

**HYDROGEOLOGICAL INVESTIGATION  
REPORT**

**476420 3<sup>RD</sup> LINE**

**TOWNSHIP OF MELANCTHON  
COUNTY OF DUFFERIN**

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## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Existing Site Description .....	1
1.2	Proposed Redevelopment .....	1
<b>2.0</b>	<b>GEOLOGY .....</b>	<b>1</b>
2.1	Physiography, Topography & Drainage .....	1
2.2	Regional Geology .....	2
2.3	Local Geology .....	2
2.3.1	Topsoil .....	2
2.3.2	Earth Fill .....	2
2.3.3	Sand to Gravelly Sand .....	2
2.3.4	Glacial Till .....	3
2.4	Source Water Protection Information .....	3
<b>3.0</b>	<b>HYDROGEOLOGY .....</b>	<b>3</b>
3.1	MECP Well Records .....	4
3.2	Hydrostratigraphy .....	4
3.3	Groundwater Levels .....	4
3.4	Groundwater Quality .....	5
<b>4.0</b>	<b>FIELD WORK .....</b>	<b>5</b>
4.1	Monitoring Well Installation .....	5
4.2	Groundwater Monitoring .....	5
4.3	Overburden Water Quality Sampling .....	6
4.4	Water Quantity Testing .....	6
4.5	Bedrock Water Quality Sampling .....	6
<b>5.0</b>	<b>RESULTS .....</b>	<b>6</b>
5.1	Groundwater Levels .....	6
5.2	Overburden Water Quality .....	7
5.3	Water Quantity Testing .....	8
5.3.1	Step-Testing of PW1 .....	8
5.3.2	Step-Testing of PW2 .....	9
5.4	Bedrock Water Quality .....	9
5.4.1	PW1 Water Quality Analysis .....	9
5.4.2	PW2 Water Quality Analysis .....	10
<b>6.0</b>	<b>DESIGN CONSIDERATIONS .....</b>	<b>10</b>
6.1	Water Balance .....	11
6.1.1	Methodology .....	11
6.1.2	Precipitation (P) .....	11
6.1.3	Storage (S) .....	12
6.1.4	Evapotranspiration (ET) .....	12
6.1.5	Water Surplus (R+I) .....	13
6.1.6	Pre-Development Infiltration .....	13
6.1.7	Post-Development Infiltration .....	13
6.1.8	Water Balance Impact Assessment .....	13

<b>6.2</b>	<b>Short &amp; Long-Term Dewatering .....</b>	<b>13</b>
<b>7.0</b>	<b>CONCLUSIONS &amp; RECOMMENDATIONS .....</b>	<b>14</b>
<b>8.0</b>	<b>REFERENCES.....</b>	<b>15</b>

## LIST OF TABLES

<b>Table 1:</b>	Summary of Regional Hydrostratigraphy of the NVCA Watershed (NVCA, 2019)
<b>Table 2:</b>	Monitoring Well Details
<b>Table 3:</b>	Groundwater Levels (July 2024 – March 2025)
<b>Table 4:</b>	Overburden Water Quality Exceedances
<b>Table 5:</b>	PW1 Step-Test Results
<b>Table 6:</b>	PW2 Step-Test Results
<b>Table 7:</b>	PW1 Water Quality Results
<b>Table 8:</b>	PW2 Water Quality Results
<b>Table 9:</b>	Summary of Water Balance
<b>Table 10:</b>	Climate Data (1981 – 2010) for Ruskview Climate Station

## LIST OF APPENDICES

<b>Appendix A:</b>	MECP Well Summary Table
<b>Appendix B:</b>	Hydrographs
<b>Appendix C:</b>	Overburden Water Quality Results
<b>Appendix D:</b>	PW1: Step-Test Results
<b>Appendix E:</b>	Domestic Water Demand Calculations
<b>Appendix F:</b>	PW2: Step-Test Results
<b>Appendix G:</b>	PW1: Water Quality Results
<b>Appendix H:</b>	PW2: Water Quality Results
<b>Appendix I:</b>	Water Balance Assessment

## LIST OF FIGURES

<b>Figure 1:</b>	Site Location Plan
<b>Figure 2:</b>	Physiography
<b>Figure 3:</b>	Bedrock Geology
<b>Figure 4:</b>	Surficial Geology
<b>Figure 5:</b>	MECP Well Location Plan
<b>Figure 6:</b>	Monitoring Well Location Plan

## 1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) has been retained by Sheldon Creek Developments to prepare a comprehensive Hydrogeological Investigation Report in support of the future Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA) for the proposed residential redevelopment located at 476420 3<sup>rd</sup> Line, in the Township of Melancthon, County of Dufferin (Figure 1). The following report has been prepared to summarize existing conditions, characterize the hydrogeological system, describe hydrogeological driven constraints for the development, and assess whether there is sufficient groundwater capacity to support the future development. The scope of this report was designed to meet the relevant Township of Melancthon (Township), County of Dufferin (County) and Nottawasaga Valley Conservation Authority (NVCA) criteria.

### 1.1 Existing Site Description

Located at 476420 3<sup>rd</sup> Line, in the Township of Melancthon, County of Dufferin the development site (herein referred to as the Site) is approximately 37.0 ha. The Site is located in an agricultural area, and is bounded by agricultural lands to the north, south, and west, and 3<sup>rd</sup> line to the west. The Site is currently utilized as a permanent year-round residential community and seasonal campground (Chipwoods Park) with approximately 120 campsites. Other features on the property include a recreation hall, gatehouse, workshop, playground, pool, two (2) ponds, and at grade parking areas. The developed portion of the Site is located on the western portion of the property, accounting for approximately 12 ha, with the remainder of the property consisting of forested areas.

### 1.2 Proposed Redevelopment

Based on the Development Concept Plan prepared by Glen Schnarr & Associates Inc. (GSAI) dated June 20, 2025, the following elements are envisioned for the property:

- Residential Dwellings with an approximate coverage area of 6.31 ha
- Internal roadways and associated parking areas covering approximately 2.06 ha
- A common recreational area, complete with open green space, spanning approximately 0.74 ha

## 2.0 Geology

The following sections below outline the existing conditions of the Site Area based on literature review and field observations.

### 2.1 Physiography, Topography & Drainage

As shown in Figure 2, the Site is located within the Dundalk Till Plain physiographic region according to Chapman and Putnam (1984). The Dundalk Till Plain is a gently rolling, partially drumlinized, and fluted surface, where the long axis of the drumlins is oriented in a southeastward direction. Surface elevation in the Dundalk Till Plain ranges from approximately 523 metres above sea level (masl) to 485 masl. The Dundalk Till Plain is characterized by swamps, bogs, and wetlands due to the presence of poorly drained depressions.

The Site Area is situated in the Boyne River Subwatershed within the greater Nottawasaga Valley Watershed. Surface drainage is interpreted to follow topography and drain roughly in the eastern direction towards the Boyne River. The Boyne River flows towards the main branch of the Nottawasaga River and ultimately, reaches Georgian Bay.

## 2.2 Regional Geology

The Site sits atop a bedrock basement of the Amabel Formation. The Amabel Formation primarily consists of sandstone, shale, dolostone and siltstone. According to Ontario Geological Survey (OGS) mapping, the depth to bedrock is estimated to range from approximately 1.66 metres below ground surface (mbgs) to 34.71 mbgs. The surficial geology of the general study area primarily consists of glacial deposits accumulated following the last glaciation. A mixture of clay, silt textured till, sand, and gravel can be found within the Site area derived from glaciolacustrine deposits.

The Site is also located within an "area of potential karst" according to OGS mapping. Karst is a landform feature formed by the dissolution of carbonate bedrock by water. In areas of thin or absent overburden material, exposures of dolostone and limestone are subjected to weathering and dissolution, causing karstic features such as caves, crevices, springs, sinkholes, and smaller karren features such as vugs and fractures. The nearest occurrence of "known karst" to the site is located approximately 11.62 km southeast of the Site area. On the site and the surrounding area, overburden thickness is observed to be approximately between 1.66 m to 34.71 m. Since overburden thickness is greater than 1 m thick around the area of the Site, significant karst formation on the property is not anticipated. Please note that a formal investigation for the presence of karst features on the property has not been completed and is outside the scope of this report.

The bedrock and surficial geology of the Site and the general study area are displayed in Figure 3 and Figure 4, respectively.

## 2.3 Local Geology

A Geotechnical Investigation was completed in July 2024 to characterize the existing geological conditions and determine design constraints. Eight (8) boreholes were advanced on Site, and six (6) of the boreholes were converted to a monitoring well. According to the Geotechnical Investigation, the following stratigraphy was encountered:

### 2.3.1 Topsoil

Dark brown topsoil was encountered at all boreholes except for BH1, with thickness ranging from approximately 0.2 to 0.5 m.

### 2.3.2 Earth Fill

Earth fill predominantly comprised of sand to sandy silt, with trace to some gravel, and trace of clay was encountered in all boreholes. The earth fill was found underlying the surficial topsoil and extended to depths of approximately 0.8 to 0.9 mbgs.

### 2.3.3 Sand to Gravelly Sand

Native deposits of sand to gravelly sand with silt content ranging from trace of silt to silty, and trace of clay was encountered in all boreholes. These deposits extended to depths ranging from 3.0 to 6.6 mbgs.

#### 2.3.4 Glacial Till

Native deposits of a glacial till, comprised of sand till, silt till and sandy silt till, with trace to some gravel, trace to some clay, and cobble to boulder inclusions, was encountered in all boreholes except for BH2. The glacial till layer extended to the depths ranged between 6.1 to 6.6 mbgs.

The results of the geotechnical investigation performed by Green Geotechnical Ltd. (Green) align with OGS Mapping. According to OGS Mapping, the primarily encountered overburden layer consists of a mixture of clay, silt textured till, sand, and gravel derived from glaciolacustrine deposits.

For further details regarding the Geotechnical Investigation, please refer to the geotechnical report prepared by Green, submitted under separate cover.

### 2.4 Source Water Protection Information

Based on the Ministry of Environment, Conservation, and Parks (MECP) Source Protection Information Atlas, the Site is located atop a Highly Vulnerable Aquifer (HVA) with a vulnerability score of 6. A HVA is a subsurface, geologic formation that contains drinking water, it can be easily impacted by the release of pollutants on the ground surface.

The Site is located within the Nottawasaga Valley Protection Region and is governed by the policies outlined within the South Georgian Bay Lake Simcoe Source Protection Plan (SPP). The South Georgian Bay Lake SPP ensures that actions are taken to prevent any contamination of raw sources of municipal and private drinking water. No significant drinking water threats and source protection policies related to the HVA are identified for the Site Area under Ontario's Clean Drinking Water Act (2006).

Despite no *significant* drinking water threats being identified for the Site Area, there are numerous activities identified in the South Georgian Bay Lake Simcoe SPP that pose low to moderate threats to future drinking water use, the following threats should be considered for the Site area:

- The application of road salt.
- The handling and storage of road salt.
- The storage of snow.
- An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body.
- An activity that reduces the recharge of an aquifer.

Best management practices should be employed such that any On-Site activity does not pose a significant threat to drinking water.

## 3.0 Hydrogeology

The following sections below detail the existing hydrogeological conditions of the Site based on regional studies, local studies, and relevant background information.

### 3.1 MECP Well Records

A review of the MECP well record database was completed for wells within 500 m of the Site Area boundary (Figure 5). There are fifteen (15) identified well records within 500 m of the Site and the records can be summarized below.

- The majority of well records encountered brown and white to grey limestone rock.
- Of the fifteen (15) well records, thirteen (13) were for domestic use, one (1) was abandoned, and one (1) had an unspecified use.
- Of the fourteen (14) wells where pumping tests were completed, there is a maximum reported pumping rate of 151.42 litres per minute (LPM), and a minimum reported pumping rate of 10.00 LPM. The average pumping rate was 45.35 LPM.
- Static water levels range from 0.61 mbgs to 9.14 mbgs.

A summary table of the well records has been appended to this report as **Appendix A**.

### 3.2 Hydrostratigraphy

The hydrostratigraphic framework of the Nottawasaga Valley Conservation Authority (NVCA) Watershed has been outlined in the NVCA Groundwater Monitoring Network Review and Assessment (2019). There are four (4) hydrostratigraphic units in the NVCA Watershed. The hydrostratigraphic units of the Site and surrounding area are summarized in Table 1 below.

**Table 1: Summary of Regional Hydrostratigraphy of the NVCA Watershed (NVCA, 2019)**

Layer	Hydrostratigraphic Unit Name	Function	Material
A1	Oak Ridges Moraine	Unconfined shallow aquifer	Coarse-grained glacial and interglacial sediments (contact stratified drift)
A2	Upper Thorncliffe Formation	Confined aquifer: private water / small municipal water supply	Surficial ice-contact sand deposits
A3	Lower Thorncliffe Formation	Confined aquifer: supply source for several municipalities	Medium-coarse sand with gravel and silty layers
A4 <sup>1</sup>	Tunnel channels and Laurentian Channel	Aquifer: Deepest municipal water supply wells	Fine-medium sand with minor gravel areas; medium-coarse sand with gravel

1. Aquifer not continuous throughout watershed.

In general, the regional aquifer A1, is a shallow aquifer which overlays three (3) thicker aquifer units A2, A3, and A4. The deep regional aquifer A3, is the major supply source for many municipal wells in the area, followed by the regional aquifer A1 and A2.

### 3.3 Groundwater Levels

Regional shallow and deep groundwater flow direction is interpreted to follow surface and bedrock topography and flow eastward towards the Boyne River and ultimately, Georgian Bay. According to the Oak Ridges Moraine Groundwater Program Mapping, groundwater elevations range from approximately 480 masl at Site to 180 masl at Georgian Bay.

### 3.4 Groundwater Quality

Groundwater quality within Ontario Watersheds is obtained from monitoring wells within the Provincial Groundwater Monitoring Network (PGMN) and municipal data. Groundwater sampling results are compared to the Ontario Drinking Water Quality Standards (ODWQS) and any exceedances are flagged and investigated to determine the potential source and impact of the exceedance.

According to the Boyne River Subwatershed Health Check (2023) an insufficient amount of data has been collected to determine the status of groundwater quality within Subwatershed. However, according to the greater Nottawasaga Valley Watershed Report Card (2023) the Nottawasaga Valley Watershed received an overall average grading of "A" meaning that the groundwater quality is excellent. However, it should be noted that in areas such as Amaranth (approximately 25 km from the Site) an overall grading of "F" was received meaning the groundwater quality is very poor due to elevated concentrations of Nitrate in areas where land is heavily fertilized and septic systems are used.

Localized groundwater quality sampling was conducted on the property and results are presented in Section 5.0.

### 4.0 Field Work

The following section outlines the field investigation conducted by Crozier staff and previous consultants to characterize the existing conditions.

#### 4.1 Monitoring Well Installation

As mentioned in Section 2.3, six (6) monitoring wells were installed by Green for both Geotechnical and Hydrogeological purposes in July 2024 (Figure 6). Soil sampling was conducted at regular intervals during drilling to classify the soils. Please see Table 2 for a summary of the monitoring wells.

**Table 2: Monitoring Well Details**

Monitoring Well Name	Screen Interval (mbgs)	Screened Material
MW1	3.0 – 6.1	Sand, Silty sand till
MW2	3.5 – 5.0	Gravelly sand
MW3	3.0 – 6.1	Gravelly sand, Silt to silt till
MW4	3.0 – 6.1	Sandy silt till to silt till
MW6	2.3 – 5.8	Silt till
MW8	3.0 – 6.1	Silt till

For detailed borehole logs, please refer to the geotechnical report prepared by Green submitted under separate cover.

#### 4.2 Groundwater Monitoring

Manual groundwater measurements were collected using an electronic water level meter and automatic level loggers were deployed in select wells across the Site. The water level loggers were set to measure water levels on an hourly basis to collect a more comprehensive dataset for a greater understanding of the shallow groundwater system.

Results of groundwater monitoring to date is covered in Section 5.1 below.

#### **4.3 Overburden Water Quality Sampling**

Overburden groundwater quality sampling was conducted in September 2024 at MW6 and MW8. A minimum of three (3) well volumes were removed prior to sampling using hand purging methods. The raw, unfiltered sample was sent to a third-party laboratory for analysis. The resultant concentrations were compared to the Ontario Drinking Water Quality Standards (ODWQS).

For a detailed summary of the overburden water quality testing results, please refer to Section 5.2 below.

#### **4.4 Water Quantity Testing**

Water quantity testing was conducted in February 2025 utilizing the two water wells present on Site, a 6-inch well and an 8-inch well. The 6-inch well (referred to as PW1) is currently the primary supply well for the campground, while the 8-inch well (referred to as PW2) provides additional water during the summer months.

Variable rate step tests were conducted on both wells to assess their potential yield and their capacity to meet the future domestic water demand of the proposed redevelopment. Each step test was performed in three stages, followed by one hour of recovery for each stage, with the total test duration lasting six (6) hours.

For a detailed summary of the water quantity testing results, please refer to Section 5.3 below.

#### **4.5 Bedrock Water Quality Sampling**

Bedrock water quality sampling was conducted in February 2025 at both PW1 and PW2. Two (2) representative water quality samples were collected from each well on the day of their respective step tests, one (1) sample at the beginning and one (1) at the end of each test. The collected samples were then submitted to an accredited laboratory for analysis. The analysis covered microbiological, chemical, and physical parameters, all compared against the Ontario Drinking Water Quality Standards (ODWQS) outlined in the Safe Drinking Water Act (2002) and Ontario Regulation 169/03.

For a detailed summary of the bedrock water quality testing results, please refer to Section 5.3 below.

### **5.0 Results**

The following sections outline the results of the investigation at the time of this report. Note that groundwater monitoring is ongoing, and this report will be updated as additional results are obtained.

#### **5.1 Groundwater Levels**

Table 3 below displays the manual groundwater level readings from March 2024 to March 2025. Note that groundwater monitoring is ongoing on the property and additional results can be provided following additional monitoring.

**Table 3: Groundwater Levels (July 2024 – March 2025)**

Monitoring Well	Water Level (mbgs)			
	July 7, 2024	September 20, 2024	January 21, 2025	March 19, 2025
MW1	4.79	5.12	4.87	4.53
MW2	4.39	4.53	4.45	4.07
MW3	1.91	2.33	2.10	1.67
MW4	2.18	2.45	2.20	1.82
MW6	2.48	2.80	2.69	2.02
MW8	-0.20	0.30	-	-0.7

Manual water levels across the Site have varied from -0.70 mbgs to 5.12 mbgs between July and March. The highest water level to date was captured in March and the lowest water level was captured in September.

Automatic level loggers were deployed in all monitoring wells on Site. The hydrographs for all monitoring wells on Site are presented in **Appendix B**.

All hydrographs exhibit minor fluctuations due to precipitation. Based on these observations, it is presumed that screened unit is semi-confined in nature. It is predicted that seasonally high groundwater levels will be encountered in Spring 2025 (March-May). Crozier acknowledges that the highest groundwater levels to date have been recorded in March 2025, however, it is recommended that monitoring continue through the end of Spring 2025. This will allow for a more comprehensive understanding of groundwater fluctuations and provide more accurate data on seasonally high conditions for design purposes. Therefore, groundwater monitoring will continue throughout Spring 2025 to refine the assessment and to fully capture the extent of seasonal groundwater variations.

Please note that on January 21, 2025, Crozier staff was unable to take a manual reading at MW8 due to freezing conditions. MW8 has experienced above-grade readings, suggesting that the well may have frozen at surface.

## 5.2 Overburden Water Quality

As noted above, two (2) representative groundwater samples were collected from MW6 and MW8 and were submitted to ALS Laboratories for analysis. The resultant concentrations were compared to the ODWQS. The detailed laboratory results are provided in **Appendix C**.

In summary, the following exceedances of the ODWQS were reported:

**Table 4: Overburden Water Quality Exceedances**

Parameter	Unit	Monitoring Well Name		ODWQS
		MW6	MW8	
Alkalinity, total (as CaCO <sub>3</sub> )	mg/L	3600	-	30-500
Hardness (as CaCO <sub>3</sub> )	mg/L	317	261	80-100
Turbidity	NTU	>4000	586	5

Overall, three (3) exceedances were noted in MW6, and two (2) exceedances were noted in MW9. Elevated turbidity levels are expected due to the sampling method used. Hand purging methods can stir settled sediments at the base of a monitoring well and/or pull in additional sediments through the screen. Additionally, the increased levels of alkalinity and hardness in the groundwater are typical for this region, as the underlying limestone bedrock aquifer commonly contributes to these characteristics. Based on the results, filtration and treatment are recommended to meet the ODWQS. Please note that the design of filtration or treatment systems is beyond the scope of this report.

### 5.3 Water Quantity Testing

#### 5.3.1 Step-Testing of PW1

On February 12, 2025, step testing was conducted on PW1. The Step-drawdown test was carried out in three distinct stages, with flow rates set at 0.32, 0.63, and 0.95 L/s (5, 10, and 15 IGPM). These rates were selected based on previous pumping rates for the existing wells on Site. During the test, pumping rates were monitored using a water level tape and adjusted with a manually operated valve. It is important to note that based on the MECP Well Records Database, **Well Record ID: 1705324** was assumed for reference of the existing well specifications as the well depth and diameter were consistent with what was observed in the field.

Table 5 summarizes the key evaluative criteria, derived through graphical analysis, which were compared to the specifications of the existing well.

**Table 5: PW1 Step-Test Results**

Factor	Result		
Static Water Level (mbgl)	0.73		
Top of Screen (mbgl)	20.12		
Total Available Drawdown (m)	19.38		
	Step 1	Step 2	Step 3
Pumping Rate (L/s)	0.32	0.63	0.95
Total Drawdown (m)	0.11	0.79	1.19
Total Drawdown (%)	0.55	4.09	6.13
Drawdown Water Level (mbgl)	0.84	1.52	1.92
Specific Capacity (L/s/m)	2.9998	0.7950	0.7992
Recovery (90%) (mins)	1.00	1.00	1.00

Based on the data presented, it is assumed that PW1 can sustainably produce a pumping rate of 0.95 L/s (15 US GPM) or more over the course of one (1) year of pumping. However, to accurately determine the maximum recommended pumping rate for the well, additional long-term testing will be required. Long-term testing will help confirm the available yield and ensure that the well can consistently meet the water demand over time.

Crozier has assessed the domestic water requirements for the proposed redevelopment, estimating an average daily water demand of 3.5 L/s (55.48 US GPM) and a maximum daily water demand of 9.63 L/s (152.64 US GPM). Based on these estimates and preliminary data, it appears that PW1 does have the capacity to meet the daily water demand. However, given the well's 6-inch diameter, it is unlikely that a 6-inch pump would be able to consistently sustain such a high-water demand. To ensure the system can reliably meet the average daily demand of 3.5 L/s, Crozier recommends upgrading to an 8-inch pump for the Site.

For a more detailed analysis, please refer to **Appendix D** for the Step-Test Data of PW1 and **Appendix E** for the Proposed Domestic Water Demand calculations.

### 5.3.2 Step-Testing of PW2

Step testing of PW2 was completed on February 11, 2025. The step-drawdown test was carried out in three (3) distinct stages, with flow rates set at 0.13, 0.25, and 0.38 L/s (2, 4, and 6 US GPM). These rates were selected based on previous pumping rates for the existing wells on Site as reported on the MECP Well Record. During the test, pumping rates were monitored using a water level tape and adjusted with a manually operated valve. It is important to note that based on the MECP Well Records Database, **Well Record ID: 1704376** was assumed for reference of the existing well specifications based on the dimensions, depth and location on site.

Table 6 summarizes the key evaluative criteria, derived through graphical analysis, which were compared to the specifications of the existing well.

**Table 6: PW2 Step-Test Results**

Factor	Result		
Static Water Level (mbgl)	3.87		
Top of Screen (mbgl)	11.12		
Total Available Drawdown (m)	7.25		
	Step 1	Step 2	Step 3
Pumping Rate (L/s)	0.13	0.25	0.38
Total Drawdown (m)	2.50	5.64	9.05
Total Drawdown (%)	34.45	77.73	124.79
Drawdown Water Level (mbgl)	6.37	9.51	12.92
Specific Capacity (L/s/m)	0.0520	0.0443	0.0420
Recovery (90%) (mins)	5.00	5.00	5.00

Based on these findings, it is assumed that PW2 can sustainably produce a flow rate of 0.13 L/s (2 US GPM) over the course of one year of continuous pumping. Therefore, a pumping rate of 0.13 L/s is recommended to ensure long-term sustainability. For short-term pumping, preliminary data suggests that the 8-inch well can reliably produce up to 0.25 L/s (4 US GPM) for a continuous duration of one hour.

For more detailed information regarding the results of the Step-Test Data for PW2, please refer to **Appendix F**.

## 5.4 Bedrock Water Quality

### 5.4.1 PW1 Water Quality Analysis

Table 7 provides a summary of the exceedances detected during the sample collection from PW1 on February 12, 2025.

**Table 7: PW1 Water Quality Results**

Parameter	Unit	Production Well 1		ODWQS
		Start	End	
Colour	CU	52.3	57.6	5
Hardness (as CaCO <sub>3</sub> )	mg/L	268	266	80-100
Turbidity	NTU	7.96	9.24	5
Total Iron	mg/L	0.701	0.878	0.3

Overall, four (4) exceedances were noted from the sampling. The turbidity and colour exceedances may be due to the campground being almost completely empty meaning the well is experiencing very little use. The elevated levels of iron and hardness found in the groundwater is not atypical for groundwater in this region due to the limestone bedrock aquifer underlying the area.

Given these exceedances, additional water quality testing will be necessary during a long-term pumping test to determine the appropriate treatment requirements for a groundwater-based water system on site that meets ODWQS. For more detailed water quality results, please refer to **Appendix G**.

#### 5.4.2 PW2 Water Quality Analysis

Table 8 provides a summary of the exceedances detected during the sample collection from PW2 on February 11, 2025.

**Table 8: PW2 Water Quality Results**

Parameter	Unit	Production Well 2		ODWQS
		Start	End	
Colour	CU	41.3	43.9	5
Hardness (as CaCO <sub>3</sub> )	mg/L	159	165	80-100
Turbidity	NTU	16.1	16.2	5
Total Iron	mg/L	1.41	1.37	0.3
Total Manganese	Mg/L	0.0589	-	0.05
Total Coliforms	2 CFU/100mL	-	2	1
Total Arsenic	mg/L	-	0.0150	0.01

Overall, five (5) exceedances were noted in the first sample (Start), and six (6) exceedances were noted in the second sample (End). The turbidity, colour, and total coliform exceedances are assumed to be primarily due to the fact that the well on Site has not been used for an extended period of time, which may have influenced the presence of suspended solids. The elevated presence of hardness found in the groundwater is interpreted to be a result of the natural mineral composition of the Site area. In the second sample, exceedances of total coliforms and total arsenic were observed. The presence of naturally occurring arsenic in the Town of Shelburne area is well documented and could likely be the reason for the elevated level in this well.

Given these exceedances, additional water quality testing will be necessary during a long-term pumping test to determine the appropriate treatment requirements for a groundwater-based water system on site that meets ODWQS. For more detailed water quality results, please refer to **Appendix H**.

## 6.0 Design Considerations

The following section outlines preliminary design constraints and considerations that should be considered in the design of the proposed redevelopment.

## 6.1 Water Balance

A water balance assessment was conducted to assess potential impacts of the proposed redevelopment on the local groundwater conditions. The water balance was conducted under existing (pre-development) and proposed (post-development) conditions. The water balance assessment was conducted in accordance with accepted site condition values from Table 6.3 of the Urban Storm Drainage Criteria Manual: Volume 1 (Urban Drainage and Flood Control District, 2016) and Table 3.1 of the MECP Stormwater Management Planning and Design Manual (MECP, 2003). The appropriate reference tables are provided in **Appendix I**.

The results of the water balance assessment are presented in Table 9.

**Table 9: Summary of Water Balance**

Pre-Development Infiltration (mm/yr)	Post-Development Infiltration without Mitigation (mm/yr)	Infiltration Deficit (mm/yr)
362.31	326.77	35.55

### 6.1.1 Methodology

The water balance on a site can be estimated from the following equation described in Thornthwaite and Mather 1957:

$$P = S + R + I + ET$$

**Where:**

P = precipitation

S = change in groundwater storage

R = surface water runoff

I = infiltration

ET = evapotranspiration/evaporation

The components of the water balance equation can be estimated using field observations of drainage conditions, land cover, soil types, groundwater conditions and local climate records.

### 6.1.2 Precipitation (P)

The nearest climate station to the Site is located approximately 14.64 km southeast of the Site and is known as Ruskview Climate Station (Climate ID: 6147229, 44°14'00.000" N, 80°08'00.000" W, elevation of 472.40 masl). Monthly average precipitation and climate data from 1981 – 2010 was used to complete the water balance calculations for the Site. The long-term monthly average for precipitation and climate is shown in Table 10 below.

**Table 10: Climate Data (1981 – 2010) for Ruskview Climate Station**

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Precipitation (mm)	85.6	69.8	68.0	73.9	86.9	90.8	81.5	79.4	95.4	83.3	100.3	80.9	<b>995.8<sup>1</sup></b>
Temperature (°C)	-7.3	-6.8	-1.9	5.4	12.1	17.4	19.7	18.8	14.7	7.9	1.7	-4.3	<b>6.45<sup>2</sup></b>

1. Total average annual precipitation from 1981-2010

2. Average annual temperature from 1981-2010

Therefore, based on the data above, the long-term annual average precipitation for the area is 995.8 mm/year and the long-term average temperature for the Site area is 6.45 °C.

### 6.1.3 Storage (S)

Long-term groundwater storage (S) is assumed to be negligible as no evidence of groundwater impact on significant groundwater pumping or withdrawal is noted in regional studies of the area. The seasonal changes in water levels are expected to balance annually.

### 6.1.4 Evapotranspiration (ET)

The rate of evapotranspiration is a function of the water holding capacity of the soil, soil and vegetation type and land cover. Through the Thornthwaite and Mather method or a soil moisture balance approach and local climate data, the Potential Evapotranspiration (PET) and the Actual Evapotranspiration (AET) can be calculated (see Appendix I) using the following equations:

$$PET = 16 \times \left( \frac{10T\alpha}{H_i} \right)^\alpha$$

**Where:**  $T_\alpha$  = average daily temperature, 0 degrees for negative temperature months  
 $H_i$  = heat index value, assuming 12 hours per day, 30 days a month of daylight

The average heat index value is estimated using the following equation:

$$H_i = \sum_{i=1}^{12} \left( \frac{10T\alpha}{5} \right)^{1.514}$$

The evapotranspiration factor ( $\alpha$ ) is determined using the following equation:

$$\alpha = 0.49 + (0.0179 \times H_i) - (0.0000771 \times H_i^2) + (0.000000675 \times H_i^3)$$

PET is adjusted to account for the average number of hours of daylight per month for a given location. The adjustment factor is dependent on the subject property's latitude and is presented in Appendix I (Thornthwaite and Mather, 1957). The PET is multiplied by the adjustment factor per month to determine the Adjusted Potential Evapotranspiration ( $PET_{adj}$ ).

The Actual Evapotranspiration (AET) is determined using the following equation:

$$AET = PET_{adj} - \Delta S$$

The Change in Soil Storage ( $\Delta S$ ) is depended on the types of soil on the property and the Accumulated Potential Water Loss (APWL) per month. The Change in Soil Storage and Accumulated Potential Water Loss can be calculated using the following equations:

$$\Delta S = S_{mc} \times$$

**Where:**  $S_{mc}$  = soil moisture capacity

APWL = accumulated potential water loss

$$\text{For } \Delta P < 0: APWL = -\sum_{i=0}^{12} PET_i$$

$$\text{For } \Delta P < 0: APWL = \frac{\ln\left(\frac{|AET - PET|}{S_{mc}}\right)}{S_{mc}}$$

According to the Ministry of Agricultural, Food and Rural Affairs (OMAFRA), AgMaps mapping tool, the soil type on the property was primarily identified as Type A, fine sand. Using the Ministry Environment, Conservation and Parks (MECP) Stormwater Management and Design Manual Table 3.1. (2003), the soil moisture capacity was estimated to be 100 for fine sands in pasture and shrubs environments.

Therefore, based on local climate conditions the Actual Evapotranspiration (AET) is calculated to be 575.43 mm/year.

#### 6.1.5 Water Surplus (R+I)

The difference between mean annual P and mean annual ET outputs the amount of water surplus for the Site. The water surplus either infiltrates (I) into the soil or travels across the site as runoff (R).

The distribution of water that infiltrates into the soil is a function of an infiltration factor as described in Table 3.1 of the MECP Stormwater Management Planning and Design Manual (MECP, 2003). The infiltration factor for each catchment area was determined using the MECP methodology. The water balance components were used to estimate the pre-development and post-development water balance scenarios. Detailed water balance calculations for the subject property can be seen in **Appendix I**.

#### 6.1.6 Pre-Development Infiltration

The pre-development water balance calculations are presented in **Appendix I** Under existing conditions, the infiltration for the Site is calculated to be 362.31 mm/yr.

#### 6.1.7 Post-Development Infiltration

To complete the post-development infiltration calculation, the proposed redevelopment was separated by land use and assigned a percent imperviousness. Based on the water balance components, the calculated post-development infiltration volumes are estimated to be 326.77 mm/yr. In comparing the pre and post development infiltration volumes, the proposed redevelopment has the potential to decrease by 10%.

#### 6.1.8 Water Balance Impact Assessment

Based on the results of the water balance, the proposed redevelopment has the potential to decrease infiltration by 35.55 mm/yr. Low impact development features should be designed to infiltrate 35.55 mm/yr to achieve water balance. Please note, mitigation of the infiltration deficit will be considered as part of the servicing strategy and will be provided under separate cover in the Functional Servicing Report (Crozier, 2025).

## 6.2 Short & Long-Term Dewatering

Discussion on the potential for future dewatering below is based on the interaction between the groundwater surface and proposed design elements for the Site.

If proposed building footings are to be extended below the reported seasonally high groundwater conditions, it can be expected that short-term and/or long-term groundwater dewatering will be required. Discharge of any dewatering flows should be analyzed against the local sewer use by-law to ensure that they are within the allowable tolerance.

It should also be noted that dependent on the required discharge volumes during and post-construction, additional permitting requirements may apply. If construction volumes are expected to fall between 50,000 L/day and 400,000 L/day registration with the MECP Environmental Activity Sector Register is required. If construction dewatering volumes are to exceed 400,000 L/day, a Permit to Take Water will be required. Similarly, if daily permanent dewatering volumes are to exceed 50,000 L/day post-construction, an additional Permit to Take Water will be required for the groundwater discharge. Local permitting will also likely be required prior to any groundwater discharge.

Based on the proposed concept plan of slab-on-grade homes, dewatering is expected to be unlikely. However, once final footings for the proposed buildings are determined, potential dewatering volumes can be assessed.

## 7.0 Conclusions & Recommendations

Based on the information presented above, Crozier is prepared to make the following conclusions and recommendations.

- In stratigraphic order, the soils of the Site Area are primarily topsoil, earth fill, sand to gravelly sand, and glacial till.
- Results of the testing of the existing wells on Site indicate that it is possible to supply the future development with a groundwater-based system capable of meeting the normal daily and peak water demands.
- The groundwater quality sampling completed on the existing PW1 and PW2 showed exceedances for certain parameters. Additional water quality testing will be required to determine potential treatment and/or filtration requirements for a groundwater-based water system at the Site.
- According to the MECP Source Protection Information Atlas, the Site is located within an HVA. However, no specific source protection policies apply.
- Groundwater monitoring began on the Site in May 2024. Groundwater levels have ranged from -0.70 mbgs to 5.12 mbgs (July 2024 to March 2025). Groundwater monitoring is ongoing.
- A site wide water balance was completed for the Site. Using the Thornthwaite and Mather method pre-development infiltration was determined to be 362.31 mm/yr and post-development infiltration was determined to be 326.77 mm/yr. Therefore, the infiltration deficit is calculated to be 35.55 mm/yr.

Respectfully submitted,

**C.F. CROZIER & ASSOCIATES INC.**



Victoria Mazur, Engineering Intern  
Hydrogeology, Land Development

VM/cj

**C.F. CROZIER & ASSOCIATES INC.**



Chris Gerrits, M.Sc., P.Eng.  
Director, Land Development

## 8.0 References

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# APPENDIX A

## MECP Well Summary Table

MECP Well Records

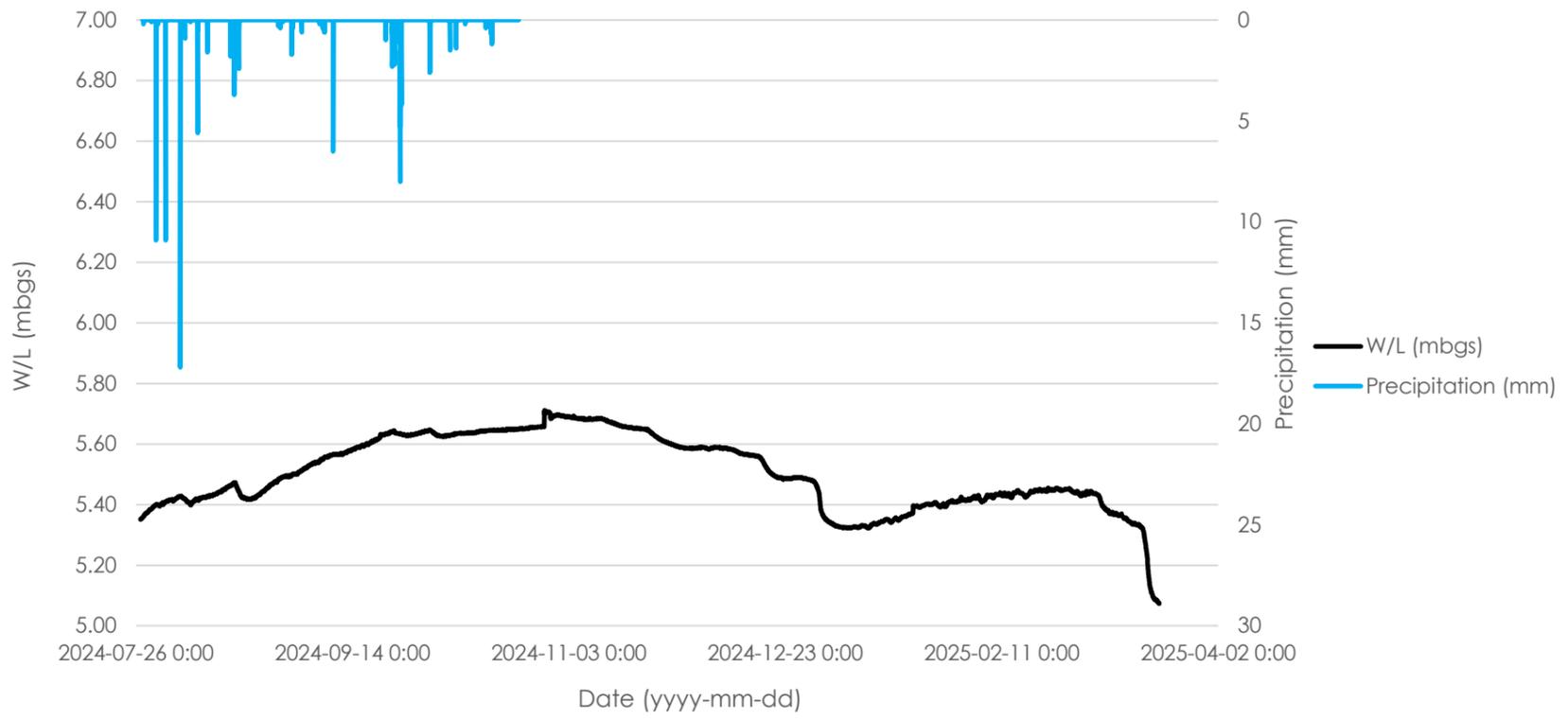
Project Number: 2621-7000  
 Project Name: Chipwoods Park  
 Date Completed: 06-21-2024  
 Prepared by: VM

Well ID	Diameter (cm)	Depth (m)	Static Level (m)	Quality (Lpm)	Quality	Materials	Aquifer	Use	Date Completed
1701434	10.16	20.73	0.610	151.416	Fresh	Limestone Rock	BR	Domestic	04/01/1973
1701819	10.16	27.43	2.438	37.854	Fresh	Brown Limestone	BR	Domestic	07/25/1974
1704289	12.7	21.34	1.524	37.854	Fresh	Brown Rock	BR	Domestic	09/25/1990
1704290	12.7	33.53	1.524	34.069	Fresh	Light Grey Limestone	BR	-	09/24/1990
1704376	15.5575	24.38	4.267	22.712	Fresh	White Limestone	BR	Domestic	09/27/1991
1704866	15.875	37.19	7.315	37.854	Fresh	White Limestone	BR	Domestic	06/05/1995
1705230	12.7	37.19	9.144	30.283	Fresh	Brown Limestone	BR	Domestic	10/24/1998
1705278	15.875	24.99	7.010	56.781	Fresh	Brown Limestone	BR	Domestic	12/14/1998
1705324	15.24	21.34	8.230	37.854	Fresh	Brown Limestone	BR	Domestic	07/24/1999
1706278	15.24	18.29	-	10.000	Fresh	White Limestone	BR	Domestic	08/22/2004
1706286	15.8	32.6	-	45.000	Fresh	Grey Limestone	BR	Domestic	09/22/2004
1706336	100	-	-	-	-	-	-	Abandoned	01/13/2004
1706342	158	28.98	-	50.000	-	Grey Shale	BR	Domestic	01/08/2004
1706699	15.875	11.28	-	37.854	Fresh	Grey Limestone	BR	Domestic	06/19/2006
7040578	15.875	18.90	-	45.425	Fresh	Limestone	BR	Domestic	11/06/2006

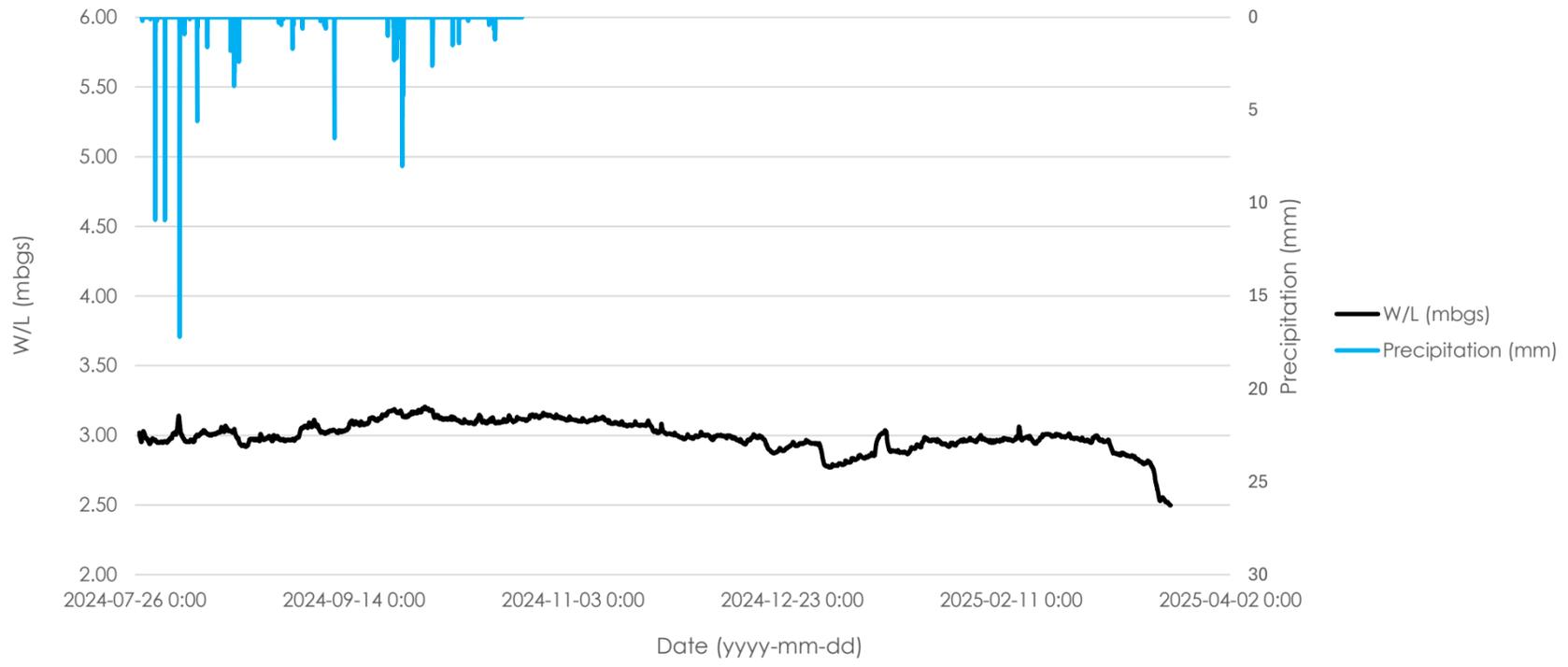
# APPENDIX B

## Hydrographs

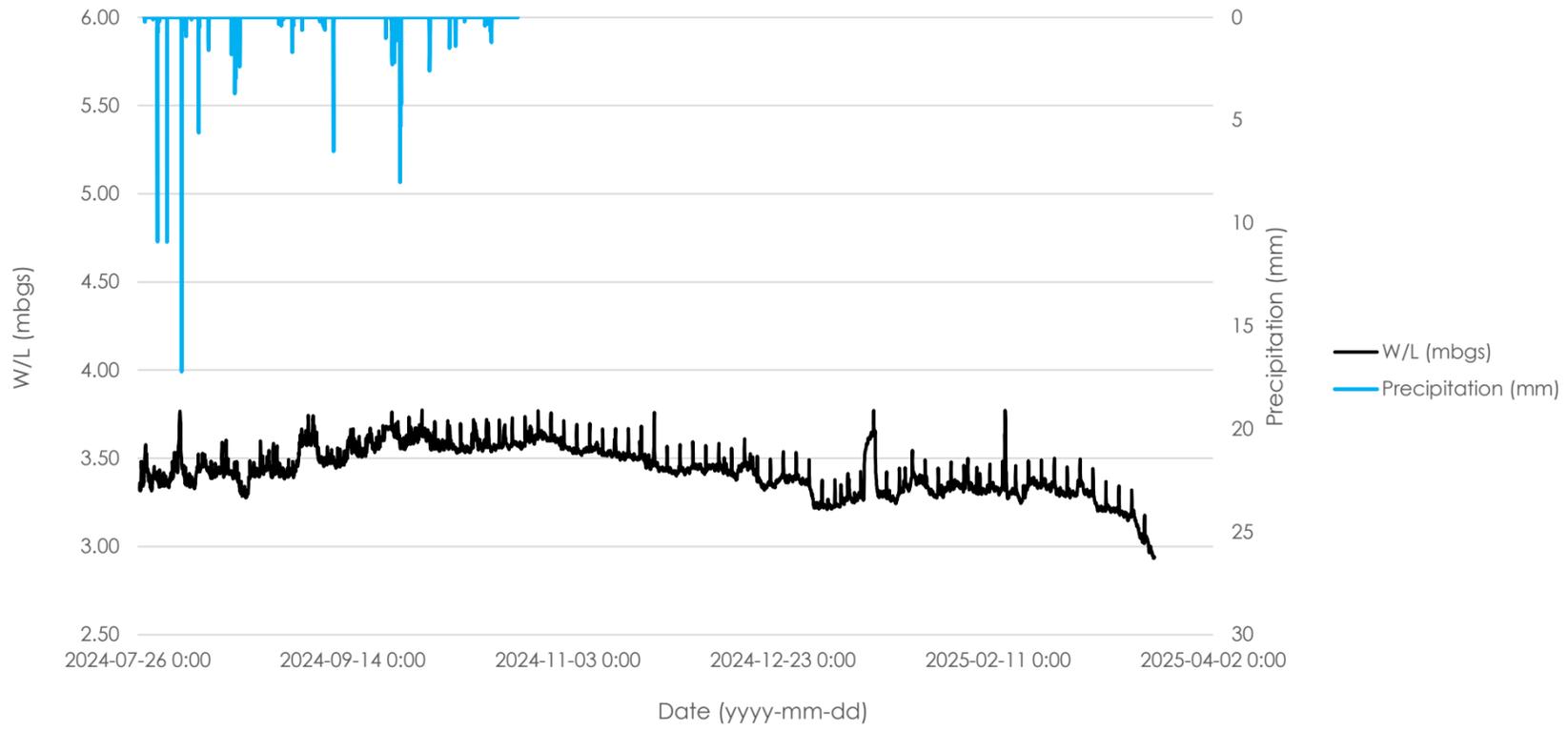
### MW1 - Chipwoods Park



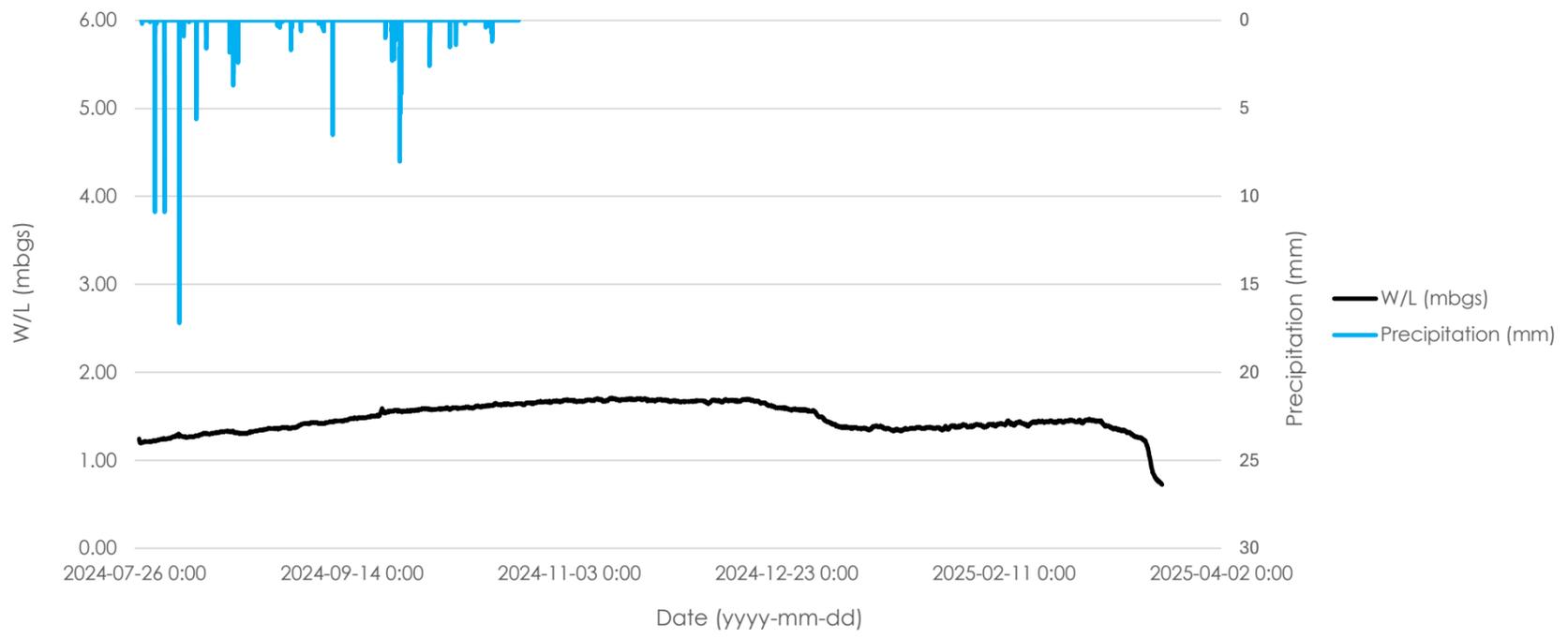
### MW3 - Chipwoods Park



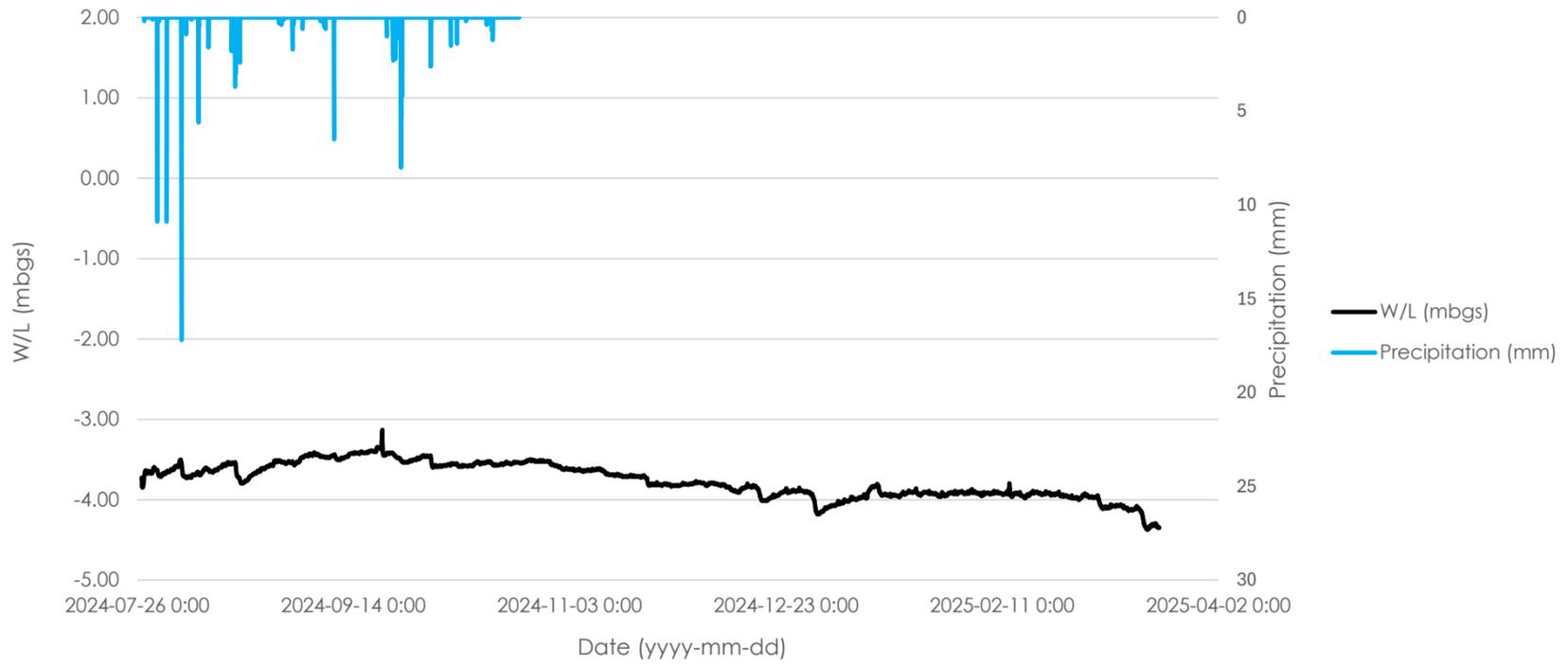
### MW4 - Chipwoods Park



### MW6 - Chipwoods Park



### MW8 - Chipwoods Park



# APPENDIX C

## Overburden Water Quality Results



## CERTIFICATE OF ANALYSIS

<p><b>Work Order</b> : <b>WT2427872</b></p> <p>Client : <b>CF Crozier &amp; Associates</b></p> <p>Contact : Victoria Mazur</p> <p>Address : 2800 High Point Drive Milton ON Canada L9T 6P4</p> <p>Telephone : (548) 708-0039</p> <p>Project : 2621-7000</p> <p>PO : ----</p> <p>C-O-C number : ----</p> <p>Sampler : CLIENT</p> <p>Site : ----</p> <p>Quote number : 2024 SOA</p> <p>No. of samples received : 2</p> <p>No. of samples analysed : 2</p>	<p>Page : 1 of 6</p> <p>Laboratory : ALS Environmental - Waterloo</p> <p>Account Manager : Andrew Martin</p> <p>Address : 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8</p> <p>Telephone : +1 519 886 6910</p> <p>Date Samples Received : 20-Sep-2024 14:02</p> <p>Date Analysis Commenced : 21-Sep-2024</p> <p>Issue Date : 27-Sep-2024 17:22</p>
---	---

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

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Nik Perkio	Senior Analyst	Inorganics, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Metals, Waterloo, Ontario



## 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.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances  
LOR: Limit of Reporting (detection limit).

Unit	Description
-	no units
µS/cm	microsiemens per centimetre
CU	colour units (1 cu = 1 mg/l pt)
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

## Workorder Comments

<1 or Not Detected with LOR of 1 equals Zero (0).

Not Detected = Absent; Detected = Present.

## Sample Comments

Sample	Client Id	Comment
WT2427872-001	MW 6	All samples received for dissolved metals were received unfiltered but preserved - unable to test for dissolved metals from the bottles received. Lab will subsample, filter/preserve and analyze from an un preserved general chemistry bottle. Qualifiers may be added to the report - 23/09/2024, A. Martin
WT2427872-002	MW 8	All samples received for dissolved metals were received unfiltered but preserved - unable to test for dissolved metals from the bottles received. Lab will subsample, filter/preserve and analyze from an un preserved general chemistry bottle. Qualifiers may be added to the report - 23/09/2024, A. Martin



---

## Qualifiers

<i>Qualifier</i>	<i>Description</i>
<i>DLDS</i>	<i>Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.</i>
<i>TMV</i>	<i>Turbidity exceeded upper limit of the nephelometric method. Minimum value reported.</i>

---



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					MW 6	MW 8	----	----	----
Client sampling date / time					20-Sep-2024 00:00	20-Sep-2024 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	WT2427872-001	WT2427872-002	-----	-----	-----
					Result	Result	----	----	----
<b>Physical Tests</b>									
Alkalinity, total (as CaCO3)	----	E290/WT	1.0	mg/L	3600	416	----	----	----
Colour, apparent	----	E330/WT	2.0	CU	8440	1700	----	----	----
Conductivity	----	E100/WT	1.0	µS/cm	609	479	----	----	----
Hardness (as CaCO3), dissolved	----	EC100/WT	0.50	mg/L	317	261	----	----	----
pH	----	E108/WT	0.10	pH units	7.98	8.04	----	----	----
Solids, total dissolved [TDS]	----	E162/WT	10	mg/L	365 <sup>DLDS</sup>	278 <sup>DLDS</sup>	----	----	----
Turbidity	----	E121/WT	0.10	NTU	>4000 <sup>TMV</sup>	586	----	----	----
<b>Anions and Nutrients</b>									
Ammonia, total (as N)	7664-41-7	E298/WT	0.0050	mg/L	0.0414	0.0838	----	----	----
Chloride	16887-00-6	E235.Cl/WT	0.50	mg/L	25.3	6.14	----	----	----
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L	0.061	0.094	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3/WT	0.020	mg/L	1.48	<0.020	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2/WT	0.010	mg/L	0.047	<0.010	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	0.0010	mg/L	<0.0010	<0.0010	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	0.30	mg/L	35.8	22.1	----	----	----
<b>Dissolved Metals</b>									
Aluminum, dissolved	7429-90-5	E421/WT	0.0010	mg/L	0.0027	0.0031	----	----	----
Antimony, dissolved	7440-36-0	E421/WT	0.00010	mg/L	0.00022	<0.00010	----	----	----
Arsenic, dissolved	7440-38-2	E421/WT	0.00010	mg/L	0.00036	0.00307	----	----	----
Barium, dissolved	7440-39-3	E421/WT	0.00010	mg/L	0.0568	0.0432	----	----	----
Beryllium, dissolved	7440-41-7	E421/WT	0.000020	mg/L	<0.000020	<0.000020	----	----	----
Bismuth, dissolved	7440-69-9	E421/WT	0.000050	mg/L	<0.000050	<0.000050	----	----	----
Boron, dissolved	7440-42-8	E421/WT	0.010	mg/L	0.021	0.023	----	----	----
Cadmium, dissolved	7440-43-9	E421/WT	0.0000050	mg/L	0.0000085	<0.0000050	----	----	----
Calcium, dissolved	7440-70-2	E421/WT	0.050	mg/L	80.5	60.2	----	----	----
Cesium, dissolved	7440-46-2	E421/WT	0.000010	mg/L	<0.000010	<0.000010	----	----	----
Chromium, dissolved	7440-47-3	E421/WT	0.00050	mg/L	<0.00050	<0.00050	----	----	----
Cobalt, dissolved	7440-48-4	E421/WT	0.00010	mg/L	0.00098	<0.00010	----	----	----
Copper, dissolved	7440-50-8	E421/WT	0.00020	mg/L	0.00063	0.00031	----	----	----



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					MW 6	MW 8	----	----	----
Client sampling date / time					20-Sep-2024 00:00	20-Sep-2024 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	WT2427872-001	WT2427872-002	-----	-----	-----
					Result	Result	----	----	----
<b>Dissolved Metals</b>									
Iron, dissolved	7439-89-6	E421/WT	0.010	mg/L	<0.010	<0.010	----	----	----
Lead, dissolved	7439-92-1	E421/WT	0.000050	mg/L	<0.000050	<0.000050	----	----	----
Lithium, dissolved	7439-93-2	E421/WT	0.0010	mg/L	0.0047	0.0054	----	----	----
Magnesium, dissolved	7439-95-4	E421/WT	0.0050	mg/L	28.1	26.8	----	----	----
Manganese, dissolved	7439-96-5	E421/WT	0.00010	mg/L	0.0358	0.0377	----	----	----
Molybdenum, dissolved	7439-98-7	E421/WT	0.000050	mg/L	0.00318	0.00104	----	----	----
Nickel, dissolved	7440-02-0	E421/WT	0.00050	mg/L	0.00207	<0.00050	----	----	----
Phosphorus, dissolved	7723-14-0	E421/WT	0.050	mg/L	<0.050	<0.050	----	----	----
Potassium, dissolved	7440-09-7	E421/WT	0.050	mg/L	1.92	2.55	----	----	----
Rubidium, dissolved	7440-17-7	E421/WT	0.00020	mg/L	0.00178	0.00039	----	----	----
Selenium, dissolved	7782-49-2	E421/WT	0.000050	mg/L	0.000298	<0.000050	----	----	----
Silicon, dissolved	7440-21-3	E421/WT	0.050	mg/L	6.88	8.42	----	----	----
Silver, dissolved	7440-22-4	E421/WT	0.000010	mg/L	<0.000010	<0.000010	----	----	----
Sodium, dissolved	7440-23-5	E421/WT	0.050	mg/L	17.8	4.42	----	----	----
Strontium, dissolved	7440-24-6	E421/WT	0.00020	mg/L	0.197	0.292	----	----	----
Sulfur, dissolved	7704-34-9	E421/WT	0.50	mg/L	12.8	7.98	----	----	----
Tellurium, dissolved	13494-80-9	E421/WT	0.00020	mg/L	<0.00020	<0.00020	----	----	----
Thallium, dissolved	7440-28-0	E421/WT	0.000010	mg/L	<0.000010	<0.000010	----	----	----
Thorium, dissolved	7440-29-1	E421/WT	0.00010	mg/L	<0.00010	<0.00010	----	----	----
Tin, dissolved	7440-31-5	E421/WT	0.00010	mg/L	<0.00010	<0.00010	----	----	----
Titanium, dissolved	7440-32-6	E421/WT	0.00030	mg/L	<0.00030	<0.00030	----	----	----
Tungsten, dissolved	7440-33-7	E421/WT	0.00010	mg/L	<0.00010	<0.00010	----	----	----
Uranium, dissolved	7440-61-1	E421/WT	0.000010	mg/L	0.00142	0.000439	----	----	----
Vanadium, dissolved	7440-62-2	E421/WT	0.00050	mg/L	<0.00050	<0.00050	----	----	----
Zinc, dissolved	7440-66-6	E421/WT	0.0010	mg/L	<0.0010	<0.0010	----	----	----
Zirconium, dissolved	7440-67-7	E421/WT	0.00020	mg/L	<0.00020	<0.00020	----	----	----
Dissolved metals filtration location	----	EP421/WT	-	-	Laboratory	Laboratory	----	----	----

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.



## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: WT2427872</b>	<b>Page</b>	: 1 of 11
<b>Client</b>	: CF Crozier & Associates	<b>Laboratory</b>	: ALS Environmental - Waterloo
<b>Contact</b>	: Victoria Mazur	<b>Account Manager</b>	: Andrew Martin
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<b>Project</b>	: 2621-7000	<b>Date Samples Received</b>	: 20-Sep-2024 14:02
<b>PO</b>	: ----	<b>Date Analysis Commenced</b>	: 21-Sep-2024
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 27-Sep-2024 17:30
<b>Sampler</b>	: CLIENT		
<b>Site</b>	: ----		
<b>Quote number</b>	: 2024 SOA		
<b>No. of samples received</b>	: 2		
<b>No. of samples analysed</b>	: 2		

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
- Matrix Spike (MS) Report; Recovery 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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Nik Perkio	Senior Analyst	Waterloo Inorganics, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario

Page : 2 of 11  
Work Order : WT2427872  
Client : CF Crozier & Associates  
Project : 2621-7000



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## 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

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

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### 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: <b>Water</b>					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
<b>Physical Tests (QC Lot: 1665483)</b>											
HA2402049-014	Anonymous	Turbidity	----	E121	0.10	NTU	864	862	0.232%	15%	----
<b>Physical Tests (QC Lot: 1669481)</b>											
WT2427872-001	MW 6	Solids, total dissolved [TDS]	----	E162	20	mg/L	365	375	2.70%	20%	----
<b>Physical Tests (QC Lot: 1671322)</b>											
WT2427970-001	Anonymous	pH	----	E108	0.10	pH units	7.66	7.70	0.521%	4%	----
<b>Physical Tests (QC Lot: 1671323)</b>											
WT2427970-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	822	818	0.488%	10%	----
<b>Physical Tests (QC Lot: 1671962)</b>											
HA2402049-007	Anonymous	Colour, apparent	----	E330	20.0	CU	1220	1240	1.11%	20%	----
<b>Anions and Nutrients (QC Lot: 1664933)</b>											
WT2427547-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.148	0.150	1.07%	20%	----
<b>Anions and Nutrients (QC Lot: 1671325)</b>											
WT2427895-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.167	0.164	0.002	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 1671326)</b>											
WT2427895-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	2.63	2.63	0.0502%	20%	----
<b>Anions and Nutrients (QC Lot: 1671327)</b>											
WT2427895-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 1671328)</b>											
WT2427895-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	38.0	38.0	0.152%	20%	----
<b>Anions and Nutrients (QC Lot: 1671329)</b>											
WT2427895-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	19.8	19.9	0.423%	20%	----
<b>Anions and Nutrients (QC Lot: 1671331)</b>											
WT2427872-002	MW 8	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
<b>Dissolved Metals (QC Lot: 1667329)</b>											
WT2427842-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0039	0.0043	0.0003	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00024	0.00024	0.000004	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00043	0.00045	0.00002	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0388	0.0388	0.0492%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	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
<b>Dissolved Metals (QC Lot: 1667329) - continued</b>											
WT2427842-001	Anonymous	Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.055	0.056	0.001	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	59.3	58.7	0.952%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00013	0.00013	0.000008	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00054	0.00055	0.000001	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.080	0.084	0.004	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000124	0.000130	0.000007	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0041	0.0044	0.0002	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	12.2	12.0	1.89%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0957	0.105	9.20%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000704	0.000729	3.53%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00103	0.00103	0.000002	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	0.060	0.010	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	4.82	5.12	5.89%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00374	0.00395	5.54%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000160	0.000181	0.000021	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	0.519	0.529	1.82%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	240	251	4.34%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.355	0.355	0.0790%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	8.32	8.52	2.34%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.00040	0.00040	0.000002	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000066	0.000065	0.000001	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00081	0.00088	0.00007	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0644	0.0658	2.03%	20%	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	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
<b>Physical Tests (QCLot: 1665483)</b>						
Turbidity	---	E121	0.1	NTU	<0.10	---
<b>Physical Tests (QCLot: 1669481)</b>						
Solids, total dissolved [TDS]	---	E162	10	mg/L	<10	---
<b>Physical Tests (QCLot: 1671323)</b>						
Conductivity	---	E100	1	µS/cm	<1.0	---
<b>Physical Tests (QCLot: 1671324)</b>						
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	<1.0	---
<b>Physical Tests (QCLot: 1671962)</b>						
Colour, apparent	---	E330	2	CU	<2.0	---
<b>Anions and Nutrients (QCLot: 1664933)</b>						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	---
<b>Anions and Nutrients (QCLot: 1671325)</b>						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	---
<b>Anions and Nutrients (QCLot: 1671326)</b>						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	---
<b>Anions and Nutrients (QCLot: 1671327)</b>						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	---
<b>Anions and Nutrients (QCLot: 1671328)</b>						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	---
<b>Anions and Nutrients (QCLot: 1671329)</b>						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
<b>Anions and Nutrients (QCLot: 1671331)</b>						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	---
<b>Dissolved Metals (QCLot: 1667329)</b>						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	---
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	---
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	---
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	---
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	---
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	---
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Dissolved Metals (QCLot: 1667329) - continued</b>						
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----

Page : 7 of 11  
Work Order : WT2427872  
Client : CF Crozier & Associates  
Project : 2621-7000

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## 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	Target Concentration	LCS	Low	High	Qualifier
<b>Physical Tests (QCLot: 1665483)</b>									
Turbidity	---	E121	0.1	NTU	200 NTU	96.5	85.0	115	---
<b>Physical Tests (QCLot: 1669481)</b>									
Solids, total dissolved [TDS]	---	E162	10	mg/L	1000 mg/L	98.6	85.0	115	---
<b>Physical Tests (QCLot: 1671322)</b>									
pH	---	E108	---	pH units	7 pH units	101	98.0	102	---
<b>Physical Tests (QCLot: 1671323)</b>									
Conductivity	---	E100	1	µS/cm	1410 µS/cm	100	90.0	110	---
<b>Physical Tests (QCLot: 1671324)</b>									
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	150 mg/L	102	85.0	115	---
<b>Physical Tests (QCLot: 1671962)</b>									
Colour, apparent	---	E330	2	CU	25 CU	98.3	70.0	130	---
<b>Anions and Nutrients (QCLot: 1664933)</b>									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	100	85.0	115	---
<b>Anions and Nutrients (QCLot: 1671325)</b>									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	---
<b>Anions and Nutrients (QCLot: 1671326)</b>									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	99.5	90.0	110	---
<b>Anions and Nutrients (QCLot: 1671327)</b>									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	102	90.0	110	---
<b>Anions and Nutrients (QCLot: 1671328)</b>									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	---
<b>Anions and Nutrients (QCLot: 1671329)</b>									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	---
<b>Anions and Nutrients (QCLot: 1671331)</b>									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.05 mg/L	100	80.0	120	---
<b>Dissolved Metals (QCLot: 1667329)</b>									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	0.1 mg/L	98.0	80.0	120	---
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	0.05 mg/L	98.7	80.0	120	---
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	0.05 mg/L	102	80.0	120	---
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.012 mg/L	99.4	80.0	120	---



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
<b>Dissolved Metals (QCLot: 1667329) - continued</b>									
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.005 mg/L	103	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	0.05 mg/L	102	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	0.05 mg/L	101	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.005 mg/L	99.3	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	2.5 mg/L	97.8	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.002 mg/L	94.8	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.012 mg/L	99.8	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.012 mg/L	98.2	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.012 mg/L	98.8	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	0.05 mg/L	94.2	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.025 mg/L	98.2	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.012 mg/L	96.8	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	2.5 mg/L	101	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.012 mg/L	97.3	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.012 mg/L	98.6	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.025 mg/L	99.2	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	0.5 mg/L	97.5	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	2.5 mg/L	95.7	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.005 mg/L	97.8	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	0.05 mg/L	99.3	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	0.5 mg/L	102	60.0	140	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.005 mg/L	87.2	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	2.5 mg/L	103	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.012 mg/L	97.3	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	2.5 mg/L	102	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.005 mg/L	95.1	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	0.05 mg/L	99.7	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.005 mg/L	96.8	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.025 mg/L	96.0	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.012 mg/L	95.7	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.005 mg/L	96.9	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0 mg/L	99.4	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.025 mg/L	99.7	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.025 mg/L	98.3	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.005 mg/L	94.6	80.0	120	----



## Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>Anions and Nutrients (QCLot: 1664933)</b>										
WT2427547-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
<b>Anions and Nutrients (QCLot: 1671325)</b>										
WT2427895-001	Anonymous	Fluoride	16984-48-8	E235.F	0.985 mg/L	1 mg/L	98.5	75.0	125	----
<b>Anions and Nutrients (QCLot: 1671326)</b>										
WT2427895-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	ND mg/L	----	ND	75.0	125	----
<b>Anions and Nutrients (QCLot: 1671327)</b>										
WT2427895-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.503 mg/L	0.5 mg/L	101	75.0	125	----
<b>Anions and Nutrients (QCLot: 1671328)</b>										
WT2427895-001	Anonymous	Chloride	16887-00-6	E235.Cl	99.5 mg/L	100 mg/L	99.5	75.0	125	----
<b>Anions and Nutrients (QCLot: 1671329)</b>										
WT2427895-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	102 mg/L	100 mg/L	102	75.0	125	----
<b>Anions and Nutrients (QCLot: 1671331)</b>										
WT2427872-002	MW 8	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0201 mg/L	0.02 mg/L	102	70.0	130	----
<b>Dissolved Metals (QCLot: 1667329)</b>										
WT2427842-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0498 mg/L	0.05 mg/L	99.6	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0537 mg/L	0.05 mg/L	107	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	----	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.00563 mg/L	0.005 mg/L	112	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.0468 mg/L	0.05 mg/L	93.5	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.052 mg/L	0.05 mg/L	104	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00500 mg/L	0.005 mg/L	99.9	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00251 mg/L	0.002 mg/L	100	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0127 mg/L	0.012 mg/L	102	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0122 mg/L	0.012 mg/L	97.8	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0120 mg/L	0.012 mg/L	96.4	70.0	130	----
		Iron, dissolved	7439-89-6	E421	0.045 mg/L	0.05 mg/L	89.2	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0235 mg/L	0.025 mg/L	94.1	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0130 mg/L	0.012 mg/L	104	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	----	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0133 mg/L	0.012 mg/L	107	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0242 mg/L	0.025 mg/L	96.7	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	0.574 mg/L	0.5 mg/L	115	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	
<b>Dissolved Metals (QCLot: 1667329) - continued</b>										
WT2427842-002	Anonymous	Potassium, dissolved	7440-09-7	E421	2.64 mg/L	2.5 mg/L	106	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.00492 mg/L	0.005 mg/L	98.4	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0507 mg/L	0.05 mg/L	101	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	0.533 mg/L	0.5 mg/L	107	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00429 mg/L	0.005 mg/L	85.8	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	----	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	----	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.00521 mg/L	0.005 mg/L	104	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.0473 mg/L	0.05 mg/L	94.7	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.00448 mg/L	0.005 mg/L	89.6	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0246 mg/L	0.025 mg/L	98.6	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0128 mg/L	0.012 mg/L	103	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.00489 mg/L	0.005 mg/L	97.7	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.000245 mg/L	0 mg/L	98.1	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0259 mg/L	0.025 mg/L	104	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.0246 mg/L	0.025 mg/L	98.4	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.00499 mg/L	0.005 mg/L	99.7	70.0	130	----



## QUALITY CONTROL INTERPRETIVE REPORT

<p><b>Work Order</b> : <b>WT2427872</b></p> <p><b>Client</b> : <b>CF Crozier &amp; Associates</b></p> <p><b>Contact</b> : Victoria Mazur</p> <p><b>Address</b> : 2800 High Point Drive Milton ON Canada L9T 6P4</p> <p><b>Telephone</b> : (548) 708-0039</p> <p><b>Project</b> : 2621-7000</p> <p><b>PO</b> : ----</p> <p><b>C-O-C number</b> : ----</p> <p><b>Sampler</b> : CLIENT</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : 2024 SOA</p> <p><b>No. of samples received</b> : 2</p> <p><b>No. of samples analysed</b> : 2</p>	<p><b>Page</b> : 1 of 10</p> <p><b>Laboratory</b> : ALS Environmental - Waterloo</p> <p><b>Account Manager</b> : Andrew Martin</p> <p><b>Address</b> : 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8</p> <p><b>Telephone</b> : +1 519 886 6910</p> <p><b>Date Samples Received</b> : 20-Sep-2024 14:02</p> <p><b>Issue Date</b> : 27-Sep-2024 17:45</p>
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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 Matrix Spike 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)***

- Analysis Holding Time Outliers exist - please see following pages for full details.

### ***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 : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>Anions and Nutrients : Ammonia by Fluorescence</b>										
Amber glass total (sulfuric acid) [ON MECP] MW 6	E298	20-Sep-2024	21-Sep-2024	28 days	2 days	✔	24-Sep-2024	28 days	5 days	✔
<b>Anions and Nutrients : Ammonia by Fluorescence</b>										
Amber glass total (sulfuric acid) [ON MECP] MW 8	E298	20-Sep-2024	21-Sep-2024	28 days	2 days	✔	24-Sep-2024	28 days	5 days	✔
<b>Anions and Nutrients : Chloride in Water by IC</b>										
HDPE [ON MECP] MW 6	E235.Cl	20-Sep-2024	25-Sep-2024	28 days	5 days	✔	26-Sep-2024	28 days	6 days	✔
<b>Anions and Nutrients : Chloride in Water by IC</b>										
HDPE [ON MECP] MW 8	E235.Cl	20-Sep-2024	25-Sep-2024	28 days	5 days	✔	26-Sep-2024	28 days	6 days	✔
<b>Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)</b>										
HDPE [ON MECP] MW 6	E378-U	20-Sep-2024	25-Sep-2024	7 days	5 days	✔	25-Sep-2024	7 days	6 days	✔
<b>Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)</b>										
HDPE [ON MECP] MW 8	E378-U	20-Sep-2024	25-Sep-2024	7 days	5 days	✔	25-Sep-2024	7 days	6 days	✔
<b>Anions and Nutrients : Fluoride in Water by IC</b>										
HDPE [ON MECP] MW 6	E235.F	20-Sep-2024	25-Sep-2024	28 days	5 days	✔	26-Sep-2024	28 days	6 days	✔



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>Anions and Nutrients : Fluoride in Water by IC</b>										
HDPE [ON MECP] MW 8	E235.F	20-Sep-2024	25-Sep-2024	28 days	5 days	✓	26-Sep-2024	28 days	6 days	✓
<b>Anions and Nutrients : Nitrate in Water by IC</b>										
HDPE [ON MECP] MW 6	E235.NO3	20-Sep-2024	25-Sep-2024	7 days	5 days	✓	26-Sep-2024	7 days	6 days	✓
<b>Anions and Nutrients : Nitrate in Water by IC</b>										
HDPE [ON MECP] MW 8	E235.NO3	20-Sep-2024	25-Sep-2024	7 days	5 days	✓	26-Sep-2024	7 days	6 days	✓
<b>Anions and Nutrients : Nitrite in Water by IC</b>										
HDPE [ON MECP] MW 6	E235.NO2	20-Sep-2024	25-Sep-2024	7 days	5 days	✓	26-Sep-2024	7 days	6 days	✓
<b>Anions and Nutrients : Nitrite in Water by IC</b>										
HDPE [ON MECP] MW 8	E235.NO2	20-Sep-2024	25-Sep-2024	7 days	5 days	✓	26-Sep-2024	7 days	6 days	✓
<b>Anions and Nutrients : Sulfate in Water by IC</b>										
HDPE [ON MECP] MW 6	E235.SO4	20-Sep-2024	25-Sep-2024	28 days	5 days	✓	26-Sep-2024	28 days	6 days	✓
<b>Anions and Nutrients : Sulfate in Water by IC</b>										
HDPE [ON MECP] MW 8	E235.SO4	20-Sep-2024	25-Sep-2024	28 days	5 days	✓	26-Sep-2024	28 days	6 days	✓
<b>Dissolved Metals : Dissolved Metals in Water by CRC ICPMS</b>										
HDPE [ON MECP] MW 6	E421	20-Sep-2024	23-Sep-2024	0 hrs	87 hrs	* UCP	23-Sep-2024	0 hrs	95 hrs	* UCP
<b>Dissolved Metals : Dissolved Metals in Water by CRC ICPMS</b>										
HDPE [ON MECP] MW 8	E421	20-Sep-2024	23-Sep-2024	0 hrs	87 hrs	* UCP	23-Sep-2024	0 hrs	95 hrs	* UCP



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Physical Tests : Alkalinity Species by Titration</b>											
HDPE [ON MECP] MW 6	E290	20-Sep-2024	25-Sep-2024	14 days	5 days	✓	25-Sep-2024	14 days	6 days	✓	
<b>Physical Tests : Alkalinity Species by Titration</b>											
HDPE [ON MECP] MW 8	E290	20-Sep-2024	25-Sep-2024	14 days	5 days	✓	25-Sep-2024	14 days	6 days	✓	
<b>Physical Tests : Colour (Apparent) by Spectrometer</b>											
HDPE [ON MECP] MW 6	E330	20-Sep-2024	----	----	----		25-Sep-2024	48 hrs	132 hrs	* EHT	
<b>Physical Tests : Colour (Apparent) by Spectrometer</b>											
HDPE [ON MECP] MW 8	E330	20-Sep-2024	----	----	----		25-Sep-2024	48 hrs	132 hrs	* EHT	
<b>Physical Tests : Conductivity in Water</b>											
HDPE [ON MECP] MW 6	E100	20-Sep-2024	25-Sep-2024	28 days	5 days	✓	25-Sep-2024	28 days	6 days	✓	
<b>Physical Tests : Conductivity in Water</b>											
HDPE [ON MECP] MW 8	E100	20-Sep-2024	25-Sep-2024	28 days	5 days	✓	25-Sep-2024	28 days	6 days	✓	
<b>Physical Tests : pH by Meter</b>											
HDPE [ON MECP] MW 6	E108	20-Sep-2024	25-Sep-2024	14 days	5 days	✓	25-Sep-2024	14 days	6 days	✓	
<b>Physical Tests : pH by Meter</b>											
HDPE [ON MECP] MW 8	E108	20-Sep-2024	25-Sep-2024	14 days	5 days	✓	25-Sep-2024	14 days	6 days	✓	
<b>Physical Tests : TDS by Gravimetry</b>											
HDPE [ON MECP] MW 6	E162	20-Sep-2024	----	----	----		24-Sep-2024	7 days	5 days	✓	



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>Physical Tests : TDS by Gravimetry</b>										
HDPE [ON MECP] MW 8	E162	20-Sep-2024	----	----	----		24-Sep-2024	7 days	5 days	✔
<b>Physical Tests : Turbidity by Nephelometry</b>										
HDPE [ON MECP] MW 6	E121	20-Sep-2024	----	----	----		21-Sep-2024	48 hrs	39 hrs	✔
<b>Physical Tests : Turbidity by Nephelometry</b>										
HDPE [ON MECP] MW 8	E121	20-Sep-2024	----	----	----		21-Sep-2024	48 hrs	39 hrs	✔

**Legend & Qualifier Definitions**

EHT: Exceeded ALS recommended hold time prior to analysis.

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

UCP: Unsuitable Container and/or Preservative used (invalidates standard hold time). Maximum hold time of zero applied. Test results may be biased low / unreliable, and may not meet regulatory requirements.



## 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	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Alkalinity Species by Titration	E290	1671324	0	10	0.0	5.0	✖
Ammonia by Fluorescence	E298	1664933	1	18	5.5	5.0	✔
Chloride in Water by IC	E235.Cl	1671328	1	15	6.6	5.0	✔
Colour (Apparent) by Spectrometer	E330	1671962	1	12	8.3	5.0	✔
Conductivity in Water	E100	1671323	1	14	7.1	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1667329	1	18	5.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1671331	1	16	6.2	5.0	✔
Fluoride in Water by IC	E235.F	1671325	1	9	11.1	5.0	✔
Nitrate in Water by IC	E235.NO3	1671326	1	15	6.6	5.0	✔
Nitrite in Water by IC	E235.NO2	1671327	1	12	8.3	5.0	✔
pH by Meter	E108	1671322	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1671329	1	10	10.0	5.0	✔
TDS by Gravimetry	E162	1669481	1	20	5.0	5.0	✔
Turbidity by Nephelometry	E121	1665483	1	17	5.8	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Alkalinity Species by Titration	E290	1671324	1	10	10.0	5.0	✔
Ammonia by Fluorescence	E298	1664933	1	18	5.5	5.0	✔
Chloride in Water by IC	E235.Cl	1671328	1	15	6.6	5.0	✔
Colour (Apparent) by Spectrometer	E330	1671962	1	12	8.3	5.0	✔
Conductivity in Water	E100	1671323	1	14	7.1	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1667329	1	18	5.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1671331	1	16	6.2	5.0	✔
Fluoride in Water by IC	E235.F	1671325	1	9	11.1	5.0	✔
Nitrate in Water by IC	E235.NO3	1671326	1	15	6.6	5.0	✔
Nitrite in Water by IC	E235.NO2	1671327	1	12	8.3	5.0	✔
pH by Meter	E108	1671322	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1671329	1	10	10.0	5.0	✔
TDS by Gravimetry	E162	1669481	1	20	5.0	5.0	✔
Turbidity by Nephelometry	E121	1665483	1	17	5.8	5.0	✔
<b>Method Blanks (MB)</b>							
Alkalinity Species by Titration	E290	1671324	1	10	10.0	5.0	✔
Ammonia by Fluorescence	E298	1664933	1	18	5.5	5.0	✔
Chloride in Water by IC	E235.Cl	1671328	1	15	6.6	5.0	✔
Colour (Apparent) by Spectrometer	E330	1671962	1	12	8.3	5.0	✔
Conductivity in Water	E100	1671323	1	14	7.1	5.0	✔



Matrix: **Water** Evaluation: \* = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
<b>Method Blanks (MB) - Continued</b>							
Dissolved Metals in Water by CRC ICPMS	E421	1667329	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1671331	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	1671325	1	9	11.1	5.0	✓
Nitrate in Water by IC	E235.NO3	1671326	1	15	6.6	5.0	✓
Nitrite in Water by IC	E235.NO2	1671327	1	12	8.3	5.0	✓
Sulfate in Water by IC	E235.SO4	1671329	1	10	10.0	5.0	✓
TDS by Gravimetry	E162	1669481	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	1665483	1	17	5.8	5.0	✓
<b>Matrix Spikes (MS)</b>							
Ammonia by Fluorescence	E298	1664933	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	1671328	1	15	6.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1667329	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1671331	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	1671325	1	9	11.1	5.0	✓
Nitrate in Water by IC	E235.NO3	1671326	1	15	6.6	5.0	✓
Nitrite in Water by IC	E235.NO2	1671327	1	12	8.3	5.0	✓
Sulfate in Water by IC	E235.SO4	1671329	1	10	10.0	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
Conductivity in Water	E100 ALS Environmental - Waterloo	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 ALS Environmental - Waterloo	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 ALS Environmental - Waterloo	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC	E235.NO2 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Waterloo	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Colour (Apparent) by Spectrometer	E330 ALS Environmental - Waterloo	Water	APHA 2120 C (mod)	Colour (Apparent) is measured in an unfiltered sample spectrophotometrically using the single wavelength method. The colour contribution of settleable solids are not included in the result. This method is intended for potable waters.  Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Waterloo	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.  Field filtration is recommended to ensure test results represent conditions at time of sampling.
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Waterloo	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Waterloo	Water	APHA 2340B	"Hardness (as CaCO <sub>3</sub> ), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Waterloo	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Waterloo	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO <sub>3</sub> .



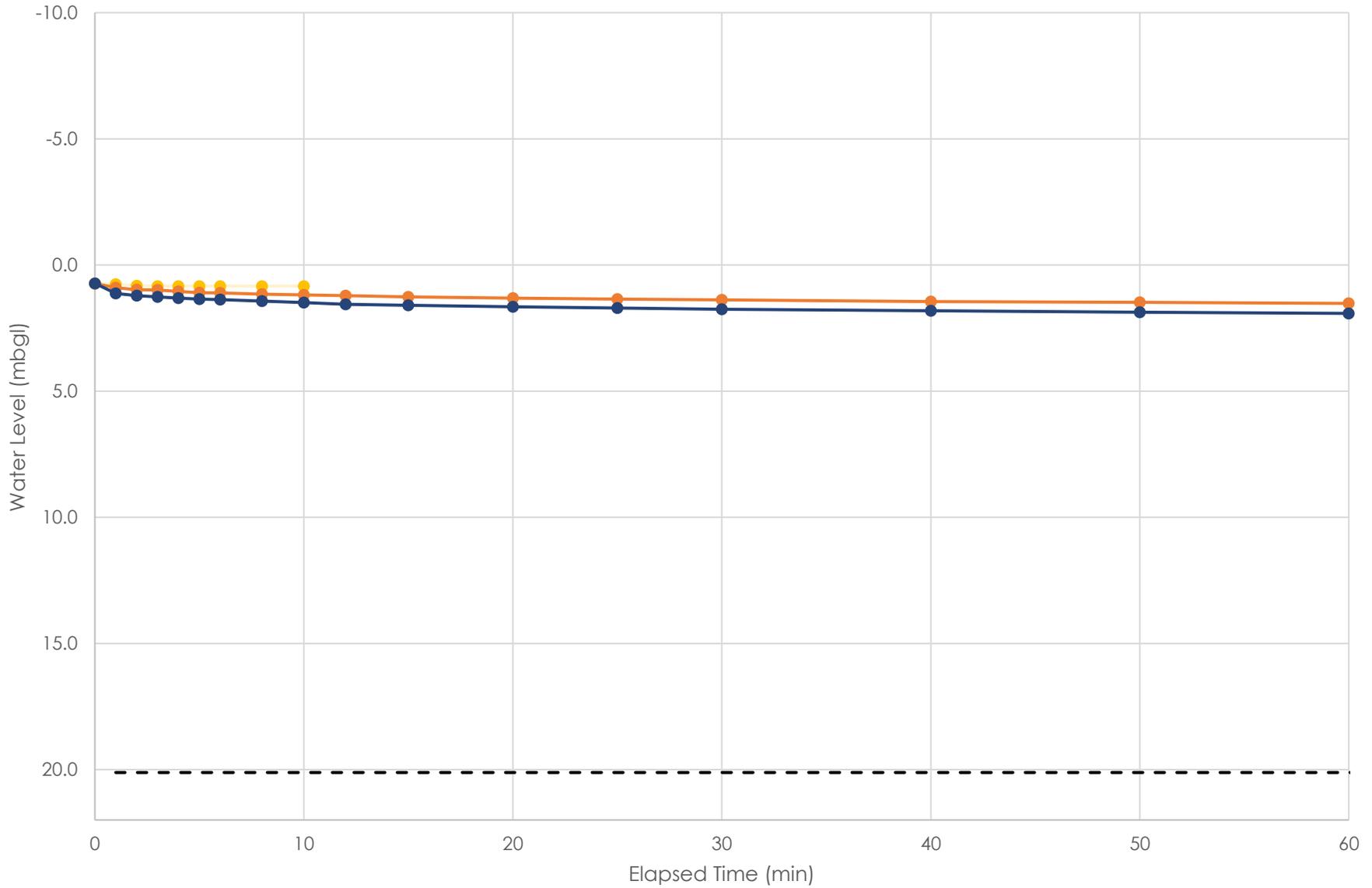
# APPENDIX D

## PW1: Step-Test Results



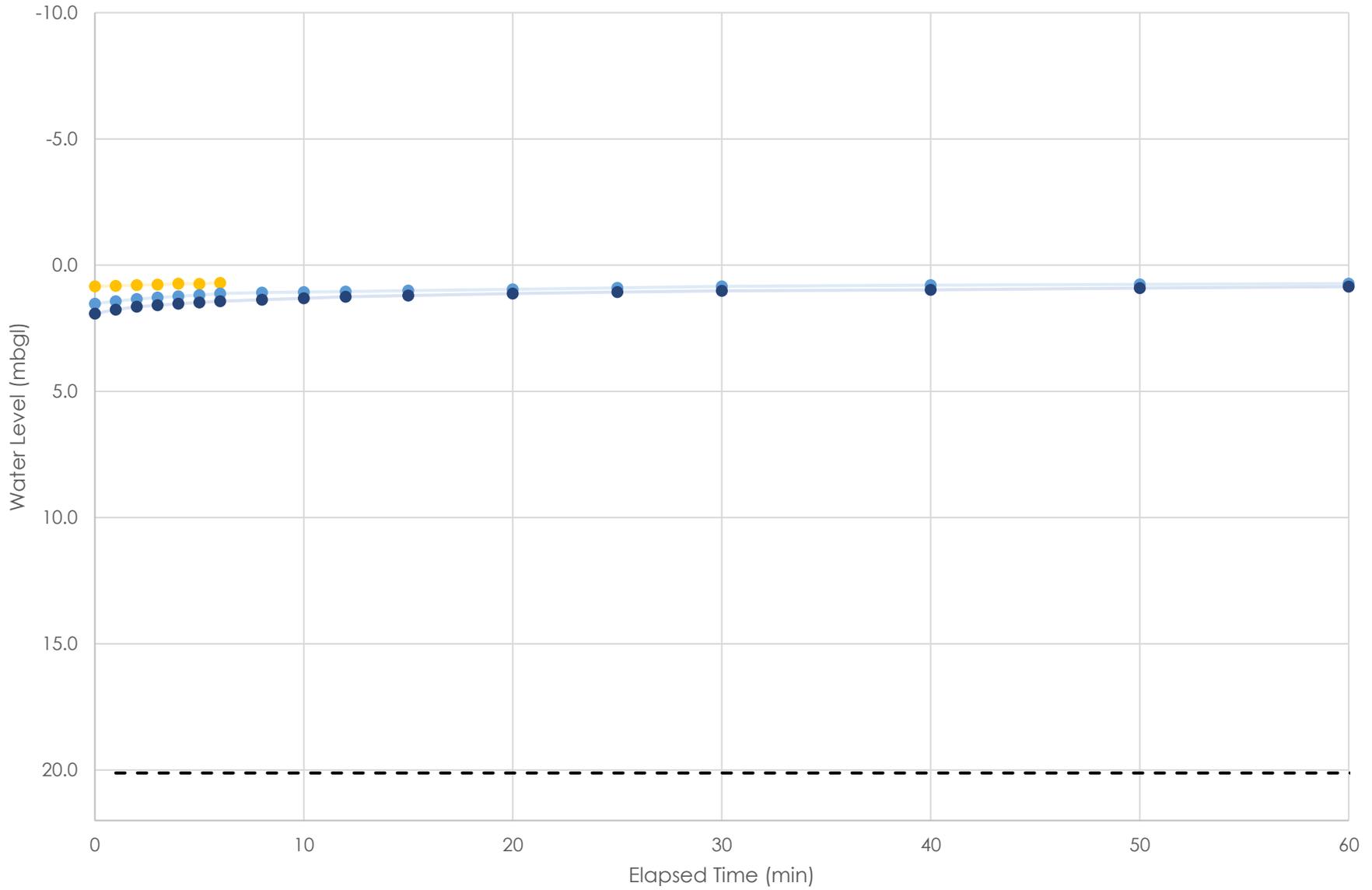
# Chipwoods Park: Pump Test Day 2

--- Top of Screen    ● 0.32 L/s    ● 0.63 L/s    ● 0.95 L/s    — Series3

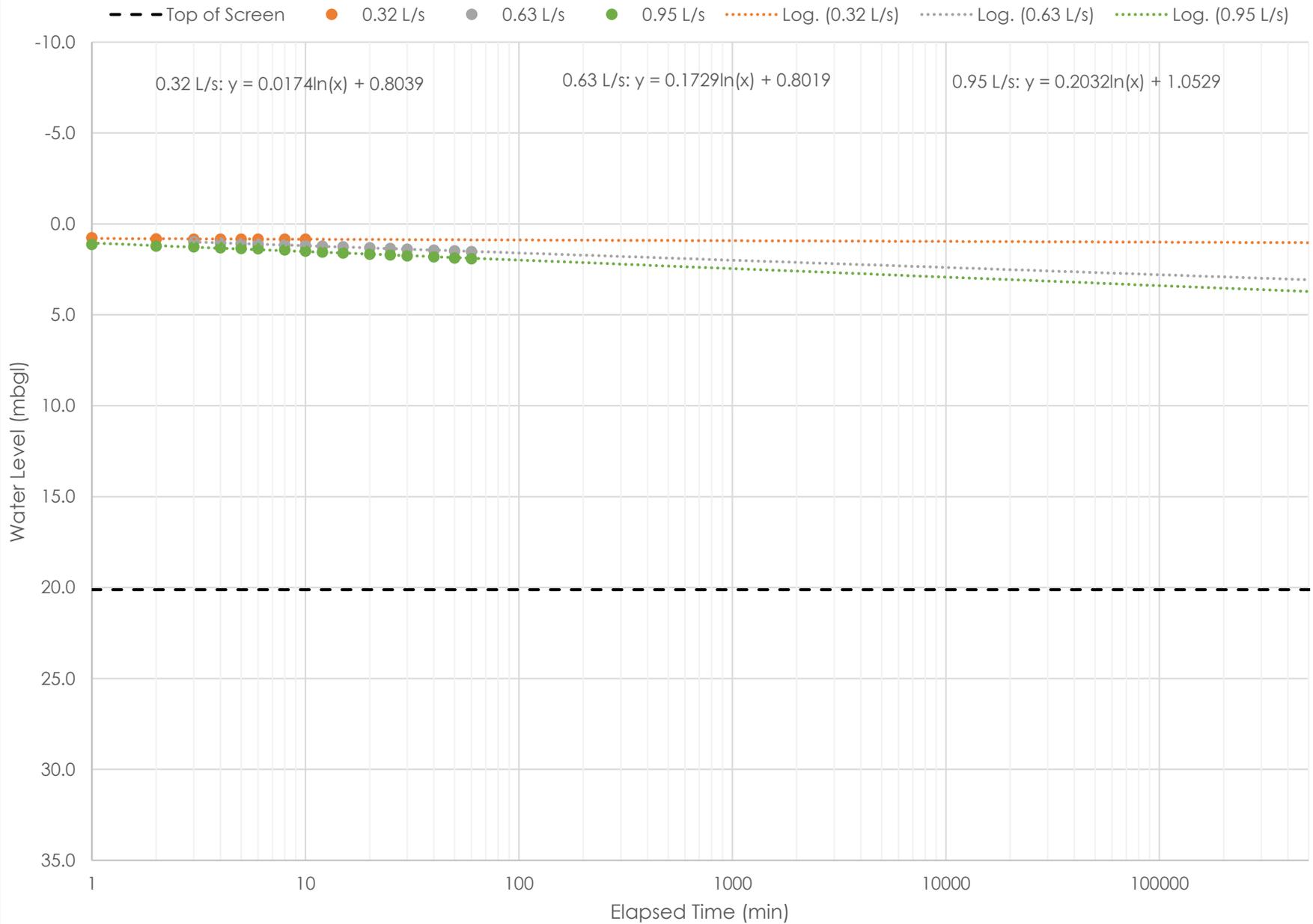


# Chipwoods Park: Pump Test Day 2

--- Top of Screen    ● 0.32 L/s    ● 0.63 L/s    ● 0.95 L/s

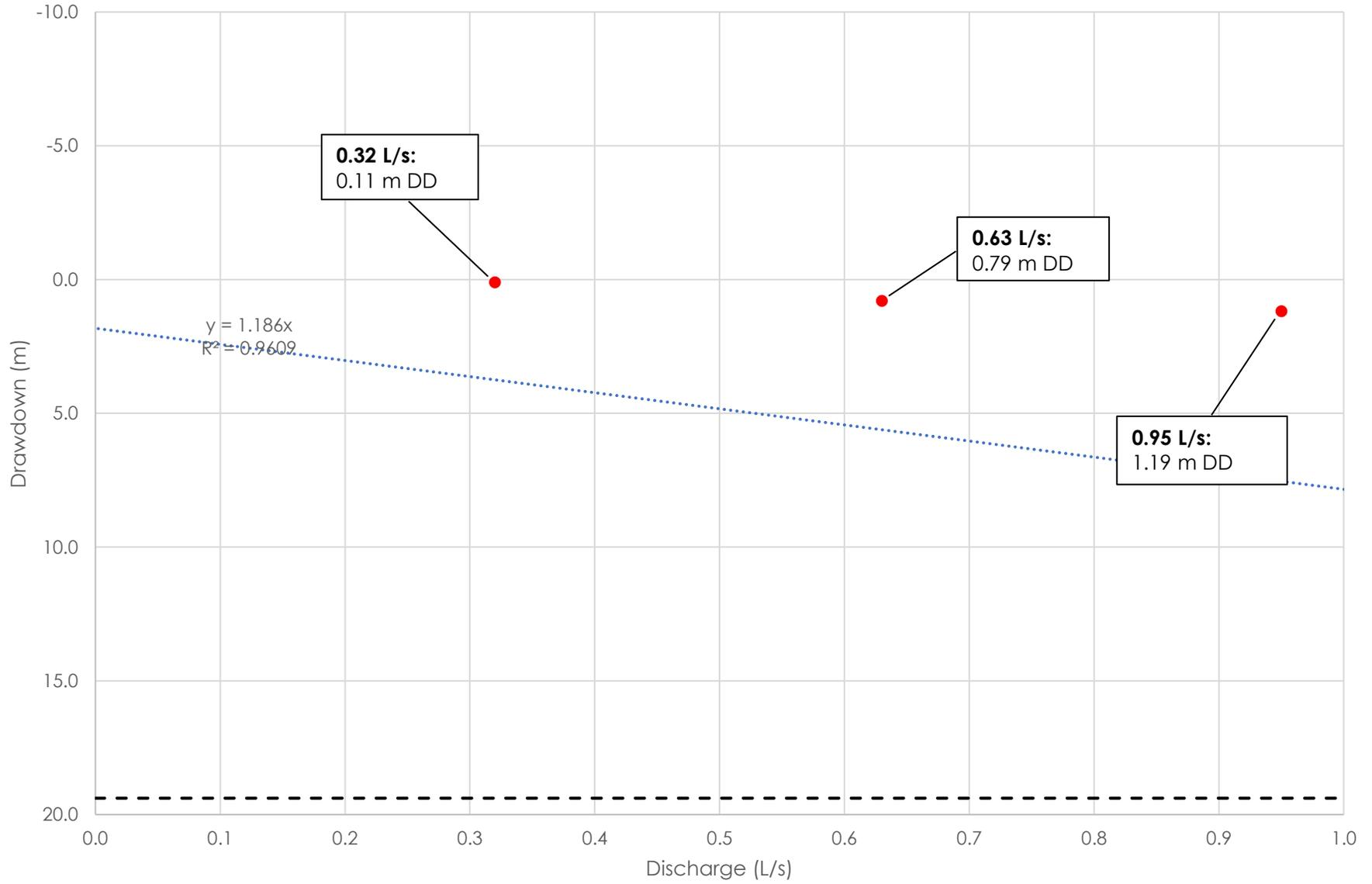


# Chipwoods Park: Pump Test Day 2



# Chipwoods Park: Pump Test Day 2

● SC (L/s/m)    - - - Total Available Drawdown    ..... Linear (SC (L/s/m))    ..... Linear (SC (L/s/m))



# APPENDIX E

## Domestic Water Demand Calculations



## Proposed Domestic Water Demand

Site Area: 37.38 ha  
 Number of Units: 224 Units  
 Eqv Population Density: 3.0 Persons Per Unit (Large Apt.)  
**Population:** 672 capita  
 Commercial Area: 0.00 ha  
 Eqv Population Density: 86 Persons per ha  
**Population:** 0 capita

**Design Parameters**

Domestic Demand (L/capita/d)	
450	<i>Residential</i>
225	<i>Commerical</i>

**Domestic Water Demand (Residential):**

Average Daily Demand = 302,400 L/day  
 = **3.50 L/s**

*Peaking Factors (Residential)*

Max Day = 2.75  
 Peak Hour = 4.13

Average Day = 3.50 L/s  
 Max Day = **9.63** L/s  
 Peak Hour = **14.46** L/s

**Notes & References**

Development Concept Plan prepared by GSAI (February, 2025)

Population Equivalent Assumed based on the Building Concepts prepared by Sheldon Creek Homes (November, 2024)

Average Demand from Section E1.05 of the Town of Shelburne Design Criteria (October 2012)

Peaking Factors from Table 3-1 of the Ministry of Environment Design Guidelines for Drinking Water Systems (2008)

Max Day = Average Day Demand \* Max Day  
 Peak Hour = Average Day Demand \* Peak Hour

Municipality	Average Daily Water Demand (L/s)	Max Day Demand (L/s)	Peak Hourly Demand (L/s)
Town of Shelburne	3.50	9.63	14.46

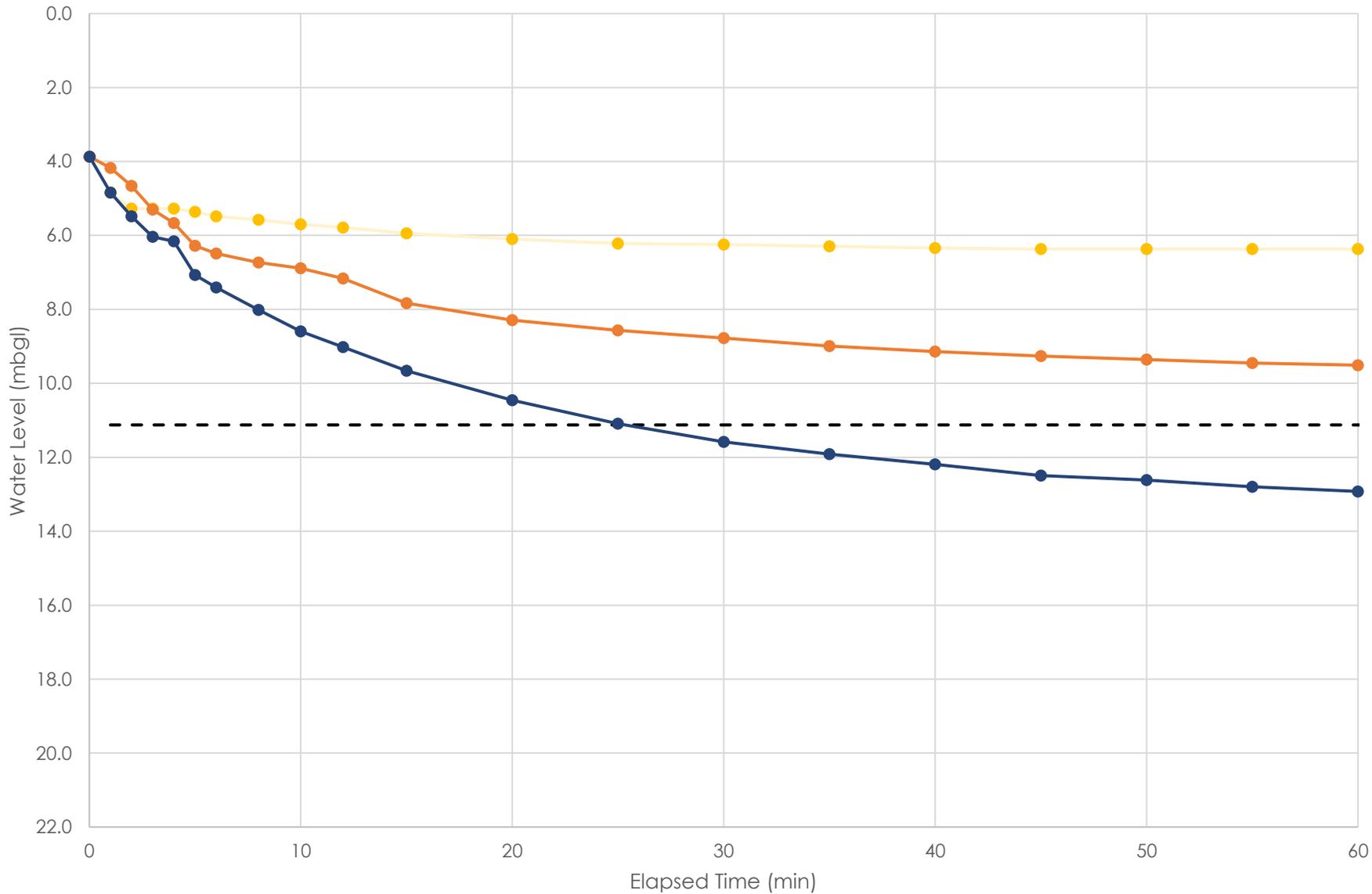
# APPENDIX F

## PW2: Step-Test Results

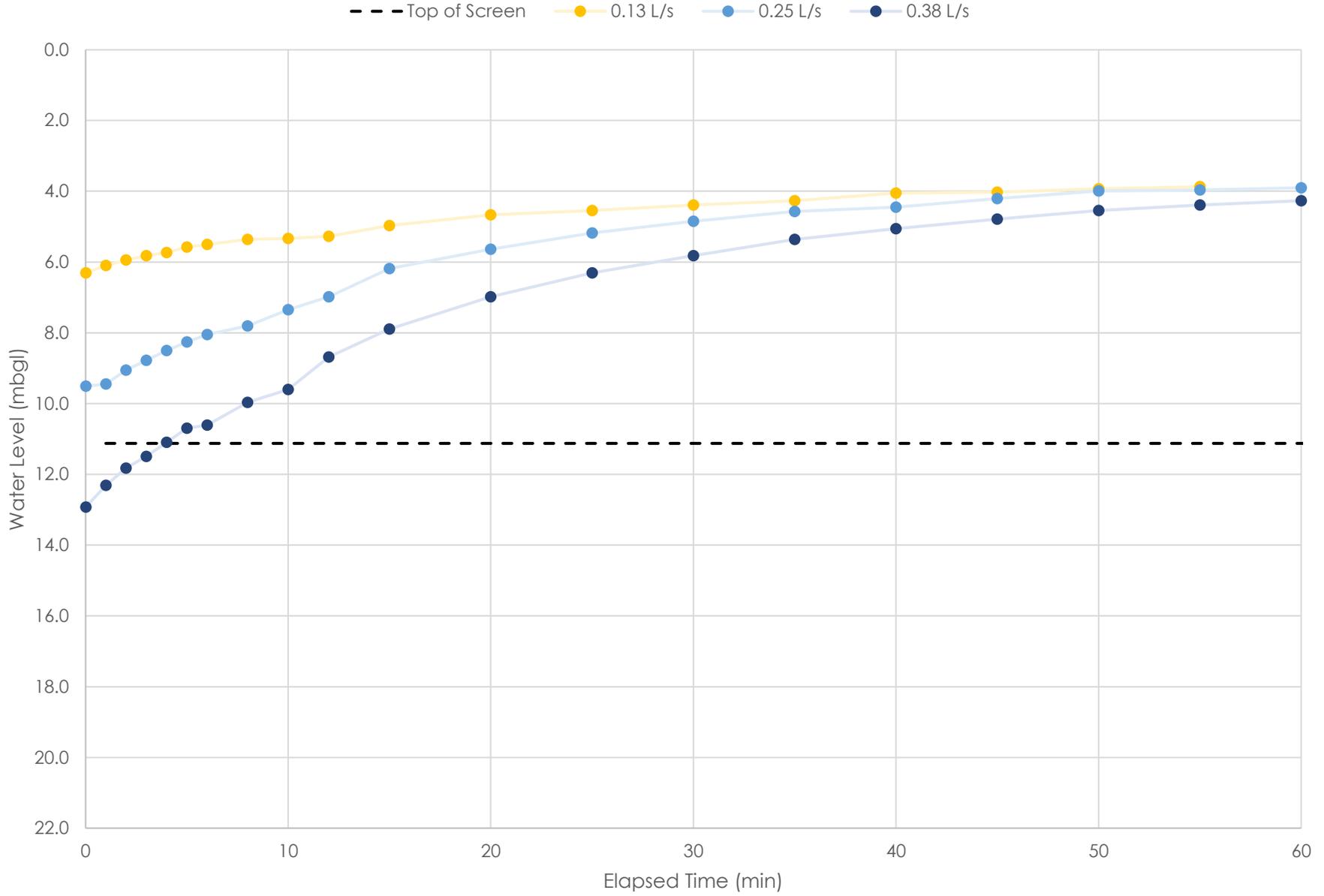


# Chipwoods Park: Pump Test Day 1

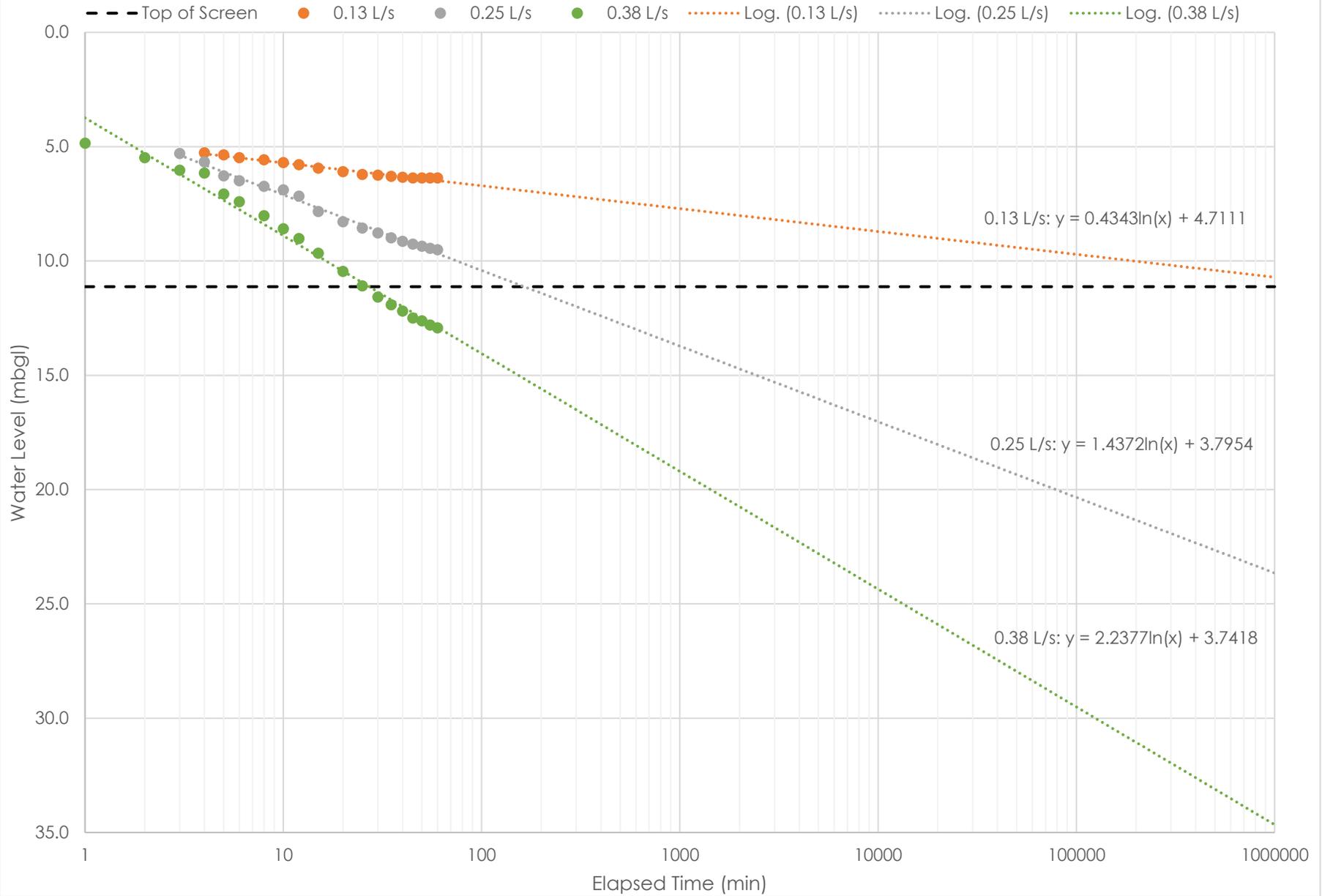
--- Top of Screen    ● 0.13 L/s    ● 0.25 L/s    ● 0.38 L/s    — Series3



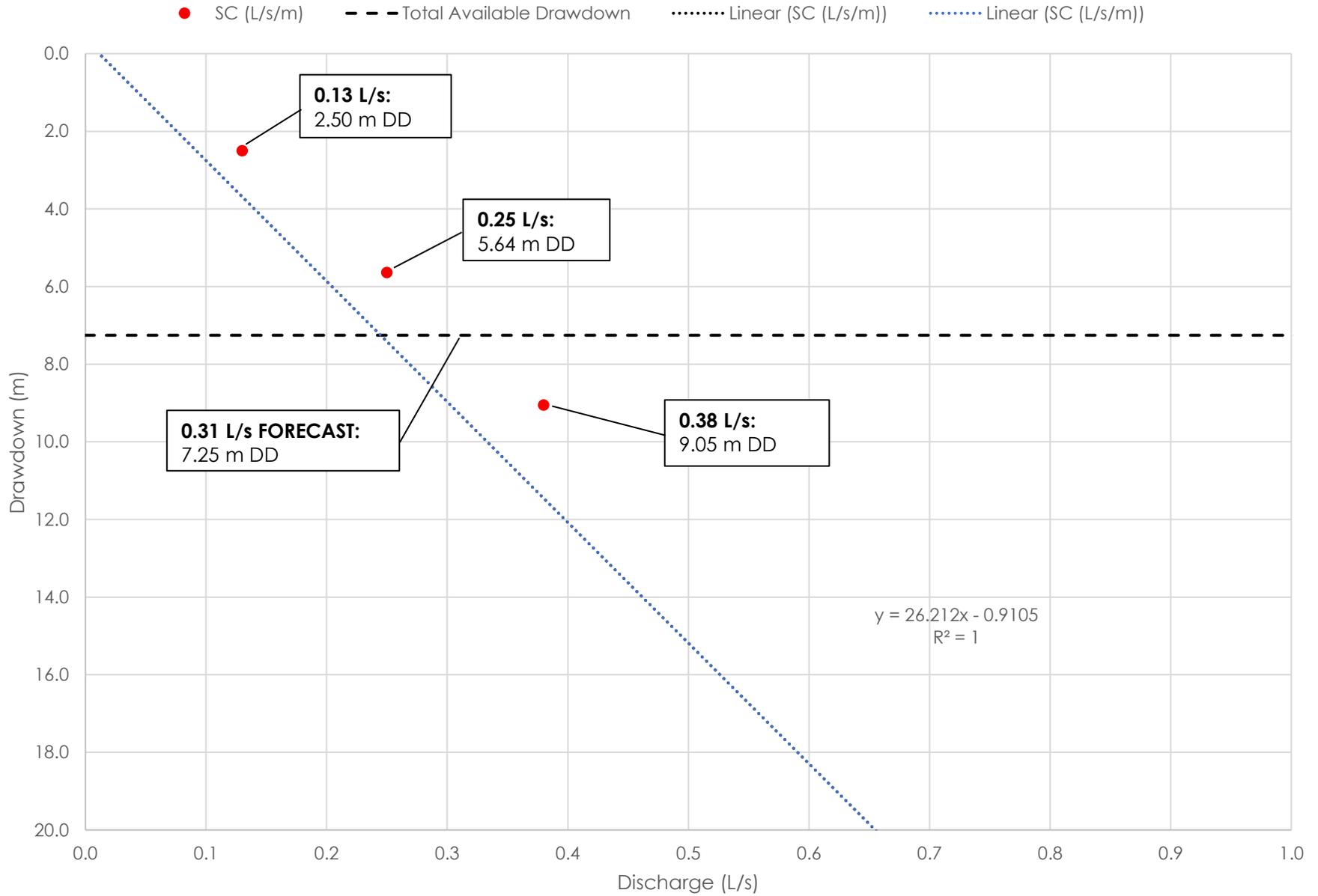
# Chipwoods Park: Pump Test Day 1



# Chipwoods Park: Pump Test Day 1



# Chipwoods Park: Pump Test Day 1



# APPENDIX G

## PW1: Water Quality Results



## CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

<p><b>Work Order</b> : <b>WT2502771</b></p> <p><b>Client</b> : <b>CF Crozier &amp; Associates</b></p> <p><b>Contact</b> : Victoria Mazur</p> <p><b>Address</b> : 2800 High Point Drive Milton ON Canada L9T 6P4</p> <p><b>Telephone</b> : (548) 708-0039</p> <p><b>Project</b> : 2621-7000</p> <p><b>PO</b> : ----</p> <p><b>C-O-C number</b> : 23-1125867</p> <p><b>Sampler</b> : ----</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : 2024/2025 SOA</p> <p><b>No. of samples received</b> : 2</p> <p><b>No. of samples analysed</b> : 2</p>	<p><b>Page</b> : 1 of 10</p> <p><b>Laboratory</b> : ALS Environmental - Waterloo</p> <p><b>Account Manager</b> : Andrew Martin</p> <p><b>Address</b> : 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8</p> <p><b>Telephone</b> : +1 519 886 6910</p> <p><b>Date Samples Received</b> : 12-Feb-2025 16:34</p> <p><b>Date Analysis Commenced</b> : 14-Feb-2025</p> <p><b>Issue Date</b> : 20-Feb-2025 15:58</p>
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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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Nik Perkio	Senior Analyst	Inorganics, Waterloo, Ontario
Nik Perkio	Senior Analyst	Metals, Waterloo, Ontario
Ruby Sujeepan	Analyst	Microbiology, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Inorganics, Waterloo, Ontario



### Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
PT2 START	Water	Colour, apparent	May interfere with disinfection; removal is important to ensure effective treatment.	ONDWS	AO/OG	52.3 CU	5 CU
	Water	Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg	Hardness levels between 80 and 100 mg/L (as CaCO <sub>3</sub> ) provide acceptable balance between corrosion and incrustation; where a water softener is used, a separate unsoftened supply for cooking and drinking purposes is recommended.	ONDWS	AO/OG	268 mg/L	80-100 mg/L
	Water	Turbidity	Filtration systems should be designed and operated to reduce turbidity levels as low as reasonably achievable and strive to achieve a treated water turbidity target from individual filters of less than 0.1 NTU. Particles can harbour microorganisms, protecting them from disinfection, and can entrap heavy metals and biocides; elevated or fluctuating turbidity in filtered water can indicate a problem with the water treatment process and a potential increased risk of pathogens in treated water.	ONDWS	AO/OG	7.96 NTU	5 NTU
	Water	Iron, total	Based on taste and staining of laundry and plumbing fixtures; no evidence exists of dietary iron toxicity in the general population.	ONDWS	AO/OG	0.701 mg/L	0.3 mg/L
PT2 END	Water	Colour, apparent	May interfere with disinfection; removal is important to ensure effective treatment.	ONDWS	AO/OG	57.6 CU	5 CU
	Water	Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg	Hardness levels between 80 and 100 mg/L (as CaCO <sub>3</sub> ) provide acceptable balance between corrosion and incrustation; where a water softener is used, a separate unsoftened supply for cooking and drinking purposes is recommended.	ONDWS	AO/OG	266 mg/L	80-100 mg/L
	Water	Turbidity	Filtration systems should be designed and operated to reduce turbidity levels as low as reasonably achievable and strive to achieve a treated water turbidity target from individual filters of less than 0.1 NTU. Particles can harbour microorganisms, protecting them from disinfection, and can entrap heavy metals and biocides; elevated or fluctuating turbidity in filtered water can indicate a problem with the water treatment process and a potential increased risk of pathogens in treated water.	ONDWS	AO/OG	9.24 NTU	5 NTU
	Water	Iron, total	Based on taste and staining of laundry and plumbing fixtures; no evidence exists of dietary iron toxicity in the general population.	ONDWS	AO/OG	0.878 mg/L	0.3 mg/L



## 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).

<i>Unit</i>	<i>Description</i>
-	no units
%	percent
µS/cm	microsiemens per centimetre
CFU/100mL	colony forming units per hundred millilitres
CU	colour units (1 cu = 1 mg/l pt)
meq/L	milliequivalents per litre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

>: 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.

## Workorder Comments

<1 or Not Detected with LOR of 1 equals Zero (0).

Not Detected = Absent; Detected = Present.



## Qualifiers

<i>Qualifier</i>	<i>Description</i>
<i>DLDS</i>	<i>Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.</i>
<i>PEHT</i>	<i>Parameter exceeded recommended holding time prior to analysis.</i>



## Analytical Results Evaluation

Matrix: Drinking Water

				Client sample ID	PT2 START	PT2 END	---	---	---	---	---
				Sampling date/time	12-Feb-2025 00:00	12-Feb-2025 00:00	---	---	---	---	---
				Sub-Matrix	Drinking Water	Drinking Water	---	---	---	---	---
Analyte	CAS Number	Method/Lab	Unit	WT2502771-001	WT2502771-002	-----	-----	-----	-----	-----	-----
<b>Physical Tests</b>											
Alkalinity, bicarbonate (as HCO <sub>3</sub> )	71-52-3	E290/WT	mg/L	282	277	---	---	---	---	---	---
Alkalinity, carbonate (as CO <sub>3</sub> )	3812-32-6	E290/WT	mg/L	5.3	3.7	---	---	---	---	---	---
Alkalinity, hydroxide (as OH)	14280-30-9	E290/WT	mg/L	<0.3	<0.3	---	---	---	---	---	---
Alkalinity, total (as CaCO <sub>3</sub> )	----	E290/WT	mg/L	240	233	---	---	---	---	---	---
Colour, apparent	----	E330/WT	CU	52.3	57.6	---	---	---	---	---	---
Conductivity	----	E100/WT	µS/cm	490	493	---	---	---	---	---	---
Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg	----	EC100A/WT	mg/L	268	266	---	---	---	---	---	---
pH	----	E108/WT	pH units	8.46	8.40	---	---	---	---	---	---
Solids, total dissolved [TDS]	----	E162/WT	mg/L	294 <sup>DLDS</sup>	289 <sup>DLDS</sup>	---	---	---	---	---	---
Solids, total dissolved [TDS], calculated	----	EC103A/WT	mg/L	318	320	---	---	---	---	---	---
Turbidity	----	E121/WT	NTU	7.96	9.24	---	---	---	---	---	---
Langelier index (@ 20°C)	----	EC105A/WT	-	1.25	1.18	---	---	---	---	---	---
Langelier index (@ 4°C)	----	EC105A/WT	-	1.01	0.930	---	---	---	---	---	---
pH, saturation (@ 20°C)	----	EC105A/WT	pH units	7.21	7.22	---	---	---	---	---	---
pH, saturation (@ 4°C)	----	EC105A/WT	pH units	7.45	7.47	---	---	---	---	---	---
<b>Anions and Nutrients</b>											
Ammonia, total (as N)	7664-41-7	E298/WT	mg/L	0.0754	0.0662	---	---	---	---	---	---
Bromide	24959-67-9	E235.Br/WT	mg/L	<0.10	<0.10	---	---	---	---	---	---
Chloride	16887-00-6	E235.Cl/WT	mg/L	7.33	7.24	---	---	---	---	---	---
Fluoride	16984-48-8	E235.F/WT	mg/L	0.073	0.070	---	---	---	---	---	---
Nitrate (as N)	14797-55-8	E235.NO3/WT	mg/L	<0.020	<0.020	---	---	---	---	---	---
Nitrate + Nitrite (as N)	----	EC235.N+N/WT	mg/L	<0.0224	<0.0224	---	---	---	---	---	---
Nitrite (as N)	14797-65-0	E235.NO2/WT	mg/L	<0.010	<0.010	---	---	---	---	---	---
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	mg/L	<0.0010	<0.0010	---	---	---	---	---	---
Sulfate (as SO <sub>4</sub> )	14808-79-8	E235.SO4/WT	mg/L	23.7	23.8	---	---	---	---	---	---
<b>Organic / Inorganic Carbon</b>											
Carbon, dissolved organic [DOC]	----	E358-L/WT	mg/L	1.65	1.44	---	---	---	---	---	---



## Analytical Results Evaluation

Matrix: Drinking Water				Client sample ID	PT2 START	PT2 END	----	----	----	----	----
				Sampling date/time	12-Feb-2025 00:00	12-Feb-2025 00:00	----	----	----	----	----
				Sub-Matrix	Drinking Water	Drinking Water	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit	WT2502771-001	WT2502771-002	-----	-----	-----	-----	-----	-----
<b>Microbiological Tests</b>											
Coliforms, Escherichia coli [E. coli]	----	E012A.EC/WT	CFU/100 mL	Not <sup>PEHT</sup>	Not Detected <sup>PEHT</sup>	----	----	----	----	----	----
Coliforms, total	----	E012.TC/WT	CFU/100 mL	Detected <sup>PEHT</sup> Not	Not Detected <sup>PEHT</sup>	----	----	----	----	----	----
coliforms, total background	----	E012.BG.TC/WT	CFU/100 mL	Not <sup>PEHT</sup> Detected	Not Detected <sup>PEHT</sup>	----	----	----	----	----	----
<b>Metals</b>											
Sodium adsorption ratio [SAR]	----	EC102/WT	-	0.10	0.10	----	----	----	----	----	----
<b>Ion Balance</b>											
Anion sum	----	EC101A/WT	meq/L	5.50	5.36	----	----	----	----	----	----
Cation sum (total)	----	EC101A/WT	meq/L	5.59	5.54	----	----	----	----	----	----
Ion balance (APHA)	----	EC101A/WT	%	0.812	1.65	----	----	----	----	----	----
Ion balance (cations/anions)	----	EC101A/WT	%	102	103	----	----	----	----	----	----
<b>Total Metals</b>											
Aluminum, total	7429-90-5	E420/WT	mg/L	<0.0030	<0.0030	----	----	----	----	----	----
Antimony, total	7440-36-0	E420/WT	mg/L	<0.00010	<0.00010	----	----	----	----	----	----
Arsenic, total	7440-38-2	E420/WT	mg/L	0.00393	0.00428	----	----	----	----	----	----
Barium, total	7440-39-3	E420/WT	mg/L	0.0616	0.0622	----	----	----	----	----	----
Beryllium, total	7440-41-7	E420/WT	mg/L	<0.000020	<0.000020	----	----	----	----	----	----
Bismuth, total	7440-69-9	E420/WT	mg/L	<0.000050	<0.000050	----	----	----	----	----	----
Boron, total	7440-42-8	E420/WT	mg/L	0.013	0.013	----	----	----	----	----	----
Cadmium, total	7440-43-9	E420/WT	mg/L	<0.0000050	<0.0000050	----	----	----	----	----	----
Calcium, total	7440-70-2	E420/WT	mg/L	69.8	68.7	----	----	----	----	----	----
Cesium, total	7440-46-2	E420/WT	mg/L	<0.000010	<0.000010	----	----	----	----	----	----
Chromium, total	7440-47-3	E420/WT	mg/L	<0.00050	<0.00050	----	----	----	----	----	----
Cobalt, total	7440-48-4	E420/WT	mg/L	<0.00010	<0.00010	----	----	----	----	----	----
Copper, total	7440-50-8	E420/WT	mg/L	0.00076	0.00173	----	----	----	----	----	----
Iron, total	7439-89-6	E420/WT	mg/L	0.701	0.878	----	----	----	----	----	----
Lead, total	7439-92-1	E420/WT	mg/L	0.000396	0.000082	----	----	----	----	----	----



## Analytical Results Evaluation

Matrix: Drinking Water

				Client sample ID	PT2 START	PT2 END	----	----	----	----	----
				Sampling date/time	12-Feb-2025 00:00	12-Feb-2025 00:00	----	----	----	----	----
				Sub-Matrix	Drinking Water	Drinking Water	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit	WT2502771-001	WT2502771-002	-----	-----	-----	-----	-----	-----
<b>Total Metals</b>											
Lithium, total	7439-93-2	E420/WT	mg/L	0.0021	0.0019	----	----	----	----	----	----
Magnesium, total	7439-95-4	E420/WT	mg/L	22.9	22.9	----	----	----	----	----	----
Manganese, total	7439-96-5	E420/WT	mg/L	0.0118	0.0144	----	----	----	----	----	----
Molybdenum, total	7439-98-7	E420/WT	mg/L	0.000755	0.000768	----	----	----	----	----	----
Nickel, total	7440-02-0	E420/WT	mg/L	<0.00050	<0.00050	----	----	----	----	----	----
Phosphorus, total	7723-14-0	E420/WT	mg/L	<0.050	<0.050	----	----	----	----	----	----
Potassium, total	7440-09-7	E420/WT	mg/L	0.771	0.774	----	----	----	----	----	----
Rubidium, total	7440-17-7	E420/WT	mg/L	0.00033	0.00031	----	----	----	----	----	----
Selenium, total	7782-49-2	E420/WT	mg/L	<0.000050	<0.000050	----	----	----	----	----	----
Silicon (as SiO2), total	7631-86-9	EC420.SiO2/WT	mg/L	14.9	15.0	----	----	----	----	----	----
Silicon, total	7440-21-3	E420/WT	mg/L	6.97	7.01	----	----	----	----	----	----
Silver, total	7440-22-4	E420/WT	mg/L	<0.000010	<0.000010	----	----	----	----	----	----
Sodium, total	7440-23-5	E420/WT	mg/L	3.92	3.93	----	----	----	----	----	----
Strontium, total	7440-24-6	E420/WT	mg/L	0.174	0.177	----	----	----	----	----	----
Sulfur, total	7704-34-9	E420/WT	mg/L	8.13	7.82	----	----	----	----	----	----
Tellurium, total	13494-80-9	E420/WT	mg/L	<0.00020	<0.00020	----	----	----	----	----	----
Thallium, total	7440-28-0	E420/WT	mg/L	<0.000010	<0.000010	----	----	----	----	----	----
Thorium, total	7440-29-1	E420/WT	mg/L	<0.00010	<0.00010	----	----	----	----	----	----
Tin, total	7440-31-5	E420/WT	mg/L	<0.00010	<0.00010	----	----	----	----	----	----
Titanium, total	7440-32-6	E420/WT	mg/L	<0.00030	<0.00030	----	----	----	----	----	----
Tungsten, total	7440-33-7	E420/WT	mg/L	<0.00010	<0.00010	----	----	----	----	----	----
Uranium, total	7440-61-1	E420/WT	mg/L	0.000234	0.000230	----	----	----	----	----	----
Vanadium, total	7440-62-2	E420/WT	mg/L	<0.00050	<0.00050	----	----	----	----	----	----
Zinc, total	7440-66-6	E420/WT	mg/L	0.0045	<0.0030	----	----	----	----	----	----
Zirconium, total	7440-67-7	E420/WT	mg/L	<0.00020	<0.00020	----	----	----	----	----	----

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					
<b>Physical Tests</b>									
Alkalinity, bicarbonate (as HCO <sub>3</sub> )	71-52-3	mg/L	--	--					
Alkalinity, carbonate (as CO <sub>3</sub> )	3812-32-6	mg/L	--	--					
Alkalinity, hydroxide (as OH)	14280-30-9	mg/L	--	--					
Alkalinity, total (as CaCO <sub>3</sub> )	----	mg/L	30 - 500 mg/L	--					
Colour, apparent	----	CU	5 CU	--					
Conductivity	----	µS/cm	--	--					
Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg	----	mg/L	80 - 100 mg/L	--					
Langelier index (@ 20°C)	----	-	--	--					
Langelier index (@ 4°C)	----	-	--	--					
pH, saturation (@ 20°C)	----	pH units	--	--					
pH, saturation (@ 4°C)	----	pH units	--	--					
pH	----	pH units	6.5 - 8.5 pH units	--					
Solids, total dissolved [TDS], calculated	----	mg/L	--	--					
Solids, total dissolved [TDS]	----	mg/L	500 mg/L	--					
Turbidity	----	NTU	5 NTU	--					
<b>Anions and Nutrients</b>									
Ammonia, total (as N)	7664-41-7	mg/L	--	--					
Bromide	24959-67-9	mg/L	--	--					
Chloride	16887-00-6	mg/L	250 mg/L	--					
Fluoride	16984-48-8	mg/L	--	1.5 mg/L					
Nitrate (as N)	14797-55-8	mg/L	--	10 mg/L					
Nitrate + Nitrite (as N)	----	mg/L	--	10 mg/L					
Nitrite (as N)	14797-65-0	mg/L	--	1 mg/L					
Phosphate, ortho-, dissolved (as P)	14265-44-2	mg/L	--	--					
Sulfate (as SO <sub>4</sub> )	14808-79-8	mg/L	500 mg/L	--					
<b>Organic / Inorganic Carbon</b>									
Carbon, dissolved organic [DOC]	----	mg/L	5 mg/L	--					
<b>Microbiological Tests</b>									
Coliforms, Escherichia coli [E. coli]	----	CFU/100mL	--	1 CFU/100mL					
coliforms, total background	----	CFU/100mL	--	--					
Coliforms, total	----	CFU/100mL	--	1 CFU/100mL					
<b>Metals</b>									
Sodium adsorption ratio [SAR]	----	-	--	--					
<b>Ion Balance</b>									
Anion sum	----	meq/L	--	--					
Cation sum (total)	----	meq/L	--	--					



Analyte	CAS Number	Unit	ONDWS AO/OG	ONDWS MAC					
<b>Ion Balance - Continued</b>									
Ion balance (APHA)	----	%	--	--					
Ion balance (cations/anions)	----	%	--	--					
<b>Total Metals</b>									
Aluminum, total	7429-90-5	mg/L	0.1 mg/L	--					
Antimony, total	7440-36-0	mg/L	--	0.006 mg/L					
Arsenic, total	7440-38-2	mg/L	--	0.01 mg/L					
Barium, total	7440-39-3	mg/L	--	1 mg/L					
Beryllium, total	7440-41-7	mg/L	--	--					
Bismuth, total	7440-69-9	mg/L	--	--					
Boron, total	7440-42-8	mg/L	--	5 mg/L					
Cadmium, total	7440-43-9	mg/L	--	0.005 mg/L					
Calcium, total	7440-70-2	mg/L	--	--					
Cesium, total	7440-46-2	mg/L	--	--					
Chromium, total	7440-47-3	mg/L	--	0.05 mg/L					
Cobalt, total	7440-48-4	mg/L	--	--					
Copper, total	7440-50-8	mg/L	1 mg/L	--					
Iron, total	7439-89-6	mg/L	0.3 mg/L	--					
Lead, total	7439-92-1	mg/L	--	0.01 mg/L					
Lithium, total	7439-93-2	mg/L	--	--					
Magnesium, total	7439-95-4	mg/L	--	--					
Manganese, total	7439-96-5	mg/L	0.05 mg/L	--					
Molybdenum, total	7439-98-7	mg/L	--	--					
Nickel, total	7440-02-0	mg/L	--	--					
Phosphorus, total	7723-14-0	mg/L	--	--					
Potassium, total	7440-09-7	mg/L	--	--					
Rubidium, total	7440-17-7	mg/L	--	--					
Selenium, total	7782-49-2	mg/L	--	0.05 mg/L					
Silicon (as SiO2), total	7631-86-9	mg/L	--	--					
Silicon, total	7440-21-3	mg/L	--	--					
Silver, total	7440-22-4	mg/L	--	--					
Sodium, total	7440-23-5	mg/L	200 mg/L	20 mg/L					
Strontium, total	7440-24-6	mg/L	--	--					
Sulfur, total	7704-34-9	mg/L	--	--					
Tellurium, total	13494-80-9	mg/L	--	--					
Thallium, total	7440-28-0	mg/L	--	--					
Thorium, total	7440-29-1	mg/L	--	--					
Tin, total	7440-31-5	mg/L	--	--					
Titanium, total	7440-32-6	mg/L	--	--					
Tungsten, total	7440-33-7	mg/L	--	--					



## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: WT2502771</b>	<b>Page</b>	: 1 of 12
<b>Client</b>	: CF Crozier & Associates	<b>Laboratory</b>	: ALS Environmental - Waterloo
<b>Contact</b>	: Victoria Mazur	<b>Account Manager</b>	: Andrew Martin
<b>Address</b>	: 2800 High Point Drive Milton ON Canada L9T 6P4	<b>Address</b>	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
<b>Telephone</b>	: (548) 708-0039	<b>Telephone</b>	: +1 519 886 6910
<b>Project</b>	: 2621-7000	<b>Date Samples Received</b>	: 12-Feb-2025 16:34
<b>PO</b>	: ----	<b>Date Analysis Commenced</b>	: 14-Feb-2025
<b>C-O-C number</b>	: 23-1125867	<b>Issue Date</b>	: 20-Feb-2025 15:58
<b>Sampler</b>	: ----		
<b>Site</b>	: ----		
<b>Quote number</b>	: 2024/2025 SOA		
<b>No. of samples received</b>	: 2		
<b>No. of samples analysed</b>	: 2		

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
- Matrix Spike (MS) Report; Recovery 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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Waterloo Microbiology, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Inorganics, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Metals, Waterloo, Ontario
Ruby Sujeepan	Analyst	Waterloo Microbiology, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario

Page : 2 of 12  
Work Order : WT2502771  
Client : CF Crozier & Associates  
Project : 2621-7000



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## 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

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

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### 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: <b>Water</b>					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
<b>Physical Tests (QC Lot: 1874648)</b>											
WT2502737-002	Anonymous	Turbidity	----	E121	0.10	NTU	45.6	48.7	6.57%	15%	----
<b>Physical Tests (QC Lot: 1875024)</b>											
WT2502656-001	Anonymous	Colour, apparent	----	E330	2.0	CU	2.4	2.5	0.09	Diff <2x LOR	----
<b>Physical Tests (QC Lot: 1876273)</b>											
WT2502771-001	PT2 START	Conductivity	----	E100	1.0	µS/cm	490	497	1.42%	10%	----
<b>Physical Tests (QC Lot: 1876274)</b>											
WT2502771-001	PT2 START	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	240	242	1.01%	20%	----
<b>Physical Tests (QC Lot: 1876275)</b>											
WT2502771-001	PT2 START	pH	----	E108	0.10	pH units	8.46	8.28	2.15%	4%	----
<b>Physical Tests (QC Lot: 1877267)</b>											
WT2502737-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	645000 µg/L	641	0.544%	20%	----
<b>Anions and Nutrients (QC Lot: 1874635)</b>											
HA2500382-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 1876282)</b>											
HA2500044-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
<b>Organic / Inorganic Carbon (QC Lot: 1876269)</b>											
HA2500413-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.30	2.33	0.02	Diff <2x LOR	----
<b>Microbiological Tests (QC Lot: 1875142)</b>											
WT2502795-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	<1	0	Diff <2x LOR	----
<b>Total Metals (QC Lot: 1873972)</b>											
WT2502771-001	PT2 START	Aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00393	0.00390	0.646%	20%	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0616	0.0608	1.23%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	0.013	0.013	0.00006	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	69.8	70.5	0.864%	20%	----
Cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	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
<b>Total Metals (QC Lot: 1873972) - continued</b>											
WT2502771-001	PT2 START	Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.00076	0.00072	0.00004	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.701	0.704	0.401%	20%	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	0.000396	0.000395	0.0000007	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0021	0.0021	0.000008	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	22.9	22.6	1.15%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.0118	0.0119	0.621%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000755	0.000814	7.54%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	0.771	0.766	0.642%	20%	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00033	0.00030	0.00003	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	6.97	7.05	1.08%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	3.92	3.92	0.260%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.174	0.172	1.18%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	8.13	7.93	2.43%	20%	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000234	0.000227	2.99%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	0.0045	0.0045	0.00004	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	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
<b>Physical Tests (QCLot: 1874648)</b>						
Turbidity	---	E121	0.1	NTU	<0.10	---
<b>Physical Tests (QCLot: 1875024)</b>						
Colour, apparent	---	E330	2	CU	<2.0	---
<b>Physical Tests (QCLot: 1876273)</b>						
Conductivity	---	E100	1	µS/cm	<1.0	---
<b>Physical Tests (QCLot: 1876274)</b>						
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	<1.0	---
<b>Physical Tests (QCLot: 1877267)</b>						
Solids, total dissolved [TDS]	---	E162	10	mg/L	<10	---
<b>Anions and Nutrients (QCLot: 1874635)</b>						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	---
<b>Anions and Nutrients (QCLot: 1876276)</b>						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	---
<b>Anions and Nutrients (QCLot: 1876277)</b>						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	---
<b>Anions and Nutrients (QCLot: 1876278)</b>						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	---
<b>Anions and Nutrients (QCLot: 1876279)</b>						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	---
<b>Anions and Nutrients (QCLot: 1876280)</b>						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
<b>Anions and Nutrients (QCLot: 1876281)</b>						
Bromide	24959-67-9	E235.Br	0.1	mg/L	<0.10	---
<b>Anions and Nutrients (QCLot: 1876282)</b>						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	---
<b>Organic / Inorganic Carbon (QCLot: 1876269)</b>						
Carbon, dissolved organic [DOC]	---	E358-L	0.5	mg/L	<0.50	---
<b>Microbiological Tests (QCLot: 1875136)</b>						
Coliforms, total	---	E012.TC	1	CFU/100mL	<1	---
<b>Microbiological Tests (QCLot: 1875137)</b>						
coliforms, total background	---	E012.BG.TC	1	CFU/100mL	<1	---
<b>Microbiological Tests (QCLot: 1875142)</b>						



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Microbiological Tests (QCLot: 1875142) - continued</b>						
Coliforms, Escherichia coli [E. coli]	---	E012A.EC	1	CFU/100mL	<1	---
<b>Total Metals (QCLot: 1873972)</b>						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	---
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	---
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	---
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	---
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	---
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	---
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	---
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	---
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	---
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	---
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	---
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	---
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	---
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	---
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	---
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	---
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	---
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	---
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	---
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	---
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	---
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	---
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	---
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	---
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	---
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	---
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	---
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	---
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	---
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	---
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	---
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	---
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	---

Page : 7 of 12  
Work Order : WT2502771  
Client : CF Crozier & Associates  
Project : 2621-7000



Sub-Matrix: **Water**

<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Result</i>	<i>Qualifier</i>
<b>Total Metals (QCLot: 1873972) - continued</b>						
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----



## 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	Target Concentration	LCS	Low	High	Qualifier
<b>Physical Tests (QCLot: 1874648)</b>									
Turbidity	---	E121	0.1	NTU	200 NTU	97.5	85.0	115	---
<b>Physical Tests (QCLot: 1875024)</b>									
Colour, apparent	---	E330	2	CU	25 CU	100	85.0	115	---
<b>Physical Tests (QCLot: 1876273)</b>									
Conductivity	---	E100	1	µS/cm	1410 µS/cm	101	90.0	110	---
<b>Physical Tests (QCLot: 1876274)</b>									
Alkalinity, total (as CaCO <sub>3</sub> )	---	E290	1	mg/L	150 mg/L	100	85.0	115	---
<b>Physical Tests (QCLot: 1876275)</b>									
pH	---	E108	---	pH units	7 pH units	101	98.0	102	---
<b>Physical Tests (QCLot: 1877267)</b>									
Solids, total dissolved [TDS]	---	E162	10	mg/L	1000 mg/L	101	85.0	115	---
<b>Anions and Nutrients (QCLot: 1874635)</b>									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	99.6	85.0	115	---
<b>Anions and Nutrients (QCLot: 1876276)</b>									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	101	90.0	110	---
<b>Anions and Nutrients (QCLot: 1876277)</b>									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	---
<b>Anions and Nutrients (QCLot: 1876278)</b>									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	102	90.0	110	---
<b>Anions and Nutrients (QCLot: 1876279)</b>									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	---
<b>Anions and Nutrients (QCLot: 1876280)</b>									
Sulfate (as SO <sub>4</sub> )	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	---
<b>Anions and Nutrients (QCLot: 1876281)</b>									
Bromide	24959-67-9	E235.Br	0.1	mg/L	0.5 mg/L	100	85.0	115	---
<b>Anions and Nutrients (QCLot: 1876282)</b>									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.05 mg/L	113	80.0	120	---
<b>Organic / Inorganic Carbon (QCLot: 1876269)</b>									
Carbon, dissolved organic [DOC]	---	E358-L	0.5	mg/L	8.57 mg/L	106	80.0	120	---



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
<b>Total Metals (QCLot: 1873972)</b>									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	94.2	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	101	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	108	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.012 mg/L	105	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.005 mg/L	93.2	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	0.05 mg/L	98.6	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	0.05 mg/L	93.6	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	99.1	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	2.5 mg/L	100	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.002 mg/L	94.8	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.012 mg/L	102	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.012 mg/L	101	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.012 mg/L	101	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	95.7	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	102	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.012 mg/L	82.0	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	2.5 mg/L	112	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.012 mg/L	101	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.012 mg/L	102	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	100	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	0.5 mg/L	102	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	2.5 mg/L	106	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.005 mg/L	104	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	104	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	0.5 mg/L	98.5	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	87.1	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	2.5 mg/L	101	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.012 mg/L	106	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	2.5 mg/L	95.2	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.005 mg/L	100	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	0.05 mg/L	104	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.005 mg/L	94.1	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	96.3	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.012 mg/L	97.6	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.005 mg/L	96.3	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0 mg/L	93.7	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
<b>Total Metals (QCLot: 1873972) - continued</b>									
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	102	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	105	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.005 mg/L	95.5	80.0	120	----



**Matrix Spike (MS) Report**

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>Anions and Nutrients (QCLot: 1874635)</b>										
HA2500382-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.104 mg/L	0.1 mg/L	104	75.0	125	----
<b>Anions and Nutrients (QCLot: 1876276)</b>										
WT2502737-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	----	----		75.0	125	----
<b>Anions and Nutrients (QCLot: 1876277)</b>										
WT2502737-001	Anonymous	Fluoride	16984-48-8	E235.F	----	----		75.0	125	----
<b>Anions and Nutrients (QCLot: 1876278)</b>										
WT2502737-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	----	----		75.0	125	----
<b>Anions and Nutrients (QCLot: 1876279)</b>										
WT2502737-001	Anonymous	Chloride	16887-00-6	E235.Cl	----	----		75.0	125	----
<b>Anions and Nutrients (QCLot: 1876280)</b>										
WT2502737-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	----	----		75.0	125	----
<b>Anions and Nutrients (QCLot: 1876281)</b>										
WT2502737-001	Anonymous	Bromide	24959-67-9	E235.Br	----	----		75.0	125	----
<b>Anions and Nutrients (QCLot: 1876282)</b>										
HA2500044-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0206 mg/L	0.02 mg/L	105	70.0	130	----
<b>Organic / Inorganic Carbon (QCLot: 1876269)</b>										
HA2500413-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	5.51 mg/L	5 mg/L	110	70.0	130	----
<b>Total Metals (QCLot: 1873972)</b>										
WT2502771-002	PT2 END	Aluminum, total	7429-90-5	E420	0.0916 mg/L	0.1 mg/L	91.6	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0524 mg/L	0.05 mg/L	105	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0540 mg/L	0.05 mg/L	108	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	----	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.00468 mg/L	0.005 mg/L	93.5	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.0478 mg/L	0.05 mg/L	95.6	70.0	130	----
		Boron, total	7440-42-8	E420	0.046 mg/L	0.05 mg/L	92.2	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00504 mg/L	0.005 mg/L	101	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	----	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.00246 mg/L	0.002 mg/L	98.2	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0128 mg/L	0.012 mg/L	102	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0123 mg/L	0.012 mg/L	98.7	70.0	130	----
		Copper, total	7440-50-8	E420	0.0123 mg/L	0.012 mg/L	98.6	70.0	130	----
		Iron, total	7439-89-6	E420	ND mg/L	----	ND	70.0	130	----
		Lead, total	7439-92-1	E420	0.0245 mg/L	0.025 mg/L	97.9	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0117 mg/L	0.012 mg/L	93.9	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>Total Metals (QCLot: 1873972) - continued</b>										
WT2502771-002	PT2 END	Magnesium, total	7439-95-4	E420	ND mg/L	---	ND	70.0	130	---
		Manganese, total	7439-96-5	E420	ND mg/L	---	ND	70.0	130	---
		Molybdenum, total	7439-98-7	E420	0.0134 mg/L	0.012 mg/L	107	70.0	130	---
		Nickel, total	7440-02-0	E420	0.0244 mg/L	0.025 mg/L	97.6	70.0	130	---
		Phosphorus, total	7723-14-0	E420	0.534 mg/L	0.5 mg/L	107	70.0	130	---
		Potassium, total	7440-09-7	E420	2.69 mg/L	2.5 mg/L	108	70.0	130	---
		Rubidium, total	7440-17-7	E420	0.00534 mg/L	0.005 mg/L	107	70.0	130	---
		Selenium, total	7782-49-2	E420	0.0542 mg/L	0.05 mg/L	108	70.0	130	---
		Silicon, total	7440-21-3	E420	ND mg/L	---	ND	70.0	130	---
		Silver, total	7440-22-4	E420	0.00435 mg/L	0.005 mg/L	87.1	70.0	130	---
		Sodium, total	7440-23-5	E420	ND mg/L	---	ND	70.0	130	---
		Strontium, total	7440-24-6	E420	ND mg/L	---	ND	70.0	130	---
		Sulfur, total	7704-34-9	E420	ND mg/L	---	ND	70.0	130	---
		Tellurium, total	13494-80-9	E420	0.00513 mg/L	0.005 mg/L	102	70.0	130	---
		Thallium, total	7440-28-0	E420	0.0502 mg/L	0.05 mg/L	100	70.0	130	---
		Thorium, total	7440-29-1	E420	0.00470 mg/L	0.005 mg/L	93.9	70.0	130	---
		Tin, total	7440-31-5	E420	0.0251 mg/L	0.025 mg/L	100	70.0	130	---
		Titanium, total	7440-32-6	E420	0.0127 mg/L	0.012 mg/L	101	70.0	130	---
		Tungsten, total	7440-33-7	E420	0.00490 mg/L	0.005 mg/L	98.0	70.0	130	---
		Uranium, total	7440-61-1	E420	0.000233 mg/L	0 mg/L	93.4	70.0	130	---
		Vanadium, total	7440-62-2	E420	0.0258 mg/L	0.025 mg/L	103	70.0	130	---
		Zinc, total	7440-66-6	E420	0.0250 mg/L	0.025 mg/L	99.8	70.0	130	---
		Zirconium, total	7440-67-7	E420	0.00493 mg/L	0.005 mg/L	98.7	70.0	130	---




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## QUALITY CONTROL INTERPRETIVE REPORT

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<p><b>Work Order</b> : <b>WT2502771</b></p> <p><b>Client</b> : <b>CF Crozier &amp; Associates</b></p> <p><b>Contact</b> : Victoria Mazur</p> <p><b>Address</b> : 2800 High Point Drive Milton ON Canada L9T 6P4</p> <p><b>Telephone</b> : (548) 708-0039</p> <p><b>Project</b> : 2621-7000</p> <p><b>PO</b> : ----</p> <p><b>C-O-C number</b> : 23-1125867</p> <p><b>Sampler</b> : ----</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : 2024/2025 SOA</p> <p><b>No. of samples received</b> : 2</p> <p><b>No. of samples analysed</b> : 2</p>	<p><b>Page</b> : 1 of 12</p> <p><b>Laboratory</b> : ALS Environmental - Waterloo</p> <p><b>Account Manager</b> : Andrew Martin</p> <p><b>Address</b> : 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8</p> <p><b>Telephone</b> : +1 519 886 6910</p> <p><b>Date Samples Received</b> : 12-Feb-2025 16:34</p> <p><b>Issue Date</b> : 20-Feb-2025 15:58</p>
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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.

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### ***Workorder Comments***

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

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### ***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 Matrix Spike 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)***

- Analysis Holding Time Outliers exist - please see following pages for full details.

***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 : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Anions and Nutrients : Ammonia by Fluorescence</b>											
Amber glass total (sulfuric acid) [ON MECP] PT2 END	E298	12-Feb-2025	14-Feb-2025	28 days	3 days	✔	14-Feb-2025	28 days	3 days	✔	
<b>Anions and Nutrients : Ammonia by Fluorescence</b>											
Amber glass total (sulfuric acid) [ON MECP] PT2 START	E298	12-Feb-2025	14-Feb-2025	28 days	3 days	✔	14-Feb-2025	28 days	3 days	✔	
<b>Anions and Nutrients : Bromide in Water by IC</b>											
HDPE [ON MECP] PT2 END	E235.Br	12-Feb-2025	16-Feb-2025	28 days	5 days	✔	18-Feb-2025	28 days	6 days	✔	
<b>Anions and Nutrients : Bromide in Water by IC</b>											
HDPE [ON MECP] PT2 START	E235.Br	12-Feb-2025	16-Feb-2025	28 days	5 days	✔	18-Feb-2025	28 days	6 days	✔	
<b>Anions and Nutrients : Chloride in Water by IC</b>											
HDPE [ON MECP] PT2 END	E235.Cl	12-Feb-2025	16-Feb-2025	28 days	5 days	✔	18-Feb-2025	28 days	6 days	✔	
<b>Anions and Nutrients : Chloride in Water by IC</b>											
HDPE [ON MECP] PT2 START	E235.Cl	12-Feb-2025	16-Feb-2025	28 days	5 days	✔	18-Feb-2025	28 days	6 days	✔	
<b>Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)</b>											
HDPE [ON MECP] PT2 END	E378-U	12-Feb-2025	16-Feb-2025	7 days	5 days	✔	19-Feb-2025	7 days	8 days	✔	



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)</b>											
HDPE [ON MECP] PT2 START	E378-U	12-Feb-2025	16-Feb-2025	7 days	5 days	✓	19-Feb-2025	7 days	8 days	✓	
<b>Anions and Nutrients : Fluoride in Water by IC</b>											
HDPE [ON MECP] PT2 END	E235.F	12-Feb-2025	16-Feb-2025	28 days	5 days	✓	18-Feb-2025	28 days	6 days	✓	
<b>Anions and Nutrients : Fluoride in Water by IC</b>											
HDPE [ON MECP] PT2 START	E235.F	12-Feb-2025	16-Feb-2025	28 days	5 days	✓	18-Feb-2025	28 days	6 days	✓	
<b>Anions and Nutrients : Nitrate in Water by IC</b>											
HDPE [ON MECP] PT2 END	E235.NO3	12-Feb-2025	16-Feb-2025	7 days	5 days	✓	18-Feb-2025	7 days	6 days	✓	
<b>Anions and Nutrients : Nitrate in Water by IC</b>											
HDPE [ON MECP] PT2 START	E235.NO3	12-Feb-2025	16-Feb-2025	7 days	5 days	✓	18-Feb-2025	7 days	6 days	✓	
<b>Anions and Nutrients : Nitrite in Water by IC</b>											
HDPE [ON MECP] PT2 END	E235.NO2	12-Feb-2025	16-Feb-2025	7 days	5 days	✓	18-Feb-2025	7 days	6 days	✓	
<b>Anions and Nutrients : Nitrite in Water by IC</b>											
HDPE [ON MECP] PT2 START	E235.NO2	12-Feb-2025	16-Feb-2025	7 days	5 days	✓	18-Feb-2025	7 days	6 days	✓	
<b>Anions and Nutrients : Sulfate in Water by IC</b>											
HDPE [ON MECP] PT2 END	E235.SO4	12-Feb-2025	16-Feb-2025	28 days	5 days	✓	18-Feb-2025	28 days	6 days	✓	
<b>Anions and Nutrients : Sulfate in Water by IC</b>											
HDPE [ON MECP] PT2 START	E235.SO4	12-Feb-2025	16-Feb-2025	28 days	5 days	✓	18-Feb-2025	28 days	6 days	✓	



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Microbiological Tests : E. coli (MF-mFC-BCIG)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT2 END	E012A.EC	12-Feb-2025	----	----	----		14-Feb-2025	48 hrs	61 hrs	✓	
<b>Microbiological Tests : E. coli (MF-mFC-BCIG)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT2 START	E012A.EC	12-Feb-2025	----	----	----		14-Feb-2025	48 hrs	61 hrs	✓	
<b>Microbiological Tests : Total Coliforms (MF-mEndo)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT2 END	E012.TC	12-Feb-2025	----	----	----		14-Feb-2025	48 hrs	61 hrs	* EHT	
<b>Microbiological Tests : Total Coliforms (MF-mEndo)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT2 START	E012.TC	12-Feb-2025	----	----	----		14-Feb-2025	48 hrs	61 hrs	* EHT	
<b>Microbiological Tests : Total Coliforms Background (MF-mEndo)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT2 END	E012.BG.TC	12-Feb-2025	----	----	----		14-Feb-2025	48 hrs	61 hrs	✓	
<b>Microbiological Tests : Total Coliforms Background (MF-mEndo)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT2 START	E012.BG.TC	12-Feb-2025	----	----	----		14-Feb-2025	48 hrs	61 hrs	✓	
<b>Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)</b>											
<b>Amber glass - dissolved (lab preserved) [ON MECP]</b> PT2 END	E358-L	12-Feb-2025	16-Feb-2025	3 days	5 days	* EHT	18-Feb-2025	28 days	2 days	✓	
<b>Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)</b>											
<b>Amber glass - dissolved (lab preserved) [ON MECP]</b> PT2 START	E358-L	12-Feb-2025	16-Feb-2025	3 days	5 days	* EHT	18-Feb-2025	28 days	2 days	✓	
<b>Physical Tests : Alkalinity Species by Titration</b>											
<b>HDPE [ON MECP]</b> PT2 END	E290	12-Feb-2025	16-Feb-2025	14 days	5 days	✓	19-Feb-2025	14 days	8 days	✓	



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>Physical Tests : Alkalinity Species by Titration</b>										
HDPE [ON MECP] PT2 START	E290	12-Feb-2025	16-Feb-2025	14 days	5 days	✓	19-Feb-2025	14 days	8 days	✓
<b>Physical Tests : Colour (Apparent) by Spectrometer</b>										
HDPE [ON MECP] PT2 END	E330	12-Feb-2025	----	----	----		14-Feb-2025	48 hrs	62 hrs	* EHT
<b>Physical Tests : Colour (Apparent) by Spectrometer</b>										
HDPE [ON MECP] PT2 START	E330	12-Feb-2025	----	----	----		14-Feb-2025	48 hrs	62 hrs	* EHT
<b>Physical Tests : Conductivity in Water</b>										
HDPE [ON MECP] PT2 END	E100	12-Feb-2025	16-Feb-2025	28 days	5 days	✓	19-Feb-2025	28 days	8 days	✓
<b>Physical Tests : Conductivity in Water</b>										
HDPE [ON MECP] PT2 START	E100	12-Feb-2025	16-Feb-2025	28 days	5 days	✓	19-Feb-2025	28 days	8 days	✓
<b>Physical Tests : pH by Meter</b>										
HDPE [ON MECP] PT2 END	E108	12-Feb-2025	16-Feb-2025	14 days	5 days	✓	19-Feb-2025	14 days	8 days	✓
<b>Physical Tests : pH by Meter</b>										
HDPE [ON MECP] PT2 START	E108	12-Feb-2025	16-Feb-2025	14 days	5 days	✓	19-Feb-2025	14 days	8 days	✓
<b>Physical Tests : TDS by Gravimetry</b>										
HDPE [ON MECP] PT2 END	E162	12-Feb-2025	----	----	----		18-Feb-2025	7 days	7 days	✓
<b>Physical Tests : TDS by Gravimetry</b>										
HDPE [ON MECP] PT2 START	E162	12-Feb-2025	----	----	----		18-Feb-2025	7 days	7 days	✓



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>Physical Tests : Turbidity by Nephelometry</b>										
HDPE [ON MECP] PT2 END	E121	12-Feb-2025	----	----	----		14-Feb-2025	48 hrs	60 hrs	* EHT
<b>Physical Tests : Turbidity by Nephelometry</b>										
HDPE [ON MECP] PT2 START	E121	12-Feb-2025	----	----	----		14-Feb-2025	48 hrs	60 hrs	* EHT
<b>Total Metals : Total Metals in Water by CRC ICPMS</b>										
HDPE total (nitric acid) PT2 END	E420	12-Feb-2025	14-Feb-2025	180 days	2 days	✓	14-Feb-2025	180 days	2 days	✓
<b>Total Metals : Total Metals in Water by CRC ICPMS</b>										
HDPE total (nitric acid) PT2 START	E420	12-Feb-2025	14-Feb-2025	180 days	2 days	✓	14-Feb-2025	180 days	2 days	✓

**Legend & Qualifier Definitions**

EHT: Exceeded ALS recommended hold time prior to analysis.

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	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Total Coliforms Background (MF-mEndo)	E012.BG.TC	1875137	0	4	0.0	5.0	✖
Total Coliforms (MF-mEndo)	E012.TC	1875136	0	4	0.0	5.0	✖
E. coli (MF-mFC-BCIG)	E012A.EC	1875142	1	7	14.2	5.0	✔
Conductivity in Water	E100	1876273	1	17	5.8	5.0	✔
pH by Meter	E108	1876275	1	5	20.0	5.0	✔
Turbidity by Nephelometry	E121	1874648	1	8	12.5	5.0	✔
TDS by Gravimetry	E162	1877267	1	19	5.2	5.0	✔
Bromide in Water by IC	E235.Br	1876281	1	4	25.0	5.0	✔
Chloride in Water by IC	E235.Cl	1876279	1	17	5.8	5.0	✔
Fluoride in Water by IC	E235.F	1876277	1	17	5.8	5.0	✔
Nitrite in Water by IC	E235.NO2	1876278	1	17	5.8	5.0	✔
Nitrate in Water by IC	E235.NO3	1876276	1	18	5.5	5.0	✔
Sulfate in Water by IC	E235.SO4	1876280	1	18	5.5	5.0	✔
Alkalinity Species by Titration	E290	1876274	1	17	5.8	5.0	✔
Ammonia by Fluorescence	E298	1874635	1	20	5.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1875024	1	3	33.3	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1876269	1	7	14.2	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1876282	1	19	5.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1873972	1	10	10.0	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Conductivity in Water	E100	1876273	1	17	5.8	5.0	✔
pH by Meter	E108	1876275	1	5	20.0	5.0	✔
Turbidity by Nephelometry	E121	1874648	1	8	12.5	5.0	✔
TDS by Gravimetry	E162	1877267	1	19	5.2	5.0	✔
Bromide in Water by IC	E235.Br	1876281	1	4	25.0	5.0	✔
Chloride in Water by IC	E235.Cl	1876279	1	17	5.8	5.0	✔
Fluoride in Water by IC	E235.F	1876277	1	17	5.8	5.0	✔
Nitrite in Water by IC	E235.NO2	1876278	1	17	5.8	5.0	✔
Nitrate in Water by IC	E235.NO3	1876276	1	18	5.5	5.0	✔
Sulfate in Water by IC	E235.SO4	1876280	1	18	5.5	5.0	✔
Alkalinity Species by Titration	E290	1876274	1	17	5.8	5.0	✔
Ammonia by Fluorescence	E298	1874635	1	20	5.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1875024	1	3	33.3	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1876269	1	7	14.2	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1876282	1	19	5.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1873972	1	10	10.0	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<b>Analytical Methods</b>							
<b>Method Blanks (MB)</b>							
Total Coliforms Background (MF-mEndo)	E012.BG.TC	1875137	1	4	25.0	5.0	✔
Total Coliforms (MF-mEndo)	E012.TC	1875136	1	4	25.0	5.0	✔
E. coli (MF-mFC-BCIG)	E012A.EC	1875142	1	7	14.2	5.0	✔
Conductivity in Water	E100	1876273	1	17	5.8	5.0	✔
Turbidity by Nephelometry	E121	1874648	1	8	12.5	5.0	✔
TDS by Gravimetry	E162	1877267	1	19	5.2	5.0	✔
Bromide in Water by IC	E235.Br	1876281	1	4	25.0	5.0	✔
Chloride in Water by IC	E235.Cl	1876279	1	17	5.8	5.0	✔
Fluoride in Water by IC	E235.F	1876277	1	17	5.8	5.0	✔
Nitrite in Water by IC	E235.NO2	1876278	1	17	5.8	5.0	✔
Nitrate in Water by IC	E235.NO3	1876276	1	18	5.5	5.0	✔
Sulfate in Water by IC	E235.SO4	1876280	1	18	5.5	5.0	✔
Alkalinity Species by Titration	E290	1876274	1	17	5.8	5.0	✔
Ammonia by Fluorescence	E298	1874635	1	20	5.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1875024	1	3	33.3	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1876269	1	7	14.2	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1876282	1	19	5.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1873972	1	10	10.0	5.0	✔
<b>Matrix Spikes (MS)</b>							
Bromide in Water by IC	E235.Br	1876281	1	4	25.0	5.0	✔
Chloride in Water by IC	E235.Cl	1876279	1	17	5.8	5.0	✔
Fluoride in Water by IC	E235.F	1876277	1	17	5.8	5.0	✔
Nitrite in Water by IC	E235.NO2	1876278	1	17	5.8	5.0	✔
Nitrate in Water by IC	E235.NO3	1876276	1	18	5.5	5.0	✔
Sulfate in Water by IC	E235.SO4	1876280	1	18	5.5	5.0	✔
Ammonia by Fluorescence	E298	1874635	1	20	5.0	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1876269	1	7	14.2	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1876282	1	19	5.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1873972	1	10	10.0	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
Total Coliforms Background (MF-mEndo)	E012.BG.TC ALS Environmental - Waterloo	Water	APHA 9222B (mod)	Noncoliform bacteria observed on Total Coliform plates are enumerated.
Total Coliforms (MF-mEndo)	E012.TC ALS Environmental - Waterloo	Water	APHA 9222B (mod)	Following filtration (0.45 µm), and incubation at 35.0 ± 0.5°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated and confirmed.
E. coli (MF-mFC-BCIG)	E012A.EC ALS Environmental - Waterloo	Water	APHA 9222D (mod)	Following filtration (0.45 µm), and incubation at 44.5 ± 0.2°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated.
Conductivity in Water	E100 ALS Environmental - Waterloo	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 ALS Environmental - Waterloo	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 ALS Environmental - Waterloo	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC	E235.Br ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrite in Water by IC	E235.NO2 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Waterloo	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Colour (Apparent) by Spectrometer	E330 ALS Environmental - Waterloo	Water	APHA 2120 C (mod)	Colour (Apparent) is measured in an unfiltered sample spectrophotometrically using the single wavelength method. The colour contribution of settleable solids are not included in the result. This method is intended for potable waters.  Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Dissolved Organic Carbon by Combustion (Low Level)	E358-L ALS Environmental - Waterloo	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO <sub>2</sub> . NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Waterloo	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.  Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Waterloo	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Waterloo	Water	APHA 2340B	"Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Ion Balance using Total Metals	EC101A ALS Environmental - Waterloo	Water	APHA 1030E	Cation Sum (using total metals), Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
Sodium Adsorption Ratio [SAR] from Total Metals	EC102 ALS Environmental - Waterloo	Water	CCME Sodium Adsorption Ratio (SAR)	The Sodium Adsorption Ratio (SAR) for a water sample is calculated from the Sodium, Calcium, and Magnesium concentrations of the water, using the same calculations as would be used for a sediment paste extract.
TDS calculated from conductivity	EC103A ALS Environmental - Waterloo	Water	APHA 1030 E	Total dissolved solids (as mg/L) can be estimated by multiplying electrical conductance (in umhos/cm) by 0.65.
Saturation Index using Laboratory pH (Ca-T)	EC105A ALS Environmental - Waterloo	Water	APHA 2330B	Langelier Index provides an indication of scale formation potential at a given pH and temperature, and is calculated as per APHA 2330B Saturation Index. Positive values indicate oversaturation with respect to CaCO <sub>3</sub> . Negative values indicate undersaturation of CaCO <sub>3</sub> . This calculation uses laboratory pH measurements and provides estimates of Langelier Index at temperatures of 4, 15, 20, 25, 66, and 77°C. Ryznar Stability Index is an alternative index used for scale formation and corrosion potential.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Waterloo	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Total Silicon as Silica (Calculation)	EC420.SiO <sub>2</sub> ALS Environmental - Waterloo	Water	N/A	Total Silicon (as SiO <sub>2</sub> ) is a calculated parameter. Total Silicon (as SiO <sub>2</sub> mg/L) = 2.139 x Total Silicon (mg/L).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Waterloo	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 ALS Environmental - Waterloo	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon



# APPENDIX H

## PW2: Water Quality Results



**CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)**

<b>Work Order</b>	: <b>WT2502610</b>	<b>Page</b>	: 1 of 10
<b>Client</b>	: <b>CF Crozier &amp; Associates</b>	<b>Laboratory</b>	: ALS Environmental - Waterloo
<b>Contact</b>	: Victoria Mazur	<b>Account Manager</b>	: Andrew Martin
<b>Address</b>	: 2800 High Point Drive Milton ON Canada L9T 6P4	<b>Address</b>	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
<b>Telephone</b>	: (548) 708-0039	<b>Telephone</b>	: +1 519 886 6910
<b>Project</b>	: 2621-7000	<b>Date Samples Received</b>	: 11-Feb-2025 15:29
<b>PO</b>	: ----	<b>Date Analysis Commenced</b>	: 12-Feb-2025
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 19-Feb-2025 16:26
<b>Sampler</b>	: ----		
<b>Site</b>	: ----		
<b>Quote number</b>	: 2024/2025 SOA		
<b>No. of samples received</b>	: 2		
<b>No. of samples analysed</b>	: 2		

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Jeminikumari Patel	Analyst	Microbiology, Waterloo, Ontario
Nik Perkio	Senior Analyst	Inorganics, Waterloo, Ontario
Nik Perkio	Senior Analyst	Metals, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Inorganics, Waterloo, Ontario



### Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
PT1 START	Water	Colour, apparent	May interfere with disinfection; removal is important to ensure effective treatment.	ONDWS	AO/OG	41.3 CU	5 CU
	Water	Hardness (as CaCO3), from total Ca/Mg	Hardness levels between 80 and 100 mg/L (as CaCO3) provide acceptable balance between corrosion and incrustation; where a water softener is used, a separate unsoftened supply for cooking and drinking purposes is recommended.	ONDWS	AO/OG	159 mg/L	80-100 mg/L
	Water	Turbidity	Filtration systems should be designed and operated to reduce turbidity levels as low as reasonably achievable and strive to achieve a treated water turbidity target from individual filters of less than 0.1 NTU. Particles can harbour microorganisms, protecting them from disinfection, and can entrap heavy metals and biocides; elevated or fluctuating turbidity in filtered water can indicate a problem with the water treatment process and a potential increased risk of pathogens in treated water.	ONDWS	AO/OG	16.1 NTU	5 NTU
	Water	Iron, total	Based on taste and staining of laundry and plumbing fixtures; no evidence exists of dietary iron toxicity in the general population.	ONDWS	AO/OG	1.41 mg/L	0.3 mg/L
	Water	Manganese, total	Based on taste and staining of laundry and plumbing fixtures.	ONDWS	AO/OG	0.0589 mg/L	0.05 mg/L
PT1 END	Water	Colour, apparent	May interfere with disinfection; removal is important to ensure effective treatment.	ONDWS	AO/OG	43.9 CU	5 CU
	Water	Hardness (as CaCO3), from total Ca/Mg	Hardness levels between 80 and 100 mg/L (as CaCO3) provide acceptable balance between corrosion and incrustation; where a water softener is used, a separate unsoftened supply for cooking and drinking purposes is recommended.	ONDWS	AO/OG	165 mg/L	80-100 mg/L
	Water	Turbidity	Filtration systems should be designed and operated to reduce turbidity levels as low as reasonably achievable and strive to achieve a treated water turbidity target from individual filters of less than 0.1 NTU. Particles can harbour microorganisms, protecting them from disinfection, and can entrap heavy metals and biocides; elevated or fluctuating turbidity in filtered water can indicate a problem with the water treatment process and a potential increased risk of pathogens in treated water.	ONDWS	AO/OG	16.2 NTU	5 NTU
	Water	Iron, total	Based on taste and staining of laundry and plumbing fixtures; no evidence exists of dietary iron toxicity in the general population.	ONDWS	AO/OG	1.37 mg/L	0.3 mg/L



SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
	Water	Coliforms, total	Total coliforms are not used as indicators of potential health effects from pathogenic microorganisms; they are used as a tool to determine how well the drinking water treatment system is operating and to indicate water quality changes in the distribution system. Detection of total coliforms from consecutive samples from the same site or from more than 10% of the samples collected in a given sampling period should be investigated.	ONDWS	MAC	2 CFU/100mL	1 CFU/100mL
	Water	Arsenic, total	Health basis of MAC: Cancer (lung, bladder, liver, skin) (classified as human carcinogen). Other: Skin, vascular and neurological effects (numbness and tingling of extremities).	ONDWS	MAC	0.0150 mg/L	0.01 mg/L

### 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
-	no units
%	percent
µS/cm	microsiemens per centimetre
CFU/100mL	colony forming units per hundred millilitres
CU	colour units (1 cu = 1 mg/l pt)
meq/L	milliequivalents per litre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units



>: 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.

### Workorder Comments

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Sample time(s) not specified on the Chain of Custody as per Ontario regulation requirements, sampling times from bottle label were used.

<1 or Not Detected with LOR of 1 equals Zero (0).

Not Detected = Absent; Detected = Present.

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### Qualifiers

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

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## Analytical Results Evaluation

Matrix: Drinking Water

				Client sample ID	PT1 START	PT1 END	---	---	---	---	---
				Sampling date/time	11-Feb-2025 00:00	11-Feb-2025 00:00	---	---	---	---	---
				Sub-Matrix	Drinking Water	Drinking Water	---	---	---	---	---
Analyte	CAS Number	Method/Lab	Unit	WT2502610-001	WT2502610-002	-----	-----	-----	-----	-----	-----
<b>Physical Tests</b>											
Alkalinity, bicarbonate (as HCO <sub>3</sub> )	71-52-3	E290/WT	mg/L	204	209	---	---	---	---	---	---
Alkalinity, carbonate (as CO <sub>3</sub> )	3812-32-6	E290/WT	mg/L	2.8	1.9	---	---	---	---	---	---
Alkalinity, hydroxide (as OH)	14280-30-9	E290/WT	mg/L	<0.3	<0.3	---	---	---	---	---	---
Alkalinity, total (as CaCO <sub>3</sub> )	----	E290/WT	mg/L	171	174	---	---	---	---	---	---
Colour, apparent	----	E330/WT	CU	41.3	43.9	---	---	---	---	---	---
Conductivity	----	E100/WT	µS/cm	315	334	---	---	---	---	---	---
Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg	----	EC100A/WT	mg/L	159	165	---	---	---	---	---	---
pH	----	E108/WT	pH units	8.25	8.12	---	---	---	---	---	---
Solids, total dissolved [TDS]	----	E162/WT	mg/L	170 <sup>DLDS</sup>	189 <sup>DLDS</sup>	---	---	---	---	---	---
Solids, total dissolved [TDS], calculated	----	EC103A/WT	mg/L	205	217	---	---	---	---	---	---
Turbidity	----	E121/WT	NTU	16.1	16.2	---	---	---	---	---	---
Langelier index (@ 20°C)	----	EC105A/WT	-	0.588	0.486	---	---	---	---	---	---
Langelier index (@ 4°C)	----	EC105A/WT	-	0.341	0.238	---	---	---	---	---	---
pH, saturation (@ 20°C)	----	EC105A/WT	pH units	7.66	7.63	---	---	---	---	---	---
pH, saturation (@ 4°C)	----	EC105A/WT	pH units	7.91	7.88	---	---	---	---	---	---
<b>Anions and Nutrients</b>											
Ammonia, total (as N)	7664-41-7	E298/WT	mg/L	0.0358	0.0994	---	---	---	---	---	---
Bromide	24959-67-9	E235.Br/WT	mg/L	<0.10	<0.10	---	---	---	---	---	---
Chloride	16887-00-6	E235.Cl/WT	mg/L	0.95	1.07	---	---	---	---	---	---
Fluoride	16984-48-8	E235.F/WT	mg/L	0.144	0.144	---	---	---	---	---	---
Nitrate (as N)	14797-55-8	E235.NO <sub>3</sub> /WT	mg/L	<0.020	<0.020	---	---	---	---	---	---
Nitrate + Nitrite (as N)	----	EC235.N+N/WT	mg/L	<0.0224	<0.0224	---	---	---	---	---	---
Nitrite (as N)	14797-65-0	E235.NO <sub>2</sub> /WT	mg/L	<0.010	<0.010	---	---	---	---	---	---
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	mg/L	<0.0010	<0.0010	---	---	---	---	---	---
Sulfate (as SO <sub>4</sub> )	14808-79-8	E235.SO <sub>4</sub> /WT	mg/L	5.98	13.3	---	---	---	---	---	---
<b>Organic / Inorganic Carbon</b>											
Carbon, dissolved organic [DOC]	----	E358-L/WT	mg/L	0.74	0.88	---	---	---	---	---	---



## Analytical Results Evaluation

Matrix: Drinking Water

				Client sample ID	PT1 START	PT1 END	----	----	----	----	----
				Sampling date/time	11-Feb-2025 00:00	11-Feb-2025 00:00	----	----	----	----	----
				Sub-Matrix	Drinking Water	Drinking Water	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit	WT2502610-001	WT2502610-002	-----	-----	-----	-----	-----	-----
<b>Microbiological Tests</b>											
Coliforms, Escherichia coli [E. coli]	----	E012A.EC/WT	CFU/100 mL	Not Detected	Not Detected	----	----	----	----	----	----
Coliforms, total	----	E012.TC/WT	CFU/100 mL	Not Detected	2	----	----	----	----	----	----
coliforms, total background	----	E012.BG.TC/WT	CFU/100 mL	11	9	----	----	----	----	----	----
<b>Metals</b>											
Sodium adsorption ratio [SAR]	----	EC102/WT	-	0.30	0.28	----	----	----	----	----	----
<b>Ion Balance</b>											
Anion sum	----	EC101A/WT	meq/L	3.58	3.79	----	----	----	----	----	----
Cation sum (total)	----	EC101A/WT	meq/L	3.63	3.74	----	----	----	----	----	----
Ion balance (APHA)	----	EC101A/WT	%	0.693	-0.664	----	----	----	----	----	----
Ion balance (cations/anions)	----	EC101A/WT	%	101	98.7	----	----	----	----	----	----
<b>Total Metals</b>											
Aluminum, total	7429-90-5	E420/WT	mg/L	0.0339	<0.0030	----	----	----	----	----	----
Antimony, total	7440-36-0	E420/WT	mg/L	<0.00010	<0.00010	----	----	----	----	----	----
Arsenic, total	7440-38-2	E420/WT	mg/L	0.00814	0.0150	----	----	----	----	----	----
Barium, total	7440-39-3	E420/WT	mg/L	0.0289	0.0261	----	----	----	----	----	----
Beryllium, total	7440-41-7	E420/WT	mg/L	<0.000020	<0.000020	----	----	----	----	----	----
Bismuth, total	7440-69-9	E420/WT	mg/L	<0.000050	<0.000050	----	----	----	----	----	----
Boron, total	7440-42-8	E420/WT	mg/L	0.036	0.038	----	----	----	----	----	----
Cadmium, total	7440-43-9	E420/WT	mg/L	0.0000090	<0.0000050	----	----	----	----	----	----
Calcium, total	7440-70-2	E420/WT	mg/L	30.9	32.7	----	----	----	----	----	----
Cesium, total	7440-46-2	E420/WT	mg/L	<0.000010	<0.000010	----	----	----	----	----	----
Chromium, total	7440-47-3	E420/WT	mg/L	<0.00050	<0.00050	----	----	----	----	----	----
Cobalt, total	7440-48-4	E420/WT	mg/L	<0.00010	<0.00010	----	----	----	----	----	----
Copper, total	7440-50-8	E420/WT	mg/L	0.00220	0.00065	----	----	----	----	----	----
Iron, total	7439-89-6	E420/WT	mg/L	1.41	1.37	----	----	----	----	----	----
Lead, total	7439-92-1	E420/WT	mg/L	0.00132	0.000721	----	----	----	----	----	----



## Analytical Results Evaluation

Matrix: Drinking Water

				Client sample ID	PT1 START	PT1 END	----	----	----	----	----
				Sampling date/time	11-Feb-2025 00:00	11-Feb-2025 00:00	----	----	----	----	----
				Sub-Matrix	Drinking Water	Drinking Water	----	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit	WT2502610-001	WT2502610-002	-----	-----	-----	-----	-----	-----
<b>Total Metals</b>											
Lithium, total	7439-93-2	E420/WT	mg/L	0.0049	0.0049	----	----	----	----	----	----
Magnesium, total	7439-95-4	E420/WT	mg/L	19.8	20.3	----	----	----	----	----	----
Manganese, total	7439-96-5	E420/WT	mg/L	0.0589	0.0115	----	----	----	----	----	----
Molybdenum, total	7439-98-7	E420/WT	mg/L	0.00208	0.00153	----	----	----	----	----	----
Nickel, total	7440-02-0	E420/WT	mg/L	<0.00050	<0.00050	----	----	----	----	----	----
Phosphorus, total	7723-14-0	E420/WT	mg/L	<0.050	<0.050	----	----	----	----	----	----
Potassium, total	7440-09-7	E420/WT	mg/L	0.830	0.801	----	----	----	----	----	----
Rubidium, total	7440-17-7	E420/WT	mg/L	0.00036	0.00031	----	----	----	----	----	----
Selenium, total	7782-49-2	E420/WT	mg/L	<0.000050	<0.000050	----	----	----	----	----	----
Silicon (as SiO2), total	7631-86-9	EC420.SiO2/WT	mg/L	10.5	13.8	----	----	----	----	----	----
Silicon, total	7440-21-3	E420/WT	mg/L	4.93	6.44	----	----	----	----	----	----
Silver, total	7440-22-4	E420/WT	mg/L	<0.000010	<0.000010	----	----	----	----	----	----
Sodium, total	7440-23-5	E420/WT	mg/L	8.67	8.30	----	----	----	----	----	----
Strontium, total	7440-24-6	E420/WT	mg/L	0.267	0.290	----	----	----	----	----	----
Sulfur, total	7704-34-9	E420/WT	mg/L	1.64	4.54	----	----	----	----	----	----
Tellurium, total	13494-80-9	E420/WT	mg/L	<0.00020	<0.00020	----	----	----	----	----	----
Thallium, total	7440-28-0	E420/WT	mg/L	0.000039	0.000040	----	----	----	----	----	----
Thorium, total	7440-29-1	E420/WT	mg/L	<0.00010	<0.00010	----	----	----	----	----	----
Tin, total	7440-31-5	E420/WT	mg/L	<0.00010	<0.00010	----	----	----	----	----	----
Titanium, total	7440-32-6	E420/WT	mg/L	0.00144	<0.00030	----	----	----	----	----	----
Tungsten, total	7440-33-7	E420/WT	mg/L	<0.00010	<0.00010	----	----	----	----	----	----
Uranium, total	7440-61-1	E420/WT	mg/L	0.000559	0.000831	----	----	----	----	----	----
Vanadium, total	7440-62-2	E420/WT	mg/L	<0.00050	<0.00050	----	----	----	----	----	----
Zinc, total	7440-66-6	E420/WT	mg/L	0.0618	0.0421	----	----	----	----	----	----
Zirconium, total	7440-67-7	E420/WT	mg/L	<0.00020	<0.00020	----	----	----	----	----	----

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					
<b>Physical Tests</b>									
Alkalinity, bicarbonate (as HCO <sub>3</sub> )	71-52-3	mg/L	--	--					
Alkalinity, carbonate (as CO <sub>3</sub> )	3812-32-6	mg/L	--	--					
Alkalinity, hydroxide (as OH)	14280-30-9	mg/L	--	--					
Alkalinity, total (as CaCO <sub>3</sub> )	----	mg/L	30 - 500 mg/L	--					
Colour, apparent	----	CU	5 CU	--					
Conductivity	----	µS/cm	--	--					
Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg	----	mg/L	80 - 100 mg/L	--					
Langelier index (@ 20°C)	----	-	--	--					
Langelier index (@ 4°C)	----	-	--	--					
pH, saturation (@ 20°C)	----	pH units	--	--					
pH, saturation (@ 4°C)	----	pH units	--	--					
pH	----	pH units	6.5 - 8.5 pH units	--					
Solids, total dissolved [TDS], calculated	----	mg/L	--	--					
Solids, total dissolved [TDS]	----	mg/L	500 mg/L	--					
Turbidity	----	NTU	5 NTU	--					
<b>Anions and Nutrients</b>									
Ammonia, total (as N)	7664-41-7	mg/L	--	--					
Bromide	24959-67-9	mg/L	--	--					
Chloride	16887-00-6	mg/L	250 mg/L	--					
Fluoride	16984-48-8	mg/L	--	1.5 mg/L					
Nitrate (as N)	14797-55-8	mg/L	--	10 mg/L					
Nitrate + Nitrite (as N)	----	mg/L	--	10 mg/L					
Nitrite (as N)	14797-65-0	mg/L	--	1 mg/L					
Phosphate, ortho-, dissolved (as P)	14265-44-2	mg/L	--	--					
Sulfate (as SO <sub>4</sub> )	14808-79-8	mg/L	500 mg/L	--					
<b>Organic / Inorganic Carbon</b>									
Carbon, dissolved organic [DOC]	----	mg/L	5 mg/L	--					
<b>Microbiological Tests</b>									
Coliforms, Escherichia coli [E. coli]	----	CFU/100mL	--	1 CFU/100mL					
coliforms, total background	----	CFU/100mL	--	--					
Coliforms, total	----	CFU/100mL	--	1 CFU/100mL					
<b>Metals</b>									
Sodium adsorption ratio [SAR]	----	-	--	--					
<b>Ion Balance</b>									
Anion sum	----	meq/L	--	--					
Cation sum (total)	----	meq/L	--	--					



Analyte	CAS Number	Unit	ONDWS AO/OG	ONDWS MAC					
<b>Ion Balance - Continued</b>									
Ion balance (APHA)	----	%	--	--					
Ion balance (cations/anions)	----	%	--	--					
<b>Total Metals</b>									
Aluminum, total	7429-90-5	mg/L	0.1 mg/L	--					
Antimony, total	7440-36-0	mg/L	--	0.006 mg/L					
Arsenic, total	7440-38-2	mg/L	--	0.01 mg/L					
Barium, total	7440-39-3	mg/L	--	1 mg/L					
Beryllium, total	7440-41-7	mg/L	--	--					
Bismuth, total	7440-69-9	mg/L	--	--					
Boron, total	7440-42-8	mg/L	--	5 mg/L					
Cadmium, total	7440-43-9	mg/L	--	0.005 mg/L					
Calcium, total	7440-70-2	mg/L	--	--					
Cesium, total	7440-46-2	mg/L	--	--					
Chromium, total	7440-47-3	mg/L	--	0.05 mg/L					
Cobalt, total	7440-48-4	mg/L	--	--					
Copper, total	7440-50-8	mg/L	1 mg/L	--					
Iron, total	7439-89-6	mg/L	0.3 mg/L	--					
Lead, total	7439-92-1	mg/L	--	0.01 mg/L					
Lithium, total	7439-93-2	mg/L	--	--					
Magnesium, total	7439-95-4	mg/L	--	--					
Manganese, total	7439-96-5	mg/L	0.05 mg/L	--					
Molybdenum, total	7439-98-7	mg/L	--	--					
Nickel, total	7440-02-0	mg/L	--	--					
Phosphorus, total	7723-14-0	mg/L	--	--					
Potassium, total	7440-09-7	mg/L	--	--					
Rubidium, total	7440-17-7	mg/L	--	--					
Selenium, total	7782-49-2	mg/L	--	0.05 mg/L					
Silicon (as SiO2), total	7631-86-9	mg/L	--	--					
Silicon, total	7440-21-3	mg/L	--	--					
Silver, total	7440-22-4	mg/L	--	--					
Sodium, total	7440-23-5	mg/L	200 mg/L	20 mg/L					
Strontium, total	7440-24-6	mg/L	--	--					
Sulfur, total	7704-34-9	mg/L	--	--					
Tellurium, total	13494-80-9	mg/L	--	--					
Thallium, total	7440-28-0	mg/L	--	--					
Thorium, total	7440-29-1	mg/L	--	--					
Tin, total	7440-31-5	mg/L	--	--					
Titanium, total	7440-32-6	mg/L	--	--					
Tungsten, total	7440-33-7	mg/L	--	--					



## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: WT2502610</b>	<b>Page</b>	: 1 of 13
<b>Client</b>	: CF Crozier & Associates	<b>Laboratory</b>	: ALS Environmental - Waterloo
<b>Contact</b>	: Victoria Mazur	<b>Account Manager</b>	: Andrew Martin
<b>Address</b>	: 2800 High Point Drive Milton ON Canada L9T 6P4	<b>Address</b>	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
<b>Telephone</b>	: (548) 708-0039	<b>Telephone</b>	: +1 519 886 6910
<b>Project</b>	: 2621-7000	<b>Date Samples Received</b>	: 11-Feb-2025 15:29
<b>PO</b>	: ----	<b>Date Analysis Commenced</b>	: 12-Feb-2025
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 19-Feb-2025 16:26
<b>Sampler</b>	: ----		
<b>Site</b>	: ----		
<b>Quote number</b>	: 2024/2025 SOA		
<b>No. of samples received</b>	: 2		
<b>No. of samples analysed</b>	: 2		

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
- Matrix Spike (MS) Report; Recovery 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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Jeminikumari Patel	Analyst	Waterloo Microbiology, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Inorganics, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Metals, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario

Page : 2 of 13  
Work Order : WT2502610  
Client : CF Crozier & Associates  
Project : 2621-7000



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## 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.

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## Workorder Comments

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

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### 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: <b>Water</b>					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
<b>Physical Tests (QC Lot: 1871736)</b>											
HA2500382-001	Anonymous	Colour, apparent	----	E330	2.0	CU	81.2	80.1	1.37%	20%	----
<b>Physical Tests (QC Lot: 1871990)</b>											
WT2502587-003	Anonymous	Alkalinity, total (as CaCO <sub>3</sub> )	----	E290	2.0	mg/L	230	232	0.709%	20%	----
<b>Physical Tests (QC Lot: 1871991)</b>											
WT2502587-003	Anonymous	Conductivity	----	E100	2.0	µS/cm	19500	19600	0.205%	10%	----
<b>Physical Tests (QC Lot: 1871992)</b>											
WT2502587-003	Anonymous	pH	----	E108	0.10	pH units	7.88	7.88	0.00%	4%	----
<b>Physical Tests (QC Lot: 1873139)</b>											
HA2500382-001	Anonymous	Turbidity	----	E121	0.10	NTU	0.66	0.70	0.04	Diff <2x LOR	----
<b>Physical Tests (QC Lot: 1877267)</b>											
WT2502737-001	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	645000 µg/L	641	0.544%	20%	----
<b>Anions and Nutrients (QC Lot: 1871618)</b>											
WT2502362-003	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0322	0.0317	0.0005	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 1871984)</b>											
WT2502563-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	0.200	mg/L	3.21	3.28	2.09%	20%	----
<b>Anions and Nutrients (QC Lot: 1871985)</b>											
WT2502563-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 1871986)</b>											
WT2502563-001	Anonymous	Sulfate (as SO <sub>4</sub> )	14808-79-8	E235.SO4	3.00	mg/L	107	107	0.249%	20%	----
<b>Anions and Nutrients (QC Lot: 1871987)</b>											
WT2502563-001	Anonymous	Fluoride	16984-48-8	E235.F	0.200	mg/L	<0.200	<0.200	0	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 1871988)</b>											
WT2502563-001	Anonymous	Chloride	16887-00-6	E235.Cl	5.00	mg/L	2050	2060	0.186%	20%	----
<b>Anions and Nutrients (QC Lot: 1871989)</b>											
WT2502563-001	Anonymous	Bromide	24959-67-9	E235.Br	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 1871993)</b>											
HA2500042-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0026	0.0022	0.0003	Diff <2x LOR	----
<b>Organic / Inorganic Carbon (QC Lot: 1873580)</b>											
WT2502536-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.72	2.65	0.07	Diff <2x LOR	----
<b>Microbiological Tests (QC Lot: 1871666)</b>											



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
<b>Microbiological Tests (QC Lot: 1871666) - continued</b>											
WT2502567-002	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	1	1	0	Diff <2x LOR	----
<b>Total Metals (QC Lot: 1871042)</b>											
WT2502599-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	3.9 µg/L	0.0040	0.00009	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.11 µg/L	0.00012	0.000006	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0192	0.0195	1.64%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	0.029	0.029	0.0004	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0095 µg/L	0.0000096	0.0000001	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	81.6	82.8	1.46%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	80.1 µg/L	0.0810	1.04%	20%	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	<0.50 µg/L	<0.00050	0	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	<10 µg/L	<0.010	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.050 µg/L	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	16.9	17.0	0.608%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.00025	0.00025	0.000006	Diff <2x LOR	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000159	0.000162	0.000003	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	0.60 µg/L	0.00063	0.00002	Diff <2x LOR	----
		Phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	2.57	2.65	3.23%	20%	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00068	0.00066	0.00002	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.000222	0.000213	0.000008	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	3.26	3.32	1.65%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	108	110	1.21%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.136	0.136	0.0869%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	8.57	8.46	1.26%	20%	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----



Sub-Matrix: <b>Water</b>					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
<b>Total Metals (QC Lot: 1871042) - continued</b>											
WT2502599-001	Anonymous	Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000607	0.000611	0.624%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<3.0 µg/L	<0.0030	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	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
<b>Physical Tests (QCLot: 1871736)</b>						
Colour, apparent	---	E330	2	CU	<2.0	---
<b>Physical Tests (QCLot: 1871990)</b>						
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	<1.0	---
<b>Physical Tests (QCLot: 1871991)</b>						
Conductivity	---	E100	1	µS/cm	<1.0	---
<b>Physical Tests (QCLot: 1873139)</b>						
Turbidity	---	E121	0.1	NTU	<0.10	---
<b>Physical Tests (QCLot: 1877267)</b>						
Solids, total dissolved [TDS]	---	E162	10	mg/L	<10	---
<b>Anions and Nutrients (QCLot: 1871618)</b>						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	---
<b>Anions and Nutrients (QCLot: 1871984)</b>						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	---
<b>Anions and Nutrients (QCLot: 1871985)</b>						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	---
<b>Anions and Nutrients (QCLot: 1871986)</b>						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
<b>Anions and Nutrients (QCLot: 1871987)</b>						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	---
<b>Anions and Nutrients (QCLot: 1871988)</b>						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	---
<b>Anions and Nutrients (QCLot: 1871989)</b>						
Bromide	24959-67-9	E235.Br	0.1	mg/L	<0.10	---
<b>Anions and Nutrients (QCLot: 1871993)</b>						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	---
<b>Organic / Inorganic Carbon (QCLot: 1873580)</b>						
Carbon, dissolved organic [DOC]	---	E358-L	0.5	mg/L	<0.50	---
<b>Microbiological Tests (QCLot: 1871661)</b>						
Coliforms, total	---	E012.TC	1	CFU/100mL	<1	---
<b>Microbiological Tests (QCLot: 1871662)</b>						
coliforms, total background	---	E012.BG.TC	1	CFU/100mL	<1	---
<b>Microbiological Tests (QCLot: 1871666)</b>						



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Microbiological Tests (QCLot: 1871666) - continued</b>						
Coliforms, Escherichia coli [E. coli]	---	E012A.EC	1	CFU/100mL	<1	---
<b>Total Metals (QCLot: 1871042)</b>						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	---
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	---
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	---
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	---
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	---
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	---
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	---
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	---
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	---
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	---
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	---
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	---
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	---
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	---
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	---
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	---
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	---
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	---
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	---
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	---
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	---
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	---
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	---
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	---
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	---
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	---
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	---
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	---
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	---
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	---
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	---
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	---
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	---

Page : 8 of 13  
Work Order : WT2502610  
Client : CF Crozier & Associates  
Project : 2621-7000



Sub-Matrix: **Water**

<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Result</i>	<i>Qualifier</i>
<b>Total Metals (QCLot: 1871042) - continued</b>						
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----



## 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	Target Concentration	LCS	Low	High	Qualifier
<b>Physical Tests (QCLot: 1871736)</b>									
Colour, apparent	---	E330	2	CU	25 CU	92.2	85.0	115	---
<b>Physical Tests (QCLot: 1871990)</b>									
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	150 mg/L	100	85.0	115	---
<b>Physical Tests (QCLot: 1871991)</b>									
Conductivity	---	E100	1	µS/cm	1410 µS/cm	100	90.0	110	---
<b>Physical Tests (QCLot: 1871992)</b>									
pH	---	E108	---	pH units	7 pH units	101	98.0	102	---
<b>Physical Tests (QCLot: 1873139)</b>									
Turbidity	---	E121	0.1	NTU	200 NTU	99.0	85.0	115	---
<b>Physical Tests (QCLot: 1877267)</b>									
Solids, total dissolved [TDS]	---	E162	10	mg/L	1000 mg/L	101	85.0	115	---
<b>Anions and Nutrients (QCLot: 1871618)</b>									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	103	85.0	115	---
<b>Anions and Nutrients (QCLot: 1871984)</b>									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	99.7	90.0	110	---
<b>Anions and Nutrients (QCLot: 1871985)</b>									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	101	90.0	110	---
<b>Anions and Nutrients (QCLot: 1871986)</b>									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	---
<b>Anions and Nutrients (QCLot: 1871987)</b>									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	---
<b>Anions and Nutrients (QCLot: 1871988)</b>									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	---
<b>Anions and Nutrients (QCLot: 1871989)</b>									
Bromide	24959-67-9	E235.Br	0.1	mg/L	0.5 mg/L	102	85.0	115	---
<b>Anions and Nutrients (QCLot: 1871993)</b>									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.05 mg/L	101	80.0	120	---
<b>Organic / Inorganic Carbon (QCLot: 1873580)</b>									
Carbon, dissolved organic [DOC]	---	E358-L	0.5	mg/L	8.57 mg/L	105	80.0	120	---



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
<b>Total Metals (QCLot: 1871042)</b>									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	101	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	102	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	107	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.012 mg/L	104	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.005 mg/L	98.2	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	0.05 mg/L	96.0	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	0.05 mg/L	97.3	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	102	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	2.5 mg/L	100	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.002 mg/L	94.6	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.012 mg/L	103	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.012 mg/L	92.1	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.012 mg/L	102	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	99.3	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	99.5	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.012 mg/L	98.2	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	2.5 mg/L	118	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.012 mg/L	105	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.012 mg/L	97.1	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	100	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	0.5 mg/L	102	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	2.5 mg/L	107	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.005 mg/L	107	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	106	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	0.5 mg/L	109	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	86.1	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	2.5 mg/L	109	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.012 mg/L	104	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	2.5 mg/L	99.5	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.005 mg/L	95.8	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.005 mg/L	92.5	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	97.8	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.012 mg/L	102	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.005 mg/L	99.1	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0 mg/L	97.0	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
<b>Total Metals (QCLot: 1871042) - continued</b>									
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	104	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	102	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.005 mg/L	93.4	80.0	120	----



### Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>Anions and Nutrients (QCLot: 1871618)</b>										
WT2502362-003	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.106 mg/L	0.1 mg/L	106	75.0	125	----
<b>Anions and Nutrients (QCLot: 1871984)</b>										
WT2502563-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	25.4 mg/L	25 mg/L	102	75.0	125	----
<b>Anions and Nutrients (QCLot: 1871985)</b>										
WT2502563-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	5.10 mg/L	5 mg/L	102	75.0	125	----
<b>Anions and Nutrients (QCLot: 1871986)</b>										
WT2502563-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1020 mg/L	1000 mg/L	102	75.0	125	----
<b>Anions and Nutrients (QCLot: 1871987)</b>										
WT2502563-001	Anonymous	Fluoride	16984-48-8	E235.F	10.1 mg/L	10 mg/L	101	75.0	125	----
<b>Anions and Nutrients (QCLot: 1871988)</b>										
WT2502563-001	Anonymous	Chloride	16887-00-6	E235.Cl	ND mg/L	----	ND	75.0	125	----
<b>Anions and Nutrients (QCLot: 1871989)</b>										
WT2502563-001	Anonymous	Bromide	24959-67-9	E235.Br	5.10 mg/L	5 mg/L	102	75.0	125	----
<b>Anions and Nutrients (QCLot: 1871993)</b>										
HA2500042-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0178 mg/L	0.02 mg/L	91.0	70.0	130	----
<b>Organic / Inorganic Carbon (QCLot: 1873580)</b>										
WT2502536-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	5.10 mg/L	5 mg/L	102	70.0	130	----
<b>Total Metals (QCLot: 1871042)</b>										
WT2502599-002	Anonymous	Aluminum, total	7429-90-5	E420	0.0957 mg/L	0.1 mg/L	95.7	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0508 mg/L	0.05 mg/L	102	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0528 mg/L	0.05 mg/L	106	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	----	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.00477 mg/L	0.005 mg/L	95.3	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.0460 mg/L	0.05 mg/L	92.0	70.0	130	----
		Boron, total	7440-42-8	E420	0.046 mg/L	0.05 mg/L	92.6	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00486 mg/L	0.005 mg/L	97.1	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	----	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.00233 mg/L	0.002 mg/L	93.3	70.0	130	----
		Chromium, total	7440-47-3	E420	ND mg/L	----	ND	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0110 mg/L	0.012 mg/L	88.1	70.0	130	----
		Copper, total	7440-50-8	E420	ND mg/L	----	ND	70.0	130	----
		Iron, total	7439-89-6	E420	0.047 mg/L	0.05 mg/L	93.5	70.0	130	----
		Lead, total	7439-92-1	E420	0.0235 mg/L	0.025 mg/L	93.9	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0120 mg/L	0.012 mg/L	96.2	70.0	130	----



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>Total Metals (QCLot: 1871042) - continued</b>										
WT2502599-002	Anonymous	Magnesium, total	7439-95-4	E420	ND mg/L	----	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0124 mg/L	0.012 mg/L	99.3	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0123 mg/L	0.012 mg/L	98.3	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0236 mg/L	0.025 mg/L	94.4	70.0	130	----
		Phosphorus, total	7723-14-0	E420	0.524 mg/L	0.5 mg/L	105	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	----	ND	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.00522 mg/L	0.005 mg/L	104	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0532 mg/L	0.05 mg/L	106	70.0	130	----
		Silicon, total	7440-21-3	E420	ND mg/L	----	ND	70.0	130	----
		Silver, total	7440-22-4	E420	0.00411 mg/L	0.005 mg/L	82.3	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	----	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	----	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	----	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.00486 mg/L	0.005 mg/L	97.1	70.0	130	----
		Thallium, total	7440-28-0	E420	0.0482 mg/L	0.05 mg/L	96.4	70.0	130	----
		Thorium, total	7440-29-1	E420	0.00458 mg/L	0.005 mg/L	91.6	70.0	130	----
		Tin, total	7440-31-5	E420	0.0243 mg/L	0.025 mg/L	97.4	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0126 mg/L	0.012 mg/L	101	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.00495 mg/L	0.005 mg/L	99.1	70.0	130	----
		Uranium, total	7440-61-1	E420	0.000240 mg/L	0 mg/L	95.8	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0258 mg/L	0.025 mg/L	103	70.0	130	----
		Zinc, total	7440-66-6	E420	ND mg/L	----	ND	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.00472 mg/L	0.005 mg/L	94.3	70.0	130	----




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## QUALITY CONTROL INTERPRETIVE REPORT

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<p><b>Work Order</b> : <b>WT2502610</b></p> <p><b>Client</b> : <b>CF Crozier &amp; Associates</b></p> <p><b>Contact</b> : Victoria Mazur</p> <p><b>Address</b> : 2800 High Point Drive Milton ON Canada L9T 6P4</p> <p><b>Telephone</b> : (548) 708-0039</p> <p><b>Project</b> : 2621-7000</p> <p><b>PO</b> : ----</p> <p><b>C-O-C number</b> : ----</p> <p><b>Sampler</b> : ----</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : 2024/2025 SOA</p> <p><b>No. of samples received</b> : 2</p> <p><b>No. of samples analysed</b> : 2</p>	<p><b>Page</b> : 1 of 12</p> <p><b>Laboratory</b> : ALS Environmental - Waterloo</p> <p><b>Account Manager</b> : Andrew Martin</p> <p><b>Address</b> : 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8</p> <p><b>Telephone</b> : +1 519 886 6910</p> <p><b>Date Samples Received</b> : 11-Feb-2025 15:29</p> <p><b>Issue Date</b> : 19-Feb-2025 16:26</p>
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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.

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### ***Workorder Comments***

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

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### ***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 Matrix Spike 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)***

- Analysis Holding Time Outliers exist - please see following pages for full details.

***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 : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Anions and Nutrients : Ammonia by Fluorescence</b>											
Amber glass total (sulfuric acid) [ON MECP] PT1 END	E298	11-Feb-2025	12-Feb-2025	28 days	2 days	✔	13-Feb-2025	28 days	3 days	✔	
<b>Anions and Nutrients : Ammonia by Fluorescence</b>											
Amber glass total (sulfuric acid) [ON MECP] PT1 START	E298	11-Feb-2025	12-Feb-2025	28 days	2 days	✔	13-Feb-2025	28 days	3 days	✔	
<b>Anions and Nutrients : Bromide in Water by IC</b>											
HDPE [ON MECP] PT1 END	E235.Br	11-Feb-2025	12-Feb-2025	28 days	2 days	✔	13-Feb-2025	28 days	2 days	✔	
<b>Anions and Nutrients : Bromide in Water by IC</b>											
HDPE [ON MECP] PT1 START	E235.Br	11-Feb-2025	12-Feb-2025	28 days	2 days	✔	13-Feb-2025	28 days	2 days	✔	
<b>Anions and Nutrients : Chloride in Water by IC</b>											
HDPE [ON MECP] PT1 END	E235.Cl	11-Feb-2025	12-Feb-2025	28 days	2 days	✔	13-Feb-2025	28 days	2 days	✔	
<b>Anions and Nutrients : Chloride in Water by IC</b>											
HDPE [ON MECP] PT1 START	E235.Cl	11-Feb-2025	12-Feb-2025	28 days	2 days	✔	13-Feb-2025	28 days	2 days	✔	
<b>Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)</b>											
HDPE [ON MECP] PT1 END	E378-U	11-Feb-2025	12-Feb-2025	7 days	2 days	✔	13-Feb-2025	7 days	3 days	✔	



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)</b>											
HDPE [ON MECP] PT1 START	E378-U	11-Feb-2025	12-Feb-2025	7 days	2 days	✓	13-Feb-2025	7 days	3 days	✓	
<b>Anions and Nutrients : Fluoride in Water by IC</b>											
HDPE [ON MECP] PT1 END	E235.F	11-Feb-2025	12-Feb-2025	28 days	2 days	✓	13-Feb-2025	28 days	2 days	✓	
<b>Anions and Nutrients : Fluoride in Water by IC</b>											
HDPE [ON MECP] PT1 START	E235.F	11-Feb-2025	12-Feb-2025	28 days	2 days	✓	13-Feb-2025	28 days	2 days	✓	
<b>Anions and Nutrients : Nitrate in Water by IC</b>											
HDPE [ON MECP] PT1 END	E235.NO3	11-Feb-2025	12-Feb-2025	7 days	2 days	✓	13-Feb-2025	7 days	2 days	✓	
<b>Anions and Nutrients : Nitrate in Water by IC</b>											
HDPE [ON MECP] PT1 START	E235.NO3	11-Feb-2025	12-Feb-2025	7 days	2 days	✓	13-Feb-2025	7 days	2 days	✓	
<b>Anions and Nutrients : Nitrite in Water by IC</b>											
HDPE [ON MECP] PT1 END	E235.NO2	11-Feb-2025	12-Feb-2025	7 days	2 days	✓	13-Feb-2025	7 days	2 days	✓	
<b>Anions and Nutrients : Nitrite in Water by IC</b>											
HDPE [ON MECP] PT1 START	E235.NO2	11-Feb-2025	12-Feb-2025	7 days	2 days	✓	13-Feb-2025	7 days	2 days	✓	
<b>Anions and Nutrients : Sulfate in Water by IC</b>											
HDPE [ON MECP] PT1 END	E235.SO4	11-Feb-2025	12-Feb-2025	28 days	2 days	✓	13-Feb-2025	28 days	2 days	✓	
<b>Anions and Nutrients : Sulfate in Water by IC</b>											
HDPE [ON MECP] PT1 START	E235.SO4	11-Feb-2025	12-Feb-2025	28 days	2 days	✓	13-Feb-2025	28 days	2 days	✓	



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Microbiological Tests : E. coli (MF-mFC-BCIG)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT1 END	E012A.EC	11-Feb-2025	----	----	----		12-Feb-2025	48 hrs	34 hrs	✔	
<b>Microbiological Tests : E. coli (MF-mFC-BCIG)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT1 START	E012A.EC	11-Feb-2025	----	----	----		12-Feb-2025	48 hrs	34 hrs	✔	
<b>Microbiological Tests : Total Coliforms (MF-mEndo)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT1 END	E012.TC	11-Feb-2025	----	----	----		12-Feb-2025	48 hrs	34 hrs	✔	
<b>Microbiological Tests : Total Coliforms (MF-mEndo)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT1 START	E012.TC	11-Feb-2025	----	----	----		12-Feb-2025	48 hrs	34 hrs	✔	
<b>Microbiological Tests : Total Coliforms Background (MF-mEndo)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT1 END	E012.BG.TC	11-Feb-2025	----	----	----		12-Feb-2025	48 hrs	34 hrs	✔	
<b>Microbiological Tests : Total Coliforms Background (MF-mEndo)</b>											
<b>Sterile HDPE (Sodium thiosulphate) [ON MECP]</b> PT1 START	E012.BG.TC	11-Feb-2025	----	----	----		12-Feb-2025	48 hrs	34 hrs	✔	
<b>Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)</b>											
<b>Amber glass - dissolved (lab preserved) [ON MECP]</b> PT1 END	E358-L	11-Feb-2025	13-Feb-2025	3 days	3 days	✔	14-Feb-2025	28 days	1 days	✔	
<b>Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)</b>											
<b>Amber glass - dissolved (lab preserved) [ON MECP]</b> PT1 START	E358-L	11-Feb-2025	13-Feb-2025	3 days	3 days	✔	14-Feb-2025	28 days	1 days	✔	
<b>Physical Tests : Alkalinity Species by Titration</b>											
<b>HDPE [ON MECP]</b> PT1 END	E290	11-Feb-2025	12-Feb-2025	14 days	2 days	✔	13-Feb-2025	14 days	3 days	✔	



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Physical Tests : Alkalinity Species by Titration</b>											
HDPE [ON MECP] PT1 START	E290	11-Feb-2025	12-Feb-2025	14 days	2 days	✔	13-Feb-2025	14 days	3 days	✔	
<b>Physical Tests : Colour (Apparent) by Spectrometer</b>											
HDPE [ON MECP] PT1 END	E330	11-Feb-2025	----	----	----		12-Feb-2025	48 hrs	36 hrs	✔	
<b>Physical Tests : Colour (Apparent) by Spectrometer</b>											
HDPE [ON MECP] PT1 START	E330	11-Feb-2025	----	----	----		12-Feb-2025	48 hrs	36 hrs	✔	
<b>Physical Tests : Conductivity in Water</b>											
HDPE [ON MECP] PT1 END	E100	11-Feb-2025	12-Feb-2025	28 days	2 days	✔	13-Feb-2025	28 days	3 days	✔	
<b>Physical Tests : Conductivity in Water</b>											
HDPE [ON MECP] PT1 START	E100	11-Feb-2025	12-Feb-2025	28 days	2 days	✔	13-Feb-2025	28 days	3 days	✔	
<b>Physical Tests : pH by Meter</b>											
HDPE [ON MECP] PT1 END	E108	11-Feb-2025	12-Feb-2025	14 days	2 days	✔	13-Feb-2025	14 days	3 days	✔	
<b>Physical Tests : pH by Meter</b>											
HDPE [ON MECP] PT1 START	E108	11-Feb-2025	12-Feb-2025	14 days	2 days	✔	13-Feb-2025	14 days	3 days	✔	
<b>Physical Tests : TDS by Gravimetry</b>											
HDPE [ON MECP] PT1 END	E162	11-Feb-2025	----	----	----		18-Feb-2025	7 days	8 days	✔	
<b>Physical Tests : TDS by Gravimetry</b>											
HDPE [ON MECP] PT1 START	E162	11-Feb-2025	----	----	----		18-Feb-2025	7 days	8 days	✔	



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>Physical Tests : Turbidity by Nephelometry</b>										
HDPE [ON MECP] PT1 END	E121	11-Feb-2025	----	----	----		13-Feb-2025	48 hrs	59 hrs	* EHT
<b>Physical Tests : Turbidity by Nephelometry</b>										
HDPE [ON MECP] PT1 START	E121	11-Feb-2025	----	----	----		13-Feb-2025	48 hrs	59 hrs	* EHT
<b>Total Metals : Total Metals in Water by CRC ICPMS</b>										
HDPE total (nitric acid) PT1 END	E420	11-Feb-2025	12-Feb-2025	180 days	1 days	✓	12-Feb-2025	180 days	1 days	✓
<b>Total Metals : Total Metals in Water by CRC ICPMS</b>										
HDPE total (nitric acid) PT1 START	E420	11-Feb-2025	12-Feb-2025	180 days	1 days	✓	12-Feb-2025	180 days	1 days	✓

**Legend & Qualifier Definitions**

EHT: Exceeded ALS recommended hold time prior to analysis.

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	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Total Coliforms Background (MF-mEndo)	E012.BG.TC	1871662	0	8	0.0	5.0	✖
Total Coliforms (MF-mEndo)	E012.TC	1871661	0	12	0.0	5.0	✖
E. coli (MF-mFC-BCIG)	E012A.EC	1871666	1	18	5.5	5.0	✔
Conductivity in Water	E100	1871991	1	8	12.5	5.0	✔
pH by Meter	E108	1871992	1	14	7.1	5.0	✔
Turbidity by Nephelometry	E121	1873139	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1877267	1	19	5.2	5.0	✔
Bromide in Water by IC	E235.Br	1871989	1	7	14.2	5.0	✔
Chloride in Water by IC	E235.Cl	1871988	1	11	9.0	5.0	✔
Fluoride in Water by IC	E235.F	1871987	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	1871985	1	13	7.6	5.0	✔
Nitrate in Water by IC	E235.NO3	1871984	1	16	6.2	5.0	✔
Sulfate in Water by IC	E235.SO4	1871986	1	14	7.1	5.0	✔
Alkalinity Species by Titration	E290	1871990	1	11	9.0	5.0	✔
Ammonia by Fluorescence	E298	1871618	1	16	6.2	5.0	✔
Colour (Apparent) by Spectrometer	E330	1871736	1	9	11.1	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1873580	1	8	12.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1871993	1	11	9.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1871042	1	11	9.0	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Conductivity in Water	E100	1871991	1	8	12.5	5.0	✔
pH by Meter	E108	1871992	1	14	7.1	5.0	✔
Turbidity by Nephelometry	E121	1873139	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1877267	1	19	5.2	5.0	✔
Bromide in Water by IC	E235.Br	1871989	1	7	14.2	5.0	✔
Chloride in Water by IC	E235.Cl	1871988	1	11	9.0	5.0	✔
Fluoride in Water by IC	E235.F	1871987	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	1871985	1	13	7.6	5.0	✔
Nitrate in Water by IC	E235.NO3	1871984	1	16	6.2	5.0	✔
Sulfate in Water by IC	E235.SO4	1871986	1	14	7.1	5.0	✔
Alkalinity Species by Titration	E290	1871990	1	11	9.0	5.0	✔
Ammonia by Fluorescence	E298	1871618	1	16	6.2	5.0	✔
Colour (Apparent) by Spectrometer	E330	1871736	1	9	11.1	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1873580	1	8	12.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1871993	1	11	9.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1871042	1	11	9.0	5.0	✔



Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<b>Analytical Methods</b>							
<b>Method Blanks (MB)</b>							
Total Coliforms Background (MF-mEndo)	E012.BG.TC	1871662	1	8	12.5	5.0	✔
Total Coliforms (MF-mEndo)	E012.TC	1871661	1	12	8.3	5.0	✔
E. coli (MF-mFC-BCIG)	E012A.EC	1871666	1	18	5.5	5.0	✔
Conductivity in Water	E100	1871991	1	8	12.5	5.0	✔
Turbidity by Nephelometry	E121	1873139	1	20	5.0	5.0	✔
TDS by Gravimetry	E162	1877267	1	19	5.2	5.0	✔
Bromide in Water by IC	E235.Br	1871989	1	7	14.2	5.0	✔
Chloride in Water by IC	E235.Cl	1871988	1	11	9.0	5.0	✔
Fluoride in Water by IC	E235.F	1871987	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	1871985	1	13	7.6	5.0	✔
Nitrate in Water by IC	E235.NO3	1871984	1	16	6.2	5.0	✔
Sulfate in Water by IC	E235.SO4	1871986	1	14	7.1	5.0	✔
Alkalinity Species by Titration	E290	1871990	1	11	9.0	5.0	✔
Ammonia by Fluorescence	E298	1871618	1	16	6.2	5.0	✔
Colour (Apparent) by Spectrometer	E330	1871736	1	9	11.1	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1873580	1	8	12.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1871993	1	11	9.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1871042	1	11	9.0	5.0	✔
<b>Matrix Spikes (MS)</b>							
Bromide in Water by IC	E235.Br	1871989	1	7	14.2	5.0	✔
Chloride in Water by IC	E235.Cl	1871988	1	11	9.0	5.0	✔
Fluoride in Water by IC	E235.F	1871987	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	1871985	1	13	7.6	5.0	✔
Nitrate in Water by IC	E235.NO3	1871984	1	16	6.2	5.0	✔
Sulfate in Water by IC	E235.SO4	1871986	1	14	7.1	5.0	✔
Ammonia by Fluorescence	E298	1871618	1	16	6.2	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1873580	1	8	12.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1871993	1	11	9.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1871042	1	11	9.0	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
Total Coliforms Background (MF-mEndo)	E012.BG.TC ALS Environmental - Waterloo	Water	APHA 9222B (mod)	Noncoliform bacteria observed on Total Coliform plates are enumerated.
Total Coliforms (MF-mEndo)	E012.TC ALS Environmental - Waterloo	Water	APHA 9222B (mod)	Following filtration (0.45 µm), and incubation at 35.0 ± 0.5°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated and confirmed.
E. coli (MF-mFC-BCIG)	E012A.EC ALS Environmental - Waterloo	Water	APHA 9222D (mod)	Following filtration (0.45 µm), and incubation at 44.5 ± 0.2°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated.
Conductivity in Water	E100 ALS Environmental - Waterloo	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 ALS Environmental - Waterloo	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 ALS Environmental - Waterloo	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC	E235.Br ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrite in Water by IC	E235.NO2 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Waterloo	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Colour (Apparent) by Spectrometer	E330 ALS Environmental - Waterloo	Water	APHA 2120 C (mod)	Colour (Apparent) is measured in an unfiltered sample spectrophotometrically using the single wavelength method. The colour contribution of settleable solids are not included in the result. This method is intended for potable waters.  Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Dissolved Organic Carbon by Combustion (Low Level)	E358-L ALS Environmental - Waterloo	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO <sub>2</sub> . NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Waterloo	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.  Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Waterloo	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Waterloo	Water	APHA 2340B	"Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Ion Balance using Total Metals	EC101A ALS Environmental - Waterloo	Water	APHA 1030E	Cation Sum (using total metals), Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
Sodium Adsorption Ratio [SAR] from Total Metals	EC102 ALS Environmental - Waterloo	Water	CCME Sodium Adsorption Ratio (SAR)	The Sodium Adsorption Ratio (SAR) for a water sample is calculated from the Sodium, Calcium, and Magnesium concentrations of the water, using the same calculations as would be used for a sediment paste extract.
TDS calculated from conductivity	EC103A ALS Environmental - Waterloo	Water	APHA 1030 E	Total dissolved solids (as mg/L) can be estimated by multiplying electrical conductance (in umhos/cm) by 0.65.
Saturation Index using Laboratory pH (Ca-T)	EC105A ALS Environmental - Waterloo	Water	APHA 2330B	Langelier Index provides an indication of scale formation potential at a given pH and temperature, and is calculated as per APHA 2330B Saturation Index. Positive values indicate oversaturation with respect to CaCO <sub>3</sub> . Negative values indicate undersaturation of CaCO <sub>3</sub> . This calculation uses laboratory pH measurements and provides estimates of Langelier Index at temperatures of 4, 15, 20, 25, 66, and 77°C. Ryznar Stability Index is an alternative index used for scale formation and corrosion potential.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Waterloo	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Total Silicon as Silica (Calculation)	EC420.SiO <sub>2</sub> ALS Environmental - Waterloo	Water	N/A	Total Silicon (as SiO <sub>2</sub> ) is a calculated parameter. Total Silicon (as SiO <sub>2</sub> mg/L) = 2.139 x Total Silicon (mg/L).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Waterloo	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 ALS Environmental - Waterloo	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon



GC-540, RM-622  
N-574

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

COC Number: 22 -  
Page of

www.alsglobal.com

Environmental Division  
Waterloo

Work Order Reference  
WT2502610



Telephone: +1 519 886 8970

Contact and company name below will appear on the final report

Company: CF Crozier & Associates  
Contact: Victoria Mazur  
Phone: 548-708-0039  
Company address below will appear on the final report

Street: 55 Wyncham St N #215  
City/Province: Guelph / ON  
Postal Code: N1H 7T8

Invoice To: Same as Report To  
Copy of Invoice with Report:  YES  NO

Company: [Blank]  
Project Information  
ALS Client Code / QUOTE #: CFCR100 / 2024 SOA  
Job / Project #: 2621-7000  
PO / AFE: [Blank]  
LSD: [Blank]

ALS Lab Work Order # (ALS use only): WT2502610 FH

Reports / Recipients

Select Report Format:  PDF  EXCEL  EDD (DIGITAL)  
Merge QC/QCI Reports with COA:  YES  NO  N/A  
Compare Results to Criteria on Report - provide details below if box checked  
Select Distribution:  EMAIL  MAIL  FAX  
Email 1 or Fax: vmazur@cfcrozier.ca  
Email 2: [Blank]  
Email 3: [Blank]

Invoice Recipients

Select Invoice Distribution:  EMAIL  MAIL  FAX  
Email 1 or Fax: mhath@cfcrozier.ca  
Email 2: [Blank]

Oil and Gas Required Fields (client use)

AFE/Coast Center: [Blank] PO#: [Blank]  
Major/Minor Code: [Blank] Routing Code: [Blank]  
Requisitioner: [Blank]  
Location: [Blank]

ALS Contact: Andrew Martin  
Sampler: [Blank]

Sample Identification and/or Coordinates  
(This description will appear on the report)  
PT1 Start  
PT1 End

Date: [Blank] Time: [Blank]  
Sample Type: Drinking Water

NUMBER OF CONTAINERS

Routine Potability in Water: 6  
DOC - Lab to Filter/Preserve: 6

Turnaround Time (TAT) Requested

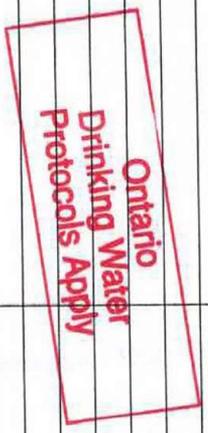
Routine [R] if received by 3pm M-F - no surcharges apply  
 4 day [P4] if received by 3pm M-F - 20% rush surcharge min/m  
 3 day [P3] if received by 3pm M-F - 25% rush surcharge min/m  
 2 day [P2] if received by 3pm M-F - 50% rush surcharge min/m  
 1 day [E] if received by 3pm M-F - 100% rush surcharge min/m  
 Same day [E2] if received by 10am M-S - 200% rush surcharge  
Additional fees may apply to rush requests on weekend

Date and Time Required for all ERP TATs:  
For all tests with rush TATs requested, please c

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

1 telephone: +1 519 886 8970

SAMPLES ON HOLD  
EXTENDED STORAGE REQUIR  
SUSPECTED HAZARD (see not



Drinking Water (DW) Samples (client use)

Are samples taken from a Regulated DW System?  
 YES  NO

Are samples for human consumption/ use?  
 YES  NO

Notes / Specify Limits for result evaluation by selecting from drop-down below  
(Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method:  NONE  ICE  FROZEN  COOLING INITIATED  
Cooler Custody Seals Intact:  YES  N/A  NO  
INITIAL COOLER TEMPERATURES °C: [Blank] FINAL COOLER TEMPERATURES °C: [Blank]

Released by: Victoria Mazur  
Date: 02/11/2025

Received by: [Signature]  
Date: 2/11/2025

Time: 15:29

Received by: [Signature]  
Date: 2025-02-11  
Time: 18:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION  
WHITE - LABORATORY COPY  
YELLOW - CLIENT COPY  
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.

# APPENDIX I

## Water Balance Assessment



**Water Balance Parameters**  
Thornthwaite & Mather Method

Project Name: Chipwoods Park  
Project Number: 2621-7000  
Created By: VM  
Checked By: CM'  
Date: 2025-04-25

Project Name: **Chipwoods Park**  
Location: **Township of Melancthon**

Climate Station: RUSKVIEW  
Longitude: 80°08'00.000" W  
Latitude: 44°14'00.000" N  
Elevation: 472.4 m  
Station ID: 6147229

LATITUDE **43** DEGREES

Month	Mean Temperature (C°) <sup>1</sup>	Heat Index [i = (t/5) <sup>1.514</sup> ]	α	Potential Evapotranspiration (PET) (mm)	Correction Factor <sup>2</sup>	Adjusted Potential Evapotranspiration (APET) (mm)	Total Precipitation (P) (mm) <sup>1</sup>	P - APET (mm)	APET - P (mm)
January	-7.3	0.0000	0.4924	0.0000	0.81	0	85.6	85.6	0.0
February	-6.8	0.0000	0.4924	0.0000	0.82	0	69.8	69.8	0.0
March	-1.9	0.0000	0.4924	0.0000	1.02	0	68	68.0	0.0
April	5.4	1.1236	0.5124	25.7214	1.12	29	73.9	45.1	0.0
May	12.1	3.8115	0.5596	59.6631	1.26	75	86.9	11.7	0.0
June	17.4	6.6062	0.6076	87.1430	1.28	112	90.8	0.0	20.7
July	19.7	7.9723	0.6307	99.1883	1.29	128	81.5	0.0	46.5
August	18.8	7.4274	0.6215	94.4673	1.2	113	79.4	0.0	34.0
September	14.7	5.1177	0.5822	73.0906	1.04	76	95.4	19.4	0.0
October	7.9	1.9988	0.5279	38.2481	0.95	36	83.3	47.0	0.0
November	1.7	0.1953	0.4959	7.7061	0.81	6	100.3	94.1	0.0
December	-4.3	0.0000	0.4924	0.0000	0.77	0	80.9	80.9	0.0
<b>TOTAL</b>	<b>6.45</b>	<b>34.3</b>	<b>1.0</b>			<b>575.4</b>	<b>995.8</b>	<b>521.52</b>	<b>101.16</b>

**TOTAL WATER DEFICIT = 101.16 mm**  
**TOTAL WATER SURPLUS (SURPLUS - DEFICIT) = 420.37 mm**

NOTES: 1. Precipitation and Temperature data from the RUSKVIEW (Station No.6147229 ) Environment Canada Station Data  
2. Latitude adjustment factors determined based on site latitude assuming 12 hours of sunlight per day for 30 days





Catchment ID	UC2												
Evapotranspiration/Evaporation Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	86	70	68	74	87	91	82	79	95	83	100	81	<b>996</b>
Adjusted Potential Evapotranspiration (APET)	0	0	0	29	75	112	128	113	76	36	6	0	575
P-APET	86	70	68	45	12	-21	-46	-34	19	47	94	81	420
Change in Storage	0	0	0	0	0	-21	-46	-34	19	47	35	0	101
Storage (S) (mm)	250	250	250	250	250	229	183	149	168	215	250	250	
Pervious Area Infiltration/Runoff Analysis													
Water Surplus (mm)	86	70	68	45	12	0	0	0	0	0	59	81	420
Potential Infiltration (I) (mm)	77	63	61	41	11	0	0	0	0	0	53	73	378
Potential Direct Surface Water Runoff (R) (mm)	9	7	7	5	1	0	0	0	0	0	6	8	42
Impervious Area Evapotranspiration/Evaporation/Runoff Analysis													
Impervious Evapotranspiration/Evaporation (mm)	0	0	0	11	13	14	12	12	14	12	15	0	104
Impervious Runoff (mm)	86	70	68	63	74	77	69	67	81	71	85	81	<b>892</b>
Combined Water Balance													
Pervious ET (m <sup>3</sup> )	0	0	0	2781	7257	10768	12352	10943	7338	3508	603	0	<b>55548</b>
Impervious ET (m <sup>3</sup> )	0	0	0	0	0	0	0	0	0	0	0	0	<b>0</b>
Pervious Runoff (m <sup>3</sup> )	826	674	656	435	113	0	0	0	0	0	572	781	<b>4058</b>
Impervious Runoff (m <sup>3</sup> )	0	0	0	0	0	0	0	0	0	0	0	0	<b>0</b>
Pervious Infiltration (m <sup>3</sup> )	7437	6064	5908	3918	1019	0	0	0	0	0	5148	7029	<b>36521</b>
Impervious Infiltration (m <sup>3</sup> )	0	0	0	0	0	0	0	0	0	0	0	0	<b>0</b>
Pre-Development Water Balance Summary													
Pre-Development Infiltration		134602.9		m <sup>3</sup> /yr		362.3		mm/yr					
Pre-Development Runoff		27154.0		m <sup>3</sup> /yr		73.1		mm/yr					

- NOTES: 1. Areas and percent imperviousness determined using Development Concept Plan Chipwoods dated 45769 prepared by GSAI Inc..  
2. The infiltration factor is determined using the MECP Methodology outlined in Stormwater Drainage Manual 2003.  
3. Additional assumptions:  
> Surplus water is unavailable for runoff and recharge in months where water losses from AET exceed precipitation inputs.  
> Runoff, infiltration and evapotranspiration do not occur when average temperature is below zero.  
> Precipitation during winter months (Dec. through Mar. is assumed to be accumulated as snow.  
> Soil Moisture Capacity is at a maximum in April.







<b>Post-Development Water Balance Summary</b>						
Post-Development Infiltration	121396.6	m <sup>3</sup> /yr	326.8	mm/yr	0.0104	L/s
Post-Development Runoff	55560.0	m <sup>3</sup> /yr	149.6	mm/yr	0.0047	L/s

- NOTES: 1.Areas and percent imperviousness determined using Development Concept Plan Chipwoods dated 45769 prepared by GSAI Inc..  
2.The infiltration factor is determined using the MECF Methodology outlined in SWM 2003 Manual.  
3. Additional assumptions:  
> Surplus water is unavailable for runoff and recharge in months where water losses from AET exceed precipitation inputs.  
> Runoff, infiltration and evapotranspiration do not occur when average temperature is below zero.  
> Precipitation during winter months (Dec. through Mar. is assumed to be accumulated as snow.  
> Soil Moisture Capacity is at a maximum in April.



**Water Balance Summary**  
Thornthwaite & Mather Method

Project Name: Chipwoods Park  
Project Number: 2621-7000  
Created By: VM  
Checked By: CM'  
Date: 2025-04-25

Project Name: **Chipwoods Park**  
Location: **Township of Melancthon**

Characteristic	Pre-Development	Post-Development	% Change (Pre to Post)
Precipitation (mm/yr)	995.80	995.80	0%
Water Surplus (mm/yr)	420.37	420.37	0%
Evapotranspiration (mm/yr)	575.43	575.43	0%
Natural Infiltration (mm/yr)	362.31	326.77	-10%
Infiltration through LID Measures (mm/yr)	0.00	0.00	-
Total Infiltration (mm/yr)	362.31	326.77	-10%
Total Runoff (mm/yr)	73.09	149.55	105%

<b>Infiltration Deficit (mm/yr)</b>	<b>35.55</b>
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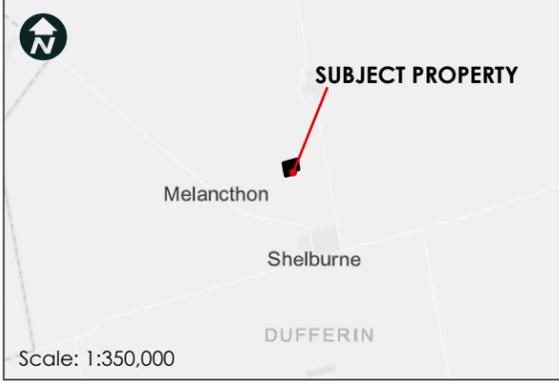
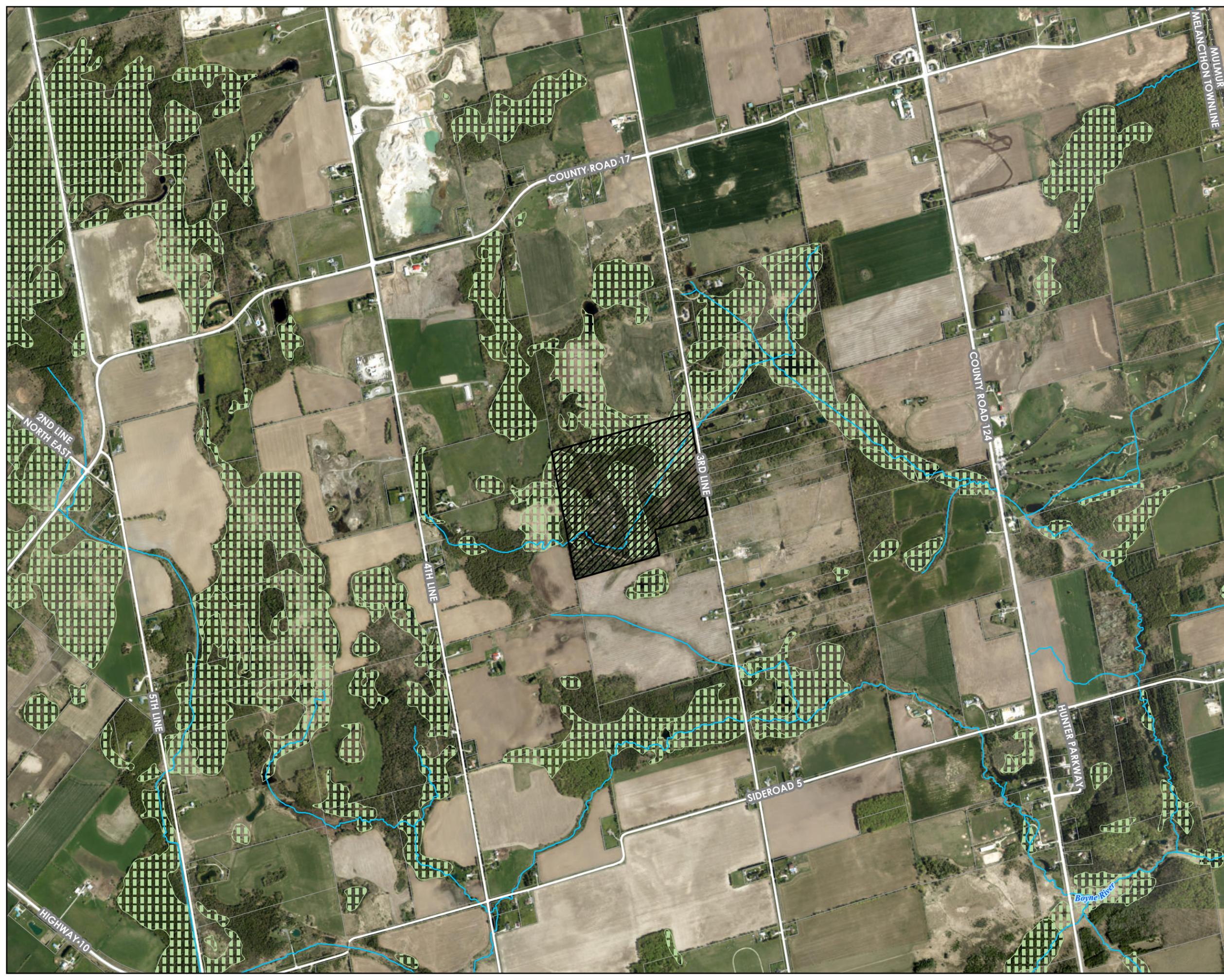
### Adjustment Factors Based on Site Latitude Based on 12 hours of Sunlight per day for 30 days

Latitude °C	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
50	0.74	0.78	1.02	1.15	1.33	1.36	1.37	1.25	1.06	0.92	0.76	0.70
49	0.75	0.79	1.02	1.14	1.32	1.34	1.35	1.24	1.05	0.93	0.76	0.71
48	0.76	0.80	1.02	1.14	1.31	1.33	1.34	1.23	1.05	0.93	0.77	0.72
47	0.77	0.80	1.02	1.14	1.30	1.32	1.33	1.22	1.04	0.93	0.78	0.73
46	0.79	0.81	1.02	1.13	1.29	1.31	1.32	1.22	1.04	0.94	0.79	0.74
45	0.80	0.81	1.02	1.13	1.28	1.29	1.31	1.21	1.04	0.94	0.79	0.75
44	0.81	0.82	1.02	1.13	1.27	1.29	1.30	1.20	1.04	0.95	0.80	0.76
43	0.81	0.82	1.02	1.12	1.26	1.28	1.29	1.20	1.04	0.95	0.81	0.77
42	0.82	0.83	1.03	1.12	1.26	1.27	1.28	1.19	1.04	0.95	0.82	0.79
41	0.83	0.83	1.03	1.11	1.25	1.26	1.27	1.19	1.04	0.96	0.82	0.80
40	0.84	0.83	1.03	1.11	1.24	1.25	1.27	1.18	1.04	0.96	0.83	0.81
39	0.85	0.84	1.03	1.11	1.23	1.24	1.26	1.18	1.04	0.96	0.84	0.82
38	0.85	0.84	1.03	1.10	1.23	1.24	1.25	1.17	1.04	0.96	0.84	0.83
37	0.86	0.84	1.03	1.10	1.22	1.23	1.25	1.17	1.03	0.97	0.85	0.83
36	0.87	0.85	1.03	1.10	1.21	1.22	1.24	1.16	1.03	0.97	0.86	0.84
35	0.87	0.85	1.03	1.09	1.21	1.21	1.23	1.16	1.03	0.97	0.86	0.85
34	0.88	0.85	1.03	1.09	1.20	1.20	1.22	1.16	1.03	0.97	0.87	0.86
33	0.88	0.86	1.03	1.09	1.19	1.20	1.22	1.15	1.03	0.97	0.88	0.86
32	0.89	0.86	1.03	1.08	1.19	1.19	1.21	1.15	1.03	0.98	0.88	0.87
31	0.90	0.87	1.03	1.08	1.18	1.18	1.20	1.14	1.03	0.98	0.89	0.88
30	0.90	0.87	1.03	1.08	1.18	1.17	1.20	1.14	1.03	0.98	0.89	0.88
29	0.91	0.87	1.03	1.07	1.17	1.16	1.19	1.13	1.03	0.98	0.90	0.89
28	0.91	0.88	1.03	1.07	1.16	1.16	1.18	1.13	1.02	0.98	0.90	0.90
27	0.92	0.88	1.03	1.07	1.16	1.15	1.18	1.13	1.02	0.99	0.90	0.90
26	0.92	0.88	1.03	1.06	1.15	1.15	1.17	1.12	1.02	0.99	0.91	0.91
25	0.93	0.89	1.03	1.06	1.15	1.14	1.17	1.12	1.02	0.99	0.91	0.91
20	0.95	0.90	1.03	1.05	1.13	1.11	1.14	1.11	1.02	1.00	0.93	0.94
15	0.97	0.91	1.03	1.04	1.11	1.08	1.12	1.08	1.02	1.01	0.95	0.97
10	1.00	0.91	1.03	1.03	1.08	1.06	1.08	1.07	1.02	1.02	0.98	0.99
5	1.02	0.93	1.03	1.02	1.06	1.03	1.06	1.05	1.01	1.03	0.99	1.02
0	1.04	0.94	1.04	1.01	1.04	1.01	1.04	1.04	1.01	1.04	1.01	1.04
-5	1.06	0.91	1.04	1.00	1.02	0.99	1.02	1.03	1.00	1.05	1.03	1.06
-10	1.08	0.97	1.05	0.99	1.01	0.96	1.00	1.01	1.00	1.06	1.05	1.10
-15	1.12	0.98	1.05	0.98	0.98	0.94	0.97	1.00	1.00	1.07	1.07	1.12
-20	1.14	1.00	1.05	0.97	0.96	0.91	0.95	0.99	1.00	1.08	1.09	1.15
-25	1.17	1.01	1.05	0.96	0.94	0.88	0.93	0.98	1.00	1.10	1.11	1.18
-30	1.20	1.03	1.06	0.95	0.92	0.85	0.90	0.96	1.00	1.12	1.14	1.21
-35	1.23	1.04	1.06	0.94	0.89	0.82	0.87	0.94	1.00	1.13	1.17	1.25
-45	1.27	1.06	1.07	0.93	0.86	0.78	0.84	0.92	1.00	1.15	1.20	1.29
-42	1.28	1.07	1.07	0.92	0.85	0.76	0.82	0.92	1.00	1.16	1.22	1.31
-44	1.30	1.08	1.07	0.92	0.83	0.74	0.81	0.91	0.99	1.17	1.23	1.33
-46	1.32	1.10	1.07	0.91	0.82	0.72	0.79	0.90	0.99	1.17	1.25	1.35
-48	1.34	1.11	1.08	0.90	0.80	0.70	0.76	0.89	0.99	1.18	1.27	1.37
-50	1.37	1.12	1.08	0.89	0.77	0.67	0.74	0.88	0.99	1.19	1.29	1.41

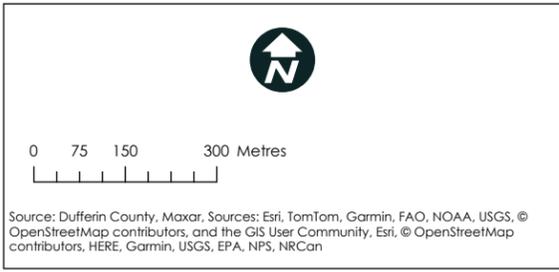
Source: Dunne, T. and Leopold, L.B., 1978. Water in environmental planning, Freeman Publishers.

# FIGURES

- Figure 1:** Site Location Plan
- Figure 2:** Physiography
- Figure 3:** Bedrock Geology
- Figure 4:** Surficial Geology
- Figure 5:** MECP Well Location Plan
- Figure 6:** Monitoring Well Location Plan



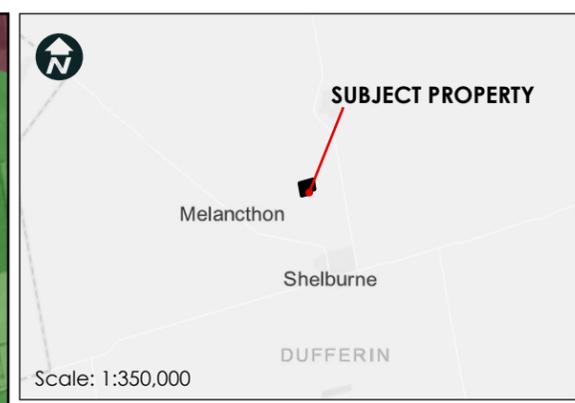
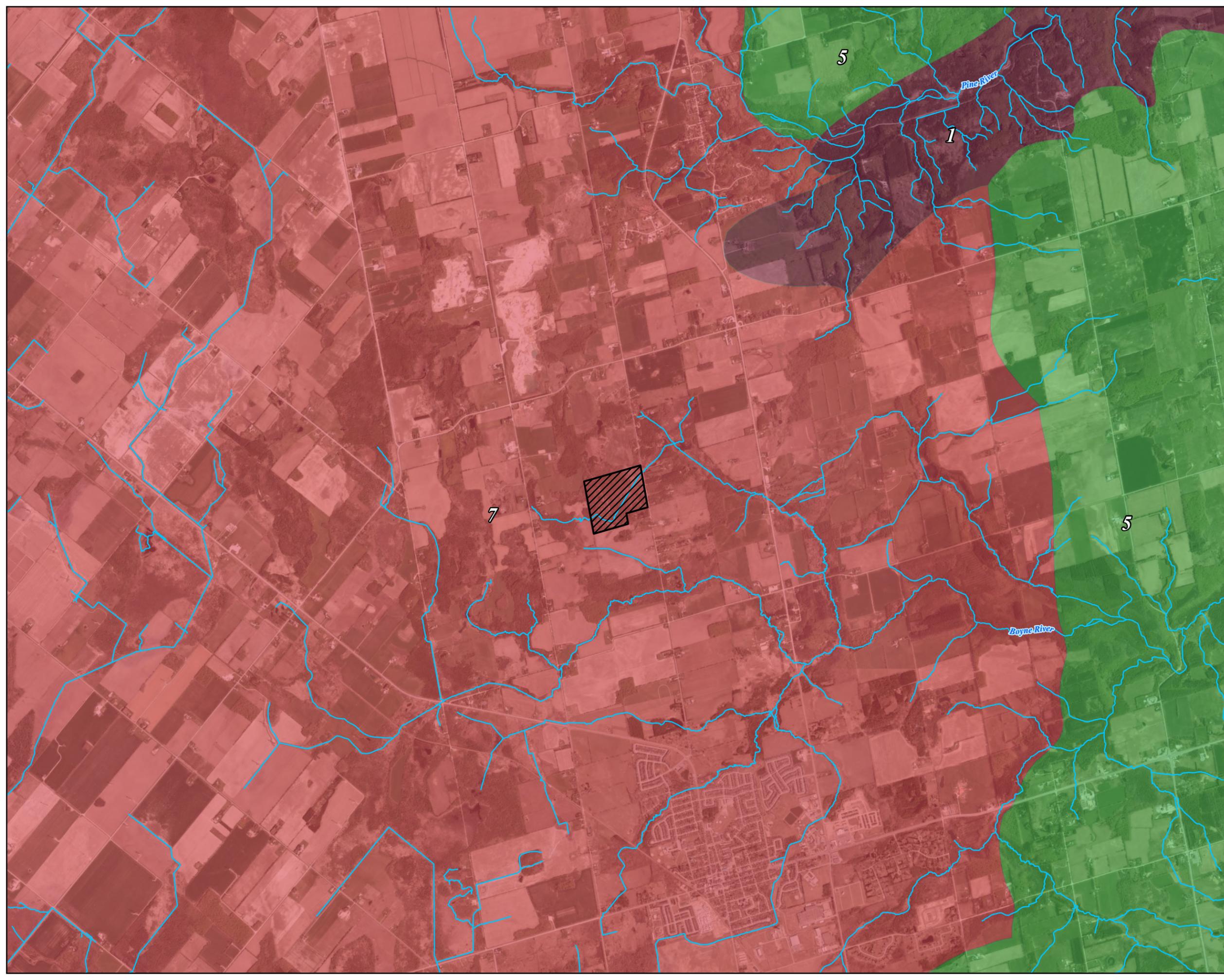
- LEGEND**
-  PROPERTY LIMITS
  -  MUNICIPAL BOUNDARY
  -  WATERCOURSE
  -  ASSESSMENT PARCEL (DUFFERIN COUNTY)
  -  WETLAND



**CHIPWOODS DEVELOPMENT**

SITE LOCATION PLAN



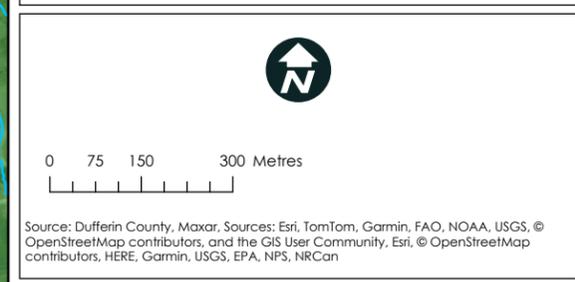


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- WATERCOURSE

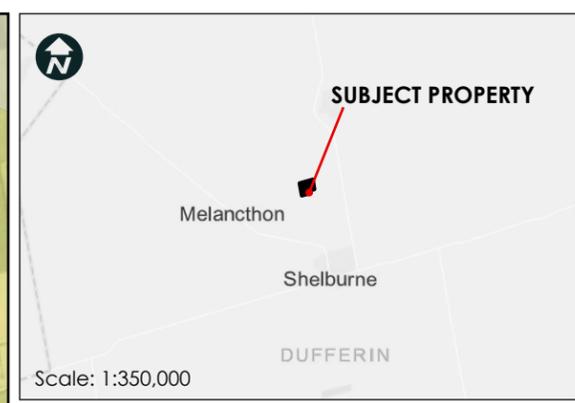
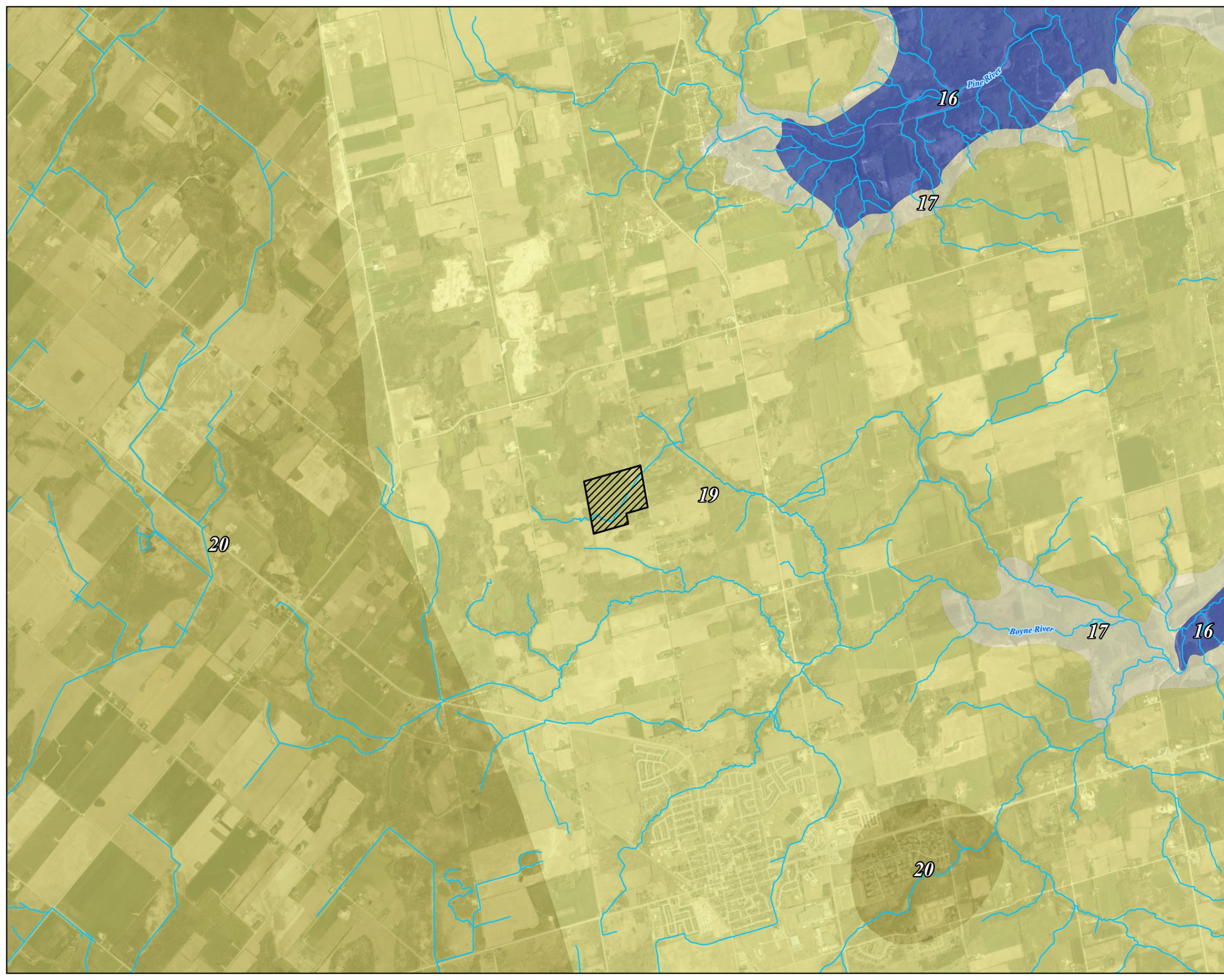
PHYSIOGRAPHIC REGION

- 1: NIAGARA ESCARPMENT
- 5: HORSESHOE MORAINES
- 7: DUNDALK TILL PLAIN



**CHIPWOODS DEVELOPMENT**  
PHYSIOGRAPHY



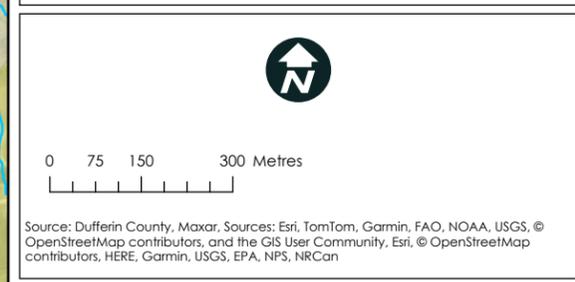


**LEGEND**

- PROPERTY LIMITS
- WATERCOURSE

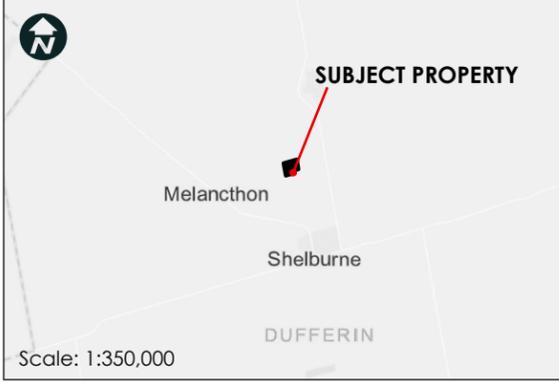
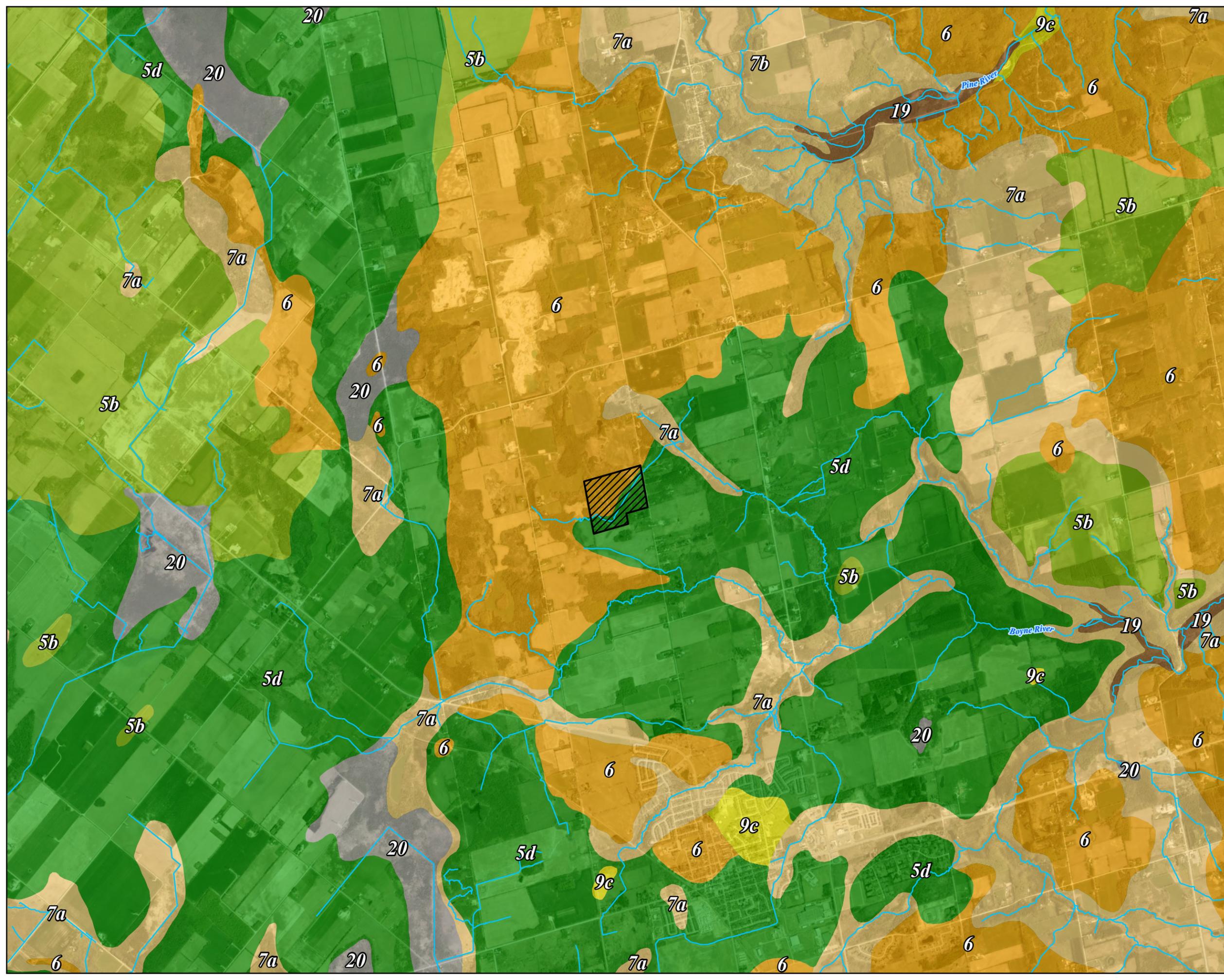
**BEDROCK GEOLOGY**

- 20 GUELPH FORMATION: TAN TO BROWN, FINE TO MEDIUM DOLOSTONE
- 19 AMABEL FORMATION: WHITE TO BLUE-GREY, THICK-TO MASSIVE-BEDDED, DOLOSTONE
- 17 CLINTON-CATARACT GROUP: THIN UNITS OF SHALE, SANDSTONE, DOLOSTONE AND/OR LIMESTONE
- 16 QUEENSTON FORMATION: RED SHALE AND SILTSTONE, MINOR GREEN SHALE AND SILTSTONE, SILTSTONE TO SANDSTONE AND LIMESTONE INTERBEDS



**CHIPWOODS DEVELOPMENT**  
BEDROCK GEOLOGY



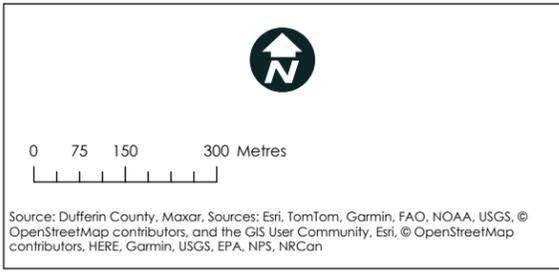


**LEGEND**

- PROPERTY LIMITS
- WATERCOURSE

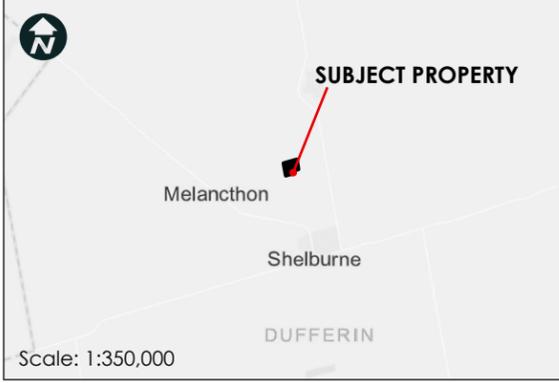
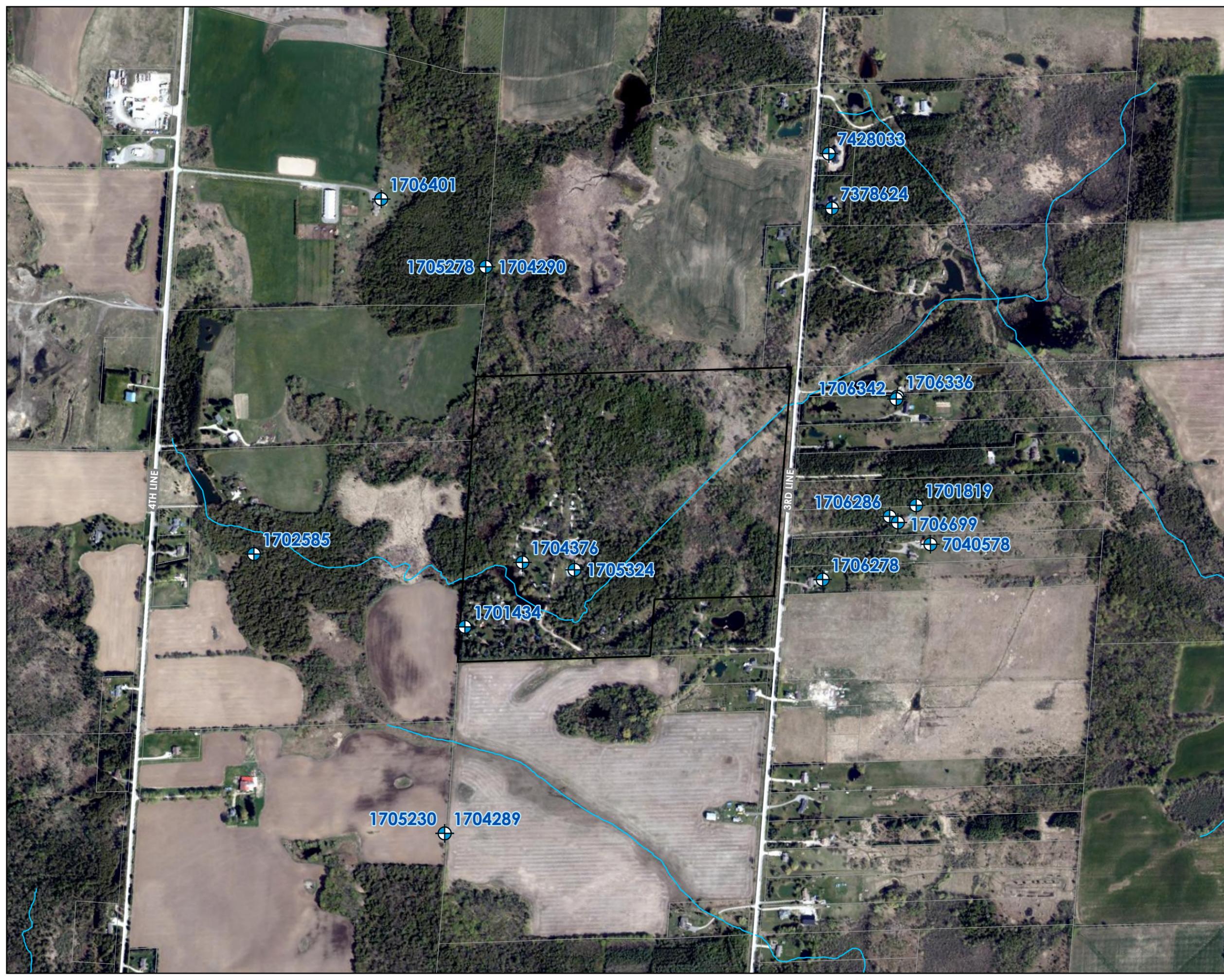
**SURFICIAL GEOLOGY**

- 20: ORGANIC DEPOSITS
- 19: MODERN FLUVIAL SILT, SAND, GRAVEL
- 9C: GLACIOLACUSTRINE SAND
- 7: GLACIOFLUVIAL SAND AND GRAVEL
- 7A: GLACIOFLUVIAL SAND
- 7B: GLACIOFLUVIAL GRAVEL
- 6: ICE-CONTACT SAND AND GRAVEL, SOME TILL AND SILT
- 5B: SILTY SAND TO SANDY SILT GLACIAL TILL
- 5D: SILTY CLAY TO CLAYEY SILT GLACIAL TILL



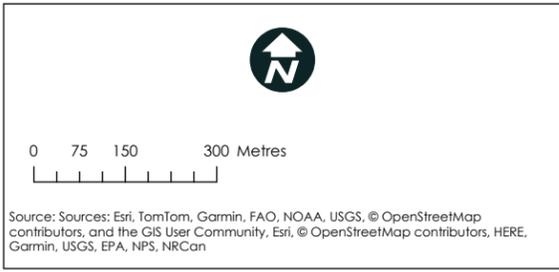
**CHIPWOODS DEVELOPMENT**  
SURFICIAL GEOLOGY





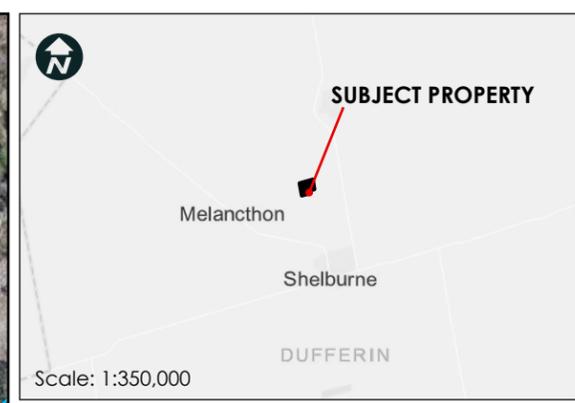
**LEGEND**

- PROPERTY LIMITS
- WATERCOURSE
- ASSESSMENT PARCEL (DUFFERIN COUNTY)
- MECP WELL



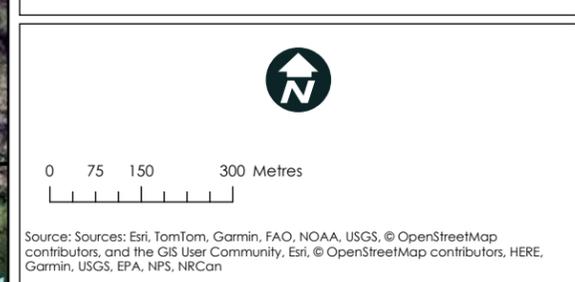
**CHIPWOODS DEVELOPMENT**  
MECP WELL LOCATION PLAN





**LEGEND**

- PROPERTY LIMITS
- WATERCOURSE
- ASSESSMENT PARCEL (DUFFERIN COUNTY)
- MONITORING WELL
- ONSITE WELL



**CHIPWOODS DEVELOPMENT**  
 MONITORING WELL LOCATION PLAN

