



ECA No. A272002, A273003 & 5854-7DSSDD

St. Edmunds Landfill Site: Annual Monitoring Report (2024)

Municipality of Northern Bruce Peninsula, Ontario

Submitted to:

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1. INTRODUCTION

The St. Edmunds landfill site is located west of Provincial Highway No.6 and approximately 4.5 km southwest of Tobermory, at the intersection of Warner Bay Road and McArthur Road. The 82-hectare site is situated on Lots 46 and 47, Concession 3 West of Bury Road (W.B.R.), in the former Township of St. Edmunds, Municipality of Northern Bruce Peninsula, County of Bruce, where shown on Figure 1. Landfill operations are conducted under Provisional Certificates of Approval (CofA) No. 273002 and No. 272003. In addition, CofA No. 5854-7DSSDD was issued on July 11, 2008, for the stormwater management facility at the Site. Copies of the Approvals are provided in Appendix A.

Based on previous reports, the landfill was owned and operated by the Township of St. Edmunds from the late 1970's (i.e., sometime between 1977 and 1980) to 1999. The Municipality was formed in 1999 as the result of the amalgamation of the former Townships of Eastnor, Lindsay, and St. Edmunds, as well as the Village of Lion's Head. Prior to 1999 each respective township was serviced by a landfill, of which the Municipality assumed ownership upon amalgamation. As a result, the St. Edmunds landfill is one of three landfill sites that service the Municipality and is approved to accept non-hazardous municipal wastes generated from within its geographic boundaries.

Approval No. A273002 was issued by the Ministry of the Environment, Conservation and Parks (MECP) on March 14, 1980, and was amended on July 10, 1998. Under this Approval, the site has an approved useable area of 3.3 ha for landfilling within the 82-ha property. The Approval references the Plan of Development and Operation Report (Henderson, Paddon and Associates Ltd., July 1995), hereafter referred to as the PDO, under which a volume of 141,000 m³ for waste and daily cover is approved.

CofA No. A273003, which was issued in October 1993 and amended in July 1998, approves a stump disposal area of 2.02 ha with a volumetric capacity of 54,700 m³. This area is located to the north of the approved landfill footprint and within the 82-ha property. The limits of the approved landfill and stump disposal areas are shown on Figure 2.

The approval for municipal and private sewage works (i.e., CofA No. 5854-7DSSDD) approves an on-site stormwater management facility for a total drainage area of 10.2-ha consisting of the existing 3.33-ha municipal waste disposal area, the 2.02-ha stump disposal area, and a 4.67-ha area for the access road and recycling facility.

According to Condition 14 of CofA No. A273003, a monitoring report providing a yearly summary of the site monitoring and operations is required, and Condition 6(2) of CofA No.5854-7DSSDD requires that an annual performance report on the stormwater management works be completed by April 30th of each year. Although the stormwater management reports are only to be made available, upon request, to the District Manager, this annual monitoring and operations report summarizes the previous year's operations, waste quantities, and groundwater and surface water monitoring results and has been completed to meet the requirements of all the compliance approvals for the St. Edmunds Landfill Site.

2. SITE USAGE

According to Statistics Canada's 2021 census data, the Municipality of Northern Bruce Peninsula has a permanent population of 4,404 and a total of 5,101 dwellings, of which 2,206 are occupied by permanent residents. For the purpose of waste generation and usage of waste management services, the contributing population is more accurately estimated to be 5,610. This is based on the method adopted by Waste Diversion Ontario (WDO) where 6 seasonal households are equivalent to 1 permanent household and an average of 2.5 people per permanent household. The former Township of St. Edmunds is estimated to account for approximately 40% of the population in the Municipality of Northern Bruce Peninsula, which equates to approximately 2,245 persons.

The St. Edmunds landfill is currently one of three landfills approved for the disposal of solid non-hazardous waste that services the Municipality of Northern Bruce Peninsula. The landfill services the residential and industrial, commercial, and institutional (IC&I) sectors located within the Municipality.

As of January 2017, the entire Municipality is serviced by curb-side waste and recycling collection. Residents are limited to 2 bags per week. Although the Municipality provides waste collection services on a weekly basis to the residents of the former Township of St. Edmunds, waste from the curbside collection services is currently transported to the Eastnor landfill site for logistical reasons. A significant portion of the waste currently disposed of at the St. Edmunds landfill originates from the IC&I sector, some of the main users include the following:

- Parks Canada
- The Chi-Cheemaun Ferry Service
- The Ministry of Transportation
- Several campgrounds and small businesses

Activities that currently occur at the St. Edmunds landfill site include landfilling of residual waste and wood waste, burning of clean wood wastes, collection of blue box materials, electronic waste, and mattresses, stockpiling of scrap metal and tires, as appropriate, and goods exchange through their reuse building. According to Site records, an estimated 595 tonnes (metric) of waste was landfilled at the St. Edmunds landfill site during the reporting period.

3. SITE LIFE EXPECTANCY

3.1. Past Landfill Development

Area A

Area A has been filled and capped to final contours and is closed. According to the 2005 Annual Report prepared by H&P (2006), topsoil was placed on approximately 90 to 95% of this area and seeding was carried out in 1993/1994. According to the PDO, the total volume of waste, interim and final cover, and topsoil placed in this area was 45,100 m³, and the remaining 1,310 m³ of final cover and topsoil was applied in 2004. Based on the historic development of this area, it is unknown if a low permeability soil was applied to the base prior to waste placement.

Area B

In 2007, Area B was filled to capacity with waste and interim cover and was subsequently closed. Approximately half of Area B was capped with clay cover in 2004 and capping of the remainder of the area was completed in 2008. The application of final topsoil and seeding has yet to be completed for the latter half of Area B.

According to the PDO, a 600 mm thick clay/silt attenuation pad was placed at the base of Area B in 1993 prior to the initiation of landfill activities in this area. Due to the permeability of the soils, shallow bedrock, and relatively high-water table in the vicinity of the landfill, the base preparations were completed to aid in the attenuation of leachate generated from the landfill.

3.2. Active Landfilling Areas

In 2007, a topographic survey of the entire landfill area was completed to determine the remaining Site capacity following the closure of Area A and partial closure of Area B. Based on a comparison of the digital terrain models from the survey to the proposed final contours (Figure 6), the remaining capacity for waste and interim cover was determined to be approximately 40,500 m³ as of the end of 2007. In 2008, the Municipality completed the base

preparations of Area C which, similar to Area B, included the application of 600 mm of low permeability clay/silt soil to the landfill base.

Since then, the remaining capacity has been determined by subtracting the estimated volumetric capacity used derived from annual surveys of the active fill areas. Using the elevation difference between the December 2023 and December 2024 topographical surveys, a capacity of 2,095 m³ was calculated to have been used. Assuming 20% interim cover by volume, the amount of landfilled waste in 2024 is estimated to be 1,675 m³.

In 2024, landfilling operations continued within Area C, where shown on Figure 3. In consideration of the limited remaining capacity, a comprehensive survey of the entire landfill footprint was completed in 2023 to provide an updated and more accurate assessment of the remaining site life. The survey data was used in conjunction with the approved final contours outlined in the PDO (which account for waste and interim cover) to confirm the remaining airspace capacity and site life. In consideration of the comprehensive survey completed in 2023, as of the end of 2024 the St. Edmunds landfill site has a remaining capacity of about 3,600 m³, or a remaining site life of approximately 1.5 to 2 years. Although not required by the Approval, it is recommended that a Closure Plan be completed for submission to the MECP in 2025, prior to the anticipated Site closure in 2027.

Based on an average fill rate over the last five years of 2,180 m³, the remaining site life is approximately two years. It is noted that the volume for final cover and topsoil of 7,470 m³ remains unused. Based on the Long-Term Waste Management Plan for the Municipality, once the St. Edmunds Landfill reaches capacity, residual waste will be directed to the Eastnor Landfill Site. A summary of the estimated annual fill volumes (since 2018) is provided in Table 1.

4. SITE DEVELOPMENT AND OPERATIONS

4.1. Method of Operation

The approved landfill footprint has been divided into three areas, Areas A, B and C, as shown on Figure 2. The approved bottom elevation for disposal of waste in Area A is 201.8 metres above sea level (masl) and for Areas B and C is 202.2 masl. It is noted that, based on a survey completed in November 2022, these elevations presented have been lowered by 0.7 meters to suit the UTM derived coordinates.

The approved final contours for the landfill, including final cover, are shown on Figure 6. Based on the original Plan of Development and Operations prepared by Ainley and Associates (1978), the maximum elevation for waste disposal is 209.9 masl (or 209.2 masl when adjusted to suit the UTM derived coordinates). Side slopes of the approved final contours are approximately 4:1 with final top grades of approximately 5%. To date, landfill operations have generally occurred from the southwest to the northeast within the approved landfill footprint and Area A and Area B have been capped and closed. In 2024, landfilling operations continued progressing within Area C, where shown on Figure 3.

The Municipality currently uses the area-ramp method of landfilling and uses a packer to help maximize the waste density achieved at the Site. The area-ramp method is efficient with respect to space utilization and requires less cover material than other methods. Continued attention should be given to ensuring that waste within the active area of the landfill is sufficiently covered in a timely fashion with an adequate amount of material.

4.2. Periods of Operation – Landfill Hours

Currently the Site is open to the public/vehicles hauling waste during the following operating hours:

Table 4-1. St. Edmunds Landfill Site – Hours of Operation

Date	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Nov 1 to March 31	Closed	Closed	10:00 – 4:00	Closed	Closed	Closed	Closed
April 1 to Oct 31	Closed	Closed	9:00 – 5:00	Closed	Closed	9:00 - 5:00	Closed

A sign at the access gate notes the hours of operation. A site attendant is present during operating hours. When the site is closed to the public, a locked gate across the entrance road controls access to the site. Waste may be received outside the hours of operation, by appointment and under the supervision of a trained attendant.

4.3. Waste Receiving Station

In 2009, the Municipality completed the construction of a waste receiving station at each of their landfill sites (Eastnor, Lindsay, and St. Edmunds). The waste receiving station at the St. Edmunds Landfill Site is located approximately 150 m north of the landfill along the site access road. The waste receiving station includes a weigh scale and transfer bins for recyclables and waste to be landfilled. The collection bins are available to the public for waste drop-off and sorting. Access to the landfill area is limited to contractors and municipal employees.

5. LANDFILL MANAGEMENT

5.1. Vector, Vermin and Wildlife Control

At the St. Edmunds landfill site there are several types of vermin, vector and wildlife that have been identified as requiring some form of precautionary management plan, including bees/wasps, coyotes, gulls, turkey vultures, rodents, and black bears. Control can effectively be accomplished by applying cover material after each day of refuse deposition and through good housekeeping (i.e., daily litter pick-up, regular site inspection and proper waste segregation practices). An electric fence also lines the perimeter of the waste disposal area to discourage black bears and coyotes from entering the active area of the landfill. The 'Vector and Vermin Control/Management Plan' should be implemented should vermin, vector, and/or wildlife become a nuisance.

It is noted that the construction of the waste receiving station at the site entrance limits public access to the site which has resulted in improved waste segregation and refuse deposition practices.

5.2. Litter Control

Continued litter pick-up is recommended to help prevent fire hazards and unsightliness. The application of cover material each day the site is operational will help with litter control. According to the Municipality, litter pick-up is to occur on a regular basis, with a thorough pick-up scheduled at the end of every month.

5.3. Public Complaints

The Municipality reports that they did not receive any complaints regarding the existence or operations of the St. Edmunds landfill site during the year of 2024.

6. BURNING OPERATIONS

As per the PDO, the burning of clean wood and brush in accordance with the MECP Guideline “Burning at Landfill Sites” is allowed. Any brush, trees and clean wood material should be stockpiled separately. Before burning takes place, the Chief Fire Official must be notified of the date and time the burn is to take place, in accordance with the Municipality of Northern Bruce By-Law No. 2000-24, as amended.

Burning at the site is to be restricted to clean, dry wood wastes such as brush, trees, and lumber. These wood wastes are to be stockpiled in a designated burn area located on-site and be limited to an area no larger than 6 x 6 meters. Burning of designated wood waste is to be carried out in an area at least 30 meters away from the active landfilling area. Additionally, an area of 4.5 meters around the burn pit should be kept free of vegetation.

Burning is to occur only on clear, dry, windless days and should be conducted under the supervision of an attendant. The site attendant is responsible for the removal of any non-wood wastes from the pile prior to burning, as well as regularly removing cold ashes from the burn area for disposal in the active landfill area. The attendant must fully extinguish the fire at the end of the day.

In 2024, approximately 180 tonnes of clean wood waste and brush was reportedly received at the Site. This material was presumably burned.

7. RECYCLING AND WASTE REDUCTION

Currently, refuse segregation and recycling services are available at all three municipal landfill sites. Furthermore, to encourage blue-box recycling, this waste diversion stream is included in the curb-side collection services provided to the entire Municipality.

The site attendant/supervisor is responsible for the proper segregation and recycling of refuse at the Site. Waste segregation and recycling occurs in the waste transfer and receiving area for ease of access and supervision, where shown on Figure 3. It is important that the Municipality continue to remove stockpiles of recyclable goods on a regular basis to prevent clutter and to maintain an aesthetically acceptable site. The following goods are separated from the solid waste and stockpiled in designated areas that are clearly labelled.

7.1. Blue Box Materials

In addition to curbside collection of recyclable materials, the Municipality currently provides three depot locations for drop-off of recyclables, each associated with the existing Municipal Landfill Sites. The Municipality accepts mixed recyclables, meaning that all accepted recyclable materials can be placed into one bin at the Municipality's Recycling Depots/Facilities. Recyclables are then transferred to a Material Recovery Facility (MRF) in Mount Forest. This single-stream recyclable processing uses separation technologies specifically designed for a mixed recyclable stream. The current list of recyclable items accepted by the Municipality includes the following:

- glass
- steel paint cans
- aluminum cans, foil, and pie pans
- paper, boxboard and cartons
- various types of plastic including, but not limited to, PETE, HDPE, LDPE, PP, and PVC

Waste Management has provided an analysis of the blue box recyclables diverted from the Eastnor, Lindsay and St. Edmunds landfill sites located in the Municipality of Northern Bruce Peninsula for the 2024 calendar year. It is noted that the amount of blue box recyclables diverted, specifically from the former Township of St. Edmunds, is not available. However, an estimate has been completed based on the percentage of the estimated population contributing recyclables from within the former Township of St. Edmunds.

The estimated population contributing waste to each municipal landfill is as follows:

Table 7-1. Northern Bruce Peninsula – Population Proportions

Estimated Contributing Population		
Site	Total Persons	Percent
Eastnor	2,545	45%
Lindsay	840	15%
St. Edmunds	2,245	40%
Total	5,610	100%

Based on the estimated proportion of the municipal population in each of the former Townships, the estimated recyclables diverted from each of the municipal landfills (in tonnes) for the 2024 calendar year is presented below:

Table 7-2. Northern Bruce Peninsula – Diversion Estimates

Landfill Site	Total Diverted (Tonnes)
Eastnor	217.8
Lindsay	72.6
St. Edmunds	193.6
Total	484.00

The total combined amount of blue box recyclables collected in 2024 by Waste Management for the Municipality was 484 tonnes. Based on the proportion of the Municipality's population serviced by the St. Edmunds landfill (i.e., 40%), an estimated 194 tonnes of the blue box recyclables were diverted from the St. Edmunds landfill.

7.2. Used Tires

In January 2019, tires were the first material to be moved to the individual producer responsibility (IPR) framework under the recent waste diversion legislation, the Waste-Free Ontario Act. The Municipality continues to collect and stockpile used tires at all three of its landfills. As a registered collector, the Municipality accepts used tires from residents. These tires are recycled by tire producers (or Producer Responsibility Organizations), who are now directly responsible and accountable for meeting mandatory collection and recycling targets for used tires. According to the site records, 204 tires weighing an estimated 2.65 tonnes were received at the St. Edmunds landfill in 2024.

According to O.Reg.347 s.6(3), there must be fewer than 5,000 tire units at any given time. The volume of tires within an individual stockpile should not exceed 300 m³. There must be greater than 15 meters between the stockpile and the property line, buildings, and the active area of the landfill, and greater than 30 meters separation between the tire pile and the burn pile. Tires should be stockpiled in an area where there is no vegetation within 4.5 meters. Individual stockpiles should be separated from each other and from other waste piles by a minimum of 6 meters.

7.3. Scrap Metal and White Goods

The Municipality accepts scrap metal at the Site, including propane tanks and both chlorofluorocarbon (CFC)-containing (i.e., air conditioners, dehumidifiers, freezers, refrigerators, and water coolers) and non-CFC-containing white goods. White goods and marketable scrap metals should be stockpiled separately. Site records indicate that 22.8 tonnes of scrap metal (including propane tanks and white goods) was diverted from the waste stream at the St. Edmunds landfill site in 2024. Scrap metal and white goods are periodically removed from the Site for recycling.

Propane Tanks

Empty propane tanks should be stored on the ground surface in a segregated area. Tanks should be stored in a manner that minimizes the potential for cylinder valves to be damaged or broken (i.e., single layer and upright position).

White Goods

In compliance with Ontario Regulation 463/10, CFC-containing white goods are to be properly drained by a certified technician and then tagged to indicate that the CFC's have been removed, prior to the removal of white goods from the site. White goods and scrap metal are collected by a hauler on an as needed basis for salvage.

7.4. Automotive Batteries

Batteries are to be stored in a single layer under a roof in order to prevent precipitation from coming in contact with the batteries and in a manner that provides secondary containment in the event of leakage. Currently, batteries are stored in a site shed to prevent spills or weathering. According to the Site operational records, no battery units were received at the site during the reporting period.

7.5. Electronic Waste

The Municipality has been collecting electronic waste since 2010. Initially the electronic waste diversion program was operated by the Ontario Electronic Stewardship (OES) who was responsible for electronics recycling in Ontario on behalf of the electronics industry. In January 2021, Electrical and Electronic Equipment (EEE), specifically information technology, telecommunications, and audio-visual equipment (ITT/AV), became the third material to be moved to the individual producer responsibility (IPR) framework under the Waste-Free Ontario Act. OES did not operate a program for lighting; however, the producer responsibility for lighting equipment came into effect in January 2023.

The Municipality continues to collect and stockpile electronic waste at all three of its landfills. Electronic waste can be dropped off free of charge. At the St. Edmunds landfill site electronic waste is stored and locked in a steel shipping container. The municipality reported receiving 9.2 tonnes of electronic waste at the site in 2024.

7.6. Mattresses

In 2012, the Municipality began diverting mattresses as an additional waste diversion stream. According to the Site operational records 126 mattresses, totaling approximately 1.89 tonnes, were received at the St. Edmunds landfill in 2024. These mattresses are stored in a dry storage area at the Site and are removed periodically for recycling by Recyc-matelas Inc.

7.7. Reuse Building

Reuse buildings are located at the St. Edmunds and Eastnor landfill sites for exchange of re-usable goods. In 2024, the Municipality recorded receiving 9.1 tonnes of re-usable goods at the St. Edmunds landfill site. These goods are free for residents to access for their use.

7.8. Hazardous and Special Products (HSP)

In October 2021, Hazardous and Special Products transitioned to the individual producer responsibility framework. The HSP program for the Municipality is operated by Bruce County through the Orange Drop Program. In the Municipality of Northern Bruce Peninsula, the County typically provides two to three collection events per year. Under the Orange Drop program residents can drop-off hazardous materials free of charge.

Based on the Household Hazardous Waste Program summary of materials reportedly received by the County, the amount of HSP collected through the Orange Drop Program was estimated to be 15.3 tonnes during the reporting period. Based on the proportion of the Municipality's population serviced by the St. Edmunds landfill (i.e., 40%), an estimated 6.12 tonnes of HSP was diverted from the St. Edmunds landfill through the Orange Drop Program.

7.9. Leaf and Yard Waste

Although the Municipality promotes home composting for wet organics through the distribution of backyard composting bins, a leaf and yard waste composting pile is maintained at the Site. The municipality reported receiving approximately 106 tonnes of leaf and yard waste at the site in 2024. This pile should be turned on a regular basis. Surface water run-off generated from this pile should be either prevented or managed. If the pile becomes odorous, it should be placed in the active face of the landfill and immediately covered. Topsoil generated from this service can be used for placement over the final cover.

7.10. Waste Reduction Summary

Based on the sum of the diversion programs at the St. Edmunds landfill site and local depot, approximately 342 tonnes of material was diverted from the landfill in 2024. A summary of the quantity of materials diverted since 2016 is provided below:

Table 7-3. Summary of Waste Diversion (Tonnes)

Materials Diverted	2016	2017	2018	2019	2020	2021	2022	2023	2024
Blue Box Recyclables	173.7	208.4	220.3	194.8	208.8	227.4	212.2	180.2	193.6
Tires	1.0	1.3	2.2	1.5	1.7	2.6	2.5	11.42*	2.65
Scrap Metal/White Goods	29.6	29.3	36.4	36.1	64.2	59.3	35.6	25.7	22.8
Automotive Batteries	0.07	0.05	0.02	0.11	0	0.23	0.13	0	0
Bale Wrap	22.6	1.7	1.1	0	0	0.14	0	0	0
Electronic Waste	8.3	3.65	14.0	8.12	4.94	5.32	3.31	1.65	9.22
Mattresses	1.4	1.2	1.65	1.77	2.4	3.0	2.3	1.97	1.89
HSP	5.62	8.02	8.53	6.77	3.54	6.2	6.3	6.34	6.12
Leaf and Yard Waste	11.9	130	25.4	37.9	40.4	60.3	34.0	246	106
Total	254.2	383.6	309.6	287.1	326.0	364.5	296.3	473.3	342.3

Note: All values are presented in tonnes. NA = Not Available. * Tires removed from the site

The variability in diversion is primarily attributed to the leaf and yard waste contribution. It is noted that the quantity of diverted materials does not account for the clean wood and brush (i.e., burnable) that is also diverted.

8. SITE SETTING

8.1. Summary of Hydrogeologic Setting

The St. Edmunds landfill site is located within the physiographic region known as the Bruce Peninsula (Chapman and Putnam, 1984). The region is characterized by generally flat topography with shallow overburden and abundant bedrock exposed at ground surface. Regionally, the bedrock dips gradually to the south-west towards Lake Huron. The upper bedrock is of the Guelph Formation and primarily consists of dolomite. The exposed bedrock surfaces in the area are scoured from glacial activity and are typically irregular due to weathering.

Based on the Hydrogeologic Investigation (H&P et al, 1989), the overburden at the site ranges in thickness from approximately 1.4 m to 3.7 m and generally consists of two units including (i) sand and gravel and (ii) silt-till. According to the borehole logs for the monitoring wells installed as part of the Hydrogeologic Investigation, the sand and gravel unit is generally found to the northwest and in close proximity to the landfill while the silt till soils are generally associated with the low-lying areas to the south, east, and west of the landfill. The underlying bedrock is generally described as poorly fractured dolostone. Copies of the borehole logs for wells O-1 to O-9 and B-1 to B-5 are provided in Appendix C and cross-sections are provided in Appendix D. It is noted that borehole logs for piezometers P-1 through P-3 and wells W-1 to W3-03 are not available for inclusion in this report. Efforts by the Municipality to locate/obtain the borehole logs have been unsuccessful.

The topography at the site generally slopes gradually towards the south/southwest. Based on groundwater elevations in the monitoring wells, groundwater flow through the shallow overburden and bedrock is inferred to be in a south to south-westerly direction towards Lake Huron (Figure 4 and Figure 5).

8.2. Existing Surface Water Features at the Site

8.2.1. Regional Drainage System

Generally, drainage from upgradient lands is intercepted by the ditch system along McArthur Road, which directs stormwater in a southeasterly direction to Warner Bay Road, then southwesterly towards Warner Bay. This drainage area upstream from the landfill is approximately 222-ha.

As shown on Figure 2, drainage from the landfill site is generally directed in a southerly direction towards Warner Bay Road. At the confluence point between the upgradient drainage system and the site drainage system, stormwater is channeled into two separate ditches, herein referred to as the 'north ditch' and 'south ditch', which continue to flow southwesterly along Warner Bay Road.

Two ponds are located at the southwest portion of the landfill site property, and approximately 800 meters from the landfill footprint. The historical extraction of cover material from a borrow pit (licensed by the Ministry of Natural Resources) resulted in the formation of these ponds, herein referred to as the 'borrow pit ponds' or 'BPP1 and BPP2'. The north ditch along Warner Bay Road drains into BPP2. Discharge water from BPP2 discharges via a drainage ditch that connects to the south drainage ditch of Warner Bay Road and flows towards Lake Huron.

8.2.2. Site Stormwater Drainage System

According to the PDO, stormwater drainage was generally characterized by sheet flow in a south/southwesterly direction prior to site development. However, in 1993/1994 drainage improvements were made to enable landfill operations to take place in Areas B and C, and to relocate an existing ditch system away from the toe of the landfill footprint.

Currently, drainage from the landfill area is directed to a ditch system constructed to the south of the landfill footprint (Figure 8). When this drainage system was constructed, stormwater flow into this area was mixed with regional flow from the northeast. However, with consultation from the MECP and consistent with the Approval for stormwater management, regional surface water drainage from the northeast has been redirected to the southeast along McArthur Road. Run-off from the landfill area is directed to the south towards Warner Bay Road, which is located 400 m from the southern limit of the landfill footprint. It then mixes with water from the northern ditch and discharges to the Borrow Pit Pond (BPP2).

8.2.3. Municipal Sewage Works Approval No. 5854-7DSSDD

On July 11, 2008, an Approval for Municipal Sewage Works (i.e., CofA No.5854-7DSSDD) was issued for the stormwater management works for the site. The drainage area of the stormwater management works consists of 10.2-ha, which includes the landfill area, the stump disposal area, and an additional 4.67-ha for access roads and the recycling area. As part of the CofA, several modifications to the existing drainage system were required, which are described in the 'Surface Water Management Report, St. Edmunds Landfill Site, Municipality of Northern Bruce Peninsula' (G&M, August 2007). Construction of these modifications to the stormwater management works was completed in about 2011.

9. MONITORING REQUIREMENTS

9.1. Monitoring Locations

9.1.1. Groundwater

Groundwater and surface water quality monitoring has been completed at the site since 1988. In recent years the sampling program has consisted of sampling twice annually, in the spring and the fall, from 11 overburden monitoring locations including wells O-1, O-2, O-3, O-4, O-6, O-7, O-8, O-9, W-1, W-2, and W-3/03, and from seven bedrock monitoring points at five different locations, including wells B-2, B-3, B-4 and B-5, and the bedrock piezometer nest (i.e. P-1, P-2, and P-3). During the reporting period, samples could not be collected from P-1 or P-2 due to the presence of an obstruction. Further efforts to re-establish these monitoring locations will be made in 2025.

It is noted that monitoring wells B-1 and O-5 have not been sampled since 1998 and 1993, respectively, and are assumed to be destroyed. There are no plans to replace these wells as the existing monitoring network continues to sufficiently monitor site compliance.

9.1.2. Surface Water

While surface water quality monitoring was first completed at the Site in 1988 (i.e., SW-1 only), a more comprehensive sampling program was initiated in 1995. Currently, surface water quality monitoring is completed at five (5) locations to support the requirements of the Approvals for both Waste Disposal and Stormwater Management. The surface water sampling program for the Site includes the following:

S-1: Located in the external drainage ditch east of the landfill footprint. Representative of background surface water flowing from McArthur Road.

S-6: Located in the stormwater management pond immediately southwest of the landfill footprint. Representative of surface water directly downgradient of the landfill.

S-6A: Located downstream of the confluence of ditches draining surface water from the stormwater management pond and McArthur Road. Representative of surface water downgradient of the landfill after mixing with background water.

S-8: Located in the north ditch prior to discharging into the borrow pit pond (i.e. BPP2).

S-9: Located in the outlet creek west of BPP2. Represents surface water discharging from the site.

It is noted that surface water sampling from S-1, S-6 and S-9 is required under the CofA for Municipal Sewage Works. The additional locations are sampled to support the assessment of potential impacts and attenuation at the site. Surface water sampling locations are presented on Figure 2 and Figure 8.

9.2. Monitoring Program

Water quality monitoring at the Site has been completed since 1988. The current monitoring program frequency of twice annual sampling in the spring and fall was initiated in 2006. The sampling program currently consists of sampling from eleven (11) shallow overburden wells, seven (7) bedrock monitoring locations and five (5) surface water sampling locations and is summarized as follows:

Table 9-1. Water Quality Monitoring Program

SAMPLING LOCATIONS			ANALYTICAL PARAMETERS
GROUNDWATER (Spring and Fall)			
O-1 *O-2* O-3 O-4	O-6 *O-7* O-8 O-9	W-1 W-2 W-3/03	Alkalinity, Hardness, Conductivity, pH, Ammonia, Nitrate, Nitrite, DOC, Chloride, Sulphate, Iron, Sodium and Potassium Calcium and Magnesium Leachate Indicator Parameter Additions: Boron *Leachate wells* (as of 2020) Spring: Same as the indicator list outlined above Fall: Schedule 5: Column 1 (i.e., Comprehensive list for groundwater and leachate) which includes field parameters (i.e., pH and Conductivity)
B2 B3 B4 B5	P1 P2 P3		
SURFACE WATER (Spring and Fall)			
S-1 S-6 S-6A S-8 S-9			Alkalinity, Hardness, Conductivity, pH, Total Ammonia, Nitrate, Nitrite, TKN, DOC, CBOD ₅ , Chloride, Sulphate, Phenols, Total Phosphorus, Iron, Boron and Zinc (Na, K, Ca, and Mg *) Field Parameters: pH, Conductivity, and Temperature

It is noted that to address the MECP comments outlined in correspondence dated February 12th, 2019, a revised sampling program was proposed. The sampling program provided herein reflects MECP recommendations. Correspondence is included in Appendix B.

9.3. Sampling Procedures

For the groundwater sampling, the static groundwater level and well depth are measured in each monitoring well prior to purging three casing volumes of stagnant water from each well. Field personnel also check to ensure that all monitoring wells are properly secured and in compliance with O.Reg.903. After purging, monitoring wells are allowed to recharge with fresh groundwater before sampling occurs. Groundwater purging and sampling is conducted using dedicated Waterra™ tubing and inertial-type pumps. Samples are collected in laboratory supplied containers and are kept chilled following completion of the sampling program and sent within 24 hours of the sampling event to an accredited laboratory for analysis. Under the site-specific program, samples collected for indicator metals are placed in laboratory supplied containers without preservative and are filtered and preserved prior to analysis. Samples collected for metals under the comprehensive list are filtered in the field and placed in laboratory supplied containers with preservative.

Surface water samples are collected by submerging the appropriate sample container into the water body and removing the container when a sufficient volume of sample has been collected. During collection, contact with the bottom sediment is avoided to prevent stirring-up sediment. When collecting surface water samples, direct dipping of the sample bottle is acceptable unless the bottle contains preservative. For those samples requiring preservative, a clean unpreserved bottle is used to obtain the sample, which is then transferred into the appropriate preserved bottle. The temperature, conductivity and pH of the surface water is measured with a YSI multi-parameter field meter and recorded at the time of sampling.

The groundwater and surface water samples are kept chilled following completion of the sampling program and sent within 24 hours of the sampling event to the accredited laboratory for analysis. Copies of the 2024 laboratory analytical reports are provided in Appendix F.

10. DETERMINATION OF REASONABLE USE CRITERIA FOR THE SITE

10.1. Determination of Action Levels

MECP Guideline B-7 establishes the basis for determining what constitutes the reasonable use of groundwater on properties adjacent to landfill sites. This approach uses both the provincial maximum concentrations identified in the Ontario Drinking Water Standards (ODWS), revised June 2006, and the site-specific background values, to calculate acceptable concentrations at the Site boundary. By applying the RUC, the potential use of groundwater for domestic consumption will almost always provide the lowest allowable concentration limits, referred to as the objective levels. MECP Procedure B-7-1 provides technical details for the application of the reasonable use approach. A change in the quality of groundwater on an adjacent property, where the reasonable use is determined to be for drinking water, will be acceptable only where:

- i. Quality is not degraded by more than 50% of the difference between background concentrations and the Ontario Drinking Water Standards for non-health related parameters, and
- ii. Quality is not degraded by more than 25% of the difference between background concentrations and the Ontario Drinking Water Standards for health-related parameters.

Background concentrations are considered to be the quality of the groundwater prior to any contamination from landfill activities.

10.2. Background Water Quality

Background concentrations are the site-specific values that represent the quality of groundwater prior to any contamination from landfill activities. The background water quality was determined using data from overburden monitoring well O-1 and bedrock well B5, which are located cross-gradient from the landfill, where shown on Figure 4 and Figure 5. Groundwater quality results collected from these monitoring locations between 1988 and November 2017, provided in Appendix G, were used to calculate the average and 95th-percentile background concentrations for each indicator parameter to aid in the determination of RUC values for groundwater in the shallow overburden and the bedrock. The 95th-percentile concentration was used to reflect the RUC background concentrations for parameters with background concentrations that exceed the ODWS, including hardness. The background concentration ranges, averages, and resulting RUC values (i.e., objective levels) for the indicator parameters monitored at the Site are summarized in Table 2 and Table 3.

Overburden

In the past, monitoring location O-7 was used to assess the background concentrations in shallow groundwater at the Site. However, due to the elevated and highly variable concentrations of sulphate and hardness, a re-assessment of the background water quality was completed in 2017 using monitoring location O-1. Monitoring well O-1 is situated approximately 65 m west of the western corner of the landfill footprint and approximately 210 m from the northern property boundary.

Based on the analytical data for well O-1, the shallow background groundwater chemistry for the Site can generally be described as having low concentrations of chloride, typically less than 15 mg/L, a slightly basic pH of approximately 8.0, and an average conductivity in the range 590 $\mu\text{S}/\text{cm}$. The average hardness and alkalinity concentrations are approximately 330 mg/L and 325 mg/L, respectively, which is representative of a carbonate-rich groundwater system. Consideration should continue to be given to the different variables that may influence the overall geochemical characteristics of the groundwater which result in a natural variability in background groundwater quality across the Site.

As demonstrated by the historical water quality results and trends noted at well O-1, the background groundwater quality shows naturally elevated hardness and sulphate concentrations, and elevated conductivity. While the concentrations of other parameters remain relatively stable, the conductivity and the concentrations of sulphate and hardness are highly variable and are typically greater in the fall. These parameter-specific fluctuations are interpreted to be the result of the shallow nature of the overburden wells that may consequently be influenced, to some degree, by 'widespread' surface water infiltration during precipitation events and/or the influence of the finer grained silty soils on the groundwater quality downgradient of the landfill. Based on this assessment, conductivity, hardness, and sulphate alone are not considered good leachate indicator parameters at the St. Edmunds landfill site. This is discussed in more detail in the following Sections of this Report.

Bedrock

The background groundwater quality within the bedrock unit was determined using data collected from well B5 during the period up to and including 2017. This well is located approximately 30 m southeast of the landfill footprint. In general, the shallow background groundwater quality within the bedrock can be described as having low concentrations of chloride (i.e., less than 15 mg/L), a slightly basic pH in the range of 8.0, and conductivity typically in the range of 400 to 1,000 $\mu\text{S}/\text{cm}$. The average hardness and alkalinity concentrations are approximately 380 mg/L and 260 mg/L, respectively, which is representative of a carbonate-rich groundwater system.

It is noted that in the Fall of 2022, the chloride concentration at B5 spiked to 170 mg/L, exceeding the RUC of 130 mg/L, however, concentrations in 2023 returned to historical concentrations. Chloride concentrations again spiked in 2024, with concentrations measured to be 306 mg/L in the fall. Increased concentrations may be related to landfill operations occurring upgradient of this monitoring location.

10.3. Calculation of Objective Levels

Table 2 and Table 3 identify the concentrations of groundwater quality indicator parameters in overburden and bedrock, respectively, used for evaluating the acceptable level of contaminant concentrations at the site boundary. Background concentrations (Cb) are the site-specific values (discussed in the previous section). The provincial maximum concentrations (Cr) are identified in the Technical Support Document for Ontario Drinking Water Standards Objectives and Guidelines (June 2006), referred to herein as the ODWS. Acceptable concentrations at the site boundary (Cm), referred to as the Reasonable Use Criteria (RUC), are calculated from MECP Procedure B-7-1 using the following formula.

$$C_m = C_b + x(C_r - C_b)$$

Where:

Cm = Maximum concentration acceptable in groundwater beneath an adjacent property.

Cb = Background concentration.

Cr = Maximum concentration that should be present in groundwater for domestic consumption according to the ODWS.

X = 0.5 for non-health related parameters (AO/OG) and 0.25 for health-related parameters (MAC & IMAC).

AO = Aesthetic Objective

OG = Operational Guideline

(I)MAC = (Interim) Maximum Acceptable Concentration, Parameters Related to Health

It should be noted that if background concentrations exceed the ODWS, the objective level is set at the background concentration, as outlined by Procedure B-7-1. A summary of the 2024 analytical results, compared to the RUC and ODWS, is provided in Table 4 and Table 6.

To determine if leachate is impacting groundwater, individual indicator parameters were evaluated in conjunction with other indicator parameters and concentration trends. Wells with elevated and stable concentrations of the identified naturally elevated constituents, that show no increases in other leachate indicator parameters, are deemed un-impacted by landfill leachate. Additionally, comparison of known leachate impacted groundwater is compared to the groundwater chemistry at locations with naturally elevated concentrations to determine if leachate contributes to the elevated concentrations measured.

10.4. Surface Water – Provincial Water Quality Objectives

The purpose of surface water quality management at the Site is to achieve the requirements established in the Provincial Water Quality Objectives (PWQO) set out by the MECP. The PWQO were established to ensure that surface waters are of a quality, which is satisfactory for aquatic life and recreation. Areas that have water quality surpassing the PWQO requirements are to be maintained at or above the applicable objectives. Areas that have water quality that does not presently meet the PWQO are not to be degraded any further and are to be upgraded if practical. The 2024 surface water quality results compared to the PWQO are presented in Table 7.

For the evaluation of surface water quality at the St. Edmunds landfill site, consideration is given to the site-specific conditions within the local sub-watershed. Therefore, water quality at the site is monitored at a background location (i.e., S-1) to characterize the surface water quality entering the Site, prior to potential impacts from landfill leachate. Based on a review of the analytical data, the background surface water can be characterized as having low levels of nutrients and metals and average concentrations of conductivity, hardness, and alkalinity of approximately 615 µS/cm, 310 mg/L and 255 mg/L, respectively. In general, chloride concentrations at this location have historically ranged between 1.7 mg/L and 60 mg/L. Elevated chloride concentrations are likely due to road salting activities along McArthur Road.

11. MONITORING RESULTS AND DISCUSSION

11.1. Leachate Generation

Leachate is produced when surface water percolates down through refuse resulting in impacted water that has the potential to migrate along the surface or in the ground. Landfill derived leachate that enters into the groundwater is often attenuated by natural mechanisms along the water migration pathway. The attenuation of leachate can occur by dilution, biologic activity, and geochemical mechanisms.

To determine the presence of potential impacts from leachate, several indicator parameters are monitored, and a trend analysis is conducted to determine changes in water quality over time. The following sections discuss the potential impacts to groundwater and surface water, with a focus on the water quality crossing the property boundaries and compliance with the RUC and PWQO. The results of the most recent groundwater monitoring and compliance with the RUC are provided in Table 4 and Table 6. The results of the most recent surface water quality monitoring and compliance with the PWQO are summarized in Table 7. Historical groundwater and surface water sampling results and graphical trends of indicator parameters are included in Appendix G and H, respectively.

11.2. Leachate Characterization

Leachate production is typically greatest directly beneath the landfill and at the perimeter of the landfilled area. Wells O-2 and O-6 are located at the downgradient edge of the landfill footprint and are within 25 meters of one another. As would be expected due to the proximity of well O-2 to the fill area, this monitoring location has historically shown the greatest influence from landfill leachate. However, it is noted that although well O-6 is also situated within close proximity to the landfill footprint, the magnitude of impacts has historically been significantly less at this location when compared to O-2.

Based on a review of the borehole logs, the difference in the magnitude of impacts historically noted between O-2 and O-6 is likely attributable to the differing geologic conditions of the two wells. Borehole logs show that well O-2 is reportedly screened in a fine to medium sand with occasional stones, while well O-6 is reportedly screened in a sandy silt till with some clay. Based on these conditions, it is reasonable to expect that preferential groundwater flow and leachate migration would be through the coarser soils where O-2 is located. As a result, the groundwater at O-2 has historically been most impacted by leachate and is considered a leachate characterization well.

As is typical for leachate-impacted groundwater, relative to background concentrations, groundwater at O-2 has consistently been noted to have high conductivity, averaging approximately 1,800 $\mu\text{S}/\text{cm}$, and elevated concentrations of hardness, alkalinity, chloride, sodium, potassium, ammonia, and DOC. Furthermore, in contrast to several of these indicator parameters, concentrations of alkalinity and potassium appear to be solely influenced by landfill leachate-derived impacts. As a result, while hardness, alkalinity, chloride, sodium, potassium, ammonia, and DOC are all considered to be primary leachate indicator parameters for the Site, alkalinity and potassium are considered key leachate indicators. The concentrations of chloride, potassium, and alkalinity for 2024 are presented on Figure 7.

Since about 2023, leachate indicator parameter concentrations at O-2 have decreased significantly. This likely reflects the transition of the active area of the site to the northerly portion of the landfill footprint, providing for a greater separation distance between this monitoring location and operations. In 2024, RUC exceedances were noted for hardness, alkalinity, and DOC. While exceedances of iron are periodically reported, iron concentrations do not appear to directly correlate with the degree of leachate influence, as indicated by other more prominent leachate indicators. Therefore, iron concentrations in the shallow groundwater are interpreted to be naturally occurring and are not considered to reflect leachate influence and/or strength. In addition, it is noted that nitrate,

nitrite, and sulphate concentrations did not historically increase at this monitoring location along with other leachate indicator parameters, suggesting that these parameters are not indicators of landfill-leachate derived impacts at the Site.

Recommended Revisions to the Monitoring Program

In response to MECP comments provided in correspondence dated February 12th, 2019, the list of required parameters for wells O-2 and O-7 was revised to be based on the parameters listed in Schedule 5: Column 1 (i.e., comprehensive list for groundwater and leachate) during the fall monitoring event. Groundwater quality results are summarized in Table 5. Based on a review of the monitoring results from the supplemental sampling completed, and as per MECP recommendations (correspondence dated August 12, 2022), it is thought that the addition of boron as a leachate-indicator parameter to the established monitoring program may be beneficial. This recommendation is reflected in the updated monitoring program presented in Section 15 of this report.

11.3. Groundwater Migration and Compliance Assessment

11.3.1. Cross-gradient (Northeast)

The northeastern property boundary, along McArthur Road, is upgradient from the landfill. As shown on Figure 2, the approved landfill footprint is located approximately 175 m southwest of McArthur Road. Based on the distance to the northeastern property boundary and the groundwater flow direction, generally to the south-southwest (Figure 4), off-site impacts related to landfill leachate are not anticipated at the northeastern compliance limit.

Compliance Well W-1

Well W-1 is located approximately 225 m east of the landfill and 10 m west of McArthur Road and could be considered to be a background well based on its location. However, when compared to background well O-1, there was a more limited data set available as this well could not be sampled between 2004 and 2012 due to insufficient water. In 2012, sediment was successfully removed from the well, which was contributing to the difficulty of obtaining a sample from this location. As would be expected, the groundwater quality reported for this monitoring location is generally similar to background. Consistent with historical results, RUC exceedances are reported for DOC, with RUC exceedances for iron occurring periodically. These are interpreted to be naturally occurring.

Monitoring Well O-7

Monitoring well O-7 is located approximately 30 meters cross-gradient and to the east of the landfill footprint. As previously discussed, historical water quality results suggest that groundwater quality at the site can be influenced by different variables that may influence the overall geochemical characteristics of the groundwater.

Available data from well O-7 suggests that the groundwater quality in the shallow overburden is highly variable with respect to conductivity, hardness, and sulphate concentrations (refer to trend graph provided in Appendix G). At well O-7, conductivity, hardness, and sulphate concentrations have generally ranged between 380 and 2,500 $\mu\text{S}/\text{cm}$, 170 and 1,900 mg/L, and 10 and 1,520 mg/L, respectively. Other leachate indicator parameters remain relatively stable and similar to background, including chloride, potassium, and alkalinity. Therefore, conductivity, hardness and sulphate alone are not considered good leachate indicator parameters at the St. Edmunds landfill site.

Based on a review of historic analytical data, it appears that the elevated concentrations of conductivity, hardness and sulphate may be due to the natural mineralogy of the parent material from which the soils were derived. Based on the ratios of dissolved calcium and magnesium to sulphate in groundwater, it is estimated that the dissolution of gypsum and/or anhydrite minerals are the primary contributing factor to these naturally elevated concentrations. The occurrence of these evaporate minerals is relatively common in the bedrock of the area. The elevated hardness and conductivity appear to be a direct result of the dissolved calcium, magnesium, and sulphate ions.

11.3.2. Cross-gradient (East)

The eastern limit of the approved landfill footprint is situated greater than 400 meters from the compliance limit to the east towards the intersection of MacArthur Road and Warner Bay Road. Groundwater quality is monitored at overburden monitoring wells W-2 and O-8, which are located approximately 75 m cross-gradient and to the east of the landfill. The well depths are reported to be approximately 2.5 m and 1.4 m below ground surface, respectively.

In recent years, the groundwater quality at these two shallow overburden monitoring locations has exhibited similar groundwater quality results and trends. The concentrations of naturally elevated parameters, including hardness and sulphate, when apparent, are generally greater in the fall. Concentrations of primary leachate indicator parameters are similar to background indicating that leachate impacts are not occurring within the shallow overburden in this area of the Site.

At well O-8, RUC exceedances are typically noted for DOC, however in the absence of other leachate indicators, the slightly elevated DOC concentrations at this location are considered to be naturally occurring. In the fall of 2024, slight RUC exceedances for alkalinity were also noted at O-8 and W-2.

11.3.3. Downgradient (South to Southeast)

Overburden Wells – Downgradient from Landfill

Wells W-3/O3, O-3 and O-4 are located between 50 to 75 m downgradient of the landfill and, based on the south to southwesterly groundwater flow direction, are inferred to intersect groundwater flow from the landfilled area. In general, the groundwater quality at these monitoring locations is noted to be geochemically similar to that noted at well O-7, as indicated by the elevated sulphate and hardness concentrations and associated concentration trends. These are considered to be naturally occurring at the Site.

With respect to potential impacts from the landfill, groundwater quality results indicate that a similar suite of leachate indicator parameters exists at both W-3/O3 and O-3. However, consistent with their location further downgradient from the landfill than leachate well O-2, concentrations have historically been lower and, more recently, similar to those reported at O-2, exhibiting minor leachate influence (Table 4). A generally stable concentration trend for leachate-indicator parameters has typically been exhibited at both locations, however a slightly increasing concentration trend has more recently been noted at well O-3. In conjunction with increased alkalinity at wells W-3/O3 and O-3, typically in the range of 300 mg/L to 700 mg/L, chloride concentrations have averaged 28 mg/L and 19 mg/L and potassium concentrations have averaged 13.6 mg/L and 5.5 mg/L, respectively. Similar to well O-2, RUC exceedances for hardness, alkalinity, DOC, and periodically iron, are often noted.

Consistent with the limited impacts noted at well O-6, and the additional separation distance of greater than 50 meters from the landfill footprint, the shallow groundwater further downgradient from well O-6 at well O-4 generally does not exhibit impacts from landfill leachate. This suggests that leachate-impacted groundwater has naturally attenuated between these two monitoring locations.

In summary, it appears that leachate impacted groundwater is having minor influence at O-3 and W-3/O3, and a minimal to negligible influence at well O-4. Based on the degree of leachate influence and the downgradient distance to the compliance limits to the southeast and southwest of the landfill (i.e., over 500 m), off-site impacts are not anticipated in the shallow overburden.

Bedrock Wells

The bedrock wells considered to be downgradient of the landfill include wells B2, B3 and B4. Wells B2 and B4 are located directly southwest and southeast of the landfill, respectively, and well B-3 is located approximately 100 m to the south. In general, the background groundwater quality at these locations is influenced by the naturally

elevated sulphate and hardness concentrations. In closer proximity to the landfill the sulphate concentrations are generally less, averaging approximately 50 mg/L directly downgradient of the landfill, and averaging approximately 1,000 mg/L further downgradient at well B3.

Bedrock well B2 is located adjacent to leachate well O-2. Based on the water level elevations (Appendix E), a downward hydraulic gradient is apparent at this location and generally exists in the vicinity of the landfill footprint (Figure 4 and Figure 5). While leachate impacts have been evident in overburden well O-2, the magnitude of impacts noted at depth within the bedrock, is minimal. Average chloride concentrations are reported to be in the range of 13 mg/L and 28 mg/L at wells B2 and B4, respectively, and concentrations of other leachate indicators suggest limited to minor impacts to the bedrock unit directly downgradient of the landfill. Since 2023, chloride concentrations noted at well B4 show an increasing trend with concentrations reported to be greater than 100 mg/L in 2024. Consistent with historical results, in 2024 RUC exceedances for DOC were noted at wells B2, B3 and B4.

Further downgradient at bedrock well B3, the combination of chloride, alkalinity, and potassium concentrations, which are all slightly elevated, suggests minor leachate impacts at depth. A review of key leachate indicator parameter trends suggests that a relatively stable concentration trend exists at this time. In 2024, RUC exceedances noted at well B3 included hardness, alkalinity, sulphate, and iron of which alkalinity and, in part, hardness may be considered to be related to landfill leachate-derived impacts.

In general, it appears that landfill leachate may be having minimal impacts to groundwater at well B2, with impacts more recently apparent at bedrock well B4. Minor leachate influence is evident at well B3, which is located approximately 100 meters downgradient of the landfill footprint. Based on the water quality results and the distance to the compliance limit to the southeast of greater than 500 m, off-site impacts via groundwater migration through the bedrock are not anticipated.

11.3.4. Cross-gradient (West)

Groundwater quality cross-gradient and to the west of the landfill is monitored at two overburden wells (well O-1 and O-9) and a bedrock piezometer nest (P1, P2, and P3). Monitoring well O-1, which is considered the background well for the Site, is situated approximately 65 m west of the western corner of the landfill footprint. Well O-9 is located approximately 180 m to the southwest of the landfill and approximately 350 m from the compliance limit to the southwest. Piezometers P1, P2 and P3 are situated approximately 50 m west of the landfill and greater than 200 m from the property boundary to the northwest.

Overburden Well

Monitoring well O-9 is located in a low-lying wet 'swampy' area to the southwest of the landfill. With the exception of sulphate and DOC concentrations, which are elevated at O-9 relative to that in background well O-1, the water quality at O-9 is similar to background and does not exhibit leachate impacts. The high DOC concentrations at this location are attributed to the characteristically nutrient-rich and organic swampy area in the vicinity of well O-9. Historically, DOC concentrations have been highest at this monitoring location with concentrations consistently exceeding the RUC.

Piezometer Nest

Groundwater levels measured at the bedrock piezometer nest, P3 (shallow), P1 (intermediate) and P2 (deep) suggest that a downward hydraulic gradient exists at this location. In general, groundwater quality at these piezometers is similar to the background well B5. However, consistent with the absence of elevated sulphate and hardness concentrations in the overburden wells in this area of the Site (i.e., O-1), these parameter concentrations do not appear to be naturally elevated in this area.

Chloride concentrations have fluctuated over time and most recently were reported to be in the range of 20 to 55 mg/L in wells P1 and P2. Based on the location of the piezometer nest (next to the access road and potentially downgradient of former excess snow storage areas), the chloride response appears to be related to road salt and/or the periodic application of dust suppressant along the access road in the summer and fall. Overall, chloride concentrations may decrease over time due to limited road salt associated with the construction of a transfer station at the site entrance (limiting winter road maintenance requirements to active area) and the suspension of excess snow storage practices at the landfill site. However, it is noted that the periodic application of dust suppressant along this access road in the summer and fall may continue to influence the groundwater quality to some degree.

11.4. Groundwater Quality Summary

Groundwater quality at the site can be divided into five different categories, each representing different geochemical characteristics and potential influences. This is likely due to the shallow nature of the overburden wells that may consequently be influenced, to some degree, by the infiltration of surface water across the site during periods of precipitation. Some wells exhibit the combined influence from two or more of these categories. The groundwater at the site can be classified as follows:

Table 11-1. Groundwater Quality Summary - Categorization

Category	Defining Feature	Potential Source	Well No's
1	'Normal'	Concentrations within range, typically observed in the area.	O-1 B2 B5
2	High sulphate, alkalinity, conductivity, and hardness	Likely associated with the native soils/bedrock and natural geochemistry.	O-3 O-4 O-7 W-2 B3
3	High DOC	Likely associated with groundwater derived from organic-rich swampy areas. DOC concentrations are similar to those measured in surface water.	O-8 O-9 W-1 W-3/03
4	Elevated chloride and hardness only	Elevated chloride concentrations. Other leachate indicator parameters are similar to background. May be associated with road salt and/or dust suppressant.	P1 P2 P3
5	Elevated chloride, potassium, hardness, and alkalinity.	Influenced by landfill derived leachate to varying degrees.	O-2 O-3 O-6 W-3/03 B2 B3 B4

As noted in the Table above, it appears that overburden wells O-2, O-3, O-6, and W-3/03 are being influenced by leachate. In addition, it appears that landfill leachate may be having minimal impacts to groundwater at bedrock well B2, with leachate influence more evident at wells B3 and B4. Bedrock well B3 is located approximately 100 meters downgradient of the landfill footprint.

Based on the location of these wells, it appears that the leachate plume is migrating in a southerly to southwesterly direction through the overburden soils and bedrock. It is noted that the degree of leachate influence in the wells

downgradient from O-2 and O-6 (i.e., O-3, W-3/03, and B3) is not considered to be significant at this time and is estimated to be limited to within 100 m of the landfill. Therefore, considering the level of attenuation and the distance between the surrounding property boundaries and the landfill footprint, off-site impacts above the RUC from landfill leachate are not anticipated.

12. SURFACE WATER QUALITY AND STORMWATER MANAGEMENT

12.1. Surface Water Quality

As per the CofA for the stormwater management facility, surface water quality samples are collected from a background monitoring location (S-1), from the stormwater management pond (S-6), and from the outlet creek west of Pond BPP2 (S-9). Monitoring location S-9 is representative of surface water discharging from the site. Two additional locations are sampled to support the assessment of potential impacts and attenuation at the site including S-8, which is collected from surface water flowing along Warner Bay Road in the north ditch, and S-6A which is located downgradient of S-6. Surface water sampling locations are shown on Figure 2 and Figure 8.

As would be expected due to the proximity of S-6 to the landfill footprint and consistent with the characteristics of the leachate-impacted groundwater, the surface water quality at this location exhibits elevated concentrations of hardness, alkalinity, chloride, sodium, potassium, and ammonia. Therefore, leachate impacts to surface water are apparent within the stormwater management pond.

Monitoring location S-6A is located downstream of the confluence of ditches draining surface water from the stormwater management pond (i.e., S-6) and McArthur Road (i.e., S-1) and is representative of surface water downgradient of the landfill after mixing with background surface water. As would be expected, while a similar suite of leachate indicator parameters is typically noted at this location, the magnitude of leachate impacts is, at times, less than that observed directly downgradient of the landfill (i.e., at S-6). This suggests that some dilution of the surface water from the stormwater management pond is periodically occurring.

Correspondence from the MECP dated June 21, 2018, requested clarification with respect to the source of leachate contamination at S-6/S-6A. As provided in a response issued to the MECP on July 3, 2018, the source of leachate is considered to be groundwater that is being intercepted by the perimeter swale constructed along the west side of the landfill. A more detailed discussion is provided in the following Section 12.2. Correspondence is included in Appendix B.

Consistent with historical results, phosphorus concentrations were noted to exceed the PWQO at monitoring location S-6 in the spring only (i.e., 0.05 mg/L) and at S-6A (0.04 mg/L), slightly exceeding the PWQO for phosphorus of 0.02 mg/L. However, it is noted that comparison to background concentrations at S-1 suggests that phosphorus concentrations of up to 0.06 mg/L have been measured in background surface water. Therefore, the periodic exceedance of the PWQO for phosphorus is not likely directly attributable to landfill leachate. PWQO exceedances for iron were reported at these locations in the fall. PWQO exceedances for boron are also commonly reported at these surface water sampling locations situated in closer proximity to the landfill and were reported in 2024.

Further downgradient, along Warner Bay Road, the surface water quality at S-8 and S-9 is similar to background and does not appear to be influenced by landfill leachate, suggesting that adequate attenuation of impacts to surface water is occurring before water is discharged from the Site. It is noted that in 2024, PWQO exceedances were noted for phenol and phosphorus at S-8 and S-9. Based on the leachate characteristics and the historical surface water quality at these locations, which show infrequent exceedances of various parameters (i.e., phosphorus, iron, and phenol), exceedances reported are not attributed to landfill-leachate derived impacts.

The surface water chemistry at S-6 and to a lesser degree at S-6A, situated immediately downgradient of the landfill area, indicates that impacts from landfill leachate are occurring within the stormwater management pond. However, based on the water quality noted at S-8 and S-9, the attenuation of the impacts from landfill leachate is occurring within the sewage works and before reaching potential sensitive receptors (i.e., Borrow Pit Pond BPP2).

12.2. Stormwater Management: Trigger Levels

As per Condition 5(2) of the Approval for the stormwater management facility, monitoring results for sampling location S-6 are to be compared to the trigger levels (as provided in the table below) to identify leachate contamination to stormwater.

Table 12-1. Trigger Parameters and Levels

Trigger Parameters Trigger Location: S-6 (SWM Pond)		
Parameter	Units	Trigger Level
Ammonia (Un-ionized)	mg/L	0.06
Chloride	mg/L	60
Conductivity	µS/cm	2,200

As per the requirements of the Approval, a “Stormwater Management Contingency and Remedial Action Plan” was completed by GMBP and submitted to the MECP in 2009, hereafter referred to as the Contingency Plan. The report describes the conditions (i.e., trigger levels and locations) under which contingency measures may be required and recommends the corresponding contingency and remedial action plans for the Site. The primary goal of the Contingency Plan is to provide a course of action in the event that the monitoring program indicates a potential for off-site impacts related to the production and migration of leachate.

It is noted that in 2011, exceedances of the trigger levels were reported for unionized ammonia and contingency measures were implemented including the following:

- i. A review of the potential for off-site impacts: This concluded that attenuation of the impacts from landfill leachate was occurring within the sewage works and before reaching potential sensitive receptors (i.e., Borrow Pit Pond BPP2).
- ii. A visual inspection for leachate seeps within the stormwater management works: This indicated that groundwater impacted with landfill leachate was discharging into the drainage ditch located west of the landfill in the vicinity of well O-2. As this drainage ditch appeared to have intersected the groundwater table, mitigative measures were undertaken in 2011 and 2012. These measures included raising the base grade of the drainage ditch with a low permeability soil to limit leachate seepage into the drainage ditch and planting of cattails (i.e., *Typha* spp.) at the outlet of the ditch.

Since 2013, the cattails have become more established and the surface water within the pond has been observed to be much clearer relative to previous years. The reported ammonia concentrations continue to exhibit improvement relative to pre-2012 conditions. Since 2014, un-ionized ammonia concentrations have ranged between 0.002 and 0.03 mg/L, remaining below the trigger level of 0.06 mg/L. It is anticipated that concentrations of un-ionized ammonia will continue to remain low as the vegetation has become well established within the drainage ditches and ponds. In addition, since 2019, chloride concentrations at S-6 have generally remained below the trigger level of 60 mg/L. As previously discussed, surface water quality results suggest that adequate attenuation of impacts from landfill leachate is occurring within the sewage works and prior to reaching potential sensitive receptors (i.e., Borrow Pit Pond BPP2).

12.3. Review of Surface Water Monitoring Network and Trigger Levels

As noted in the Contingency Plan, the trigger levels established for the Site were intended to provide an indicator of when potential impacts outside the sewage works may occur. Trigger levels were estimated based on the analytical results from S-6 that were available at that time (i.e., 2009) and prior to the modifications of the stormwater works. As a result, it was noted that due to the limited data available, particularly for ammonia, and the change in the condition associated with the trigger location, the trigger levels could only be estimated. Consequently, it was recognized that the trigger levels may need to be adjusted as performance data for the stormwater works became available.

This was recognized in the CofA under Condition 5(5), which allows for the trigger levels and parameters to be updated after two years of monitoring (with permission from the MECP District Manager). Based on the modifications made to the sewage works in 2012/2013, it is recommended that the water quality within the sewage works continue to be closely monitored. At this time, it is recognized that attenuation of impacts is being achieved in the sewage works. In MECP correspondence dated December 14, 2021, it was recognized that continued sampling prior to the finalization of trigger levels would be reasonable.

Further, the mitigative measures previously implemented have improved surface water quality at trigger location S-6. However, as previously noted, leachate influence continues to be present at this location. The surface water quality at S-6 and the vegetative state of the ditches and surface water pond will continue to be closely monitored as it is anticipated that surface water quality may continue to improve as vegetation becomes more established. It should be noted that based on the location of S-6 in relation to the landfill, it is anticipated that a level of leachate influence will continue to persist at this location.

13. METHANE GAS PRODUCTION

Landfill gas is primarily produced by the bacterial decomposition of organic materials after the capping and closure of a landfill has been completed and is combustible if it accumulates to concentrations greater than the lower explosive limit (LEL). Landfill gas tends to migrate laterally from the landfill area when the gas is unable to escape vertically through the ground surface via dry relatively permeable soils, commonly due to an overlying low permeability geologic stratum or when the ground surface is frozen.

Soils in the vicinity of the St. Edmunds landfill site are limited in thickness (i.e., less than 3.7 meters) and have a moderate to high permeability that would permit the venting of gases to the atmosphere, greatly reducing the potential for lateral migration of landfill gas. In addition, the landfill is primarily constructed above grade and the vadose zone around the perimeter of the waste is relatively thin, limiting the potential pathway for methane gas migration. Therefore, at the St. Edmunds Landfill site methane gas is vented passively to the surrounding atmosphere. It is further noted that the closest receptor of methane gas is located greater than 500 m from the Site and the re-use storage building and operator weigh scale building are both sufficiently separated from the landfill footprint.

In summary, due to the existence of a thin vadose zone and the moderately permeable overburden soils, combined with the distance of the landfill from the site boundaries and any structures, the generation and migration of landfill gas at the site is not considered to be of concern at the Site.

14. CONCLUSIONS

Presented below is a summary of conclusions for the landfill operations, recycling programs, and environmental monitoring for the year 2024.

1. Based on the annual topographical surveys of the active area, it is estimated that a volume of 2,095 m³ was used during the reporting period. The remaining capacity for waste and daily cover is estimated to be about 3,600 m³.
2. The average fill rate over the last five years is approximately 2,180 m³/yr. At the five-year average fill rate, the remaining site life is estimated to be approximately 1.5 to 2 years.
3. In 2024, an estimated 342 tonnes of material were diverted from the St. Edmunds landfill through Municipal programs.
4. Different variables influence the overall geochemical characteristics of the groundwater resulting in a natural variability in background groundwater quality across the Site. This is demonstrated by the historical water quality results and trends noted at well O-7, which shows naturally elevated hardness and sulphate concentrations, and elevated conductivity.
5. It is noted that the groundwater quality at the site, particularly in the overburden, fluctuates to a significant degree. This appears to be directly related to seasonal variations where parameters are typically higher in the fall and lower in the spring. Lower concentrations in the spring are likely due to the higher proportion of surface water infiltration (i.e., snow melt and rain) resulting in a level of dilution.
6. It appears that past road salt usage and/or excess snow storage at the site may have historically influenced chloride concentrations at a number of bedrock monitoring locations at the site. Parameters including chloride and hardness in select bedrock wells continue to appear to be influenced by site operations (i.e., the application of road salt and/or dust suppressant on access roads).
7. DOC concentrations are noted to be generally elevated at monitoring wells located in organic rich swampy areas.
8. Due to the variability in groundwater chemistry at the site, various leachate indicators that are normally used to assess leachate migration are not considered to be reliable. Based on the site-specific scenario, the key leachate indicators for groundwater are found to be alkalinity and potassium. Although chloride concentrations can be influenced by other factors, such as road salt and dust suppressants, chloride is also considered to be a reliable indicator of leachate when assessed in conjunction with other leachate indicator parameters.
9. Based on the analytical results for groundwater, it appears that the leachate plume is migrating in a southerly to southwesterly direction through the overburden soils and bedrock. It is noted that the degree of leachate influence in the downgradient wells is not considered to be significant at this time. Considering the level of attenuation being demonstrated in the groundwater and the distance between the surrounding property boundaries and the landfill footprint, offsite impacts from leachate are not anticipated.
10. Based on the analytical results for surface water, it appears that influence from leachate continues to occur at S-6. However, water quality has improved at these locations following the mitigation efforts undertaken in 2011 and 2012. The surface water chemistry at S-8 and S-9, located downstream of S-6, is similar to background conditions and does not exhibit influence from leachate. Therefore, attenuation of leachate impacted surface water appears to be occurring onsite within the sewage works and prior to entering sensitive surface water receptors.

15. RECOMMENDATIONS

Based on the findings of this report and the Conditions of the Approvals, the following recommendations are provided:

1. The Municipality continues to employ the area ramp method to achieve optimal compaction and reduce litter.
2. Given that Area B has reached capacity and clay capping has been completed, it is recommended that the application of topsoil and seed be completed to provide protection of the cover material from erosion, promote evapotranspiration, and enhance the site aesthetics.
3. In consideration of the limited remaining capacity, a comprehensive survey of the entire landfill footprint was completed in 2023 to provide an updated and more accurate assessment of the remaining site life. The survey data was used in conjunction with the approved final contours outlined in the PDO (which account for waste and interim cover) to confirm the remaining airspace capacity and site life. Based on the comprehensive survey, the St. Edmunds landfill site had a remaining capacity of 5,700 m³ at the end of 2023. Although not required by the Approval, it is recommended that a Closure Plan be completed for submission to the MECP in 2025.
4. Cover material be applied on regular basis to inhibit leachate generation and prevent litter and scavenging.
5. Based on previous revisions, it is recommended that the monitoring program for 2024 include the locations and parameters outlined in Table 15-1.

Table 15-1. Recommended Monitoring Program (2025)

SAMPLING LOCATIONS			ANALYTICAL PARAMETERS
GROUNDWATER (Spring and Fall)			
O-1 *O-2* O-3 O-4	O-6 *O-7* O-8 O-9	W-1 W-2 W-3/03	Alkalinity, Hardness, Conductivity, pH, Ammonia, Nitrate, Nitrite, DOC, Chloride, Sulphate, Iron, Sodium and Potassium Calcium and Magnesium Leachate Indicator Parameter Addition: Boron *Leachate wells* (as of 2020) Spring: Same as the indicator list outlined above Fall: Schedule 5: Column 1 (i.e., Comprehensive list for groundwater and leachate) which includes field parameters (i.e., pH and Conductivity)
B2 B3 B4 B5	P1 P2 P3		
SURFACE WATER (Spring and Fall)			
S-1 S-6 S-6A S-8 S-9			Alkalinity, Hardness, Conductivity, pH, Total Ammonia, Nitrate, Nitrite, TKN, DOC, CBOD ₅ , Chloride, Sulphate, Phenols, Total Phosphorus, Iron, Boron and Zinc (Na, K, Ca, and Mg) Field Parameters: pH, Conductivity, and Temperature

6. Groundwater level elevations should continue to be monitored in the spring and fall from all monitoring locations.
7. Under Condition 5(5) of the Approval for Municipal Sewage Works, the trigger levels and parameters may be updated with approval from the MECP District Manager. Based on the modifications made to the sewage works in 2012/2013, it is recommended that the water quality within the sewage works continue to be closely monitored. At this time, it is recognized that attenuation of impacts continues to be achieved in the sewage works.

Tables

Table 1: Landfill Volume Capacity

Table 2: Site Specific Background & Guideline B-7-1 RUC Determination (Overburden)

Table 3: Site Specific Background & Guideline B-7-1 RUC Determination (Bedrock)

Table 4: Overburden Groundwater Quality Summary - 2024

Table 5: Leachate Characterization

Table 6: Bedrock Groundwater Quality Summary - 2024

Table 7: Summary of Surface Water Quality Results - 2024

TABLE 1
LANDFILL VOLUME CAPACITY (m³)

	2019	2020	2021	2022	2023	2024
<u>Total Approved Capacity</u>						
Total Capacity for Waste and Daily Cover	141,100	141,100	141,100	141,100	141,100	141,100
Total Capacity for Topsoil	3,510	3,510	3,510	3,510	3,510	3,510
Total Capacity for Final Cover	21,020	21,020	21,020	21,020	21,020	21,020
Total Air Space Capacity	165,630	165,630	165,630	165,630	165,630	165,630
<u>Capacity Used During Year</u>						
Capacity Used for Waste and Daily Cover	820	1,750	1,750	2,650	2,660	2,095
Volume of Topsoil Used	-	-	-	-	-	-
Capacity Used for Final Cover	-	-	-	-	-	-
Total Capacity Used	820	1,750	1,750	2,650	2,660	2,095
<u>Volume Filled at End of Year</u>						
Volume of Waste and Daily Cover	128,605	130,355	132,105	134,755	137,415	139,510
Volume of Topsoil	1,650	1,650	1,650	1,650	1,650	1,650
Volume of Final Cover	15,410	15,410	15,410	15,410	15,410	15,410
Total Volume Filled	145,665	147,415	149,165	151,815	154,475	156,570
<u>Remaining Capacity at End of Year</u>						
Capacity for Waste and Daily Cover	12,495	10,745	8,995	6,345	5700*	3,605
Capacity for Topsoil	1,860	1,860	1,860	1,860	1,860	1,860
Capacity for Final Cover	5,610	5,610	5,610	5,610	5,610	5,610
Total Remaining Capacity	19,965	18,215	16,465	13,815	13,170	13,170
<u>Remaining Site Life</u>						
At 5-Year Average Fill Rate (2180 m ³ /year)	5.7	4.9	4.1	2.9	2.6	1.7
At 5-Year Max Fill Rate (3,000 m ³ /year)	4.2	3.6	3.0	2.1	1.9	1.9

Notes:

1. Remaining capacity for the landfill is calculated using a volumetric comparison of the landfill area to final contours completed using elevation data from the fall of 2007 less annual fill volumes.
2. Annual fill volumes are calculated using elevations obtained from topographic surveys of the active landfill areas completed in the fall of each year.
3. In consideration of the limited remaining capacity, a comprehensive survey of the entire landfill footprint was completed in 2023 to provide an updated and more accurate assessment of the remaining site life. The survey data was used in conjunction with the approved final contours outlined in the PDO (which account for waste and interim cover) to confirm the remaining airspace capacity and site life. Based on the comprehensive survey, the St. Edmunds landfill site has a remaining capacity of 5,700 m³.

TABLE 2
SITE SPECIFIC BACKGROUND CONCENTRATIONS AND
GUIDELINE B-7-1 RUC DETERMINATION
OVERBURDEN GROUNDWATER

GROUNDWATER INDICATOR PARAMETERS ST. EDMUNDS LANDFILL SITE							
Parameter (mg/L)	ODWS Maximum Concentration and Classification		BACKGROUND CONCENTRATION			Average Background Concentration (Cb)	Objective Level (Cm)
			Overburden Well: O-1				
			Range [n]	Average	95th Percentile		
Conductivity (uS/cm)	NV	NV	335 - 1180 [38]	569	912	569	NV
pH (no units)	6.5 to 8.5	OG	7.73 - 8.41 [23]	8.03	8.32	8.03	6.5 to 8.5
Hardness*	80 to 100	OG	178 - 664 [39]	322	527	527	527
Alkalinity	500	OG	173 - 641 [23]	308	502	308	404
Chloride	250	AO	0.34 - 21.1 [38]	5.4	12.7	5.4	128
Nitrate	10	MAC	0.05 - 6.96 [23]	1.10	4.37	1.10	3.33
Nitrite	1.0	MAC	<0.25 [23]	NA	NA	NA	0.25
Sulphate	500	AO	1.74 - 35.8 [23]	10.8	25.5	10.8	255
Sodium	200	AO	0.92 - 6.31 [23]	2.93	5.68	2.93	101
Potassium	NV	NV	0.37 - 4.31 [22]	1.21	2.69	1.21	NV
Ammonia	NV	NV	<0.05 [23]	NA	NA	NA	NV
Iron	0.3	AO	<0.005 - 0.59 [36]	0.037	0.14	0.037	0.17
DOC	5.0	AO	<1.0 - 20.5 [37]	4.74	13.8	4.74	4.87

Notes:

1. [n] = number of data points used to determine the average background concentration.
2. Available data from O-1 , up to and including November 2017, was used to calculate background concentrations.
3. mg/L = milligrams per litre; uS/cm = microsiemens per centimetre; NV = No Value.

4. AO = Aesthetic Objective; OG = Operational Guideline
MAC = Maximum Acceptable Concentration, Parameters Related to Health
IMAC = Interim Maximum Acceptable Concentration, Parameters Related to Health

MOECC Procedure B-7-1

$$C_m = C_b + x(C_r - C_b)$$

Where:

C_m = Maximum concentration acceptable in groundwater beneath an adjacent property.

C_b = Background concentration.

C_r = Maximum concentration that should be present in groundwater for domestic consumption according to the Ontario Drinking Water Standards (ODWS).

x = 0.5 for non-health related parameters and 0.25 for health related parameters.

5. For parameters in which the background concentration (i.e. the average concentration) exceeds the ODWS, the average of the 95th percentiles is used to represent the RUC for the Site. These parameters are shaded and shown in **BOLD**.

TABLE 3
SITE SPECIFIC BACKGROUND CONCENTRATIONS AND
GUIDELINE B-7-1 RUC DETERMINATION
BEDROCK GROUNDWATER

GROUNDWATER INDICATOR PARAMETERS ST. EDMUNDS LANDFILL SITE							
Parameter (mg/L)	ODWS Maximum Concentration and Classification		BACKGROUND CONCENTRATION Bedrock Well: B-5			Average Background Concentration (Cb)	Objective Level (Cm)
			Range [n]	Average	95th Percentile		
Conductivity (uS/cm)	NV	NV	354 - 1110 [38]	663	947	663	NV
pH (no units)	6.5 to 8.5	OG	7.78 - 8.30 [24]	8.02	8.18	8.02	6.5 to 8.5
Hardness*	80 to 100	OG	172 - 598 [38]	365	543	543	543
Alkalinity	500	OG	130 - 300 [24]	250	284	250	375
Chloride	250	AO	0.30 - 42.8 [38]	10.5	32.7	10.5	130
Nitrate	10	MAC	<0.25 [24]	NA	NA	NA	2.50
Nitrite	1.0	MAC	<0.25 [24]	NA	NA	NA	0.25
Sulphate	500	AO	18.2 - 338 [24]	147	298	147	324
Sodium	200	AO	1.52 - 15.8 [24]	4.26	6.82	4.26	102
Potassium	NV	NV	0.66 - 1.62 [23]	1.27	1.55	1.27	NV
Ammonia	NV	NV	<0.02 - 0.21 [24]	0.06	0.13	0.06	NV
Iron	0.3	AO	<0.01 - 1.97 [37]	0.17	0.60	0.17	0.24
DOC	5.0	AO	0.70 - 11.0 [36]	3.60	7.3	3.60	4.30

Notes:

- [n] = number of data points used to determine the average background concentration.
- Available data from B-5, up to and including November 2017, was used to calculate background concentrations.
- mg/L = milligrams per litre; uS/cm = microsiemens per centimetre; NV = No Value.
- AO = Aesthetic Objective; OG = Operational Guideline
MAC = Maximum Acceptable Concentration, Parameters Related to Health
IMAC = Interim Maximum Acceptable Concentration, Parameters Related to Health

MOECC Procedure B-7-1

$$C_m = C_b + x(C_r - C_b)$$

Where:

- C_m = Maximum concentration acceptable in groundwater beneath an adjacent property.
- C_b = Background concentration.
- C_r = Maximum concentration that should be present in groundwater for domestic consumption according to the Ontario Drinking Water Standards (ODWS).
- x = 0.5 for non-health related parameters and 0.25 for health related parameters.

- For parameters in which the background concentration (i.e. the average concentration) exceeds the ODWS, the average of the 95th percentiles is used to represent the RUC for the Site. These parameters are shaded and shown in **BOLD**.

TABLE 4
OVERBURDEN GROUNDWATER QUALITY SUMMARY - 2024

Parameter Description Sampling Date	Bkgd	ODWS		RUC	Northeast (Upgradient)			East (Crossgradient)			Northwest (Crossgradient)			
					O-7	W-1		O-8	W-2		O-1		O-9	
					Silt till	N/A		Silt till	Silt till		Sand & gravel		Silt till	
					30-Apr-24	30-Apr-24	12-Nov-24	30-Apr-24	30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24
Conductivity (uS/cm)	569	NV	NV	NV	396	507	616	764	672	790	662	831	548	742
pH (Unitless)	8.03	6.5-8.5	OG	6.5-8.5	7.76	7.85	7.90	7.53	7.80	7.95	7.69	7.58	7.66	7.77
Hardness	527	80-100	OG	527	221	288	292	431	374	374	327	532	292	402
Alkalinity	308	30-500	OG	404	228	306	392	475	411	421	373	513	330	433
Chloride	5.4	250	AO	128	0.53	3.12	4.07	3.96	1.72	7.52	4.44	6.94	6.42	8.16
Nitrate	1.10	10.0	MAC	3.33	0.91	0.06	0.10	<0.05	<0.05	0.13	0.86	0.57	<0.05	0.12
Nitrite	ND	1.0	MAC	0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	10.8	500	AO	255	14.8	10.7	24.6	0.55	4.0	48.7	7.2	8.1	2.7	8.4
Sodium	2.93	200	AO	101	2.55	3.45	3.42	3.86	1.24	2.68	4.24	5.85	3.98	3.89
Potassium	1.21	NV	NA	NV	0.90	0.65	0.76	<0.50	0.71	1.29	1.11	2.76	3.89	5.90
Calcium	ND	NV	NA	NV	67.0	84.7	92.8	132	116	115	92.1	153	76.7	114
Magnesium	ND	NV	NA	NV	13.0	18.5	14.6	24.7	20.4	21.0	23.5	36.4	24.4	28.4
Ammonia	ND	NV	NA	NV	0.55	0.08	0.11	0.02	0.02	<0.02	<0.02	<0.02	0.06	0.07
Iron	0.04	0.3	AO	0.17	<0.020	0.34	0.05	<0.020	<0.020	<0.020	<0.020	<0.020	0.47	0.15
Boron	0.01	5	IMAC	1.25	<0.010	<0.010	0.015	<0.010	<0.010	0.022	0.046	0.075	0.015	0.052
DOC	4.74	5.0	AO	4.87	7.4	33.9	28.5	9.2	4.8	4.6	2.8	8.3	26.2	27.2

Parameter Description Sampling Date	Bkgd	ODWS		RUC	South (Downgradient)						South - Edge of Landfill			
					W3-03		O-3		O-4		O-2		O-6	
					N/A		Silt till		Sand & silt		Sand		Sand&Gravel/Silt	
					30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24
Conductivity (uS/cm)	569	NV	NV	NV	1040	975	1970	1970	765	836	1370	1390	1430	1400
pH (Unitless)	8.03	6.5-8.5	OG	6.5-8.5	7.52	7.75	7.43	7.53	7.76	7.83	7.20	7.12	7.05	7.17
Hardness	527	80-100	OG	527	416	382	985	957	382	387	570	520	600	535
Alkalinity	308	30-500	OG	404	529	590	476	506	302	385	749	808	836	838
Chloride	5.4	250	AO	128	19.1	17.6	39.0	41.3	0.42	15.4	30.6	39.0	16.9	23.8
Nitrate	1.10	10.0	MAC	3.33	<0.05	0.27	<0.07	<0.07	<0.05	<0.05	<0.05	<0.05	<0.05	0.81
Nitrite	ND	1.0	MAC	0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	10.8	500	AO	255	12.8	4.5	589	571	142	118	4.08	2.33	7.0	10.2
Sodium	2.93	200	AO	101	21.7	18.3	18.8	19.3	1.64	10.1	36.1	57.3	24.0	20.3
Potassium	1.21	NV	NA	NV	14.0	13.2	4.20	5.29	<0.50	1.33	21.7	26.7	21.0	20.6
Calcium	ND	NV	NA	NV	113	109	263	259	105	106	152	131	160	150
Magnesium	ND	NV	NA	NV	32.4	26.6	79.8	75.4	29.1	29.6	46.3	46.9	48.7	38.9
Ammonia	ND	NV	NA	NV	8.08	9.12	0.04	0.08	<0.02	<0.02	23.8	26.2	24.9	24.2
Iron	0.04	0.3	AO	0.17	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.34	1.47	<0.020	0.03
Boron	0.01	5	IMAC	1.25	0.36	0.36	0.018	0.044	<0.010	0.060	0.39	0.64	0.28	0.28
DOC	4.74	5.0	AO	4.87	11.3	12.7	4.5	3.5	3.0	2.4	17.5	23.2	14.6	19.5

Notes:

1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006).
2. AO: Aesthetic Objective; OG = Operational Guideline; MAC = Maximum Acceptable Concentration.
3. NV = No Value specified; NA = Not Applicable; ISW = Insufficient Water
4. Background concentrations calculated using data collected between 1988 through 2017 from monitoring well O-1.
5. Values in bold represent results greater than the ODWS.
6. Shaded values represent results greater than the Reasonable Use Criteria (RUC).
7. Samples analyzed by an accredited laboratory.
8. Results presented in mg/L (milligrams per litre) unless otherwise specified.

TABLE 5
SUMMARY OF LEACHATE CHARACTERIZATION

Monitoring Location	UNITS	ODWS	RUC	O-2	O-2	O-2
Sampling Date				09-22-22	11-28-23	11-12-24
INORGANICS						
Alkalinity	mg/L	30 - 500	404	911	917	855
Total Ammonia-N	mg/L	NV	NV	33.4	34.4	30.6
Arsenic (As)	mg/L	0.01	N/A	0.007	<0.001	<0.001
Barium (Ba)	mg/L	1	N/A	0.11	0.052	0.065
Boron (B)	mg/L	5	N/A	0.35	0.19	0.42
Cadmium (Cd)	mg/L	0.005	N/A	<0.0001	<0.0001	<0.0001
Calcium (Ca)	mg/L	NV	NV	184	172	148
Chloride (Cl-)	mg/L	250	128	65.1	29.7	61.7
Chromium (Cr)	mg/L	0.05	N/A	<0.002	<0.002	<0.002
Conductivity	umho/cm	NV	NV	1970	1610	1570
Copper (Cu)	mg/L	1.0	N/A	0.002	0.003	0.002
Hardness (CaCO3)	mg/L	80-100	527	643	579	548
Iron (Fe)	mg/L	0.3	0.17	22.5	0.53	0.02
Lead (Pb)	mg/L	0.01	N/A	<0.0005	<0.0005	<0.0005
Magnesium (Mg)	mg/L	NV	NV	44.6	36.4	43.5
Manganese (Mn)	mg/L	NV	NV	0.66	0.20	0.37
Mercury (Hg)	mg/L	0.001	N/A	<0.0001	<0.0001	----
Nitrate (N)	mg/L	10	3.33	<0.07	1.22	<0.05
Nitrite (N)	mg/L	1	0.25	1.98	<0.05	<0.05
Total Kjeldahl Nitrogen (TKN)	mg/L	NV	NV	35.4	34.6	31.8
pH	pH	6.5 - 8.5	6.5 - 8.5	7.27	7.17	7.43
Total Phosphorus	mg/L	NV	NV	0.05	0.12	0.14
Potassium (K)	mg/L	NV	NV	17.8	5.9	18.6
Sodium (Na)	mg/L	200	101	30	9.5	52.8
Total Dissolved Solids	mg/L	500	N/A	840	742	892
Sulphate (SO4)	mg/L	500	255	<0.19	3.41	1.62
Zinc (Zn)	mg/L	5	N/A	<0.005	0.008	<0.005
OTHER ORGANICS						
Total BOD	mg/L	NV	NV	4	5	<20
Total Chemical Oxygen Demand (COD)	mg/L	NV	NV	60	40	46
Dissolved Organic Carbon	mg/L	5	4.9	24	11	18.5
Phenols-4AAP	mg/L	NV	NV	0.072	0.013	0.001
VOLATILE ORGANICS						
Benzene	mg/L	0.001	N/A	0.0017	0.0014	0.0012
1,4-Dichlorobenzene	mg/L	0.001	N/A	<0.0002	<0.001	<0.0001
Methylene Chloride(Dichloromethane)	mg/L	0.05	N/A	<0.0006	<0.003	<0.03
Toluene	mg/L	0.024	N/A	<0.0004	<0.002	<0.0002
Vinyl Chloride	mg/L	0.001	N/A	<0.0004	<0.002	<0.0002

Notes:

1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006)
2. NV = No value specified
3. NM = Not Measured; N/A = Not Available
4. Values in bold represent results greater than the ODWS
5. Shaded values represent results greater than the Reasonable Use Criteria
6. Samples analyzed by Bureau Veritas.
7. Analytical parameters based on Schedule 5, Column 1 Comprehensive List for Groundwater and Leachate (O.Reg. 232/98, Rev. January 2012).

TABLE 6
BEDROCK GROUNDWATER QUALITY SUMMARY - 2024

Parameter Sampling Date	Bkgd	ODWS		RUC	North (Upgradient)		West (Crossgradient)	
					B5		P3	P3
					30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24
Conductivity (uS/cm)	663	NV	NA	NV	1260	1870	642	733
pH (Unitless)	8.02	6.5-8.5	OG	6.5-8.5	7.73	7.84	7.99	7.94
Hardness	543	80-100	OG	543	642	375	308	273
Alkalinity	250	30-500	OG	375	345	414	321	332
Chloride	10.5	250	AO	130	15.1	306	8.42	49.8
Nitrate	ND	10.0	MAC	2.5	<0.05	<0.07	0.24	0.44
Nitrite	ND	1.0	MAC	0.25	<0.05	<0.05	<0.05	<0.05
Sulphate	147	500	AO	324	318	71.3	13.7	16.6
Sodium	4.26	200	AO	102	10.7	173	3.75	22.8
Potassium	1.27	NV	NA	NV	1.39	1.44	0.59	<0.50
Calcium	ND	NV	NA	NV	173	106	84.6	72.3
Magnesium	ND	NV	NA	NV	50.9	26.8	23.6	22.5
Ammonia	0.06	NV	NA	NV	0.09	<0.02	<0.02	<0.02
Iron	0.17	0.3	AO	0.24	0.026	<0.020	<0.020	<0.020
Boron	0.01	5	IMAC	1.25	0.034	0.18	<0.010	0.023
DOC	3.6	5.0	AO	4.3	5.3	3.4	2.9	1.6

Parameter Sampling Date	Bkgd	ODWS		RUC	South (Downgradient)					
					B2		B3		B4	
					30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24
Conductivity (uS/cm)	663	NV	NA	NV	688	653	2690	2460	1560	1450
pH (Unitless)	8.02	6.5-8.5	OG	6.5-8.5	7.81	7.93	7.40	7.59	7.55	7.63
Hardness	543	80-100	OG	543	333	288	1310	1230	542	532
Alkalinity	250	30-500	OG	375	309	326	463	502	578	631
Chloride	10.5	250	AO	130	10.3	15.0	16.0	16.0	115	129
Nitrate	ND	10.0	MAC	2.50	<0.05	<0.05	<0.14	<0.14	<0.05	<0.05
Nitrite	ND	1.0	MAC	0.25	<0.05	<0.05	<0.11	<0.11	<0.05	<0.05
Sulphate	147	500	AO	324	50.2	39.1	983	888	53.9	58.5
Sodium	4.26	200	AO	102	10.6	12.1	16.0	19.7	72.1	69.0
Potassium	1.27	NV	NA	NV	1.45	1.30	3.17	3.35	5.63	7.13
Calcium	ND	NV	NA	NV	84.1	72.0	359	329	119	128
Magnesium	ND	NV	NA	NV	29.9	26.2	100	99.2	59.5	51.6
Ammonia	0.06	NV	NA	NV	0.20	0.29	0.12	0.16	2.92	4.16
Iron	0.17	0.3	AO	0.24	<0.020	<0.020	0.53	0.65	<0.020	<0.020
Boron	0.01	5	IMAC	1.25	0.048	0.054	0.047	0.069	0.22	0.27
DOC	3.6	5	AO	4.3	6.2	5.7	5.3	4.2	18.0	17.2

Notes:

1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006).
2. RUC = Reasonable Use Criteria
3. AO = Aesthetic Objective; OG = Operational Guideline; MAC = Maximum Acceptable Concentration.
4. NV = No Value specified; NA = Not Applicable
5. Background concentrations calculated using data collected from 1988 through 2017 from monitoring well B-5.
6. Values in bold represent results greater than the ODWS.
7. Shaded values represent results greater than the Reasonable Use Criteria (RUC).
8. Samples analyzed by AGAT Laboratories, Ltd.
9. Results presented in mg/L (milligrams per litre) unless otherwise specified.

TABLE 7
SUMMARY OF SURFACE WATER QUALITY RESULTS - 2024

Parameter Sampling Date	Units	PWQO	Trigger Level (S-6)	S-1: Background		S-6		S-6A		S-8		S-9	
				30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24	30-Apr-24	12-Nov-24
CBOD ₅	mg/L	NV	NV	<2	<20	<2	<20	<2	<20	<2	<20	<2	<20
Conductivity	uS/cm	NV	2200	593	804	921	1000	825	977	363	492	328	471
pH	unitless	6.5 to 8.5	NV	8.14	7.73	8.05	7.81	8.06	7.85	8.15	7.97	8.16	7.91
Hardness	mg/L	NV	NV	220	410	351	414	321	409	193	277	176	269
Alkalinity	mg/L	Note 5	NV	248	345	381	431	374	438	214	297	204	270
Chloride	mg/L	NV	60	42.2	34.0	31.3	81.4	28.7	80.2	4.31	6.88	0.69	5.68
Nitrate	mg/L	NV	NV	0.08	<0.05	1.48	0.65	1.60	0.51	0.05	<0.05	<0.05	<0.05
Nitrite	mg/L	NV	NV	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/L	NV	NV	4.43	81.3	41.8	27.7	38.0	29.6	2.98	12.4	0.75	10.8
Ammonia	mg/L	NV	NV	0.02	<0.02	1.11	0.18	0.82	<0.02	0.03	<0.02	0.03	<0.02
DOC	mg/L	NV	NV	14.2	13.1	15.4	12.0	15.0	11.3	17.1	16.7	7.8	17.4
Phenols	mg/L	0.001	NV	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.002	<0.001
TKN	mg/L	NV	NV	0.26	0.24	2.31	0.40	1.78	0.46	0.20	<0.10	<0.10	0.18
Phosphorus	mg/L	0.02	NV	0.06	<0.02	0.05	<0.02	0.04	0.04	0.04	<0.02	0.05	<0.02
Boron	mg/L	0.2	NV	0.015	<0.010	0.36	0.37	0.36	0.36	0.031	0.021	0.017	0.017
Zinc	mg/L	0.03	NV	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Iron	mg/L	0.3	NV	<0.050	0.22	0.20	2.29	0.13	1.15	0.068	0.079	<0.050	0.083
Sodium	mg/L	NV	NV	30.9	25.4	34.3	66.2	35.8	63.1	4.16	5.49	1.78	4.94
Potassium	mg/L	NV	NV	0.84	1.76	12.5	13.2	11.6	13.2	1.01	2.26	1.69	2.07
Un-ionized Ammonia	mg/L	0.02	0.06	0.0005	<0.001	0.036	0.005	0.031	<0.001	0.002	<0.001	0.0012	<0.001
Field Conductivity	uS/cm	NV	2200	737	920	838	1140	560	990	349	540	357	540
Field pH	unitless	6.5 to 8.5	NV	8.04	8.04	8.16	8.16	8.24	8.24	8.34	8.34	8.22	8.22
Field Temperature	°C	NV	NV	10.0	10.0	10.3	10.3	9.9	9.9	10.9	10.9	11.7	11.7

Notes:

1. Analytical results presented in mg/L (milligrams per litre) unless otherwise specified.
2. PWQO = Provincial Water Quality Objectives (July 1994).
3. NV = No Value specified; NM = Not Monitored
4. Un-ionized ammonia calculated using pH and temperature per PWQO Guidelines.
5. Alkalinity should not be decreased by more than 25% of the natural concentration.
6. Values that are in bold indicate an exceedance of the PWQO.
7. Values that are shaded indicate an exceedance of the Trigger Level.
8. Samples analyzed by an accredited laboratory.

Figures

Figure 1: Site Location Map

Figure 2: General Site Plan

Figure 3: Site Layout and Existing Conditions

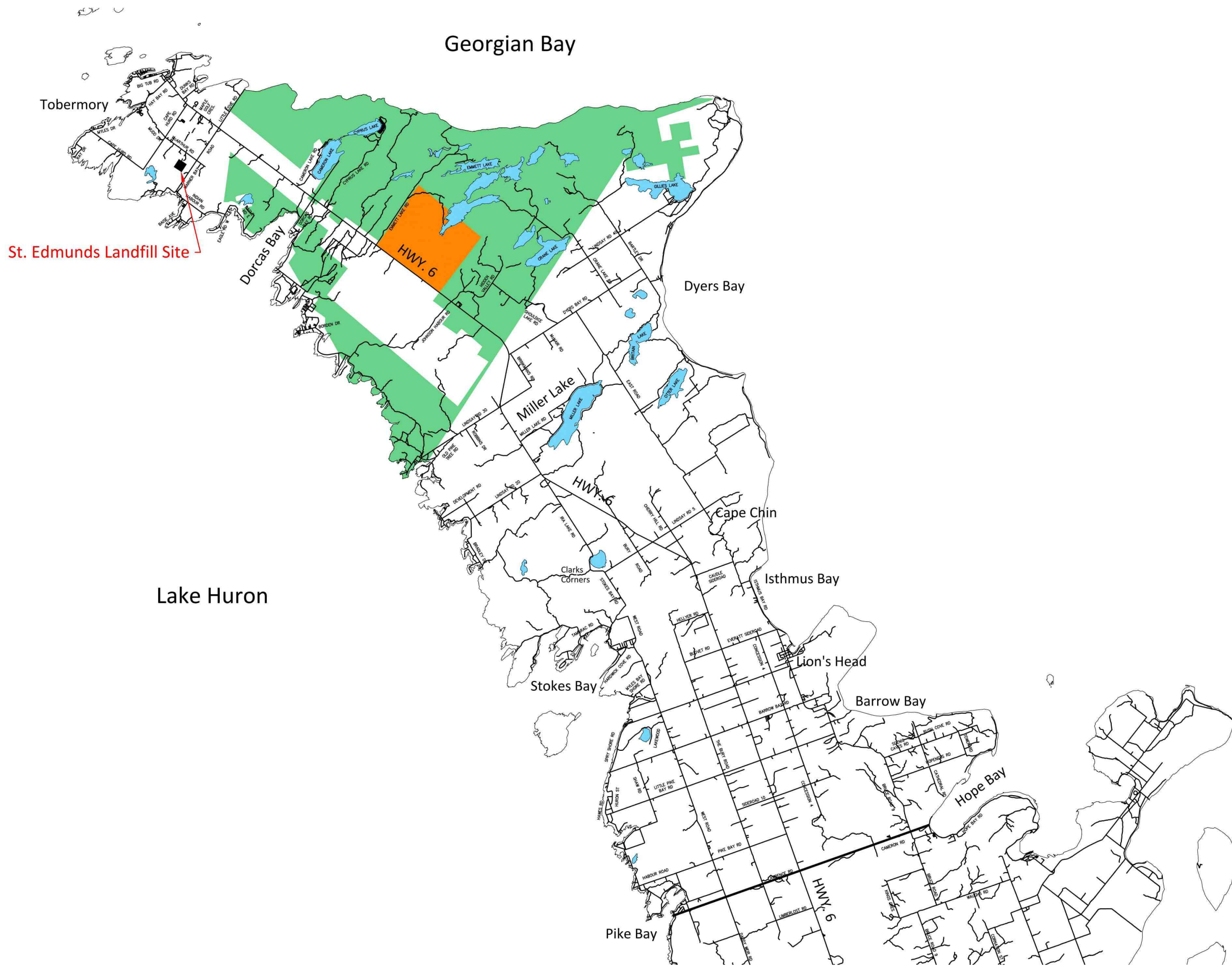
Figure 4: Overburden Groundwater Flow

Figure 5: Bedrock Groundwater Flow

Figure 6: Final Contours

Figure 7: Chloride, Alkalinity and Potassium Concentrations

Figure 8: Surface Water Management Works – 2015 Air Photo



LEGEND

- FIRST NATION LANDS
- NATIONAL, PROVINCIAL PARKS & RESERVES

NOT TO SCALE
 APRIL 2025

SITE LOCATION MAP

**ST. EDMUNDS
 WASTE DISPOSAL SITE**

Figure No. 1



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Municipality of Northern Bruce Peninsula



LEGEND

- S-7 ▲ ACTIVE SURFACE WATER MONITORING STATION
O-7 ◈ MONITORING WELL
S-3 △ FORMER SURFACE WATER MONITORING STATION
→ SURFACE WATER FLOW
— EXISTING SWALE
--- MUNICIPAL PROPERTY BOUNDARY (COMPLIANCE BOUNDARY)

NOTES:

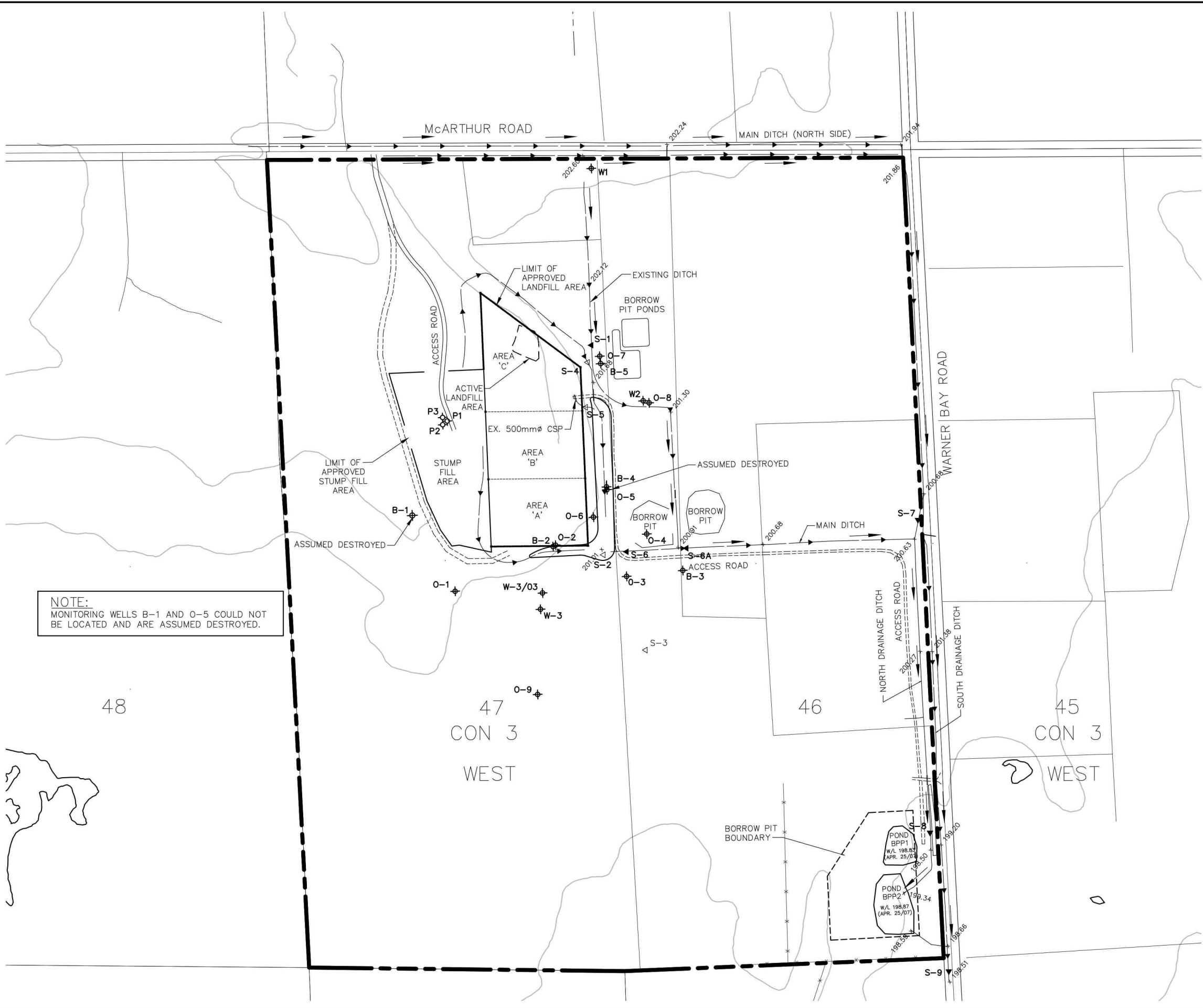
1. SURFACE DRAINAGE FEATURES WERE SURVEYED BY GAMSBY AND MANNEROW LIMITED ON APRIL 25, 2007.
2. THE INFORMATION SHOWN HERE WAS OBTAINED FROM A DRAWING BY HENDERSON PADDON AND ASSOCIATES LIMITED, DATED JUNE 2005.
3. LOCATION OF PROPERTY LINES ARE APPROXIMATE ONLY.
4. FIGURES WERE ADJUSTED IN 2022 TO SUIT UTM DERIVED COORDINATES AND THE ELEVATIONS ACROSS THE SITE WERE LOWERED BY 0.7m.

SCALE = 1:5,000
APRIL 2025

GENERAL SITE PLAN

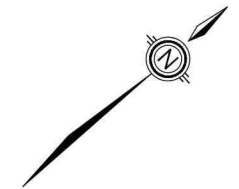
ST. EDMUNDS
WASTE DISPOSAL SITE

Figure No. 2



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Part Lots 46 & 47, Conc. 3 W.B.R.
Municipality of Northern Bruce Peninsula



LEGEND

	APPROXIMATE LIMIT OF EXISTING LANDFILL
	EXISTING DITCH, SWALE
	TREELINE
	SW-2
	S-3
	0-7 (Ob)
	P3 (Bdrk)
	MONITORING WELL - OVERBURDEN
	BEDROCK PIEZOMETER

NOTES:

1. SURFACE DRAINAGE FEATURES WERE SURVEYED BY GAMSBY AND MANNEROW LIMITED ON APRIL 25, 2007.
2. THE INFORMATION SHOWN HERE WAS OBTAINED FROM A DRAWING BY HENDERSON PADDON AND ASSOCIATES LIMITED, DATED JUNE 2005.
3. LOCATION OF PROPERTY LINES ARE APPROXIMATE ONLY.
4. FIGURES WERE ADJUSTED IN 2022 TO SUIT UTM DERIVED COORDINATES AND THE ELEVATIONS ACROSS THE SITE WERE LOWERED BY 0.7m.

SCALE = 1:2,500
APRIL 2025

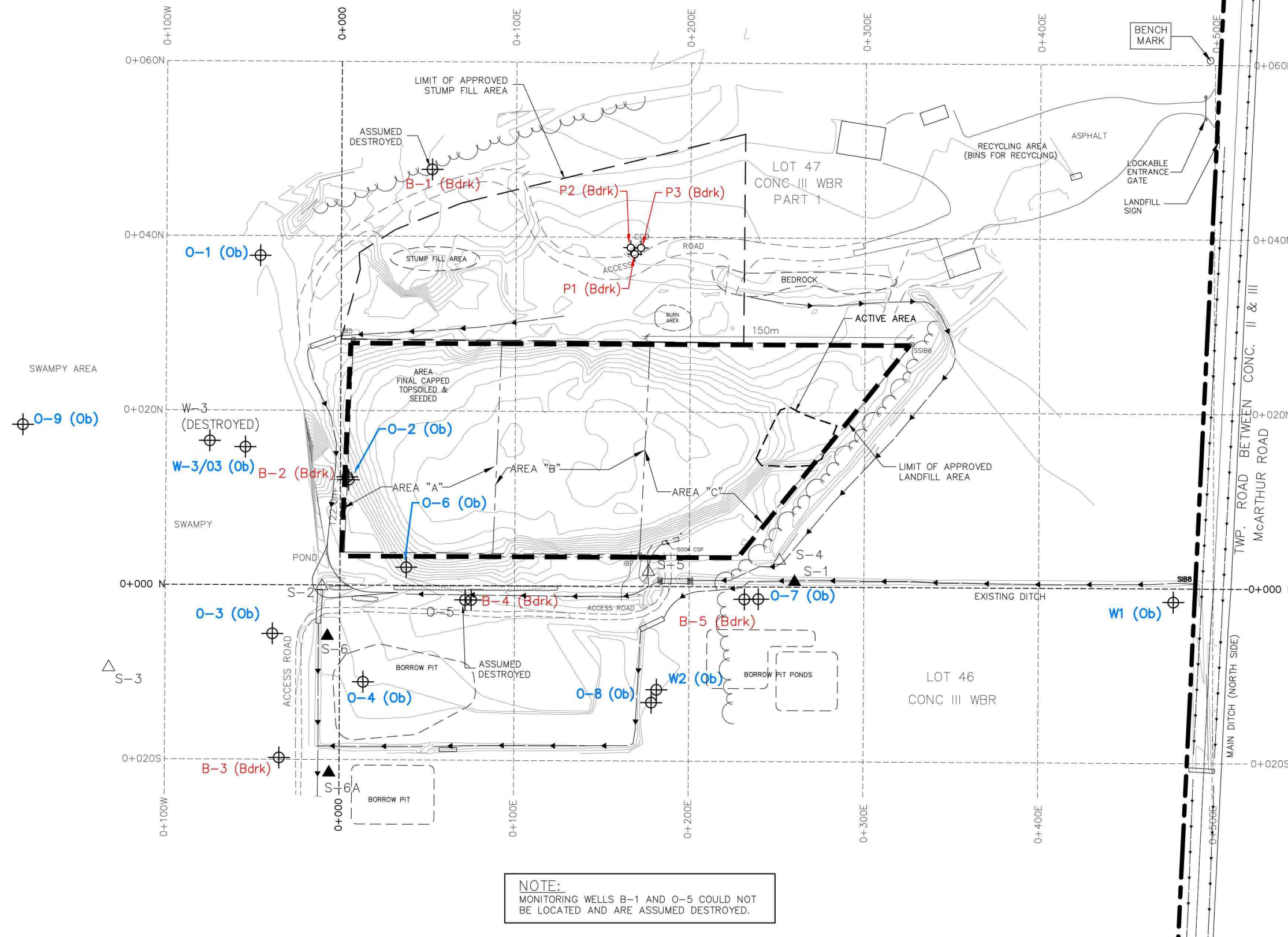
SITE LAYOUT &
EXISTING CONDITIONS

ST. EDMUNDS
WASTE DISPOSAL SITE

Figure No. 3



B.M. #1 ELEV. 206.29m
NAIL & FLAGGING IN EAST FACE OF FIRST HYDRO POLE
NORTHWEST OF LANDFILL MAIN ENTRANCE.



NOTE:
MONITORING WELLS B-1 AND 0-5 COULD NOT
BE LOCATED AND ARE ASSUMED DESTROYED.

B.M. #1 ELEV. 206.29m
NAIL & FLAGGING IN EAST FACE OF FIRST HYDRO POLE
NORTHWEST OF LANDFILL MAIN ENTRANCE.

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LEGEND

- APPROXIMATE LIMIT OF EXISTING LANDFILL
- - - EXISTING DITCH, SWALE
- TREELINE
- ▲ SW-2 ACTIVE SURFACE WATER MONITORING STATION
- △ S-3 FORMER SURFACE WATER MONITORING STATION
- ⊕ O-7 (Ob) MONITORING WELL - OVERBURDEN
- ⊕ P3 (Bdrk) BEDROCK PIEZOMETER
- ⊕ O-4 (Ob) 201.68 GROUNDWATER ELEVATION IN OVERBURDEN
- ⊕ B-4 (Bdrk) 200.05 GROUNDWATER ELEVATION IN BEDROCK
- 201.50 INFERRED OVERBURDEN GROUNDWATER CONTOUR
- INFERRED OVERBURDEN GROUNDWATER FLOW
- (s) DENOTES SPRING MONITORING ROUND
- (f) DENOTES FALL MONITORING ROUND

NOTES:

1. THE INFORMATION SHOWN HERE WAS OBTAINED FROM A DRAWING BY HENDERSON PADDON AND ASSOCIATES LIMITED, DATED JUNE 2005.
2. LOCATION OF PROPERTY LINES ARE APPROXIMATE ONLY.
3. SURFACE WATER DRAINAGE FEATURES WERE SURVEYED BY GAMSBY AND MANNEROW LIMITED ON APRIL 25, 2007.
4. GROUNDWATER CONTOURS SHOWN DERIVED FROM WATER LEVELS RECORDED DURING SPRING (APRIL 30th, 2024) AND FALL MONITORING (NOVEMBER 12th, 2024).
5. FIGURES WERE ADJUSTED IN 2022 TO SUIT UTM DERIVED COORDINATES AND THE ELEVATIONS ACROSS THE SITE WERE LOWERED BY 0.7m.

SCALE = 1:2,500
APRIL 2025

OVERBURDEN
GROUNDWATER FLOW

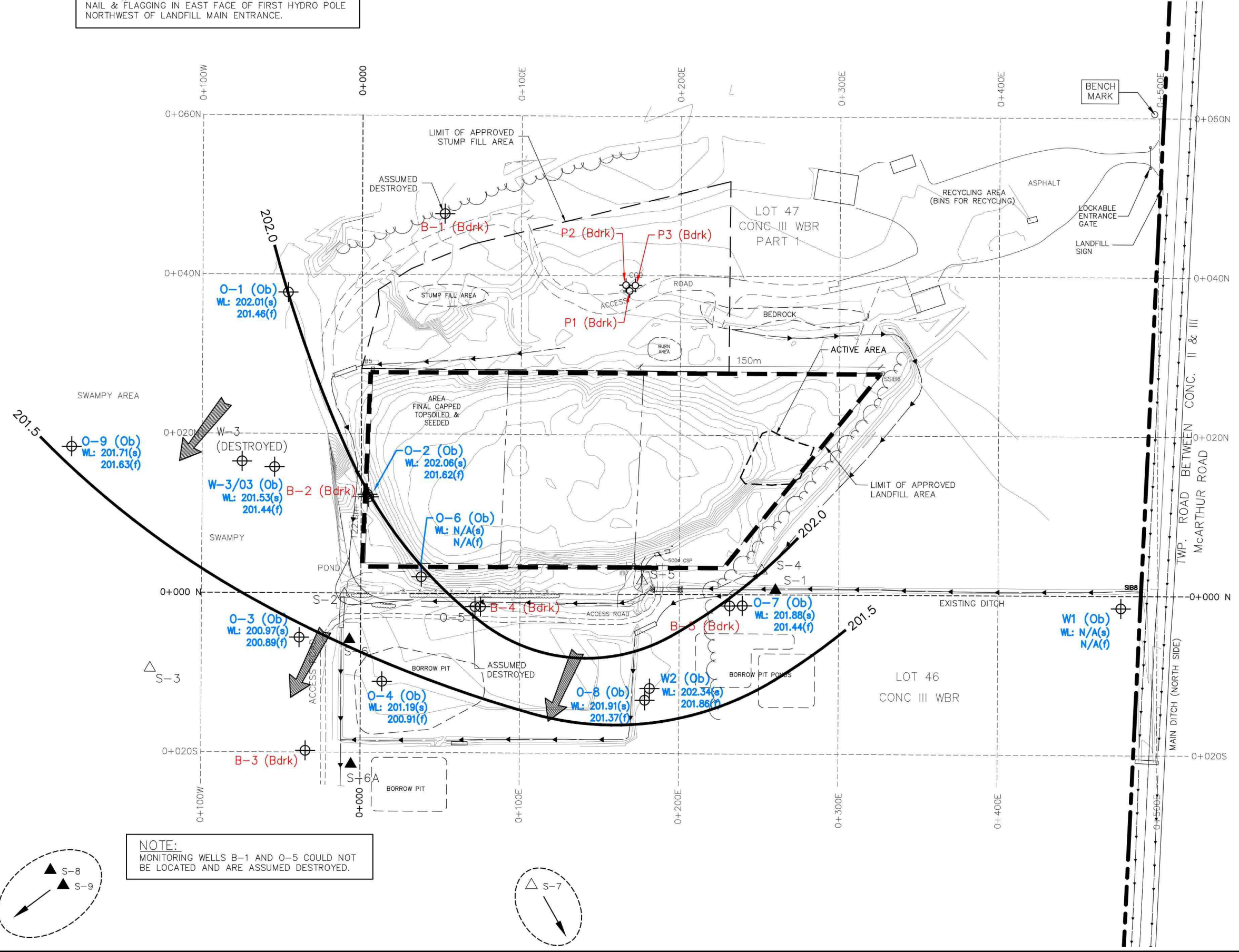
ST. EDMUNDS
WASTE DISPOSAL SITE

Figure No. 4



NOTE:
MONITORING WELLS B-1 AND O-5 COULD NOT
BE LOCATED AND ARE ASSUMED DESTROYED.

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LEGEND

- APPROXIMATE LIMIT OF EXISTING LANDFILL
- EXISTING DITCH, SWALE
- TREELINE
- SW-2 ACTIVE SURFACE WATER MONITORING STATION
- S-3 FORMER SURFACE WATER MONITORING STATION
- O-7 (Ob) MONITORING WELL - OVERBURDEN
- P3 (Bdrk) BEDROCK PIEZOMETER
- O-4 (Ob) 201.68 GROUNDWATER ELEVATION IN OVERBURDEN
- B-4 (Bdrk) 200.05 GROUNDWATER ELEVATION IN BEDROCK
- 200.5 INFERRED BEDROCK GROUNDWATER CONTOUR
- INFERRED BEDROCK GROUNDWATER FLOW
- (s) DENOTES SPRING MONITORING ROUND
- (f) DENOTES FALL MONITORING ROUND

NOTES:

- THE INFORMATION SHOWN HERE WAS OBTAINED FROM A DRAWING BY HENDERSON PADDON AND ASSOCIATES LIMITED, DATED JUNE 2005.
- LOCATION OF PROPERTY LINES ARE APPROXIMATE ONLY.
- SURFACE WATER DRAINAGE FEATURES WERE SURVEYED BY GAMSBY AND MANNEROW LIMITED ON APRIL 25, 2007.
- GROUNDWATER CONTOURS SHOWN DERIVED FROM WATER LEVELS RECORDED DURING SPRING (APRIL 30th, 2024) AND FALL MONITORING (NOVEMBER 12th, 2024).
- FIGURES WERE ADJUSTED IN 2022 TO SUIT UTM DERIVED COORDINATES AND THE ELEVATIONS ACROSS THE SITE WERE LOWERED BY 0.7m.

SCALE = 1:2,500

APRIL 2025

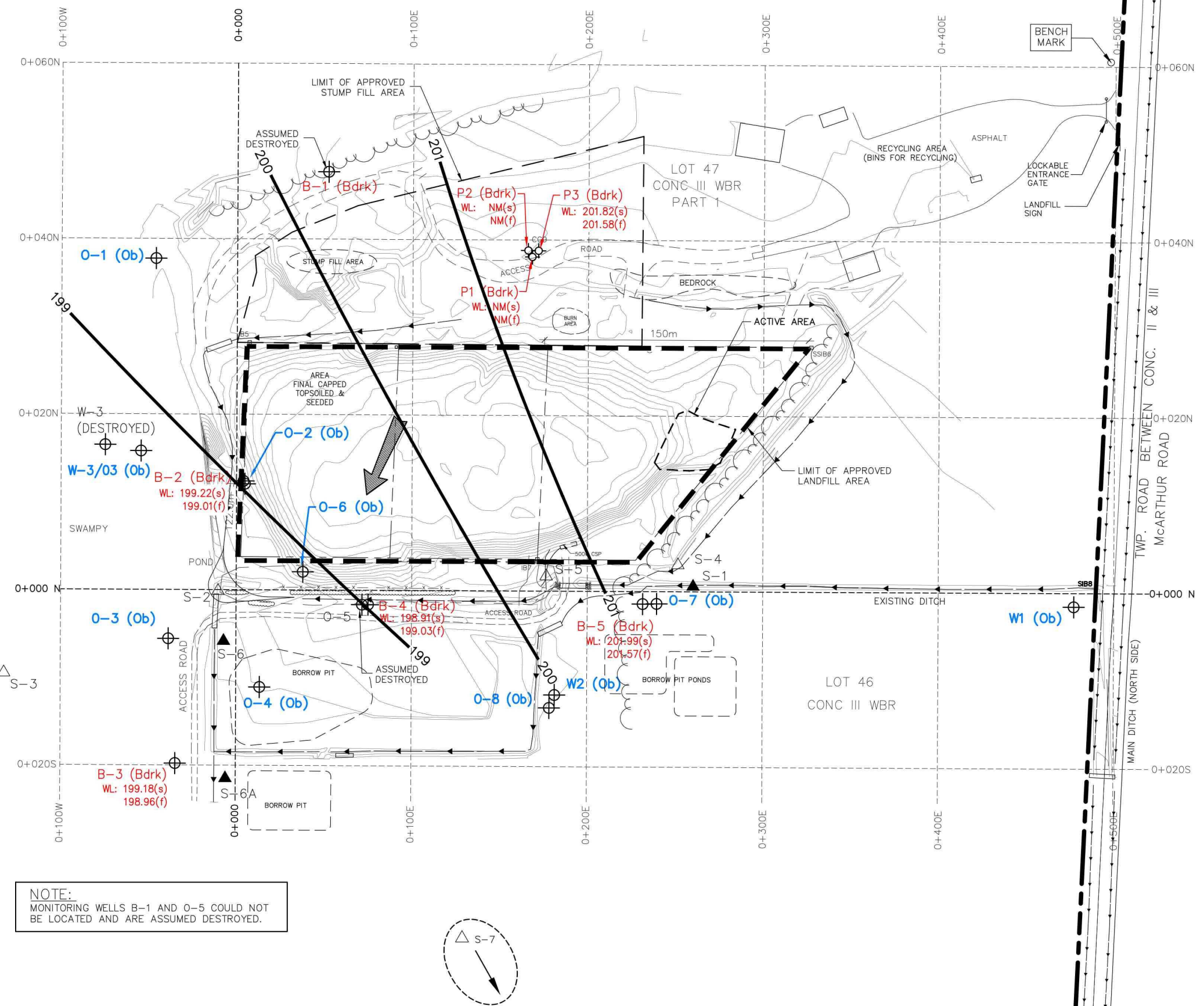
BEDROCK
GROUNDWATER FLOW

ST. EDMUNDS
WASTE DISPOSAL SITE

Figure No. 5



B.M. #1 ELEV. 206.29m
NAIL & FLAGGING IN EAST FACE OF FIRST HYDRO POLE
NORTHWEST OF LANDFILL MAIN ENTRANCE.

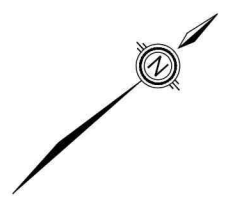


NOTE:
MONITORING WELLS B-1 AND O-5 COULD NOT
BE LOCATED AND ARE ASSUMED DESTROYED.

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St. Edmund's Annual Report
Part Lots 46 & 47, Conc. 3 W.B.R.
Municipality of Northern Bruce Peninsula



LEGEND

- APPROXIMATE LIMIT OF EXISTING LANDFILL
- - - EXISTING DITCH, SWALE
- TREELINE
- ▲ SW-2 ACTIVE SURFACE WATER MONITORING STATION
- △ S-3 FORMER SURFACE WATER MONITORING STATION
- ⊕ O-7 (Ob) MONITORING WELL - OVERBURDEN
- ⊕ P3 (Bdrk) BEDROCK PIEZOMETER
- 208.3 --- PROPOSED FINAL CONTOUR

NOTES:

1. THE INFORMATION SHOWN HERE WAS OBTAINED FROM A DRAWING BY HENDERSON PADDON AND ASSOCIATES LIMITED, DATED MAY 2006.
2. LOCATION OF PROPERTY LINES ARE APPROXIMATE ONLY.
3. SURFACE WATER DRAINAGE FEATURES WERE SURVEYED BY GAMSBY AND MANNEROW LIMITED ON APRIL 25, 2007.
4. FIGURES WERE ADJUSTED IN 2022 TO SUIT UTM DERIVED COORDINATES AND THE ELEVATIONS ACROSS THE SITE WERE LOWERED BY 0.7m.

SCALE = 1:2,500

APRIL 2025

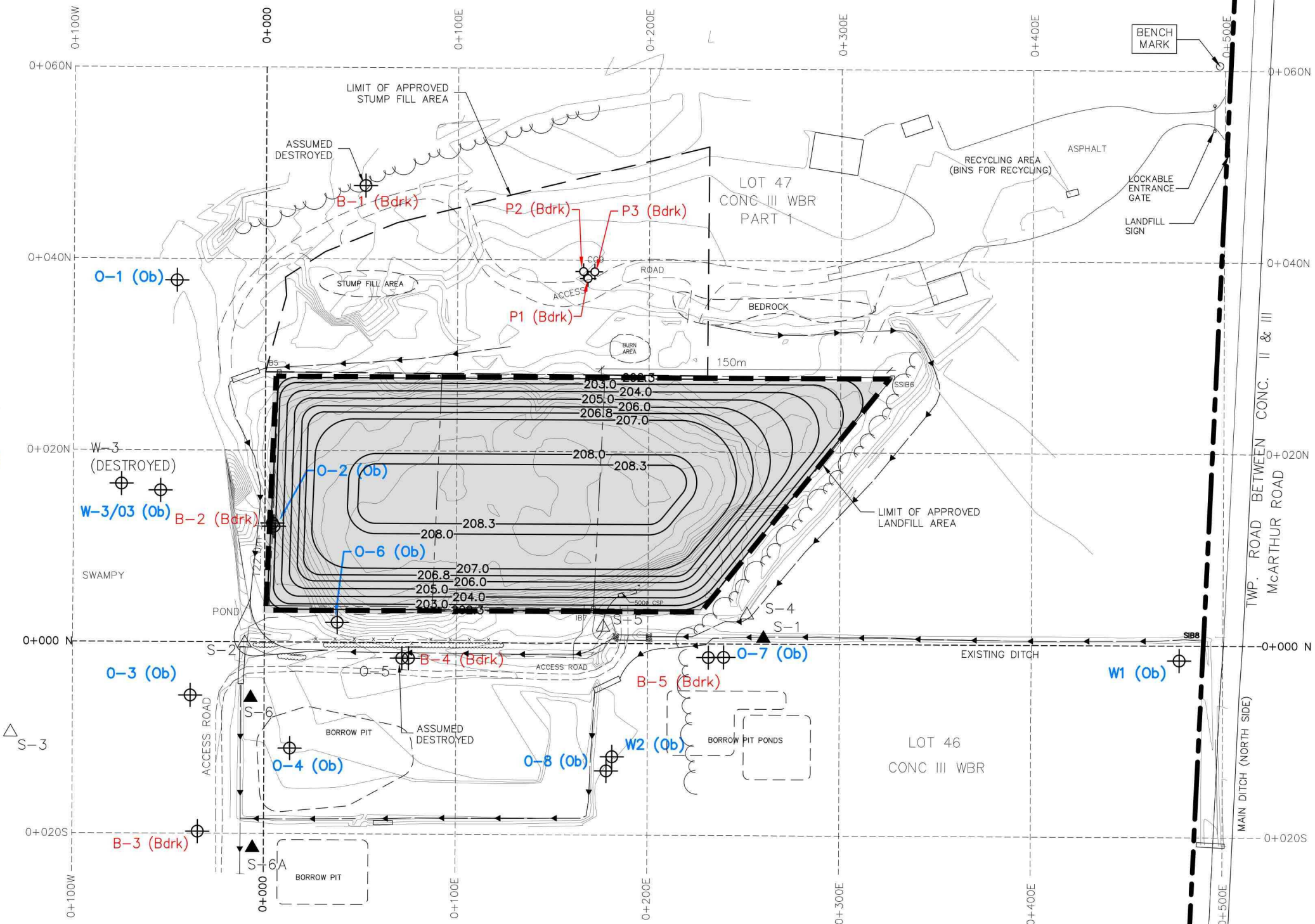
FINAL CONTOURS

ST. EDMUNDS
WASTE DISPOSAL SITE

Figure No. 6



B.M. #1 ELEV. 206.29m
NAIL & FLAGGING IN EAST FACE OF FIRST HYDRO POLE
NORTHWEST OF LANDFILL MAIN ENTRANCE.



NOTE:
MONITORING WELLS B-1 AND O-5 COULD NOT
BE LOCATED AND ARE ASSUMED DESTROYED.

2402869
St. Edmund's Annual Report
Part Lots 46 & 47, Conc. 3 W.B.R.
Municipality of Northern Bruce Peninsula



LEGEND

	APPROXIMATE LIMIT OF EXISTING LANDFILL
	EXISTING DITCH, SWALE
	TREELINE
	ACTIVE SURFACE WATER MONITORING STATION
	FORMER SURFACE WATER MONITORING STATION
	MONITORING WELL - OVERBURDEN
	BEDROCK PIEZOMETER
Cl:	CHLORIDE CONCENTRATION SPRING/FALL (mg/L)
Alk:	ALKALINITY SPRING/FALL (mg/L)
K:	POTASSIUM CONCENTRATION SPRING/FALL (mg/L)
100/100	SPRING VALUE / FALL VALUE

NOTES:

1. THE INFORMATION SHOWN HERE WAS OBTAINED FROM A DRAWING BY HENDERSON PADDON AND ASSOCIATES LIMITED, DATED MAY 2006.
2. LOCATION OF PROPERTY LINES ARE APPROXIMATE ONLY.
3. PARAMETER CONCENTRATIONS PRESENTED WERE MEASURED DURING THE SPRING & FALL OF 2021.
4. FIGURES WERE ADJUSTED IN 2022 TO SUIT UTM DERIVED COORDINATES AND THE ELEVATIONS ACROSS THE SITE WERE LOWERED BY 0.7m.

SCALE = 1:2,500
APRIL 2025

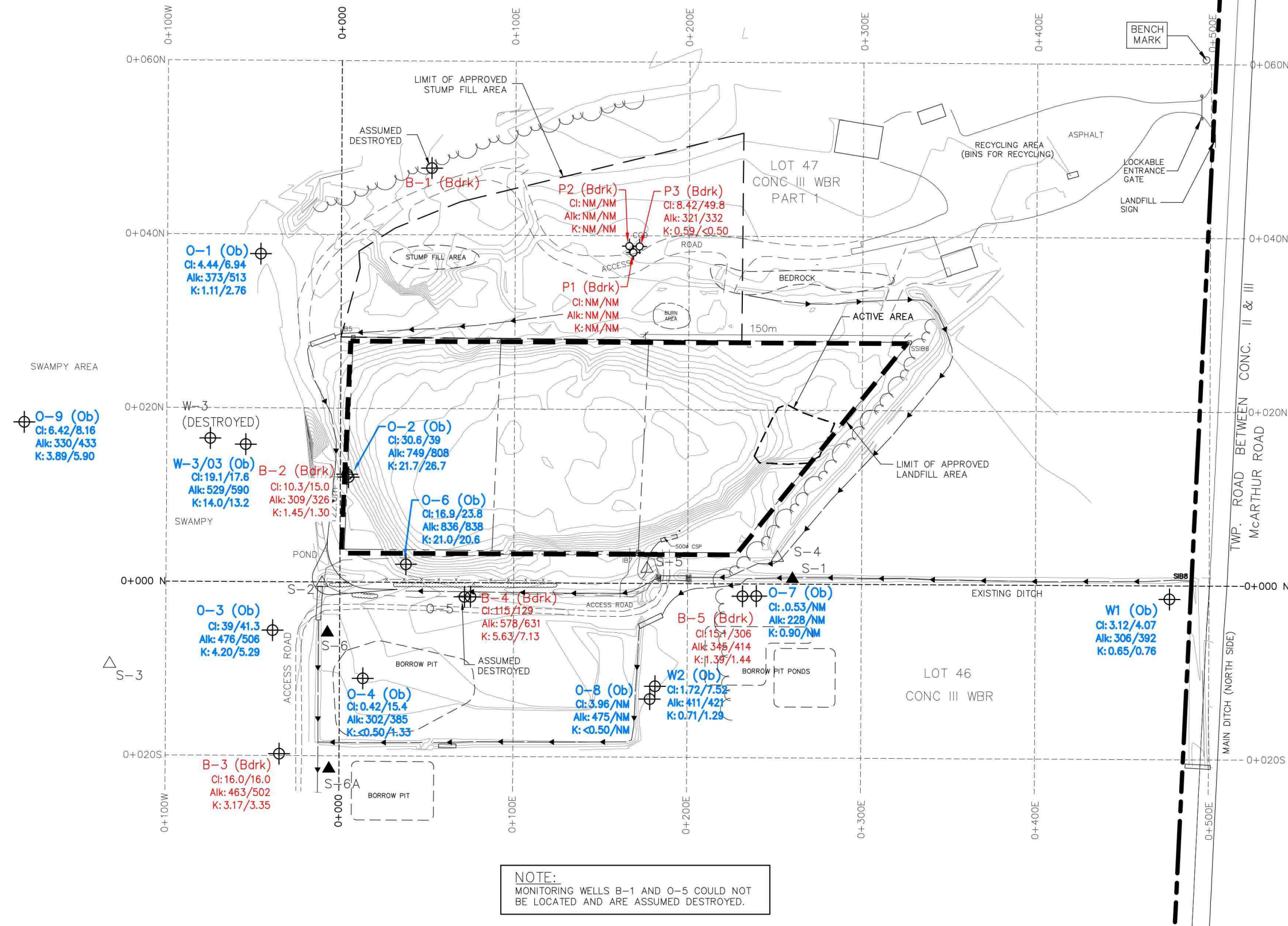
CHLORIDE, ALKALINITY &
POTASSIUM CONCENTRATIONS

ST. EDMUNDS
WASTE DISPOSAL SITE

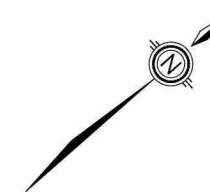
Figure No. 7



B.M. #1 ELEV. 206.29m
NAIL & FLAGGING IN EAST FACE OF FIRST HYDRO POLE
NORTHWEST OF LANDFILL MAIN ENTRANCE.



NOTE:
MONITORING WELLS B-1 AND O-5 COULD NOT
BE LOCATED AND ARE ASSUMED DESTROYED.



LEGEND

-  APPROXIMATE LIMIT OF EXISTING LANDFILL
-  EXISTING DITCH, SWALE
-  ACTIVE SURFACE WATER MONITORING STATION
-  MUNICIPAL PROPERTY BOUNDARY

SCALE = 1:2,000
APRIL 2025

**SURFACE WATER
MANAGEMENT WORKS-
2015 AIR PHOTO**

**ST. EDMUNDS
WASTE DISPOSAL SITE**

Figure No. 8



Appendix A Environmental Compliance Approvals



Ministry
of the
Environment

Provisional Certificate No. A-273002

PROVISIONAL CERTIFICATE OF APPROVAL WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Township of St. Edmunds
Box 70
Tobermory, Ontario
N0H 2R0

for the use and operation of a 3.2 hectare landfilling site within a total area of 45 hectares

all in accordance with the following plans and specifications: Report entitled "Sanitary Landfill Utilization Report File # 77283" prepared jointly by Ainley and Associates Limited, Consulting Engineers and Planners, and by Ian D. Wilson Associates Limited, Consulting Hydrogeologists, dated August, 1978.

Located:

Lot 47 and Part Lot 46, Concession 3 W.B.R.
Township of St. Edmunds
County of Bruce

which includes the use of the site only for the disposal of the following categories of waste (NOTE: Use of the site for additional categories of wastes requires a new application and amendments to the Provisional Certificate of Approval) Domestic, Commercial and 22 other limited to brush and lumber

and subject to the following conditions:

1. No operation shall be carried out at the site after sixty days from this condition becoming enforceable unless this Certificate including the reasons for this condition has been registered by the applicant as an Instrument in the appropriate Land Registry Office against title to the site and a duplicate registered copy thereof has been returned by the applicant to the Director.

Dated this 14 day of March, 1980

Director, Section 39,
The Environmental Protection Act, 1971



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NOTICE
Page 1 of 2

The Corporation of the Township of St. Edmunds
P.O. Box 70
Tobermory, Ontario
NOH 2R0

You are hereby notified that the Provisional Certificate of Approval No. A 273002 dated March 14, 1980, is hereby amended as follows:

- A. The first page of the Certificate of Approval is amended to read:
for the use and operation of a 3.33 hectare landfilling site within a total area of 82 hectares

all in accordance with the following plans and specifications:

1. Application for Approval of a Waste Disposal Site (to amend the existing Certificate of Approval) dated January 11, 1996 with a cover letter from Ross Slaughter, P.Eng., of Henderson, Paddon & Associates Limited, to Mr. Jim Janse of the Ministry of the Environment, dated January 16, 1996.
2. Document entitled "Plan of Development and Operation, Township of St. Edmunds Landfill", revised July 1995.
3. Drawing entitled "Present Landuse, Figure 1" and drawing entitled "Site Plan and Buffer Area Landfill, Township of St. Edmunds, Figure 2", dated March 21, 1991.

All other conditions on the original Provisional Certificate of Approval, dated March 14, 1980, and as amended, not affected by this amendment, remain in effect.

This Notice shall constitute part of the approval issued under Certificate of Approval No. A 273002 dated March 14, 1980.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, : may by written notice served upon me, the Environmental Appeal Board and the Environmental Commissioner, Environmental Bill of Rights, S.O. 1993, Chapter 28, within 15 days after receipt of this Notice, require a hearing by the Board. Section 142 of the Environmental Protection Act, as amended provides that the Notice requiring a hearing shall state:



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NOTICE
Page 2 of 2

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary,
Environmental Appeal Board,
100 Yonge St., 12th Fl.,
O. Box 2382
Toronto, Ontario.
M4P 1E4

The Environmental Commissioner,
1075 Bay Street,
Suite 605,
6th Floor,
Toronto, Ontario.
M5S 2W5

The Director,
Section 39, *Environmental Protection Act*,
Ministry of the Environment,
250 Davisville Avenue, 3rd Floor,
Toronto, Ontario.
M4S 1H2

This instrument is subject to Section 38 of the Environmental Bill of Rights, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek to appeal for 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry, you can determine when the leave to appeal period ends.

DATED AT TORONTO this 10th day of July, 1998.


A. Dominski, P. Eng.
Director
Section 39
Environmental Protection Act

-/st
District Manager, Barrie



Ministry of the Environment
Ministère de l'Environnement

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A WASTE DISPOSAL SITE (LANDFILL)

NO. A273003

PAGE 1 OF 7

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

The Corporation of the Township of St. Edmunds
P.O. Box 70
Tobermory, Ontario
NOH 2R0

for the use and operation of a Waste Disposal Site (Landfill)

all in accordance with the following plans and specifications:

the application for a Certificate of Approval for a Waste Disposal Site (Landfill) dated March 23, 1993, and the supporting information found in Schedule A.

Located: Lot 47, Concession III W.B.R.
Township of St. Edmunds
County of Bruce

which includes the use of the site only for the final disposal by landfilling of the following category of waste (Note: Use of the site or additional categories of wastes requires a new application and amendments to the Provisional Certificate of Approval)

STUMPS

and subject to the following conditions:

A. Definitions

1. For the purpose of this Provisional Certificate of Approval:

- a. "Act" means the Environmental Protection Act, R.S.O. 1990, C.E-19 as amended;
- b. "Certificate" means Provisional Certificate of Approval for a Waste Disposal Site (Landfill);
- c. "Director" means the Regional Director, Southwestern Region, Ontario Ministry of the Environment and Energy;

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A WASTE DISPOSAL SITE (LANDFILL)
NO. A273003
PAGE 2 OF 7

- d. "District Office" means the Owen Sound District Office, Southwestern Region, Ontario Ministry of the Environment and Energy;
- e. "District Officer" means the District Officer of the Owen Sound District Office, Ontario Ministry of the Environment and Energy;
- f. "Minister" means the Minister of the Ontario Ministry of the Environment and Energy;
- g. "Ministry" means the Ontario Ministry of the Environment and Energy;
- h. "Proponent" means The Corporation of the Township of St. Edmunds;
- i. "Regional Office" means the London Regional Office of the Ontario Ministry of the Environment and Energy;
- j. "Site" means Lot 47, Concession III W.B.R., St. Edmunds Township, Bruce County.

General

Except as otherwise provided by the Special Terms and Conditions set out in this Certificate, the Waste Disposal Site (Landfill) shall be operated in accordance with the application for a Certificate of Approval for the Waste Disposal Site (Landfill) dated March 23, 1993, and the documents as listed under Schedule "A" attached.

Where there is a conflict between a provision of any document referred to in Condition (2) and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence.

Requirements specified in this Certificate are the requirements under the Act. Issuance of this Certificate in no way abrogates the Proponent's legal obligations to take all reasonable steps to avoid violating other applicable provisions of the Act and other legislation and regulations.

Requirements of this Certificate are severable. If any requirement of this Certificate, or the application of any requirement of this Certificate to any circumstance, is held invalid, the application of such requirement to other circumstances and the remainder of this Certificate shall not be affected thereby.

The Proponent must ensure compliance with all terms and Conditions of this Certificate. Any non-compliance constitutes a violation of the Act and is grounds for enforcement.

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A WASTE DISPOSAL SITE (LANDFILL)

NO. A273003

PAGE 3 OF 7

7. Any information relating to this Certificate and contained in Ministry files may be made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, R.S.O. 1990, C. F-31.

8. The Proponent shall notify the District Officer in writing of any of the following changes within thirty (30) days of the change occurring:

- a.
 - i. change of Owner or operator of the Site or both;
 - ii. change of address or address of the new Owner;
 - iii. change of partners where the Owner or operator is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, 1991 shall be included in the notification to the District Officer;
 - iv. any change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (form 1 or 2 of O. Reg. 182, Chapter C-39, R.R.O. 1990 as amended from time to time), filed under the Corporations Information Act shall be included in the notification to the District Officer;
 - v. change in directors or officers of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" as referred to in 8(a)(iv), supra;
- b. In the event of any change in ownership of the Site, the Owner shall notify in writing the succeeding owner of the existence of this Certificate, and a copy of such notice shall be forwarded to the District Officer.

9. If any changes to the Site are contemplated, application shall be made to the Ministry for approval, and such changes shall not be made until approval has been granted by the Director.

10. This Certificate shall be registered on the title to the lands comprising the waste disposal site. No operation shall be carried out at the site after sixty days from the date of this Certificate unless this Certificate including the reasons for this condition have been registered by the proponent as an instrument in the appropriate Land Registry Office against title to the site and a duplicate registered copy thereof returned by the applicant to the Director and District Officer.

A. Site Operations

11. a. The amount of waste to accepted at this Site may not exceed 200 cubic metres per day.
- b. This Site is limited to a maximum filling capacity of 35,800 cubic metres.
12. The disposal of any waste, other than Stumps is prohibited at this Site.
13. The burning of wastes is prohibited at this Site.

B. Annual Report

14. The annual report for the St. Edmunds Township Landfill, Provisional Certificate of Approval for a Waste Disposal Site (Landfill) Number A273002, shall include but not be limited to the following information as it pertains to the stump disposal site approved under this Certificate:
 - a. a yearly summary of the volumes of wastes received at the Site;
 - b. any environmental and operational problems encountered during the operation of the Site and any mitigative actions taken;
 - c. a statement as to compliance with all Conditions of approval and with the inspection and reporting requirements of the Conditions; and
 - d. any recommendations to minimize impacts and improve Site operations.

SCHEDULE "A"

This Schedule "A" forms part of Provisional Certificate of Approval: A

1. Hydrogeological Investigation - Landfill Site - St. Edmunds Township by Henderson, Paddon & Associates & Morrison Beatty Ltd., October 1989.
2. Plan of Development and Operation - Township of St. Edmunds Landfill, June 1992.
3. Engineering Plan Drawing No. 9048-01 - Existing conditions, bottom elevations and final contours, Waste Disposal Site, Township of St. Edmunds, Revised March 1993.
4. Engineering Plan Drawing No. 9048-02 - Site Development Plan, Waste Disposal Site, Township of St. Edmunds, Revised March 1993, Stump Disposal Site.
5. Extract from Bruce County Official Plan.
6. Extract from Zoning By-Law 1986-12.
7. By-Law No. 78-34.
8. Figure No. 2A showing landfill area and stump dump area and buffer owned by Township of St. Edmunds.

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A WASTE DISPOSAL SITE (LANDFILL)

NO. A273003

PAGE 6 OF 7

The reasons for the imposition of these Conditions are as follows:

1. The reason for Condition 1 is to simplify the wording of the subsequent Conditions and to define the specific meaning of terms as used in this Certificate.

2. The reason for Conditions 2, 11, 12 and 13 is to ensure that the Waste Disposal Site (Landfill) is operated in accordance with the application, supporting information, the Certificate of Approval and the Act.

3. The reason for Conditions 3, 4, 5, 6, 7, 8 and 9 is to clarify the legal rights and obligations of this Certificate of Approval.

4. The reason for Condition 10 requiring registration of the Certificate, is that Section 46 of the Act, prohibits any use being made of the lands after they cease to be used for waste disposal purposes within a period of twenty five years from the year in which such land ceased to be used, unless approval of the Minister for the proposed use has been given. The purpose of this prohibition is to protect future occupants of the site and the environment from any hazards which might occur as a result of waste being disposed of on the site. This prohibition and potential hazard should be drawn to the attention of future owners and occupants by the Certificate being registered on title.

5. The reason for Condition 14 is to ensure that the Proponent submits a yearly summary of the Site operations to this Ministry.

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A WASTE DISPOSAL SITE (LANDFILL)

NO. A273003

PAGE 7 OF 7

You may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board. Section 142 of the Environmental Protection Act, R.S.O. 1990 c. E-19, as amended, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary,
Environmental Appeal Board,
12 St. Clair Avenue West,
Suite 502,
Toronto, Ontario,
M4V 1N3

AND

The Director,
Section 39, Environmental Protection Act,
Ministry of the Environment and Energy,
985 Adelaide Street South
London, Ontario,
N6E 1V3

DATED AT LONDON this 15th day of October, 1993.



Director,
Section 39,
Environmental Protection Act



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NOTICE
Page 1 of 2

The Corporation of the Township of St. Edmunds
P.O. Box 70
Tobermory, Ontario
N0H 2R0

You are hereby notified that the Provisional Certificate of Approval No. A 273003 dated October 1, 1993, is hereby amended as follows:

- A. The first page of the Certificate of Approval is amended to read:
for the use and operation of a 2.02 hectare Waste Disposal Site (stump disposal) within a total area of 82 hectares
- B. Condition 11 is hereby revoked and replaced with the following:
11. (a) The amount of waste to be accepted at this Site may not exceed 200 cubic metres per day; and
 - (b) This Site is limited to a final volumetric capacity of 54,700 cubic metres.
- C. The Schedule "A" attached to the original Provisional Certificate of Approval No. A 273003, dated October 1, 1993, is hereby amended to add, in addition to those articles already listed, the following:
9. Application for Approval of a Waste Disposal Site (to amend the existing Certificate of Approval) dated December 7, 1995 with a cover letter from Ross Slaughter, P.Eng., of Henderson, Paddon & Associates Limited, to Mr Todd Fleet of the Ministry of the Environment, dated December 14, 1995.
 10. Document entitled "Plan of Development and Operation, Township of St. Edmunds Landfill", revised July 1995.
 11. Drawing entitled "Present Landuse, Figure 1" and drawing entitled "Site Plan and Buffer Area Landfill, Township of St. Edmunds, Figure 2", dated March 21, 1991.
 12. Engineering Plan Drawing No. 9048-01 - existing conditions, bottom elevations and final contours, Waste Disposal Site, Township of St. Edmunds, revised July 1994.
 13. Engineering Plan Drawing No. 9048-02A - Stump Dump Disposal Plan, Waste Disposal Site, Township of St. Edmunds, revised December 1995.

All other conditions on the original Provisional Certificate of Approval, dated October 1, 1993, and as amended, not affected by this amendment, remain in effect.

This Notice shall constitute part of the approval issued under Certificate of Approval No. A 273003 dated October 1, 1993.



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NOTICE
Page 2 of 2

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, you may by written notice served upon me, the Environmental Appeal Board and the Environmental Commissioner, Environmental Bill of Rights, S.O. 1993, Chapter 28, within 15 days after receipt of this Notice, require a hearing by the Board. Section 142 of the Environmental Protection Act, as amended provides that the Notice requiring a hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary,
Environmental Appeal Board,
2300 Yonge St., 12th Fl.,
P.O. Box 2382
Toronto, Ontario.
M4P 1E4

The Environmental Commissioner,
1075 Bay Street,
Suite 605,
6th Floor,
Toronto, Ontario.
M5S 2W5

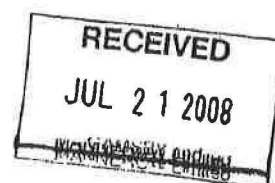
The Director,
Section 39, Environmental Protection Act,
Ministry of the Environment,
250 Davisville Avenue, 3rd Floor,
Toronto, Ontario.
M4S 1H2

This instrument is subject to Section 38 of the Environmental Bill of Rights, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek to appeal for 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry, you can determine when the leave to appeal period ends.

DATED AT TORONTO this 10th day of July, 1998.

A. Dominski, P. Eng.
Director
Section 39
Environmental Protection Act

TF/st
cc: District Manager, Barrie



Ministry of the Environment
Ministère de l'Environnement

**CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS**

NUMBER 5854-7DSSDD
Issue Date: July 11, 2008

The Corporation of the Municipality of Northern Bruce Peninsula
56 Lindsay Road 5
Rural Route, No. 2, Lions Head
Northern Bruce Peninsula, Ontario
N0H 1W0

Site Location: St. Edmunds Waste Disposal Site
Lot 46 & 47, Concession 3 WBR
Northern Bruce Peninsula Municipality, County of Bruce

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

a stormwater management facility for a total drainage area of 10.2 ha consisting of an existing 3.33 ha for municipal waste disposal, an existing 2.02 ha for tree stump disposal, and remaining 4.67 ha for access roads and recycling area, located within a total of 82 ha landfill property of the St. Edmunds Landfill Site which is located in the Municipality of Northern Bruce Peninsula, County of Bruce, designed to attenuate stormwater runoff from storm events up to 1:100 year return frequency to predevelopment levels, consisting of the following:

External Drainage Ditch (EDD)

- one (1) triangular drainage ditch approximately 900 m long with depths ranging from 0.2 m to 1.5 m and side slopes of 3H:1V, running from McArthur Road in a westerly direction through a proposed new diversion drainage ditch, designed to separate non-contact stormwater runoff from stormwater runoff originating from the approved landfill footprint, then in a southerly direction to a drainage ditch along the north side of Warner Bay Road, discharging to an existing Borrow Pit Pond (BPP2) described below;

Northwest Perimeter Drainage Ditch (NWPDD)

- one (1) triangular drainage ditch approximately 300 m long with depths ranging from 0.2 m to 1.5 m, 0.5% grades, and side slopes of 3H:1V, running along the north side of the landfill site in a westerly direction and then in a southerly direction conveying stormwater runoff from western portion of the approved landfill footprint,

discharging to a forebay of a proposed stormwater management pond (SWM Pond) described below;

Northeast Perimeter Drainage Ditch (NEPDD)

- one (1) triangular drainage ditch approximately 380 m long with depths ranging from 0.2 m to 1.5 m, 0.5% grades, and side slopes of 3H:1V, running along the north side of the landfill site in an easterly direction and then in a southerly direction conveying stormwater runoff from eastern portion of the approved landfill footprint, discharging to a forebay of a proposed stormwater management pond (SWM Pond) described below;

Stormwater Management Pond (SWM Pond)

- one (1) 215 m long and 15.0 m wide wet extended detention stormwater management pond with a maximum depth of 1.5 m and 5H:1V side slopes, providing a maximum storage capacity of 2,365 m³, located at the southern part of the landfill footprint, equipped with two (2) 70 m³ storage capacity shallow forebays at each end of the pond, receiving stormwater runoff from the approved landfill footprint only, equipped with a 20 m long 375 mm diameter PVC discharge control outlet pipe, discharging to an existing west drainage ditch described above;

Borrow Pit Pond (BPP2)

- one (1) stormwater management pond located at the southwest corner of the 82 ha landfill site property and approximately 800 m from the approved landfill footprint, created as a result of cover material extraction activities, having an approximate dimensions of 80 m long, 50 m wide, and 2.5 m deep, providing a total storage capacity of 10,000 m³, receiving stormwater flows from the drainage ditches described above, discharging to Warner Bay Road roadside ditch and eventually through Hopkins Bay to Lake Huron;
- all associated controls and appurtenances.

all in accordance with the Application for Approval of Municipal and Private Sewage Works submitted by The Municipality of Northern Bruce Peninsula dated August 21, 2007 and engineering drawings and design specifications prepared by Gamsby and Mannerow Limited, Owen Sound, Ontario, and the following documents:

1. "Certificate of Approval Application, St. Edmunds Landfill Site, Municipality of Northern Bruce Peninsula" dated May 2007, prepared by Gamsby and Mannerow Limited, Consulting Professional Engineers, Owen Sound.
2. "Plan of Development and Operation Township of St. Edmunds Landfill" revised July 1995, prepared by Henderson Paddon & Associates Limited, Owen Sound, Ontario.

3. "Surface Water Management Report, St. Edmunds Landfill Site, Municipality of Northern Bruce Peninsula" dated August 2007, prepared by Gamsby and Mannerow Limited, Consulting Professional Engineers, Owen Sound.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Act* " means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

"*Certificate* " means this entire certificate of approval document, issued in accordance with Section 53 of the *Act* , and includes any schedules;

"*Director* " means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act* ;

"*District Manager* " means the District Manager of the Owen Sound District Office of the Ministry;

"*Ministry* " means the Ontario Ministry of the Environment;

"*Owner* " means The Municipality of Northern Bruce Peninsula and includes its successors and assignees;

"*Works* " means the sewage works described in the *Owner* 's application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate* .

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

- (1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
- (2) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate* , the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate* .
- (3) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate* , the Conditions in this *Certificate*

shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

- (4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
- (5) The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Proposed Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. CHANGE OF OWNER

- (1) The *Owner* shall notify the *District Manager* and the *Director*, in writing, of any of the following changes within 30 days of the change occurring:
 - (a) change of *Owner* ;
 - (b) change of address of the *Owner* ;
 - (c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager* ; and
 - (d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C 39 shall be included in the notification to the *District Manager* .
- (2) In the event of any change in ownership of the *Works*, other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Certificate*, and a copy of such notice shall be forwarded to the *District Manager* and the *Director*.

4. MONITORING AND RECORDING

The *Owner* shall carry out the following monitoring program:

- (1) All samples and measurements taken for the purposes of this *Certificate* are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.
- (2) The Owner shall collect at least three (3) stormwater grab samples at a semi-annual frequency^{*NOTE} during spring and fall period from the designated sampling locations and analyse for the parameters listed in Table 1.

Table 1 - Surface Water Monitoring Sampling Locations: S-1 (EDD), S-6 (SWM Pond) and S-9 (BPP 2)		
Parameter	Parameter	Field Parameter
Alkalinity	CBOD5	pH
Hardness	Chloride	Temperature
Conductivity	Boron	Conductivity
pH	Phenols	
Total Ammonia	Total Phosphorus	
Nitrate	Sulphate	
Nitrite	Iron	
TKN	Zinc	
DOC		

* Note: Samples shall be collected as soon as practically possible after a rainfall event resulting in a stormwater discharge from the pond during spring and fall period.

- (3) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:
 - (a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;
 - (b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions; and
 - (c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions.
- (4) The measurement frequencies specified in subsection (2) in respect to any parameter are minimum requirements which may, after two (2) years of monitoring in accordance with this Condition, be modified by the *District Manager* in writing from time to time.

- (5) The *Owner* shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this *Certificate* .

5. OPERATION AND MAINTENANCE

- (1) Within six (6) months of the issuance date of this *Certificate* , the *Owner* shall prepare a "Stormwater Management Contingency and Remedial Action Plan" for the *Works* and submit it for approval to the *District Manager* .
- (2) The *Owner* shall compare monitoring results for sampling location S-6 (SWM Pond) obtained under Section 4 (2) with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater.

Table 2 Trigger Parameters	
Parameter	Trigger Level (mg/L unless indicated)
Ammonia (Un-ionized)	0.06
Chloride	60
Conductivity (uS/cm)	2,200

- (3) In the event of an exceedence of a trigger level for any of the trigger parameters, the *Owner* shall implement the "Stormwater Management Contingency and Remedial Action Plan" approved under Condition 5 (1) to identify the cause of contamination and implement remedial measures.
- (4) The *Owner* shall maintain a record of all trigger level exceedence events identified under Condition 5 (3). The *Owner* shall report all trigger level exceedence events and all contingency and remedial measures implemented in the annual monitoring report prepared under Condition 6 (2).
- (5) After two years of monitoring in accordance with Condition 4 (2), the *Owner* may submit to the *District Manager* an assessment report and a proposal to modify the list of trigger parameters and corresponding trigger levels stipulated under Condition 5 (2). Any modification to the list of trigger parameters and corresponding trigger levels shall be approved by the *District Manager* in writing from time to time.
- (6) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive build-up of sediments and/or vegetation.
- (7) The *Owner* shall maintain a logbook to record the results of these inspections and any

cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or *Owner's* operational headquarter for inspection by the *Ministry*. The logbook shall include the following:

- (a) the name of the *Works* ;
- (b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed; and
- (c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant.

6. REPORTING

- (1) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.
- (2) The *Owner* shall prepare, and submit to the *District Manager* upon request, a performance report, on an annual basis, by April 30th following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:
 - (a) a summary of all monitoring results undertaken in the reporting period including sampling locations and dates;
 - (b) a description of any operating problems encountered and corrective actions taken; and
 - (c) a summary of all maintenance carried out on any major structure or thing forming part of the *Works* .

The reasons for the imposition of these terms and conditions are as follows:

- 1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate* .
- 2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will

meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works* are made aware of the *Certificate* and continue to operate the *Works* in compliance with it.
4. Condition 4 is included to enable the *Owner* to evaluate and demonstrate the performance of the *Works*, on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives specified in the *Certificate* and that the *Works* does not cause any impairment to the receiving watercourse.
5. Condition 5 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry*.
6. Condition 6 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate*, so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*

The Director

Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

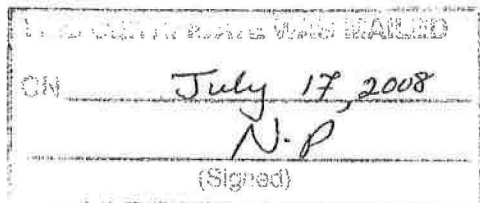
AND

Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 11th day of July, 2008



Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

SH/

c: District Manager, MOE Owen Sound
John Slocombe, Gamsby and Mannerow Engineers ✓

Appendix B Correspondence

**Ministry of the Environment and
Climate Change**

Southwestern Region
Owen Sound District Office
3rd Flr
101 17th St
Owen Sound ON N4K 0A5
Fax: (519) 371-2905
Tel: (519) 371-6191

**Ministère de l'Environnement et de
l'Action en matière de changement
climatique**

Direction régionale du Sud-Ouest
Bureau du district d'Owen Sound
101 rue 17th, 3ème étage
Owen Sound ON N4K 0A5
Télécopieur: (519) 371-2905
Tél: (519) 371-6191



June 21, 2018

Mr. Troy Cameron
Municipality of Northern Bruce Peninsula
R.R. # 2
56 Lindsay Rd. 5
Lion's Head, ON N0H 1W0

Dear Mr. Cameron,

RE: St Edmunds Landfill Site, 2017 Annual Report

We have received a copy of the report titled "Municipality of Northern Bruce Peninsula, 2017 Annual Monitoring Report – St Edmunds Landfill," dated February 2018 and prepared by GM BluePlan Engineering Limited. Our regional surface water specialist reviewed the report and provides the following comments:

Section 12 of the report notes that surface water sample location S-6 is impacted by landfill leachate. The report goes on to state " S-6....is consistent with the characteristics of the leachate impacted groundwater, the surface water quality at this location exhibits elevated concentrations of hardness, alkalinity, chloride, sodium, potassium, and ammonia." (page 19). The report does not clarify the source of leachate contamination. If the source is leachate impacted groundwater movement to the pond, our surface water reviewer may be willing to accept an attenuation argument for mitigation given there is only 6 years left of active landfilling at the site (page 3). However if leachate impact is surface water runoff associated with the open face of the landfill, then the Municipality should take steps to improve site operations to contain surface water leachate generation.

Water quality results provided in appendix G. suggest water quality results for all surface water monitoring sites are remaining within historical norms (save for S-6 discussed above), accordingly there are no other surface water comments associated with the site. No changes are recommended to the surface water monitoring program.

Please provide the undersigned with a response concerning the source of impacts to S-6 discussed above. If you have any questions concerning this letter, please contact the undersigned at (519) 371-6191.

Yours truly,

Ian Mitchell , P.Eng.
District Engineer
Owen Sound District Office

July 3, 2018
Our File: M-1555

MOECC Owen Sound District Office
101-17th Street East
Owen Sound, ON N4K 0A5

Attention: Mr. Ian Mitchell

Re: Annual Monitoring Report (2017)
Surface Water Comments
St. Edmunds Landfill Site
ECA No. A273002, A273003 and
5854-7DSSDD

Dear Ian,

This letter is being provided in response to the comments you provided in correspondence dated June 21, 2018.

With respect to the water quality at S-6, the source of leachate influence is considered to be groundwater that was intercepted during construction of the perimeter swale along the west side of the landfill. This has been documented in Annual Monitoring Reports (AMRs) starting in 2012 (i.e., monitoring year 2011) and carried forward since that time. A more fulsome discussion of the issue is provided in Section 12.2 of the 2017 AMR.

It is noted that in 2011, exceedances of the trigger levels were reported for un-ionized ammonia and contingency measures were implemented including the following:

- i. A review of the potential for off-site impacts: This concluded that attenuation of the impacts from landfill leachate was occurring within the sewage works and before reaching potential sensitive receptors (i.e., Borrow Pit Pond BPP2).*
- ii. A visual inspection for leachate seeps within the stormwater management works: This indicated that groundwater impacted with landfill leachate was discharging into the drainage ditch located west of the landfill in the vicinity of well O-2. As this drainage ditch appeared to have intersected the groundwater table, mitigative measures were undertaken in 2011 and 2012. These measures included raising the base grade of the drainage ditch with a low permeability soil to limit leachate seepage into the drainage ditch and planting of cattails (i.e. *Typha* spp.) at the outlet of the ditch which have become well established since that time.*

Since 2013, the cattails have become more established and the surface water within the pond has been observed to be much clearer relative to previous years. The reported ammonia concentrations continue to exhibit improvement relative to pre-2012 conditions. Since 2014, un-ionized ammonia concentrations have ranged between 0.002 and 0.03 mg/L, remaining below the trigger level of 0.06 mg/L. It is anticipated that concentrations of un-ionized ammonia will continue improve as the vegetation becomes further established within the drainage ditches and ponds.

Since 2012, chloride concentrations at S-6 have typically exceeded the trigger level of 60 mg/L during the fall sampling event. In the fall of 2017 a concentration of 131 mg/L was reported. It is noted that during the fall sampling event water levels were noted to be very low, with little to no flow (i.e., stagnant conditions). As previously discussed, surface water quality results suggest that adequate attenuation of impacts from landfill leachate is occurring within the sewage works and prior to reaching potential sensitive receptors (i.e., Borrow Pit Pond BPP2).

In recent years, groundwater discharge to the swale along the west side of the landfill is observed under wet conditions (typically spring), with significantly less quantity than prior to remedial efforts and with apparently better quality.

Based on landfill inspections during the monitoring program, and discussions with the Municipality, there has not been evidence of surface water run-off or leachate break-out in the active area. During the 2018 spring monitoring program (under wet conditions) there was no evidence of impacted surface water migration from the active area and the swale in this area was observed to be generally under "stagnant" flow conditions. Consequently, it appears that the impacts at S-6 are primarily related to shallow groundwater, as opposed to surface water migrating from the active area further to the east.

As the site progress landfilling progresses towards the boundaries of the footprint, and closer to the stormwater swales, it is noted that a clayey soil berm will be placed at the perimeter. This is standard practice and allows the operator a limit of fill boundary with which to work waste into lifts. The berm will mitigate the potential for contact stormwater from directly entering the swale by limiting migration and forcing infiltration.

In the meantime, the operators will continue to monitor the active area to ensure leachate impacted surface water is managed appropriately and is not directly entering the stormwater swale. Our team will also continue to provide specific inspection during the twice-annual monitoring program.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED

Per:

A handwritten signature in blue ink, appearing to read 'MN', followed by a horizontal line.

Matthew Nelson, P.Eng., P.Geo.
MN/mz

cc: Troy Cameron, Municipality of Northern Bruce Peninsula
File No. M-1555

**Ministry of the Environment,
Conservation and Parks**
Southwestern Region
Owen Sound District Office
3rd Flr
101 17th St
Owen Sound ON N4K 0A5
Fax: (519) 371-2905
Tel: (519) 371-6191

**Ministère de l'Environnement, de la
Protection de la nature et des
Parcs**
Direction régionale du Sud-Ouest
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101 rue 17th, 3ème étage
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Tél: (519) 371-6191



February 12, 2019

Mr. Troy Cameron
Municipality of Northern Bruce Peninsula
R.R. # 2
56 Lindsay Rd. 5
Lion's Head, ON N0H 1W0

Dear Mr. Cameron,

RE: St Edmunds Landfill Site, 2017 Annual Report

Further to my letter to you dated June 21, 2018, containing surface water comments for the St Edmunds Landfill 2017 Annual Monitoring Report, our regional hydrogeologist has reviewed the annual report and provides comments in the attached memorandum.

In addition, the annual report states that the generation and migration of landfill gas at the site is not considered to be of concern. The consultant should comment specifically on whether or not methane monitors should be installed in on site buildings or the attendants shack.

If you have any questions concerning this letter, please contact the undersigned at (519) 371-6191.

Yours truly,

Ian Mitchell, P.Eng.
District Engineer
Owen Sound District Office

File Storage Number: SI BR NB C2 610

enclosure

cc. H. Pfeiffer, MECP, Owen Sound
Helene Pierard, MECP, London
M.D. Nelson, GM BluePlan, Owen Sound

**Ministry of the Environment,
Conservation and Parks**

Southwestern Region
Technical Support Section
Water Resources
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London ON N6E 1L3
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Tel: (519) 873-5034

**Ministère de l'Environnement, de la
Protection de la nature et des
Parcs**

Direction régionale du Sud-Ouest
Secteur du Soutien Technique
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London ON N6E 1L3
Télécopieur: (519) 873-5020
Tél: (519) 873-5034



February 8th, 2019

Mr. Ian Mitchell, P.Eng.
District Engineer
Ministry of the Environment, Conservation and Parks
Owen Sound District Office
101 17th Street. East
Owen Sound, ON N4K 0A5

Dear Ian

**RE: St. Edmunds Landfill (ECA A273002) - 2017 Annual Monitoring
Report - Groundwater Comments
Lots 46 & 47, Concession 3 WBR, Northern Bruce Peninsula
(formerly St. Edmunds), Bruce County
Reference Numbers 2447-AVQLPV (2017) and 8028-ALZL7Z (2016)**

I reviewed the "2017 Annual Monitoring Report - St. Edmunds Landfill - ECA No. A273002, A273003 and 5854-7DSSDD" prepared by GM Blue Plan Engineering and dated February 2018.

The site is located on lots 46 and 47, concession 3 WBR, in the former township of St. Edmunds, now municipality of the Northern Bruce Peninsula in the County of Bruce. The waste disposal area occupies an area of approximately 3.33 hectares on a 82 hectare site.

The purpose of the report is to document site activities under 3 different Environmental Compliance Approvals. The purpose of my review is to assess the hydrogeological aspect of the site and determine site compliance with the Reasonable Use Guideline (Policy B-7). My comments are the following:

1. The Consultant has commented on the 'natural variability' and the significant fluctuation in the groundwater chemistry at the site. The Consultant should explain the possible causes of this variation. There should also be some consideration for the inspection and repair and/or replacement of some of the monitoring wells to ensure that the groundwater collected from the monitoring wells is representative of the groundwater quality at the site.
2. In addition to the potential well issues, especially relating to the sealing of the annular space, the fact that some of the wells, including some bedrock wells, have been assumed to be

destroyed, may add to the connectivity between the hydrogeological units. Efforts should be made to find and properly abandon these destroyed wells. If the wells cannot be found at all, the Municipality should retain a professional geoscientist or professional engineer to prepare a report regarding the risk caused by not finding the wells. Given the current land use, it would be appropriate for the qualified person to focus on contaminants of concerns and potential receptors.

3. Cross-Sections - The existing cross-sections should be expanded to include all the wells along the segment. For example, cross-section A-A' should include wells O-9 and the W-3 series. Water levels should also be noted on the cross-sections. Additional cross-sections for the site would help understand the hydrogeological conditions.
4. Are the 2 overburden units (the sand and gravel and the silt till) and the waste acting as one hydrogeological unit? It would be helpful for the "groundwater elevation table" to indicate the hydrogeological unit in which the wells are completed. It would also be helpful to have a visual aid on the figures to distinguish the wells from the different hydrogeological units. A discussion on the potential influence of the ditches and other surface water features on groundwater flow should be included in the report.
5. Leachate Characterization - Currently, the leachate at the site is characterized by the leachate chemistry of monitoring well O-2 which is near the oldest part of the landfill and is reported to be unlined. Since Area B is now closed and capped, it would be helpful to add another leachate well in Area B to not only better characterize newer waste, but also as a representative of a well with a silty/clay base. I also recommend that the list of analytical parameters for the leachate wells be revised to follow that of the long list of Schedule 5 of the Landfill Standard Guideline document. A better characterization of the leachate will also allow for a more comprehensive list of the key and/or primary leachate indicators for the site.
6. Similarly to the leachate characterization, it would be helpful to add parameters such as boron to the list of groundwater chemistry for all the wells on the site. If the leachate characterization offers additional key or primary leachate indicators, they should also be added to the analytical list of groundwater sampling.
7. The Consultant should provide additional information on the type of dust suppressant that is used at the site?
8. Interpretation of overburden groundwater chemistry - Table 4 should have the hydrogeological unit indicated for each well. By doing so, it would be easier to determine if the groundwater chemistry in the sand and gravel is significantly different than that of the till overburden wells. Even if the groundwater flow pattern is similar in the different overburden units, the attenuation of leachate may be different depending on what unit it is in.
9. Nitrate & Sulphate - On page 15 of the report, the Consultant has suggested that nitrate, nitrate and sulphate do not appear to be indicators of leachate impact on groundwater. Considering that the geochemistry of the leachate of monitoring well O-2 suggests that anaerobic conditions are present in the waste, nitrate and sulphate may not currently be present in that form in the waste mound, however they might as oxidation conditions develop.

10. Based on my current knowledge of the site and the information before me, no Reasonable Use compliance issues require immediate action. The site characterization and the groundwater monitoring, however, needs to be enhanced to increase the confidence in the information.

Please let me know if you have any questions.

Yours truly,



Helene Pierard P.Geo
Hydrogeologist
Southwestern Region

File Storage Number: SI BR NB C3 610

File Storage Number:

Limitations: The purpose of the preceding review is to provide advice to the Ministry of the Environment, Conservation and Parks regarding subsurface conditions based on the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on information provided by others, except where otherwise specifically noted. The Ministry cannot guarantee that the information that has been provided by others is accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expressed in the reviewed material.

December 14, 2021

Mr. Troy Cameron
Municipality of Northern Bruce Peninsula
R.R. # 2
56 Lindsay Rd. 5
Lion's Head, ON N0H 1W0

Via email: pwmanager@northernbruce.ca

Dear Mr. Cameron

Re: St Edmunds Landfill Site, 2020 Annual Report
MOE File: SI BR NB C2 610

We have received a copy of the report titled "Municipality of Northern Bruce Peninsula, 2020 Annual Monitoring Report – St Edmunds Landfill," dated March 2021 and prepared by GM BluePlan Engineering Limited. Our regional surface water specialist reviewed the report and provides the following comments:

ECA 5854-7DSSDD indicates that semi-annual sampling is required at surface water locations S-1, S-6, S-8 and S-9 and Point 8 in the recommendations section also lists spring and fall sampling. However, it appears that sampling in 2020 was only done in the fall with the exception of S-9 in April. The annual report should explain why S-1, S-6, S-6a and S-8 were not sampled in April as well. Is it expected that sampling will return to the approved semi-annual frequency moving forward?

The sampling results from fall 2020 indicate acceptable unionized ammonia concentrations and only slight exceedances of phenols which is also seen in background conditions.

The recommendation for continued sampling prior to trigger finalization is reasonable given the most recent sampling results.

If you have any questions concerning this letter, please contact the undersigned at (519) 374-1388.

Yours truly,



Ian Mitchell
District Engineer
Owen Sound District

cc. Alison Munro, MECP, London
MD Nelson, GM BluePlan, Owen Sound, matthew.nelson@gmblueplan.ca
Kim Pietz, MECP, Owen Sound

733 Exeter Rd
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733 Exeter Rd
London ON N6E 1L3
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Tél: (519) 873-5034

Memorandum

Date: August 12th, 2022

To: Kimberley Pietz – Senior Environmental Officer – Southwestern Region

From: Gloria Suarez – Hydrogeologist – Southwestern Region – Technical Support Section

Re: **Review of the 2020 and 2021 Annual Monitoring Reports - St. Edmund's landfill, Municipality of Northern Bruce Peninsula, Ontario**

Groundwater Technical Review Request, Reference Number: 1-107841506

In preparation of this memorandum, I have reviewed the following documents:

1. 2020 Annual Monitoring Report - St. Edmund's landfill, Municipality of Northern Bruce Peninsula, Ontario by GM BluePlan Engineering Dated March 2021, and signed by M. D. Nelson MSc, PEng, PGeo.
2. 2021 Annual Monitoring Report - St. Edmund's landfill, Municipality of Northern Bruce Peninsula, Ontario by GM BluePlan Engineering Dated March 2022, and signed by M. D. Nelson MSc, PEng, PGeo.
3. Amended Certificates of Approval (CofA) N° A273002; issued on July 10th, 1998.
4. Amended Certificates of Approval (CofA) N° A273003; issued on July 10th, 1998.

Background

As requested, I have reviewed the 2020 and 2021 Annual Monitoring Reports for the St. Edmunds Landfill (Site) located in lots 46 & 47, Concession 3 WBR Northern Bruce Peninsula prepared by GM BluePlan Engineering (Consultant) on behalf of the Municipality of Northern Bruce Peninsula (Municipality). According to Site records, an estimated 1,750 m³ of waste was landfilled in 2021 with a remaining capacity for waste and daily cover estimated to be 9,010 m³. The 82-hectare non-hazardous waste Site opened in 1970 and operates under the following instruments:

1. Amended Certificates of Approval (CofA) N° A273002; issued on July 10th, 1998.
2. Amended Certificates of Approval (CofA) N° A273003; issued on July 10th, 1998.

The Site generally slopes towards the south/southwest with an inferred groundwater flow south to south-westerly (overburden and bedrock). Based on the hydrogeologic investigation, the overburden at the Site is ~ 1.4 to 3.7 m of sand and gravel and silt till. The underlying bedrock is a poorly fractured dolostone.

The Municipality conducts a site-wide groundwater monitoring program which includes: spring and fall sampling (alkalinity, hardness, conductivity, pH, ammonia, nitrate, nitrite, DOC, chloride, sulphate, iron, sodium & potassium) from eleven (11) overburden wells (O-1, O-2, O-3, O-4, O-6, O-7, O-8, O-9, W-1, W-2 & W-3/03), seven (7) bedrock wells at five (5) different locations (B-2, B-3, B-4 & B-5) and the bedrock piezometer (P-1, P-2 & P-3). A revised sampling program was proposed to address MECP comments dated February 8th, 2019, calcium and magnesium were added to the list of leachate characterization for the analytical list of groundwater sampling in 2020. A preliminary review of results will be provided in the 2022 annual report.

Included in Appendix G of each of the 2020 and 2021 annual reports, is a Groundwater Monitoring Review report. These reports included the detailed technical evaluation of the monitoring data and an annual determination of the adequacy of the monitoring program and contingency measures. These reports were the primary focus of my review.

The purpose of my review was to evaluate whether there is potential for offsite groundwater impacts and to provide conclusions and recommendations, if any, from a hydrogeological perspective. It is noted that I did not complete an exhaustive review of historical data for the site.

My review following the Reasonable Use Criteria (RUC) and Contaminant Attenuation Zone was to determine if the Site meets RUC at property boundary for landfill contaminants of concern:

1. *Guideline B-7 Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities, and*
2. *Guideline B-7-1 Determination of Contaminant Limits and Attenuation Zones (CAZ)*

Based on my review, I offer the following comments and recommendations which may be forwarded to the technical consultant.

Comments

Monitoring wells were constructed to intersect the shallow groundwater within the overburden that has less than 4 m thickness. The historical shallow groundwater results and trends show naturally elevated hardness and sulphate concentrations and elevated conductivity. Iron is naturally presented in shallow groundwater. Nitrate, nitrite, and sulphate concentrations have not increased, suggesting these parameters are not leachate indicators. While the concentrations of other parameters remain relatively stable, conductivity, sulphate and hardness are highly variable and are typically greater in the fall. However, historical water quality can be influenced by surface water infiltration that may influence the geochemical characteristics of the groundwater.

1. Leachate Characterization – Wells O-2 & O-7 (2020) have been selected as leachate wells. O-2 results show high concentration of hardness, alkalinity, chloride, sodium, potassium, ammonia, and DOC and these parameters are primary leachate indicators for the Site. Because of historical water quality variability, only chloride, alkalinity, and potassium are reliable as leachate indicators. O-7 results indicate elevated concentrations of conductivity,

hardness, and sulphate. It could be caused by dissolved calcium, magnesium, and sulphate ions in groundwater.

2. Reasonable Use Criteria and Contamination Attenuation Zone (CAZ): the areas in which the site is divided for discussion purposes are northeastern, east, south to southeast (downgradient) and west to northwest (upgradient and considered background). Groundwater flow direction is generally towards the south-southwest. Based on the groundwater flow direction, the main area of the site where there is concern for the off-site migration of landfill-impacted groundwater are overburden and bedrock downgradient south to southeast. Overburden wells W-3/03, O-3 and O-4 indicate minor increased alkalinity, chloride, and potassium **(W-3/03 & O-3) with exceedances for RUC hardness, alkalinity, and DOC**. Bedrock downgradient wells B2, B3, & B4 show naturally elevated hardness and sulphate concentrations. B2 does not show impacts even though the depth within the bedrock is minimal. B3 located ~100 m downgradient indicates chloride, alkalinity, and potassium slightly elevated concentrations, suggesting minor leachate impacts at bedrock. **2021 RUC exceedances in B3 for hardness, alkalinity, sulphate, iron, and DOC; and in B2 & B4 for DOC and alkalinity.**

Overburden wells O-2, O-3, O-6 & W-3/03 and bedrock B3 & B4 are being influenced by leachate. Plume is migrating in southerly to southwesterly direction through overburden soils and bedrock. However, leachate influence is not considered to be greater than 100 m. Because of level of attenuation and distance to property boundaries, off-site impacts above the RUC from landfill leachate are not anticipated.

Downgradient wells O-4 & O-6 do not show landfill leachate impacts suggesting that leachate impacted groundwater has naturally attenuated between these two wells.

3. Methane Gas Management: gas is not monitored. Gas is venting passively to the atmosphere. Soils have moderate to high permeability that would permit the venting of gases to the atmosphere. Therefore, landfill gas at the site is not considered to be of concern at this time.

Conclusions and Recommendations

I concur with the consultant; Area B has reached capacity and should be capped. I recommend adding another leachate well in area B to characterize newer waste and a representative of a well with silty/clay base. I disagree with using O-7 as a leachate well of the active Area C of landfilling. The well is located ~30 m cross-gradient and to the east of landfill footprint.

Wells O-5 & B-1 were destroyed in 1994 and 1999 respectively. It is recommended, abandonment of these wells in accordance with O. Reg 903.

I noted that calcium and magnesium were added as analytical parameters in 2020 to address the MECP comments dated February 8th, 2019, for a revised sampling program. However, they were not sampled during 2020 & 2021. I recommend adding boron as a parameter to leachate characterization for all wells on the site.

SAMPLING LOCATIONS			ANALYTICAL PARAMETERS
GROUNDWATER (Spring and Fall)			
O-1 *O-2* O-3 O-4	O-6 *O-7* O-8 O-9	W-1 W-2 W-3/03	Alkalinity, Hardness, Conductivity, pH, Ammonia, Nitrate, Nitrite, DOC, Chloride, Sulphate, Iron, Sodium and Potassium Calcium and Magnesium (add in 2020)
B2 B3 B4 B5	P1 P2 P3		*Leachate wells* (as of 2020) <u>Spring:</u> Same as the indicator list outlined above <u>Fall:</u> Schedule 5: Column 1 (i.e. Comprehensive list for groundwater and leachate) which includes field parameters (i.e. pH and Conductivity)
SURFACE WATER (Spring and Fall)			
S-1 S-6 S-6A S-8 S-9			Alkalinity, Hardness, Conductivity, pH, Total Ammonia, Nitrate, Nitrite, TKN, DOC, CBOD ₅ , Chloride, Sulphate, Phenols, Total Phosphorus, Iron, Boron and Zinc (Na, K, Ca and Mg *) Field Parameters: pH, Conductivity, and Temperature

Note: *It is recommended that the surface water parameters also include Na, K, Ca and Mg.

It appears that the leachate plume is migrating in a southerly to southwesterly direction through the overburden and bedrock. Considering natural attenuation and distance to property boundaries and the landfill footprint, offsite impacts from leachate are not anticipated at this time.

The site has developed stable leachate mounds and a stable leachate plume (size and concentrations). Seasonal and annual water levels and water quality fluctuations are well understood. There are no trigger values with contingency plans or site remedial actions.

However, hardness, conductivity, chloride, and alkalinity increasing trend concentrations since 2006 have been noted in the southeast downgradient bedrock well B-4. A detailed follow-up of this well is recommended in future monitoring reports.

Groundwater level elevations should continue to be monitored in the spring and fall from all monitoring locations.

Limitations:

The purpose of the preceding review is to provide advice to the Ministry of the Environment regarding subsurface conditions based on the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on information provided by others, except where otherwise specifically noted. The Ministry cannot guarantee that the information that has been provided by others is accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expressed in the reviewed material.

I trust that this hydrogeological review is sufficient for your purposes. If you have any further comments or questions, please feel free to contact me by phone at (289) 659-4007 or by e-mail at gloria.suarez@ontario.ca.



Gloria Suarez, M.Sc., P.Geo.
Hydrogeologist – TSS – SWR
cc: B. Harman

Appendix C Borehole Logs

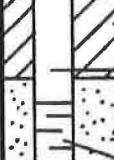
APPENDIX C
SUMMARY OF BOREHOLE LOGS AND MONITORING WELL INSTALLATION DETAILS

Well ID (Drilled)	Installation Date	Details					Screen Interval					Top of Sandpack Elevation (mbgs)		Well Screen and Sandpack Interval	Unit ID	Depth Interval of Each Unit				Description of Unit Encountered	
		Ground	TOC	BH Bottom		Bottom		Top			(mbgs)	(masl)	From			To	From	To			
				(mbgs)	(masl)	(mbgs)	(masl)	Length (ft)													
									mbgs	meters											
O-1	1988	202.1	203.31	1.2	1.52	200.59	1.52	200.59	1.20	200.91	1	1.0	201.1		Topsoil	0	0.3	202.11	201.81	Topsoil: Black, organic, sandy	
														O-1	S/G	0.3	1.52	201.81	200.59	SAND AND GRAVEL: Brown, medium to coarse.	
															[Bdrk]	1.52		200.59		Refusal: Interpreted bedrock surface	
O-2	1988	203.0	204.07	1.1	2.13	200.84	2.0	200.97	0.75	202.22	4	0.6	202.4		Sand	0	1.8	202.97	201.17	SAND: Brown, fine to medium, occasional stones	
														O-2	Sand	1.8	2.13	201.17	200.84	SAND: Brown, coarse, dense	
															[Bdrk]	2.13		200.84		Refusal: Interpreted bedrock surface	
O-3	1988	201.1	202.20	1.1	2.44	198.66	2.3	198.80	1.1	200.00	4	0.95	200.2		Topsoil	0	0.2	201.10	200.90	Topsoil: Black, organic, sandy	
														O-3	Till	0.2	2.44	200.90	198.66	SILT: Grey, some sand and clay, occasional stones (TILL)	
															[Bdrk]	2.44		198.66		Refusal: Interpreted bedrock surface	
O-4	1988	201.8	202.75	1.0	3.60	198.15	3.50	198.25	2.00	199.75	5	1.25	200.5		O-4	Till	0	3.6	201.75	198.15	Sandy SILT: Brown to grey, fine, some clay, occasional stones, dense
															[Bdrk]	3.6		198.15		Refusal: Interpreted bedrock surface	
O-5	1988	202.9	203.62	0.75	4.42	198.45	2.60	200.27	1.10	201.77	5	1.0	201.9		Topsoil	0	0.3	202.87	202.57	Topsoil: Black, organic, sandy	
															O-5	Sand	0.3	1.95	202.57	200.92	SAND: grey, medium, occasional small stones
																Till	1.95	3.8	200.92	199.07	SILT: Grey, some sand and clay, occasional stones (TILL)
																Bdrk	3.8	4.42	199.07	198.45	DOLOSTONE: weathered, interbedded with fine grey sand
O-6	1988	202.30	203.45	1.15	3.66	198.64	2.25	200.05	1.05	201.25	4	0.65	201.7		S/G	0	1.25	202.30	201.05	SAND AND GRAVEL: Grey, medium to coarse.	
														OW-6	Till	1.25	3.66	201.05	198.64	Sandy SILT: grey, fine, some clay, soft (TILL)	
															[Bdrk]	3.7		198.64		Refusal: Interpreted bedrock surface	
O-7	1988	202.23	203.38	1.15	1.37	200.86	1.37	200.86	0.75	201.48	2	0.65	201.6		Topsoil	0	0.3	202.23	201.93	Topsoil: Black, organic, sandy	
														O-7	Till	0.3	1.37	201.93	200.86	SILT: Grey-brown, some sand and clay, occasional small stones (TILL)	
															[Bdrk]	1.37		200.86		Refusal: Interpreted bedrock surface	
O-8	1988	202.16	203.26	1.10	1.37	200.79	1.37	200.79	1.05	201.11	1	0.65	201.5		Topsoil	0	0.4	202.16	201.76	Topsoil: Black, organic, sandy	
														O-8	Till	0.4	1.37	201.76	200.79	SILT: Grey-brown, some sand and clay, occasional small stones (TILL)	
															[Bdrk]	1.37		200.79		Refusal: Interpreted bedrock surface	
O-9	1988	201.90	202.65	0.75	2.40	199.50	2.40	199.50	0.90	201.00	5	0.75	201.2		Topsoil	0	0.6	201.90	201.30	Topsoil: Black, organic, sandy	
														O-9	Till	0.6	2.40	201.30	199.50	SILT: Grey, some sand and clay, occasional stones, dense (TILL)	
															[Bdrk]	2.40		199.50		Refusal: Interpreted bedrock surface	
B-1	1988	205.32	206.32	1.0*	13.4	191.92	13.40	191.92	3.10	202.22	10.3	N/A	N/A		S/G	0	0.7	205.32	204.62	SAND AND GRAVEL: Brown	
				Assumed							Open Hole			B-1	Bdrk	0.7	13.4	204.62	191.92	Dolostone: finely crystalline, buff grey	
B-2	1988	204.35	205.15	0.80	12.81	191.54	12.81	191.54	4.50	199.85	8.31	N/A	N/A		Sand	0	1.9	204.35	202.45	SAND: Brown, fine to medium, occasional stones	
															Open Hole						
															Sand	1.9	2.30	202.45	202.05	SAND: Brown, coarse, dense	
															S.Sand	2.3	4.30	202.05	200.05	Silty SAND: grey with weathered dolostone pieces	
														B-2	Bdrk	4.3	12.81	200.05	191.54	Dolostone: buff grey, poorly fractured	
B-3	1988	201.38	201.66	0.28	12.34	189.04	12.34	189.04	3.10	198.28	9.24	N/A	N/A		Till	0	1.75	201.38	199.63	Sandy SILT: Brown to grey, fine, some clay, occasional stones, dense (TILL)	
															Open Hole						
														B-3	Bdrk	1.75	3.00	199.63	198.38	Dolostone: Weathered, interbedded with fine sand	
															Bdrk	3.0	12.34	198.38	189.04	Dolostone: buff grey, poorly fractured	
B-4	1988	202.91	203.41	0.50	15.85	187.06	15.85	187.06	5.00	197.91	10.85	N/A	N/A		Sand	0	1.95	202.91	200.96	SAND: grey, medium, occasional small stones	
															Open Hole						
															Till	1.95	3.90	200.96	199.01	SILT: Grey, some sand and clay, occasional stones (TILL)	
														B-4	Bdrk	3.9	15.85	199.01	187.06	Dolostone: finely crystalline, buff grey	
B-5	1988	202.27	203.17	0.90	12.19	190.08	12.19	190.08	2.00	200.27	10.19	N/A	N/A		Sand	0	0.3	202.27	201.97	SAND: grey, medium, occasional small stones	
															Open Hole						
															Till	0.3	1.70	201.97	200.57	SILT: Grey, some sand and clay, occasional stones (TILL)	
														B-5	Bdrk	1.7	12.19	200.57	190.08	Dolostone: finely crystalline, buff grey	

- Notes:
- mbgs = meters below ground surface.
 - TOC = top of PVC pipe (i.e. measuring point); BH btm = Bottom of Borehole.
 - Information presented for wells OW-1 through OW-4 was obtained from borehole logs prepared by AMEC.
 - Borehole logs and well installation details for P1, P2, P3, W-1, W-2 and W-0-3/03 are not available.
 - In November 2022 the site was surveyed to reflect UTM derived coordinates and the elevation across the Site was lowered by 0.7 meters. Elevation have been adjusted to reflect this survey.



CLIENT ST. EDMUNDS TOWNSHIP FILE NO. 646-881
PROJECT HYDROGEOLOGIC STUDY LOCATION TOBERMORY
GEOLOGIST/ENGINEER GDP DATE COMPLETED NOVEMBER 22, 1988

DESCRIPTION		DEPTH		SAMPLE			WELL DETAIL	REMARKS	
		metres	feet	no.	type	"N"			BLOWS PER FOOT
									10 20 30 40 50 60 70 80 90
									square steel protective casing cement/bentonite surface seal
TOPSOIL, sandy, organic, black.									
SAND & GRAVEL, medium to coarse compact, brown, saturated.			1	1	SS				bentonite seal 50mm Ø PVC flush threaded riser pipe silica sand filter pack 50mm Ø PVC #10 slot well screen
END OF HOLE 1.52m Auger Refusal			5	2	SS				
			2						
			3						
			4						
			15						
			5						
			6						
			20						

GS- GRAB SAMPLE SS - SPLIT SPOON ST-'SHELBY TUBE "N" BLOWS PER FOOT WATER LEVEL ▽



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O-2

CLIENT ST. EDMUNDS TOWNSHIP

FILE NO. 646-881

PROJECT HYDROGEOLOGIC STUDY LOCATION TOBERMORY

GEOLOGIST/ENGINEER GDP DATE COMPLETED NOVEMBER 21, 1988

DESCRIPTION	DEPTH		SAMPLE			WELL DETAIL	REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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GS- GRAB SAMPLE SS- SPLIT SPOON ST- SHELBY TUBE "N" BLOWS PER FOOT WATER LEVEL ▽



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consulting engineers and hydrogeologists
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O-3

CLIENT ST. EDMUNDS TOWNSHIP

FILE NO. 646-881

PROJECT HYDROGEOLOGIC STUDY LOCATION TOBERMORY

GEOLOGIST/ENGINEER GDP DATE COMPLETED NOVEMBER 17, 1988

DESCRIPTION	DEPTH		SAMPLE			WELL DETAIL	REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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GS- GRAB SAMPLE

SS- SPLIT SPOON

ST- 'SHELBY TUBE

"N" BLOWS PER FOOT

WATER LEVEL ▽



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4500 dale road, 120, mississauga, ontario (416) 624-9300

O-4

CLIENT ST. EDMUNDS TOWNSHIP FILE NO. 646-881
PROJECT HYDROGEOLOGIC STUDY LOCATION TOBERMORY
GEOLOGIST/ENGINEER GDP DATE COMPLETED NOVEMBER 18, 1988

DESCRIPTION	DEPTH		SAMPLE			WELL DETAIL	REMARKS										
	metres	feet	no.	type	"N"		BLOWS PER FOOT										
							10	20	30	40	50	60	70	80	90		
																	square steel protective casing
																	cement/bentonite surface seal
Sandy SILT, fine, some clay, occasional stones, brown to grey, dense, saturated (TILL).		1	1	SS													bentonite seal
		5	2	SS													50mm Ø PVC flush threaded riser
		2															silica sand filter pack
			3	SS													
		3 10	4	SS													50mm Ø PVC #10 slot well screen
END OF HOLE 3.60m Auger Refusal		4															
		15															
		5															
		6 20															

GS- GRAB SAMPLE SS- SPLIT SPOON ST- SHELBY TUBE "N" BLOWS PER FOOT WATER LEVEL



CLIENT ST. EDMUNDS TOWNSHIP FILE NO. 646-881
PROJECT HYDROGEOLOGIC STUDY LOCATION TOBERMORY
GEOLOGIST/ENGINEER GDP DATE COMPLETED NOVEMBER 17, 1988

10204-75

GS- GRAB SAMPLE SS- SPLIT SPOON ST-'SHELBY TUBE "N" BLOWS PER FOOT WATER LEVEL



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0-6

CLIENT ST. EDMUNDS TOWNSHIP

FILE NO. 646-881

PROJECT HYDROGEOLOGIC STUDY LOCATION TOBERMORY

GEOLOGIST/ENGINEER GDP DATE COMPLETED NOVEMBER 20, 1988

DESCRIPTION	DEPTH		SAMPLE			WELL DETAIL	REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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GS- GRAB SAMPLE

SS- SPLIT SPOON

ST-'SHELBY TUBE

"N" BLOWS PER FOOT

WATER LEVEL ∇



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0-7

CLIENT ST. EDMUNDS TOWNSHIP

FILE NO. 646-881

PROJECT TEST DRILLING

LOCATION ST. EDMUNDS TOWNSHIP LANDFILL

GEOLOGIST/ENGINEER GDP

DATE COMPLETED NOVEMBER 14, 1988

DESCRIPTION	DEPTH metres feet	SAMPLE			WELL DETAIL	REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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GS- GRAB SAMPLE

SS- SPLIT SPOON

ST- SHELBY TUBE

"N" BLOWS PER FOOT

WATER LEVEL ∇



CLIENT ST. EDMUNDS TOWNSHIP FILE NO. 646-881
PROJECT HYDROGEOLOGIC STUDY LOCATION TOBERMORY
GEOLOGIST/ENGINEER GDP DATE COMPLETED NOVEMBER 15, 1988

GS- GRAB SAMPLE SS - SPLIT SPOON ST-'SHELBY TUBE "N" BLOWS PER FOOT WATER LEVEL 

GS- GRAB SAMPLE

SS - SPLIT SPOON

ST-'SHELBY TUBE

"N" BLOWS PER FOOT

WATER LEVEL

$$\nabla$$



CLIENT ST. EDMUNDS TOWNSHIP FILE NO. 646-881
PROJECT HYDROGEOLOGIC STUDY LOCATION TOBERMORY
GEOLOGIST/ENGINEER GDP DATE COMPLETED NOVEMBER 24, 1988

WL-040101

GS- GRAB SAMPLE SS- SPLIT SPOON ST-'SHELBY TUBE "N" BLOWS PER FOOT WATER LEVEL ∇



CLIENT ST. EDMUNDS TOWNSHIP FILE NO. 646-881
PROJECT HYDROGEOLOGIC STUDY LOCATION TOBERMORY
GEOLOGIST/ENGINEER JSC DATE COMPLETED NOVEMBER 24, 1988

01-000001

GS- GRAB SAMPLE SS - SPLIT SPOON ST- SHELBY TUBE "N" BLOWS PER FOOT WATER LEVEL



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B-2

CLIENT ST. EDMUNDS TOWNSHIP FILE NO. 646-881
PROJECT HYDROGEOLOGIC STUDY LOCATION TOBERMORY
GEOLOGIST/ENGINEER GDP DATE COMPLETED November 21, 1988

DESCRIPTION	DEPTH		SAMPLE			WELL DETAIL	REMARKS										
	metres	feet	no.	type	"N"		BLOWS PER FOOT										
								10	20	30	40	50	60	70	80	90	
																	square steel protective casing
SAND, fine to medium occasional stones, brown, saturated.		1															cement/bentonite surface seal
		5															native backfill
SAND, coarse, dense, brown, saturated.		2															
		3															50mm Ø PVC flush threaded riser
Silty SAND, grey with weathered dolostone pieces (TILL).		10															
		4															
		15															bentonite seal
DOLOSTONE, buff grey, poorly fractured.		5															PVC "o" ring
		6															
		20															
		7															
		25															
		8															
		30															
		9															
		35															
		10															
		40															
		11															
		50															
		12															
		55															
		13															
END OF HOLE 12.81m		45															
		14															
		50															
		15															
		55															
		16															
		60															
		17															
		18															
		60															

GS- GRAB SAMPLE SS- SPLIT SPOON ST- SHELBY TUBE "N" BLOWS PER FOOT WATER LEVEL ∇



CLIENT ST. EDMUNDS TOWNSHIP

FILE NO. 646-881

PROJECT HYDROGEOLOGIC STUDY

LOCATION TOBERMORY

GEOLOGIST/ENGINEER GDP

DATE COMPLETED NOVEMBER 17, 1988

201WATER LEVEL



morrison beatty limited
consulting engineers and hydrogeologists
4500 dale road, 12a, mississauga, ontario (416) 824-9308

B-4

CLIENT ST. EDMUNDS TOWNSHIP FILE NO. 646-881
PROJECT HYDROGEOLOGIC STUDY LOCATION TOBERMORY
GEOLOGIST/ENGINEER GOP DATE COMPLETED NOVEMBER 20, 1988

DESCRIPTION	DEPTH metres feet	SAMPLE no. type "N"	WELL DETAIL	REMARKS BLOWS PER FOOT									
				10	20	30	40	50	60	70	80	90	
SAND, medium, occasional small stones, grey, wet	1 5												6 5/8" I.J. steel casing
SILT, some sand and clay, occasional stones, grey, saturated (TILL).	2 10												bentonite grout
DOLOSTONE, finely crystalline, buff grey, trace thin shaley partings; poorly defined fossils, vugular with quartz crystals.	3 15												
	4 20												5 7/8" open hole
	5 25												
	6 30												
	7 35												
	8 40												
	9 45												
	10 50												
END OF HOLE 15.85m	11 55												
	12 60												

GS- GRAB SAMPLE SS- SPLIT SPOON ST- SHELBY TUBE "N" BLOWS PER FOOT WATER LEVEL ∇



morrison beatty limited
consulting engineers and hydrogeologists
4800 dale road, 18a, mississauga, ontario (416) 624-8700

B-5

CLIENT ST. EDMUNDS TOWNSHIP

FILE NO. 646-881

PROJECT HYDROGEOLOGIC STUDY

LOCATION TOBERMORY

GEOLOGIST/ENGINEER GDP

DATE COMPLETED NOVEMBER 14, 1988

DESCRIPTION	DEPTH metres feet	SAMPLE			WELL DETAIL	REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		no.	type	"N"		BLOWS PER FOOT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

GS- GRAB SAMPLE

SS- SPLIT SPOON

ST- SHELBY TUBE

"N" BLOWS PER FOOT

WATER LEVEL ∇

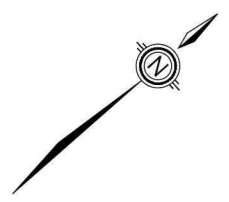
3 7/8" open rock hole

Appendix D Cross-Sections

FILE:W:\OwenSound\Municipal\1500 To M-1555\1555 St. Edmunds Waste Disposal Site\1555 Drawings\1555 AMR Figures.dwg LAYOUT-APPENDIX D
LAST SAVED BY:Kboers, 1/29/2024 4:12:12 PM PLOTTED BY:Ken Boers - GM BluePlan 1/29/2024 5:14:50 PM

B.M. #1 ELEV. 206.29m
NAIL & FLAGGING IN EAST FACE OF FIRST HYDRO POLE
NORTHWEST OF LANDFILL MAIN ENTRANCE.

M-1555
St. Edmund's Annual Report
Part Lots 46 & 47, Conc. 3 W.B.R.
Municipality of Northern Bruce Peninsula



LEGEND

- APPROXIMATE LIMIT OF EXISTING LANDFILL
- - - EXISTING DITCH, SWALE
- ~ TREELINE
- ▲ SW-2 ACTIVE SURFACE WATER MONITORING STATION
- △ S-3 FORMER SURFACE WATER MONITORING STATION
- ⊕ O-7 (Ob) MONITORING WELL
- ⊙ P3 (Bdrk) BEDROCK PIEZOMETER

NOTES:

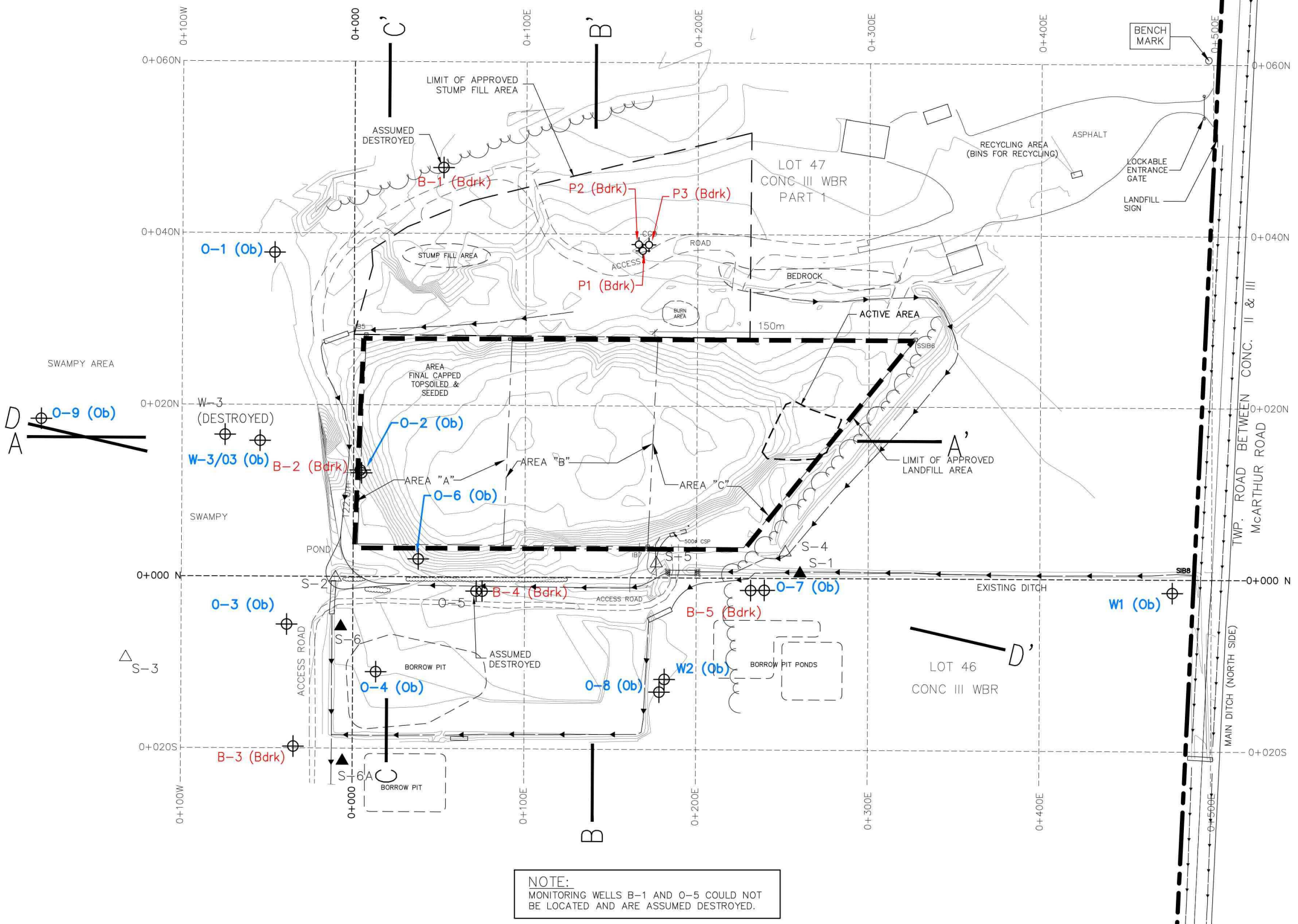
1. THE INFORMATION SHOWN HERE WAS OBTAINED FROM A DRAWING BY HENDERSON PADDON AND ASSOCIATES LIMITED, DATED JUNE 2005.
2. LOCATION OF PROPERTY LINES ARE APPROXIMATE ONLY.
3. SURFACE WATER DRAINAGE FEATURES WERE SURVEYED BY GAMSBY AND MANNEROW LIMITED ON APRIL 25, 2007.
4. FIGURES WERE ADJUSTED IN 2022 TO SUIT UTM DERIVED COORDINATES AND THE ELEVATIONS ACROSS THE SITE WERE LOWERED BY 0.7m.

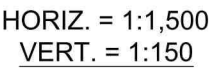
SCALE = 1:2,500
JANUARY 2024

CROSS-SECTION
LOCATION PLAN

ST. EDMUNDS
WASTE DISPOSAL SITE

Appendix D



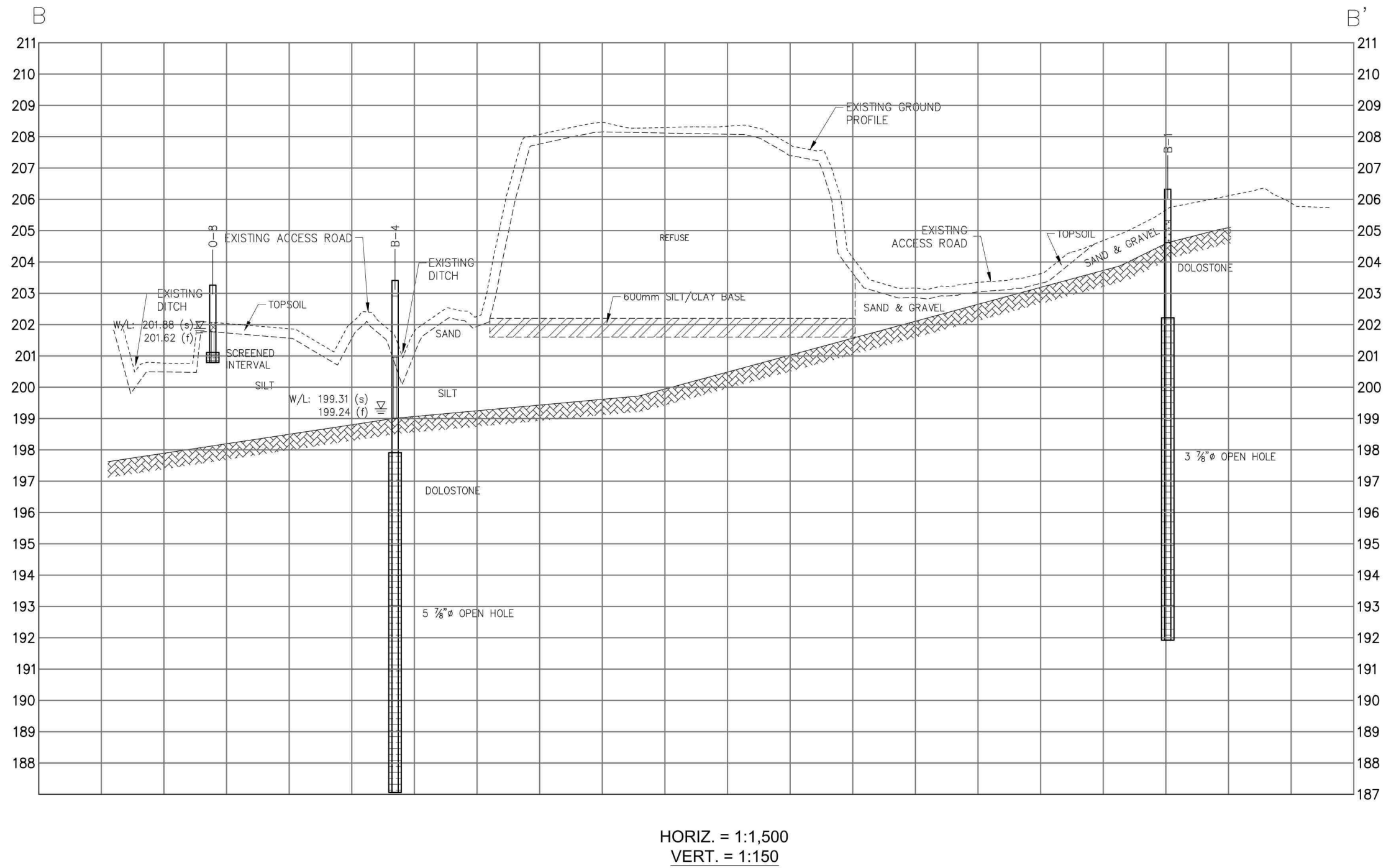


IN NOVEMBER 2022 THE SITE WAS SURVEYED TO REFLECT UTM DERIVED COORDINATES AND THE ELEVATION ACROSS THE SITE WAS LOWERED BY 0.7 METERS.

Appendix D1



M-1555
St. Edmund's Annual Report
Part Lots 46 & 47, Conc. 3 W.B.R.
Municipality of Northern Bruce Peninsula



NOTE:

IN NOVEMBER 2022 THE SITE WAS SURVEYED TO REFLECT UTM DERIVED COORDINATES AND THE ELEVATION ACROSS THE SITE WAS LOWERED BY 0.7 METERS.

JANUARY 2024

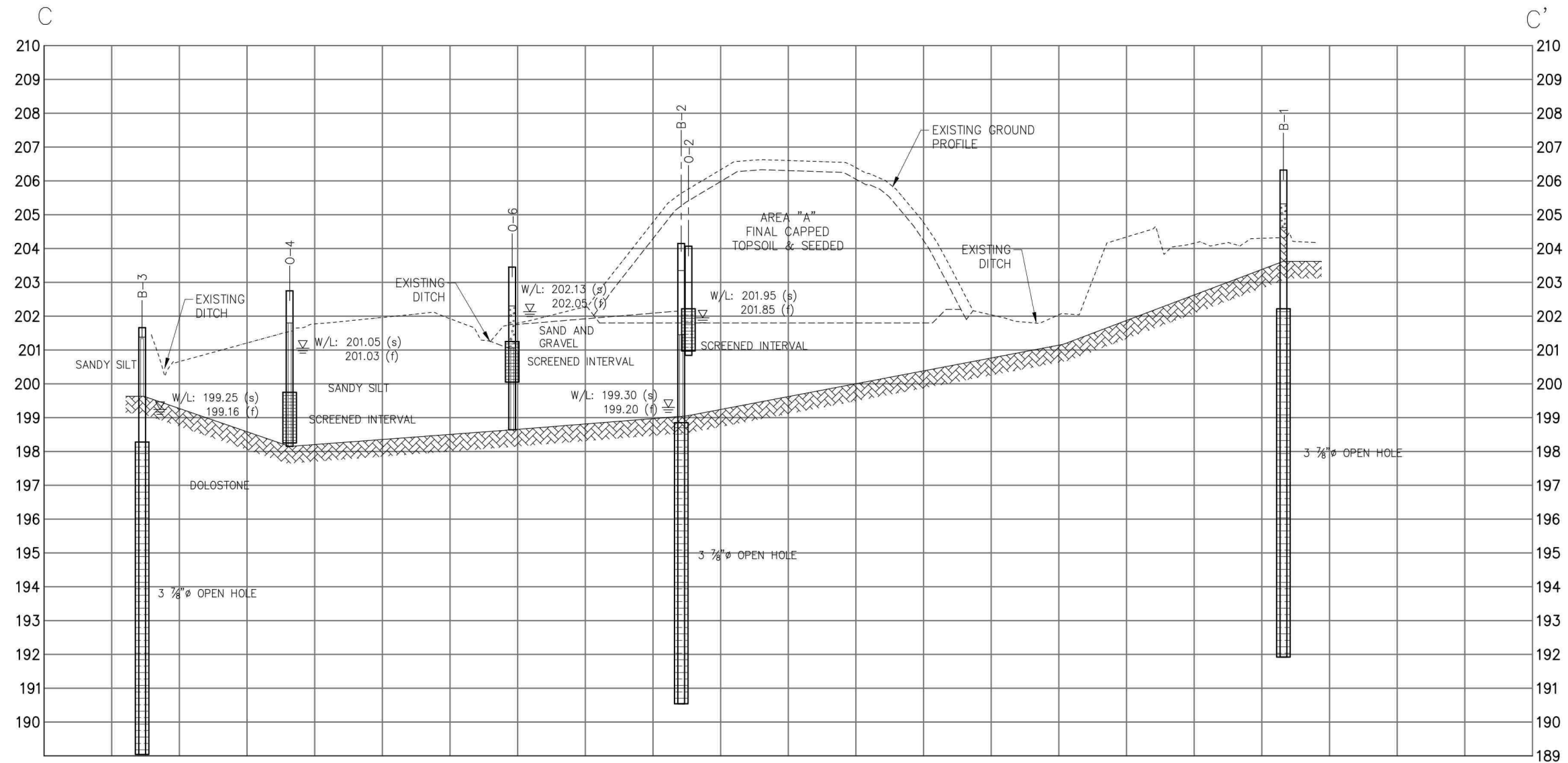
CROSS-SECTION B-B'

ST. EDMUNDS
WASTE DISPOSAL SITE

Appendix D2



M-1555
St. Edmund's Annual Report
Part Lots 46 & 47, Conc. 3 W.B.R.
Municipality of Northern Bruce Peninsula



HORIZ. = 1:1,500
VERT. = 1:150

NOTE:

IN NOVEMBER 2022 THE SITE WAS SURVEYED TO REFLECT UTM DERIVED COORDINATES AND THE ELEVATION ACROSS THE SITE WAS LOWERED BY 0.7 METERS.

JANUARY 2024

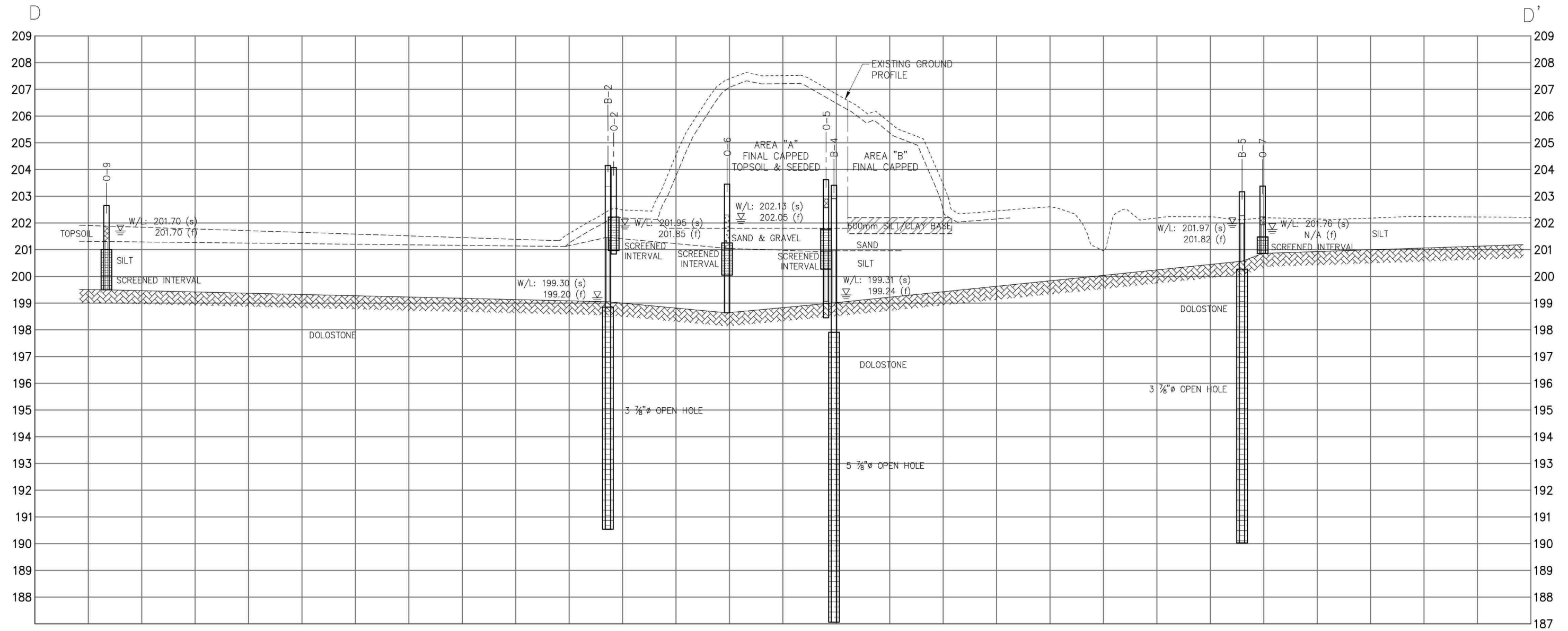
CROSS-SECTION C-C'

ST. EDMUNDS
WASTE DISPOSAL SITE

Appendix D3



M-1555
St. Edmund's Annual Report
Part Lots 46 & 47, Conc. 3 W.B.R.
Municipality of Northern Bruce Peninsula



HORIZ. = 1:1,500
VERT. = 1:150

JANUARY 2024

CROSS-SECTION D-D'

ST. EDMUNDS
WASTE DISPOSAL SITE

Appendix D4

NOTE:

IN NOVEMBER 2022 THE SITE WAS SURVEYED TO REFLECT UTM DERIVED COORDINATES AND THE ELEVATION ACROSS THE SITE WAS LOWERED BY 0.7 METERS.



Appendix E Summary of Historical Groundwater Elevations

SUMMARY OF HISTORICAL GROUNDWATER LEVEL ELEVATIONS

Unit	Well ID	Reference Elevation TOC (masl)	Well Depth from TOC (masl)	12-Dec-88		30-Jan-89		13-Dec-89		7-Mar-90		13-Jan-93		25-Jan-94	
				Water Level		Water Level		Water Level		Water Level		Water Level		Water Level	
				Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation
Overburden	O-1	204.01	2.73	1.47	202.54	1.34	202.67	1.53	202.48	1.56	202.45	Frozen	----	1.70	202.31
	O-2	204.77	3.25	2.24	202.53	2.11	202.66	2.27	202.50	2.22	202.55	2.15	202.62	2.42	202.35
	O-3	202.90	3.42	1.30	201.60	1.19	201.71	1.245	201.66	1.25	201.65	Frozen	----	1.30	201.60
	O-4	203.45	4.50	1.55	201.90	1.16	202.29	1.50	201.95	1.45	202.00	1.42	202.03	1.35	202.10
	O-5	204.32	3.33	1.83	202.49	1.65	202.67	1.74	202.58	1.75	202.57	1.65	202.67	Destroyed	
	O-6	204.15	3.46	1.75	202.40	1.59	202.56	1.72	202.43	1.73	202.42	1.41	202.74	NM	----
	O-7	204.08	2.60	DRY	----	1.17	202.91	1.425	202.66	1.40	202.68	Frozen	----	Frozen	----
	O-8	203.96	2.32	DRY	----	1.19	202.77	Frozen	----	1.39	202.57	Frozen	----	Frozen	----
	O-9	203.35	3.16	1.40	202.51	1.30	202.61	1.47	202.44	1.44	202.47	Frozen	----	1.55	202.36
	W-1	NA	1.65	1.04	NA	0.96	NA	1.00	NA	0.98	NA	Frozen	NA	Frozen	NA
	W-2	203.97	3.52	1.35	202.62	1.21	202.76	Frozen	----	1.33	202.64	Frozen	----	Frozen	----
	W-3	202.86	1.91	1.14	201.72	1.00	201.86	1.15	201.71	1.13	201.73	1.05	201.81	1.12	201.74
Bedrock	B-1	207.02	13.37	6.35	200.67	6.07	200.95	6.30	200.72	6.30	200.72	6.05	200.97	6.32	200.70
	B-2	204.85	13.61	4.60	200.25	4.46	200.39	4.70	200.15	4.63	200.22	4.54	200.31	4.65	200.20
	B-3	202.36	11.70	1.70	200.66	1.96	200.40	2.20	200.16	2.14	200.22	2.08	200.28	2.18	200.18
	B-4	204.11	15.61	3.96	200.15	3.65	200.46	3.18	200.93	3.27	200.84	3.58	200.53	3.86	200.25
	B-5	203.87	12.80	0.99	202.88	0.90	202.97	Frozen	----	0.92	202.95	Frozen	----	Frozen	----
	P-1	205.36	17.58	NI	----	NI	----	NI	----	NI	----	3.21	202.15	3.52	201.84
	P-2	205.36	31.89	NI	----	NI	----	NI	----	NI	----	5.27	200.09	5.68	199.68
	P-3	205.35	9.12	NI	----	NI	----	NI	----	NI	----	3.12	202.23	3.36	201.99

Unit	Well ID	Reference Elevation TOC (masl)	Well Depth from TOC (masl)	16-Nov-94		30-Oct-95		17-Dec-96		15-Oct-97		28-Oct-98		9-Nov-99	
				Water Level		Water Level		Water Level		Water Level		Water Level		Water Level	
				Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation
Overburden	O-1	204.01	2.73	1.54	202.47	1.45	202.56	1.21	202.80	1.55	202.46	2.00	202.01	1.36	202.65
	O-2	204.77	3.25	2.31	202.46	2.25	202.52	2.10	202.67	2.30	202.47	2.70	202.07	2.21	202.56
	O-3	202.90	3.42	1.31	201.59	1.26	201.64	1.20	201.70	1.31	201.59	2.00	200.90	1.24	201.66
	O-4	203.45	4.50	1.40	202.05	1.28	202.17	1.24	202.21	1.36	202.09	2.90	200.55	1.62	201.83
	O-6	204.15	3.46	1.84	202.31	1.47	202.68	1.40	202.75	1.56	202.59	2.00	202.15	1.40	202.75
	O-7	204.08	2.60	1.38	202.70	1.35	202.73	1.30	202.78	1.39	202.69	NM	----	1.37	202.71
	O-8	203.96	2.32	1.42	202.54	1.35	202.61	1.34	202.62	1.45	202.51	NM	----	1.43	202.53
	O-9	203.35	3.16	1.30	202.61	1.38	202.53	1.35	202.56	1.43	202.48	2.22	201.69	1.48	202.43
	W-1	NA	1.65	1.32	NA	1.17	NA	1.14	NA	1.25	NA	1.31	NA	1.23	NA
	W-2	203.97	3.52	1.33	202.64	1.23	202.74	1.21	202.76	1.33	202.64		203.97	1.28	202.69
	W-3	202.86	1.91	1.09	201.77	1.03	201.83	1.01	201.85	1.11	201.75	1.30	201.56	1.22	201.64
	B-1	207.02	13.37	NM	----	4.63	202.39	5.58	201.44	6.17	200.85	6.80	200.22	Destroyed	
Bedrock	B-2	204.85	13.61	4.64	200.21	4.60	200.25	4.55	200.30	4.65	200.20	5.50	199.35	4.61	200.24
	B-3	202.36	11.70	2.12	200.24	2.12	200.24	2.50	199.86	2.16	200.20	3.05	199.31	2.16	200.20
	B-4	204.11	15.61	3.86	200.25	3.71	200.40	3.68	200.43	3.86	200.25	4.65	199.46	3.81	200.30
	B-5	203.87	12.80	1.05	202.82	0.95	202.92	0.82	203.05	0.98	202.89	1.22	202.65	0.88	202.99
	P-1	205.36	17.58	2.02	203.34	1.93	203.43	1.95	203.41	1.71	203.65	3.00	202.36	3.11	202.25
	P-2	205.36	31.89	5.48	199.88	5.40	199.96	5.17	200.19	5.07	200.29	6.33	199.03	5.35	200.01
	P-3	205.35	9.12	2.98	202.37	2.52	202.83	2.94	202.41	2.93	202.42	3.89	201.46	3.72	201.63

SUMMARY OF HISTORICAL GROUNDWATER LEVEL ELEVATIONS

Unit	Well ID	Reference Elevation TOC (masl)	Well Depth from TOC (masl)	27-Oct-00		1-Nov-01		12-Nov-02		23-Oct-03		10-Nov-04		1-Nov-05	
				Water Level		Water Level		Water Level		Water Level		Water Level		Water Level	
				Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation
Overburden	O-1	204.01	2.73	1.68	202.33	1.53	202.48	1.57	202.44	1.75	202.26	1.92	202.09	1.34	202.67
	O-2	204.77	3.25	2.47	202.30	2.15	202.62	2.32	202.45	2.44	202.33	2.56	202.21	2.22	202.55
	O-3	202.90	3.42	1.45	201.45	1.28	201.62	1.33	201.57	1.46	201.44	1.55	201.35	1.23	201.67
	O-4	203.45	4.50	2.20	201.25	1.68	201.77	1.75	201.70	1.67	201.78	1.96	201.49	1.59	201.86
	O-6	204.15	3.46	1.66	202.49	1.32	202.83	1.56	202.59	1.82	202.33	1.85	202.30	1.63	202.52
	O-7	204.08	2.60	2.00	202.08	1.36	202.72	1.40	202.68	2.11	201.97	DRY	----	1.35	202.73
	O-8	203.96	2.32	2.20	201.76	1.42	202.54	1.44	202.52	DRY	----	DRY	----	1.38	202.58
	O-9	203.35	3.16	1.68	202.23	1.53	202.38	1.59	202.32	1.91	202.00	1.39	201.96	0.95	202.40
	W-1	NA	1.65	1.28	NA	1.20	NA	1.23	NA	1.27	NA	1.35	NA	0.95	NA
	W-2	203.97	3.52	2.03	201.94	1.20	202.77	1.37	202.60	2.71	201.26	2.76	201.21	0.83	203.14
	W-3	202.86	1.91	Plugged		Plugged		Plugged		Plugged		Plugged		Plugged	
	W-3/03	202.96	2.14	Not Installed		Not Installed		Not Installed		0.87	202.09	0.89	202.07	0.74	202.22
Bedrock	B-2	204.85	13.61	4.90	199.95	2.27	202.58	4.82	200.03	5.16	199.69	5.36	199.49	4.79	200.06
	B-3	202.36	11.70	2.42	199.94	4.72	197.64	2.33	200.03	2.70	199.66	2.87	199.49	2.34	200.02
	B-4	204.11	15.61	4.11	200.00	NM	----	4.04	200.07	4.45	199.66	4.55	199.56	4.00	200.11
	B-5	203.87	12.80	1.20	202.67	0.95	202.92	0.97	202.90	1.18	202.69	1.33	202.54	0.90	202.97
	P-1	205.36	17.58	3.40	201.96	3.10	202.26	3.28	202.08	3.57	201.79	4.22	201.14	3.35	202.01
	P-2	205.36	31.89	5.66	199.70	5.20	200.16	5.44	199.92	6.24	199.12	6.28	199.08	5.62	199.74
	P-3	205.35	9.12	3.55	201.80	2.90	202.45	3.06	202.29	3.30	202.05	3.40	201.95	2.97	202.38

Unit	Well ID	Reference Elevation TOC (masl)	Well Depth from TOC (masl)	18-Apr-06		31-Oct-06		19-Apr-07		20-Nov-07		15-Apr-08		7-Oct-08	
				Water Level		Water Level		Water Level		Water Level		Water Level		Water Level	
				Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation
Overburden	O-1	204.01	2.73	1.46	202.55	1.51	202.50	1.45	202.56	1.58	202.43	1.25	202.76	1.93	202.08
	O-2	204.77	3.25	2.18	202.59	2.27	202.50	2.18	202.59	2.30	202.47	2.07	202.70	2.56	202.21
	O-3	202.90	3.42	1.39	201.51	1.34	201.56	1.35	201.55	1.32	201.58	1.29	201.61	1.93	200.97
	O-4	203.45	4.50	1.75	201.70	1.77	201.68	1.76	201.69	1.72	201.73	1.66	201.79	2.87	200.58
	O-6	204.15	3.46	1.36	202.79	1.57	202.58	1.30	202.85	1.61	202.54	1.32	202.83	1.83	202.32
	O-7	204.08	2.60	1.38	202.70	1.42	202.66	1.34	202.74	1.40	202.68	1.80	202.28	Dry	NA
	O-8	203.96	2.32	1.42	202.54	1.35	202.61	1.43	202.53	1.34	202.62	1.43	202.53	Dry	NA
	O-9	203.35	3.16	0.95	202.40	0.99	202.36	1.00	202.35	1.04	202.31	0.95	202.40	1.63	201.72
	W-1	NA	1.65	1.00	NA	1.07	NA	1.06	NA	1.06	NA	Dry	NA	1.29	NA
	W-2	203.97	3.52	0.89	203.08	0.89	203.08	0.98	202.99	0.89	203.08	1.04	202.93	1.76	202.21
	W-3	202.86	1.91	1.06	201.80	1.21	201.65	1.18	201.68	----	----	1.12	201.74	1.45	201.41
	W-3/03	202.96	2.14	0.76	202.20	0.81	202.15	0.78	202.18	0.77	202.19	0.74	202.22	1.00	201.96
Bedrock	B-2	204.85	13.61	4.87	199.98	4.87	199.98	4.93	199.92	4.91	199.94	4.85	200.00	5.47	199.38
	B-3	202.36	11.70	2.38	199.98	2.42	199.94	2.50	199.86	2.46	199.90	2.41	199.95	3.03	199.33
	B-4	204.11	15.61	4.03	200.08	4.01	200.10	4.20	199.91	4.17	199.94	4.15	199.96	4.71	199.40
	B-5	203.87	12.80	0.92	202.95	0.95	202.92	0.98	202.89	1.10	202.77	1.69	202.18	1.58	202.29
	P-1	205.36	17.58	3.94	201.42	4.09	201.27	4.02	201.34	3.48	201.88	3.92	201.44	4.22	201.14
	P-2	205.36	31.89	5.81	199.55	5.82	199.54	5.97	199.39	9.10	196.26	5.64	199.72	6.50	198.86
	P-3	205.35	9.12	4.50	200.85	3.16	202.19	3.53	201.82	6.33	199.02	3.45	201.90	3.57	201.78

SUMMARY OF HISTORICAL GROUNDWATER LEVEL ELEVATIONS

Unit	Well ID	Reference Elevation TOC (masl)	Well Depth from TOC (masl)	20-Apr-09		11-Nov-09		7-Apr-10		12-Nov-10		14-Apr-11		1-Nov-11	
				Water Level		Water Level		Water Level		Water Level		Water Level		Water Level	
				Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation
Overburden	O-1	204.01	2.73	1.40	202.61	1.60	202.41	1.95	202.06	2.06	201.95	1.40	202.61	1.54	202.47
	O-2	204.77	3.25	2.16	202.61	2.26	202.51	2.64	202.13	2.75	202.02	2.52	202.25	2.38	202.39
	O-3	202.90	3.42	1.23	201.67	1.30	201.60	1.21	201.69	1.51	201.39	1.28	201.62	1.36	201.54
	O-4	203.45	4.50	1.83	201.62	1.78	201.68	1.64	201.81	2.09	201.36	1.65	201.80	1.71	201.74
	O-6	204.15	3.46	1.37	202.78	1.48	202.67	1.50	202.65	1.94	202.21	1.31	202.84	1.50	202.65
	O-7	204.08	2.60	1.68	202.40	1.85	202.23	1.60	202.48	2.18	201.90	1.80	202.28	1.82	202.26
	O-8	203.96	2.32	1.51	202.45	dry	NA	1.43	202.53	1.85	202.11	1.80	202.16	1.79	202.17
	O-9	203.35	3.16	0.94	202.41	0.97	202.38	1.27	202.08	1.47	201.88	0.97	202.38	1.03	202.32
	W-1	NA	1.65	1.02	NA	1.07	NA	NA	NA	1.10	NA	1.03	NA	----	----
	W-2	203.97	3.52	0.92	203.05	2.15	201.82	1.15	202.82	1.38	202.59	1.38	202.59	1.41	202.56
	W-3	202.86	1.91	1.10	201.76	1.2	201.66	1.14	201.72	1.3	201.56	----	----	----	----
	W-3/03	202.96	2.14	0.74	202.22	0.79	202.17	0.78	202.18	1.04	201.92	0.80	202.16	0.82	202.14
Bedrock	B-2	204.85	13.61	4.85	200.00	4.90	199.95	5.24	199.61	5.36	199.49	4.80	200.05	4.82	200.03
	B-3	202.36	11.70	2.40	199.96	2.47	199.89	2.51	199.85	2.89	199.47	2.43	199.93	2.43	199.93
	B-4	204.11	15.61	4.06	200.05	4.16	199.95	4.20	199.91	4.61	199.50	4.05	200.06	4.10	200.01
	B-5	203.87	12.80	1.17	202.70	2.46	201.41	1.54	202.33	1.57	202.30	1.70	202.17	1.72	202.15
	P-1	205.36	17.58	3.60	201.76	3.90	201.46	4.43	200.93	4.25	201.11	4.20	201.16	4.05	201.31
	P-2	205.36	31.89	5.66	199.70	5.94	199.42	5.96	199.40	6.39	198.97	5.75	199.61	5.79	199.57
	P-3	205.35	9.12	3.60	201.75	3.30	202.05	4.41	200.94	3.63	201.72	3.17	202.18	3.70	201.65

Unit	Well ID	Reference Elevation TOC (masl)	Well Depth from TOC (masl)	11-Apr-12		1-Nov-12		15-Apr-13		14-Nov-13		12-May-14		29-Oct-14	
				Water Level		Water Level		Water Level		Water Level		Water Level		Water Level	
				Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation
Overburden	O-1	204.01	2.73	1.71	202.30	1.80	202.21	1.21	202.80	1.52	202.49	1.45	202.56	1.46	202.55
	O-2	204.77	3.25	2.44	202.33	2.55	202.22	2.00	202.77	2.21	202.56	2.30	202.47	2.20	202.57
	O-3	202.90	3.42	1.37	201.53	1.36	201.54	1.26	201.64	1.36	201.54	1.31	201.59	1.25	201.65
	O-4	203.45	4.50	1.91	201.54	1.64	201.81	1.60	201.85	1.72	201.73	1.77	201.68	1.62	201.83
	O-6	204.15	3.46	1.59	202.56	1.85	202.30	1.27	202.88	1.45	202.70	1.38	202.77	1.44	202.71
	O-7	204.08	2.60	2.03	202.05	1.91	202.17	1.70	202.38	1.84	202.24	1.80	202.28	1.69	202.39
	O-8	203.96	2.32	1.96	202.00	1.58	202.38	1.54	202.42	1.74	202.22	1.61	202.35	1.40	202.56
	O-9	203.35	3.16	1.05	202.30	1.15	202.20	0.96	202.39	1.00	202.35	0.98	202.37	0.96	202.39
	W-1	NA	1.65	1.06	NA	1.05	NA	1.01	NA	1.07	NA	1.06	NA	1.03	NA
	W-2	203.97	3.52	1.50	202.47	1.39	202.58	1.27	202.70	1.33	202.64	1.16	202.81	1.05	202.92
	W-3	202.86	1.91	----	----	1.27	201.59	1.21	201.65	1.13	201.73	1.09	201.77	1.02	201.84
	W-3/03	202.96	2.14	0.82	202.14	0.90	202.06	0.73	202.23	0.78	202.18	0.76	202.20	0.77	202.19
Bedrock	B-2	204.85	13.61	4.99	199.86	5.21	199.64	4.81	200.04	4.86	199.99	4.85	200.00	4.80	200.05
	B-3	202.36	11.70	2.56	199.80	2.78	199.58	2.37	199.99	2.45	199.91	2.44	199.92	2.36	200.00
	B-4	204.11	15.61	4.23	199.88	4.37	199.74	4.40	199.71	4.3	199.81	4.80	199.31	4.04	200.07
	B-5	203.87	12.80	1.70	202.17	1.68	202.19	1.77	202.10	1.64	202.23	1.34	202.53	1.38	202.49
	P-1	205.36	17.58	4.24	201.12	4.35	201.01	4.00	201.36	3.72	201.64	4.33	201.03	4.25	201.11
	P-2	205.36	31.89	5.99	199.37	9.25	196.11	5.71	199.65	5.86	199.50	5.73	199.63	5.89	199.47
	P-3	205.35	9.12	3.54	201.81	2.16	203.19	3.1	202.25	2.8	202.55	2.8	202.55	2.66	202.69

SUMMARY OF HISTORICAL GROUNDWATER LEVEL ELEVATIONS

Unit	Well ID	Reference Elevation TOC (masl)	Well Depth from TOC (masl)	23-Apr-15		29-Oct-15		21-Apr-16		1-Nov-16		25-Apr-17		14-Nov-17	
				Water Level		Water Level		Water Level		Water Level		Water Level		Water Level	
				Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation
Overburden	O-1	204.01	2.73	1.32	202.69	2.23	201.78	1.35	202.66	1.93	202.08	1.47	202.54	1.83	202.18
	O-2	204.77	3.25	2.11	202.66	2.65	202.12	2.10	202.67	2.57	202.20	2.12	202.65	2.47	202.30
	O-3	202.90	3.42	1.27	201.63	1.74	201.16	1.28	201.62	1.43	201.47	1.33	201.57	1.32	201.58
	O-4	203.45	4.50	1.61	201.84	4.28	199.17	1.74	201.71	2.03	201.42	1.70	201.75	1.70	201.75
	O-6	204.15	3.46	1.30	202.85	1.96	202.19	1.28	202.87	1.83	202.32	1.36	202.79	1.74	202.41
	O-7	204.08	2.60	1.60	202.48	2.43	201.65	1.67	202.41	2.09	201.99	2.00	202.08	1.86	202.22
	O-8	203.96	2.32	1.39	202.57	1.56	202.40	1.42	202.54	2.08	201.88	1.95	202.01	1.94	202.02
	O-9	203.35	3.16	0.96	202.39	2.00	201.35	0.95	202.40	1.49	201.86	0.99	202.36	1.03	202.32
	W-1	NA	1.65	1.03	NA	1.06	NA	1.05	NA	1.12	NA	1.04	NA	1.06	NA
	W-2	203.97	3.52	0.95	203.02	1.32	202.65	0.95	203.02	1.64	202.33	1.57	202.40	1.56	202.41
	W-3/03	202.96	2.14	0.79	202.17	0.80	202.16	0.59	202.37	1.30	201.66	0.76	202.20	0.86	202.10
Bedrock	B-2	204.85	13.61	4.75	200.10	5.94	198.91	4.80	200.05	5.57	199.28	4.86	199.99	5.14	199.71
	B-3	202.36	11.70	2.37	199.99	3.55	198.81	2.44	199.92	3.15	199.21	2.51	199.85	2.73	199.63
	B-4	204.11	15.61	4.06	200.05	5.09	199.02	4.28	199.83	4.68	199.43	4.14	199.97	4.38	199.73
	B-5	203.87	12.80	1.19	202.68	1.78	202.09	1.20	202.67	1.90	201.97	1.87	202.00	1.85	202.02
	P-1	205.36	17.58	4.43	200.93	6.25	199.11	4.50	200.86	5.90	199.46	4.87	200.49	4.57	200.79
	P-2	205.36	31.89	5.68	199.68	6.94	198.42	5.67	199.69	6.63	198.73	5.73	199.63	6.23	199.13
	P-3	205.35	9.12	3.80	201.55	3.88	201.47	2.95	202.40	3.18	202.17	3.14	202.21	2.98	202.37

Unit	Well ID	Reference Elevation TOC (masl)	Well Depth from TOC (masl)	8-May-18		20-Nov-18		16-Apr-19		22-Oct-19		25-Apr-20		28-Oct-20	
				Water Level		Water Level		Water Level		Water Level		Water Level		Water Level	
				Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation
Overburden	O-1	204.01	2.73	1.29	202.72	1.55	202.46	1.23	202.78	1.66	202.35	1.68	202.33	1.61	202.40
	O-2	204.77	3.25	2.03	202.74	2.18	202.59	1.97	202.80	2.34	202.43	2.26	202.51	2.30	202.47
	O-3	202.90	3.42	1.29	201.61	1.30	201.60	1.27	201.63	1.31	201.59	1.30	201.60	1.29	201.61
	O-4	203.45	4.50	1.67	201.78	1.68	201.77	1.55	201.90	1.65	201.80	1.43	202.02	1.67	201.78
	O-6	204.15	3.46	1.24	202.91	1.42	202.73	NM	NM	1.62	202.53	1.50	202.65	1.53	202.62
	O-7	204.08	2.60	1.84	202.24	1.84	202.24	1.66	202.42	1.77	202.31	1.94	202.14	1.78	202.30
	O-8	203.96	2.32	1.89	202.07	1.65	202.31	1.40	202.56	1.74	202.22	2.03	201.93	1.64	202.32
	O-9	203.35	3.16	0.96	202.39	0.97	202.38	0.96	202.39	0.97	202.38	0.99	202.36	1.00	202.35
	W-1	NA	1.65	0.99	NA	1.02	NA	1.01	NA	1.03	NA	1.03	NA	1.02	NA
	W-2	203.97	3.52	1.52	202.45	1.48	202.49	1.25	202.72	1.42	202.55	1.61	202.36	1.43	202.54
	W-3/03	202.96	2.14	0.79	202.17	0.80	202.16	0.78	202.18	0.84	202.12	0.79	202.17	0.81	202.15
Bedrock	B-2	204.85	13.61	4.81	200.04	4.90	199.95	4.71	200.14	5.03	199.82	4.95	199.90	4.93	199.92
	B-3	202.36	11.70	2.40	199.96	2.50	199.86	2.36	200.00	2.65	199.71	2.52	199.84	2.52	199.84
	B-4	204.11	15.61	4.08	200.03	4.15	199.96	4.03	200.08	4.33	199.78	4.19	199.92	4.21	199.90
	B-5	203.87	12.80	1.83	202.04	1.86	202.01	1.79	202.08	1.86	202.01	1.82	202.05	1.83	202.04
	P-1	205.36	17.58	4.23	201.13	4.38	200.98	4.17	201.19	2.71	202.65	4.30	201.06	4.27	201.09
	P-2	205.36	31.89	5.62	199.74	5.89	199.47	5.68	199.68	6.01	199.35	5.99	199.37	5.93	199.43
	P-3	205.35	9.12	2.74	202.61	2.64	202.71	2.51	202.84	2.70	202.65	2.88	202.47	2.93	202.42

SUMMARY OF HISTORICAL GROUNDWATER LEVEL ELEVATIONS

Unit	Well ID	Reference Elevation TOC (masl)	Well Depth from TOC (masl)	4-May-21		6-Oct-21	
				Water Level		Water Level	
				Measured	Elevation	Measured	Elevation
Overburden	O-1	204.01	2.73	1.28	202.73	1.84	202.17
	O-2	204.77	3.25	2.10	202.67	2.40	202.37
	O-3	202.90	3.42	1.20	201.70	1.37	201.53
	O-4	203.45	4.50	1.87	201.58	2.30	201.15
	O-6	204.15	3.46	1.28	202.87	1.65	202.50
	O-7	204.08	2.60	1.49	202.59	2.50	201.58
	O-8	203.96	2.32	2.25	201.71	2.12	201.84
	O-9	203.35	3.16	0.94	202.42	1.10	202.25
	W-1	NA	1.65	0.94	N/A	1.29	N/A
	W-2	203.97	3.52	1.14	202.83	1.64	202.33
Bedrock	W-3/03	202.96	2.14	0.78	202.18	0.84	202.12
	B-2	204.85	13.61	4.76	200.09	5.07	199.78
	B-3	202.36	11.70	2.36	200.00	2.62	199.74
	B-4	204.11	15.61	3.95	200.16	4.30	199.81
	B-5	203.87	12.80	1.76	202.11	1.83	202.04
	P-1	205.36	17.58	4.44	200.92	4.62	200.74
	P-2	205.36	31.89	5.80	199.56	6.10	199.26
	P-3	205.35	9.12	2.78	202.57	3.06	202.29

Unit	Well ID	Reference Elevation TOC (masl)	Well Depth from TOC (masl)	26-Apr-22		22-Sep-22		21-Apr-23		28-Nov-23		30-Apr-24		12-Nov-24	
				Water Level		Water Level		Water Level		Water Level		Water Level		Water Level	
				Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation	Measured	Elevation
Overburden	O-1	203.31	2.73	1.33	201.98	1.64	201.67	1.60	201.71	1.62	201.69	1.30	202.01	1.85	201.46
	O-2	204.07	3.25	2.00	202.07	2.56	201.51	2.12	201.95	2.22	201.85	2.01	202.06	2.45	201.62
	O-3	202.20	3.42	1.28	200.92	1.75	200.45	1.26	200.94	1.25	200.95	1.23	200.97	1.31	200.89
	O-4	202.75	4.50	1.61	201.14	NM	N/A	1.70	201.05	1.72	201.03	1.56	201.19	1.84	200.91
	O-6	203.45	3.46	1.24	202.21	1.84	201.61	1.32	202.13	1.40	202.05	NM	N/A	NM	N/A
	O-7	203.38	2.60	1.75	201.63	DRY	N/A	1.62	201.76	DRY	N/A	1.50	201.88	1.94	201.44
	O-8	203.26	2.32	1.57	201.69	2.10	201.16	1.38	201.88	1.64	201.62	1.35	201.91	1.89	201.37
	O-9	202.65	3.16	0.95	201.70	1.53	201.12	0.95	201.70	0.95	201.70	0.94	201.71	1.02	201.63
	W-1	N/A	1.65	1.04	N/A	1.38	N/A	1.05	N/A	1.06	N/A	0.99	N/A	1.08	N/A
	W-2	203.27	3.52	1.02	202.25	1.54	201.73	0.93	202.34	1.15	202.12	0.93	202.34	1.41	201.86
Bedrock	W-3/03	202.26	2.14	0.81	201.45	0.96	201.30	0.79	201.47	0.80	201.46	0.73	201.53	0.82	201.44
	B-2	204.15	13.61	4.77	199.38	5.59	198.56	4.85	199.30	4.95	199.20	4.93	199.22	5.14	199.01
	B-3	201.66	11.70	2.42	199.24	3.17	198.49	2.41	199.25	2.50	199.16	2.48	199.18	2.70	198.96
	B-4	203.41	15.61	3.99	199.42	4.83	198.58	4.10	199.31	4.17	199.24	4.50	198.91	4.38	199.03
	B-5	203.17	12.80	1.26	201.91	1.69	201.48	1.20	201.97	1.35	201.82	1.18	201.99	1.60	201.57
	P-1	204.66	17.58	4.31	200.35	5.04	199.62	4.21	200.45	NM	N/A	NM	N/A	NM	N/A
	P-2	204.66	31.89	NM	N/A	NM	N/A	NM	N/A	NM	N/A	NM	N/A	NM	N/A
	P-3	204.65	9.12	2.30	202.35	3.21	201.44	2.52	202.13	2.51	202.14	2.83	201.82	3.07	201.58

** In November 2022 the site was surveyed to reflect UTM derived coordinates and the elevation across the Site was lowered by 0.7 meters.

Appendix F Laboratory Analytical Reports

CLIENT NAME: GM BLUEPLAN**1260 Second Avenue East, Unit 1
OWEN SOUND, ON N4K2J3
(519) 376-1805****ATTENTION TO: Jessica Weller****PROJECT: M1555****AGAT WORK ORDER: 24T144991****WATER ANALYSIS REVIEWED BY: Yris Verastegui, Inorganic Team Lead****DATE REPORTED: May 13, 2024****PAGES (INCLUDING COVER): 12****VERSION*: 1**

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

Notes*Disclaimer:**

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.
- For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 24T144991

PROJECT: M1555

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

CLIENT NAME: GM BLUEPLAN

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

CBOD5

DATE RECEIVED: 2024-05-01

DATE REPORTED: 2024-05-13

		SAMPLE DESCRIPTION:		S-1	S-6	S-6A	S-8	S-9
		SAMPLE TYPE:		Water	Water	Water	Water	Water
		DATE SAMPLED:		2024-04-30	2024-04-30	2024-04-30	2024-04-30	2024-04-30
Parameter	Unit	G / S	RDL	5831075	5831087	5831088	5831089	5831090
Biochemical Oxygen Demand, Carbonaceous	mg/L		2	<2	<2	<2	<2	<2

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

5831087-5831090 Un-ionized Ammonia detection limit is a calculated RDL. The calculation of Un-ionized Ammonia is based on the field temperature and pH. Values are reported as calculated.
Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Halifax (unless marked by *)

Certified By:

José Verástegui



Certificate of Analysis

AGAT WORK ORDER: 24T144991

PROJECT: M1555

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
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CLIENT NAME: GM BLUEPLAN

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

Groundwater Package

DATE RECEIVED: 2024-05-01

DATE REPORTED: 2024-05-13

		SAMPLE DESCRIPTION:		O-1	O-2	O-3	O-4	O-6	O-7	O-8	O-9
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2024-04-30	2024-04-30	2024-04-30	2024-04-30	2024-04-30	2024-04-30	2024-04-30	2024-04-30
Parameter	Unit	G / S	RDL	5831020	5831047	5831048	5831049	5831050	5831051	5831052	5831053
Electrical Conductivity	uS/cm	2		662	1370	1970	765	1430	396	764	548
pH	pH Units	NA		7.69	7.20	7.43	7.76	7.05	7.76	7.53	7.66
Hardness (as CaCO3) (Calculated)	mg/L	0.5		327	570	985	382	600	221	431	292
Alkalinity (as CaCO3)	mg/L	5		373	749	476	302	836	228	475	330
Chloride	mg/L	0.10		4.44	30.6	39.0	0.42	16.9	0.53	3.96	6.42
Nitrate as N	mg/L	0.05		0.86	<0.05	<0.07	<0.05	<0.05	0.91	<0.05	<0.05
Nitrite as N	mg/L	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/L	0.10		7.20	4.08	589	142	7.04	14.8	0.55	2.67
Ammonia as N	mg/L	0.02		<0.02	23.8	0.04	<0.02	24.9	0.55	0.02	0.06
Dissolved Organic Carbon	mg/L	0.5		2.8	17.5	4.5	3.0	14.6	7.4	9.2	26.2
Dissolved Calcium	mg/L	0.05		92.1	152	263	105	160	67.0	132	76.7
Dissolved Magnesium	mg/L	0.05		23.5	46.3	79.8	29.1	48.7	13.0	24.7	24.4
Dissolved Potassium	mg/L	0.50		1.11	21.7	4.20	<0.50	21.0	0.90	<0.50	3.89
Dissolved Sodium	mg/L	0.05		4.24	36.1	18.8	1.64	24.0	2.55	3.86	3.98
Dissolved Iron	mg/L	0.020		<0.020	0.341	<0.020	<0.020	<0.020	<0.020	<0.020	0.467
Dissolved Boron	mg/L	0.010		0.046	0.388	0.018	<0.010	0.282	<0.010	<0.010	0.015
Lab Filtration DOC				1	1	1	1	1	1	1	1
Lab Filtration Metals				1	1	1	1	1	1	1	1

Certified By:

José Verástegui



Certificate of Analysis

AGAT WORK ORDER: 24T144991

PROJECT: M1555

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

CLIENT NAME: GM BLUEPLAN

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

Groundwater Package

DATE RECEIVED: 2024-05-01

DATE REPORTED: 2024-05-13

		SAMPLE DESCRIPTION:		W-1	W-2	W-3/03	B2	B3	B4	B5	P3
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2024-04-30	2024-04-30	2024-04-30	2024-04-30	2024-04-30	2024-04-30	2024-04-30	2024-04-30
Parameter	Unit	G / S	RDL	5831054	5831055	5831056	5831057	5831058	5831059	5831060	5831061
Electrical Conductivity	uS/cm		2	507	672	1040	688	2690	1560	1260	642
pH	pH Units		NA	7.85	7.80	7.52	7.81	7.40	7.55	7.73	7.99
Hardness (as CaCO ₃) (Calculated)	mg/L		0.5	288	374	416	333	1310	542	642	308
Alkalinity (as CaCO ₃)	mg/L		5	306	411	529	309	463	578	345	321
Chloride	mg/L		0.10	3.12	1.72	19.1	10.3	16.0	115	15.1	8.42
Nitrate as N	mg/L		0.05	0.06	<0.05	<0.05	<0.05	<0.14	<0.05	<0.05	0.24
Nitrite as N	mg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.11	<0.05	<0.05	<0.05
Sulphate	mg/L		0.10	10.7	4.00	12.8	50.2	983	53.9	318	13.7
Ammonia as N	mg/L		0.02	0.08	0.02	8.08	0.20	0.12	2.92	0.09	<0.02
Dissolved Organic Carbon	mg/L		0.5	33.9	4.8	11.3	6.2	5.3	18.0	5.3	2.9
Dissolved Calcium	mg/L		0.05	84.7	116	113	84.1	359	119	173	84.6
Dissolved Magnesium	mg/L		0.05	18.5	20.4	32.4	29.9	100	59.5	50.9	23.6
Dissolved Potassium	mg/L		0.50	0.65	0.71	14.0	1.45	3.17	5.63	1.39	0.59
Dissolved Sodium	mg/L		0.05	3.45	1.24	21.7	10.6	16.0	72.1	10.7	3.75
Dissolved Iron	mg/L		0.020	0.342	<0.020	<0.020	<0.020	0.530	<0.020	0.026	<0.020
Dissolved Boron	mg/L		0.010	<0.010	<0.010	0.363	0.048	0.047	0.218	0.034	<0.010
Lab Filtration DOC				1	1	1	1	1	1	1	1
Lab Filtration Metals				1	1	1	1	1	1	1	1

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

5831020-5831061 Metals analysis completed on a filtered sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

José Verástegui



Certificate of Analysis

AGAT WORK ORDER: 24T144991

PROJECT: M1555

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TEL (905)712-5100
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<http://www.agatlabs.com>

CLIENT NAME: GM BLUEPLAN

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

Surface Water Package

DATE RECEIVED: 2024-05-01

DATE REPORTED: 2024-05-13

SAMPLE DESCRIPTION:				S-1	S-6		S-6A	S-8		S-9
SAMPLE TYPE:				Water	Water		Water	Water		Water
DATE SAMPLED:				2024-04-30	2024-04-30		2024-04-30	2024-04-30		2024-04-30
Parameter	Unit	G / S	RDL	5831075	RDL	5831087	5831088	RDL	5831089	5831090
Electrical Conductivity	uS/cm	2		593	2	921	825	2	363	328
pH	pH Units	NA		8.14	NA	8.05	8.06	NA	8.15	8.16
Hardness (as CaCO3) (Calculated)	mg/L	0.5		220	0.5	351	321	0.5	193	176
Alkalinity (as CaCO3)	mg/L	5		248	5	381	374	5	214	204
Chloride	mg/L	0.10		42.2	0.12	31.3	28.7	0.10	4.31	0.69
Nitrate as N	mg/L	0.05		0.08	0.05	1.48	1.60	0.05	0.05	<0.05
Nitrite as N	mg/L	0.05		<0.05	0.05	<0.05	<0.05	0.05	<0.05	<0.05
Sulphate	mg/L	0.10		4.43	0.10	41.8	38.0	0.10	2.98	0.75
Total Phosphorus	mg/L	0.02		0.06	0.02	0.05	0.04	0.02	0.04	0.05
Ammonia-Un-ionized (Calculated)	mg/L	0.000002		0.000486	0.000002	0.0362	0.0310	0.000002	0.00153	0.00124
Ammonia as N	mg/L	0.02		0.02	0.02	1.11	0.82	0.02	0.03	0.03
Total Kjeldahl Nitrogen	mg/L	0.10		0.26	0.10	2.31	1.78	0.10	0.20	<0.10
Dissolved Organic Carbon	mg/L	0.5		14.2	0.5	15.4	15.0	0.5	17.1	7.8
Phenols	mg/L	0.001		0.001	0.001	0.001	0.001	0.001	<0.001	0.002
Total Calcium	mg/L	0.20		68.2	0.20	103	88.3	0.20	51.3	51.1
Total Magnesium	mg/L	0.10		12.0	0.10	22.9	24.5	0.10	15.8	11.8
Total Potassium	mg/L	0.50		0.84	0.50	12.5	11.6	0.50	1.01	1.69
Total Sodium	mg/L	0.10		30.9	0.10	34.3	35.8	0.10	4.16	1.78
Total Boron	mg/L	0.010		0.015	0.010	0.361	0.358	0.010	0.031	0.017
Total Iron	mg/L	0.050		<0.050	0.050	0.202	0.131	0.050	0.068	<0.050
Total Zinc	mg/L	0.020		<0.020	0.020	<0.020	<0.020	0.020	<0.020	<0.020
Lab Filtration DOC				1		1	1		1	1
Field Temperature	Deg C			10.0		10.3	9.9		10.9	11.7
Field pH	pH Units			NA	NA	8.16	8.24	NA	8.34	8.22

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

5831075-5831090 Dilution required, RDL has been increased accordingly.

Un-ionized Ammonia detection limit is a calculated RDL. The calculation of Un-ionized Ammonia is based on the field temperature and pH. Values are reported as calculated.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

José Verástegui

Quality Assurance

CLIENT NAME: GM BLUEPLAN

PROJECT: M1555

SAMPLING SITE: St. Edmunds

AGAT WORK ORDER: 24T144991

ATTENTION TO: Jessica Weller

SAMPLED BY:

Water Analysis															
RPT Date: May 13, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Groundwater Package															
Electrical Conductivity	5832463		931	941	1.1%	< 2	96%	80%	120%						
pH	5832463		8.04	8.11	0.9%	NA	100%	90%	110%						
Alkalinity (as CaCO3)	5832463		422	428	1.4%	< 5	106%	80%	120%						
Chloride	5831048	5831048	39.0	38.6	1.0%	< 0.10	94%	70%	130%	100%	80%	120%	103%	70%	130%
Nitrate as N	5831048	5831048	<0.07	<0.07	NA	< 0.05	93%	70%	130%	94%	80%	120%	95%	70%	130%
Nitrite as N	5831048	5831048	<0.05	<0.05	NA	< 0.05	95%	70%	130%	96%	80%	120%	95%	70%	130%
Sulphate	5831048	5831048	589	580	1.5%	< 0.10	92%	70%	130%	95%	80%	120%	NA	70%	130%
Ammonia as N	5820946		0.02	0.02	NA	< 0.02	105%	70%	130%	103%	80%	120%	92%	70%	130%
Dissolved Organic Carbon	5831020	5831020	2.8	2.7	3.6%	< 0.5	102%	90%	110%	100%	90%	110%	100%	80%	120%
Dissolved Calcium	5830045		155	158	1.9%	< 0.05	103%	70%	130%	104%	80%	120%	107%	70%	130%
Dissolved Magnesium	5830045		22.7	23.2	2.2%	< 0.05	103%	70%	130%	104%	80%	120%	108%	70%	130%
Dissolved Potassium	5830045		0.52	0.56	NA	< 0.50	101%	70%	130%	104%	80%	120%	106%	70%	130%
Dissolved Sodium	5830045		2.61	2.69	3.0%	< 0.05	103%	70%	130%	104%	80%	120%	106%	70%	130%
Dissolved Iron	5830045		1.54	1.44	6.7%	< 0.010	105%	70%	130%	103%	80%	120%	101%	70%	130%
Dissolved Boron	5830045		<0.010	<0.010	NA	< 0.010	101%	70%	130%	112%	80%	120%	114%	70%	130%
Surface Water Package															
Electrical Conductivity	5831056	5831056	1040	1040	0.0%	< 2	97%	80%	120%						
pH	5831056	5831056	7.52	7.52	0.0%	NA	99%	90%	110%						
Alkalinity (as CaCO3)	5831056	5831056	529	525	0.8%	< 5	110%	80%	120%						
Chloride	5831048	5831048	39.0	38.6	1.0%	< 0.10	94%	70%	130%	100%	80%	120%	103%	70%	130%
Nitrate as N	5831048	5831048	<0.07	<0.07	NA	< 0.05	93%	70%	130%	94%	80%	120%	95%	70%	130%
Nitrite as N	5831048	5831048	<0.05	<0.05	NA	< 0.05	95%	70%	130%	96%	80%	120%	95%	70%	130%
Sulphate	5831048	5831048	589	580	1.5%	< 0.10	92%	70%	130%	95%	80%	120%	NA	70%	130%
Total Phosphorus	5835439		0.05	0.05	NA	< 0.02	100%	70%	130%	106%	80%	120%	96%	70%	130%
Ammonia as N	5831057	5831057	0.20	0.20	0.0%	< 0.02	105%	70%	130%	103%	80%	120%	100%	70%	130%
Total Kjeldahl Nitrogen	5822121		3.37	3.22	4.6%	< 0.10	102%	70%	130%	100%	80%	120%	93%	70%	130%
Dissolved Organic Carbon	5831020	5831020	2.8	2.7	3.6%	< 0.5	102%	90%	110%	100%	90%	110%	100%	80%	120%
Phenols	5830056		0.002	0.002	NA	< 0.001	97%	90%	110%	100%	90%	110%	98%	80%	120%
Total Calcium	5835439		230	234	1.7%	< 0.20	95%	70%	130%	102%	80%	120%	NA	70%	130%
Total Magnesium	5835439		130	124	4.7%	< 0.10	101%	70%	130%	111%	80%	120%	109%	70%	130%
Total Potassium	5835439		5.20	5.02	3.5%	< 0.50	105%	70%	130%	109%	80%	120%	85%	70%	130%
Total Sodium	5835439		218	225	3.2%	< 0.10	110%	70%	130%	108%	80%	120%	119%	70%	130%
Total Boron	5835439		0.478	0.468	2.1%	< 0.010	102%	70%	130%	99%	80%	120%	89%	70%	130%
Total Iron	5835439		0.240	0.260	NA	< 0.050	97%	70%	130%	97%	80%	120%	94%	70%	130%
Total Zinc	5835439		0.044	0.032	NA	< 0.020	96%	70%	130%	95%	80%	120%	92%	70%	130%

Comments: NA signifies Not Applicable.

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

Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.

CBOD5

AGAT QUALITY ASSURANCE REPORT (V1)

Page 6 of 12

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

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

Quality Assurance

CLIENT NAME: GM BLUEPLAN

PROJECT: M1555

SAMPLING SITE: St. Edmunds

AGAT WORK ORDER: 24T144991

ATTENTION TO: Jessica Weller

SAMPLED BY:

Water Analysis (Continued)

RPT Date: May 13, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Biochemical Oxygen Demand, Carbonaceous	5831823	<6	<6	NA	< 2	113%	70%	130%
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Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:


Method Summary

CLIENT NAME: GM BLUEPLAN
PROJECT: M1555
SAMPLING SITE: St. Edmunds
AGAT WORK ORDER: 24T144991
ATTENTION TO: Jessica Weller
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Biochemical Oxygen Demand, Carbonaceous	INOR-121-6023	SM 5210 B	INCUBATOR
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Hardness (as CaCO ₃) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Alkalinity (as CaCO ₃)	INOR-93-6000	Modified from SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	modified from SM 4500-NH ₃ H	LACHAT FIA
Dissolved Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER
Dissolved Calcium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Magnesium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Dissolved Potassium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Sodium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Iron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Boron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Lab Filtration DOC	SR-78-9001		FILTRATION
Lab Filtration Metals	SR-78-9001		FILTRATION
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
Ammonia-Un-ionized (Calculated)		MOE REFERENCE, PWQOs Tab 2	CALCULATION
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA
Phenols	INOR-93-6072	modified from SM 5530 D	LACHAT FIA
Total Calcium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Magnesium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Potassium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Sodium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Iron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Field Temperature			N/A
Field pH			N/A

CLIENT NAME: GEI CONSULTANTS**1260 Second Avenue East, Unit 1
OWEN SOUND, ON N4K2J3
(519) 376-1805****ATTENTION TO: Jessica Weller****PROJECT: M1555****AGAT WORK ORDER: 24T220815****TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist****WATER ANALYSIS REVIEWED BY: Yris Verastegui, Inorganic Team Lead****DATE REPORTED: Nov 26, 2024****PAGES (INCLUDING COVER): 16****VERSION*: 1**

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

Notes*Disclaimer:**

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
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- All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.
- This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.
- For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 24T220815

PROJECT: M1555

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

CLIENT NAME: GEI CONSULTANTS

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

Volatile Organic Compounds in Water

DATE RECEIVED: 2024-11-14

DATE REPORTED: 2024-11-26

SAMPLE DESCRIPTION: O-2
SAMPLE TYPE: Water
DATE SAMPLED: 2024-11-12
G / S RDL 6321627

Parameter	Unit	G / S	RDL	6321627
Vinyl Chloride	µg/L		0.17	<0.17
Benzene	µg/L		0.20	1.23
Dichloromethane	mg/L		0.030	<0.030
Toluene	µg/L		0.20	<0.20
1,4-Dichlorobenzene	µg/L		0.10	<0.10
Surrogate	Unit	Acceptable Limits		
Toluene-d8	% Recovery	50-140	98	
4-Bromofluorobenzene	% Recovery	50-140	61	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 24T220815

PROJECT: M1555

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

CLIENT NAME: GEI CONSULTANTS

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

BOD5

DATE RECEIVED: 2024-11-14

DATE REPORTED: 2024-11-26

SAMPLE DESCRIPTION: O-2
SAMPLE TYPE: Water
DATE SAMPLED: 2024-11-12

Parameter	Unit	G / S	RDL	6321627
Biochemical Oxygen Demand, Total	mg/L		20	<20

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
6321627 RDL for BOD is raised due to insufficient DO depletion at selected dilution levels.
Analysis performed at AGAT Halifax (unless marked by *)

Certified By:

José Verástegui



Certificate of Analysis

AGAT WORK ORDER: 24T220815

PROJECT: M1555

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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<http://www.agatlabs.com>

CLIENT NAME: GEI CONSULTANTS

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

St. Edmunds Groundwater Package

DATE RECEIVED: 2024-11-14

DATE REPORTED: 2024-11-26

SAMPLE DESCRIPTION:				O-1		O-2		O-3		O-4	
SAMPLE TYPE:				Water		Water		Water		Water	
DATE SAMPLED:				2024-11-12		2024-11-12		2024-11-12		2024-11-12	
Parameter	Unit	G / S	RDL	6321571	RDL	6321580	RDL	6321581	RDL	6321582	
Electrical Conductivity	uS/cm		2	831	2	1390	2	1970	2	836	
pH	pH Units		NA	7.58	NA	7.12	NA	7.53	NA	7.83	
Hardness (as CaCO3) (Calculated)	mg/L		0.5	532	0.5	520	0.5	957	0.5	387	
Alkalinity (as CaCO3)	mg/L		5	513	5	808	5	506	5	385	
Chloride	mg/L		0.12	6.94	0.12	39.0	0.24	41.3	0.12	15.4	
Nitrate as N	mg/L		0.05	0.57	0.05	<0.05	0.07	<0.07	0.05	<0.05	
Nitrite as N	mg/L		0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	
Sulphate	mg/L		0.10	8.10	0.10	2.33	0.19	571	0.10	118	
Ammonia as N	mg/L		0.02	<0.02	0.06	26.2	0.02	0.08	0.02	<0.02	
Dissolved Organic Carbon	mg/L		0.5	8.3	0.5	23.2	0.5	3.5	0.5	2.4	
Dissolved Calcium	mg/L		0.05	153	0.05	131	0.05	259	0.05	106	
Dissolved Magnesium	mg/L		0.05	36.4	0.05	46.9	0.05	75.4	0.05	29.6	
Dissolved Potassium	mg/L		0.50	2.76	0.50	26.7	0.50	5.29	0.50	1.33	
Dissolved Sodium	mg/L		0.05	5.85	0.05	57.3	0.05	19.3	0.05	10.1	
Dissolved Boron	mg/L		0.010	0.075	0.010	0.636	0.010	0.044	0.010	0.060	
Dissolved Iron	mg/L		0.020	<0.020	0.020	1.47	0.020	<0.020	0.020	<0.020	
Lab Filtration DOC				Y		Y		Y		Y	
Lab Filtration Metals				Y		Y		Y		Y	

Certified By:

José Verástegui



Certificate of Analysis

AGAT WORK ORDER: 24T220815

PROJECT: M1555

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

CLIENT NAME: GEI CONSULTANTS

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

St. Edmunds Groundwater Package

DATE RECEIVED: 2024-11-14

DATE REPORTED: 2024-11-26

		SAMPLE DESCRIPTION:		O-6		O-9		W-1		W-2		W-3/03
		SAMPLE TYPE:		Water		Water		Water		Water		Water
		DATE SAMPLED:		2024-11-12		2024-11-12		2024-11-12		2024-11-12		2024-11-12
Parameter	Unit	G / S	RDL	6321583	RDL	6321584	6321585	6321586	RDL	6321587		
Electrical Conductivity	uS/cm		2	1400	2	742	616	790	2	975		
pH	pH Units		NA	7.17	NA	7.77	7.90	7.95	NA	7.75		
Hardness (as CaCO3) (Calculated)	mg/L		0.5	535	0.5	402	292	374	0.5	382		
Alkalinity (as CaCO3)	mg/L		5	838	5	433	392	421	5	590		
Chloride	mg/L		0.12	23.8	0.10	8.16	4.07	7.52	0.12	17.6		
Nitrate as N	mg/L		0.05	0.81	0.05	0.12	0.10	0.13	0.05	0.27		
Nitrite as N	mg/L		0.05	<0.05	0.05	<0.05	<0.05	<0.05	0.05	<0.05		
Sulphate	mg/L		0.10	10.2	0.10	8.35	24.6	48.7	0.10	4.49		
Ammonia as N	mg/L		0.06	24.2	0.02	0.07	0.11	<0.02	0.03	9.12		
Dissolved Organic Carbon	mg/L		0.5	19.5	0.5	27.2	28.5	4.6	0.5	12.7		
Dissolved Calcium	mg/L		0.05	150	0.05	114	92.8	115	0.05	109		
Dissolved Magnesium	mg/L		0.05	38.9	0.05	28.4	14.6	21.0	0.05	26.6		
Dissolved Potassium	mg/L		0.50	20.6	0.50	5.90	0.76	1.29	0.50	13.2		
Dissolved Sodium	mg/L		0.05	20.3	0.05	3.89	3.42	2.68	0.05	18.3		
Dissolved Boron	mg/L		0.010	0.278	0.010	0.052	0.015	0.022	0.010	0.362		
Dissolved Iron	mg/L		0.020	0.030	0.020	0.151	0.045	<0.020	0.020	<0.020		
Lab Filtration DOC				Y		Y	Y	Y		Y		
Lab Filtration Metals				Y		Y	Y	Y		Y		

Certified By:

José Verástegui



Certificate of Analysis

AGAT WORK ORDER: 24T220815

PROJECT: M1555

5835 COOPERS AVENUE
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CLIENT NAME: GEI CONSULTANTS

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

St. Edmunds Groundwater Package

DATE RECEIVED: 2024-11-14

DATE REPORTED: 2024-11-26

		SAMPLE DESCRIPTION:		B2		B3		B4		B5	
		SAMPLE TYPE:		Water		Water		Water		Water	
		DATE SAMPLED:		2024-11-12		2024-11-12		2024-11-12		2024-11-12	
Parameter	Unit	G / S	RDL	6321588	RDL	6321589	RDL	6321590	RDL	6321591	
Electrical Conductivity	uS/cm		2	653	2	2460	2	1450	2	1870	
pH	pH Units		NA	7.93	NA	7.59	NA	7.63	NA	7.84	
Hardness (as CaCO3) (Calculated)	mg/L		0.5	288	0.5	1230	0.5	532	0.5	375	
Alkalinity (as CaCO3)	mg/L		5	326	5	502	5	631	5	414	
Chloride	mg/L		0.10	15.0	0.49	16.0	0.12	129	0.24	306	
Nitrate as N	mg/L		0.05	<0.05	0.14	<0.14	0.05	<0.05	0.07	<0.07	
Nitrite as N	mg/L		0.05	<0.05	0.11	<0.11	0.05	<0.05	0.05	<0.05	
Sulphate	mg/L		0.10	39.1	0.38	888	0.10	58.5	0.19	71.3	
Ammonia as N	mg/L		0.02	0.29	0.02	0.16	0.02	4.16	0.02	<0.02	
Dissolved Organic Carbon	mg/L		0.5	5.7	0.5	4.2	0.5	17.2	0.5	3.4	
Dissolved Calcium	mg/L		0.05	72.0	0.05	329	0.05	128	0.05	106	
Dissolved Magnesium	mg/L		0.05	26.2	0.05	99.2	0.05	51.6	0.05	26.8	
Dissolved Potassium	mg/L		0.50	1.30	0.50	3.35	0.50	7.13	0.50	1.44	
Dissolved Sodium	mg/L		0.05	12.1	0.05	19.7	0.05	69.0	0.05	173	
Dissolved Boron	mg/L		0.010	0.054	0.010	0.069	0.010	0.268	0.010	0.179	
Dissolved Iron	mg/L		0.020	<0.020	0.020	0.654	0.020	<0.020	0.020	<0.020	
Lab Filtration DOC				Y		Y		Y		Y	
Lab Filtration Metals				Y		Y		Y		Y	

Certified By:

José Verástegui



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 24T220815

PROJECT: M1555

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

CLIENT NAME: GEI CONSULTANTS

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

St. Edmunds Groundwater Package

DATE RECEIVED: 2024-11-14

DATE REPORTED: 2024-11-26

		SAMPLE DESCRIPTION:		P3
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-11-12
Parameter	Unit	G / S	RDL	6321592
Electrical Conductivity	uS/cm		2	733
pH	pH Units		NA	7.94
Hardness (as CaCO ₃) (Calculated)	mg/L		0.5	273
Alkalinity (as CaCO ₃)	mg/L		5	332
Chloride	mg/L		0.10	49.8
Nitrate as N	mg/L		0.05	0.44
Nitrite as N	mg/L		0.05	<0.05
Sulphate	mg/L		0.10	16.6
Ammonia as N	mg/L		0.02	<0.02
Dissolved Organic Carbon	mg/L		0.5	1.6
Dissolved Calcium	mg/L		0.05	72.3
Dissolved Magnesium	mg/L		0.05	22.5
Dissolved Potassium	mg/L		0.50	<0.50
Dissolved Sodium	mg/L		0.05	22.8
Dissolved Boron	mg/L		0.010	0.023
Dissolved Iron	mg/L		0.020	<0.020
Lab Filtration DOC				Y
Lab Filtration Metals				Y

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

6321571-6321592 Metals analysis completed on a filtered sample.
Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

José Verástegui



Certificate of Analysis

AGAT WORK ORDER: 24T220815

PROJECT: M1555

5835 COOPERS AVENUE
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CLIENT NAME: GEI CONSULTANTS

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

St. Edmunds Groundwater Package (Fall)

DATE RECEIVED: 2024-11-14

DATE REPORTED: 2024-11-26

		SAMPLE DESCRIPTION:		O-2
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-11-12
Parameter	Unit	G / S	RDL	6321627
Electrical Conductivity	uS/cm		2	1570
pH	pH Units		NA	7.43
Total Dissolved Solids	mg/L		10	892
Total Suspended Solids	mg/L		10	126
Alkalinity (as CaCO3)	mg/L		5	855
Chloride	mg/L		0.12	61.7
Nitrate as N	mg/L		0.05	<0.05
Nitrite as N	mg/L		0.05	<0.05
Sulphate	mg/L		0.10	1.62
Ammonia as N	mg/L		0.06	30.6
Chemical Oxygen Demand	mg/L		5	46
Phenols	mg/L		0.001	0.001
Total Kjeldahl Nitrogen	mg/L		0.10	31.8
Total Phosphorus	mg/L		0.02	0.14
Dissolved Organic Carbon	mg/L		0.5	18.5
Dissolved Calcium	mg/L		0.05	148
Dissolved Magnesium	mg/L		0.05	43.5
Dissolved Potassium	mg/L		0.50	18.6
Dissolved Sodium	mg/L		0.05	52.8
Dissolved Arsenic	mg/L		0.001	<0.001
Dissolved Barium	mg/L		0.002	0.065
Dissolved Boron	mg/L		0.010	0.417
Dissolved Cadmium	mg/L		0.0001	<0.0001
Dissolved Chromium	mg/L		0.002	<0.002
Dissolved Copper	mg/L		0.001	0.002
Dissolved Iron	mg/L		0.010	0.016
Dissolved Lead	mg/L		0.0005	<0.0005
Dissolved Manganese	mg/L		0.002	0.365
Dissolved Zinc	mg/L		0.005	<0.005
Lab Filtration DOC				Y

Certified By:

José Verástegui



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 24T220815

PROJECT: M1555

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
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CLIENT NAME: GEI CONSULTANTS

SAMPLING SITE: St. Edmunds

ATTENTION TO: Jessica Weller

SAMPLED BY:

St. Edmunds Groundwater Package (Fall)

DATE RECEIVED: 2024-11-14

DATE REPORTED: 2024-11-26

SAMPLE DESCRIPTION: O-2
SAMPLE TYPE: Water
DATE SAMPLED: 2024-11-12

Parameter	Unit	G / S	RDL	6321627
Lab Filtration Metals				Y

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

6321627 Metals & DOC analysis completed on a filtered sample.
Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Iris Verástegui

Quality Assurance

CLIENT NAME: GEI CONSULTANTS

AGAT WORK ORDER: 24T220815

PROJECT: M1555

ATTENTION TO: Jessica Weller

SAMPLING SITE: St. Edmunds

SAMPLED BY:

Trace Organics Analysis

RPT Date: Nov 26, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Volatile Organic Compounds in Water

Vinyl Chloride	6321627	6321627	<0.17	<0.17	NA	< 0.17	60%	50%	140%	101%	50%	140%	91%	50%	140%
Benzene	6321627	6321627	1.23	1.14	7.6%	< 0.20	97%	50%	140%	119%	60%	130%	93%	50%	140%
Dichloromethane	6321627	6321627	<0.030	<0.030	NA	< 0.030	117%	50%	140%	106%	60%	130%	85%	50%	140%
Toluene	6321627	6321627	<0.20	<0.20	NA	< 0.20	96%	50%	140%	113%	60%	130%	85%	50%	140%
1,4-Dichlorobenzene	6321627	6321627	<0.10	<0.10	NA	< 0.10	95%	50%	140%	101%	60%	130%	89%	50%	140%

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

Certified By:



Quality Assurance

CLIENT NAME: GEI CONSULTANTS

PROJECT: M1555

SAMPLING SITE: St. Edmunds

AGAT WORK ORDER: 24T220815

ATTENTION TO: Jessica Weller

SAMPLED BY:

Water Analysis															
RPT Date: Nov 26, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

St. Edmunds Groundwater Package

Electrical Conductivity	6321459		23	22	4.4%	< 2	110%	80%	120%						
pH	6321459		5.95	5.52	7.5%	NA	100%	90%	110%						
Alkalinity (as CaCO3)	6321459		12	7	NA	< 5	114%	80%	120%						
Chloride	6321571	6321571	6.94	6.92	0.3%	< 0.10	98%	70%	130%	101%	80%	120%	100%	70%	130%
Nitrate as N	6321571	6321571	0.57	0.58	1.7%	< 0.05	94%	70%	130%	98%	80%	120%	96%	70%	130%
Nitrite as N	6321571	6321571	<0.05	<0.05	NA	< 0.05	96%	70%	130%	102%	80%	120%	94%	70%	130%
Sulphate	6321571	6321571	8.10	8.39	3.5%	< 0.10	96%	70%	130%	98%	80%	120%	96%	70%	130%
Ammonia as N	6346351		<0.02	<0.02	NA	< 0.02	104%	70%	130%	113%	80%	120%	107%	70%	130%
Dissolved Organic Carbon	6323085		13.0	13.9	6.7%	< 0.5	101%	90%	110%	94%	90%	110%	NA	80%	120%
Dissolved Calcium	6322924		82.2	79.4	3.5%	< 0.05	98%	70%	130%	82%	80%	120%	93%	70%	130%
Dissolved Magnesium	6322924		39.1	37.4	4.4%	< 0.05	98%	70%	130%	90%	80%	120%	114%	70%	130%
Dissolved Potassium	6322924		1.70	1.73	NA	< 0.50	115%	70%	130%	81%	80%	120%	80%	70%	130%
Dissolved Sodium	6322924		11.5	10.6	8.1%	< 0.05	99%	70%	130%	81%	80%	120%	101%	70%	130%
Dissolved Boron	6322924		0.279	0.270	3.3%	< 0.010	98%	70%	130%	103%	80%	120%	104%	70%	130%
Dissolved Iron	6322924		<0.020	<0.020	NA	< 0.010	102%	70%	130%	100%	80%	120%	91%	70%	130%

St. Edmunds Groundwater Package (Fall)

Electrical Conductivity	6321581	6321581	1970	1970	0.0%	< 2	105%	80%	120%						
pH	6321581	6321581	7.53	7.58	0.7%	NA	100%	90%	110%						
Total Dissolved Solids	6321423		112	118	5.2%	< 10	98%	80%	120%						
Total Suspended Solids	6321627	6321627	126	134	6.2%	< 10	104%	80%	120%						
Alkalinity (as CaCO3)	6321581	6321581	506	519	2.5%	< 5	108%	80%	120%						
Chloride	6321571	6321571	6.94	6.92	0.3%	< 0.10	98%	70%	130%	101%	80%	120%	100%	70%	130%
Nitrate as N	6321571	6321571	0.57	0.58	1.7%	< 0.05	94%	70%	130%	98%	80%	120%	96%	70%	130%
Nitrite as N	6321571	6321571	<0.05	<0.05	NA	< 0.05	96%	70%	130%	102%	80%	120%	94%	70%	130%
Sulphate	6321571	6321571	8.10	8.39	3.5%	< 0.10	96%	70%	130%	98%	80%	120%	96%	70%	130%
Ammonia as N	6321588	6321588	0.29	0.28	3.5%	< 0.02	104%	70%	130%	113%	80%	120%	109%	70%	130%
Chemical Oxygen Demand	6320083		<5	<5	NA	< 5	99%	80%	120%	98%	90%	110%	97%	70%	130%
Phenols	6321392		<0.001	<0.001	NA	< 0.001	102%	90%	110%	101%	90%	110%	93%	80%	120%
Total Kjeldahl Nitrogen	6320061		<0.10	<0.10	NA	< 0.10	92%	70%	130%	94%	80%	120%	84%	70%	130%
Total Phosphorus	6322924		0.06	0.06	NA	< 0.02	101%	70%	130%	104%	80%	120%	113%	70%	130%
Dissolved Organic Carbon	6321583	6321583	19.5	20.3	4.0%	< 0.5	103%	90%	110%	105%	90%	110%	NA	80%	120%
Dissolved Calcium	6322924		82.2	79.4	3.5%	< 0.05	98%	70%	130%	82%	80%	120%	93%	70%	130%
Dissolved Magnesium	6322924		39.1	37.4	4.4%	< 0.05	98%	70%	130%	90%	80%	120%	114%	70%	130%
Dissolved Potassium	6322924		1.70	1.73	NA	< 0.50	115%	70%	130%	81%	80%	120%	80%	70%	130%
Dissolved Sodium	6322924		11.5	10.6	8.1%	< 0.05	99%	70%	130%	81%	80%	120%	101%	70%	130%
Dissolved Arsenic	6322924		0.002	<0.001	NA	< 0.001	93%	70%	130%	110%	80%	120%	108%	70%	130%
Dissolved Barium	6322924		0.024	0.022	8.7%	< 0.002	103%	70%	130%	106%	80%	120%	102%	70%	130%
Dissolved Boron	6322924		0.279	0.270	3.3%	< 0.010	98%	70%	130%	103%	80%	120%	104%	70%	130%
Dissolved Cadmium	6322924		<0.0001	<0.0001	NA	< 0.0001	99%	70%	130%	99%	80%	120%	103%	70%	130%

AGAT QUALITY ASSURANCE REPORT (V1)

Page 11 of 16

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

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

Quality Assurance

CLIENT NAME: GEI CONSULTANTS

PROJECT: M1555

SAMPLING SITE: St. Edmunds

AGAT WORK ORDER: 24T220815

ATTENTION TO: Jessica Weller

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Nov 26, 2024

RPT Date: Nov 26, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dissolved Chromium	6322924		<0.002	<0.002	NA	< 0.002	97%	70%	130%	99%	80%	120%	94%	70%	130%
Dissolved Copper	6322924		0.001	0.002	NA	< 0.001	99%	70%	130%	100%	80%	120%	94%	70%	130%
Dissolved Iron	6322924		<0.020	<0.020	NA	< 0.010	102%	70%	130%	100%	80%	120%	91%	70%	130%
Dissolved Lead	6322924		<0.0005	<0.0005	NA	< 0.0005	95%	70%	130%	101%	80%	120%	93%	70%	130%
Dissolved Manganese	6322924		0.003	0.004	NA	< 0.002	95%	70%	130%	107%	80%	120%	100%	70%	130%
Dissolved Zinc	6322924		<0.005	<0.005	NA	< 0.005	99%	70%	130%	98%	80%	120%	99%	70%	130%

Comments: NA signifies Not Applicable.

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

Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.

BOD5

Biochemical Oxygen Demand, Total 6323205 6323205 1820 1890 3.8% < 2 91% 70% 130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By:



Method Summary

CLIENT NAME: GEI CONSULTANTS

PROJECT: M1555

SAMPLING SITE: St. Edmunds

AGAT WORK ORDER: 24T220815

ATTENTION TO: Jessica Weller

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Vinyl Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Dichloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

Method Summary

CLIENT NAME: GEI CONSULTANTS

PROJECT: M1555

SAMPLING SITE: St. Edmunds

AGAT WORK ORDER: 24T220815

ATTENTION TO: Jessica Weller

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Biochemical Oxygen Demand, Total	INOR-121-6023	SM 5210 B	INCUBATOR
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Hardness (as CaCO ₃) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Alkalinity (as CaCO ₃)	INOR-93-6000	Modified from SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	modified from SM 4500-NH ₃ H	LACHAT FIA
Dissolved Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER
Dissolved Calcium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Magnesium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Dissolved Potassium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Sodium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Boron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Iron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Lab Filtration DOC	SR-78-9001		FILTRATION
Lab Filtration Metals	SR-78-9001		FILTRATION
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684, ON MOECC E3139, SM 2540B, C, D	BALANCE
Total Suspended Solids	INOR-93-6028	modified from EPA 1684, ON MOECC E3139, SM 2540B, C, D	BALANCE
Chemical Oxygen Demand	INOR-93-6042	modified from SM 5220 A and SM 5220 D	SPECTROPHOTOMETER
Phenols	INOR-93-6072	mod from SM 510C, EPA 420.2, ISO 3696, ASTM D1193	SEGMENTED FLOW ANALYSIS
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA
Total Phosphorus	INOR-93-6057	modified from LACHAT 10-115-01-3A	LACHAT FIA
Dissolved Arsenic	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Barium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cadmium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Chromium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Copper	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Lead	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Manganese	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Zinc	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS

CLIENT NAME: GEI CONSULTANTS**1260 Second Avenue East, Unit 1
OWEN SOUND, ON N4K2J3
(519) 376-1805****ATTENTION TO: Jessica Weller****PROJECT: M1555 - St Edmunds****AGAT WORK ORDER: 24T220818****WATER ANALYSIS REVIEWED BY: Yris Verastegui, Inorganic Team Lead****DATE REPORTED: Nov 25, 2024****PAGES (INCLUDING COVER): 6****VERSION*: 1**

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

Notes*Disclaimer:**

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
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- All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.
- This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.
- For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 24T220818

PROJECT: M1555 - St Edmunds

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

CLIENT NAME: GEI CONSULTANTS

ATTENTION TO: Jessica Weller

SAMPLING SITE:

SAMPLED BY:

CBOD5

DATE RECEIVED: 2024-11-14

DATE REPORTED: 2024-11-25

		SAMPLE DESCRIPTION:		S-1	S-6	S-6A	S-8	S-9
		SAMPLE TYPE:		Water	Water	Water	Water	Water
		DATE SAMPLED:		2024-11-12	2024-11-12	2024-11-12	2024-11-12	2024-11-12
Parameter	Unit	G / S	RDL	6321392	6321394	6321395	6321396	6321397
Biochemical Oxygen Demand, Carbonaceous	mg/L		20	<20	<20	<20	<20	<20

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

Analysis performed at AGAT Halifax (unless marked by *)

Certified By:

José Verástegui



Certificate of Analysis

AGAT WORK ORDER: 24T220818

PROJECT: M1555 - St Edmunds

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

CLIENT NAME: GEI CONSULTANTS

ATTENTION TO: Jessica Weller

SAMPLING SITE:

SAMPLED BY:

St. Edmunds Surface Water Package

DATE RECEIVED: 2024-11-14

DATE REPORTED: 2024-11-25

		SAMPLE DESCRIPTION:		S-1	S-6	S-6A		S-8	S-9
		SAMPLE TYPE:		Water	Water	Water		Water	Water
		DATE SAMPLED:		2024-11-12	2024-11-12	2024-11-12		2024-11-12	2024-11-12
Parameter	Unit	G / S	RDL	6321392	6321394	6321395	RDL	6321396	6321397
Electrical Conductivity	uS/cm	2		804	1000	977	2	492	471
pH	pH Units	NA		7.73	7.81	7.85	NA	7.97	7.91
Hardness (as CaCO ₃) (Calculated)	mg/L	0.5		410	414	409	0.5	277	269
Alkalinity (as CaCO ₃)	mg/L	5		345	431	438	5	297	270
Chloride	mg/L	0.12		34.0	81.4	80.2	0.10	6.88	5.68
Nitrate as N	mg/L	0.05	<0.05		0.65	0.51	0.05	<0.05	<0.05
Nitrite as N	mg/L	0.05	<0.05		<0.05	<0.05	0.05	<0.05	<0.05
Sulphate	mg/L	0.10		81.3	27.7	29.6	0.10	12.4	10.8
Total Phosphorus	mg/L	0.02	<0.02		<0.02	0.04	0.02	<0.02	<0.02
Ammonia as N	mg/L	0.02	<0.02		0.18	<0.02	0.02	<0.02	<0.02
Total Kjeldahl Nitrogen	mg/L	0.10		0.24	0.40	0.46	0.10	<0.10	0.18
Dissolved Organic Carbon	mg/L	0.5		13.1	12.0	11.3	0.5	16.7	17.4
Phenols	mg/L	0.001	<0.001		<0.001	<0.001	0.001	<0.001	<0.001
Total Calcium	mg/L	0.20		133	112	107	0.20	77.9	74.0
Total Magnesium	mg/L	0.10		19.0	32.6	34.4	0.10	20.1	20.5
Total Potassium	mg/L	0.50		1.76	13.2	13.2	0.50	2.26	2.07
Total Sodium	mg/L	0.10		25.4	66.2	63.1	0.10	5.49	4.94
Total Boron	mg/L	0.010	<0.010		0.368	0.360	0.010	0.021	0.017
Total Iron	mg/L	0.050		0.223	2.29	1.15	0.050	0.079	0.083
Total Zinc	mg/L	0.020	<0.020		<0.020	<0.020	0.020	<0.020	<0.020
Lab Filtration DOC				Y	Y	Y		Y	Y

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

6321392-6321397 Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

José Verástegui

Quality Assurance

CLIENT NAME: GEI CONSULTANTS

PROJECT: M1555 - St Edmunds

SAMPLING SITE:

AGAT WORK ORDER: 24T220818

ATTENTION TO: Jessica Weller

SAMPLED BY:

Water Analysis															
RPT Date: Nov 25, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
St. Edmunds Surface Water Package															
Electrical Conductivity	6319927		1070	1070	0.0%	< 2	106%	80%	120%						
pH	6321167		7.91	7.98	0.9%	NA	100%	90%	110%						
Alkalinity (as CaCO3)	6319927		455	486	6.6%	< 5	110%	80%	120%						
Chloride	6321392	6321392	34.0	34.1	0.3%	< 0.10	97%	70%	130%	100%	80%	120%	101%	70%	130%
Nitrate as N	6321392	6321392	<0.05	<0.05	NA	< 0.05	94%	70%	130%	99%	80%	120%	95%	70%	130%
Nitrite as N	6321392	6321392	<0.05	<0.05	NA	< 0.05	98%	70%	130%	92%	80%	120%	96%	70%	130%
Sulphate	6321392	6321392	81.3	81.7	0.5%	< 0.10	95%	70%	130%	98%	80%	120%	97%	70%	130%
Total Phosphorus	6324192		0.08	0.07	NA	< 0.02	99%	70%	130%	91%	80%	120%	96%	70%	130%
Ammonia as N	6340022		<0.02	<0.02	NA	< 0.02	96%	70%	130%	112%	80%	120%	105%	70%	130%
Total Kjeldahl Nitrogen	6320061		<0.10	<0.10	NA	< 0.10	92%	70%	130%	94%	80%	120%	84%	70%	130%
Dissolved Organic Carbon	6321392	6321392	13.1	12.7	3.1%	< 0.5	93%	90%	110%	97%	90%	110%	NA	80%	120%
Phenols	6321392	6321392	<0.001	<0.001	NA	< 0.001	102%	90%	110%	101%	90%	110%	93%	80%	120%
Total Calcium	6320264		62.6	64.7	3.3%	< 0.20	106%	70%	130%	101%	80%	120%	102%	70%	130%
Total Magnesium	6320264		47.7	48.1	0.8%	< 0.10	108%	70%	130%	111%	80%	120%	109%	70%	130%
Total Potassium	6320264		1.60	1.69	NA	< 0.50	100%	70%	130%	98%	80%	120%	98%	70%	130%
Total Sodium	6320264		30.7	31.1	1.3%	< 0.10	110%	70%	130%	113%	80%	120%	110%	70%	130%
Total Boron	6320264		0.092	0.094	2.2%	< 0.010	104%	70%	130%	96%	80%	120%	96%	70%	130%
Total Iron	6320264		1.23	1.22	0.8%	< 0.050	107%	70%	130%	114%	80%	120%	106%	70%	130%
Total Zinc	6320264		<0.020	<0.020	NA	< 0.020	104%	70%	130%	107%	80%	120%	106%	70%	130%

Comments: NA signifies Not Applicable.

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

Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.

CBOD5

Biochemical Oxygen Demand, Carbonaceous	6324828		80	91	12.9%	< 2	84%	70%	130%
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Certified By:



Method Summary

CLIENT NAME: GEI CONSULTANTS

PROJECT: M1555 - St Edmunds

SAMPLING SITE:
AGAT WORK ORDER: 24T220818

ATTENTION TO: Jessica Weller

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Biochemical Oxygen Demand, Carbonaceous	INOR-121-6023	SM 5210 B	INCUBATOR
Electrical Conductivity	INOR-93-6000	SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Hardness (as CaCO ₃) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Alkalinity (as CaCO ₃)	INOR-93-6000	Modified from SM 2320 B	PC TITRATE
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
Ammonia as N	INOR-93-6059	modified from SM 4500-NH ₃ H	LACHAT FIA
Total Kjeldahl Nitrogen	INOR-93-6048	modified from EPA 351.2 and SM 4500-NORG D	LACHAT FIA
Dissolved Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER
Phenols	INOR-93-6072	mod from SM 510C, EPA 420.2, ISO 3696, ASTM D1193	SEGMENTED FLOW ANALYSIS
Total Calcium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Magnesium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Potassium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Sodium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Iron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Lab Filtration DOC	SR-78-9001		FILTRATION

Appendix G Historical Groundwater Quality Results (Tables and Graphs)

HISTORICAL GROUNDWATER QUALITY DATA: O-1

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.30	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Dec-88	592		323		7.0							4.1*	2.4	<0.001			
Jan-89	578		309		4.9							2.7*	1.6	<0.001			
Jul-90	437		218		1.2							0.03	1.2	<0.001			
Jan-94	635		299		5.2							0.02	2.3	0.0081			
Nov-94	607		339		0.7							0.02	1.6	0.0012			
Oct-95	1008*		519		76.3*							0.01	3.7	0.0049			
Oct-95 Dup	1008*		519		76.5*							0.01	3.7	0.0016			
Dec-96	463		240		5.7							<0.01	2.0	0.0030			
Oct-97	538		289		10.4							<0.01	<1	<0.001			
Oct-98	545		298		6.3							0.16	17	0.039			
Nov-99	523		287		3.7							<0.01	<1	<0.001			
Oct-00	481		267		3.3							<0.01	10	<0.001			
Nov-01	520		243		21.1							<0.01	4.0	<0.001			
Nov-01 Dup	524		245		21.0							<0.01	5.0	<0.001			
Dec-02	600		380		4.9							<0.02	4.7	<0.001			
Dec-02 Dup	682		381		4.8							<0.02	4.3	<0.001			
Oct-03	547		327		8.0							<0.005	13	<0.001			
Nov-04	755		494		6.9							<0.005	5.7	<0.001			
Nov-05	667		367		10.2							<0.005	8.3	<0.001			
Apr-06	429	8.05	225	215	1.4	0.90	<0.05	7.82	4.01		<0.05	2.37*	2.0				
Oct-06	402	8.06	215	199	8.96	0.19	<0.05	15.9	3.66	1.07	<0.05	0.135	1.9				
Apr-07	373	8.41	207	186	1.19	0.46	<0.05	6.34	2.57	0.37	<0.05	0.098	1.1				
Nov-07	513	8.33	268	253	9.11	0.71	<0.05	13.5	3.56	1.18	<0.05	<0.005	1.7				
Apr-08	357	7.91	191	188	2.81	0.38	<0.05	5.61	2.62	0.60	<0.05	<0.010	1.0				
Oct-08	1020	7.85	602	504	4.48	6.96	<0.05	25.6	3.92	2.06	<0.05	<0.01	9.9				
Apr-09	335	8.15	193	173	1.81	0.20	<0.05	5.13	2.81	0.50	<0.02	<0.010	1.2				
Nov-09	616	7.89	381	340	2.63	1.15	<0.05	12.7	3.09	1.35	<0.05	<0.01	5.1				
Apr-10	495	8.21	281	282	1.78	0.25	<0.05	5.36	2.60	0.88	<0.02	<0.01	1.3				
Nov-10	682	8.06	438	406	3.75	1.80	<0.05	24.8	3.07	1.41	<0.02	<0.01	5.4				
Apr-11	380	8.01	212	200	1.09	0.12	<0.05	3.98	1.37	0.67	<0.02	<0.01	1.2				
Nov-11	415	8.12	267	269	3.90	0.96	<0.05	6.45	2.28	0.82	<0.02	<0.01	2.4				
Apr-12	442	7.77	245	254	1.41	0.05	<0.05	3.72	1.58	0.53	<0.02	<0.01	1.2				
Nov-12	716	8.02	432	385	6.90	4.61	<0.05	35.8	2.80	1.12	<0.02	<0.01	5.2				
Apr-13	417	8.08	218	219	0.95	0.07	<0.05	3.16	1.66	0.70	0.03	<0.01	1.1				
Nov-13	673	7.93	332	342	2.99	2.16	<0.25	9.56	2.47	1.20	<0.02	<0.01	5.2				
May-14	416	7.90	218	224	1.00	0.26	<0.05	2.84	1.59	0.57	0.15	0.02	1.3				
Oct-14	699	7.87	403	377	6.75	2.02	<0.25	7.17	3.41	1.41	<0.02	<0.01	4.3				
Apr-15	465	7.86	241	263	1.7	0.18	<0.05	2.5	1.65	0.61	<0.02	<0.01	1.0				
Oct-15	893	8.03	512	488	10.1	0.38	<0.25	15.5	3.64	1.43	<0.02	0.59	10.8				
Nov-16	860	8.20	438	479	11.5	0.33	<0.25	12.8	5.86	2.72	<0.02	<0.01	11.6				
Apr-17	347	8.18	178	187	0.34	0.11	<0.05	1.74	0.92	1.01	<0.02	0.12	1.3				
Nov-17	1180	7.73	664	641	19.2	<0.25	<0.25	21.1	6.31	4.31	<0.02	<0.01	20.5				
May-18	400	8.00	210	220	1.1	<0.10	<0.010	<1.0	0.95	0.77	<0.050	<0.1	1.2				
Nov-18	696	7.92	349	377	3.99	1.18	<0.05	6.19	2.79	3.32	<0.02	0.019	6.4				
Apr-19	446	7.72	223	265	2.41	0.16	<0.05	0.89	1.57	0.75	<0.02	<0.01	2.6				
Oct-19	669	7.62	359	355	20.0	<0.10	<0.10	4.16	2.66	2.45	<0.02	<0.01	8.5				
Apr-20	549	7.66	224	259	4.87	0.28	<0.05	1.65	1.86	0.68	<0.02	0.035	5.2		63.3	15.9	
Oct-20	909	7.78	613	527	14.3	<0.25	<0.25	9.99	5.04	2.33	<0.02	<0.010	10.6		166	48.2	
May-21	598	7.93	294	289	11.2	0.57	<0.05	2.52	3.70	1.12	<0.02	<0.010	2.1		82.6	21.2	
Oct-21	1230	7.44	669	673	14.8	<0.05	<0.05	14.2	6.78	<2.50	<0.02	<0.010	115				
Apr-22	574	7.67	271	302	4.45	0.33	<0.05	1.93	3.79	0.88	<0.02	0.022	1.9		77.9	18.5	
Apr-23	551	7.63	320	277	4.18	1.78	<0.05	3.01	3.15	1.27	<0.02	<0.010	1.8		88.8	23.8	0.050
Nov-23	755	7.41	388	432	9.93	2.02	<0.05	9.0	4.30	2.66	<0.02	0.025	2.7		108	28.8	0.089
Apr-24	662	7.69	327	373	4.44	0.86	<0.05	7.2	4.24	1.11	<0.02	<0.020	2.8		92.1	23.5	0.046
Nov-24	831	7.58	532	513	6.94	0.57	<0.05	8.1	5.85	2.76	<0.02	<0.020	8.3		153	36.4	0.075
Average	598	7.91	336	332	6.30	0.84	<0.05	9.08	3.17	1.37	<0.05	0.033	6.74	0.0034	104	27.0	0.065
Std. Dev.	197	0.24	126	131	5.38	1.38	NA	7.89	1.47	0.92	NA	0.087	15.7	0.0088	36.7	10.6	0.021

HISTORICAL GROUNDWATER QUALITY DATA: O-2

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.30	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Dec-88	872		385		45.5							2.7	6.0	0.0020			
Jan-89	1084		486		50.4							13.2	6.9	0.0450			
Dec-89	1024				50.9												
Jul-90	1113		475		7.00							23.0	7.1	0.0030			
Jan-93			568									23.2	20.5	0.0045			
Jan-94	984		509		39.7							17.3	20.0	0.0089			
Nov-94	1360		540		50.3							14.7	14.6	0.0066			
Oct-95	1690		628		98.5							28.0	19.5	0.0132			
Dec-96	2110		621		116							31.6	25	0.0010			
Oct-97	2380		733		146							37.7	35	<0.001			
Oct-98	2460		794		184							36.6	12	0.0010			
Nov-99	2050		756		130							20.7	19	<0.001			
Oct-00	2330		770		139							31.4	47	<0.001			
Nov-01	2210		712		129							37.8	35	<0.001			
Dec-02	2090		774		158							32.3	24	<0.001			
Oct-03	2280		838		178							34.0	79	<0.001			
Nov-04	2400		907		181							34.0	28.3	<0.001			
Nov-05	2720		853		188							29.8	79.6	<0.001			
Apr-06	1620	7.49	561	720	70.4	0.10	<0.05	5.81	75.5		39.2	24.2	19.0				
Oct-06	1700	7.55	602	811	91.1	2.89	<0.05	26.5	81.2	51.9	21.3	0.30	9.7				
Apr-07	1280	7.62	497	594	56.4	0.10	<0.05	13.6	56.7	30.7	27.0	0.25	14.4				
Nov-07	2290	7.48	719	1070	139	1.88	<0.05	12.3	108	69.9	4.76	0.063	34.0				
Apr-08	2130	7.47	673	1050	140	0.11	<0.05	29.7	102	56.3	78.2	0.83	18.2				
Oct-08	2450	7.44	850	1100	136	<0.05	<0.05	18.1	117	78.9	4.45	0.028	27.9				
Apr-09	1920	7.45	672	926	99.2	0.15	<0.05	8.6	86.1	55.7	54.3	0.030	19.2				
Nov-09	2180	7.40	802	1070	130	<0.05	<0.05	14.9	110	70.7	50.4	1.36	23.8				
Apr-10	2600	7.55	950	1260	2.05	<0.05	<0.05	1020*	165	64.3	<0.02	0.14	38.7				
Nov-10	2030	7.33	753	1190	90.7	0.26	<0.05	4.93	95.4	67.9	58.2	0.01	31.4				
Apr-11	856	7.92	451	459	2.36	0.74	<0.05	10.3	4.54	14.6	17.3	0.09	3.9				
Nov-11	1370	7.72	727	843	69.3	0.43	<0.05	10.8	61.1	40.0	29.2	0.15	15.5				
Apr-12	2140	7.47	799	1180	84.7	<0.05	<0.05	5.28	78.9	41.6	32.7	0.08	15.0				
Nov-12	2750	7.70	973	1400	235	0.39	<0.05	2.71	200	73.0	84.7	0.30	40.8				
Apr-13	896	7.78	324	414	29.7	0.29	<0.25	9.34	27.6	18.3	5.04	0.07	8.2				
Nov-13	1900	7.53	571	897	75.5	<1.0	<1.0	7.14	65.2	34.3	31.2	0.11	16.3				
May-14	1560	7.63	581	745	72.3	0.34	<0.05	4.94	64.2	40.0	32.4	0.04	12.3				
Oct-14	2270	7.57	713	1150	112	<0.5	<0.5	1.9	91.7	56.8	73.3	0.06	26.2				
Apr-15	1020	7.54	409	537	29.4	<0.25	<0.25	4.1	23.9	19.5	1.3	0.02	6.7				
Oct-15	2240	7.94	777	1070	123	<1.0	<1.0	<2.0	101.0	57.6	62.2	38.1	25.4				
Apr-16	1250	7.90	496	647	40.9	<0.25	<0.25	8.46	36.9	22.9	21.3		10.2				
Nov-16	2050	6.82	755	979	106	1.36	<0.25	3.89	85.8	45.7	51.2	0.07	22.4				
Apr-17	1830	7.82	685	863	103	<0.25	<0.25	19.6	79.4	39.1	22.8	13.5	9.0				
Nov-17	2460	7.68	837	1190	150	<0.5	<0.5	13.8	118	58.5	46.2	0.06	20.8				
May-18	1400	7.45	470	650	58	0.29	0.015	6.2	55	27	20.0	<0.1	9.2				
Nov-18	1510	7.76	581	703	54	20.6*	<0.25	4.4	36.6	17.2	14.3	0.024	7.0				
Apr-19	1140	7.68	368	610	43.5	0.22	<0.05	1.75	42.3	23.3	25.0	2.98	15.5				
Oct-19	1910	7.69	701	1020	76.2	<0.5	<0.5	<1.0	75.1	52.8	32.2	<0.01	15.3				
Apr-20	1500	7.38	512	674	30.5	<0.25	<0.25	2.78	20.3	16.4	18	0.037	10.3		138	40.7	
Oct-20	1950	7.63	689	996	115	<0.5	<0.5	<1.0	86.1	45.5	10	0.029	6.3		161	69.6	
May-21	2050	7.31	699	944	98.3	<0.5	<0.5	<1.0	74.1	41.4	44.9	0.033	24.0		168	67.8	
Oct-21	2150	7.45	680	1030	122	<0.07	<0.05	<0.19	126	45.2	47.7	<0.010	187				
Apr-22	2000	7.26	582	958	111	0.39	<0.05	1.19	83.1	33.0	41.0	0.080	20.6		144	54.1	
Sep-22	1970	7.27	643	911	65.1	<0.07	1.98	<0.2	30.0	17.8	33.4	22.5	24.0		184	44.6	
Apr-23	903	7.20	524	468	4.73	0.06	<0.05	5.15	3.33	2.89	20.8	<0.010	4.8		156	32.6	0.043
Nov-23	1610	7.17	579	917	29.7	1.22	<0.05	3.41	9.50	5.90	34.4	0.53	11.0		172	36.4	0.19
Apr-24	1370	7.20	570	749	30.6	<0.05	<0.05	4.08	36.1	21.7	23.8	0.34	17.5		152	46.3	0.39
Nov-24	1390	7.12	520	808	39.0	<0.05	<0.05	2.33	57.3	26.7	26.2	1.47	23.2		131	46.9	0.64
Average	1796	7.51	648	884	90.1	0.38	<0.25	8.65	72.9	40.1	33.5	11.1	24.1	0.0052	156	48.8	0.31
Std. Dev.	531	0.24	150	240	53.7	0.58	NA	7.11	42.2	20.2	20.6	14.3	26.9	0.0109	17.0	12.9	0.26

HISTORICAL GROUNDWATER QUALITY DATA: O-3

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.30	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Dec-88	897		456		36.6							0.88	5.6	0.0045			
Jan-89	1034		536		40.7							0.83	>20	0.0200			
Dec-89	1450				18.7												
Jul-90	1400		743		17.1							0.14	1.8	<0.001			
Jan-94	469		613		15.1							0.04	1.9	0.0042			
Nov-94	1223		696		16.0							0.07	1.7	<0.001			
Oct-95	1228		647		16.4							0.11	1.9	0.0055			
Dec-96	1197		537		15.6							0.04	3	0.0010			
Oct-97	1180		602		16.3							0.03	2	<0.001			
Oct-98	1595		873		24.9							0.03	2	<0.001			
Nov-99	1767		756		17.2							<0.01	<1	<0.001			
Oct-00	1736		931		16.2							0.27	13.0	<0.001			
Nov-01	1676		1078		16.8							<0.01	7.0	<0.001			
Dec-02	2100		1279		18.5							<0.02	1.2	<0.001			
Oct-03	2310		1450		17.9							0.014	17.0	<0.001			
Nov-04	2530		1700		20.6							0.025	1.2	<0.001			
Nov-05	2350		1370		18.4							2.63	5.7	<0.001			
Apr-06	2360	7.50	1330	462	15.6	<0.05	<0.05	984	113		0.05	4.93	2.0				
Oct-06	2000	7.77	1070	383	14.0	<0.05	<0.05	924	102	7.33	<0.05	0.895	2.8				
Apr-07	2590	7.68	1670	421	16.7	<0.05	<0.05	1370	88.4	7.54	0.16	0.971	1.9				
Nov-07	2070	7.64	1030	408	15.1	<0.05	<0.05	1070	131	7.33	0.09	<0.005	4.6				
Apr-08	2320	7.71	1430	448	16.7	<0.05	<0.05	1300	105	9.95	0.39	0.057	2.0				
Oct-08	2780	7.61	1760	440	17.2	<0.05	<0.05	1240	96.3	8.98	0.07	0.143	1.9				
Apr-09	2650	7.66	1560	469	21.7	<0.05	<0.05	1330	107	7.97	<0.02	0.015	2.0				
Nov-09	2450	7.83	1530	475	20.7	<0.05	<0.05	1120	111	8.10	<0.05	<0.01	3.2				
Apr-10	2320	7.94	1380	491	18.9	<0.05	<0.05	1140	122	7.93	<0.02	0.17	1.7				
Nov-10	2010	7.85	1270	491	22.2	<0.05	<0.05	1030	108	7.98	<0.02	<0.01	2.1				
Apr-11	1360	7.88	375	464	12.4	<0.05	<0.05	315	149	6.72	0.03	<0.01	4.9				
Nov-11	1080	7.84	468	447	10.5	<0.05	<0.05	309	121	6.67	<0.02	<0.01	5.3				
Apr-12	1090	7.80	402	464	6.68	<0.05	<0.05	177	98.5	5.38	<0.02	0.04	4.5				
Nov-12	729	8.23	345	278	6.97	<0.05	<0.05	171	42.1	3.67	<0.02	0.012	6.8				
Apr-13	1040	7.94	439	379	6.32	<0.25	<0.25	185	57.9	4.58	0.05	<0.01	5.0				
Nov-13	873	7.93	389	368	3.65	<0.25	<0.25	110	33.0	3.67	<0.02	<0.01	5.2				
May-14	1080	7.69	503	431	7.43	<0.25	<0.25	181	42.6	3.91	0.15	<0.01	4.7				
Oct-14	1030	7.69	495	477	5.92	<0.25	<0.25	125	36.6	4.41	0.04	0.03	5.6				
Apr-15	1160	7.80	559	508	7.05	<0.25	<0.25	181	44.0	4.17	<0.02	<0.01	4.2				
Oct-15	1670	7.96	931	455	14.5	<0.25	<0.25	547	49.1	6.23	<0.02	0.64	3.9				
Apr-16	1390	7.98	722	429	13.2	<0.25	<0.25	421	39.3	4.56	<0.02		4.4				
Nov-16	1690	7.19	851	461	17.6	<0.25	<0.25	574	37.9	5.36	<0.02	<0.01	4.4				
Apr-17	1180	8.07	597	327	11.9	<0.25	<0.25	335	22.7	3.44	<0.02	0.55	5.2				
Nov-17	1070	7.73	547	440	6.76	<0.25	<0.25	199	20.9	3.40	<0.02	<0.01	7.7				
May-18	1300	7.74	700	450	12	<0.10	<0.010	320	28	4.1	0.068	<0.1	5.1				
Nov-18	999	7.72	486	340	9.14	<0.25	<0.25	235	14.9	2.93	<0.02	<0.010	6.8				
Apr-19	1270	7.80	648	430	11.4	<0.25	<0.25	339	20.9	3.79	<0.02	<0.01	5.4				
Oct-19	1360	7.64	815	404	18.3	<0.25	<0.25	461	24.8	4.70	<0.02	<0.01	5.1				
Apr-20	1920	7.55	913	432	20.9	<0.5	<0.5	560	26.4	4.57	<0.02	0.038	4.0		253	68.4	
Oct-20	1660	7.84	864	435	25.2	<0.25	<0.25	572	22.8	4.69	<0.02	0.055	5.9		232	69.1	
May-21	1850	7.84	1020	427	29.0	<0.5	<0.5	621	25.1	4.82	<0.02	<0.010	3.7		279	78.1	
Oct-21	1800	7.51	1070	422	32.2	<0.07	<0.05	679	25.4	5.50	<0.02	<0.010	64.5				
Apr-22	1780	7.54	1030	441	33.3	<0.07	<0.05	660	24.7	5.31	<0.02	0.021	3.9		283	78.8	
Sep-22	2030	7.32	1120	422	35.0	<0.07	<0.05	762	25.2	5.41	0.04	0.013	4.3		302	88.8	
Apr-23	1820	7.27	1020	409	37.6	<0.07	<0.05	647	21.1	4.63	<0.02	<0.010	3.4		267	86.1	0.027
Nov-23	1720	7.33	901	457	43.8	<0.07	<0.05	664	19.8	5.55	<0.02	0.027	3.3		234	76.8	0.056
Apr-24	1970	7.43	985	476	39.0	<0.07	<0.05	589	18.8	4.20	0.04	<0.020	4.5		263	79.8	0.018
Nov-24	1970	7.53	957	506	41.3	<0.07	<0.05	571	19.3	5.29	0.08	<0.020	3.5		259	75.4	0.044
Average	1629	7.71	897	433	18.9	<0.25	<0.25	606	57.8	5.53	0.041	0.26	5.47	0.0025	264	77.9	0.036
Std. Dev.	548	0.22	383	48.2	9.93	NA	NA	381	41.4	1.75	0.069	0.78	8.79	0.0050	22.7	6.76	0.017

HISTORICAL GROUNDWATER QUALITY DATA: O-4

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.30	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Dec-88	639		37		4.9							1.36	2.2	<0.001			
Jan-89	622		342		2.1							2.20	1.5	<0.001			
Dec-89	998				2.6												
Jul-90	674		360		<0.1							0.01	1.8	0.0010			
Jan-93	780		549									0.15	1.3	<0.001			
Jan-94	2240		472									0.17	1.5	0.0081			
Nov-94	902		539		0.9							0.26	1.1	<0.001			
Oct-95	943		529		0.7							1.21	1.6	0.0139			
Dec-96	943		468		3.0							1.10	1.0	0.0010			
Oct-97	796		443		3.0							0.35	<1	<0.001			
Oct-98	823		452		1.6							<0.01	<1	<0.001			
Nov-99	744		421		2.1							<0.01	1.0	<0.001			
Oct-00	936		530		2.6							0.03	12	<0.001			
Nov-01	1035		580		2.9							<0.01	5.0	<0.001			
Dec-02	1050		600		2.3							<0.02	1.2	<0.001			
Oct-03	1380		813		2.6							0.017	11	<0.001			
Nov-04	1780		1070		4.2							0.012	1.1	<0.001			
Nov-05	1350		750		1.7							1.45	5.4	<0.001			
Apr-06	975	7.96	456	261	0.24	<0.05	<0.05	281	40.9		0.43	18.3	1.0				
Oct-06	1950	7.74	1310	345	1.4	<0.05	<0.05	1070	46.9	4.40	<0.05	0.96	2.0				
Apr-07	1020	8.14	597	237	0.55	<0.05	<0.05	361	15.5	1.73	0.08	0.42	1.4				
Nov-07	939	7.86	492	255	0.70	<0.05	<0.05	312	17.3	1.46	0.11	<0.005	1.7				
Apr-08	678	7.99	385	213	0.44	<0.05	<0.05	187	4.06	1.00	<0.05	<0.010	1.9				
Oct-08	2010	7.61	1350	375	2.13	<0.05	<0.05	829	6.91	3.49	<0.05	0.106	1.6				
Apr-09	560	8.03	326	201	0.75	<0.05	<0.05	118	2.28	0.66	<0.02	<0.01	1.6				
Nov-09	695	8.02	402	254	0.62	<0.05	<0.05	133	3.20	0.67	<0.05	<0.01	3.3				
Apr-10	559	8.22	315	214	0.27	<0.05	<0.05	111	1.88	0.61	<0.02	<0.01	1.4				
Nov-10	1540	7.93	1140	351	1.79	<0.05	<0.05	821	4.23	2.07	<0.02	<0.01	1.9				
Apr-11	380	8.08	208	171	0.60	<0.05	<0.05	33.8	1.61	0.51	<0.02	<0.01	1.4				
Nov-11	805	7.89	544	302	1.79	<0.05	<0.05	288	2.70	0.86	<0.02	<0.01	2.1				
Apr-12	470	7.91	253	216	0.88	<0.05	<0.05	53.7	1.44	0.40	<0.02	<0.01	1.1				
Nov-12	1040	8.09	739	275	2.08	<0.05	<0.05	438	3.05	1.20	<0.02	0.015	1.7				
Apr-13	597	8.00	311	189	0.72	<0.05	<0.05	122	1.60	0.61	0.04	<0.01	1.3				
Nov-13	965	7.86	517	280	1.16	<0.25	<0.25	264	2.50	1.05	<0.02	<0.01	1.9				
May-14	568	8.07	307	186	0.77	<0.10	<0.10	114	1.57	1.22	0.15	0.01	1.4				
Oct-14	604	7.92	327	284	0.90	<0.10	<0.10	56.4	1.73	0.51	<0.02	<0.01	1.6				
Apr-15	538	7.95	274	202	0.76	<0.05	<0.05	97	1.36	0.61	<0.02	<0.01	1.4				
Oct-15	994	7.88	563	272	6.32	<0.25	<0.25	305	4.38	1.62	0.10	14.9	1.7				
Apr-16	739	8.08	417	230	1.01	<0.10	<0.10	199	1.79	0.65	<0.02		1.5				
Nov-16	2360	7.25	1550	416	4.40	<1.0	<1.0	1180	5.05	2.04	<0.02	0.01	2.0				
Apr-17	718	8.11	377	231	<0.50	<0.25	<0.25	164	2.01	0.52	<0.02	8.0	1.4				
Nov-17	1010	7.72	587	325	2.21	<0.25	<0.25	279	3.16	1.22	<0.02	<0.01	2.5				
May-18	690	7.91	380	240	<1.0	<0.10	<0.10	140	1.8	0.71	<0.050	<0.1	1.3				
Nov-18	936	7.76	491	333	1.84	<0.25	<0.25	223	2.38	0.59	0.10	<0.010	1.9				
Apr-19	763	7.73	401	285	0.98	<0.25	<0.25	174	1.74	0.57	<0.02	<0.01	2.1				
Oct-19	1090	7.75	656	338	9.07	<0.25	<0.25	347	7.46	1.71	<0.02	<0.01	2.2				
Apr-20	673	7.59	251	223	0.68	<0.10	<0.10	99	1.26	0.30	<0.02	<0.010	1.5		70.2	18.4	
Oct-20	1420	7.78	866	382	3.55	<0.25	<0.25	572	4.24	1.42	<0.02	<0.010	1.9		235	67.8	
May-21	716	7.92	363	249	0.81	<0.10	<0.10	125	1.80	0.62	<0.02	<0.010	1.8		99.3	27.9	
Oct-21	1550	7.53	921	358	3.13	<0.05	<0.05	747	3.80	2.52	<0.02	<0.010	61.4				
Apr-22	504	7.77	250	214	0.47	<0.05	<0.05	60.1	1.42	<0.50	<0.02	0.016	1.9		70.0	18.3	
Apr-23	676	7.59	399	216	1.02	<0.05	<0.05	143	1.89	0.69	<0.02	<0.010	1.6		111	29.7	<0.010
Nov-23	944	7.39	490	382	1.24	<0.05	<0.05	194	2.30	1.52	<0.02	0.030	2.1		133	38.4	0.022
Apr-24	765	7.76	382	302	0.42	<0.05	<0.05	142	1.64	<0.50	<0.02	<0.020	3.0		105	29.1	<0.010
Nov-24	836	7.83	387	385	15.4	<0.05	<0.05	118	10.1	1.33	<0.02	<0.020	2.4		106	29.6	0.060
Average	962	7.85	536	275	2.17	<0.25	<0.25	295	5.92	1.21	0.037	0.97	3.25	0.0018	116	32.4	0.041
Std. Dev.	439	0.21	296	66.7	2.53	NA	NA	285	9.9	0.89	0.075	3.35	8.32	0.0036	52.4	15.7	N/A

HISTORICAL GROUNDWATER QUALITY DATA: O-5

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.30	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Dec-88	487		248		7.4							3.3	5.5	0.002			
Jan-89	414		233		4.2							4.4	1.9	0.001			
Dec-89	539				10.3												
Jul-90	491		249		10.0							2.4	1.5	<0.001			
Jan-93	370		250									0.03	1.4	<0.001			
Jan-94	DESTROYED																
Average	460	NA	245	NA	7.98	NA	NA	NA	NA	NA	NA	2.53	2.58	<0.001	NA	NA	NA
Std. Dev.	67.4	NA	8.0	NA	2.83	NA	NA	NA	NA	NA	NA	1.86	1.96	NA	NA	NA	NA

HISTORICAL GROUNDWATER QUALITY DATA: O-6

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.30	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Dec-88	1256		553		70.5							1.82	10	0.003			
Jan-89	1240		569		50.5							3.0	8.4	0.002			
Dec-89	1470				77.6												
Jul-90	1530		582		70.2							9.6	11	0.001			
Jan-93			506									17.6	8.8	0.0035			
Nov-94	1490		597		81.9							18.4	16.9	0.0091			
Oct-95	1550		716		41.2							27.0	12	0.0063			
Dec-96	1347		577		9.3							12.9	5	0.0010			
Oct-97	1493		810		15.0							17.3	4	<0.001			
Oct-98	1467		742		20.9							13.6	29	<0.001			
Nov-99	1392		766		10.6							9.35	10	<0.001			
Oct-00	1324		737		5.7							3.62	19	<0.001			
Nov-01	1247		665		6.7							2.39	4	<0.001			
Dec-02	1040		747		8.6							0.85	3.5	<0.001			
Oct-03	1030		732		6.4							0.50	25	<0.001			
Nov-04	1110		706		10.7							0.137	2.8	<0.001			
Nov-05	1140		682		9.9							0.26	11.3	<0.001			
Apr-06	854	7.76	465	429	1.96	1.07	<0.05	28.6	3.3		<0.05	3.45	2.0				
Oct-06	1130	7.61	653	625	17.0	0.42	<0.05	83.0	12.3	6.61	0.44	0.47	4.5				
Apr-07	845	7.84	484	432	2.27	2.20	<0.05	35.2	3.07	4.35	0.13	0.26	1.8				
Nov-07	1050	7.90	561	550	11.4	0.36	<0.05	56.2	8.09	6.15	<0.05	<0.005	3.4				
Apr-08	905	7.98	523	503	4.56	1.71	<0.05	53.2	5.13	5.69	<0.05	<0.010	1.9				
Oct-08	1090	7.72	622	551	8.18	0.12	<0.05	41.1	8.61	6.22	0.20	<0.01	2.6				
Apr-09	910	7.99	553	467	4.80	1.95	<0.05	37.4	6.09	4.39	0.05	0.048	2.0				
Nov-09	924	7.86	555	505	6.53	0.39	<0.05	26.9	6.30	5.42	<0.05	<0.01	1.7				
Apr-10	845	8.00	533	470	6.94	0.80	0.07	31.5	7.84	5.04	0.02	<0.01	1.8				
Nov-10	905	7.90	545	539	14.9	<0.05	<0.05	37.4	9.98	5.79	0.38	0.02	2.7				
Apr-11	905	7.96	541	432	9.62	1.19	<0.05	74.6	7.91	4.47	0.12	<0.01	2.1				
Nov-11	832	7.88	535	511	5.75	0.21	<0.05	65.7	7.02	4.99	0.17	<0.01	2.7				
Apr-12	944	7.77	531	506	3.53	0.96	<0.05	51.8	4.24	3.99	<0.02	0.01	1.4				
Nov-12	912	8.00	592	525	6.58	0.06	<0.05	53.6	5.71	5.19	0.05	<0.01	2.7				
Apr-13	1100	7.91	605	545	4.14	1.68	<0.25	68.4	3.56	4.17	0.03	<0.01	1.8				
Nov-13	1250	7.64	686	629	21.0	<0.5	<0.5	39.6	15.2	6.21	0.14	<0.01	3.5				
May-14	1150	7.43	708	583	14.2	2.84	<0.25	45.6	11.1	4.87	0.13	0.02	2.6				
Oct-14	1040	7.68	552	559	12.6	0.30	<0.25	35.4	9.6	4.10	<0.02	0.02	2.5				
Apr-15	1020	7.58	551	569	7.8	0.71	<0.25	25.3	6.9	3.65	<0.02	<0.01	1.9				
Oct-15	1100	7.81	586	580	16.1	<0.25	<0.25	24.6	11.7	5.82	0.96	0.27	3.5				
Apr-16	940	7.97	491	503	6.2	1.10	<0.25	40.0	6.6	3.76	<0.02		2.0				
Nov-16	1450	6.88	699	797	33.9	0.29	<0.25	24.3	29.1	9.43	5.06	<0.01	4.8				
Apr-17	1040	7.78	541	507	10.3	1.22	0.41	49.0	11.6	4.74	1.06	0.69	2.1				
Nov-17	1210	7.52	609	640	21.4	0.29	<0.25	36.3	17.1	6.68	2.93	<0.01	5.6				
May-18	960	7.36	510	510	7.5	1.33	0.14	29.0	7.9	4.7	1.7	<0.1	1.9				
Nov-18	1290	7.70	600	669	24.6	<0.05	<0.05	34.2	18.4	8.36	3.24	<0.010	3.2				
Oct-19	1190	7.75	585	672	21.3	0.30	<0.25	14.1	21.6	12.9	11.0	<0.01	<0.5				
Apr-20	1500	7.41	543	693	20.0	0.88	0.44	13.4	20.9	15.5	16.3	0.040	9.7		151	40.3	
Oct-20	1380	7.73	626	777	30.2	0.44	<0.25	8.81	30.9	19.2	27.9	<0.010	12.8		165	51.9	
May-21	1440	7.36	559	717	20.7	1.06	<0.25	9.71	22.7	21.7	32.4	<0.010	9.3		149	45.4	
Oct-21	1400	7.42	577	742	18.7	0.81	<0.05	8.18	24.4	21.5	22.7	<0.010	165				
Apr-22	1190	7.31	485	644	9.7	0.46	<0.05	13.3	13.0	16.1	18.9	0.038	6.5		135	36.0	
Sep-22	1560	7.02	654	774	28.3	1.08	0.93	6.56	27.1	23.6	24.2	0.036	18.3		178	51.0	
Apr-23	1400	7.00	658	692	22.3	<0.05	<0.05	11.6	26.1	22.1	20.0	0.03	12.7		179	51.2	0.256
Nov-23	1400	6.94	733	839	23.5	1.49	<0.05	8.78	35.2	26.3	23.4	2.68	16.9		190	62.7	0.448
Apr-24	1430	7.05	600	836	16.9	<0.05	<0.05	7.04	24.0	21.0	24.9	<0.020	14.6		160	48.7	0.282
Nov-24	1400	7.17	535	838	23.8	0.81	<0.05	10.2	20.3	20.6	24.2	0.03	19.5		150	38.9	0.278
Average	1189	7.61	605	604	19.1	0.80	<0.25	33.5	13.80	9.87	7.10	2.82	10.28	0.0019	162	47.3	0.32
Std. Dev.	225	0.33	84.2	122.2	18.9	0.69	NA	20.4	8.88	7.24	10.55	6.02	22.8	0.0025	17.7	8.22	0.09

HISTORICAL GROUNDWATER QUALITY DATA: O-7

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.30	5.0	NV	NV	NV	NV
RUC	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Jan-89	2030		1165		14.1							0.10	13.3	0.0020			
Dec-89	1900				6.70												
Jul-90	2210		1197		5.50							0.02	4.0	<0.001			
Nov-94	2360		1338		0.50							0.04	3.6	0.0138			
Oct-95	2190		1114		0.70							0.03	4.3	0.0021			
Dec-96	1859		596		2.80							0.26	6	<0.001			
Oct-97	518		528		3.00							0.23	6	<0.001			
Nov-99	1281		470		1.70							0.14	3	<0.001			
Nov-01	1042		463		<1.0							<0.01	6	<0.001			
Dec-02	1420		678		1.00							<0.02	6.7	<0.001			
Oct-03	1970		1270		1.10							<0.005	13	<0.001			
Nov-05	869		465		8.00							0.012	14.5	<0.001			
Apr-06	978	7.79	527	373	0.38	<0.05	<0.05	188	14.2		<0.05	1.67	7				
Oct-06	690	8.10	396	216	0.57	<0.05	<0.05	216	7.58	1.36	<0.05	0.39	48				
Apr-07	913	8.08	531	290	0.20	<0.05	<0.05	236	10.9	1.51	2.00	0.45	7.1				
Nov-07	869	8.11	483	227	0.36	<0.05	<0.05	298	10.1	1.70	<0.05	<0.005	9.6				
Apr-08	491	8.19	268	195	1.07	0.17	<0.05	83	3.67	0.89	<0.05	<0.010	4.2				
Apr-09	1370	8.05	876	274	1.61	<0.05	<0.05	594	11.6	1.82	<0.02	<0.010	4.4				
Nov-09	1530	8.05	997	264	0.65	<0.05	<0.05	711	14.4	2.23	<0.05	<0.01	7.1				
Apr-10	1330	8.13	834	265	0.70	0.42	<0.05	615	12.0	1.78	<0.02	<0.01	4.1				
Nov-10	2170	7.88	1790	291	0.41	<0.05	<0.05	1520	12.2	2.49	<0.02	<0.01	3.3				
Apr-11	1340	8.01	809	240	1.83	0.19	<0.05	618	9.95	1.42	<0.02	<0.01	4.5				
Nov-11	971	8.05	650	235	1.14	<0.05	<0.05	473	8.57	1.49	<0.02	<0.01	7.1				
Apr-12	1030	7.93	572	247	1.13	<0.05	<0.05	373	7.17	1.09	<0.02	0.010	3.0				
Nov-12	792	8.14	485	215	1.09	<0.05	<0.05	310	7.69	1.22	<0.02	0.012	5.4				
Apr-13	695	8.04	368	218	0.83	0.07	<0.05	155	4.98	0.82	0.03	<0.01	4.0				
Nov-13	1120	8.00	594	258	0.54	<0.25	<0.25	399	7.43	1.46	<0.02	<0.01	6.5				
May-14	1330	7.90	875	282	1.30	<0.25	<0.25	517	8.40	1.26	0.09	0.02	4.7				
Oct-14	1560	7.98	919	361	0.78	<0.25	<0.25	667	8.73	1.63	0.14	0.03	4.6				
Apr-15	1590	7.93	936	442	1.46	<0.25	<0.25	547	8.07	0.95	<0.02	<0.01	4.3				
Oct-15	2530	8.10	1880	311	3.2	<1.0	<1.0	1500	8.66	3.01	<0.02	1.17	3.3				
Apr-16	381	7.94	196	139	0.73	0.80	<0.05	65.2	2.57	0.36	<0.02		3.5				
Nov-16	1420	7.10	897	291	1.2	<0.5	<0.5	593	6.87	1.66	<0.02	<0.01	4.3				
Apr-17	651	8.21	339	210	0.92	<0.25	<0.25	149	3.52	0.55	<0.02	1.08	4.6				
Nov-17	1110	7.94	656	268	1.46	<0.25	<0.25	408	6.03	1.17	0.03	<0.01	4.5				
May-18	500	7.94	250	210	1.4	<0.10	<0.010	49	2.8	0.40	<0.050	<0.1	4.3				
Nov-18	674	7.96	337	311	0.98	<0.10	<0.10	74.9	4.48	0.63	<0.02	0.04	7.5				
Apr-19	526	7.82	268	286	2.57	0.07	<0.05	29.0	3.24	0.44	<0.02	<0.01	6.0				
Oct-19	552	7.69	303	262	0.79	0.19	<0.05	58.9	3.99	0.72	<0.02	<0.01	<0.5				
Apr-20	552	7.75	242	247	0.55	<0.05	<0.05	16.3	2.96	0.46	<0.02	0.084	4.8		72.7	14.8	
Oct-20	504	8.09	274	264	0.28	0.15	<0.05	30.5	4.06	0.73	0.03	0.103	6.0		81.2	17.2	
May-21	447	8.06	218	220	0.32	0.11	<0.05	11.3	2.46	0.56	<0.02	<0.010	5.5		65.4	13.4	
Apr-22	403	7.77	169	206	0.43	0.17	<0.05	8.39	1.91	<0.50	<0.02	0.034	5.0		49.7	10.8	
Apr-23	445	7.86	236	192	0.66	0.16	<0.05	23.6	2.50	0.68	<0.02	0.016	4.9		71.6	14.0	<0.010
Apr-24	396	7.76	221	228	0.53	0.91	<0.05	14.8	2.55	0.90	0.55	<0.020	7.4		67.0	13.0	<0.010
Average	1145	7.95	652	259	1.754	0.16	<0.25	350	6.86	1.21	0.10	0.14	6.77	0.0020	67.9	13.9	<0.010
Std. Dev.	617	0.20	414	58.0	2.506	0.21	NA	378	3.67	0.64	0.35	0.34	6.94	0.0040	10.5	2.12	N/A

HISTORICAL GROUNDWATER QUALITY DATA: O-8

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Jan-89	1920		1186		6.8							0.19	17.2	0.0015			
Jul-90													3.5	0.0010			
Nov-94	2180		1143		1.3							0.02	1.7	<0.001			
Oct-95	1330		696		0.8							0.22	2.9	0.0120			
Dec-96	1001		240		2.4							0.04	6.0	0.0010			
Oct-97														<0.001			
Nov-99	451		91		2.7							1.3	16.0	<0.001			
Nov-01	790		184		3.2							2.0	14.0	<0.001			
Dec-02	840		224		1.9							0.07	9.2	<0.001			
Nov-05	791		440		3.1							0.60	19.5	<0.001			
Apr-06	567	7.55	295	301	0.71	<0.05	<0.05	1.14	6.01		<0.05	7.53	8.0				
Apr-07	798	8.32	504	457	1.01	<0.05	<0.05	46.1	8.93	0.63	0.09	0.27	7.5				
Nov-07	1010	7.57	568	336	2.02	<0.05	<0.05	274	7.64	0.87	<0.05	<0.005	9.3				
Apr-09	514	7.71	286	279	2.46	0.06	<0.05	8.06	3.06	0.27	<0.02	0.043	5.6				
Apr-10	529	8.23	301	274	1.72	0.09	<0.05	30.0	3.16	0.25	<0.02	<0.01	5.1				
Nov-10	948	8.22	638	388	2.87	<0.05	<0.05	261	5.11	0.71	<0.02	<0.01	5.6				
Nov-12	477	8.12	266	229	2.32	0.42	<0.05	49.4	6.20	0.67	<0.02	<0.01	11.3				
Apr-13	463	8.06	244	233	1.92	<0.05	<0.05	9.55	3.12	0.20	0.07	<0.01	5.4				
Nov-13	458	8.08	225	232	1.02	<0.10	<0.10	10.6	3.55	0.21	<0.02	<0.01	11.4				
May-14	454	7.85	240	233	0.82	0.20	<0.05	7.61	3.20	0.24	0.10	0.02	6.4				
Oct-14	695	7.73	384	404	2.58	<0.25	<0.25	1.78	4.20	0.38	<0.02	0.02	7.3				
Apr-15	817	7.64	421	472	1.80	<0.25	<0.25	0.3	5.37	0.28	<0.02	<0.01	6.3				
Oct-15	819	8.11	475	450	6.51	<0.25	<0.25	15.3	4.24	0.40	<0.02	6.03	5.4				
Apr-16	625	8.04	350	338	2.00	<0.10	<0.10	29.0	4.47	0.22	<0.02		7.6				
Apr-17	366	8.13	188	192	0.60	<0.05	<0.05	6.43	2.66	0.21	<0.02	2.42	5.9				
Nov-17	520	7.87	281	278	2.77	<0.10	<0.10	12.4	4.41	0.29	<0.02	<0.01	6.1				
May-18	310	7.91	160	170	<1.0	<0.10	<0.010	1.3	2.6	<0.2	<0.050	<0.1	5.0				
Nov-18	509	7.80	252	276	1.19	<0.05	<0.05	5.29	3.63	0.20	<0.02	0.033	10				
Apr-19	391	7.80	195	232	0.55	<0.05	<0.05	1.90	1.99	0.07	0.03	<0.01	4.1				
Oct-19	451	7.81	249	257	0.71	<0.05	<0.05	2.93	3.42	0.39	<0.02	<0.01	13				
Apr-20	456	7.68	200	213	0.42	<0.05	<0.05	2.31	2.00	0.09	<0.02	0.027	6.0		65.6	8.72	
Oct-20	498	8.02	268	288	0.67	<0.05	<0.05	1.73	3.38	0.39	<0.02	0.068	11		87.5	12.0	
May-21	396	7.98	190	202	0.35	<0.05	<0.05	2.35	2.74	<0.50	<0.02	0.146	5.8		62.5	8.27	
Apr-22	407	7.62	186	218	0.59	<0.05	<0.05	1.76	2.53	<0.50	<0.02	0.034	6.3		60.8	8.29	
Nov-23	785	7.33	446	489	4.84	<0.05	<0.05	0.54	3.90	0.74	<0.02	<0.010	6.8		140	23.4	0.027
Apr-24	764	7.53	431	475	3.96	<0.05	<0.05	0.55	3.86	<0.50	0.02	<0.020	9.2		132	24.7	<0.010
Average	716	7.87	366	304	2.08	0.066	<0.10	30.1	4.05	0.37	0.022	0.64	8.05	0.0019	91.4	14.23	0.03
Std. Dev.	410	0.25	247	98.7	1.61	0.085	NA	71.2	1.67	0.23	0.025	1.69	4.06	0.0036	36.0	7.74	N/A

HISTORICAL GROUNDWATER QUALITY DATA: O-9

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Dec-88	554		281		20.3							2.95	8.8	0.0020			
Jan-89	587		317		21.5							4.90	7.3	0.0010			
Dec-89	585				17.8												
Jul-90	629		321		13.6							0.54	9.1	0.0074			
Jan-94	618		335		9.4							0.30	13.4	0.0064			
Nov-94	671		379		9.0							0.26	10	0.0037			
Oct-95	637		361		8.2							0.53	19	0.0049			
Dec-96	559		308		7.7							0.26	11	0.0010			
Oct-97	614		324		6.9							0.25	12	<0.001			
Oct-98	777		431		6.7							0.42	10	<0.001			
Nov-99	618		342		6.2							0.46	15	<0.001			
Oct-00	679		403		4.5							2.39	18	<0.001			
Nov-01	593		319		5.5							0.18	21	<0.001			
Dec-02	582		321		4.6							0.14	15.2	<0.001			
Oct-03	650		418		4.9							0.71	28	<0.001			
Nov-04	601		376		5.8							0.53	13.4	<0.001			
Nov-05	647		388		4.9							0.50	25.2	<0.001			
Apr-06	496	7.99	271	236	4.45	<0.05	<0.05	20.6	3.35		0.08	10.60	15.0				
Oct-06	566	7.90	314	201	6.34	<0.05	<0.05	112	3.55	1.71	<0.05	0.26	21.8				
Apr-07	504	8.24	286	211	4.41	<0.05	<0.05	47.5	3.74	0.95	6.60	0.15	11.0				
Nov-07	608	8.21	331	230	5.72	<0.05	<0.05	119	2.77	1.20	<0.05	0.01	22.1				
Apr-08	502	8.04	283	243	4.98	<0.05	<0.05	40.5	3.59	1.13	<0.05	0.05	10.9				
Oct-08	724	7.88	418	313	5.80	<0.05	<0.05	64.9	4.80	1.44	0.08	1.19	14.4				
Apr-09	499	8.08	299	234	4.10	<0.05	<0.05	34.5	3.39	1.01	<0.02	0.10	11.7				
Nov-09	553	7.76	346	267	3.69	<0.05	<0.05	44.3	3.33	1.65	<0.05	0.01	19.4				
Apr-10	577	8.06	332	304	4.08	<0.05	<0.05	35.6	3.29	1.26	<0.02	0.09	12.6				
Nov-10	611	7.89	373	298	4.09	<0.05	<0.05	92.3	3.62	1.83	<0.02	0.07	16.9				
Apr-11	546	7.89	310	235	4.95	<0.05	<0.05	57.2	2.97	1.19	0.02	0.04	16.3				
Nov-11	529	7.94	340	249	4.04	<0.05	<0.05	87.2	3.02	1.39	0.04	<0.01	19.8				
Apr-12	497	7.89	269	253	3.55	<0.05	<0.05	25.7	2.54	1.00	<0.02	0.13	12.6				
Nov-12	636	8.12	380	207	5.99	<0.05	<0.05	190	3.35	1.61	<0.02	0.04	13.9				
Apr-13	509	8.00	270	222	5.66	<0.05	<0.05	40.7	2.78	0.99	0.03	0.02	11.4				
Nov-13	559	7.98	273	209	5.73	<0.10	<0.10	75.3	2.76	1.19	<0.02	0.04	19.8				
May-14	540	7.89	292	263	5.38	<0.05	<0.05	26.3	3.07	1.03	0.18	0.03	12.7				
Oct-14	678	7.81	397	371	6.54	<0.25	<0.25	11.0	3.58	1.42	0.03	0.21	22.3				
Apr-15	618	7.75	328	341	6.70	<0.05	<0.05	3.0	3.22	1.03	<0.02	0.13	16.4				
Oct-15	716	7.88	411	324	7.52	<0.25	<0.25	71.9	3.87	1.65	0.05	4.06	15.2				
Apr-16	530	7.97	295	259	5.58	<0.05	<0.05	36.6	3.27	1.44	<0.02		13.4				
Nov-16	690	7.31	345	277	8.68	<0.25	<0.25	102	3.89	1.79	<0.02	0.05	16.6				
Apr-17	513	8.13	266	247	5.81	<0.05	<0.05	17.5	3.54	1.34	<0.02	1.70	11.5				
Nov-17	702	7.78	384	331	11.5	<0.10	<0.10	52.8	5.03	2.07	<0.02	0.09	19.6				
May-18	620	7.76	320	320	10.0	<0.10	<0.010	<1.0	4.7	1.8	<0.050	<0.1	13.0				
Nov-18	663	7.77	328	321	10.3	<0.05	<0.05	43.2	5.04	2.77	<0.02	0.058	19.5				
Apr-19	589	7.81	299	341	6.87	<0.05	<0.05	6.97	4.35	2.40	<0.02	0.040	12.3				
Oct-19	680	7.80	376	352	8.21	<0.10	<0.10	41.1	5.05	3.88	0.02	0.19	25.4				
Apr-20	747	7.64	348	347	9.06	<0.10	<0.10	2.56	4.07	3.12	<0.02	0.15	21.8		92.4	28.5	
Oct-20	671	7.83	365	364	10.3	<0.10	<0.10	21.8	4.99	3.70	0.05	0.31	27.8		97.0	29.8	
May-21	668	7.91	322	334	9.06	<0.10	<0.10	2.16	3.92	3.40	0.03	0.48	17.7		85.9	26.1	
Oct-21	819	7.62	438	441	8.44	<0.05	<0.05	2.60	5.42	4.59	0.06	0.042	82.8				
Apr-22	662	7.29	314	329	8.74	0.09	<0.05	4.36	4.23	3.43	0.07	0.51	17.4		84.4	25.0	
Sep-22	866	7.63	361	414	7.06	<0.05	0.33	13.6	4.72	4.49	0.16	0.40	27.0		97.5	28.5	
Apr-23	550	7.60	307	259	5.85	0.06	<0.05	5.0	3.63	4.17	0.10	0.57	25.6		83.2	24.1	0.023
Nov-23	690	7.47	349	420	6.54	<0.05	<0.05	6.57	3.90	6.05	<0.02	0.22	20.8		92.0	28.9	0.076
Apr-24	548	7.66	292	330	6.42	<0.05	<0.05	2.67	3.98	3.89	0.06	0.47	26.2		76.7	24.4	0.015
Nov-24	742	7.77	402	433	8.16	0.12	<0.05	8.35	3.89	5.90	0.07	0.15	27.2		114	28.4	0.052
Average	619	7.84	338	298	7.41	<0.10	<0.10	42.4	3.80	2.29	0.21	0.74	18.1	0.0019	91.5	27.1	0.04
Std. Dev.	83.6	0.21	45.7	66.4	3.70	NA	NA	41.5	0.74	1.43	1.07	1.72	10.54	0.0023	10.86	2.17	0.03

HISTORICAL GROUNDWATER QUALITY DATA: W-1

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.30	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Dec-88	901		466		57.9							0.74	12.6	<0.001			
Jan-89	629		331		21.2							1.20	9.0	0.0215			
Dec-89	900				54.1												
Nov-94	600		349		6.9							0.19	12.8	<0.001			
Oct-95	551		312		6.6							1.04	18.1	0.0085			
Dec-96	366		188		5.4							0.08	13	<0.001			
Oct-97	603		306		3.7							1.62	21	<0.001			
Oct-98	538		314		2.5							0.99	21	<0.001			
Nov-99	682		403		7.9							1.29	29	<0.001			
Oct-00	626		365		4.3							0.66	17	<0.001			
Nov-01	541		302		5.0							0.42	15	<0.001			
Dec-02	650		375		4.4							0.43	13.2	<0.001			
Nov-04	861		529		4.9							0.17	11.0	<0.001			
Nov-12	535	8.13	305	221	7.45	<0.05	<0.05	91.6	5.45	0.74	0.04	0.19	12.2				
Apr-13	475	7.85	246	225	5.73	<0.05	<0.05	17.2	4.62	0.49	0.06	0.28	9.3				
Nov-13	575	8.04	283	268	8.99	<0.10	<0.10	25.5	6.98	0.69	0.05	0.32	14.5				
May-14	522	7.85	270	270	8.13	0.17	<0.05	5.4	6.15	0.58	0.17	0.77	11.9				
Oct-14	505	8.01	272	275	5.96	<0.10	<0.10	6.0	4.90	0.61	0.08	0.13	4.7				
Apr-15	525	7.93	266	281	6.03	<0.05	<0.05	4.9	5.51	0.50	0.05	0.35	6.1				
Oct-15	561	7.87	301	281	5.17	<0.10	<0.10	23.0	6.24	0.59	0.04	9.32	6.7				
Apr-16	468	7.92	250	252	4.63	0.21	<0.05	8.9	4.62	0.45	<0.02		9.3				
Nov-16	608	7.80	307	249	6.15	0.13	<0.05	67.8	5.01	0.78	<0.02	0.20	11.8				
Apr-17	448	7.87	230	222	4.11	0.08	<0.05	8.6	4.3	0.46	0.05	8.65	9.2				
Nov-17	522	7.91	277	279	4.47	<0.10	<0.10	7.1	4.66	0.78	0.06	0.13	6.4				
May-18	490	7.61	260	260	4.1	<0.10	<0.010	6.2	3.9	0.57	0.14	0.13	4.8				
Nov-18	562	7.86	270	284	6.46	0.10	<0.05	13.8	5.16	0.73	<0.02	0.017	11.6				
Apr-19	444	7.76	221	248	5.89	<0.05	<0.05	7.10	3.87	0.54	0.03	0.020	7.1				
Oct-19	525	7.80	278	295	4.21	<0.05	<0.05	7.77	4.70	0.83	0.03	0.070	16.5				
Apr-20	565	7.58	246	259	3.60	0.11	<0.05	8.70	3.75	0.53	0.03	0.093	10.1		69.9	17.3	
Oct-20	546	7.97	296	310	4.93	0.13	<0.05	3.74	4.60	0.80	0.24	<0.010	14.8		83.2	21.5	
May-21	519	7.87	256	268	3.72	0.12	<0.05	1.68	4.01	0.55	0.03	0.64	11.3		74.1	17.2	
Apr-22	623	7.72	315	331	4.75	0.12	<0.05	5.36	4.45	0.61	0.03	0.37	14.2		91.8	20.9	
Apr-23	456	7.72	220	197	3.00	0.17	<0.05	23.9	3.06	0.82	<0.02	0.52	18.8		63.1	15.2	<0.010
Nov-23	608	7.46	305	337	4.56	0.12	<0.05	26.0	3.80	2.05	0.04	0.23	28.3		87.9	20.7	0.030
Apr-24	507	7.85	288	306	3.12	0.06	<0.05	10.7	3.45	0.65	0.08	0.34	33.9		84.7	18.5	<0.010
Nov-24	616	7.90	292	392	4.07	0.10	<0.05	24.6	3.42	0.76	0.11	0.045	28.5		92.8	14.6	0.015
Average	574	7.84	300	274	8.4	0.09	<0.10	17.6	4.64	0.70	0.06	0.96	14.1	0.0029	80.9	18.2	0.02
Std. Dev.	116	0.15	67	43	12.1	0.05	NA	21.4	0.97	0.32	0.06	2.11	7.1	0.0063	10.78	2.63	N/A

HISTORICAL GROUNDWATER QUALITY DATA: W-2

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Dec-88	1530		911		1.7							1.16	8.0	<0.001			
Jan-89	1940		1232		1.7							2.50	5.9	0.0010			
Jul-90	2130		1942		6.7							94*	7.2	0.0015			
Nov-94	2040		1375		0.9							2.73	5.4	<0.001			
Oct-95	1630		1055		0.7							1.83	7	0.0057			
Oct-95 Dup	1630		1049		0.7							1.85	7	0.0020			
Dec-96	1608		765		2.8							2.00	5	<0.001			
Oct-97	1440		878		2.9							1.94	10	<0.001			
Nov-99	988		548		2.3							0.01	13	<0.001			
Oct-00	2732		2080		3.0							9.38	18	<0.001			
Nov-01	1605		1143		2.1							0.54	3	<0.001			
Dec-02	1700		1088		1.5							0.130	4.8	<0.001			
Oct-03	3170		2730		2.7							0.022	22	<0.001			
Nov-04	3200		2710		2.6							0.008	3.8	<0.001			
Nov-05	2430		1800		2.7							0.56	16.1	<0.001			
Apr-06	2290	7.64	1650	464	1.18	0.94	<0.05	1100	7.12		<0.05	6.13	3.0				
Oct-06	1930	7.65	1340	395	2.16	<0.05	<0.05	1030	5.81	3.69	0.08	0.72	3.7				
Apr-07	2470	7.89	1780	420	1.45	<0.05	<0.05	1360	6.81	4.10	0.17	0.81	2.9				
Nov-07	2100	7.87	1500	382	0.8	<0.05	<0.05	1400	4.51	2.58	0.07	<0.005	5.0				
Apr-08	1750	7.82	1260	400	1.4	<0.05	<0.05	933	5.24	3.51	<0.05	<0.010	2.8				
Oct-08	3290	7.71	2740	469	1.67	0.11	<0.05	1760	9.99	7.19	0.35	<0.01	3.8				
Apr-09	1410	7.85	905	374	1.74	<0.05	<0.05	507	3.88	1.76	<0.02	<0.010	3.1				
Nov-09	1420	7.95	935	429	1.30	<0.01	<0.05	471	4.17	2.46	<0.05	<0.01	4.7				
Apr-10	1360	8.06	866	376	0.79	<0.05	<0.05	538	3.19	2.34	0.02	<0.01	2.5				
Nov-10	1510	7.81	1110	412	4.47	<0.05	<0.05	729	4.59	3.30	<0.02	<0.01	2.8				
Apr-11	902	7.97	533	351	2.13	<0.05	<0.05	180	2.29	1.26	<0.02	<0.01	2.3				
Nov-11	731	8.05	482	360	3.21	<0.05	<0.05	154	2.40	1.52	0.02	<0.01	3.0				
Apr-12	694	7.94	376	302	1.77	<0.05	<0.05	96.1	1.54	1.23	<0.02	0.04	2.1				
Nov-12	780	8.23	490	273	5.04	<0.05	<0.05	227	2.45	1.80	0.04	<0.01	4.1				
Apr-13	607	8.00	321	247	1.82	0.06	<0.05	78.9	1.30	1.85	0.05	<0.01	2.7				
Nov-13	703	8.04	361	273	2.43	<0.25	<0.25	108	1.46	2.12	<0.02	<0.01	4.0				
May-14	602	7.88	317	250	1.37	<0.10	<0.10	74.0	1.13	1.80	0.17	0.02	2.8				
Oct-14	860	8.00	487	359	5.38	<0.25	<0.25	135	1.91	1.75	0.06	<0.01	2.7				
Apr-15	844	7.88	436	404	4.07	<0.25	<0.25	79.3	1.76	1.22	<0.02	<0.01	2.5				
Oct-15	961	8.02	541	300	8.18	<0.25	<0.25	248	2.94	2.04	0.03	2.11	2.9				
Apr-16	622	8.02	351	319	2.44	<0.10	<0.10	35.9	1.96	0.88	0.31		2.9				
Nov-16	891	8.19	493	299	4.88	<0.25	<0.25	194	2.95	1.77	<0.02	<0.01	4.0				
Apr-17	347	8.14	178	178	0.41	<0.05	<0.05	6.1	0.64	1.83	<0.02	12.1	3.4				
Nov-17	794	8.01	441	379	2.03	<0.25	<0.25	98.4	2.11	1.37	<0.02	<0.01	3.5				
May-18	450	8.05	240	240	<1.0	<0.10	<0.010	13	0.93	0.63	<0.050	<0.1	1.6				
Nov-18	741	7.96	377	378	1.62	<0.05	<0.05	40.9	1.69	1.25	<0.02	<0.010	2.3				
Apr-19	456	7.77	230	271	0.71	<0.05	<0.05	5.16	0.85	0.49	<0.02	<0.01	2.0				
Oct-19	620	7.87	336	341	1.08	<0.10	<0.10	26.1	1.32	1.25	<0.02	<0.01	3.9				
Apr-20	515	7.70	237	239	0.66	<0.05	<0.05	7.08	0.83	1.15	<0.02	0.032	3.0		73.5	13.0	
Oct-20	626	8.05	456	347	1.68	<0.10	<0.10	22.8	1.74	1.29	<0.02	0.075	5.2		142	24.7	
May-21	381	8.03	185	193	0.34	<0.05	<0.05	3.19	0.82	2.71	<0.02	0.057	5.5		59.6	8.87	
Oct-21	649	7.72	337	332	0.52	<0.05	<0.05	10.7	1.30	1.57	<0.02	<0.010	72.6				
Apr-22	603	7.75	312	330	0.31	<0.05	<0.05	7.00	1.01	0.70	<0.02	0.051	2.9		94.7	18.4	
Sep-22	739	7.50	347	323	2.27	0.34	0.10	51.7	0.93	1.84	0.04	0.021	3.6		106	20.0	
Apr-23	641	7.63	361	326	1.62	<0.05	<0.05	7.6	0.88	0.61	<0.02	<0.010	3.1		112	19.8	<0.010
Nov-23	726	7.75	408	448	7.20	<0.05	<0.05	8.88	1.80	1.79	<0.02	0.011	3.7		128	21.4	0.032
Apr-24	672	7.80	374	411	1.72	<0.05	<0.05	4.0	1.24	0.71	0.02	<0.020	4.8		116	20.4	<0.010
Nov-24	790	7.95	374	421	7.52	0.13	<0.05	48.7	2.68	1.29	<0.02	<0.020	4.6		115	21.0	0.022
Average	1288	7.90	864	343	2.39	0.08	<0.25	311	2.64	1.91	0.05	0.92	6.3	0.0010	105.2	18.6	0.03
Std. Dev.	784	0.17	680	73.1	1.88	0.16	NA	464	2.09	1.24	0.08	2.30	10.1	0.0014	25.8	4.79	N/A

HISTORICAL GROUNDWATER QUALITY DATA: W-3

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Dec-88	935		476		47.2							0.33	1.5	0.0010			
Jan-89	918		477		34.1							0.20	5.9	0.0015			
Dec-89	1064				58.1												
Jul-90	883		440		31.4							0.48	5.8	0.0010			
Jan-93	750		639									0.66	5.1	0.0095			
Jan-94	1255		676		50.7							0.55	6.5	0.0139			
Nov-94	1147		672		34.7							0.39	4.0	0.0034			
Oct-95	1177		676		25.8							0.41	6.6	0.0055			
Dec-96	1183		606		19.3							0.42	6.0	<0.001			
Oct-97	1241		672		21.7							0.29	<1	0.003			
Oct-98	1120		624		28.0							0.10	20	0.004			
Nov-99	1533		678		30.6							0.31	20	0.127			
Oct-00	Replaced by W3/03																
Average	1101	NA	603	NA	34.7	NA	NA	NA	NA	NA	NA	0.38	8.14	0.017	NA	NA	NA
Std. Dev.	208	NA	92.8	NA	12.3	NA	NA	NA	NA	NA	NA	0.16	6.43	0.039	NA	NA	NA

HISTORICAL GROUNDWATER QUALITY DATA: W-3/03

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	6.5 - 8.5	527	404	128	3.33	0.25	255	101	NV	NV	0.17	4.87	NV	NV	NV	NV
Oct-03	1230		685		48.6							10.3	33	<0.001			
Nov-04	1120		661		30.8							16.4	7.0	<0.001			
Nov-05	1200		638		41.0							20.6	13.5	<0.001			
Apr-06	1440	7.81	789	489	47.7	<0.05	<0.05	238	16.4		4.96	34.6	8				
Oct-06	1220	7.64	619	530	49.1	<0.05	<0.05	167	27.6	13.9	2.17	0.33	13.1				
Apr-07	1240	7.94	690	514	31.0	<0.05	<0.05	167	23.9	14.6	4.95	0.35	7.4				
Nov-07	1130	7.73	563	468	38.0	<0.05	<0.05	141	21.9	14.5	0.47	<0.005	12.8				
Apr-08	1070	7.78	575	415	35.1	<0.05	<0.05	195	16.4	12.3	7.18	0.59	7.4				
Oct-08	1310	7.64	309	532	33.9	<0.05	<0.05	133	8.43	4.77	6.37	0.20	6.8				
Apr-09	1080	7.82	597	431	17.1	<0.05	<0.05	178	16.4	7.61	0.84	<0.010	5.0				
Nov-09	1110	7.69	630	571	19.9	<0.05	<0.05	76.9	19.8	10.6	1.27	0.01	6.6				
Apr-10	992	8.01	523	483	20.9	<0.05	<0.05	91.2	18.8	11.3	2.25	<0.01	7.2				
Nov-10	816	7.73	417	411	21.0	<0.05	<0.05	85.0	10.9	12.7	5.53	<0.01	6.4				
Apr-11	856	7.77	431	393	19.8	<0.05	<0.05	66.7	13.3	13.3	0.06	<0.01	7.9				
Nov-11	741	7.86	422	399	16.1	<0.05	<0.05	63.9	8.14	12.1	1.73	0.11	5.1				
Apr-12	1200	7.74	651	673	14.0	<0.05	<0.05	36.9	9.28	10.2	1.16	0.030	4.6				
Nov-12	850	7.85	470	410	24.6	<0.05	<0.05	84.0	12.9	10.9	0.34	1.06	8.2				
Apr-13	924	7.97	462	409	18.8	<0.25	<0.25	66.6	14.5	11.7	0.49	1.50	4.4				
Nov-13	1330	7.61	617	658	34.1	<0.5	<0.5	32.6	25.7	15.5	1.60	0.76	7.9				
May-14	1070	7.55	506	520	23.5	<0.25	<0.25	44.9	24.4	14.9	3.26	0.030	6.0				
Oct-14	1180	7.72	534	610	32.4	<0.25	<0.25	22.9	25.7	16.9	7.6	0.010	7.2				
Apr-15	1270	7.59	575	678	34.8	<0.25	<0.25	18.1	23.7	18.3	10.2	<0.01	7.4				
Oct-15	1060	7.87	475	523	25.5	0.57	<0.25	27.7	20.2	16.8	9.2	47.5	7.4				
Apr-16	877	7.86	389	416	21.7	<0.25	<0.25	47.0	15.4	14.6	<0.02		10.0				
Nov-16	1350	7.90	622	669	37.2	<0.25	<0.25	20.0	31.3	14.5	6.1	0.020	8.2				
Apr-17	956	7.97	421	401	28.6	<0.25	<0.25	83.3	19.8	12.7	6.8	39.9	5.0				
Nov-17	1280	7.65	626	663	38.6	<0.25	<0.25	25.9	34.8	13.0	5.38	0.03	9.4				
May-18	960	7.49	430	420	35.0	<0.10	<0.010	40	16	14	7.9	<0.1	5.3				
Nov-18	1410	7.73	644	734	44.6	<0.05	<0.05	11.8	34.9	14.5	5.32	<0.010	9.1				
Apr-19	968	7.69	393	526	20.5	<0.05	<0.05	25.1	22.3	14.4	7.60	0.20	7.7				
Oct-19	1020	7.84	496	568	20.2	0.28	<0.25	9.67	24.4	14.8	8.45	<0.01	9.9				
Apr-20	1090	7.56	386	483	19.4	<0.25	<0.25	17.8	20.2	15.0	10.6	0.013	9.3		100	33.0	
Oct-20	1080	7.82	498	582	29.5	<0.25	<0.25	9.62	27.0	17.9	12.3	<0.010	10.4		129	42.7	
May-21	1060	7.53	442	511	22.6	<0.25	<0.25	18.4	27.9	13.8	6.72	0.015	8.4		116	36.9	
Oct-21	913	7.50	402	461	17.9	<0.05	<0.05	11.7	20.8	13.6	7.35	<0.010	65.6				
Apr-22	1000	7.58	421	521	17.1	0.17	<0.05	12.0	22.5	13.8	8.67	0.034	6.3		119	30.0	
Sep-22	1280	7.19	482	605	23.8	0.52	0.63	6.55	28.3	14.9	12.5	0.016	12.0		135	35.3	
Apr-23	869	7.26	396	411	19.7	<0.05	<0.05	21.6	20.3	12.6	8.30	0.016	14.2		108	30.6	0.273
Nov-23	956	7.17	308	522	21.6	<0.05	<0.05	19.9	19.4	18.9	11.4	<0.010	8.0		82.1	25.1	0.349
Apr-24	1040	7.52	416	529	19.1	<0.05	<0.05	12.8	21.7	14.0	8.08	<0.020	11.3		113	32.4	0.363
Nov-24	975	7.75	382	590	17.6	0.27	<0.05	4.49	18.3	13.2	9.12	<0.020	12.7		109	26.6	0.362
Average	1086	7.69	512	519	27.6	<0.25	<0.25	61.4	20.6	13.6	5.79	4.37	10.32	<0.0005	112	32.5	0.3
Std. Dev.	171	0.20	115	94	9.8	NA	NA	61.2	6.62	2.71	3.66	11.4	9.98	NA	15.6	5.37	0.04

HISTORICAL GROUNDWATER QUALITY DATA: B-1

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	NA	543	375	130	2.50	0.25	324	102	NV	NV	0.24	4.3	NV	NV	NV	NV
Dec-88	446		241		5.1							0.94	2.2	<0.001			
Jan-89	456		234		4.8							0.05	2.1	<0.001			
Dec-89	438				4.5												
Jul-90	439		229		2.2							0.25	0.5	<0.001			
Jan-93	420		261									0.04	1.8	<0.001			
Jan-94	430		223		2.8							0.02	0.9	0.0010			
Oct-95	445		230		3.4							0.06	1.2	<0.001			
Dec-96	506		277		7.7							<0.01	<1	0.0010			
Oct-97	529		297		4.9							<0.01	<1	<0.001			
Oct-98	554		315		3.7							<0.01	4.0	<0.001			
Nov-99									DESTROYED								
Average	466	NA	256	NA	4.34	NA	NA	NA	NA	NA	NA	0.15	1.52	<0.001	NA	NA	NA
Std. Dev.	46.2	NA	33.2	NA	1.61	NA	NA	NA	NA	NA	NA	0.31	1.15	NA	NA	NA	NA

HISTORICAL GROUNDWATER QUALITY DATA: B-2

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
RUC	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
	NV	NA	543	375	130	2.50	0.25	324	102	NV	NV	0.24	4.3	NV	NV	NV	NV
Dec-88	681		353		24.6							0.92	2.6	<0.001			
Jan-89	695		382		24.4							2.10	1.8	<0.001			
Dec-89	660				23.9									<0.001			
Jul-90	647		335		22.2				102			0.72	1.6	<0.001			
Jan-93	250		384									0.79	2.3	<0.001			
Jan-94	700		332		34.6							0.84	2.7	0.0009			
Jan-94 Dup			331									0.83	2.9	0.0094			
Nov-94	539		308		10.4							0.62	3.1	0.0015			
Nov-94 Dup	535		306		9.9							0.64	3.3	<0.001			
Oct-95	499		286		2.9							0.61	3.9	0.0101			
Dec-96	488		250		4.9							0.46	2	0.0010			
Oct-97	496		281		4.4							0.49	2	<0.001			
Oct-98	547		295		11.6							0.48	6	<0.001			
Nov-99	492		268		3.7							0.52	<1	<0.001			
Oct-00	497		284		3.8							0.44	6	<0.001			
Nov-01	486		247		4.0							0.36	5	<0.001			
Dec-02	506		277		4.1							0.42	3.1	<0.001			
Oct-03	485		284		4.1							0.46	15	<0.001			
Nov-04	498		298		7.0							0.51	3.6	<0.001			
Nov-05	529		297		4.2							0.50	7.9	<0.001			
Apr-06	546	8.15	289	234	3.26	<0.05	<0.05	46.1	3.67		<0.05	1.55	4.0				
Oct-06	541	8.07	285	243	17.9	<0.05	<0.05	45.4	5.77	1.19		0.12	0.16	2.4			
Apr-07	662	8.25	349	283	26.9	<0.05	<0.05	31.4	10.5	2.07	0.72	0.14	2.9				
Nov-07	588	8.19	304	250	17.7	<0.05	<0.05	43.7	5.38	1.27	0.09	<0.005	2.6				
Apr-08	489	8.21	270	249	4.6	<0.05	<0.05	28.1	3.26	1.49	0.13	<0.010	3.5				
Oct-08	752	7.96	388	300	34.7	<0.05	<0.05	35.4	14.2	2.03	0.31	0.064	3.6				
Apr-09	496	8.10	290	244	3.54	<0.05	<0.05	28.4	3.09	0.91	<0.02	0.024	4.0				
Nov-09	569	8.01	332	263	16.3	<0.05	<0.05	26.6	6.61	1.41	0.07	<0.01	4.9				
Apr-10	485	8.19	283	241	3.44	<0.05	<0.05	30.3	3.44	0.96	0.02	<0.01	3.7				
Nov-10	447	8.03	261	254	3.95	<0.05	<0.05	30.0	3.06	0.86	<0.02	<0.01	4.8				
Apr-11	664	7.97	345	252	4.72	<0.05	<0.05	114.0	3.54	1.04	0.02	<0.01	4.2				
Nov-11	659	8.02	386	314	33.7	<0.05	<0.05	61.9	13.7	1.58	0.13	<0.01	3.3				
Apr-12	532	8.02	279	255	6.80	<0.05	<0.05	32.5	4.27	0.90	0.03	<0.01	3.7				
Nov-12	596	8.13	341	286	21.9	<0.05	<0.05	42.8	11.4	1.54	0.09	<0.01	4.0				
Apr-13	539	8.03	281	249	4.02	<0.05	<0.05	30.3	3.34	1.06	0.07	<0.01	3.9				
Nov-13	823	7.97	367	324	37.3	<0.25	<0.25	56.7	15.8	1.65	0.18	<0.01	3.2				
May-14	514	7.88	273	245	4.5	<0.05	<0.05	28.9	3.14	1.01	0.21	<0.01	4.3				
Oct-14	498	8.19	263	240	3.1	<0.10	<0.10	30.4	2.79	0.78	0.10	0.010	3.9				
Apr-15	578	7.93	298	258	5.6	<0.05	<0.05	61.0	3.34	0.88	0.05	<0.01	3.9				
Oct-15	587	7.94	317	279	15.1	<0.10	<0.10	32.2	5.56	1.06	0.12	0.85	5.4				
Apr-16	559	8.11	302	257	4.8	<0.10	<0.10	54.1	4.29	0.88	0.04		4.4				
Nov-16	881	8.14	413	380	56.0	<0.25	<0.25	38.9	21.4	1.86	0.22	<0.01	4.4				
Apr-17	853	8.05	408	332	37.6	<0.25	<0.25	65.3	17.0	1.70	0.15	1.10	2.9				
Nov-17	635	7.88	324	284	18.6	<0.10	<0.10	40.5	8.51	1.05	0.08	<0.01	5.4				
May-18	540	7.95	290	260	3.9	<0.10	<0.010	32.0	3.3	0.90	0.12	<0.1	4.2				
Nov-18	653	7.64	301	296	23.8	<0.05	<0.05	29.3	8.88	1.37	0.22	0.042	5.0				
Apr-19	548	7.86	270	283	4.79	<0.05	<0.05	34.7	3.99	0.91	0.07	0.010	4.4				
Oct-19	543	7.72	296	266	8.10	<0.05	<0.05	36.3	4.06	0.87	0.08	<0.01	5.1				
Apr-20	721	7.72	321	262	4.74	<0.10	<0.10	78.2	4.25	0.97	0.06	0.031	5.6		83.6	27.2	
Oct-20	550	8.00	297	275	7.15	<0.05	<0.05	39.4	4.76	0.93	0.07	<0.010	4.8		75.7	26.2	
May-21	623	7.98	299	267	7.12	<0.10	<0.10	44.6	5.18	0.99	0.03	<0.010	4.3		76.9	25.9	
Oct-21	559	7.88	282	245	3.42	<0.05	<0.05	51.0	3.29	0.88	0.03	<0.010	42.1				
Apr-22	631	7.67	285	270	7.58	<0.05	<0.05	61.5	5.94	1.05	0.03	0.034	4.9		73.4	24.6	
Sep-22	658	7.74	337	248	4.51	<0.05	<0.05	75.1	4.13	1.35	0.05	0.014	5.1		84.2	30.8	
Apr-23	616	7.69	317	255	9.19	<0.05	<0.05	44.4	6.58	1.16	0.06	0.039	4.9		80.3	28.4	0.036
Nov-23	628	7.48	291	296	6.53	<0.05	<0.05	64.1	5.00	0.92	0.09	<0.010	3.9		73.8	26.0	0.055
Apr-24	688	7.81	333	309	10.3	<0.05	<0.05	50.2	10.6	1.45	0.20	<0.020	6.2		84.1	29.9	0.048
Nov-24	653	7.93	288	326	15.0	<0.05	<0.05	39.1	12.1	1.30	0.29	<0.020	5.7		72.0	26.2	0.054
Average	585	7.96	310	273	12.6	<0.10	<0.10	45.1	9.2	1.20	0.12	0.30	4.9	0.0015	78.2	27.2	0.05
Std. Dev.	106	0.18	39.1	31.7	11.8	NA	NA	18.0	15.8	0.35	0.13	0.43	5.4	0.0028	4.91	2.05	0.01

HISTORICAL GROUNDWATER QUALITY DATA: B-3

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
RUC	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
	NV	NA	543	375	130	2.50	0.25	324	102	NV	NV	0.24	4.3	NV	NV	NV	NV
Dec-88	2020		1307		7.7							1.92	4.8	<0.001			
Jan-89	2160		1383		5.3							5.50	4.0	<0.001			
Dec-89	1960				7.6												
Jul-90	2260		1415		5.2							9.20	3.3	<0.001			
Jan-93	2110		1738									10.30	3.8	<0.001			
Jan-94	1241		1446									8.38	3.8	<0.001			
Nov-94	2170		1462		6.9							8.41	3.7	<0.001			
Oct-95	2110		1427		8.0							8.45	4.2	0.011			
Dec-96	2140		1330		8.2							8.50	3	<0.001			
Dec-96 Dup	2140		1434		8.1							8.70	3	0.001			
Oct-97	2140		1354		8.8							8.53	3	<0.001			
Oct-97 Dup	2130		1372		8.9							8.45	4	<0.001			
Oct-98	1812		1078		29							6.45	3	<0.001			
Oct-98 Dup	1812		1122		24							6.15	2	<0.001			
Nov-99	2160		1381		12.2							8.95	17	<0.001			
Oct-00	2310		1654		12.0							9.17	10	<0.001			
Nov-01	2130		1656		17.0							10.00	<1	<0.001			
Nov-01 Dup	2140		1583		17.1							10.20	10	<0.001			
Dec-02	2270		1504		20.0							8.42	3.9	<0.001			
Dec-02 Dup	2190		1504		17.6							8.55	4.0	<0.001			
Oct-03	2080		1550		18.6							8.84	17	<0.001			
Nov-04	2110		1510		26.2							8.22	3.5	<0.001			
Nov-05	2220		1570		30.6							8.99	10.5	<0.001			
Apr-06	2280	7.70	1530	384	22.2	0.75	<0.05	1060	12.5		0.18	13.10	4.0				
Oct-06	1920	7.69	1290	376	35.7	<0.05	<0.05	904	16.7	3.29	0.23	0.76	4.2				
Apr-07	1800	7.84	1160	334	23.9	<0.05	<0.05	786	11.8	2.69	0.22	1.44	3.5				
Nov-07	1930	7.61	1240	378	37.6	<0.05	<0.05	1020	13.6	3.29	0.13	<0.005	5.5				
Apr-08	1670	7.82	1170	376	25.3	<0.05	<0.05	813	12.0	3.68	0.13	1.10	3.9				
Oct-08	2400	7.52	1710	393	35.5	<0.05	<0.05	1000	18.2	3.94	0.54	5.43	4.1				
Apr-09	2040	7.46	1440	375	23.8	<0.05	<0.05	957	14.1	3.36	0.06	1.64	4.0				
Nov-09	2310	7.78	1660	420	35.5	<0.05	<0.05	1110	18.6	3.80	0.15	2.00	5.1				
Apr-10	2260	7.93	1570	417	29.0	<0.05	<0.05	1220	16.0	3.70	0.20	1.06	3.6				
Nov-10	1940	7.66	1450	401	35.5	<0.05	<0.05	1056	19.4	3.68	0.08	0.95	4.2				
Apr-11	2310	7.70	1560	398	37.0	<0.05	<0.05	1190	16.2	3.53	0.11	0.19	3.5				
Nov-11	1860	7.74	1490	398	75.3	<0.05	<0.05	1090	19.1	3.83	0.18	1.89	3.9				
Apr-12	2320	7.82	1520	404	31.5	<0.05	<0.05	1210	16.5	3.38	0.10	0.18	3.2				
Nov-12	1920	7.97	1490	382	43.7	<0.10	<0.10	1060	23.4	4.24	0.14	3.20	3.7				
Apr-13	2380	7.87	1490	409	35.2	<0.5	<0.5	1110	19.6	3.68	0.10	0.39	3.6				
Nov-13	2320	7.76	1490	386	34.6	<1.0	<1.0	1090	22.4	4.55	0.15	2.22	3.5				
May-14	1830	7.57	1100	350	18.5	<0.5	<0.5	783	12.5	2.96	0.60	<0.01	3.6				
Oct-14	2230	7.76	1550	409	32.0	<0.5	<0.5	1090	21.2	4.26	0.18	1.10	3.3				
Apr-15	2220	7.77	1400	408	24.9	<0.25	<0.25	1070	17.9	3.35	0.14	1.07	3.2				
Oct-15	2380	7.90	1620	400	42.0	<1.0	<1.0	1180	22.7	3.58	0.15	3.45	4.5				
Apr-16	2130	7.88	1410	405	23.0	<0.5	<0.5	1042	17.6	3.35	0.12		4.1				
Nov-16	2120	7.20	1220	445	30.2	<0.5	<0.5	854	22.1	3.47	0.13	0.14	3.5				
Apr-17	1710	7.97	1070	378	27.0	<0.25	<0.25	609	17.4	3.28	0.10	4.70	3.2				
Nov-17	2270	7.57	1540	419	27.9	<0.5	<0.5	1070	23.0	4.06	0.14	0.42	4.2				
May-18	2400	7.54	1500	430	24.0	<0.10	<0.10	1000	19.0	3.5	0.16	1.70	3.5				
Nov-18	2260	7.70	1280	417	33.1	<0.5	<0.5	1080	22.7	3.5	0.07	1.25	4.0				
Apr-19	2260	7.66	1360	450	16.2	<0.5	<0.5	975	19.8	3.5	0.10	2.34	3.5				
Oct-19	2100	7.72	1350	419	25.6	<0.5	<0.5	1100	24.1	3.9	0.13	0.020	4.4				
Apr-20	2670	7.38	1420	422	19.4	<1.0	<1.0	1120	18.7	3.47	0.14	0.015	4.0		394	106	
Oct-20	2110	8.00	1370	423	23.7	<0.5	<0.5	1070	23.8	4.10	0.15	0.12	3.9		372	106	
May-21	2340	7.66	1410	418	19.6	<1.0	<1.0	1030	19.9	4.04	0.04	1.63	3.8		387	107	
Oct-21	2140	7.40	1380	410	20.0	<0.07	<0.05	995	22.0	4.36	0.07	<0.010	91.2				
Apr-22	2110	7.44	1320	425	17.0	<0.07	<0.05	997	20.6	3.97	0.04	0.074	4.2		366	97.9	
Sep-22	2390	7.17	1370	433	18.9	<0.14	1.05	1110	21.1	3.16	0.12	0.044	4.5		379	102	
Apr-23	2210	7.15	1380	392	17.4	<0.07	<0.05	1060	18.3	3.92	0.07	0.53	4.0		371	111	0.058
Nov-23	2150	7.15	1050	470	17.4	<0.07	<0.05	946	20.1	3.74	0.10	0.077	2.8		286	80.6	0.077
Apr-24	2690	7.40	1310	463	16.0	<0.14	<0.11	983	16.0	3.17	0.12	0.53	5.3		359	100	0.047
Nov-24	2460	7.59	1230	502	16.0	<0.14	<0.11	888	19.7	3.35	0.16	0.65	4.2		329	99.2	0.069
Average	2142	7.64	1411	408	23.2	<0.25	<0.25	1019	18.7	3.64	0.15	4.21	6.07	<0.001	360.33	101.08	0.06
Std. Dev.	234	0.23	160	31.9	12.1	NA	NA	127	3.44	0.40	0.11	3.90	11.62	NA	33.51	8.78	0.01

HISTORICAL GROUNDWATER QUALITY DATA: B-4

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	NA	543	375	130	2.50	0.25	324	102	NV	NV	0.24	4.3	NV	NV	NV	NV
Dec-88	386		179		2.5							0.77	2.8	0.0010			
Jan-89	489		253		2.8							0.26	8.5	0.0010			
Dec-89	511				10.0												
Jul-90	479		315		6.0							36*	1.5	0.0055			
Jan-93	440		263									68.8*	1.5	0.0120			
Jan-94	474		233		4.3							1.04	1.6	<0.001			
Nov-94	445		247		3.8							0.37	1.3	0.0027			
Oct-95	496		275		4.2							0.78	1.4	0.0210			
Dec-96	488		242		4.7							17.9*	1.0	<0.001			
Oct-97	477		346		5.3							17.8*	1.0	<0.001			
Oct-98	482		355		3.3							2.06	<1	<0.001			
Nov-99	492		495		3.7							<0.01	3.0	<0.001			
Oct-00	481		265		6.7							8.70	12	<0.001			
Oct-00 Dup	484		263		6.9							10.10	4.0	<0.001			
Nov-01	509		273		6.9							0.50	4.0	<0.001			
Dec-02	485		254		4.5							0.09	2.8	<0.001			
Oct-03	501		267		11.6							1.02	11	<0.001			
Nov-04	504		284		4.4							0.60	3.6	<0.001			
Nov-05	536		294		11.2							0.03	6.3	<0.001			
Apr-06	561	8.23	287	238	12.2	<0.05	<0.05	34.3	6.37		<0.05	3.16	2.0				
Oct-06	530	8.22	281	247	16.0	<0.05	<0.05	39.8	6.77	1.45	0.10	0.26	1.9				
Apr-07	622	8.33	343	261	16.4	<0.05	<0.05	42.7	9.06	1.57	0.29	0.15	2.2				
Nov-07	554	8.32	286	253	9.1	<0.05	<0.05	35.7	4.52	1.37	<0.05	<0.005	5.1				
Apr-08	589	8.28	315	271	17.8	<0.05	<0.05	46.2	8.04	1.97	0.05	0.034	2.8				
Oct-08	594	8.02	333	252	10.7	<0.05	<0.05	37.4	6.38	1.42	0.16	0.15	4.1				
Apr-09	817	8.05	434	297	49.3	<0.05	<0.05	75.5	18.1	1.86	0.03	0.015	4.2				
Nov-09	701	8.13	374	289	33.5	<0.05	<0.05	54.7	14.8	1.74	0.06	<0.01	5.5				
Apr-10	565	8.23	312	259	12.9	<0.05	<0.05	46.2	7.67	1.39	0.08	0.030	4.2				
Nov-10	749	8.03	396	310	53.9	<0.05	<0.05	71.2	21.9	2.09	0.09	<0.01	5.4				
Apr-11	709	7.92	364	284	45.5	<0.05	<0.05	60.5	18.3	1.80	0.11	0.15	3.7				
Nov-11	600	8.06	350	286	32.0	<0.05	<0.05	50.8	15.4	1.71	0.13	<0.01	4.9				
Apr-12	792	8.10	389	313	45.6	<0.05	<0.05	57.2	22.8	2.05	0.08	<0.01	3.8				
Nov-12	560	8.24	324	260	16.7	<0.05	<0.05	51.0	9.85	1.44	0.09	0.010	4.5				
Apr-13	750	8.17	360	292	36.3	<0.25	<0.25	53.5	18.4	1.97	0.10	<0.01	3.7				
Nov-13	625	8.10	296	265	15.5	<0.10	<0.10	45.5	9.83	1.58	0.14	0.010	4.2				
May-14	770	7.99	371	300	40.2	<0.25	<0.25	55.9	20.1	1.97	0.25	0.020	4.0				
Oct-14	751	8.10	371	307	41.0	<0.25	<0.25	58.1	19.6	2.11	0.16	<0.01	4.3				
Apr-15	783	7.97	350	313	43.2	<0.25	<0.25	58.0	21.4	1.69	0.16	<0.01	5.7				
Oct-15	783	8.00	366	303	43.4	<0.25	<0.25	59.7	22.7	1.84	0.23	1.70	6.7				
Apr-16	753	8.05	350	306	40.6	<0.10	<0.10	57.7	22.3	1.81	0.35		6.2				
Nov-16	926	7.05	389	391	58.2	<0.25	<0.25	59.9	34.0	2.59	0.45	<0.01	6.6				
Apr-17	777	8.11	356	308	35.9	<0.05	<0.05	50.2	21.7	2.01	0.29	1.21	4.7				
Nov-17	999	7.85	418	365	79.1	<0.25	<0.25	73.4	42.6	3.24	0.65	<0.01	7.4				
May-18	1000	7.84	450	430	60.0	<0.10	<0.010	43.0	38.0	4.4	1.4	<0.1	6.1				
Nov-18	928	7.92	384	379	59.4	<0.25	<0.25	54.1	33.2	3.55	0.60	0.022	5.9				
Apr-19	914	7.80	389	428	45.2	<0.25	<0.25	41.5	30.6	4.00	0.89	<0.01	6.1				
Oct-19	809	7.82	376	357	42.6	<0.25	<0.25	46.3	27.5	3.84	0.80	<0.01	5.9				
Apr-20	1100	7.56	417	451	34.5	<0.25	<0.25	35.0	24.0	6.56	4.65	<0.010	6.5		99.8	40.8	
Oct-20	846	8.01	396	395	37.4	<0.25	<0.25	46.5	25.7	4.61	0.68	0.086	5.7		93.9	39.3	
May-21	985	7.88	432	444	33.5	<0.25	<0.25	30.7	24.5	6.40	1.86	0.024	5.7		105	41.2	
Oct-21	928	7.58	303	430	31.6	<0.05	<0.05	31.7	5.0	1.15	1.37	<0.010	108				
Apr-22	859	7.64	389	398	30.8	0.19	<0.05	33.3	22.8	5.22	1.57	0.027	5.2		92.8	38.2	
Sep-22	996	7.69	432	402	44.0	<0.05	<0.05	43.8	27.8	5.29	1.32	0.024	7.8		101	43.7	
Apr-23	1020	7.52	448	402	58.4	<0.05	<0.05	43.3	31.0	5.14	1.06	0.013	8.9		105	45.1	0.123
Nov-23	1260	7.42	489	550	99.4	<0.05	<0.05	53.6	61.4	6.61	1.48	0.033	9.3		110	52.0	0.252
Apr-24	1560	7.55	542	578	115	<0.05	<0.05	53.9	72.1	5.63	2.92	<0.020	18.0		119	59.5	0.218
Nov-24	1450	7.63	532	631	129	<0.05	<0.05	58.5	69.0	7.13	4.16	<0.020	17.2		128	51.6	0.268
Average	714	7.93	348	349	30.9	<0.25	<0.25	49.7	23.6	3.03	0.76	0.71	7.12	0.0027	106	45.7	0.22
Std. Dev.	254	0.28	77.3	95.0	28.1	NA	NA	11.2	16.2	1.83	1.09	1.89	14.3	0.0054	11.48	7.17	0.06

HISTORICAL GROUNDWATER QUALITY DATA: B-5

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
RUC	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
	NV	NA	543	375	130	2.50	0.25	324	102	NV	NV	0.24	4.3	NV	NV	NV	NV
Jan-89	847		464		1.6							0.45	4.4	0.0010			
Jul-90	857		478		0.3							1.14	5.2	<0.001			
Nov-94	676		385		3.4							0.19	1.1	<0.001			
Nov-94 Dup	666		377		3.3							0.15	1.1	<0.001			
Oct-95	469		261		4.0							0.02	1.1	0.0116			
Dec-96	573		279		7.7							0.12	3.0	<0.001			
Oct-97	504		289		7.4							0.23	<1	<0.001			
Oct-98	472		268		3.4							0.11	<1	<0.001			
Nov-99	515		288		10.3							0.03	5.0	<0.001			
Oct-00	482		277		5.1							0.18	11.0	<0.001			
Nov-01	565		280		20.8							0.02	3.0	<0.001			
Dec-02	623		333		40.8							0.23	2.6	<0.001			
Oct-03	462		255		6.1							0.14	9.0	<0.001			
Oct-03 Dup	465		255		6.1							0.14	8.0	<0.001			
Nov-04	461		249		5.8							0.12	0.7	<0.001			
Nov-04 Dup	466		252		6.1							0.12	0.6	<0.001			
Nov-05	558		312		25.7							0.17	4.4	<0.001			
Nov-05 Dup	552		314		25.6							0.17	4.4	<0.001			
Apr-06	625	8.15	311	227	42.8	<0.05	<0.05	19.1	2.74		<0.05	1.97	2.0				
Oct-06	390	8.17	244	229	10.5	<0.05	<0.05	21.4	1.60	1.01	<0.05	0.16	1.7				
Apr-07	537	8.30	298	228	22.3	<0.05	<0.05	19.5	1.95	0.96	<0.05	0.16	1.4				
Nov-07	556	8.13	286	244	24.8	<0.05	<0.05	18.2	1.52	1.20	<0.05	<0.005	2.0				
Apr-08	563	8.18	312	283	2.86	<0.05	<0.05	85.3	2.82	1.54	0.05	<0.010	3.1				
Oct-08	535	8.04	303	229	11.9	<0.05	<0.05	30.0	2.45	1.30	0.07	0.011	1.6				
Apr-09	679	7.98	394	257	2.43	<0.05	0.26	126	2.94	1.24	<0.02	<0.010	3.7				
Nov-09	519	8.12	295	224	3.20	<0.05	<0.05	50.6	2.80	1.14	<0.05	0.011	5.0				
Apr-10	742	8.11	433	243	1.68	<0.05	<0.05	201	3.06	1.32	0.02	<0.01	4.2				
Nov-10	598	8.09	362	250	4.06	<0.05	<0.05	127	2.70	1.29	<0.02	<0.01	2.2				
Apr-11	937	7.92	543	284	3.04	<0.05	<0.05	267	2.89	1.15	0.05	<0.01	4.2				
Nov-11	646	8.01	402	263	6.66	<0.05	<0.05	157	3.60	1.28	0.08	<0.01	3.7				
Apr-12	980	7.96	544	281	2.42	<0.05	<0.05	302	3.08	1.26	<0.02	0.020	3.7				
Nov-12	573	8.11	333	230	12.7	<0.05	<0.05	89.0	5.10	1.34	<0.02	<0.01	2.7				
Apr-13	876	8.00	477	277	4.82	<0.25	<0.25	199	3.25	1.30	<0.02	<0.01	3.6				
Nov-13	822	7.90	404	261	11.2	<0.25	<0.25	182	5.72	1.62	0.08	<0.01	3.7				
May-14	941	7.81	517	262	3.3	<0.25	<0.25	273	3.45	1.24	0.21	0.010	3.7				
Oct-14	855	7.92	484	274	5.5	<0.25	<0.25	236	4.54	1.45	0.13	<0.01	3.6				
Apr-15	1110	7.88	598	300	9.0	<0.25	<0.25	338	5.57	1.31	0.09	<0.01	3.5				
Oct-15	354	7.78	172	130	8.2	<0.05	<0.05	45.1	4.43	0.66	0.10	0.11	6.7				
Apr-16	909	8.01	513	257	11.1	<0.25	<0.25	264	6.82	1.42	0.06		3.3				
Nov-16	641	8.13	291	241	31.3	<0.05	<0.05	53.2	15.8	1.27	0.13	<0.01	2.7				
Apr-17	853	8.03	444	265	8.5	<0.25	<0.25	195	6.59	1.32	0.06	0.47	3.2				
Nov-17	885	7.81	478	270	12.0	<0.25	<0.25	226	6.79	1.55	0.12	0.020	3.8				
May-18	990	7.65	530	290	6.2	<0.10	<0.010	250	4.7	1.2	<0.050	<0.1	3.4				
Nov-18	728	7.81	358	250	11.4	<0.10	<0.10	147	4.92	1.24	0.07	<0.010	4.0				
Apr-19	840	7.80	435	294	5.69	<0.25	<0.25	193	5.05	1.33	0.06	0.090	3.6				
Oct-19	775	7.75	421	261	12.9	<0.10	<0.10	176	8.03	1.42	0.09	<0.01	2.6				
Apr-20	1020	7.69	447	264	3.42	<0.25	<0.25	234	3.82	1.35	0.06	0.044	4.5		119	36.3	
Oct-20	886	7.95	477	271	11.9	<0.25	<0.25	250	7.04	1.43	0.12	0.088	3.9		126	39.4	
May-21	1080	7.93	562	319	4.52	<0.25	<0.25	270	3.93	<2.50	<0.02	<0.010	4.4		155	42.5	
Oct-21	993	7.75	242	274	22.4	<0.05	<0.05	253	0.79	<1.00	0.04	<0.010	58.3				
Apr-22	1100	7.64	573	335	2.01	<0.05	<0.05	324	3.73	<2.50	<0.02	0.038	4.9		157	44.0	
Sep-22	1180	7.82	386	282	170	<0.05	<0.05	61.4	89.7	2.41	0.06	0.034	4.3		113	25.3	
Apr-23	1130	7.50	657	280	13.8	<0.05	<0.05	356	9.98	1.53	0.03	0.011	4.3		177	52.2	0.03
Nov-23	1020	7.39	494	324	34.0	<0.05	<0.05	224	22.1	1.54	0.08	0.012	2.6		131	40.5	0.08
Apr-24	1260	7.73	642	345	15.1	<0.05	<0.05	318	10.7	1.39	0.09	0.026	5.3		173	50.9	0.03
Nov-24	1870	7.84	375	414	306	<0.07	<0.05	71.3	173	1.44	<0.02	<0.020	3.4		106	26.8	0.18
Average	754	7.92	387	269	18.9	<0.25	<0.25	175	11.83	1.34	0.057	0.13	4.69	0.0011	140	39.8	0.08
Std. Dev.	275	0.20	116	44.3	45.5	NA	NA	103	30.41	0.26	0.045	0.31	7.67	0.0026	26.4	9.31	0.07

HISTORICAL GROUNDWATER QUALITY DATA: P-1

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
RUC	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
	NV	NA	543	375	130	2.50	0.25	324	102	NV	NV	0.24	4.3	NV	NV	NV	NV
Dec-89	410				2.1												
Jul-90	407		515		0.2							0.76	0.6	0.0079			
Jan-93	390		242									4.98*	0.6	<0.001			
Jan-94	418		208		5.7							0.01	0.9	0.0010			
Nov-94	413		216		5.1							<0.01	0.6	<0.001			
Oct-95	447		250		6.4							<0.01	1.0	0.0085			
Dec-96	500		278		7.2							0.08	<1	0.0010			
Oct-97	557		314		16.1							<0.01	10	<0.001			
Oct-98	575		329		23.6							<0.01	<1	<0.001			
Nov-99	617		316		36.4							<0.01	<1	<0.001			
Oct-00	680		408		49.8							0.05	6	<0.001			
Nov-01	666		361		42.8							<0.01	3	<0.001			
Dec-02	669		345		50.3							<0.02	1	<0.001			
Oct-03	646		368		56.1							<0.005	10	<0.001			
Nov-04	626		371		56.4							<0.005	1.0	<0.001			
Nov-05	644		355		43.5							<0.005	5.3	<0.001			
Apr-06	604	8.28	215	224	32.0	0.70	<0.05	15.3	2.53		<0.05	1.66	2.0				
Oct-06	555	8.01	289	248	29.6	0.70	<0.05	16.4	2.22	0.82	<0.05	0.20	2.5				
Apr-07	592	8.17	322	232	33.2	0.64	<0.05	15.3	2.46	0.78	<0.05	0.15	1.1				
Nov-07	630	8.16	312	239	47.8	0.86	<0.05	14.9	2.67	0.98	<0.05	<0.005	2.0				
Apr-08	577	8.19	308	253	36.4	0.67	<0.05	15.6	4.15	1.21	<0.05	<0.010	1.9				
Oct-08	731	7.94	375	249	62.5	0.81	<0.05	16.0	7.68	1.45	<0.05	<0.01	1.7				
Apr-09	584	8.04	328	244	35.6	0.62	<0.05	15.3	5.01	0.86	<0.02	<0.010	2.1				
Nov-09	587	8.07	326	256	29.4	0.05	<0.05	15.3	3.70	0.82	<0.05	<0.01	3.0				
Apr-10	504	8.03	285	237	15.1	0.30	<0.05	21.5	2.22	0.83	<0.02	<0.01	1.3				
Nov-10	565	7.94	315	271	33.1	0.79	<0.05	18.3	4.15	0.83	<0.02	<0.01	1.8				
Apr-11	539	7.74	289	238	16.1	0.25	<0.05	22.3	2.39	0.69	0.02	<0.01	2.3				
Nov-11	457	8.03	281	252	18.9	0.35	<0.05	20.1	2.78	0.74	<0.02	<0.01	1.7				
Apr-12	525	7.94	276	251	13.5	0.27	<0.05	19.9	2.09	0.62	<0.02	<0.01	1.0				
Nov-12	536	8.12	296	251	27.0	0.53	<0.05	21.7	4.90	0.89	<0.02	<0.01	1.6				
Apr-13	534	8.05	277	245	13.0	0.21	<0.05	20.6	2.22	0.75	0.04	<0.01	1.2				
Nov-13	537	7.99	252	240	16.2	0.30	<0.10	21.4	3.06	0.73	0.06	0.07	1.1				
May-14	512	7.87	266	231	13.3	0.16	<0.05	20.9	1.92	0.54	0.19	<0.01	1.3				
Oct-14	512	8.16	264	239	14.7	<0.10	<0.10	21.2	2.33	0.57	0.06	<0.01	0.9				
Apr-15	493	7.95	254	232	16.2	<0.05	<0.05	22.9	2.34	0.77	<0.02	<0.01	0.9				
Oct-15	523	7.86	277	233	17.6	<0.10	<0.10	23.3	2.49	0.52	<0.02	6.18	1.4				
Apr-16	519	7.87	285	240	18.6	<0.05	<0.05	23.2	3.16	0.55	<0.02		1.3				
Nov-16	519	8.23	263	220	20.5	<0.05	<0.05	20.8	3.93	0.58	<0.02	<0.01	1.3				
Apr-17	542	8.10	270	275	21.4	<0.05	<0.05	20.7	4.98	0.72	<0.02	2.72	0.8				
Nov-17	552	7.91	268	242	23.7	<0.10	<0.10	20.9	7.54	0.68	<0.02	<0.01	1.8				
May-18	520	7.98	260	240	18.0	<0.10	<0.010	17.0	5.3	0.58	<0.050	<0.1	1.1				
Nov-18	584	7.85	256	242	34.1	<0.05	<0.05	23.8	10.1	0.65	<0.02	<0.010	1.5				
Apr-19	592	7.85	267	267	34.9	<0.05	<0.05	20.7	12.1	0.60	<0.02	<0.01	1.6				
Oct-19	563	7.83	274	235	38.8	<0.05	<0.05	21.7	13.7	0.72	<0.02	<0.01	<0.5				
Apr-20	639	7.69	256	236	27.8	<0.10	<0.10	19.2	11.5	0.71	0.03	0.061	3.7		67.9	21.0	
Oct-20	541	7.98	259	239	39.8	0.12	<0.05	21.5	12.0	0.77	0.04	<0.010	1.6		67.0	22.2	
May-21	659	8.02	270	237	50.0	<0.10	<0.10	27.3	18.6	0.72	<0.02	<0.010	4.1		70.5	22.7	
Oct-21	524	8.00	243	226	17.9	0.08	<0.05	18.9	6.4	0.66	<0.02	<0.010	25.2				
Apr-22	545	7.75	240	238	24.6	0.10	<0.05	19.0	12.4	0.67	<0.02	0.017	1.7		63.1	19.9	
Sep-22	585	7.98	250	224	25.7	0.09	<0.05	20.4	10.0	0.74	<0.02	0.021	1.8		66.3	20.5	
Average	553	7.99	293	242	26.9	0.27	<0.10	19.8	5.73	0.75	0.02	0.26	2.49	0.0016	67.0	21.3	N/A
Std. Dev.	75.9	0.14	54.8	12.6	15.3	0.28	NA	3.00	4.29	0.19	0.03	1.00	3.88	0.0027	2.68	1.17	N/A

HISTORICAL GROUNDWATER QUALITY DATA: P-2

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
RUC	NV	NA	543	375	130	2.50	0.25	324	102	NV	NV	0.24	4.3	NV	NV	NV	NV
Dec-89	385				4.3												
Jul-90	383		199		1.6							0.01	<0.01	0.0078			
Jan-93	390		244									0.05	0.6	<0.001			
Jan-94	424		224		2.0							0.02	0.7	0.0010			
Nov-94	416		230		4.1							0.01	0.7	0.0027			
Oct-95	432		244		1.7							<0.01	0.8	<0.001			
Dec-96	437		245		3.7							<0.01	<1	0.0020			
Oct-97	456		260		6.0							<0.01	1.0	<0.001			
Oct-97 Dup	456		265		6.1							0.01	2.0	<0.001			
Oct-98	451		261		4.8							0.01	<1	<0.001			
Oct-98 Dup	451		251		4.7							0.01	<1	<0.001			
Nov-99	482		269		11.9							<0.01	<1	<0.001			
Nov-99 Dup	484		272		11.9							0.04	<1	<0.001			
Oct-00	527		294		18.8							<0.01	5.0	<0.001			
Oct-00 Dup	526		295		18.9							<0.01	3.0	<0.001			
Nov-01	591		315		32.1							<0.01	5.0	<0.001			
Dec-02	520		272		17.4							<0.02	0.7	<0.001			
Oct-03	477		278		16.0							0.008	8.0	<0.001			
Nov-04	472		279		16.0							0.005	0.6	<0.001			
Nov-04 Dup	470		281		16.4							0.005	0.6	<0.001			
Nov-05	508		285		15.9							0.012	5.1	<0.001			
Nov-05 Dup	506		286		15.9							0.013	3.4	<0.001			
Apr-06	479	8.25	253	212	12.6	0.24	<0.05	12.9	1.57		<0.05	0.77	1.0				
Oct-06	449	7.99	235	222	12.2	0.22	<0.05	12.7	1.27	0.58	<0.05	0.14	0.9				
Apr-07	479	8.16	269	216	15.3	0.25	<0.05	12.4	1.43	0.58	<0.05	0.12	0.8				
Nov-07	501	8.25	252	223	19.0	0.32	<0.05	12.8	1.12	0.71	<0.05	<0.005	2.7				
Apr-08	459	8.29	250	226	13.3	0.20	<0.05	12.5	1.88	0.74	<0.05	<0.010	0.9				
Oct-08	522	8.05	279	219	19.3	0.23	<0.05	11.9	2.93	0.79	0.08	<0.01	1.0				
Apr-09	521	8.11	295	231	22.5	0.40	<0.05	13.4	3.33	0.71	<0.02	<0.010	1.4				
Nov-09	476	8.15	279	228	11.8	0.17	<0.05	11.2	2.01	0.65	<0.05	<0.01	2.5				
Apr-10	443	8.28	244	233	7.37	0.14	<0.05	14.3	1.52	0.59	<0.02	<0.01	0.8				
Nov-10	427	8.09	254	231	13.1	0.24	<0.05	13.7	1.94	0.62	<0.02	<0.01	0.9				
Apr-11	453	8.05	254	220	6.44	0.05	<0.05	15.4	1.41	0.60	<0.02	<0.01	0.9				
Nov-11	407	8.05	238	230	6.84	<0.05	<0.05	14.6	1.34	0.52	<0.02	<0.01	1.2				
Apr-12	465	7.96	249	232	7.73	0.11	<0.05	14.5	1.49	0.54	<0.02	<0.01	0.8				
Nov-12	461	8.14	260	233	16.8	0.30	<0.05	16.1	3.35	0.60	<0.02	<0.01	1.2				
Apr-13	488	8.08	256	231	7.95	0.10	<0.05	13.5	1.94	0.75	0.04	<0.01	1.0				
Nov-13	583	8.05	269	255	18.2	0.48	<0.10	18.5	4.04	0.75	<0.02	<0.01	1.6				
May-14	459	7.94	239	219	8.2	<0.05	<0.05	15.8	1.36	0.49	0.11	<0.01	1.1				
Oct-14	479	8.12	249	227	10.3	<0.10	<0.10	19.4	1.96	0.57	0.02	<0.01	0.9				
Apr-15	445	7.89	232	224	7.7	<0.05	<0.05	14.6	1.73	0.54	<0.02	<0.01	1.8				
Oct-15	460	7.99	249	222	8.2	<0.10	<0.10	15.3	1.70	0.49	<0.02	0.080	1.2				
Apr-16	468	8.05	252	229	10.5	<0.05	<0.05	16.6	2.17	0.50	<0.02		0.7				
Nov-16	471	8.13	237	218	9.8	<0.05	<0.05	14.2	2.43	0.49	<0.02	<0.01	1.5				
Apr-17	553	8.14	283	266	11.9	0.31	<0.05	14.2	3.63	0.87	<0.02	0.47	1.5				
Nov-17	530	7.90	261	237	19.4	<0.10	<0.10	18.8	5.32	0.53	<0.02	<0.01	1.4				
May-18	540	7.91	270	240	21.0	<0.10	<0.10	19.0	6.1	0.53	<0.050	<0.1	0.8				
Nov-18	536	7.97	247	237	23.9	<0.05	<0.05	19.1	6.91	0.57	<0.02	<0.010	1.1				
Apr-19	580	7.85	265	265	32.1	<0.05	<0.05	19.1	10.9	0.59	<0.02	<0.01	1.7				
Oct-19	559	7.89	294	248	33.7	0.20	<0.05	15.9	13.3	0.76	<0.02	<0.01	1.6				
Apr-20	681	7.71	270	240	37.1	<0.10	<0.10	19.7	13.1	0.61	<0.02	<0.010	2.9		71.5	22.1	
Oct-20	537	8.07	257	236	34.2	0.06	<0.05	18.7	10.4	0.61	<0.02	0.016	1.0		66.1	22.4	
May-21	598	8.07	258	233	37.5	<0.05	<0.05	17.5	13.4	0.73	<0.02	<0.010	1.4		66.9	22.0	
Average	486	8.05	261	232	14.3	0.14	<0.10	15.4	4.10	0.62	0.020	0.041	1.54	0.0010	68.2	22.2	N/A
Std. Dev.	58.2	0.13	21.2	12.9	9.27	0.13	NA	2.57	3.92	0.10	0.022	0.13	1.46	0.0016	2.91	0.21	N/A

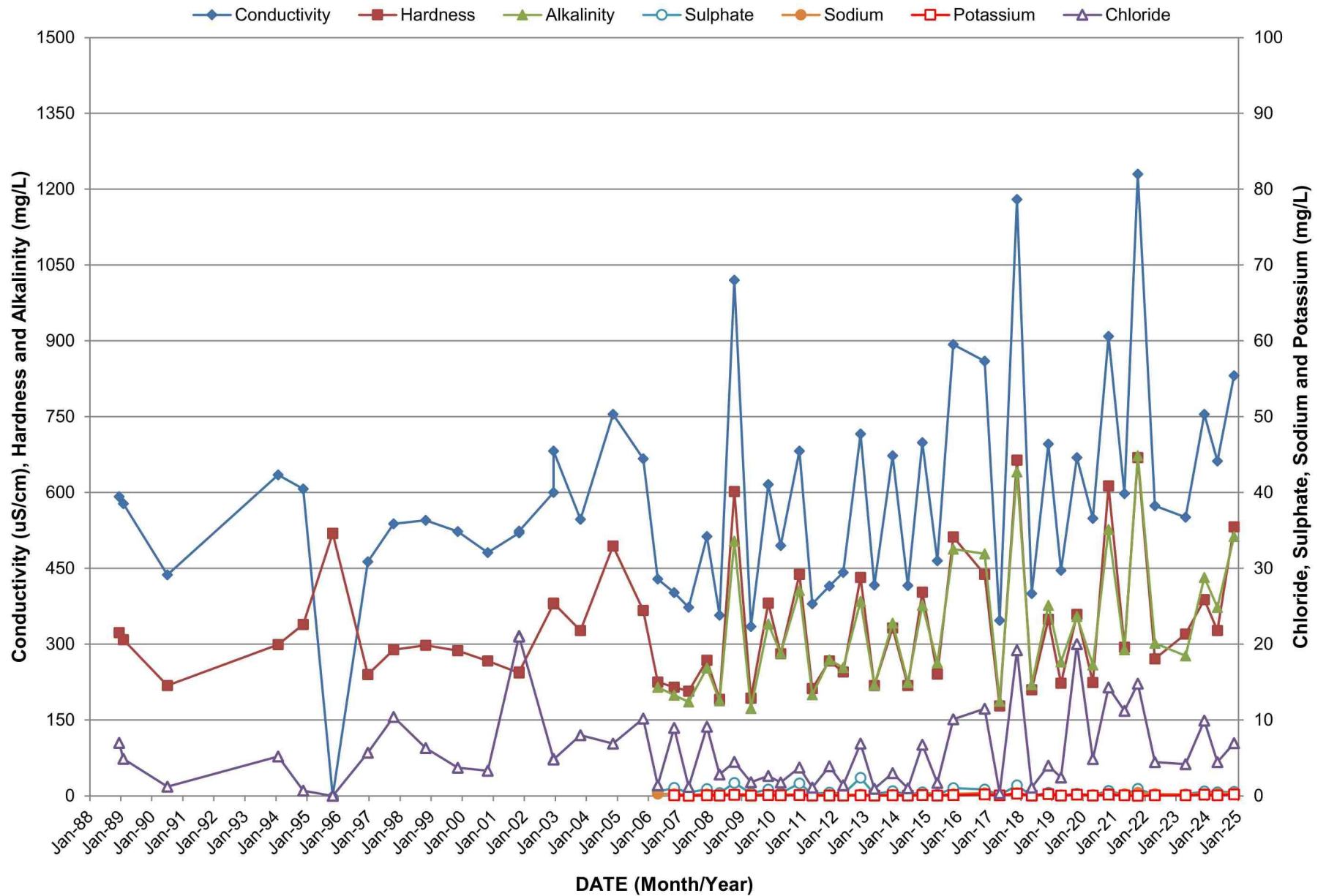
HISTORICAL GROUNDWATER QUALITY DATA: P-3

Parameter	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Sodium	Potassium	Ammonia	Iron	DOC	Phenols	Calcium	Magnesium	Boron
UNITS	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ODWS	NV	6.5-8.5	80-100	30-500	250	10	1.0	500	200	NV	NV	0.3	5.0	NV	NV	NV	NV
RUC	NA	OG	OG	OG	AO	MAC	MAC	AO	AO	NA	NA	AO	AO	NA	NA	NA	NA
	NV	NA	543	375	130	2.50	0.25	324	102	NV	NV	0.24	4.3	NV	NV	NV	NV
Dec-89	384				3.8												
Jan-93	390		241									0.04	0.6	0.0015			
Jan-94	425		218		5.7							<0.01	0.7	<0.001			
Nov-94	407		223		4.6							0.01	0.7	0.0027			
Oct-95	445		244		6.4							0.01	1.0	<0.001			
Dec-96	497		269		7.3							<0.01	<1	<0.001			
Dec-96 Dup	499		276		5.3							<0.01	1.0	<0.001			
Oct-97	548		304		15.2							<0.01	<1	<0.001			
Oct-98	566		302		21.5							<0.01	<1	<0.001			
Nov-99	587		317		30.3							<0.01	<1	<0.001			
Oct-00	679		378		48.8							<0.01	1.0	<0.001			
Nov-01	647		341		39.5							<0.01	5.0	<0.001			
Dec-02	533		336		45.4							<0.02	1.1	<0.001			
Oct-03	636		357		53.9							<0.005	9.0	<0.001			
Oct-03 Dup	636		360		53.9							<0.005	11	<0.001			
Nov-04	616		368		51.4							<0.005	1.0	<0.001			
Nov-05	631		350		39.3							<0.005	6.5	<0.001			
Apr-06	583	8.23	295	231	28.5	0.70	<0.05	15.3	3.53		<0.05	1.88	1.0				
Oct-06	536	7.97	287	245	30.4	0.70	<0.05	16.9	2.24	0.82	<0.05	0.18	1.4				
Apr-07	588	8.31	316	236	35.2	0.68	<0.05	15.6	2.54	0.74	<0.05	0.16	1.1				
Nov-07	617	8.27	321	245	43.0	0.81	<0.05	15.8	2.61	0.98	<0.05	<0.005	1.3				
Apr-08	577	8.32	304	255	38.4	0.72	<0.05	16.2	4.06	1.12	<0.05	<0.010	1.4				
Oct-08	709	7.98	371	248	55.7	0.72	<0.05	15.6	6.87	1.26	0.09	<0.01	1.4				
Apr-09	582	8.10	310	246	32.2	0.56	<0.05	16.3	4.23	0.80	<0.02	0.017	1.7				
Nov-09	568	8.09	329	258	24.9	0.50	<0.05	13.9	3.54	0.76	<0.05	<0.01	3.1				
Apr-10	540	8.20	302	255	19.7	0.48	<0.05	19.1	2.83	0.76	<0.02	<0.01	1.3				
Nov-10	544	8.04	313	265	30.1	0.79	<0.05	18.9	3.83	0.69	<0.02	<0.01	1.4				
Apr-11	546	7.99	302	265	17.7	0.37	<0.05	16.9	2.82	0.69	0.02	<0.01	1.4				
Nov-11	485	8.11	300	266	19.7	0.48	<0.05	19.8	3.21	0.69	0.29	<0.01	2.6				
Apr-12	543	7.99	291	269	13.7	0.36	<0.05	16.9	2.38	0.65	<0.02	<0.01	1.2				
Nov-12	544	8.17	313	259	26.6	0.65	<0.05	20.7	5.32	0.74	0.07	<0.01	2.0				
Apr-13	547	8.10	280	254	13.6	0.30	<0.05	15.3	3.16	0.77	<0.02	<0.01	1.4				
Nov-13	481	8.05	227	221	8.94	0.11	<0.10	14.0	2.05	0.62	<0.02	<0.01	1.0				
May-14	524	7.97	277	251	12.4	0.31	<0.05	14.8	2.96	0.61	0.22	0.010	1.7				
Oct-14	591	8.11	307	281	16.0	0.20	<0.10	19.1	3.94	0.72	0.02	<0.01	1.6				
Apr-15	554	7.88	288	278	12.6	0.36	<0.05	18.3	2.75	0.57	<0.02	<0.01	1.3				
Oct-15	724	8.02	350	291	51.5	0.42	<0.10	25.1	18.9	0.88	<0.02	0.94	1.7				
Apr-16	529	8.08	288	263	12.4	0.36	<0.05	15.6	3.41	0.59	<0.02		1.7				
Nov-16	699	8.12	305	268	62.4	0.68	<0.25	16.7	18.2	0.79	<0.02	<0.01	2.3				
Apr-17	495	8.12	246	227	12.4	<0.05	<0.05	15.2	3.28	0.59	<0.02	0.090	0.8				
Nov-17	669	7.89	315	297	42.3	0.52	<0.10	19.3	16.5	0.75	<0.02	<0.01	2.5				
May-18	570	7.94	290	280	17.0	0.29	<0.010	14.0	5.4	0.72	0.064	<0.1	2.0				
Nov-18	616	7.96	291	293	20.1	0.43	<0.05	17.3	6.68	0.87	0.22	<0.01	2.3				
Apr-19	519	7.87	253	280	9.43	0.26	<0.05	10.9	3.89	0.79	0.02	<0.01	2.1				
Oct-19	573	7.90	281	272	25.9	0.42	<0.05	15.1	9.90	0.80	<0.02	<0.01	2.4				
Apr-20	639	7.76	278	266	11.7	0.35	<0.10	13.5	3.91	0.66	<0.02	<0.010	3.0		77.8	20.4	
Oct-20	582	8.04	294	281	22.0	0.41	<0.05	16.2	8.02	0.70	<0.02	0.053	2.7		80.3	22.6	
May-21	579	8.03	282	269	10.6	0.29	<0.05	14.3	3.90	0.74	<0.02	<0.010	1.9		77.5	21.6	
Oct-21	599	7.84	285	273	20.2	0.52	<0.05	16.8	7.01	0.67	<0.02	<0.010	169				
Apr-22	548	7.73	267	277	7.99	0.28	<0.05	13.7	3.74	0.81	<0.02	0.021	2.4		74.3	19.9	
Sep-22	785	7.92	329	304	54.7	0.47	<0.05	22.7	18.6	0.66	<0.02	0.016	2.0		93.5	23.2	
Nov-23	579	7.59	303	324	6.41	0.25	<0.05	17.4	3.10	1.42	<0.02	<0.010	1.2		82.8	23.4	0.027
Apr-24	642	7.99	308	321	8.42	0.24	<0.05	13.7	3.75	0.59	<0.02	<0.020	2.9		84.6	23.6	<0.010
Nov-24	733	7.94	273	332	49.8	0.44	<0.05	16.6	22.8	<0.50	<0.02	<0.020	1.6		72.3	22.5	0.023
Average	572	8.02	299	269	25.6	0.46	<0.10	16.6	6.10	0.77	0.037	0.071	5.2	0.0007	80.4	22.2	0.03
Std. Dev.	83.2	0.16	36.8	25.5	16.8	0.18	NA	2.72	5.49	0.18	0.065	0.29	23.02	0.0006	6.69	1.39	N/A

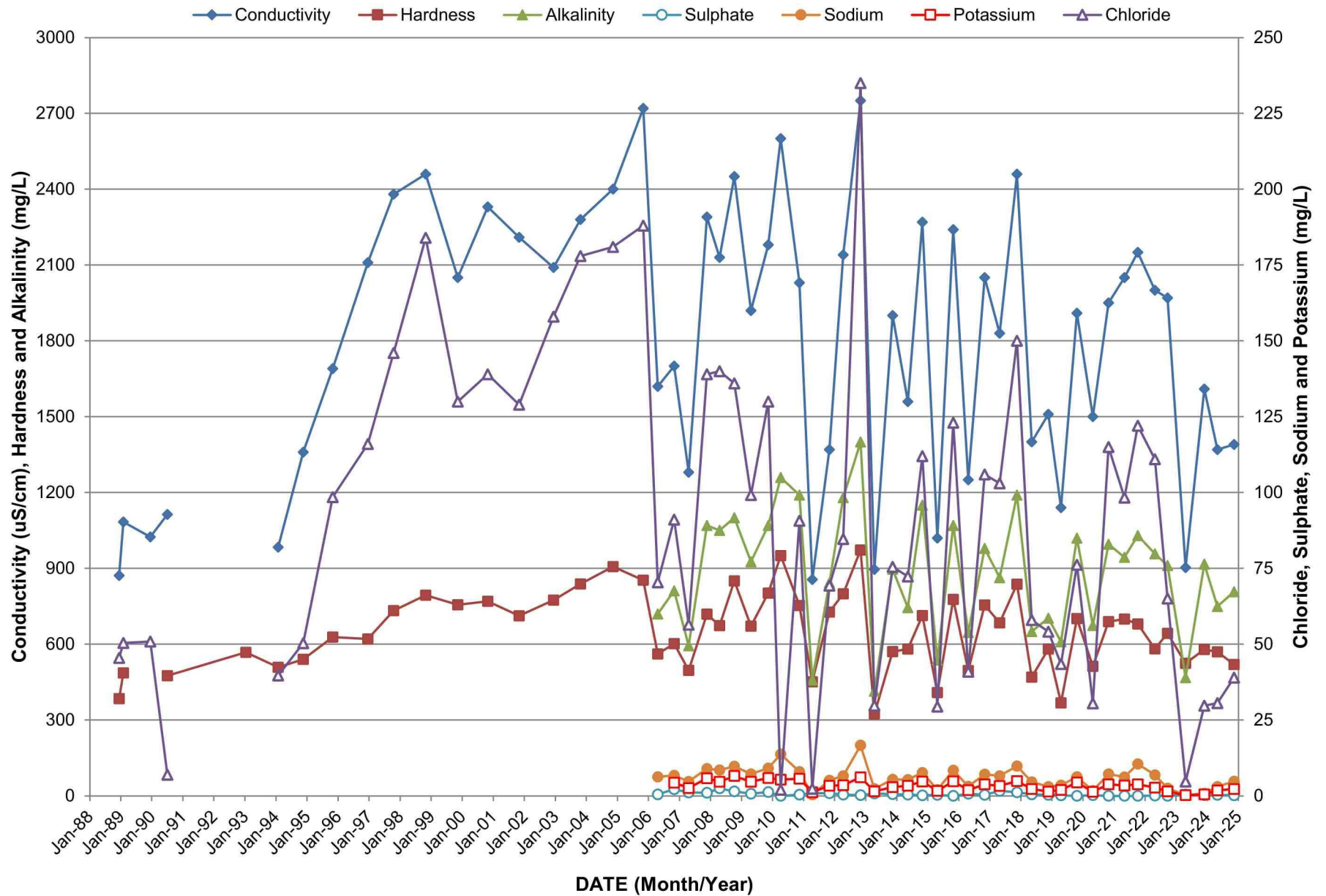
Notes:

1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006)
2. PWQO = Provincial Water Quality Objectives
3. NM = Not Monitored; NV = No value specified; NA = Not Applicable.
4. Results presented in mg/L (milligrams per litre) unless otherwise specified. $\mu\text{S}/\text{cm}$ = microsiemens per centimetre.
5. Samples analyzed by AGAT Laboratories Limited.
6. * indicates outlier interpreted as sample or lab error.
7. Data prior to 2006 from Annual Monitoring Report (2005), Henderson, Paddon and Associates, Ltd.
8. Values reported as less than detection limits used as 1/2 detection limit for calculation of averages and plotting.

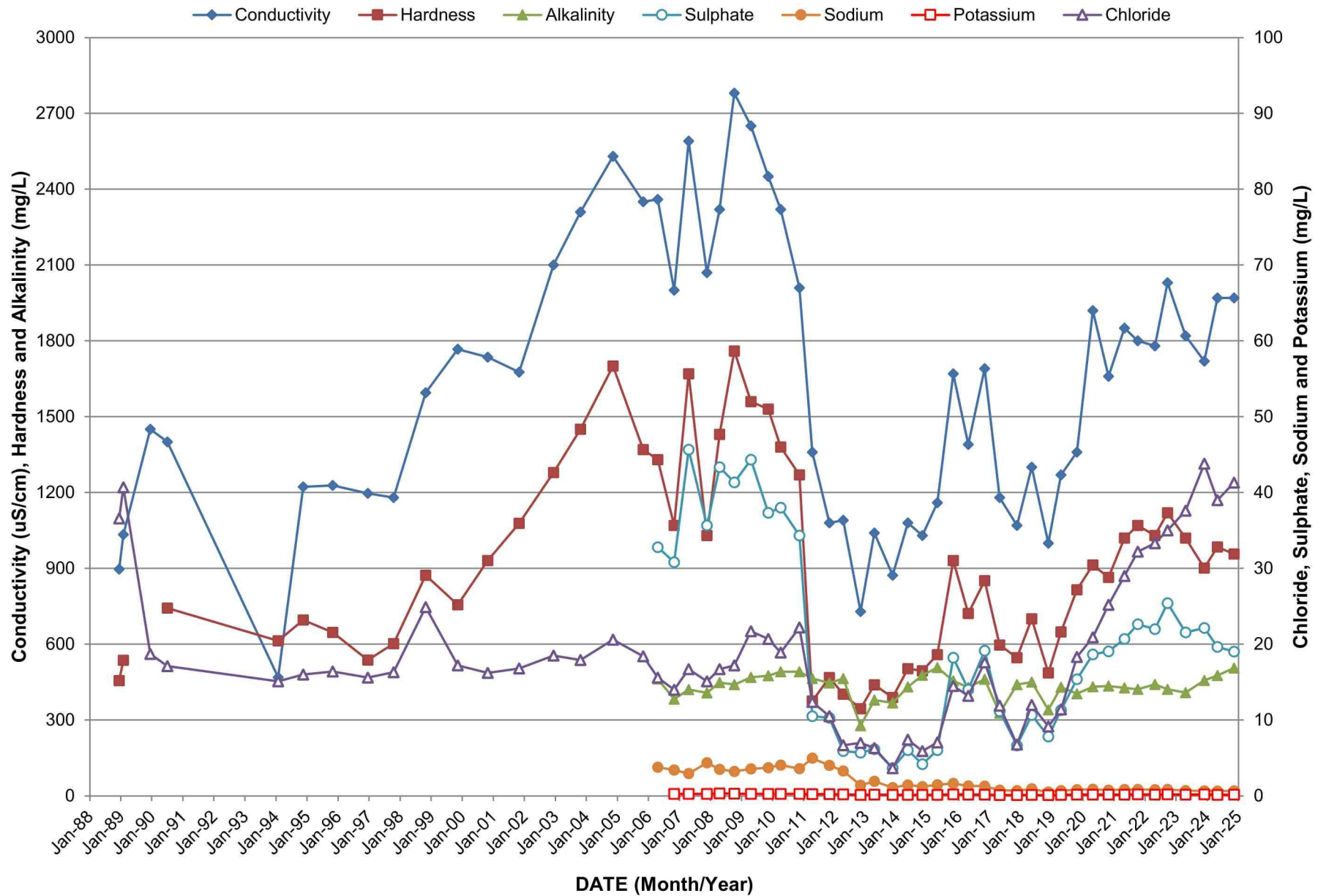
Monitoring Well O-1



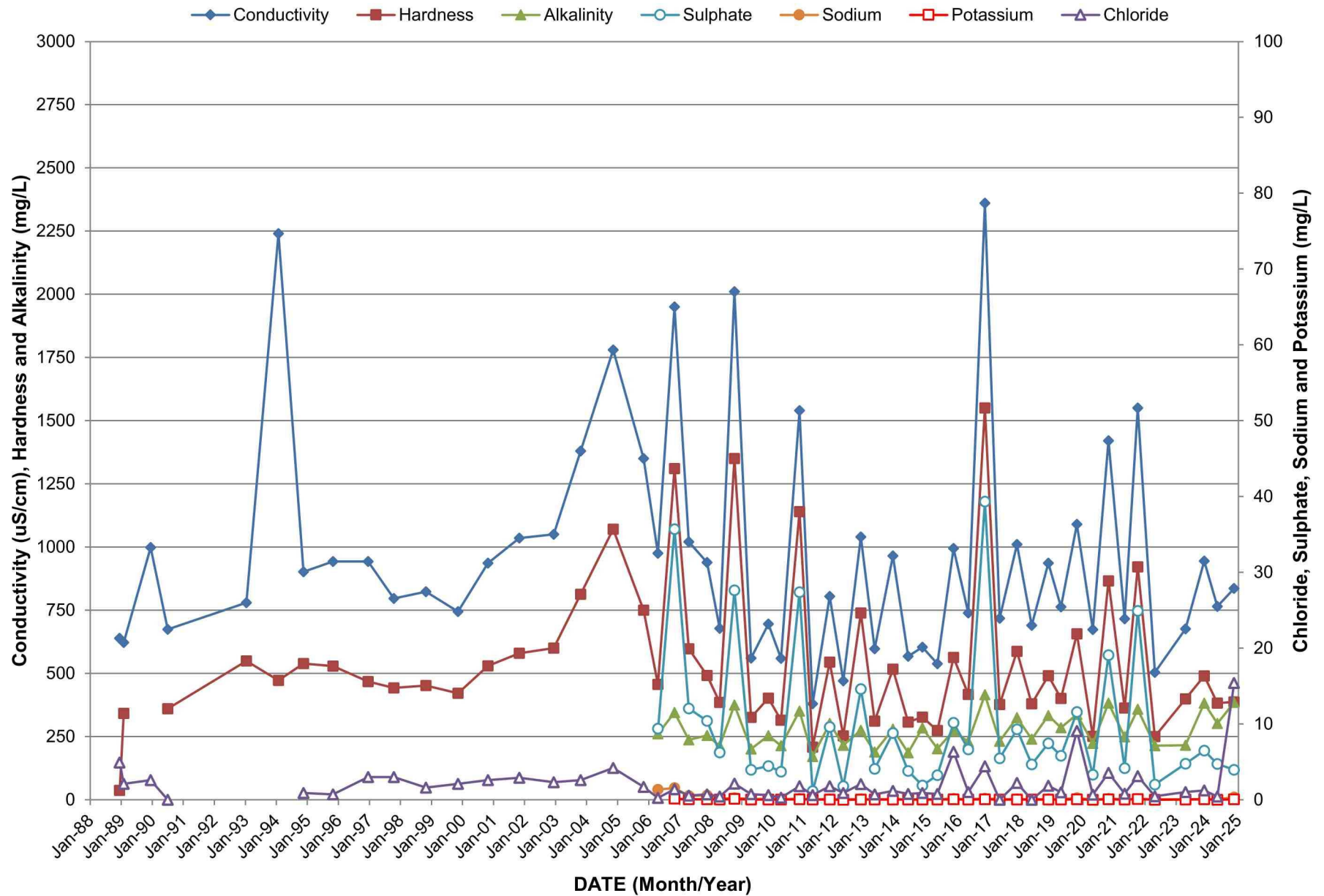
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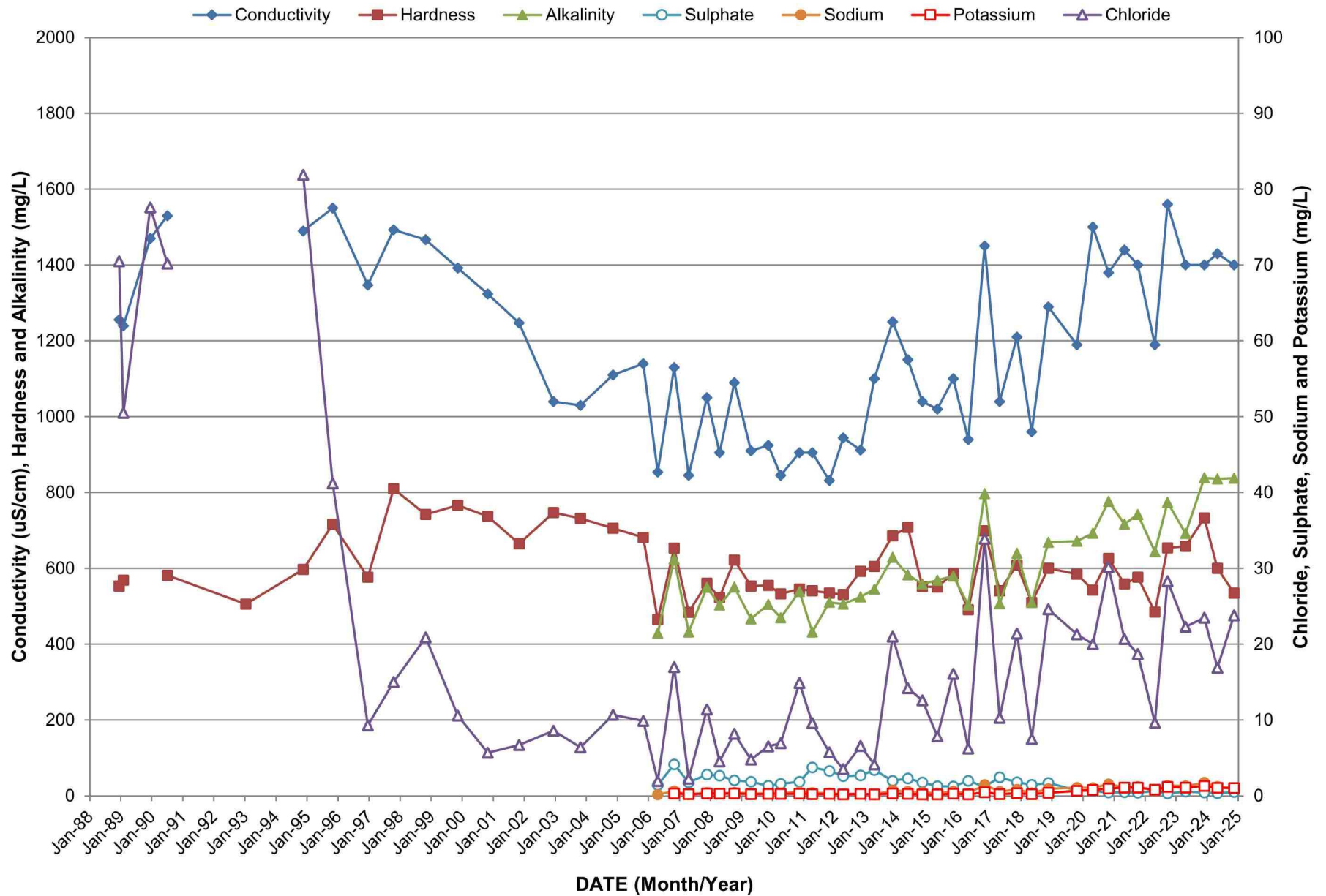
Monitoring Well O-3



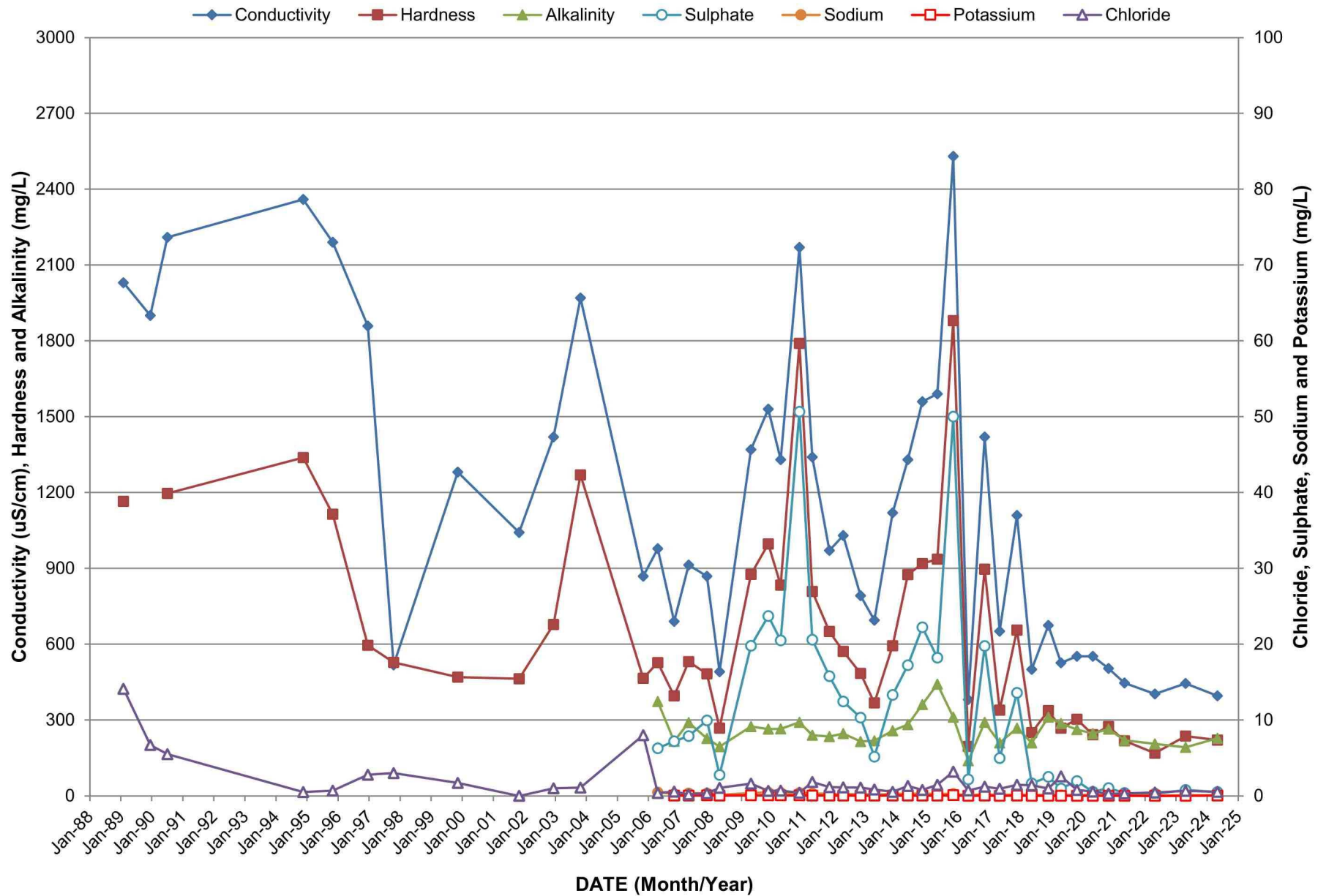
Monitoring Well O-4



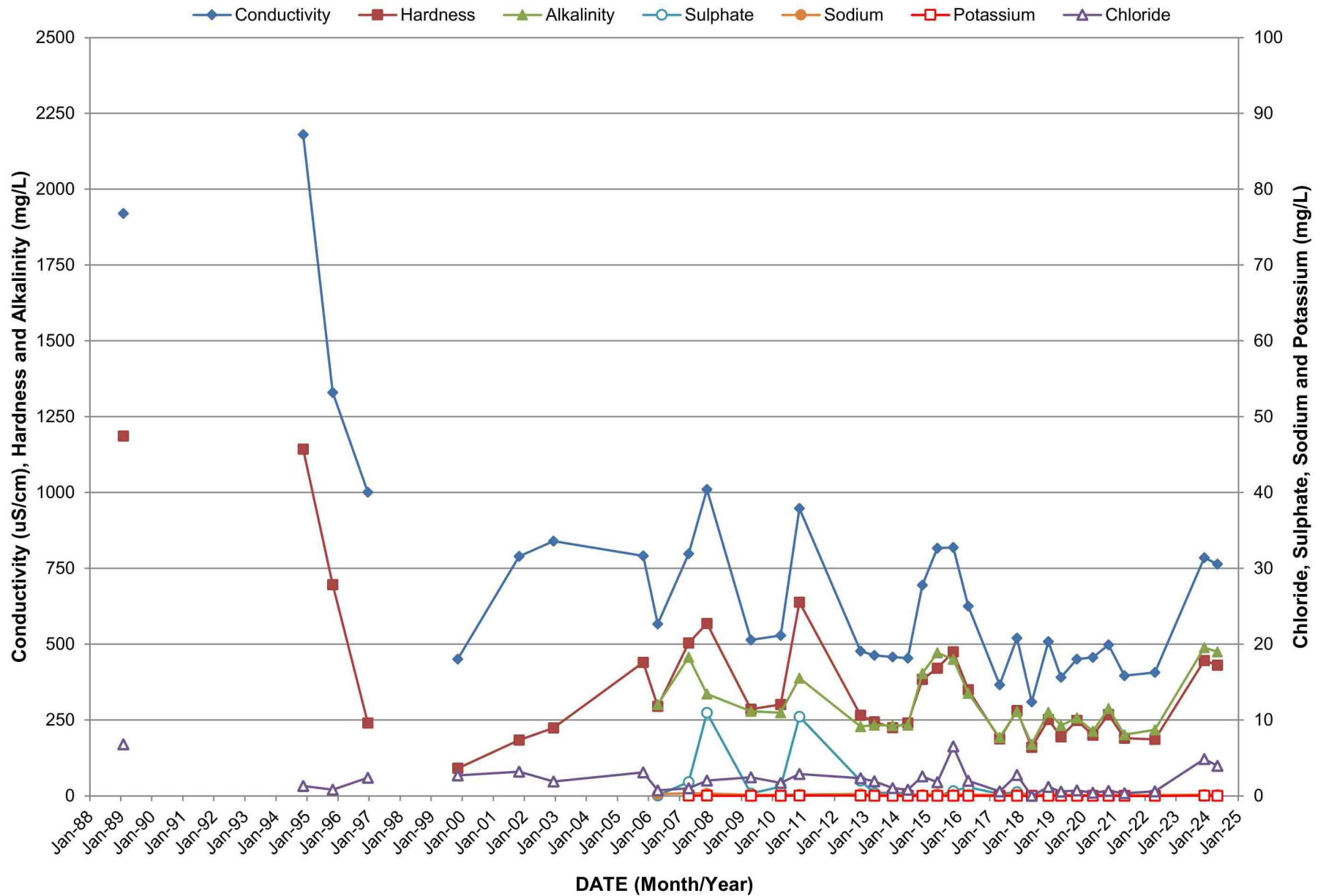
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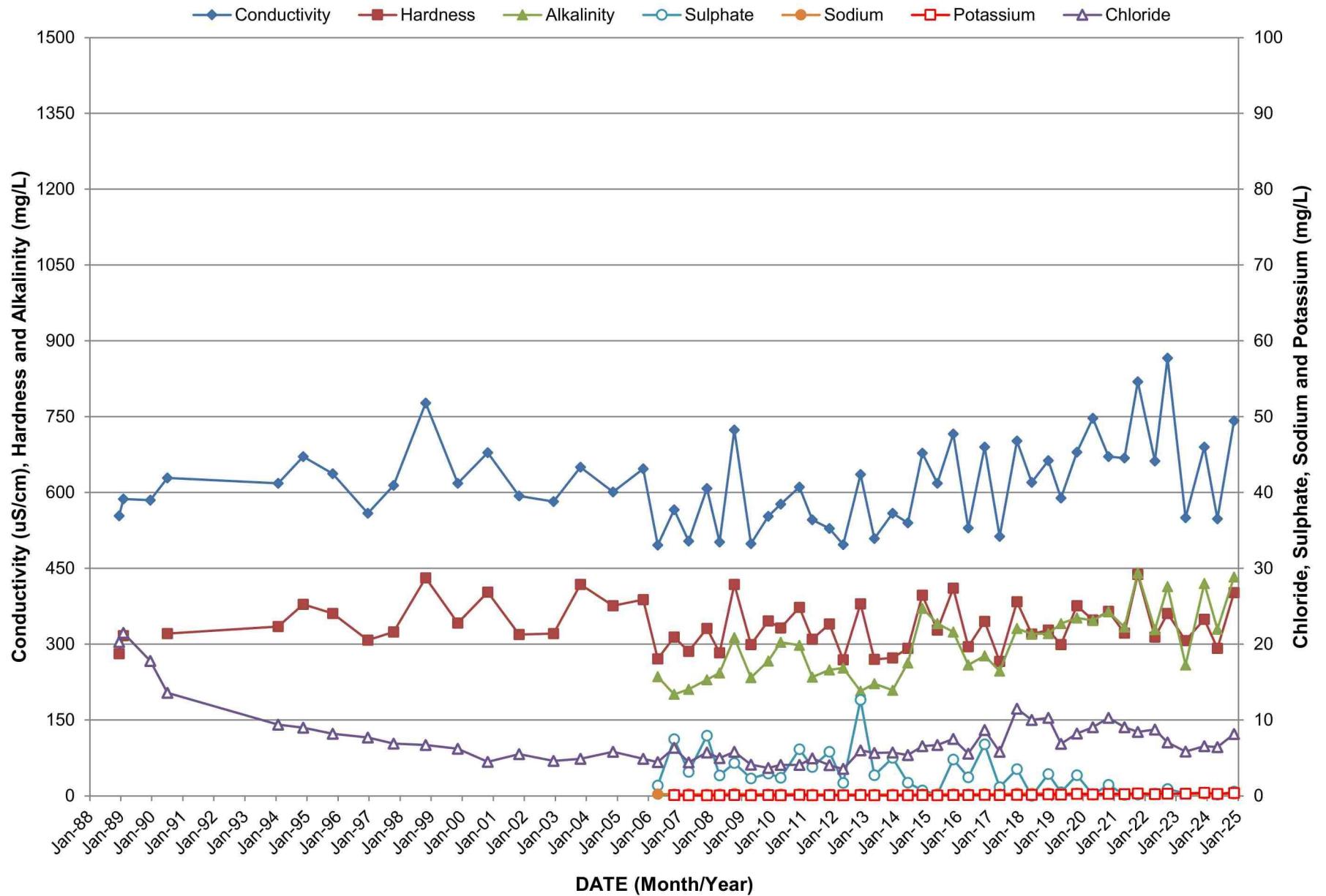
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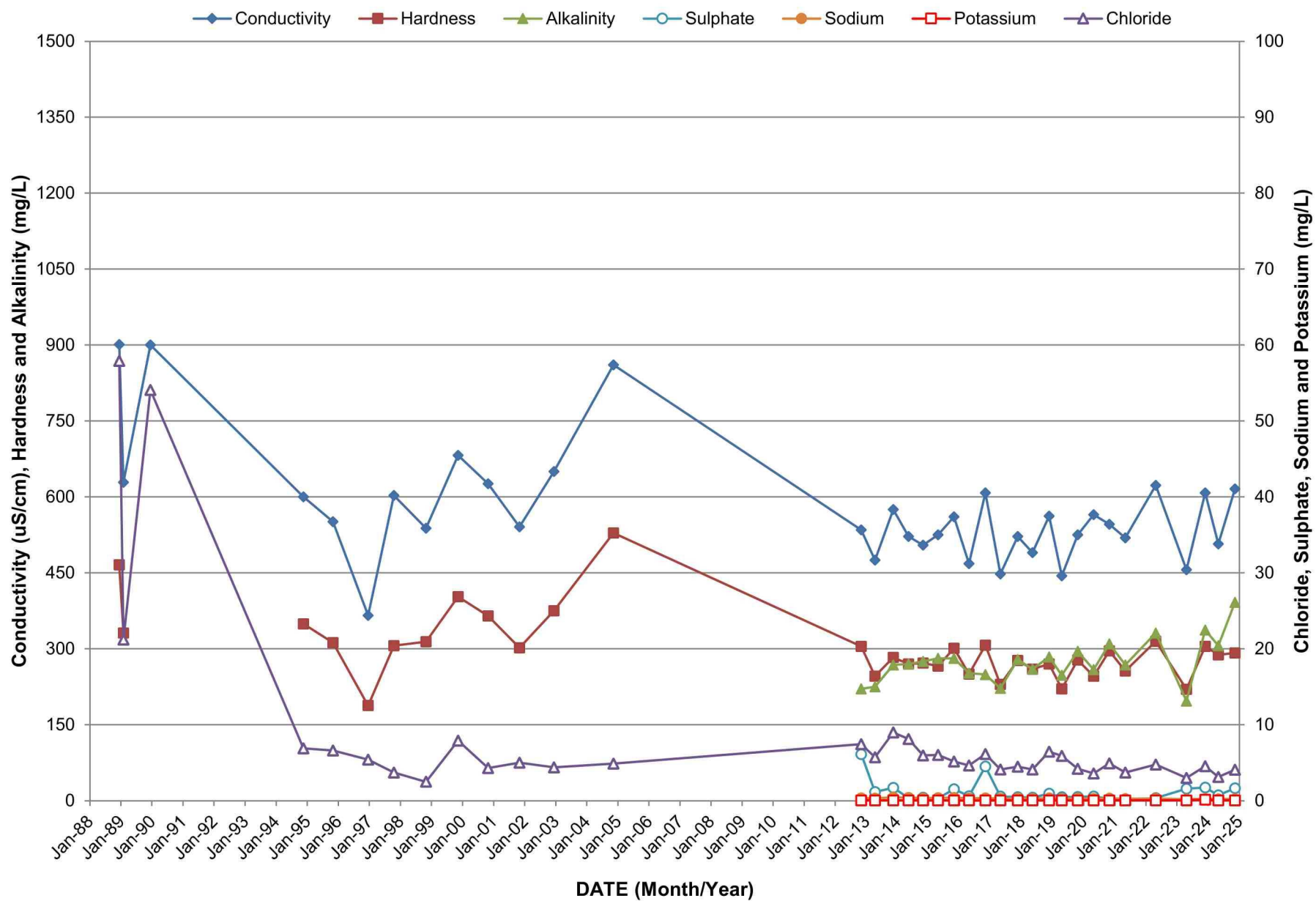
Monitoring Well O-8



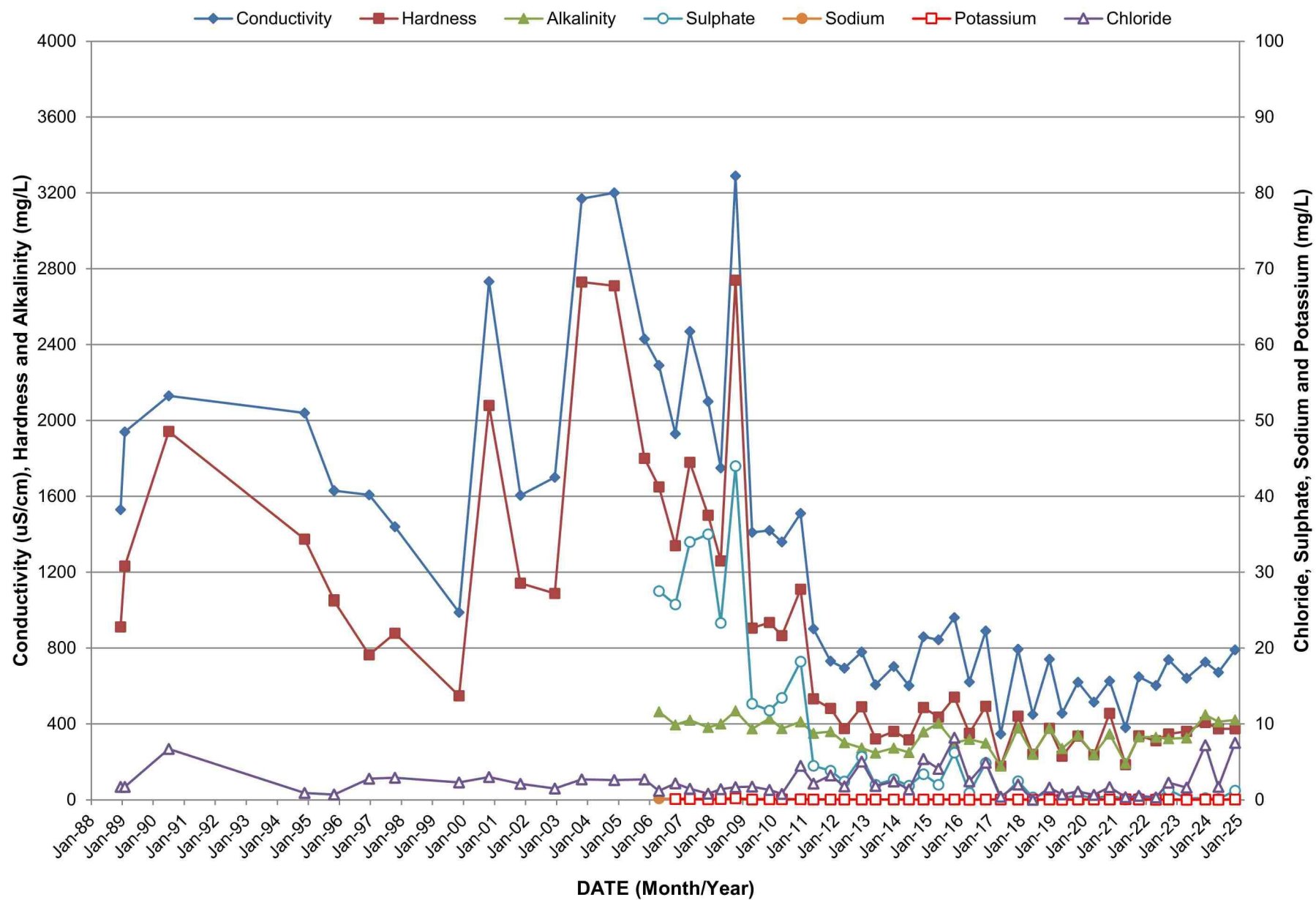
Monitoring Well O-9



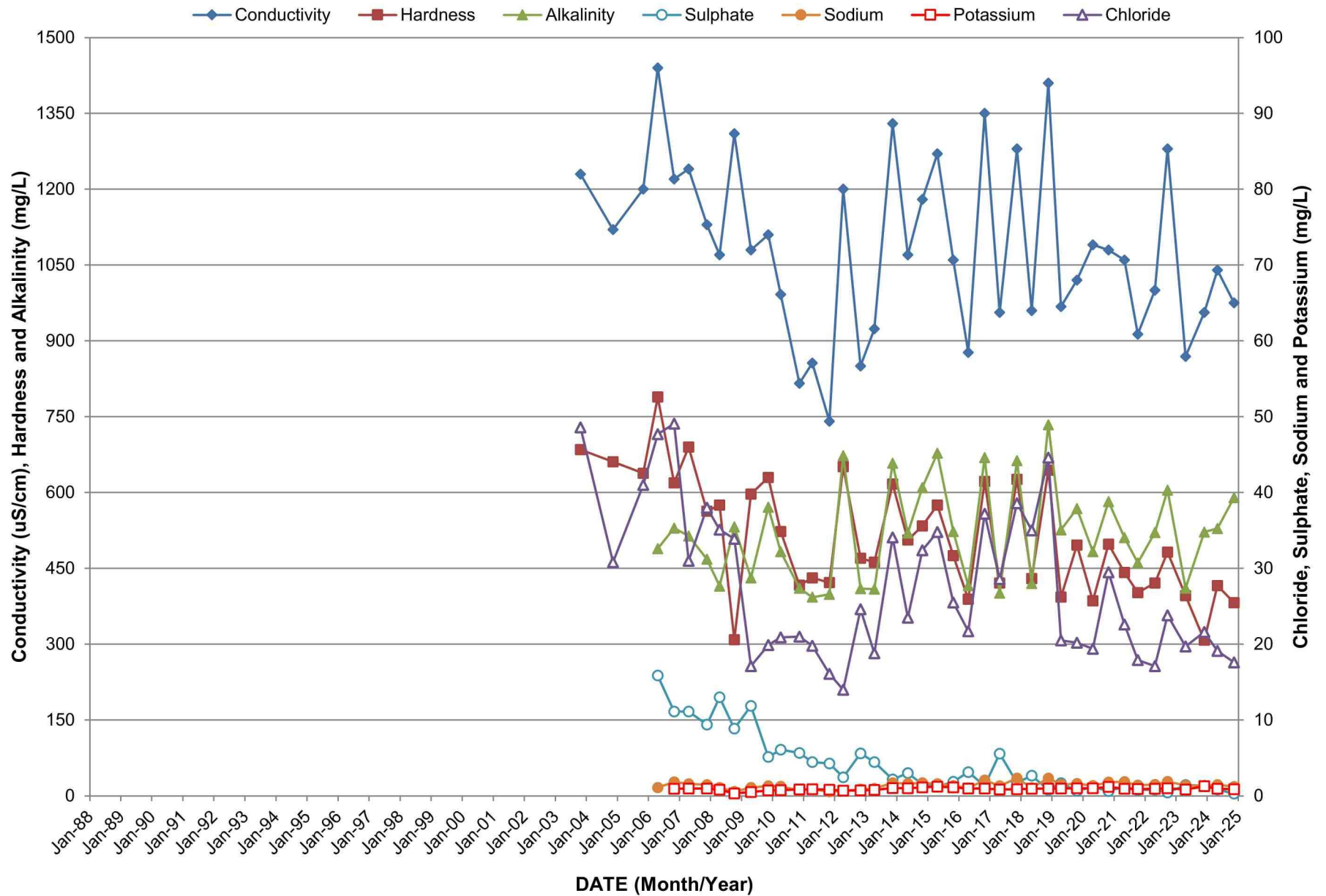
Monitoring Well W-1



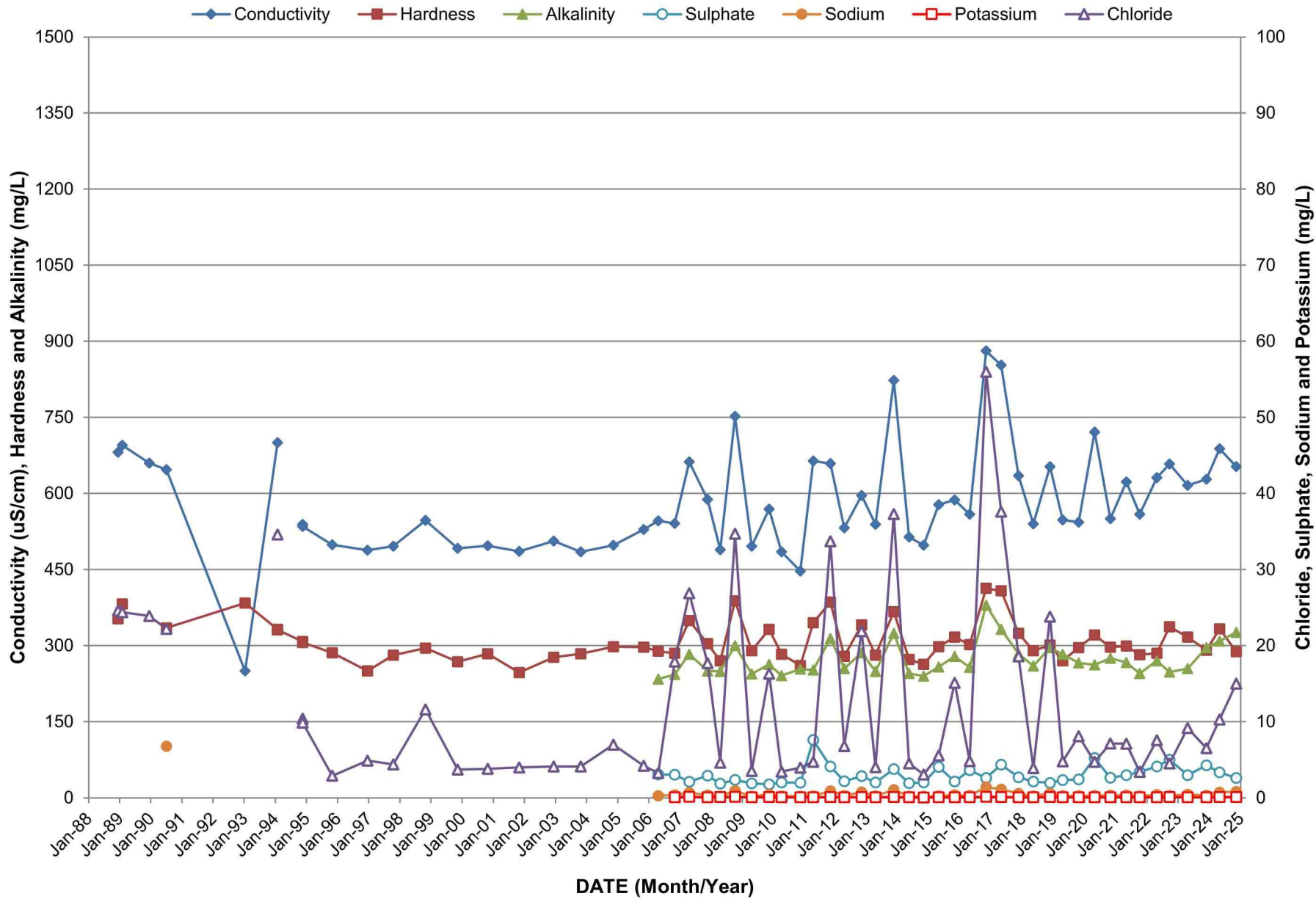
Monitoring Well W-2



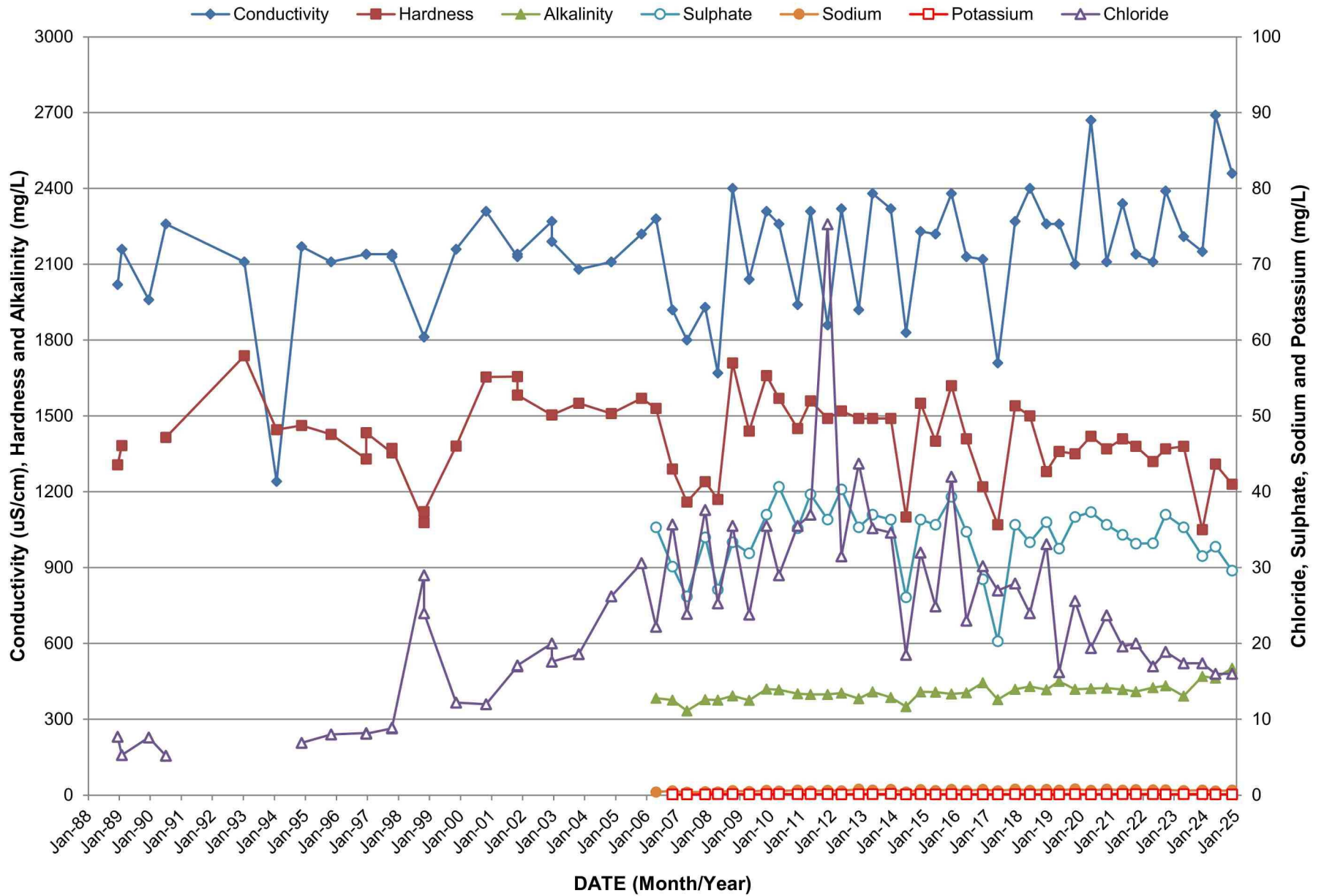
Monitoring Well W-3/03



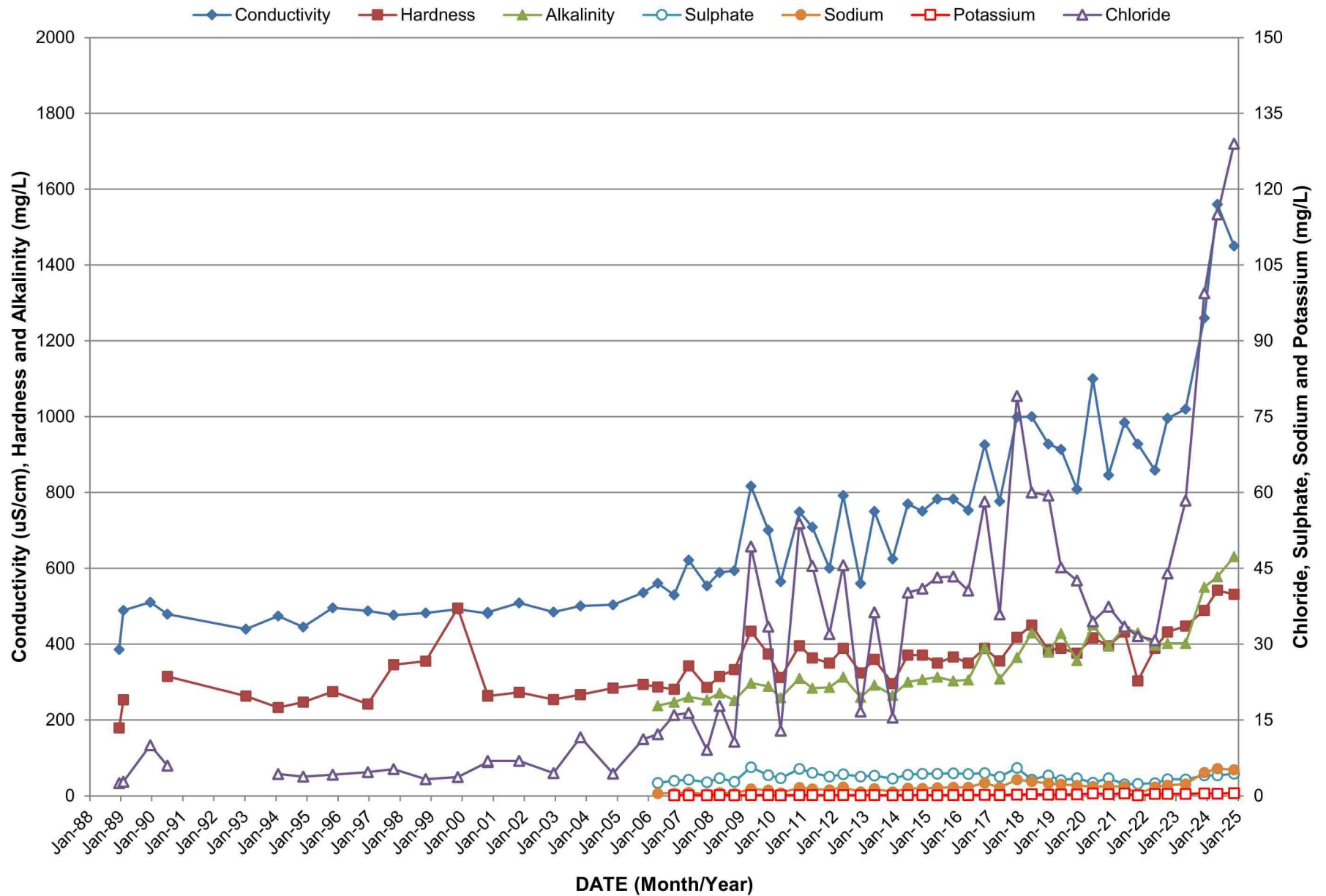
Monitoring Well B-2



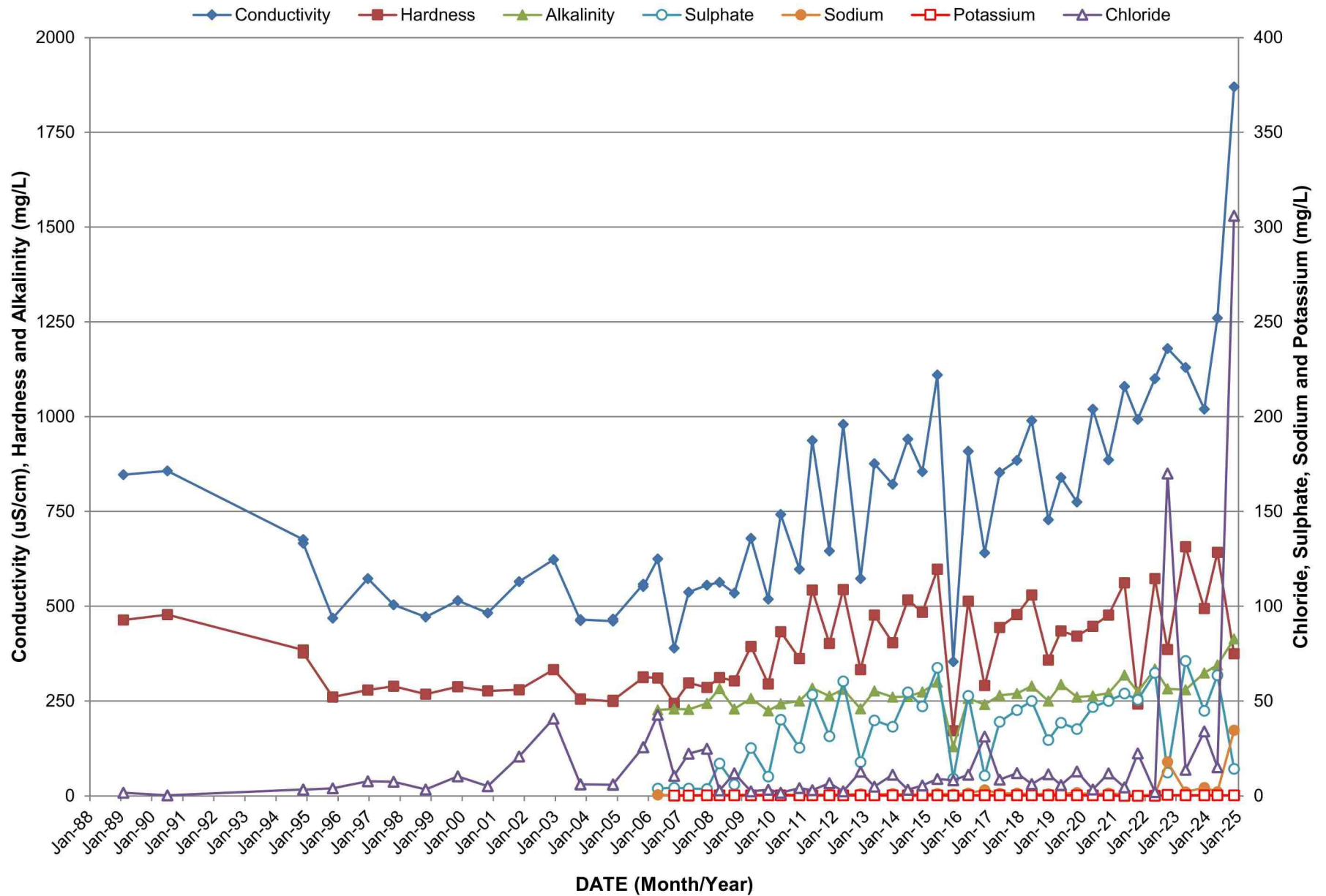
Monitoring Well B-3



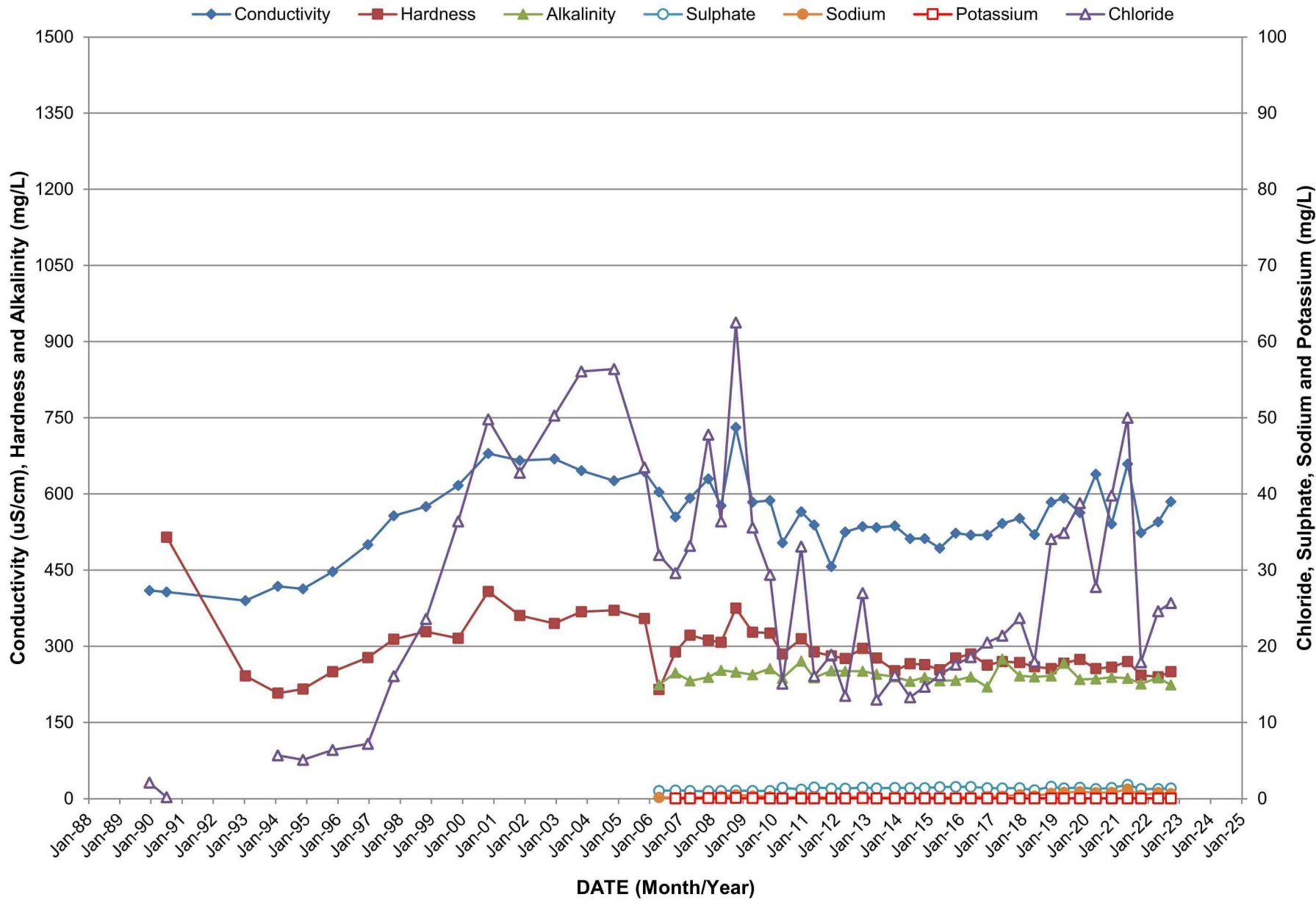
Monitoring Well B-4



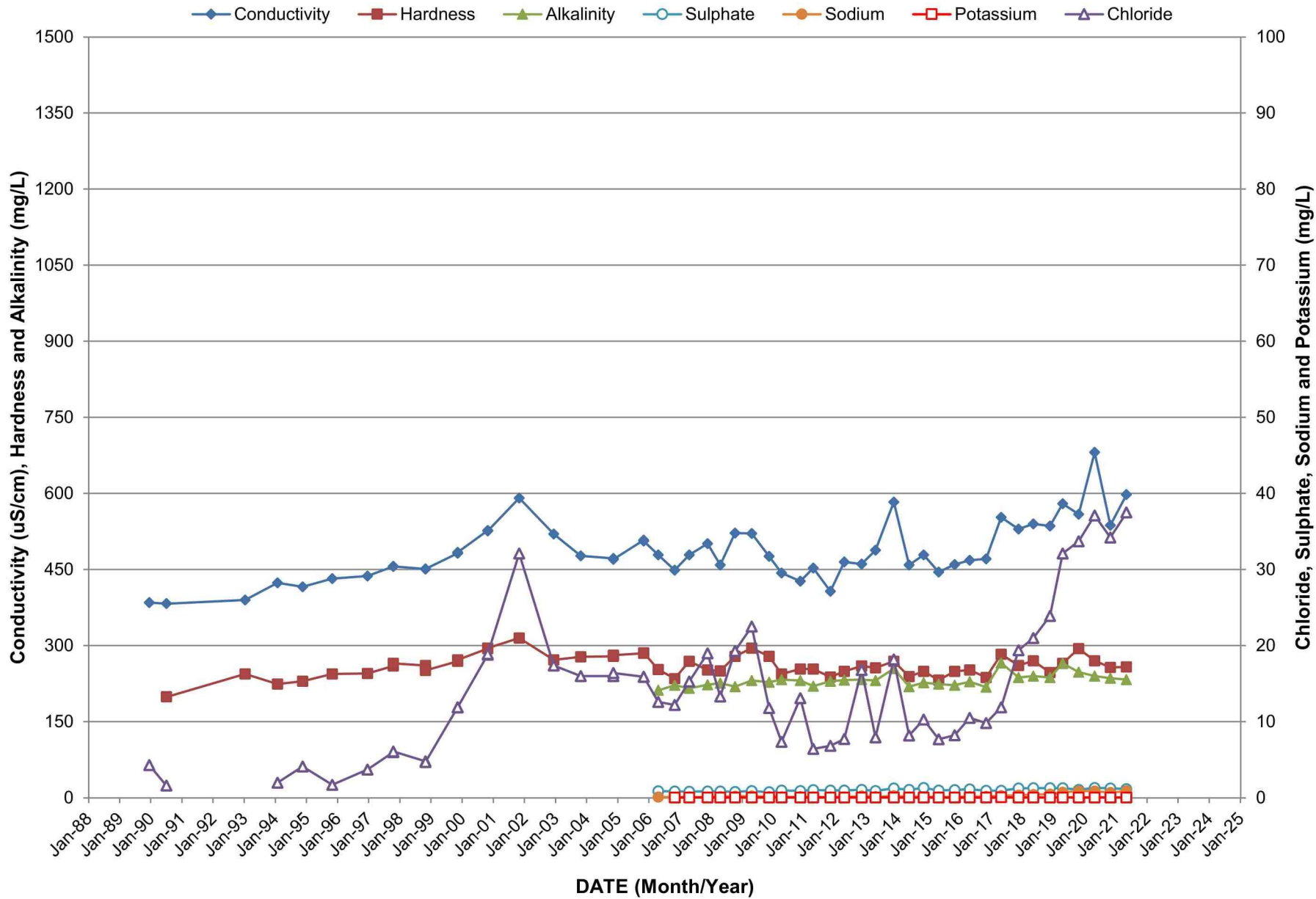
Monitoring Well B-5



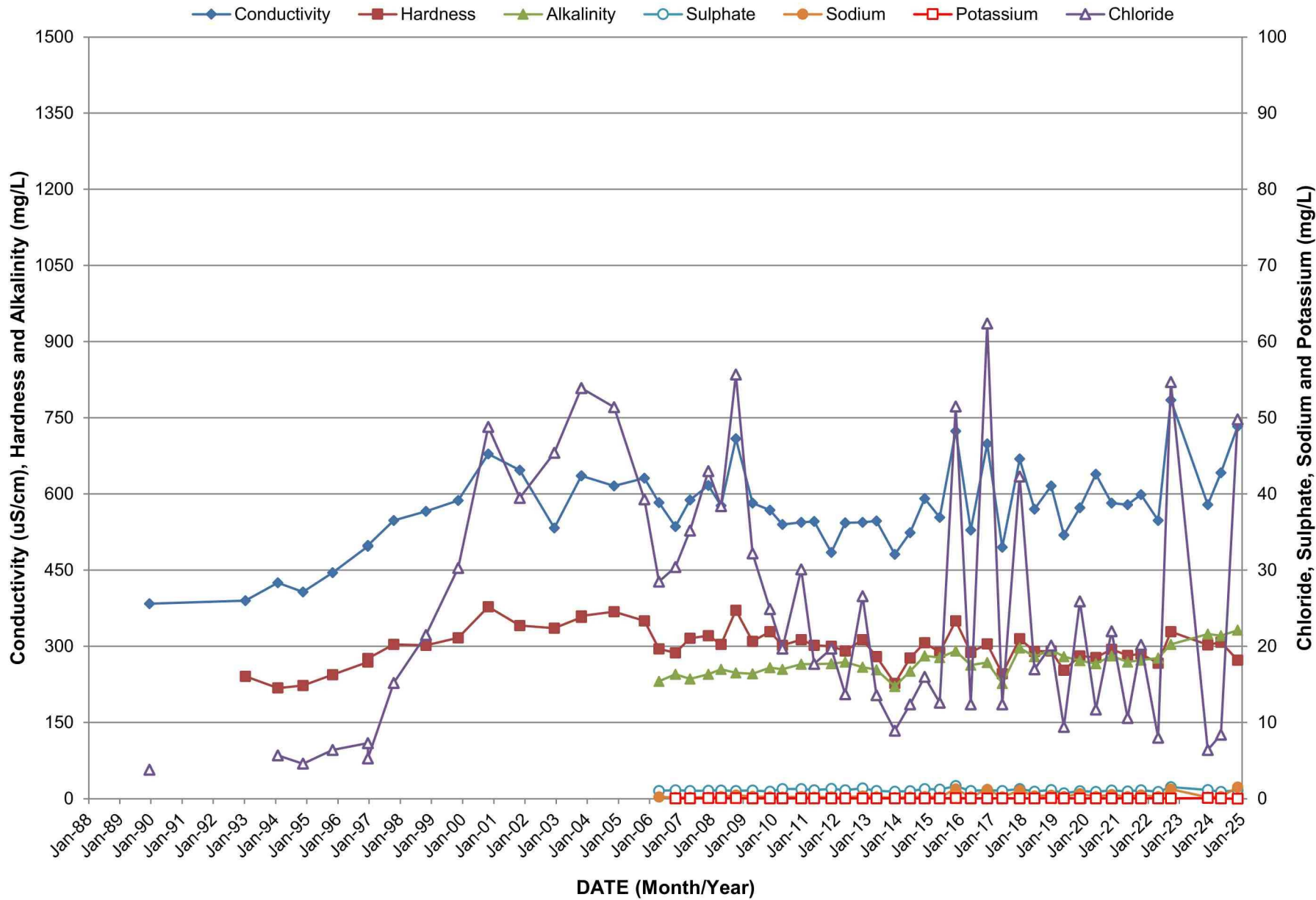
Monitoring Well P-1



Monitoring Well P-2



Monitoring Well P-3



Appendix H Historical Surface Water Quality Results (Tables and Graphs)

HISTORICAL SURFACE WATER QUALITY DATA: S-1

Parameter	CBOD ₅	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Ammonia	DOC	Phenols	TKN	Phosphorus	Boron	Zinc	Iron	Sodium	Potassium	Un-ionized Ammonia	Conductivity (field)	pH (field)	Temperature (field)	
PWQO	NV	NV	6.5-8.5	NV	NV	NV	NV	NV	NV	NV	NV	0.0010	NV	0.02	0.2	0.03	0.3	NV	NV	0.02	NV	6.5-8.5	NA	
UNITS	mg/L	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	Unitless	°C
Dec-88	NM	394	NM	218	NM	9.8	NM	NM	NM	NM	NM	<0.001	NM	NM	NM	NM	2.6	NM	NM	NM	NM	NM	NM	
Jan-89	NM	447	NM	219	NM	4.3	NM	NM	NM	NM	10.6	0.0025	NM	NM	NM	NM	0.08	NM	NM	NM	NM	NM	NM	
Jul-90	NM	659	NM	367	NM	1.7	NM	NM	NM	NM	NM	0.0015	NM	NM	NM	NM	0.8	NM	NM	NM	NM	NM	NM	
Nov-94	NM	831	NM	512	NM	4.1	NM	NM	NM	NM	11.4	0.0072	NM	NM	NM	NM	0.04	NM	NM	NM	NM	NM	NM	
Nov-94 Dup	NM	834	NM	513	NM	4.2	NM	NM	NM	NM	11.4	0.0027	NM	NM	NM	NM	0.16	NM	NM	NM	NM	NM	NM	
Nov-10	<5	771	8.14	478	312	9.3	<0.05	<0.05	158	<0.02	15.4	<0.001	0.95	<0.05	<0.010	<0.005	<0.01	NM	NM	<0.0003	NM	NM	5.0	
Apr-11	<5	513	8.07	262	192	17.7	0.05	<0.05	50.9	0.02	8.9	<0.001	0.73	<0.05	<0.010	<0.005	<0.01	NM	NM	0.0001	346	7.43	11.8	
Nov-11	<5	592	8.23	330	280	31.4	<0.05	<0.05	57.1	0.04	13.2	<0.001	0.49	0.02	<0.010	<0.005	<0.01	NM	NM	0.0003	687	7.72	7.3	
Apr-12	<5	619	8.15	320	282	20.5	<0.05	<0.05	30.4	<0.02	10.1	0.0010	0.67	0.04	<0.010	<0.005	<0.01	NM	NM	<0.0001	637	7.70	5.3	
Nov-12	<5	662	8.21	362	187	22.8	0.23	<0.05	186	<0.02	14.5	<0.001	0.80	<0.02	<0.010	0.02	0.025	NM	1.19	<0.00003	716	7.01	6.0	
Apr-13	<5	516	8.19	214	190	40.3	0.16	<0.05	18.9	0.02	8.1	<0.001	0.59	<0.02	<0.010	<0.005	<0.01	NM	0.75	0.0004	483	8.07	9.1	
Nov-13	<5	676	8.30	320	246	23.1	<0.25	<0.25	69.4	0.02	14.0	<0.001	0.87	<0.02	<0.010	<0.005	<0.01	14.2	0.84	0.0002	683	8.04	3.0	
May-14	<5	590	8.16	289	259	21.9	<0.10	<0.10	25.0	0.15	10.6	<0.001	0.60	<0.02	0.01	<0.005	<0.01	NM	0.78	0.0006	249	7.38	9.4	
Oct-14	<5	665	8.29	307	277	38.6	0.4	<0.10	26.4	0.03	16.7	<0.001	0.76	0.06	0.01	<0.005	0.05	21.3	1.17	0.0002	612	7.52	9.3	
Apr-15	<5	563	8.16	259	247	29.5	<0.25	<0.25	21.4	<0.02	8.9	<0.001	0.92	0.03	<0.010	<0.005	0.01	NM	0.86	0.0000	576	7.06	1.1	
Oct-15	<5	695	7.95	361	226	17.9	<0.25	<0.25	128	<0.02	16.4	0.0010	0.74	0.03	<0.010	<0.005	<0.01	NM	6.44	0.0000	459	6.34	7.4	
Apr-16	<5	572	7.95	281	260	25.1	<0.10	<0.10	31.0	<0.02	11.1	<0.001	1.10	<0.02	NM	NM	NM	NM	0.52	0.00010	386	7.52	7.5	
Nov-16	<5	868	7.45	409	316	24.2	<0.25	<0.25	164	<0.02	16.2	<0.001	0.85	0.04	<0.010	<0.005	<0.01	NM	1.29	0.00012	555	7.57	7.9	
Apr-17	<5	578	8.12	261	237	24.8	<0.05	<0.05	25.1	<0.02	9.8	<0.001	0.50	<0.02	0.01	<0.005	0.03	NM	0.66	0.00010	610	7.52	7.4	
Nov-17	<5	696	8.14	352	322	24.6	0.32	<0.10	35.1	0.02	14.8	<0.001	0.76	0.02	<0.010	<0.005	<0.01	17.4	1.01	0.00032	462	8.04	7.3	
May-18	<2	360	8.39	180	180	7.7	<0.10	<0.010	<1.0	<0.050	12.0	<0.0010	0.48	<0.040	<0.01	<0.005	<0.1	NM	NM	<0.006	250	8.82	10.5	
Nov-18	<5	646	8.03	289	260	34.4	0.11	<0.05	46.7	<0.02	13.0	<0.001	0.53	<0.02	<0.010	<0.005	0.03	NM	NM	<0.001	324	7.30	0.44	
Apr-19	<5	353	7.83	159	184	10.6	0.06	<0.05	4.39	<0.02	8.3	<0.001	0.23	<0.02	<0.010	0.005	0.02	8.44	0.73	<0.001	203	7.76	1.67	
Oct-19	<5	621	7.98	297	282	24.3	<0.10	<0.10	39.4	<0.02	15.2	0.001	0.57	0.02	0.014	<0.005	<0.01	15.3	1.49	<0.001	516	7.89	11.1	
Oct-20	<2	645	8.11	358	295	31.4	<0.10	<0.10	29.5	<0.02	14.6	0.005	0.70	0.05	0.012	<0.005	0.038	21.7	0.85	<0.001	394	7.87	5.5	
May-21	<2	470	8.14	215	203	20.9	<0.05	<0.05	2.96	<0.02	10.7	0.001	0.55	0.02	0.010	<0.005	0.10	13.1	1.33	<0.001	352	7.48	7.5	
Oct-21	<2	746	7.92	366	348	22.9	<0.05	<0.05	9.88	<0.02	54.7	0.030	0.84	<0.02	0.018	<0.020	0.050	NM	NM	<0.001	563	7.58	13.5	
Apr-22	2	515	7.81	225	209	30.0	0.10	<0.05	12.8	<0.02	10.5	0.023	0.50	<0.02	0.011	<0.020	0.079	20.7	1.21	<0.001	366	6.72	9.8	
Apr-23	<2	623	7.93	272	229	41.3	<0.05	<0.05	22.5	<0.02	10.4	0.005	0.24	<0.02	0.025	<0.020	0.020	29.3	0.72	<0.001	434	7.61	7.3	
Nov-23	<2	735	7.66	301	322	54.7	<0.05	<0.05	21.0	<0.02	8.7	0.005	0.60	0.03	0.015	<0.020	0.26	29.4	<0.50	<0.001	442	6.81	1.1	
Apr-24	<2	593	8.14	220	248	42.2	0.08	<0.05	4.43	0.02	14.2	0.001	0.26	0.06	0.015	<0.020	<0.050	30.9	0.84	0.0005	737	8.04	10	
Nov-24	<20	804	7.73	410	345	34.0	<0.05	<0.05	81.3	<0.02	13.1	<0.001	0.24	<0.02	<0.010	<0.020	0.22	25.4	1.76	<0.001	920	8.04	10	
Average	<5	620	8.04	310	257	23.4	0.09	<0.10	50.1	0.019	13.6	0.003	0.63	0.023	0.0087	<0.005	0.15	20.6	1.29	0.00042	499	7.57	7.2	
Std. Dev.	NA	132	0.21	89.3	50.8	12.8	0.09	NA	51.7	0.027	8.18	0.006	0.23	0.016	0.0052	NA	0.48	7.18	1.29	0.00055	173	0.51	3.4	

HISTORICAL SURFACE WATER QUALITY DATA: S-2

Parameter	CBOD ₅	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Ammonia	DOC	Phenols	TKN	Phosphorus	Boron	Zinc	Iron	Sodium	Potassium	Un-ionized Ammonia	Conductivity (field)	pH (field)	Temperature (field)
PWQO	NV	NV	6.5-8.5	NV	NV	NV	NV	NV	500	NV	NV	0.0010	NV	0.02	0.2	0.03	0.3	NV	NV	0.02	NV	6.5-8.5	NA
UNITS	mg/L	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	Unitless	°C
Dec-88	NM	559	NM	303	NM	8.4	NM	NM	NM	NM	NM	0.0010	NM	NM	NM	NM	4.2	NM	NM	NM	NM	NM	NM
Jan-89	NM	458	NM	227	NM	3.0	NM	NM	NM	NM	6.1	0.0015	NM	NM	NM	NM	4.8	NM	NM	NM	NM	NM	NM
Dec-89	NM	733	NM	NM	NM	9.7	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Jul-90	NM	656	NM	344	NM	8.8	NM	NM	NM	NM	NM	0.0020	NM	NM	NM	NM	19.0	NM	NM	NM	NM	NM	NM
Nov-94	NM	777	NM	432	NM	11.5	NM	NM	NM	NM	9.3	0.0039	NM	NM	NM	NM	0.18	NM	NM	NM	NM	NM	NM
Average	NA	637	NA	327	NA	8.28	NA	NA	NA	NA	7.70	0.0021	NA	NA	NA	NA	7.05	NA	NA	NA	NA	NA	NA
Std. Dev.	NA	130	NA	85.4	NA	3.18	NA	NA	NA	NA	2.26	0.0013	NA	NA	NA	NA	8.23	NA	NA	NA	NA	NA	NA

HISTORICAL SURFACE WATER QUALITY DATA: S-3

Parameter	CBOD ₅	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Ammonia	DOC	Phenols	TKN	Phosphorus	Boron	Zinc	Iron	Sodium	Potassium	Un-ionized Ammonia	Conductivity (field)	pH (field)	Temperature (field)
PWQO	NV	NV	6.5-8.5	NV	NV	NV	NV	NV	500	NV	NV	0.0010	NV	0.02	0.2	0.03	0.3	NV	NV	0.02	NV	6.5-8.5	NA
UNITS	mg/L	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	Unitless	°C
Dec-88	NM	586	NM	NM	NM	5.1	NM	NM	NM	NM	NM	0.0065	NM	NM	NM	NM	83.5	NM	NM	NM	NM	NM	NM
Jan-89	NM	402	NM	217	NM	3.0	NM	NM	NM	NM	9.52	0.0035	NM	NM	NM	NM	4.8	NM	NM	NM	NM	NM	NM
Jul-90	NM	687	NM	367	NM	9.8	NM	NM	NM	NM	NM	0.0015	NM	NM	NM	NM	3.3	NM	NM	NM	NM	NM	NM
Average	NA	558	NA	292	NA	6.0	NA	NA	NA	NA	NA	0.0035	NA	NA	NA	NA	30.5	NA	NA	NA	NA	NA	NA
Std. Dev.	NA	145	NA	106	NA	3.5	NA	NA	NA	NA	NA	0.0025	NA	NA	NA	NA	45.9	NA	NA	NA	NA	NA	NA

HISTORICAL SURFACE WATER QUALITY DATA: S-4

Parameter	CBOD ₅	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Ammonia	DOC	Phenols	TKN	Phosphorus	Boron	Zinc	Iron	Sodium	Potassium	Un-ionized Ammonia	Conductivity (field)	pH (field)	Temperature (field)	
PWQO	NV	NV	6.5-8.5	NV	NV	NV	NV	NV	500	NV	NV	0.0010	NV	0.02	0.2	0.03	0.3	NV	NV	0.02	NV	6.5-8.5	NA	
UNITS	mg/L	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	Unitless	°C
Nov-94	NM	796	NM	484	NM	3.9	NM	NM	NM	NM	10.7	0.0033	NM	NM	NM	NM	0.20	NM	NM	NM	NM	NM	NM	
Oct-95	NM	633	NM	377	NM	3.7	NM	NM	NM	NM	12.8	<0.001	NM	NM	NM	NM	0.12	NM	NM	NM	NM	NM	NM	
Dec-96	NM	315	NM	171	NM	2.8	NM	NM	NM	NM	3	<0.001	NM	NM	NM	NM	0.23	NM	NM	NM	NM	NM	NM	
Oct-97	NM	510	NM	286	NM	3.1	NM	NM	NM	NM	5	<0.001	NM	NM	NM	NM	0.15	NM	NM	NM	NM	NM	NM	
Oct-00	NM	711	NM	421	NM	8.8	NM	NM	NM	NM	25	<0.001	NM	NM	NM	NM	0.16	NM	NM	NM	NM	NM	NM	
Nov-01	NM	430	NM	257	NM	5.1	NM	NM	NM	NM	23	<0.001	NM	NM	NM	NM	0.17	NM	NM	NM	NM	NM	NM	
Dec-02	NM	522	NM	292	NM	4.6	NM	NM	NM	NM	14.5	<0.001	NM	NM	NM	NM	0.08	NM	NM	NM	NM	NM	NM	
Nov-05	NM	596	NM	350	NM	9.7	NM	NM	NM	NM	23.7	<0.001	NM	NM	NM	NM	0.10	NM	NM	NM	NM	NM	NM	
Oct-06	NM	720	8.28	407	208	8.83	<0.05	<0.05	216	<0.05	13.1	NM	NM	NM	NM	NM	0.34	1.47	NM	<0.0014	NM	NM	7.0	
Apr-07	NM	501	8.70	305	217	7.18	<0.05	<0.05	45.7	<0.05	8.3	NM	NM	NM	NM	NM	0.21	1.33	NM	NM	NM	NM	NM	
Average	NA	573	8.49	335	213	5.77	<0.05	<0.05	131	<0.05	13.9	<0.001	NA	NA	NA	NA	0.10	1.40	NA	<0.001	NA	NA	7.0	
Std. Dev.	NA	147	0.30	91.2	6.4	2.61	NA	NA	120	NA	7.8	NA	NA	NA	NA	NA	0.08	0.10	NA	NA	NA	NA	NA	

HISTORICAL SURFACE WATER QUALITY DATA: S-5

Parameter	CBOD ₅	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Ammonia	DOC	Phenols	TKN	Phosphorus	Boron	Zinc	Iron	Sodium	Potassium	Un-ionized Ammonia	Conductivity (field)	pH (field)	Temperature (field)	
PWQO	NV	NV	6.5-8.5	NV	NV	NV	NV	NV	500	NV	NV	0.0010	NV	0.02	0.2	0.03	0.3	NV	NV	0.02	NV	6.5-8.5	NA	
UNITS	mg/L	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	Unitless	°C
Nov-94	NM	744	NM	434	NM	4.0	NM	NM	NM	NM	9.8	0.0031	NM	NM	NM	NM	0.14	NM	NM	NM	NM	NM	NM	
Oct-95	NM	653	NM	289	NM	29.8	NM	NM	NM	NM	12.6	0.0142	NM	NM	NM	NM	1.09	NM	NM	NM	NM	NM	NM	
Dec-96	NM	372	NM	189	NM	5.6	NM	NM	NM	NM	7	<0.001	NM	NM	NM	NM	0.58	NM	NM	NM	NM	NM	NM	
Oct-97	NM	604	NM	311	NM	6.4	NM	NM	NM	NM	16	<0.001	NM	NM	NM	NM	0.04	NM	NM	NM	NM	NM	NM	
Oct-97 Dup	NM	608	NM	316	NM	6.4	NM	NM	NM	NM	11	<0.001	NM	NM	NM	NM	0.04	NM	NM	NM	NM	NM	NM	
Oct-98	NM	801	NM	443	NM	11.5	NM	NM	NM	NM	9	<0.001	NM	NM	NM	NM	0.04	NM	NM	NM	NM	NM	NM	
Nov-99	NM	530	NM	311	NM	6.2	NM	NM	NM	NM	22	<0.001	NM	NM	NM	NM	0.04	NM	NM	NM	NM	NM	NM	
Oct-00	NM	716	NM	419	NM	9.8	NM	NM	NM	NM	20	<0.001	NM	NM	NM	NM	0.26	NM	NM	NM	NM	NM	NM	
Nov-01	NM	472	NM	260	NM	7.4	NM	NM	NM	NM	25	0.002	NM	NM	NM	NM	0.11	NM	NM	NM	NM	NM	NM	
Dec-02	NM	528	NM	291	NM	7.5	NM	NM	NM	NM	13.3	<0.001	NM	NM	NM	NM	0.33	NM	NM	NM	NM	NM	NM	
Oct-03	NM	825	NM	461	NM	19.8	NM	NM	NM	NM	20	<0.001	NM	NM	NM	NM	0.30	NM	NM	NM	NM	NM	NM	
Nov-04	NM	1030	NM	657	NM	18.8	NM	NM	NM	NM	10	<0.001	NM	NM	NM	NM	2.77	NM	NM	NM	NM	NM	NM	
Nov-05	NM	578	NM	328	NM	9.5	NM	NM	NM	NM	19.5	<0.001	NM	NM	NM	NM	0.41	NM	NM	NM	NM	NM	NM	
Apr-06	NM	561	8.31	305	265	4.89	<0.05	<0.05	29.0	<0.05	9	NM	NM	NM	NM	NM	0.93	1.52	NM	NM	NM	NM	NM	
Oct-06	NM	665	8.37	400	203	8.09	<0.05	<0.05	193	<0.05	11.9	NM	NM	NM	NM	NM	0.32	1.60	NM	<0.0017	NM	NM	7.0	
Apr-07	NM	514	8.55	305	224	6.49	<0.05	<0.05	47.6	0.08	8.8	NM	NM	NM	NM	NM	0.22	1.35	NM	NM	NM	NM	NM	
Average	NA	638	8.41	357	231	10.1	<0.05	<0.05	89.9	0.13	14.0	0.0019	NA	NA	NA	NA	0.48	1.49	NA	NA	NA	NA	7.0	
Std. Dev.	NA	160	0.12	109	31.5	6.9	NA	NA	89.8	NA	5.6	0.0038	NA	NA	NA	NA	0.69	0.13	NA	NA	NA	NA	NA	

HISTORICAL SURFACE WATER QUALITY DATA: S-6

Parameter	CBOD ₅	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Ammonia	DOC	Phenols	TKN	Phosphorus	Boron	Zinc	Iron	Sodium	Potassium	Un-ionized Ammonia	Conductivity (field)	pH (field)	Temperature (field)
PWQO	NV	NV	6.5-8.5	NV	NV	NV	NV	NV	NV	NV	NV	0.0010	NV	0.02	0.2	0.03	0.3	NV	NV	0.02	NV	6.5-8.5	NA
UNITS	mg/L	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	Unitless	°C
Nov-94	NM	777	NM	440	NM	11.4	NM	NM	NM	NM	9.3	0.0056	NM	NM	NM	NM	0.64	NM	NM	NM	NM	NM	NM
Oct-95	NM	1006	NM	539	NM	35.2	NM	NM	NM	NM	8.8	<0.001	NM	NM	NM	NM	0.54	NM	NM	NM	NM	NM	NM
Dec-96	NM	707	NM	274	NM	10.0	NM	NM	NM	NM	3	0.0010	NM	NM	NM	NM	0.15	NM	NM	NM	NM	NM	NM
Dec-96 Dup	NM	708	NM	350	NM	9.8	NM	NM	NM	NM	3	<0.001	NM	NM	NM	NM	0.16	NM	NM	NM	NM	NM	NM
Oct-97	NM	967	NM	536	NM	26.0	NM	NM	NM	NM	10	<0.001	NM	NM	NM	NM	0.26	NM	NM	NM	NM	NM	NM
Nov-99	NM	1016	NM	552	NM	24.4	NM	NM	NM	NM	NM	<0.001	NM	NM	NM	NM	0.01	NM	NM	NM	NM	NM	NM
Nov-99 Dup	NM	1010	NM	542	NM	24.3	NM	NM	NM	NM	5	<0.001	NM	NM	NM	NM	0.01	NM	NM	NM	NM	NM	NM
Oct-00	NM	1089	NM	616	NM	30.6	NM	NM	NM	NM	25	<0.001	NM	NM	NM	NM	3.27	NM	NM	NM	NM	NM	NM
Oct-00 Dup	NM	1090	NM	605	NM	30.7	NM	NM	NM	NM	28	<0.001	NM	NM	NM	NM	2.05	NM	NM	NM	NM	NM	NM
Nov-01	NM	958	NM	669	NM	20.6	NM	NM	NM	NM	13	<0.001	NM	NM	NM	NM	0.49	NM	NM	NM	NM	NM	NM
Dec-02	NM	1060	NM	577	NM	22.9	NM	NM	NM	NM	7.1	<0.001	NM	NM	NM	NM	0.04	NM	NM	NM	NM	NM	NM
Nov-04	NM	1080	NM	581	NM	25.7	NM	NM	NM	NM	7.7	<0.001	NM	NM	NM	NM	0.06	NM	NM	NM	NM	NM	NM
Nov-05	NM	669	NM	338	NM	17.7	NM	NM	NM	NM	13.6	<0.001	NM	NM	NM	NM	0.03	NM	NM	NM	NM	NM	NM
Oct-06	NM	902	8.33	453	349	25.7	0.50	<0.05	176	<0.05	9.2	NM	NM	NM	NM	NM	0.33	17.7	NM	<0.0015	NM	NM	7.0
Apr-07	NM	707	8.53	398	328	5.37	1.04	<0.05	52.2	0.10	5.7	NM	NM	NM	NM	NM	0.26	8.12	NM	NM	NM	NM	NM
Nov-10	<5	1080	8.10	489	551	53.9	0.15	<0.05	56.9	16.3	14.6	<0.001	19.4	<0.05	0.29	0.064	0.67	NM	NM	0.2727	NM	NM	6.0
Apr-11	<5	954	8.14	407	424	29.9	1.08	<0.05	56.9	7.7	9.4	<0.001	10.3	0.06	0.18	0.013	3.82	NM	NM	0.0467	990	7.33	15.6
Nov-11	<5	871	8.25	441	430	50.8	0.49	<0.05	66.2	8.99	14.8	<0.001	10.6	0.04	0.22	0.021	1.44	NM	NM	0.0421	1012	7.49	7.5
Apr-12	<5	1090	8.23	446	516	47.6	<0.05	<0.05	35.2	11.9	10.9	0.0050	13.5	0.03	0.28	0.016	3.75	NM	NM	0.1400	1227	7.86	8.5
Nov-12	<5	881	8.21	352	254	67.2	0.21	<0.05	175	2.6	19.1	<0.001	5.37	0.08	0.35	0.040	0.41	NM	25.7	0.0315	899	7.98	5.4
Apr-13	<5	883	8.26	363	356	43.3	0.85	<0.25	42.7	4.68	11.8	<0.001	8.07	0.06	0.17	0.020	0.18	NM	17.1	0.1078	899	8.04	11.9
Nov-13	7	1140	8.25	461	405	92	0.85	<0.25	75.2	4.92	17.5	0.0020	5.91	<0.02	0.29	0.020	0.19	54	16.7	0.0524	1440	8.00	3.2
May-14	<5	935	8.06	380	422	42.4	<0.25	<0.25	18.7	2.79	12.7	<0.001	6.44	0.15	0.22	0.012	0.34	NM	17.5	0.0237	366	7.68	9.5
Oct-14	8	1050	8.16	373	380	85.4	0.6	<0.25	56.5	4.7	23.9	0.0030	7.02	0.13	0.37	0.033	0.45	62	21.9	0.0321	890	7.59	9.4
Apr-15	<5	836	8.14	316	335	48.8	0.4	<0.25	50.5	4.26	13.0	<0.001	5.23	0.05	0.18	0.008	0.08	NM	13.7	0.0009	845	6.30	2.9
Oct-15	<5	770	7.87	303	161	47.9	0.38	<0.25	169	<0.02	18.9	0.0030	1.19	0.11	0.11	0.118	0.25	NM	33.4	0.0001	479	7.58	7.5
Apr-16	<5	807	8.11	351	382	34.9	<0.25	<0.25	24.4	2.11	10.4	<0.001	3.40	<0.02	NM	NM	NM	NM	11.3	0.0052	362	7.20	7.9
Nov-16	6	1100	7.48	365	382	77.5	0.58	<0.25	92.4	4.06	33.9	<0.001	8.04	0.11	0.31	0.084	0.69	NM	28.8	0.0151	650	7.40	7.2
Apr-17	<5	985	8.23	384	403	53.3	2.45	<0.25	39.9	4.5	11.9	<0.001	5.13	<0.02	0.24	0.014	0.04	NM	17.5	0.0174	1180	7.40	7.7
Nov-17	<5	1260	8.05	451	385	131	2.19	<0.25	113	0.95	14.9	<0.001	2.64	0.04	0.53	0.020	0.20	74.5	22.3	0.0025	720	7.38	3.4
May-18	<2	730	8.04	310	300	27.0	1.01	0.035	42.0	0.55	9.8	<0.0010	1.60	<0.020	0.19	0.0057	<0.1	NM	NM	0.010	690	8.03	8.4
Nov-18	<5	1130	8.10	414	389	73.7	5.28	<0.25	120	1.90	15.3	0.002	4.08	0.02	0.55	0.015	0.03	NM	NM	0.002	383	7.10	0.30
Apr-19	<5	780	7.89	323	336	24.2	1.86	<0.25	69.7	1.25	9.6	0.001	2.55	0.03	0.25	0.146	0.02	26.6	11.3	0.004	449	7.52	2.42
Oct-19	<5	884	7.99	382	334	48.0	0.37	<0.25	102	0.13	14.6	0.003	1.14	0.03	0.43	0.012	0.10	42.3	13.6	0.001	721	7.64	10.0
Oct-20	<2	1000	8.19	486	390	63.1	0.79	<0.25	95.7	0.48	16.4	0.006	1.76	0.05	0.69	0.015	0.08	63.1	17.3	0.004	627	7.82	5.5
May-21	<2	827	8.18	325	286	41.6	1.23	<0.25	70.8	0.09	9.4	0.002	1.56	0.02	0.42	0.006	0.17	36.1	12.6	0.001	633	7.68	7.5
Apr-22	2.0	984	7.92	419	366	33.5	1.48	<0.05	118	1.76	15.2	0.008	4.64	<0.02	0.51	<0.020	0.10	35.8	15.7	0.002	702	6.76	9.2
Apr-23	<2	951	7.99	410	387	42.0	1.97	<0.05	39.7	1.80	13.7	0.003	2.93	0.04	0.39	<0.020	0.06	45.9	15.6	0.009	659	7.59	5.6
Apr-24	<2	921	8.05	351	381	31.3	1.48	<0.05	41.8	1.11	15.4	0.001	2.31	0.05	0.36	<0.020	0.20	34.3	12.5	0.036	838	8.16	10.3
Nov-24	<20	1000	7.81	414	431	81.4	0.65	<0.05	27.7	0.18	12.0	<0.001	0.40	<0.02	0.37	<0.020	2.29	66.2	13.2	0.005	1140	8.16	10.3
Average	3.02	940	8.09	430	373	42.3	1.04	<0.25	75.1	3.33	13.3	0.0015	5.41	0.047	0.328	0.034	0.63	43.6	17.8	0.035	783	7.57	7.3
Std. Dev.	2.27	142	0.20	98	75.0	25.9	1.07	NA	45.3	3.95	6.4	0.0018	4.43	0.040	0.141	0.039	1.02	19.8	6.10	0.060	285	0.44	3.3

HISTORICAL SURFACE WATER QUALITY DATA: S-6A

Parameter	CBOD ₅	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Ammonia	DOC	Phenols	TKN	Phosphorus	Boron	Zinc	Iron	Sodium	Potassium	Un-ionized Ammonia	Conductivity (field)	pH (field)	Temperature (field)
PWQO	NV	NV	6.5-8.5	NV	NV	NV	NV	NV	500	NV	NV	0.0010	NV	0.02	0.2	0.03	0.3	NV	NV	0.02	NV	6.5-8.5	NA
UNITS	mg/L	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	Unitless	°C
Nov-94	NM	810	NM	461	NM	10.6	NM	NM	NM	NM	9.3	0.0039	NM	NM	NM	NM	0.34	NM	NM	NM	NM	NM	NM
Oct-95	NM	688	NM	395	NM	7.8	NM	NM	NM	NM	12.8	0.0013	NM	NM	NM	NM	0.26	NM	NM	NM	NM	NM	NM
Oct-95 Dup	NM	687	NM	397	NM	8.0	NM	NM	NM	NM	12.4	0.0013	NM	NM	NM	NM	0.21	NM	NM	NM	NM	NM	NM
Dec-96	NM	435	NM	246	NM	5.4	NM	NM	NM	NM	7	0.0010	NM	NM	NM	NM	0.21	NM	NM	NM	NM	NM	NM
Dec-96 Dup	NM	379	NM	202	NM	3.2	NM	NM	NM	NM	9	<0.001	NM	NM	NM	NM	0.18	NM	NM	NM	NM	NM	NM
Oct-97	NM	657	NM	344	NM	6.7	NM	NM	NM	NM	11	<0.001	NM	NM	NM	NM	0.16	NM	NM	NM	NM	NM	NM
Oct-98	NM	760	NM	397	NM	14.2	NM	NM	NM	NM	8	<0.001	NM	NM	NM	NM	0.24	NM	NM	NM	NM	NM	NM
Nov-99	NM	549	NM	313	NM	6.1	NM	NM	NM	NM	16	<0.001	NM	NM	NM	NM	0.05	NM	NM	NM	NM	NM	NM
Oct-00	NM	795	NM	468	NM	12.2	NM	NM	NM	NM	24	<0.001	NM	NM	NM	NM	0.91	NM	NM	NM	NM	NM	NM
Nov-01	NM	487	NM	275	NM	7.7	NM	NM	NM	NM	22	<0.001	NM	NM	NM	NM	0.19	NM	NM	NM	NM	NM	NM
Dec-02	NM	582	NM	284	NM	8.0	NM	NM	NM	NM	13.2	<0.001	NM	NM	NM	NM	0.17	NM	NM	NM	NM	NM	NM
Oct-03	NM	809	NM	441	NM	19.3	NM	NM	NM	NM	22.0	<0.001	NM	NM	NM	NM	0.13	NM	NM	NM	NM	NM	NM
Nov-04	NM	936	NM	547	NM	20.5	NM	NM	NM	NM	8.2	<0.001	NM	NM	NM	NM	1.79	NM	NM	NM	NM	NM	NM
Nov-05	NM	534	NM	277	NM	13.7	NM	NM	NM	NM	16.9	<0.001	NM	NM	NM	NM	1.05	NM	NM	NM	NM	NM	NM
Nov-05 Dup	NM	524	NM	281	NM	13.2	NM	NM	NM	NM	15.8	<0.001	NM	NM	NM	NM	0.18	NM	NM	NM	NM	NM	NM
Apr-06	NM	639	8.39	336	307	10.3	0.14	<0.05	31.8	0.35	9.0	NM	NM	NM	NM	NM	1.01	7.70	NM	NM	NM	NM	NM
Oct-06	NM	705	8.34	386	226	16.7	0.37	<0.05	324	0.10	11.2	NM	NM	NM	NM	NM	0.31	7.38	NM	0.0031	NM	NM	7.0
Apr-07	NM	716	8.50	414	341	4.86	0.76	<0.05	49.9	0.46	7.4	NM	NM	NM	NM	NM	0.26	7.45	NM	NM	NM	NM	NM
Nov-07	NM	907	8.27	475	276	25.9	0.31	<0.05	211	0.19	32.8	NM	NM	NM	NM	NM	0.10	15.9	NM	0.0045	NM	NM	5.5
Apr-08	NM	534	8.29	284	250	11.1	0.29	<0.05	36.3	0.43	8.8	NM	NM	NM	NM	NM	0.31	7.24	NM	0.0156	NM	NM	10.5
Apr-09	NM	632	8.27	357	233	9.18	0.56	<0.05	100	0.05	11.0	NM	NM	NM	NM	NM	0.44	7.79	NM	0.0012	NM	NM	6.0
Nov-09	NM	891	8.21	489	378	31.1	0.76	<0.05	75.4	0.18	13.9	NM	NM	NM	NM	NM	0.15	19.1	NM	0.0039	NM	NM	6.0
Apr-10	NM	514	8.29	269	230	14.4	0.36	<0.05	37.2	0.95	12.5	NM	NM	NM	NM	NM	0.37	7.92	4.0	0.0332	NM	NM	10.0
Nov-10	NM	1050	8.22	469	521	56.4	0.99	<0.05	57.0	18.1	14.0	NM	NM	NM	NM	NM	0.35	44.1	24.8	0.5014	NM	NM	9.0
Apr-11	<5	920	8.20	430	412	29.8	0.75	<0.05	58.7	5.72	8.9	<0.001	8.84	<0.05	0.18	0.008	0.63	NM	NM	0.0397	920	7.46	13.4
Nov-11	NM	741	8.23	380	354	36.5	0.44	<0.05	67.7	5.53	11.9	NM	NM	NM	NM	NM	0.39	25.7	11.6	0.0588	828	7.84	7.7
Apr-12	<5	774	8.18	357	331	29.3	0.23	<0.05	56.9	3.95	9.6	0.003	5.14	0.03	0.088	0.007	0.27	NM	NM	0.0479	1128	7.97	5.7
Nov-12	<5	709	8.21	357	199	31.8	0.21	<0.05	189	0.17	13.8	<0.001	1.13	<0.02	0.090	0.013	0.05	NM	7.73	0.0012	804	7.75	5.2
Apr-13	<5	813	8.28	331	324	40.0	0.77	<0.25	40.7	3.74	10.3	<0.001	6.09	0.03	0.13	0.017	0.11	NM	13.4	0.0807	748	8.00	12.2
Nov-13	<5	672	8.28	305	233	23.1	<0.25	<0.25	83.6	<0.02	11.8	<0.001	0.75	<0.02	<0.010	<0.005	<0.01	13.7	1.11	<0.0002	786	8.03	3.4
May-14	<5	821	8.05	348	347	36.7	<0.25	<0.25	32.6	2.78	12.3	<0.001	5.34	0.09	0.15	<0.005	2.92	NM	12.3	0.0263	339	7.64	12.1
Oct-14	<5	838	8.21	316	319	57.6	<0.25	<0.25	51.0	2.97	17.9	0.002	4.82	0.10	0.19	0.022	0.23	40.4	13.8	0.0226	452	7.63	9.6
Apr-15	<5	909	8.20	345	375	50.5	0.89	<0.25	51.9	3.40	13.3	<0.001	5.46	0.03	0.20	0.009	0.03	NM	15.8	0.0075	919	7.31	3.3
Apr-16	<5	749	8.08	337	338	33.5	0.6	<0.25	32.4	3.44	11.3	<0.001	4.80	<0.02	NM	NM	NM	NM	10.2	0.0088	630	7.21	8.0
Nov-16	<5	1040	7.56	343	368	74.2	<0.25	<0.25	89.9	2.27	27.3	<0.001	5.22	0.03	0.29	0.012	0.07	NM	28.0	0.0136	677	7.58	8.0
Nov-17	<5	1230	8.13	451	370	122	2.11	<0.25	127	0.45	13.9	<0.001	2.17	0.03	0.56	0.007	<0.01	73.3	23.4	0.0034	773	7.75	5.9
May-18	<2	820	8.18	340	350	30	1.16	0.029	38	1.9	11	<0.0010	3	<0.040	0.24	0.011	<0.1	NM	NM	0.06	655	8.26	9.4
Nov-18	<5	1120	8.09	411	376	76	5.71	<0.25	136	1.91	15	0.003	3.64	<0.02	0.63	0.014	0.01	NM	NM	0.002	563	7.21	-0.5
Apr-19	<5	469	7.82	199	221	16	0.59	<0.05	18.1	0.30	8.4	<0.001	0.76	<0.02	0.076	0.005	0.02	14.2	3.25	0.001	359	7.49	2.3
Oct-20	<2	965	8.19	418	376	58.9	0.96	<0.25	95.1	0.19	15.2	0.004	1.41	0.04	0.60	0.007	0.055	51.9	13.9	0.002	604	7.93	6.1
May-21	<2	863	8.20	336	330	40.1	1.74	<0.25	49.1	1.51	10.2	0.003	3.81	0.02	0.37	0.025	0.48	34.8	13.9	0.010	652	7.65	7.5
Apr-22	<2	956	7.97	430	359	32.2	1.63	<0.05	116	1.48	15.0	0.008	3.99	<0.02	0.46	<0.020	0.071	35.6	15.5	0.001	368	6.70	10.1
Nov-23	<2	1040	7.94	428	526	54.5	2.03	<0.05	32.0	0.79	10.4	0.006	1.90	<0.02	0.45	<0.020	0.17	45.2	13.2	0.003	586	7.69	0.0
Apr-24	<2	825	8.06	321	374	28.7	1.60	<0.05	38.0	0.82	15.0	0.001	1.78	0.04	0.36	<0.020	0.13	35.8	11.6	0.031	560	8.24	9.9
Nov-24	<20	977	7.85	409	438	80.2	0.51	<0.05	29.6	<0.02	11.3	<0.001	0.46	0.04	0.36	<0.020	1.15	63.1	13.2	<0.001	990	8.24	9.9
Average	<5	766	8.16	364	336	29.3	0.90	<0.25	78.5	2.14	13.4	0.0014	3.53	0.030	0.302	0.011	0.37	27.9	13.2	0.0378	683	7.69	7.3
Std. Dev.	NA	193	0.19	76.9	80.2	24.9	1.08	NA	65.8	3.44	5.28	0.00176	2.22	0.025	0.181	0.006	0.53	20.3	6.85	0.097	211	0.39	3.5

HISTORICAL SURFACE WATER QUALITY DATA: S-7

Parameter	CBOD ₅	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Ammonia	DOC	Phenols	TKN	Phosphorus	Boron	Zinc	Iron	Sodium	Potassium	Un-ionized Ammonia	Conductivity (field)	pH (field)	Temperature (field)	
PWQO	NV	NV	6.5-8.5	NV	NV	NV	NV	NV	500	NV	NV	0.0010	NV	0.02	0.2	0.03	0.3	NV	NV	0.02	NV	6.5-8.5	NA	
UNITS	mg/L	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	Unitless	°C
Nov-94	NM	870	NM	523	NM	9.9	NM	NM	NM	NM	9.0	0.0070	NM	NM	NM	NM	0.18	NM	NM	NM	NM	NM	NM	
Oct-95	NM	575	NM	337	NM	4.5	NM	NM	NM	NM	13.9	0.0063	NM	NM	NM	NM	0.58	NM	NM	NM	NM	NM	NM	
Dec-96	NM	379	NM	202	NM	3.2	NM	NM	NM	NM	9	<0.001	NM	NM	NM	NM	0.18	NM	NM	NM	NM	NM	NM	
Oct-97	NM	604	NM	344	NM	3.3	NM	NM	NM	NM	21	<0.001	NM	NM	NM	NM	0.39	NM	NM	NM	NM	NM	NM	
Oct-98	NM	1568	NM	830	NM	2.0	NM	NM	NM	NM	10	<0.001	NM	NM	NM	NM	0.13	NM	NM	NM	NM	NM	NM	
Oct-98 Dup	NM	1605	NM	888	NM	2.0	NM	NM	NM	NM	17	<0.001	NM	NM	NM	NM	0.12	NM	NM	NM	NM	NM	NM	
Nov-99	NM	579	NM	330	NM	6.0	NM	NM	NM	NM	17	<0.001	NM	NM	NM	NM	0.04	NM	NM	NM	NM	NM	NM	
Oct-00	NM	856	NM	511	NM	14.0	NM	NM	NM	NM	17	<0.001	NM	NM	NM	NM	0.16	NM	NM	NM	NM	NM	NM	
Nov-01	NM	419	NM	217	NM	2.6	NM	NM	NM	NM	17	<0.001	NM	NM	NM	NM	0.15	NM	NM	NM	NM	NM	NM	
Nov-01 Dup	NM	420	NM	236	NM	2.7	NM	NM	NM	NM	16	<0.001	NM	NM	NM	NM	0.15	NM	NM	NM	NM	NM	NM	
Dec-02	NM	580	NM	315	NM	7.9	NM	NM	NM	NM	12.5	<0.001	NM	NM	NM	NM	0.09	NM	NM	NM	NM	NM	NM	
Dec-02 Dup	NM	573	NM	308	NM	7.9	NM	NM	NM	NM	131	<0.001	NM	NM	NM	NM	0.09	NM	NM	NM	NM	NM	NM	
Oct-03	NM	594	NM	338	NM	8.9	NM	NM	NM	NM	21.0	<0.001	NM	NM	NM	NM	0.20	NM	NM	NM	NM	NM	NM	
Nov-04	NM	689	NM	391	NM	9.9	NM	NM	NM	NM	7.5	<0.001	NM	NM	NM	NM	0.39	NM	NM	NM	NM	NM	NM	
Nov-04 Dup	NM	685	NM	404	NM	9.7	NM	NM	NM	NM	7.6	<0.001	NM	NM	NM	NM	0.80	NM	NM	NM	NM	NM	NM	
Nov-05	NM	458	NM	242	NM	5.6	NM	NM	NM	NM	21.2	<0.001	NM	NM	NM	NM	0.21	NM	NM	NM	NM	NM	NM	
Apr-06	NM	319	8.51	175	160	1.62	<0.05	<0.05	3.11	<0.05	11.0	NM	NM	NM	NM	NM	0.52	1.15	NM	NM	NM	NM	NM	
Oct-06	NM	341	8.44	197	148	1.80	<0.05	<0.05	45.0	<0.05	22.1	NM	NM	NM	NM	NM	0.19	1.09	NM	<0.0019	NM	NM	7.0	
Apr-07	NM	296	8.38	176	142	1.44	<0.05	<0.05	11.3	<0.05	11.3	NM	NM	NM	NM	NM	0.25	0.81	NM	NM	NM	NM	NM	
Nov-07	NM	409	8.37	224	152	2.62	<0.05	<0.05	61.5	0.16	23.1	NM	NM	NM	NM	NM	<0.005	0.49	NM	0.0051	NM	NM	6.5	
Apr-08	NM	278	8.24	155	142	2.34	0.07	<0.05	9.0	<0.05	10.6	NM	NM	NM	NM	NM	0.02	0.99	NM	<0.0016	NM	NM	10.0	
Apr-09	NM	263	8.23	155	134	1.61	0.07	<0.05	5.18	<0.05	11.4	NM	NM	NM	NM	NM	0.51	1.08	NM	<0.0010	NM	NM	5.0	
Nov-09	NM	380	8.41	238	199	1.45	<0.05	<0.05	11.1	<0.05	20.9	NM	NM	NM	NM	NM	0.08	1.33	NM	<0.0017	NM	NM	6.0	
Apr-10	NM	323	8.30	187	173	1.90	<0.05	<0.05	7.55	<0.02	15.0	NM	NM	NM	NM	NM	0.04	1.33	0.83	<0.0006	NM	NM	8.0	
Nov-10	NM	397	8.35	258	219	3.46	<0.05	<0.05	36	<0.02	23.2	NM	NM	NM	NM	NM	<0.01	1.46	0.39	<0.0006	NM	NM	6.0	
Average	NA	578	8.36	327	163	4.73	<0.05	<0.05	21.1	<0.05	19.9	0.0013	NA	NA	NA	NA	0.22	1.08	0.61	<0.005	NA	NA	6.9	
Std. Dev.	NA	347	0.09	189	28.7	3.54	NA	NA	21.0	NA	23.7	0.0021	NA	NA	NA	NA	0.20	0.30	0.31	NA	NA	NA	1.6	

HISTORICAL SURFACE WATER QUALITY DATA: S-8

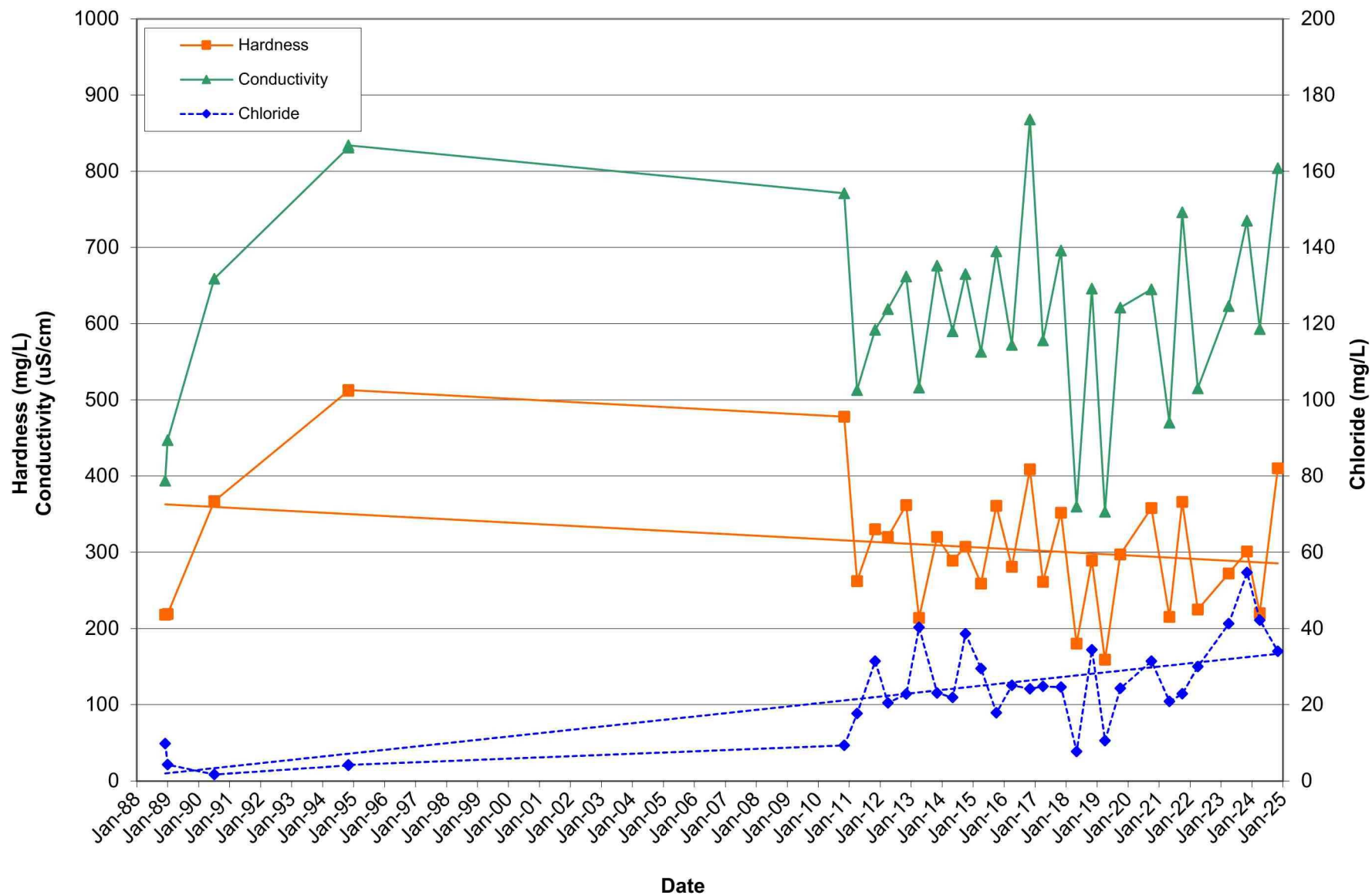
Parameter	CBOD ₅	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Ammonia	DOC	Phenols	TKN	Phosphorus	Boron	Zinc	Iron	Sodium	Potassium	Un-ionized Ammonia	Conductivity (field)	pH (field)	Temperature (field)	
PWQO	NV	NV	6.5-8.5	NV	NV	NV	NV	NV	500	NV	NV	0.0010	NV	0.02	0.2	0.03	0.3	NV	NV	0.02	NV	6.5-8.5	NA	
UNITS	mg/L	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	Unitless	°C
Nov-94	NM	772	NM	465	NM	7.0	NM	NM	NM	NM	8.8	0.0047	NM	NM	NM	NM	0.12	NM	NM	NM	NM	NM	NM	
Oct-95	NM	642	NM	375	NM	6.4	NM	NM	NM	NM	12	0.0129	NM	NM	NM	NM	0.28	NM	NM	NM	NM	NM	NM	
Dec-96	NM	389	NM	215	NM	4.0	NM	NM	NM	NM	9	<0.001	NM	NM	NM	NM	0.39	NM	NM	NM	NM	NM	NM	
Oct-97	NM	651	NM	364	NM	6.5	NM	NM	NM	NM	13	<0.001	NM	NM	NM	NM	0.04	NM	NM	NM	NM	NM	NM	
Oct-98	NM	1376	NM	754	NM	1.4	NM	NM	NM	NM	11	<0.001	NM	NM	NM	NM	0.05	NM	NM	NM	NM	NM	NM	
Nov-99	NM	540	NM	308	NM	4.6	NM	NM	NM	NM	16	<0.001	NM	NM	NM	NM	0.04	NM	NM	NM	NM	NM	NM	
Oct-00	NM	785	NM	457	NM	7.5	NM	NM	NM	NM	13	<0.001	NM	NM	NM	NM	0.03	NM	NM	NM	NM	NM	NM	
Nov-01	NM	502	NM	283	NM	6.8	NM	NM	NM	NM	23	<0.001	NM	NM	NM	NM	0.07	NM	NM	NM	NM	NM	NM	
Dec-02	NM	561	NM	315	NM	6.2	NM	NM	NM	NM	11.2	<0.001	NM	NM	NM	NM	0.07	NM	NM	NM	NM	NM	NM	
Oct-03	NM	639	NM	346	NM	10.8	NM	NM	NM	NM	18.0	<0.001	NM	NM	NM	NM	0.04	NM	NM	NM	NM	NM	NM	
Nov-04	NM	667	NM	383	NM	9.4	NM	NM	NM	NM	6.9	<0.001	NM	NM	NM	NM	0.07	NM	NM	NM	NM	NM	NM	
Nov-05	NM	447	NM	254	NM	4.3	NM	NM	NM	NM	23.4	<0.001	NM	NM	NM	NM	0.37	NM	NM	NM	NM	NM	NM	
Apr-06	NM	329	8.62	185	167	1.86	<0.05	<0.05	4.46	<0.05	10	NM	NM	NM	NM	NM	0.53	1.35	NM	NM	NM	NM	NM	
Oct-06	NM	387	8.41	218	156	3.02	<0.05	<0.05	56.1	<0.05	20.8	NM	NM	NM	NM	NM	0.18	1.72	NM	<0.0018	NM	NM	7.0	
Apr-07	NM	304	8.71	178	144	1.89	<0.05	<0.05	12.8	0.18	11.8	NM	NM	NM	NM	NM	0.13	1.07	NM	NM	NM	NM	NM	
Nov-07	NM	499	8.26	271	167	4.34	0.06	<0.05	92.6	0.11	20.4	NM	NM	NM	NM	NM	<0.005	1.21	NM	0.0024	NM	NM	5.0	
Apr-08	NM	286	8.33	157	147	2.25	<0.05	<0.05	10.0	<0.05	10.3	NM	NM	NM	NM	NM	0.03	1.17	NM	<0.0015	NM	NM	7.0	
Oct-08	NM	630	8.20	352	254	8.48	<0.05	<0.05	57.4	<0.05	8.5	NM	NM	NM	NM	NM	0.04	6.23	NM	<0.0010	NM	NM	6.0	
Apr-09	NM	275	8.29	167	139	1.77	<0.05	<0.05	6.02	<0.02	10.2	NM	NM	NM	NM	NM	0.07	1.04	NM	<0.0004	NM	NM	4.0	
Nov-09	NM	431	8.16	253	226	3.06	<0.05	<0.05	17.5	<0.05	19.8	NM	NM	NM	NM	NM	0.14	2.45	NM	<0.0009	NM	NM	4.5	
Apr-10	NM	397	8.30	217	206	4.17	0.11	<0.05	13.7	0.45	13.3	NM	NM	NM	NM	NM	0.02	3.34	2.15	0.0138	NM	NM	8.0	
Nov-10	NM	465	8.18	285	223	6.82	0.87	<0.05	51.6	0.09	20.4	NM	NM	NM	NM	NM	0.04	4.23	2.04	0.0018	NM	NM	6.0	
Nov-11	NM	366	8.19	241	207	7.31	0.18	<0.05	28.8	0.16	16.5	NM	NM	NM	NM	NM	0.03	4.10	1.73	0.0015	433	7.81	7.1	
Apr-12	<5	416	8.02	223	208	6.51	1.08	<0.05	9.67	<0.02	10.7	0.0010	0.70	0.03	0.019	0.172	0.04	NM	NM	<0.0002	426	7.83	5.3	
Nov-12	<5	609	8.31	319	186	22.4	0.44	<0.05	149	0.02	13.0	<0.001	0.84	<0.02	0.066	0.006	0.03	NM	5.76	0.0001	657	7.73	5.5	
Apr-13	<5	335	8.13	171	151	6.2	0.07	<0.05	14.9	0.04	9.5	<0.001	0.71	<0.02	<0.010	<0.005	<0.01	NM	0.85	0.0009	320	8.15	8.0	
Nov-13	<5	432	8.28	209	183	6.57	0.14	<0.10	32.6	0.11	18.5	0.0010	0.92	<0.02	0.016	<0.005	0.01	4.13	1.24	0.0014	434	8.08	3.0	
May-14	<5	358	8.11	189	177	4.2	0.05	<0.05	6.57	0.21	12.8	<0.001	0.95	<0.02	0.014	<0.005	0.02	NM	0.9	0.0025	144	7.83	9.3	
Oct-14	<5	446	8.22	236	230	7.01	<0.05	<0.05	8.10	0.06	18.7	<0.001	0.78	0.06	0.019	<0.005	0.06	4.53	1.93	0.0004	408	7.58	8.6	
Apr-15	<5	357	8.22	184	181	5.48	0.06	<0.05	7.78	0.03	10.0	<0.001	0.52	<0.02	0.011	<0.005	0.01	NM	1.12	0.00001	367	6.45	1.2	
Oct-15	<5	921	7.94	493	142	51.3	1.22	<0.25	285	<0.02	18.1	0.002	0.97	0.03	<0.010	<0.005	<0.01	NM	3.64	0.00001	631	6.54	9.1	
Apr-16	<5	317	7.90	168	161	3.66	0.06	<0.05	10.8	<0.02	11.5	<0.001	1.10	<0.02	NM	NM	<0.01	NM	0.71	0.00004	210	7.10	6.5	
Nov-16	<5	690	7.51	309	277	20.9	<0.25	<0.25	86.0	<0.02	16.2	<0.001	0.70	<0.02	0.023	0.005	<0.01	NM	4.19	0.00010	450	7.51	7.6	
Apr-17	<5	363	8.02	187	175	4.17	<0.05	<0.05	11.8	<0.02	12.7	<0.001	0.49	<0.02	0.019	<0.005	0.02	NM	0.95	0.00012	393	7.57	8.0	
Nov-17	<5	516	8.02	272	234	9.65	<0.10	<0.10	37.2	<0.02	19.0	<0.001	0.82	0.02	0.034	0.007	<0.01	7.08	1.72	0.00017	305	7.87	4.4	
May-18	2	260	8.16	130	140	<1.0	<0.10	<0.010	<1.0	<0.050	3.4	<0.0010	0.21	<0.020	<0.01	<0.005	0.13	NM	NM	<0.001	201	7.78	13.6	
Nov-18	<5	348	7.78	166	189	1.77	0.13	<0.05	10.3	<0.02	6.2	<0.001	0.38	0.11	0.027	0.009	1.71	NM	NM	<0.001	176	7.63	-0.4	
Apr-19	<5	309	7.86	150	166	3.31	0.08	<0.05	4.52	0.02	7.9	<0.001	0.21	<0.02	0.014	<0.005	<0.01	2.55	0.98	<0.001	159	7.65	0.6	
Oct-19	<5	451	7.87	240	228	7.44	<0.05	<0.05	19.6	<0.02	21.6	0.001	0.68	0.03	0.042	0.016	0.01	5.57	1.62	<0.001	241	7.87	10.2	
Oct-20	<2	489	8.13	294	258	7.37	<0.05	<0.05	17.3	<0.02	20.7	<0.001	0.87	0.07	0.036	<0.005	0.34	6.11	2.12	<0.001	299	7.90	5.5	
May-21	<2	331	8.20	170	170	0.70	<0.05	<0.05	0.46	<0.02	3.7	0.001	0.35	<0.02	0.010	<0.005	0.12	0.87	1.94	<0.001	332	7.93	9.5	
Oct-21	<2	567	8.01	311	282	3.87	<0.05	<0.05	50.8	<0.02	40.4	0.026	1.22	<0.02	0.024	<0.020	0.29	NM	NM	<0.001	466	7.90	16.9	
Apr-22	<2	378	7.96	207	191	4.93	0.09	<0.05	7.70	<0.02	13.5	0.001	0.55	<0.02	0.028	<0.020	0.098	3.81	2.18	<0.001	183	6.38	8.5	
Sep-22	2.0	385	7.98	189	173	5.44	<0.05	<0.05	7.67	<0.02	15.8	0.006	0.43	<0.02	0.015	<0.020	0.092	4.71	1.10	<0.001	289	6.96	15.8	
Apr-23	<2	424	8.06	233	202	5.73	0.08	<0.05	6.89	<0.02	12.3	<0.001	0.30	<0.02	0.033	<0.020	0.082	4.56	1.75	<0.001	214	7.74	6.4	
Nov-23	2.0	484	7.93	242	285	4.95	0.14	<0.05	8.65	<0.02	8.8	0.003	0.27	0.04	0.033	<0.020	0.24	2.51	0.64	<0.001	190	7.74	0.0	
Apr-24	<2	363	8.15	193	214	4.31	0.05	<0.05	2.98	0.03	17.1	<0.001	0.20	0.04	0.031	<0.020	0.068	4.16	1.01	0.0015	349	8.34	10.9	
Nov-24	<																							

HISTORICAL SURFACE WATER QUALITY DATA: S-9

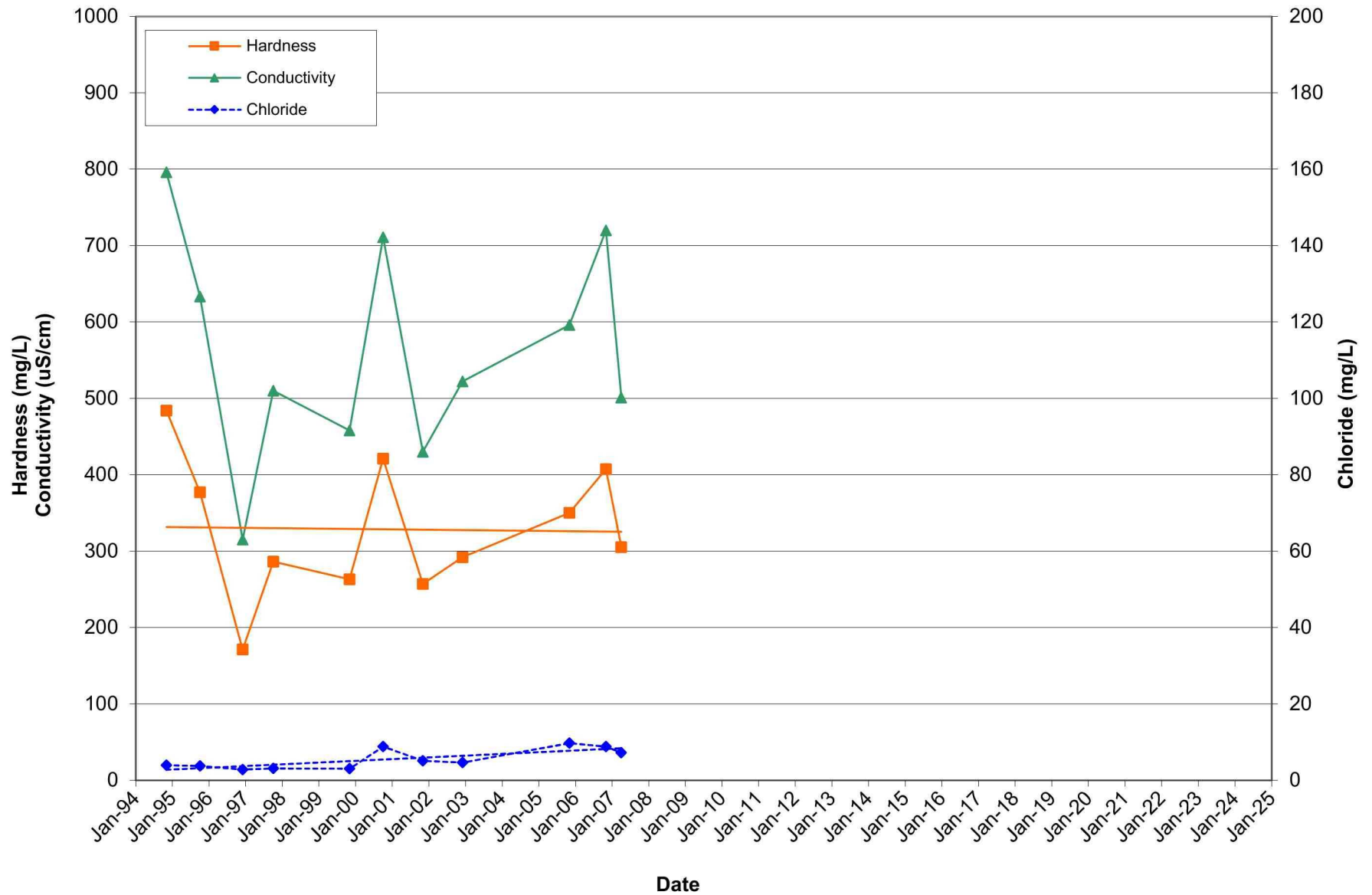
Parameter	CBOD ₅	Conductivity	pH	Hardness	Alkalinity	Chloride	Nitrate	Nitrite	Sulphate	Ammonia	DOC	Phenols	TKN	Phosphorus	Boron	Zinc	Iron	Sodium	Potassium	Un-ionized Ammonia	Conductivity (field)	pH (field)	Temperature (field)
PWQO	NV	NV	6.5-8.5	NV	NV	NV	NV	NV	NV	NV	NV	0.0010	NV	0.02	0.2	0.03	0.3	NV	NV	0.02	NV	6.5-8.5	NA
UNITS	mg/L	uS/cm	Unitless	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	Unitless	°C
Nov-94	NM	587	NM	335	NM	6.4	NM	NM	NM	NM	8.2	0.0034	NM	NM	NM	NM	0.24	NM	NM	NM	NM	NM	NM
Oct-95	NM	571	NM	323	NM	7.4	NM	NM	NM	NM	10.4	0.0081	NM	NM	NM	NM	0.36	NM	NM	NM	NM	NM	NM
Dec-96	NM	410	NM	226	NM	4.1	NM	NM	NM	NM	8	<0.001	NM	NM	NM	NM	0.57	NM	NM	NM	NM	NM	NM
Oct-97	NM	509	NM	264	NM	6.7	NM	NM	NM	NM	15	<0.001	NM	NM	NM	NM	0.27	NM	NM	NM	NM	NM	NM
Oct-98	NM	454	NM	236	NM	1.5	NM	NM	NM	NM	16	<0.001	NM	NM	NM	NM	0.57	NM	NM	NM	NM	NM	NM
Nov-99	NM	497	NM	264	NM	4.8	NM	NM	NM	NM	14	<0.001	NM	NM	NM	NM	0.04	NM	NM	NM	NM	NM	NM
Oct-00	NM	490	NM	265	NM	7.3	NM	NM	NM	NM	12	<0.001	NM	NM	NM	NM	1.20	NM	NM	NM	NM	NM	NM
Nov-01	NM	448	NM	232	NM	5.3	NM	NM	NM	NM	19	<0.001	NM	NM	NM	NM	0.08	NM	NM	NM	NM	NM	NM
Dec-02	NM	579	NM	315	NM	5.9	NM	NM	NM	NM	11.5	<0.001	NM	NM	NM	NM	0.21	NM	NM	NM	NM	NM	NM
Oct-03	NM	496	NM	240	NM	11.8	NM	NM	NM	NM	17	<0.001	NM	NM	NM	NM	0.10	NM	NM	NM	NM	NM	NM
Oct-03 Dup	NM	490	NM	240	NM	11.9	NM	NM	NM	NM	17	<0.001	NM	NM	NM	NM	0.13	NM	NM	NM	NM	NM	NM
Nov-04	NM	453	NM	239	NM	7.2	NM	NM	NM	NM	8.2	<0.001	NM	NM	NM	NM	0.07	NM	NM	NM	NM	NM	NM
Nov-05	NM	457	NM	265	NM	4.8	NM	NM	NM	NM	22.2	<0.001	NM	NM	NM	NM	0.32	NM	NM	NM	NM	NM	NM
Apr-06	NM	328	8.44	179	168	1.81	<0.05	<0.05	4.33	<0.05	11	NM	NM	NM	NM	NM	0.51	1.35	NM	NM	NM	NM	NM
Oct-06	NM	391	8.37	221	161	3.48	<0.05	<0.05	56.5	<0.05	19.7	NM	NM	NM	NM	NM	0.18	1.95	NM	<0.0017	NM	NM	7.0
Apr-07	NM	314	8.47	183	151	1.82	<0.05	<0.05	12.0	0.10	11.1	NM	NM	NM	NM	NM	0.13	1.08	NM	NM	NM	NM	NM
Nov-07	NM	461	8.31	255	255	3.88	<0.05	<0.05	80.8	0.12	22.0	NM	NM	NM	NM	NM	<0.005	1.23	NM	0.0029	NM	NM	4.5
Apr-08	NM	288	8.19	155	141	2.17	0.05	<0.05	10.1	<0.05	10.6	NM	NM	NM	NM	NM	0.04	1.17	NM	<0.0009	NM	NM	5.0
Oct-08	NM	548	8.21	292	194	9.12	<0.05	<0.05	63.7	<0.05	12.6	NM	NM	NM	NM	NM	0.04	7.24	NM	<0.0013	NM	NM	8.5
Apr-09	NM	280	8.29	168	142	1.56	<0.05	<0.05	6.18	<0.02	10.2	NM	NM	NM	NM	NM	0.03	1.02	NM	<0.0005	NM	NM	5.0
Nov-09	NM	432	8.19	260	214	3.34	<0.05	<0.05	18.9	<0.05	20.3	NM	NM	NM	NM	NM	0.06	2.68	NM	<0.0010	NM	NM	6.0
Apr-10	NM	396	8.37	219	206	4.10	0.1	<0.05	13.6	0.3	13.1	NM	NM	NM	NM	NM	0.01	3.30	2.16	0.0108	NM	NM	8.0
Nov-10	<5	509	8.29	278	230	12.1	0.37	<0.05	58.5	<0.02	17.2	<0.001	0.96	<0.05	0.016	<0.005	<0.01	NM	NM	<0.0004	NM	NM	4.0
Apr-11	<5	370	8.16	199	175	4.47	0.16	<0.05	13.6	0.25	10.5	<0.001	1.09	<0.05	0.013	0.009	0.10	NM	NM	0.0014	405	7.57	7.3
Nov-11	<5	363	8.17	234	195	7.08	<0.05	<0.05	27.5	0.23	17.6	<0.001	1.09	<0.02	0.017	<0.005	<0.01	NM	NM	0.0019	426	7.76	7.1
Apr-12	<5	400	8.10	220	206	5.48	0.23	<0.05	8.74	<0.02	10.9	0.0010	0.82	0.03	0.017	<0.005	0.04	NM	NM	<0.0004	410	8.08	7.3
Nov-12	<5	586	8.29	305	186	22.3	<0.05	<0.05	133	0.04	12.1	<0.001	0.70	<0.02	0.055	0.006	0.03	NM	5.93	0.0007	628	8.14	5.1
Apr-13	<5	333	7.97	168	152	6.69	0.1	<0.05	14.4	0.09	8.5	<0.001	0.75	<0.02	<0.010	<0.005	<0.01	NM	1.01	0.0012	319	8.03	5.2
Nov-13	<5	422	8.31	205	180	7.01	0.11	<0.10	36.1	0.08	17.6	0.0010	0.88	<0.02	0.017	0.005	<0.01	4.16	1.31	0.0014	418	8.22	3.1
May-14	<5	348	8.16	181	169	4.20	<0.05	<0.05	6.87	0.15	12.2	<0.001	0.76	<0.02	0.012	<0.005	0.02	NM	0.96	0.0033	140	8.02	11.9
Oct-14	<5	458	8.26	241	230	8.42	<0.05	<0.05	10.4	0.04	16.2	<0.001	0.62	0.07	0.024	<0.005	0.06	5.26	2.15	0.0003	419	7.72	8.7
Apr-15	<5	361	8.12	187	184	5.36	<0.05	<0.05	6.62	<0.02	9.8	<0.001	0.46	<0.02	0.012	<0.005	0.02	NM	1.09	0.00001	364	6.70	3.3
Oct-15	<5	441	8.17	233	211	8.83	<0.10	<0.10	16.4	<0.02	18.1	<0.001	0.86	<0.02	0.017	<0.005	<0.01	NM	0.87	0.00001	287	6.23	7.1
Apr-16	<5	312	8.05	163	156	3.68	<0.05	<0.05	11.7	<0.02	11.7	<0.001	1.20	<0.02	NM	NM	NM	NM	0.76	0.00005	97	7.14	8.5
Nov-16	<5	534	7.44	247	235	14.4	<0.05	<0.05	49.0	<0.02	18.3	<0.001	0.88	<0.02	0.025	<0.005	<0.01	NM	2.88	0.00008	461	7.38	7.9
Apr-17	<5	354	8.20	189	168	3.99	<0.05	<0.05	12.4	<0.02	12.3	<0.001	0.51	<0.02	0.015	<0.005	0.04	NM	1.18	0.00021	385	7.75	10.5
Nov-17	<5	517	8.04	265	235	9.71	<0.10	<0.10	37.1	<0.02	19.2	<0.001	1.04	0.03	0.038	<0.005	<0.01	7.03	1.71	0.00027	323	8.04	5.2
May-18	<2	300	8.12	160	160	2.80	<0.10	<0.010	<1.0	<0.050	11.0	<0.0010	0.39	<0.020	0.015	<0.005	<0.1	NM	NM	<0.001	195	7.97	7.6
Nov-18	<5	468	8.05	225	216	9.17	0.23	<0.05	30.4	<0.02	16.0	0.002	0.62	<0.02	0.033	<0.005	0.02	NM	NM	<0.001	238	7.58	0.0
Apr-19	<5	99	7.30	44.8	55	0.52	<0.05	<0.05	0.80	<0.02	2.9	0.001	1.03	0.11	<0.010	<0.005	<0.01	0.32	0.66	<0.001	46	7.70	0.0
Oct-19	<5	455	7.93	249	231	7.53	<0.05	<0.05	19.1	<0.02	21.7	0.002	0.66	0.02	0.030	<0.005	<0.01	5.46	1.70	<0.001	375	7.78	10.7
Apr-20	<5	494	7.77	220	221	5.50	<0.05	<0.05	7.53	<0.02	13.6	0.003	0.74	0.02	0.017	<0.005	0.06	3.57	1.56	<0.001	450	7.81	4.3
Oct-20	<2	500	8.18	286	264	7.63	<0.05	<0.05	16.8	<0.02	18.2	0.003	0.74	0.10	0.031	<0.005	0.05	6.20	2.01	<0.001	314	8.01	6.1
May-21	<2	402	8.13	208	196	4.82	<0.05	<0.05	3.66	<0.02	8.4	0.001	0.25	0.02	0.018	<0.005	0.082	3.41	1.50	<0.001	290	7.90	7.3
Oct-21	<2	593	8.01	320	300	7.33	<0.05	<0.05	4.41	<0.02	55.0	0.026	1.03	<0.02	0.024	<0.020	0.17	NM	NM	<0.001	452	7.78	14.0
Apr-22	<2	355	7.89	190	181	3.26	<0.05	<0.05	5.75	<0.02	10.6	<0.001	0.57	<0.02	0.020	<0.020	0.15	2.62	1.88	<0.001	255	7.01	9.5
Sep-22	<2	464	7.89	241	217	5.06	<0.05	<0.05	7.15	<0.02	23.2	0.008	0.74	<0.02	0.024	<0.020	0.16	4.52	0.67	<0.001	350	6.73	15.9
Apr-23	<2	383	7.91	218	193	2.95	<0.05	<0.05	4.53	<0.02	10.2	0.005	0.34	<0.02	0.026	<0.020	0.10	2.77	1.78	<0.001	278	7.49	7.5
Nov-23	<2	493	7.83	284	292	5.52	0.10	<0.05	8.82	<0.02	11.6	0.004	3.03	0.17	0.039	<0.020	3.96	4.31	1.00	<0.001	313	7.69	0.0
Apr-24	<2	328	8.16	176	204	0.69	<0.05	<0.05	0.75	0.03	7.8	0.002	<0.10	0.05	0.017	<0.020	<0.050	1.78	1.69	0.0012	357	8.22	11.7
Nov-24	<20	471	7.91	269	270	5.68	<0.05	<0.05	10.8	<0.02	17.4	<0.001	0.18	<0.02	0.017	<0.020	0.083	4.94	2.07	<0.001	540	8.22	11.7
Average	<5	431	8.10	231	199	6.05	0.059	<0.10	22.4	0.047	14.7	0.0020	0.82	0.029	0.023	0.0048	0.21	3.36	1.68	0.0009	341	7.67	7.01
Std. Dev.	NA	96.4	0.24	52.5	46.4	3.81	0.074	NA	27.0	0.072	7.32	0.0042	0.51	0.038	0.010	0.0034	0.58	2.01	1.09	0.0018	126	0.50	3.61

- Notes:**
- ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006)
 - PWQO = Provincial Water Quality Objectives
 - NM = Not Monitored; NV = No value specified; NA = Not Applicable.
 - Results presented in mg/L (milligrams per litre) unless otherwise specified. µS/cm = microsiemens per centimeter.
 - Samples analyzed by AGAT Laboratories Limited.
 - * indicates outlier interpreted as sample or lab error.
 - Data prior to 2006 from Annual Monitoring Report (2005), Henderson, Paddon and Associates, Ltd.
 - Values reported as less than detection limits used as 1/2 detection limit for calculation of averages and plotting.

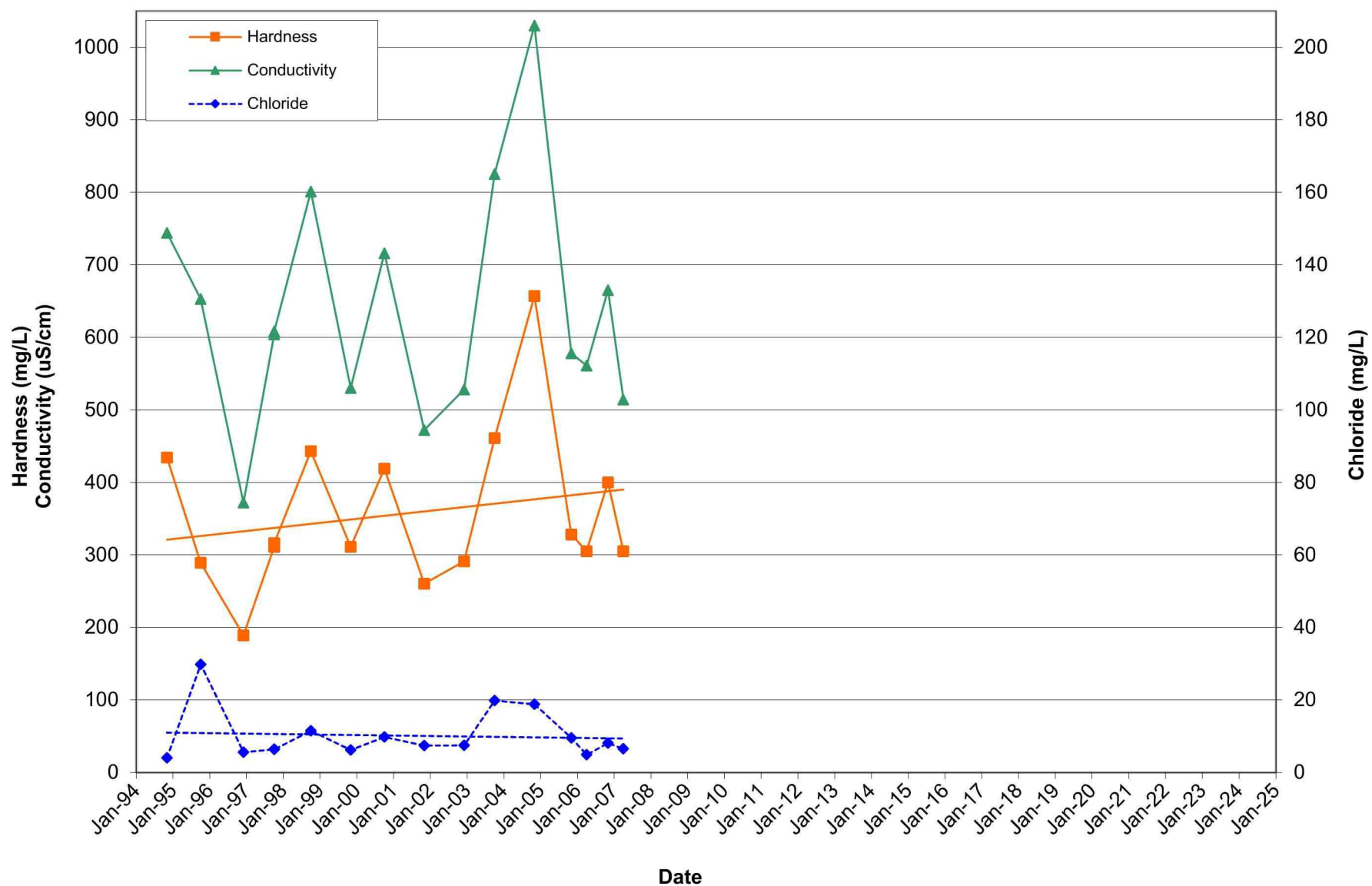
Surface Water: S-1 Chloride, Conductivity and Hardness



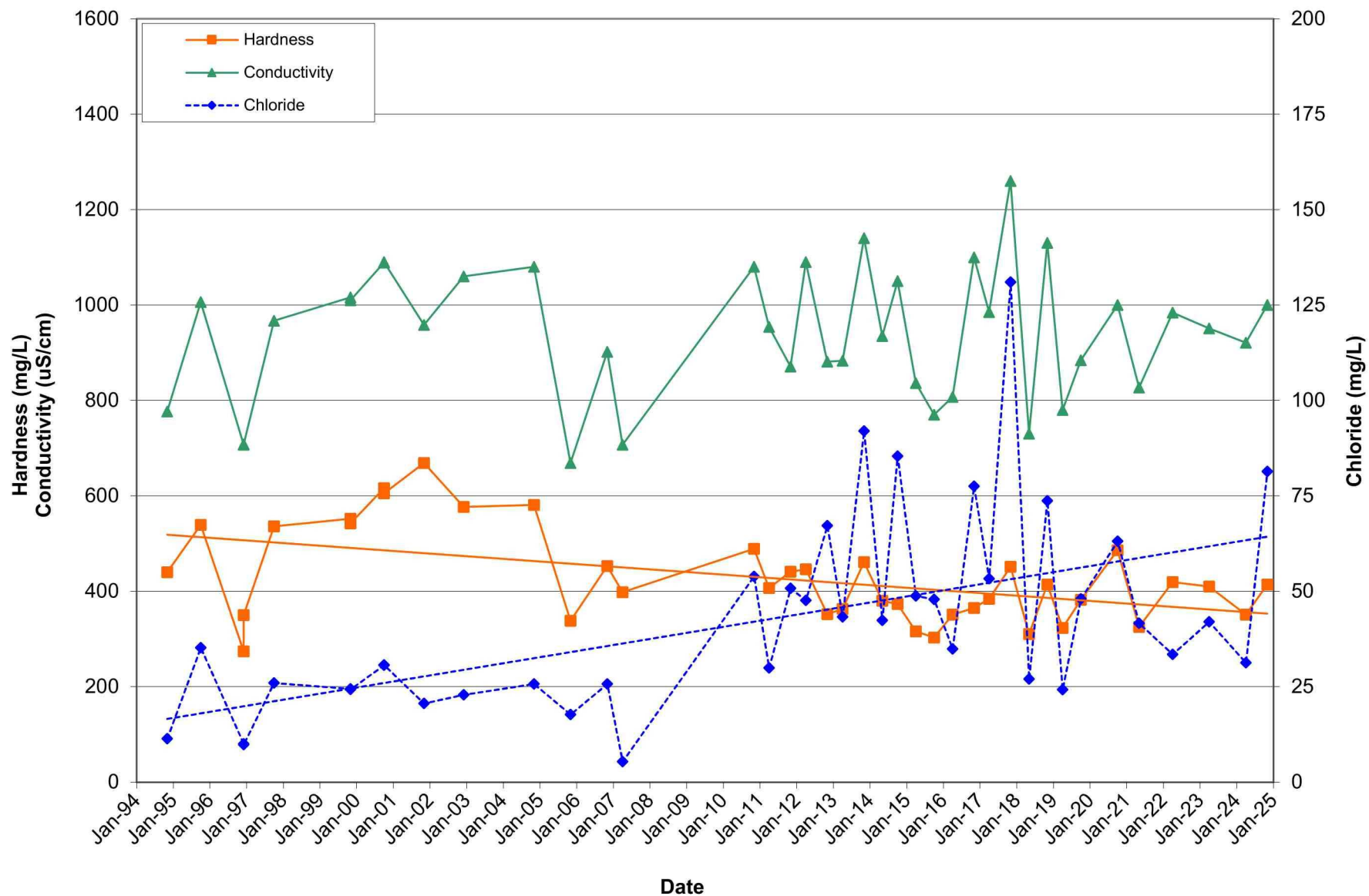
Surface Water: S-4 Chloride, Conductivity and Hardness



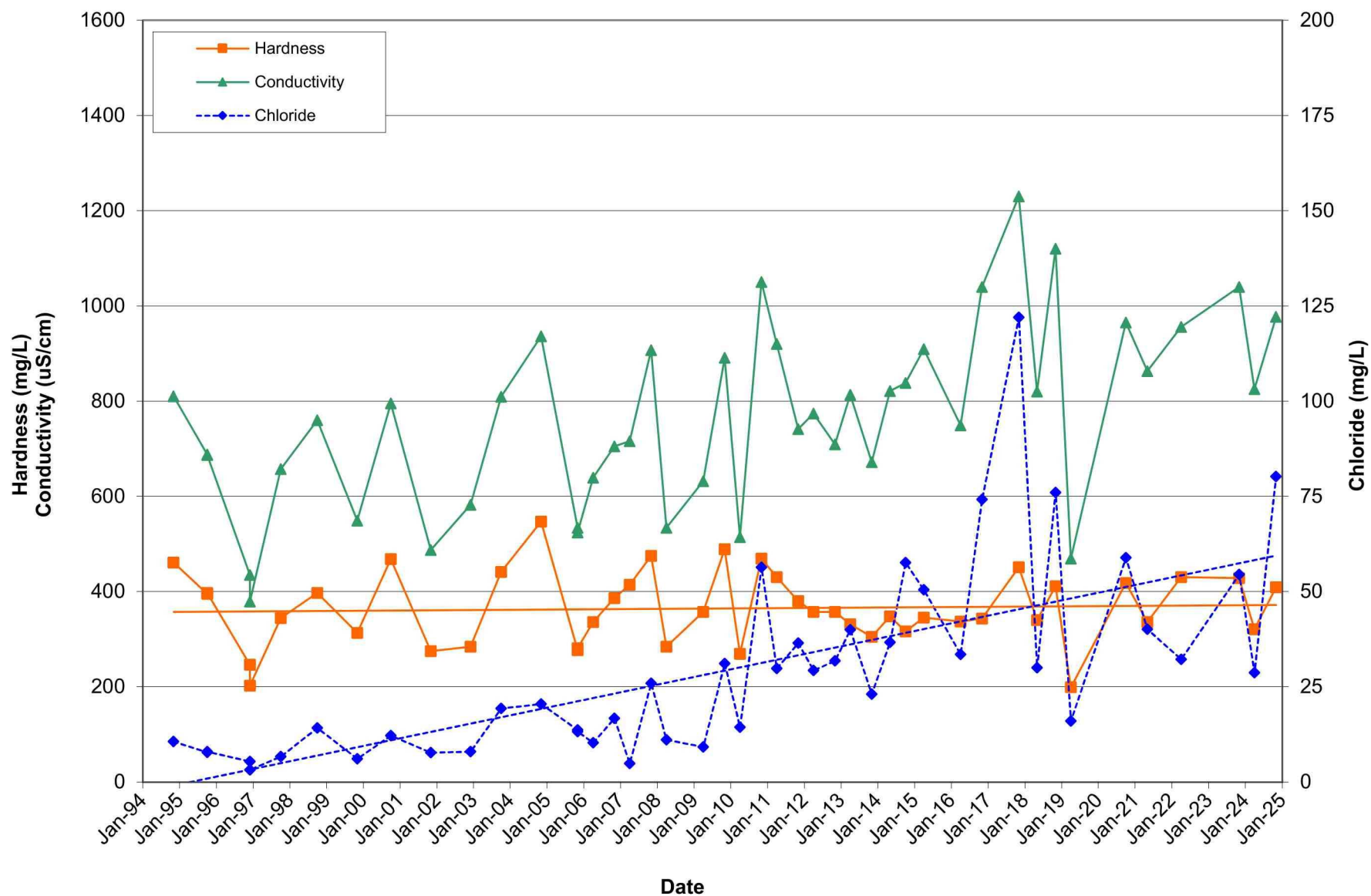
Surface Water: S-5 Chloride, Conductivity and Hardness



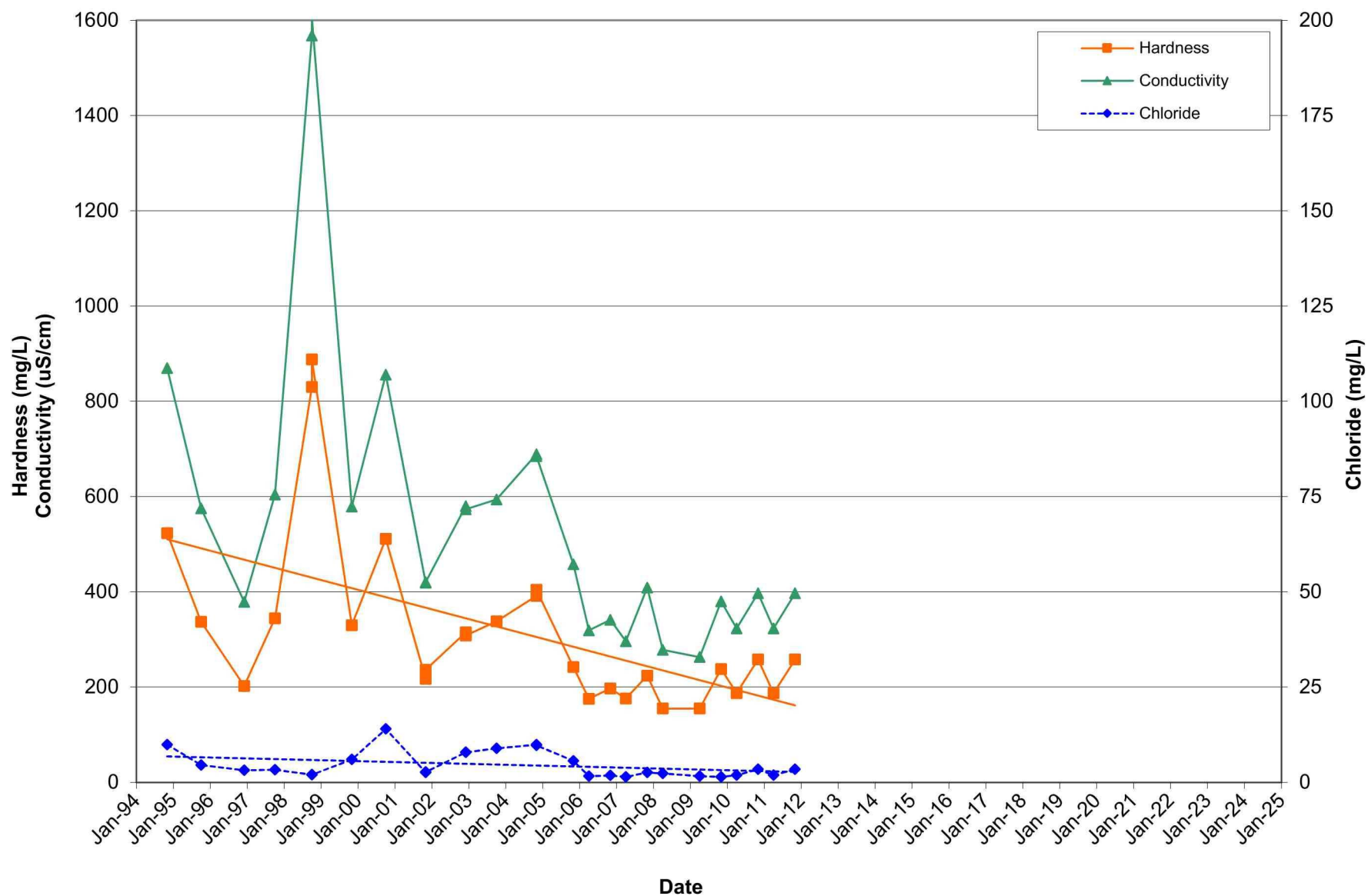
Surface Water: S-6 Chloride, Conductivity and Hardness



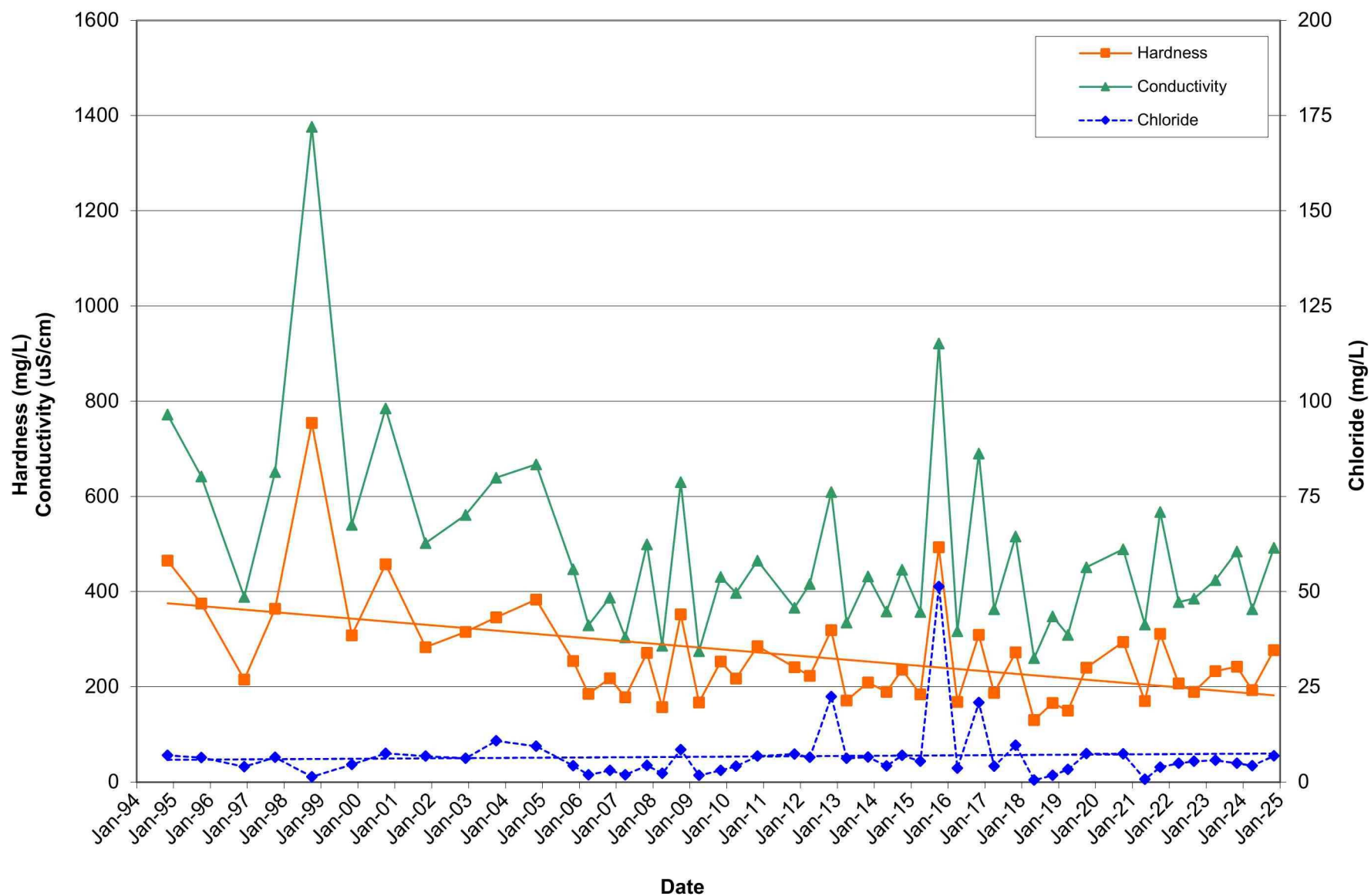
Surface Water: S-6A Chloride, Conductivity and Hardness



Surface Water: S-7 Chloride, Conductivity and Hardness



Surface Water: S-8 Chloride, Conductivity and Hardness



Surface Water: S-9 Chloride, Conductivity and Hardness

