brains are rapidly developing, they drink more water in proportion to their body weight, and they absorb more manganese and are less able to remove it from their bodies compared to other age groups.[3] For adults

and older children, short term exposure to manganese in drinking water at levels slightly above the guideline is unlikely to cause negative health effects.[3]

Health Canada notes that exposure to manganese while showering (either through breathing in water vapour or absorption through skin) is likely to be negligible.[2]

WHAT ARE THE LEVELS OF MANGANESE FOUND IN CANADIANS?

For most Canadians, diet is the main source of manganese. The Canadian Health Measures Survey (CHMS) is a national survey that collects information about the general health of Canadians and includes measurements of chemicals in blood and urine samples.[5] The objective of the chemical measurements in the CHMS survey is to establish baseline levels in the Canadian population. Given that manganese is an essential trace element, its presence in the blood and urine of Canadians is expected. Manganese in blood and urine can be interpreted as an indicator of exposure, but does not necessarily mean that health effects will occur.[5] Data collected from 2007 to 2011 for the CHMS found that the average levels of manganese measured in the blood of people in the Canadian population (aged 3 to 79) ranged from 8.8 – 11 µg/L.[6] More information on the CHMS and the levels of manganese in Canadians can be obtained by visiting the Canadian Biomonitoring Dashboard.[6]

ARE THERE STANDARDS FOR MANGANESE IN DRINKING WATER?

The Ontario Drinking Water Standard (ODWS) published in 2006 sets an aesthetic objective for manganese in drinking water at 0.05 mg/L.[7] The aesthetic objective is not intended to prevent health effects (e.g., not a health-based standard), but instead is intended to prevent the discolouration and staining of fixtures, and the undesirable taste caused by higher levels of manganese in water.

The Canadian Drinking Water Guideline for manganese developed by Health Canada stipulates a maximum acceptable concentration (MAC) in drinking water of 0.12 mg/L and an aesthetic objective of 0.02 mg/L.[2] The MAC is a health-based value intended to be protective of neurological effects in infants, the most sensitive population, and therefore it is also protective for chronic exposure in children and adults.[2]

ARE THERE OTHER STANDARDS OR GUIDELINE VALUES FOR MANGANESE?

The main source of exposure to manganese is via food, with grains, nuts and vegetables contributing the most to a person's daily intake of manganese. The average dietary intakes of manganese across all age groups according to the Canadian Total Diet Study (TDS) were estimated to range between 44.0 to 61.3 µg/kg of bodyweight per day (based on data gathered from different Canadian cities for the TDS).[2] Health Canada has also established Adequate Intake Levels for manganese ranging with age or lifestage from 0.003 to 2.6 mg/day and Tolerable Upper Intake Levels ranging from 2 to 11 mg/day.[8]

Infant formula sold in Canada is regulated to contain a minimum of 5 µg of manganese per 100 available kilocalories (equivalent to 3.33 µg per 100 mL of ready-to-feed formula); a maximum amount of manganese has not been set for infant formula.[9]

HOW CAN I TELL IF MY DRINKING WATER HAS HIGH MANGANESE LEVELS?

Water testing is the only way to know if manganese is present. Although water with elevated levels of manganese may impart a bitter metallic taste, tint water purplish brown or black (water discolouration may occur at concentrations as low as 0.005 to 0.02 mg/L), and stain laundry and plumbing fixtures;[2,10,11] but these issues can also be caused by other chemicals.

WHAT SHOULD I DO IF A HIGH LEVEL OF MANGANESE IS FOUND IN MY WELL WATER?

For households who do not obtain their drinking water from a municipal source, a residential drinking water treatment device may be an option to reduce manganese concentrations in drinking water. Options can be explored with professionals specialized in water treatment, but examples of treatment processes effective at removing manganese include reverse osmosis, ion exchange (including water softeners and other cation exchange systems) and oxidizing filters.[2] As with any water treatment system, it is important to follow the manufacturer's recommendations for operation and maintenance (e.g., replacement of filter media).

REFERENCES

1. United States Environmental Protection Agency (US EPA). Drinking Water Health Advisory for Manganese [Internet]. 2004. Available from: https://www.epa.gov/sites/default/files/2014-09/documents/support_cc1_magnese_dwreport_0.pdf

2. Health Canada. Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Manganese [Internet]. 2019. Available from: https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-drinking-water-quality-guideline-technical-document-manganese.html

3. Health Canada. Water Talk - Manganese in drinking water [Internet]. 2023. Available from: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/water-talk-manganese.html

4. HealthLink British Columbia. Manganese in Drinking Water [Internet]. Available from: https://www.healthlinkbc.ca/healthlinkbc-files/manganese-drinking-water

5. Health Canada. Second Report on Human Biomonitoring of Environmental Chemicals in Canada: Manganese [Internet]. 2013. Available from: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/environmental-contaminants/second-report-human-biomonitoring-environmental-chemicals-canada-health-canada-2013.html#a8.9

6. Government of Canada. Canadian Biomonitoring Dashboard [Internet]. 2024. Available from: https://health-infobase.canada.ca/biomonitoring/about.html

7. Ontario Ministry of the Environment, Conservation and Parks. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines [Internet]. 2006. Available from: https://wcwc.ca/wp-content/uploads/2021/08/Technical-Support-Document-for-Ontario-Drinking-Water-Standards-Objectives-and-Guidelines.pdf

8. Health Canada. Dietary reference intakes tables: Reference values for elements [Internet]. 2023. Available from: https://www.canada.ca/en/health-canada/services/food-nutrition/healthy-eating/dietary-reference-intakes/tables/reference-values-elements.html#tbl2

9. Government of Canada. Food and Drug Regulations (C.R.C., c. 870) [Internet]. Available from: https://lois-laws.justice.gc.ca/eng/regulations/C.R.C.%2C_c._870/page-53.html

10. United States Environmental Protection Agency (US EPA). Secondary Drinking Water Standards: Guidance for Nuisance Chemicals [Internet]. 2024. Available from: https://www.epa.gov/sdwa/secondary-drinking-water-standards-guidance-nuisance-chemicals

11. World Health Organization (WHO). Manganese in drinking-water: Background document for development of WHO Guidelines for drinking-water quality [Internet]. 2021. Available from: https://www.who.int/publications/i/item/WHO-HEP-ECH-WSH-2021.5

Please note: This fact sheet was created by Ottawa Public Health in consultation with Public Health Ontario.

Fiche de renseignements sur le manganèse dans l'eau potable

QU'EST-CE QUE LE MANGANÈSE?

Le manganèse est un élément naturel qui constitue un nutriment essentiel pour les humains et les animaux. On le trouve dans de nombreux aliments, ainsi que dans l'air, l'eau, le sol et les roches.[1] Le manganèse représente 0,1 % de la croûte terrestre et peut être présent dans d'autres minéraux tels que les sulfures, les oxydes, les carbonates et les silicates.[2] Le manganèse est utilisé dans la fabrication de divers produits, notamment les alliages de fer et d'acier, les batteries, le verre, les feux d'artifice, les engrais, les cosmétiques, les peintures et les produits de nettoyage et de désinfection.[1,2] Le manganèse peut également être acheté sous forme de supplément alimentaire.[2]

COMMENT LE MANGANÈSE SE RETROUVE-T-IL DANS L'EAU POTABLE?

Le manganèse est naturellement présent dans de nombreuses eaux de surface et souterraines. Le manganèse peut également être dissous à partir des sols, du sable et des roches et pénétrer dans les eaux de surface et souterraines.[1] Les activités humaines telles que l'exploitation minière, les rejets industriels ou les décharges peuvent également contribuer à la présence de manganèse dans les eaux de surface et les eaux souterraines.[1,2] En général, les concentrations de manganèse sont plus élevées dans les eaux souterraines que dans les eaux de surface.[2] Certains lacs et bassins peuvent également présenter des niveaux plus élevés de manganèse en raison de la chimie naturelle de l'eau.[2]

Le permanganate, un composé qui contient du manganèse, peut également être ajouté à l'eau pendant le traitement de l'eau potable pour éliminer d'autres produits chimiques (par exemple, pour éliminer le fer).[2,3]

COMMENT LA CONSOMMATION DE MANGANÈSE AFFECTE-T-ELLE MA SANTÉ?

Un excès ou un manque de manganèse dans l'organisme peut entraîner des problèmes de santé.

Carence en manganèse : La carence en manganèse est rare et les symptômes ne sont pas bien définis. Les effets sur la santé observés chez les personnes ayant une alimentation très pauvre en manganèse comprennent des éruptions cutanées, une croissance lente des ongles, une densité osseuse réduite, une perte de pigmentation des cheveux et un faible taux de cholestérol.[2]

Excès de manganèse : Peu de rapports font état d'effets néfastes sur la santé des personnes qui consomment trop de manganèse provenant des aliments et de l'eau.[1] Des éléments de preuves récents

examinés par Santé Canada indiquent que des niveaux élevés de manganèse dans l'eau potable peuvent avoir des répercussions sur la mémoire et l'apprentissage, le comportement et le contrôle de la motricité fine chez les nourrissons et les jeunes enfants.[2,4] Les bébés nourris à l'aide de préparations pour nourrissons peuvent être davantage exposés à des risques pour la santé si de l'eau contenant de fortes concentrations de manganèse est utilisée pour préparer les biberons. En effet, le cerveau des nourrissons se développe rapidement, ils boivent plus d'eau par rapport à leur poids corporel, ils absorbent plus de manganèse et sont moins aptes à l'éliminer de leur corps que les autres groupes d'âge.[3] Pour les adultes et les enfants plus âgés, une exposition à court terme au manganèse dans l'eau potable à des niveaux légèrement supérieurs à ceux des directives ne devrait pas avoir d'effets négatifs sur la santé.[3]

Santé Canada note que l'exposition au manganèse sous la douche (soit par l'inhalation de vapeur d'eau ou par l'absorption par la peau) est probablement négligeable.[2]

QUELS SONT LES NIVEAUX DE MANGANÈSE CHEZ LES CANADIENS?

Pour la plupart des Canadiens, l'alimentation est la principale source de manganèse. L'Enquête canadienne sur les mesures de la santé (ECMS) est une enquête nationale qui recueille des renseignements sur la santé générale des Canadiens et comprend la mesure des substances chimiques dans des échantillons de sang et d'urine.[5] L'objectif de la mesure des substances chimiques effectuée dans le cadre de l'ECMS est d'établir des niveaux de référence dans la population canadienne. Le manganèse étant un oligo-élément essentiel, sa présence dans le sang et l'urine des Canadiens est attendue. La présence de manganèse dans le sang et l'urine peut être interprétée comme un indicateur d'exposition, mais ne signifie pas nécessairement qu'il y aura des effets sur la santé.[5] Les données recueillies de 2007 à 2011 dans le cadre de l'ECMS ont révélé que les taux moyens de manganèse sanguin de la population canadienne (personnes âgées de 3 à 79 ans) allaient de 8,8 à 11 µg/L.[6] De plus amples renseignements sur l'ECMS et les niveaux de manganèse chez les Canadiens peuvent être obtenus en consultant le Tableau de bord sur la biosurveillance canadienne.[6]

Y A-T-IL DES NORMES POUR LE MANGANÈSE DANS L'EAU POTABLE?

Les Normes de qualité de l'eau potable de l'Ontario publiées en 2006 fixent un objectif d'ordre esthétique pour le manganèse dans l'eau potable à 0,05 mg/l.[7] Cet objectif n'est pas destiné à prévenir les effets sur la santé (il ne s'agit pas d'une norme liée à la santé), mais plutôt à prévenir la décoloration et la coloration des appareils sanitaires, ainsi que le goût indésirable causé par des niveaux élevés de manganèse dans l'eau.

Les Recommandations pour la qualité de l'eau potable au Canada établissent une concentration maximale acceptable (CMA) de 0,12 mg/L pour le manganèse dans l'eau potable et un objectif d'ordre esthétique de 0,02 mg/L.[2] La CMA est une valeur basée sur la santé qui vise à protéger les effets neurologiques chez les nourrissons, la population la plus sensible. De ce fait, elle vise également à protéger les enfants et les adultes en cas d'exposition chronique.[2]

EXISTE-T-IL D'AUTRES NORMES OU DIRECTIVES POUR LE MANGANÈSE?

La principale source d'exposition au manganèse est l'alimentation, les céréales, les noix et les légumes. Ces aliments contribuent le plus à l'apport quotidien en manganèse. Selon l'étude canadienne sur l'alimentation totale (EAT), les apports alimentaires moyens en manganèse pour tous les groupes d'âge ont été estimés entre 44,0 et 61,3 µg/kg de poids corporel par jour (d'après les données recueillies dans différentes villes canadiennes dans le cadre de l'EAT).[2] Santé Canada a également établi des apports suffisants en manganèse allant de 0,003 à 2,6 mg/jour en fonction de l'âge ou de l'étape de la vie et l'apport maximal tolérable (AMT) allant de 2 à 11 mg/jour.[8]

Les préparations pour nourrissons vendues au Canada sont réglementées et doivent contenir au minimum 5 µg de manganèse pour 100 kilocalories utilisables (ce qui équivaut à 3,33 µg pour 100 ml de préparations prêtes à servir); aucune quantité maximale de manganèse dans les préparations pour nourrissons n'a été établie.[9]

COMMENT PUIS-JE SAVOIR SI MON EAU POTABLE PRÉSENTE DES NIVEAUX ÉLEVÉS DE MANGANÈSE?

L'analyse de l'eau est le seul moyen de savoir si elle contient du manganèse. Cependant, l'eau contenant des niveaux élevés de manganèse peut avoir un goût métallique amer, une couleur pourpre, brune ou noire (la décoloration de l'eau peut se produire à des concentrations aussi faibles que 0,005 à 0,02 mg/L), et peut tacher la lessive et les appareils sanitaires.[2,10,11] Ces problèmes peuvent également être causés par d'autres produits chimiques.

QUE DOIS-JE FAIRE SI UN NIVEAU ÉLEVÉ DE MANGANÈSE EST DÉTECTÉ DANS L'EAU DE MON PUITS?

Pour les ménages qui ne s'approvisionnent pas en eau potable auprès d'une source municipale, un dispositif résidentiel de traitement de l'eau potable peut être une option pour réduire les concentrations de manganèse dans l'eau potable. Les options peuvent être étudiées avec des professionnels spécialisés dans le traitement de l'eau, mais des exemples de procédés de traitement efficaces pour éliminer le manganèse comprennent l'osmose inversée, l'échange d'ions (y compris les adoucisseurs d'eau et d'autres systèmes d'échange de cations) et les filtres oxydants.[2] Comme pour tout système de traitement de l'eau, il est important de suivre les recommandations du fabricant en matière de fonctionnement et d'entretien (par exemple, le remplacement du matériau filtrant).

RÉFÉRENCES

1. United States Environmental Protection Agency (US EPA). *Drinking Water Health Advisory for Manganese*. 2004. Document publié sur la page : https://www.epa.gov/sites/default/files/2014-09/documents/support_cc1_magnese_dwreport_0.pdf

2. Santé Canada. *Recommandations pour la qualité de l'eau potable au Canada : document technique – le manganèse*. 2019. Sur Internet : https://www.canada.ca/fr/sante-canada/services/publications/vie-saine/recommandations-pour-qualite-eau-potable-canada-document-technique-manganese.html

3. Santé Canada. *Parlons d'eau - Le manganèse dans l'eau potable*. 2023. Sur Internet : https://www.canada.ca/fr/sante-canada/services/sante-environnement-milieu-travail/rapports-publications/qualite-eau/manganese-dans-eau-potable.html

4. HealthLink British Columbia. *Manganese in Drinking Water.* Sur Internet : https://www.healthlinkbc.ca/healthlinkbc-files/manganese-drinking-water

5. Santé Canada. *Deuxième rapport sur la biosurveillance humaine des substances chimiques de l'environnement au Canada*. 2013. Sur Internet : https://www.canada.ca/fr/sante-canada/services/sante-environnement-milieu-travail/rapports-publications/contaminants-environnementaux/deuxieme-rapport-biosurveillance-humaine-substances-chimiques-environnement-canada-sante-canada-2013.html#a8.9

6. Gouvernement du Canada. *Tableau de bord sur la biosurveillance canadienne*. 2024. Sur Internet : https://sante-infobase.canada.ca/biosurveillance/a-propos.html

7. Ministère de l'Environnement, de la Protection de la nature et des Parcs de l'Ontario. *Document de soutien technique pour les normes, objectifs et lignes directrices de l'Ontario en matière d'eau potable*. 2006. Document publié sur la page : https://wcwc.ca/wp-content/uploads/2021/08/Technical-Support-Document-for-Ontario-Drinking-Water-Standards-Objectives-and-Guidelines.pdf (en anglais seulement)

8. Santé Canada. *Tableaux des apports nutritionnels de référence : Valeurs de référence relatives aux éléments*. 2023. Sur Internet : https://www.canada.ca/fr/sante-canada/services/aliments-nutrition/saine-alimentation/apports-nutritionnels-reference/tableaux/valeurs-reference-relatives-elements.html#tbl2

9. Gouvernement du Canada. *Règlement sur les aliments et drogues (C.R.C., ch. 870)*. Sur Internet : https://lois-laws.justice.gc.ca/fra/reglements/C.R.C.%2C_ch._870/page-53.html

10. United States Environmental Protection Agency (US EPA). *Secondary Drinking Water Standards: Guidance for Nuisance Chemicals*. 2024. Sur Internet : https://www.epa.gov/sdwa/secondary-drinking-water-standards-guidance-nuisance-chemicals

11. Organisation mondiale de la Santé. *Manganese in drinking-water: Background document for development of WHO Guidelines for drinking-water quality*. 2021. Sur Internet : https://www.who.int/publications/i/item/WHO-HEP-ECH-WSH-2021.5 (en anglais seulement)

Remarque : le contenu de cette fiche de renseignements a été fourni par Santé publique Ontario et adopté par Santé publique Ottawa aux fins d'utilisation dans les documents de communication sur les risques du bureau de santé publique.

Fiche de renseignements sur le manganèse dans l'eau potable [Dernière mise à jour : le 12 septembre 2024]