March 28, 2025
Project No. 2402749

VIA EMAIL: cdulong@huronkinloss.com

Township of Huron-Kinloss
21 Queen Street
P.O. Box 130
Ripley, ON N0G 2R0

Re: **Annual Monitoring Report (2024)**
Kinloss Landfill Site
ECA No. 272801

Dear Cory:

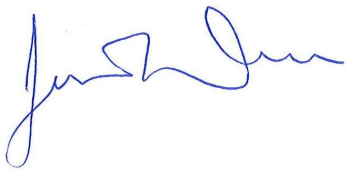
Please find enclosed one copy of the 2024 Annual Monitoring Report for the Kinloss Landfill Site (Certificate of Approval No. A27280). It is noted that the ECA was amended in January of 2024 to facilitate the operation of a Waste Diversion and Transfer Facility. Waste received at the site is transferred to the Huron Landfill, also owned by the Township of Huron-Kinloss. It is recommended that the Municipality review the new ECA to ensure operations are in compliance with the new conditions that have been imposed.

On behalf of the Township, we have submitted one copy of the report to Mr. Scott Gass, P. Eng., at the Ministry of the Environment, Conservation and Parks (MECP) District Office in Owen Sound.

Based on previous request from the MECP, a checklist has been provided with each report to support review by MECP staff. Please note that these checklists are not to be used as a replacement to the Annual Monitoring Reports, which provide the background information for the sites, and present a discussion of the findings, conclusions, and recommendations.

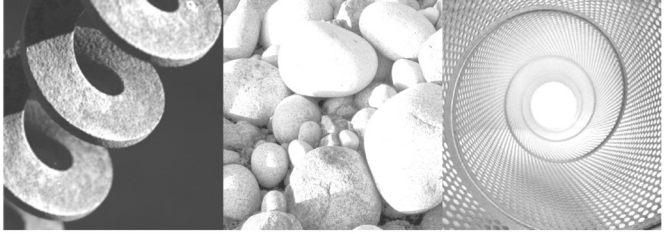
I trust this is sufficient for your use at this time. Please do not hesitate to contact the undersigned if you have any questions.

Sincerely,
GEI Consultants Canada Ltd.



Jessica K. Weller, C.E.T.
Technical Specialist

cc: MECP: Scott Gass, P.Eng. – scott.gass@ontario.ca
File No. 2402749



MECP Certificate of Approval No. A272801

Annual Monitoring Report – 2024
Kinloss Waste Disposal Site

Township of Huron-Kinloss

Submitted to:
The Township of Huron-Kinloss
21 Queen Street
Ripley, ON N0G 2R0

Submitted by:
GEI Consultants Canada Ltd.
1260 2nd Avenue East, Unit #1
Owen Sound, ON N4K 2J3
519.376.1805

March 2025
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1. Introduction and Background

The Kinloss Landfill Site is located on the north half of Part Lot 16, Concession 6 in the former Township of Kinloss in the amalgamated Township of Huron-Kinloss. The site location is provided on Figure 1. The Township of Huron-Kinloss was formed in 1999 as a result of the amalgamation of the former Townships of Huron and Kinloss, as well as the Village of Lucknow. The Kinloss Landfill Site is approved to accept domestic, commercial, and 10% non-hazardous solid industrial (limited miscellaneous debris from agriculture such as wire, stumps, and scrap metal) wastes.

According to the information available, it appears that waste disposal at the Kinloss Landfill Site began in the early 1980's. Environmental Compliance Approval No. 272801 dated January 2024, governs the current operations of the site. The current ECA recognizes the use of a 3.9 ha (9.6 acre) landfill area within a total Site area of a 6.0 ha (14.8 acre) and was amended to reflect the current conditions of the site (i.e., operating as a transfer station only). The original ECA was issued October 1st, 1980, and amended January 12th, 2024, to reflect the interim closed condition of the site. The approval, and its amendments, are enclosed in Appendix A.

Condition 41 of the current ECA requires that a report on the development, operation, and monitoring of the site be submitted annually to the District Manager by March 31st of the year following the period being reported upon. This Annual Operations and Monitoring Report, for the year 2024, has been prepared to satisfy the reporting requirements of the ECA for the Huron Landfill Site and includes a summary of the operational and environmental monitoring information.

It is noted that GEI Consultants Canada Ltd. (GEI) has been retained by the Township since 2024 to complete environmental monitoring requirements and the Annual Reports. Reporting requirements for the site were previously completed by WSP. Therefore, pre-2024 operational details and water quality results presented herein are based on the previous reports prepared by others. As part of the established annual monitoring program, site visits were conducted in May and November of 2024, at which time the site inspections, water level measurements, and collection of groundwater and surface water samples were completed.

2. Site Usage

The Township of Huron-Kinloss is comprised of three former/geographic centers: Township of Huron, the former Township of Kinloss, and the former Village of Lucknow. Waste collection is provided to the Township on a weekly basis, and recyclables are picked up on a bi-weekly basis. Currently, the Township subcontracts Bruce Area Solid Waste Recycling (BASWR) to complete the collection. Landfilling activities are currently suspended at the Kinloss landfill. Activities that currently occur at the Kinloss landfill site include waste collection of blue box materials, e-waste and other waste diversion streams, and stockpiling of scrap metal, white goods and tires, as appropriate.

3. Site Life Expectancy

The landfill site has an approved area for landfilling of 6.0 ha, of which a portion has been filled and closed. Based on previous Annual Monitoring Reports completed by others, the remaining landfill area has an approved remaining volumetric airspace capacity of 137,300 m^3 for waste and daily and final cover material. This estimate was based on a topographic survey that was reportedly completed by R.J. Burnside & Associated Ltd. in 2006.

It is of note that once the Huron landfill has reached its final capacity, the Kinloss landfill will begin to receive waste from both the Huron and Kinloss wards, with a combined average fill rate of approximately 9,333 m^3/year. Based on this combined average annual fill rate for the entire Township, the site life expectancy for the Kinloss landfill is approximately 15 years. The Huron Landfill has an approximate remaining capacity of 8 years. Therefore, the total site life for the Township landfill sites is approximately 23 years. It is recommended prior to the continuation of filling at the Kinloss site, that a comprehensive survey of the current conditions be completed in order to provide a more accurate estimate of remaining capacity onsite.

4. Burning Operations

Brush and "clean" lumber are to be segregated and stockpiled separately in a pile (or piles) generally no larger than 6 m by 6 m in area, by 3 m in height. Based on the availability and viability of a qualified contractor, these materials may be chipped for use on-site, such as internal roads or as daily cover. In the event the use of a contractor is not viable, only clean, dry wood wastes such as brush, trees and untreated lumber may be burned at the site. Supervised burning of wood waste is to occur at least 30 m from the active landfilling on clear, dry, windless days when the site is closed to the public. Additionally, an area of 4.5 m around the burn area should be kept free of vegetation.

The Site Attendant is responsible for removing any non-wood wastes from the pile prior to burning, and to regularly remove cold ashes from the burn area for disposal in the active landfill area. The Site Attendant must have the means to extinguish the fire if necessary.

5. Recycling/Waste Reduction

5.1. Recycling

The Township of Huron-Kinloss currently operates a curbside blue box recycling program for all residents where glass, steel and aluminium cans, paper (i.e., newspaper, magazines, and fine paper), boxboard, and plastic (PET and HDPE) drinking bottles and tubs are diverted from the landfill. Several recycling depots are maintained within the Township for the collection of cardboard since this material is not included in the blue box recycling program.

The Township also promotes the recycling of metals, tires, white goods, propane tanks, and electronics (e-waste) separately from the blue box program.

Bruce Area Solid Waste Recycling (BASWR) is the recycling contractor for the Township for both curbside pickup and landfill recycling. BASWR has provided an analysis of the total recyclables diverted from the Huron landfill located in the Township of Huron-Kinloss for the 2024 calendar year. Based on the information provided, the total respective amounts of recyclables that were diverted from the Huron landfill for the current operating period is presented below with a comparison to the previous year:

Recyclables	Material Diverted from the Municipality of Huron-Kinloss (Tonnes unless otherwise noted)	
Year	2023	2024
CURB-SIDE PICK –UP: BLUE BOX RECYCLABLE MATERIALS[1]		
Newspaper	79.68	61.63
Steel	25.39	19.64
Aluminium	17.22	13.32
Glass	80.95	62.61
HDPE Plastic	35.67	27.59
PET Plastic	52.86	40.89
Boxboard	62.31	48.20
Cardboard	102.99	98.93
Total (Blue Box)	**457.07**	**372.80**
Scrap Metal	128.2	74.54
Tires (Units)	3,808	3,175
Tires (est, tons)	29.11	37.90
E-waste	20.93	19.68
Other	18.69	16.22
Total Diverted	**654.0**	**521.14**

Currently, the waste collected at the Kinloss Landfill site is transferred to the Huron Landfill site. As such, the recycling totals (for Huron and Kinloss combined), have been provided in the above table. The total amount of recyclable goods diverted from both the Huron and Kinloss Landfills was generally in line with the average. The total diversion for the current operating year is reported to be 521.14 tonnes. 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.

5.2. White Goods & Miscellaneous Scrap Metal

The Township reports that they do not accept appliances containing chlorofluorocarbons (CFCs) at the Kinloss landfill site. Refrigeration units received at the site are to be tagged, indicating that they have been drained of CFCs by a qualified technician. White goods and scrap metal are to be segregated and temporarily stored on-site until they are picked up by a scrap dealer and removed offsite for recycling. In the current operating period, the Township reports that 74.54 tonnes scrap metal and no white good units were removed for recycling.

5.3. Batteries

Batteries should be stored in a single layer, within an enclosed container in order to prevent precipitation from coming in contact with the batteries. The storage container should also provide secondary containment in the event of leakage. In the current operating year, the Township reports that 0.24 tonnes of batteries were removed for recycling. Previously, batteries were collected by Environmental 360 Solutions. However, as of April 23, 2024 batteries are now included in e-waste and are collected by EPRA.

5.4. Tires

Tires should be stockpiled on the site and sold for recycling purposes. According to Environmental Protection Act 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 m^3 (or approximately 2,400 tire units based on 8 tires/m^3). There must be greater than 15 m

between the stockpile and the property line, buildings, and the active area of the landfill and greater than 30 m separation between the tire pile and the burn pile. Tires should be stockpiled in an area where there is no vegetation within 4.5 m. Individual stockpiles should be separated from each other and from other waste piles by a minimum of 6 m.

According to the site records, a total of 3,175 tires, approximately 37.90 tonnes of tires combined were removed from the Huron and Kinloss sites in 2024.

5.5. Municipal Hazardous or Special Waste (MHSW)

The MHSW program for the Township is operated by the County of Bruce through the Household Hazardous Waste Collection Program. Under the program, residents can drop-off the following hazardous materials free of charge.

- Paints and coatings, plus their containers
- Solvents, such as thinners for paint, lacquer and contact cement, paint strippers and degreasers, and their containers
- Oil filters
- Oil containers of 30 litres or less
- Single-use batteries
- Antifreeze and its containers
- Pressurized containers, such as propane tanks and cylinders, oxygen and helium tanks
- Lawn fertilizers that contain pesticides
- Pesticides, and their containers

6. General Operations

6.1. Site Controls

The site is open to the public on Saturdays from 10:00 AM to 2:00 PM, during the months of April to October.

The site is located in a relatively secluded setting, is surrounded by fencing, and is adequately screened from public view and from the Kairshea Ave right-of-way. When the site is closed to the public, a locked steel cable across the entrance road, located in the southerly portion of the site, controls access to the site.

Signs posted at the gate/main entrance to the Site note the hours of operation, the acceptable recyclables that can be dropped off at site, a list of the emergency numbers and a contact number for the Township. Within the landfill area, portable signs are posted at the various designated disposal locations including the designated areas for waste, metals, the various recyclable materials, and wood waste. These signs are clearly visible.

6.2. Site Cleanliness

The most important aspect of site cleanliness is to ensure that all landfill wastes have adequate soil cover so that refuse is not exposed. Application of an appropriate soil cover immediately following waste disposal reduces blowing litter, prevents storm water infiltration into the refuse (which reduces leachate generation), and discourages rodent and vector activity at the site.

The Township should ensure that wastes are covered and blown litter is collected on a routine basis. The Site Operator is responsible for compaction and covering of refuse and for the collection of blown litter from the site. The Municipality should also ensure that accumulations of recyclable materials, including waste tires and scrap metal are efficiently managed and that appropriate wood wastes are burned regularly or if feasible, shredded for use as cover.

6.3. Site Development

The Township was previously utilizing the area-ramp method of landfilling while the Kinloss site was in operation. Once landfilling resumes onsite, daily cover is to be applied at the end of each working day with a minimum thickness of 150 mm. Continued attention should be given to ensuring that landfilled wastes are sufficiently covered at the end of each working day with an adequate amount of material.

Based on the suspension of landfilling at the Kinloss site, interim cover was applied on the former active area. Upon re-opening of the landfill, final covering should be applied progressively as areas are filled to within 0.70 m of final contours. The application of final and interim cover will aid in reducing leachate generation. For more details regarding the development of the landfill please refer to the PDO.

To ensure sufficient visual screening of the landfill operations from the roadway and adjacent residences, the Township should continue to monitor the established tree cover and plant additional trees where required. When additional tree cover is required, it is recommended that the Township use a hardy conifer species to provide for year-round visual screening.

7. Summary of Hydrogeologic Setting

The landfill site is located within the physiographic region known as the Horseshoe Moraines. Based on local Ministry of the Environment, Conservation and Parks (MECP) well records and the *Hydrogeologic Assessment* (Paragon Engineering Ltd., 1991), the overburden in the vicinity of the site generally consists of till or kame deposits including accumulated till, sand and gravel. Based on a review of the MECP water well records, the overburden is approximately 20 to 65 m thick in the vicinity of the site and overlies the grey-brown limestone and dolomitic limestone of the Dundee formation formed during the Middle Devonian period.

Based on the borehole logs (included in Appendix D), the site generally consists of surficial silty sand deposits underlain by a relatively permeable silty sand and gravel unit. Previous investigations at the site indicated that the shallow soils, particularly near the low-lying areas are highly organic with surficial layers of peat identified. A review of regional mapping indicates that the subject property is generally located in a relatively poorly drained area.

The site is located along a ridge that trends northeast to southwest, with high-lying lands located to the west (refer to Figure 2). The site topography is observed to consist of a significant slope to the northeast/east, and contains a small pond and wetland to the east of the approved landfill area. Ground elevations range from 305 metres above sea level (masl) within the westerly limit to approximately 280 masl along the eastern limits of the property. An intermittent creek is located approximately 85 m east of the approved landfill limit in the swampy area. The Kinloss Creek (also known as the Ackert Drain) flows in a south to southwesterly direction towards the Town of Lucknow draining into Nine Mile River and ultimately into Lake Huron.

Based on current and historic water level measurements, the direction of groundwater flow in the shallow overburden aquifer is generally observed to be from the west to east across the site. In general, the regional groundwater flow direction in the overburden is inferred to be south to southwesterly. The inferred groundwater

flow direction is consistent with the regional topography, which consists of the pronounced ridge with lower lying lands to the west and south of the Site.

7.1. On-Site Groundwater Flow System

Water levels on-site form a complex pattern of groundwater flow likely controlled by both the local topography and the deeper regional groundwater system, depending on site geology. Based on an assessment of the groundwater elevation data available and our understanding of the overburden geology, topography, and the regional groundwater flow system it appears that there are likely several minor, or localized, groundwater flow systems at the site, that ultimately tie into the larger regional groundwater flow system that flows in a west to southwesterly direction.

Shallow groundwater in the vicinity of the landfill generally flows to the east towards the Kinloss Creek tributary (Figure 4) making the creek the primary receptor for potential impacts from landfill leachate via discharge from shallow groundwater migration.

Water level elevations at monitoring locations OW5, OW6, OW15 and OW16 have consistently been lower than those measured in surrounding wells OW4, OW12 and OW11-16. Based on water level measurements collected, the groundwater chemistry comparisons, a review of the borehole logs (Appendix D) and well construction details (summarized in Table 1), the lower water levels typically associated with these wells are attributed to relatively low-permeability soils observed. Specifically, within OW15 and OW16, the soils at these locations were found to consist of layers of silt with clay.

Based on the regional groundwater flow directions, and water levels identified within the monitoring wells located onsite, it is reasonable to expect that the potential leachate impacted groundwater migration would ultimately be in an easterly direction.

8. Monitoring Requirements

8.1. Sampling Requirements

Monitoring of groundwater and surface water is conducted in the spring and fall of each year. The existing sampling program is based on Schedule B of the CofA.

The monitoring wells are located around the circumference of the landfill and monitor groundwater quality in both the shallow and intermediate overburden. The surface water monitoring locations are located to determine potential impacts to surface water from the landfill. Samples are obtained from one upstream location and one downstream location.

8.1.1. Groundwater Sampling Locations

Groundwater quality monitoring was initiated at the site in 1985. Between 1989 and 2024, groundwater quality has been intermittently monitored at the site by twice annual sampling from a network of monitoring wells. The 2024 sampling program consisted of groundwater sampling from the twelve monitoring wells required by the amended CofA, as shown on Figure 3.

Monitoring is completed twice annually (spring and fall). In addition, surface water samples are collected from two (2) locations twice annually in conjunction with the groundwater monitoring program. A summary of the

groundwater and surface water quality monitoring programs and required parameters, as per the Approvals, is provided in Table 2 and Table 3, respectively (below).

TABLE 2: Summary of Groundwater Quality Monitoring Locations and Parameters

MONITORING LOCATIONS			MONITORING PARAMETERS
Sampling Location	**Spring**	**Fall**	
OW4	X	X	Alkalinity, Ammonia, Anions – Cl, NO2, NO3, SO4 Conductivity, Dissolved Metals DOC, Hardness, Phenols, pH, TKN
OW5	X	X	
OW6	X	x	
OW7	X	X	
OW11-16	X	x	
OW12	X	X	
OW13S	X	X	
OW13I	X	x	
OW13D	X	X	
OW14-14	X	x	
OW15	X	x	
OW16	X	x	

8.1.2. Surface Water

Historically, surface water has been monitored at two locations consisting of an upstream location (SW1) and one downstream location (SW2) as shown on Figure 2.

TABLE 3: Summary of Surface Water Quality Monitoring Locations and Parameters

MONITORING LOCATIONS			MONITORING PARAMETERS
Sampling Location	**Spring**	**Fall**	
SW1 (Upstream)	X	X	Alkalinity, Ammonia, Anions (CL, NO2, NO3, SO4), Conductivity, Dissolved Metals, Total Phosphorus
SW2 (Downstream)	X	X	DOC, Hardness, Phenols, pH, TKN Field Measurements: Temperature, pH, Conductivity

8.2. 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 monitoring well. GEI 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 collected for metals are field filtered using a 0.45 µm filter and placed in laboratory supplied containers with preservative. Samples are kept chilled following completion of the sampling program and sent within 24 hours of the sampling event to Bureau Veritas Laboratories of Mississauga for analysis. The laboratory analytical reports for the current monitoring period are included in Appendix H.

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 then transferred into the appropriate preserved bottle. The surface water temperature is measured and recorded at the time of sampling.

9. Determination of Reasonable Use Criteria For the Site

9.1. Determination of Action Levels

The MOE Guideline B-7 establishes the basis for determining what constitutes the reasonable use of groundwater on a property adjacent to a landfill site, which is designed to protect existing and potential water uses. To be conservative, it is assumed that the shallow groundwater in the region will typically be used for domestic purposes. MOE Procedure B-7-1 provides technical details for the application of the reasonable use approach. Generally, the reasonable use criteria (RUC) for an adjacent property are determined using the following approach:

1. Quality cannot be degraded by more than 50% of the difference between background concentrations and the Ontario Drinking Water Standards for non-health related parameters, and
2. Quality cannot be 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 site-specific quality of the groundwater prior to any impact from landfill leachate.

9.2. Background Groundwater Quality

Based on groundwater flow direction at the site, OW11-16 was selected as the background monitoring location for shallow groundwater. Previously, OW7 and OW12 were considered to be background monitors based on their upgradient location from the landfill mound. However, based on MECP comments in 2007, a new background well was recommended due to various issues with collecting samples from both OW7 and OW12 (i.e., dry conditions). In 2016, well OW11-85 was decommissioned and replaced by monitoring well OW11-16. In 2017, the MECP approved the use of OW11-16 as the background monitoring well for the Kinloss site. Historical results were used to calculate average values of indicator parameters for subsequent calculation of the RUC values. Available historical data collected from 2016 to 2024 was used to calculate the average groundwater concentrations for leachate indicator parameters. Historical water quality for OW11-16 is provided in Appendix F.

The background shallow groundwater quality is typical of the region and can be characterized as being highly mineralized with average background hardness and alkalinity concentrations above 300 mg/L, pH levels between 7.0 and 8.0, and low levels of chlorides, sulphates and DOC.

9.3. Calculation of Objective Levels

The objective levels for several groundwater quality indicator parameters were calculated to evaluate 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 ODWS, August 2000. Acceptable concentrations at the site boundary (Cm) are calculated from MOE Procedure B-7-1 using the following formula:

Cm = Cb + x(Cr – Cb)

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 and OG) and 0.25 for health-related parameters (MAC and IMAC).

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

To determine if leachate is impacting groundwater, indicator parameters including hardness, boron, alkalinity, chloride, and specific conductance are evaluated in conjunction with other indicator parameters and concentration trends. Additionally, leachate impacted groundwater is compared to the groundwater chemistry at locations with naturally elevated concentrations to determine if leachate contributes to the elevated concentrations.

9.4. 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 MOE. The criteria set out by the PWQO, summarized in Table 4, 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. Background surface water quality at the Kinloss Landfill site is represented by SW1.

10. Water Quality

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. To determine the presence of potential impacts from leachate, several indicator parameters are monitored, and a trend analysis is conducted to determine changes in existing conditions.

The following sections discuss the potential impacts to groundwater and surface water leaving the property boundaries and compliance with the Reasonable Use Criteria (RUC). In 2024, the sampling events were conducted in May and November. The groundwater and surface water quality results for the current monitoring period are summarized in Tables 4 and 5, respectively. Historical groundwater and surface water sampling results and graphical trends of select indicator parameters are included in Appendices “F” and “G,” respectively.

10.1. On-Site Conditions – Leachate Generation

Landfill leachate is produced when surface water infiltrates into the landfilled area and percolates down through the refuse. This leachate can migrate through the subsurface and has the potential to impact groundwater or surface water. To determine the presence of, or potential impacts from leachate, several leachate indicator parameters are

monitored, and a trend analysis is conducted to determine changes in groundwater and surface water conditions over time.

The following sections discuss the potential impacts to groundwater and surface water in relation to property boundaries and compliance with the RUC. The groundwater and surface water quality results for the current monitoring period are summarized in Tables 4 and 5, respectively. Historical groundwater and surface water sampling results and graphical trends of indicator parameters are included in Appendices D and E, respectively.

10.2. Onsite Monitoring

Groundwater quality at the locations of monitoring wells OW14-14 and OW4-85 display the most significant impact from landfill leachate at the site, which is as anticipated, based on their locations. OW14-14 is located within the former landfill area (i.e., within the area of placed waste) and OW4-85 is located immediately downgradient of the landfill footprint. As a result, these wells have been categorized as leachate characterization wells for the Site. Based on the groundwater chemistry at monitoring wells OW14-14 and OW4-85, the main leachate indicator parameters for the closed portion and active landfill area are: alkalinity, boron, chloride, dissolved organic carbon (DOC), hardness, iron, nitrate, nitrite, manganese, sodium and sulphate.

10.3. North Boundary Condition

Groundwater

Groundwater quality along the north boundary of the site is monitored at OW7-85, and further northeast at OW6-85. The monitoring well locations at the Site are presented on Figure 2.

OW7-85 is located along the north property boundary, directly north of the former landfill waste area, while monitoring well OW6-85 is located approximately 110 m northeast of the former fill area. Historical review of indicator parameters from OW7-85 indicates relatively stable trends. Similarly, a review of the analytical results for OW6-85 indicates that concentrations are consistent with background values. Based on the groundwater flow pattern, impacts from landfill leachate are not anticipated in the groundwater along the north property boundary.

Surface Water

SW2 is located approximately 150 m north of the northerly property boundary and is considered to represent the surface water conditions downstream of the landfill. The surface water sample is collected from the tributary of Kinloss Creek, that is noted to flow in a northerly direction directly east of the site. No RUC exceedances were reported during the most recent sampling events.

10.4. East Boundary Condition

Groundwater- Onsite

The quality of the shallow groundwater located east of the landfill property is monitored at OW5-85 and OW13s-97, OW13I-04 and OW13D-04, located east of the landfill along the easterly property boundary.

Monitoring location OW5-85 is located downgradient of the most northerly toe of the former landfill area, approximately 50 m downgradient of the former fill area. Based on a review of historical analytical results and trends for OW5-85, no evidence of leachate impacted groundwater has historically been observed at this easterly monitoring location. Based on the most recent sampling events, an anomalous increase in several analytical

parameters was reported during the spring sampling event including the concentrations of alkalinity, chloride, conductivity, hardness, sodium and to a lesser extent calcium and magnesium. The measured concentrations for the spring monitoring event were reported at levels that have never been observed in the past. However, during the fall sampling event, the identified parameters were significantly reduced and are noted to have been reported at concentrations within the historical norms for this monitoring location. The spring results are considered to be anomalous and are not representative of leachate impacts at this location. Future monitoring and evaluation of the trend graphs for the typical leachate indicator parameters will continue to further discern if an elevated trend becomes present at this location.

Monitoring wells OW13S-97, OW13I-04 and OW13D-04 are located within the most southeasterly portion of the landfill property, within a low-lying swampy area. It is noted that both OW13S and OW13I are screened within the upper sand and gravel unit and OW13D is screened within the lower silt till. Historically, both OW13S and OW13I have displayed somewhat elevated indicator parameters (as compared to background values), including slightly elevated alkalinity, chloride, nitrate, ammonia and hardness. During the current monitoring period, RUC exceedances included alkalinity, nitrate, DOC (OW13S fall sampling event only), and hardness. While exceedances were noted during the 2024 sampling events, a stable and decreasing trend is noted at both locations, inferred to be due to the interim closure of the landfill. As noted historically, ammonia concentrations continue to trend slightly upwards however, nitrate and nitrite are observed to remain below the RUC at this time.

Once landfilling resumes onsite, it is recommended that continued monitoring and evaluation of the long-term analytical trends is completed to discern if an elevated trend becomes apparent. It is noted that the Township has purchased the easterly adjacent property to provide additional buffer lands downgradient of the landfill property. No RUC exceedances were noted at OW13D, and the groundwater quality trends are noted to be stable and exhibit values similar to background groundwater quality.

Groundwater- Offsite

Based on the interpreted easterly groundwater flow direction and the upwards gradients that exist in low-lying areas downgradient of the landfill property, it is inferred that groundwater from beneath the landfill footprint may discharge to the low-lying area directly east of the site. Based on MECP comments provided in 2015, previous concerns were raised regarding the RUC exceedances previously noted within the OW13 well nest. In an effort to address these concerns, a recommendation was made for the installation of further monitoring locations within the easterly buffer lands owned by the Township. Consequently, in 2016 two additional monitoring wells were installed further downgradient of the landfill property to evaluate the potential off-site migration of leachate from the landfill property. OW-15 was installed approximately 30 m from the eastern property boundary and OW-16 was installed directly adjacent to OW-15 (approximately 35 m east of the eastern property boundary) to help further evaluate potential leachate attenuation.

In previous annual reports, it was noted that slight leachate impacts were observed in the groundwater at OW-15, with elevated indicator parameters above the RUC including alkalinity, hardness, iron, DOC and manganese. During the most recent sampling period, several parameters are noted to have slightly decreased compared to previous data including alkalinity and iron and to a lesser extent hardness and DOC. Similar to previous monitoring events, the concentration of typical leachate indicator parameters at OW-16 are analogous to background conditions. A comparison of groundwater quality at these monitoring locations indicates that leachate is attenuating with distance downgradient of the former fill area. Based on the groundwater quality results, compliance at some point between the OW-13 nest and OW-15/OW-16 is inferred.

Surface Water

An upstream surface water sample (SW1) is collected from the south end of the culvert under Kairshea Ave, as shown on Figure 3. Consistent with historical results, no RUC exceedances were reported during the current monitoring period (with the exception of iron during the spring sampling period). Historically, iron exceedances have been reported, however reported exceedances at this upgradient location are not attributed to landfill operations.

10.5. West Boundary Condition

On-Site Groundwater

The groundwater to the west of the landfill is monitored at OW11-16 and OW12-97, which are located within the southwest to central portion of the site, respectively. These monitoring wells are situated hydraulically upgradient of the former fill area. OW11-16 is located directly adjacent to the western property boundary and is considered to represent background groundwater quality at the site. Due to the direction of shallow groundwater flow at the site, no impacts to shallow groundwater from the landfill are anticipated at the west property boundary. A review of the historic data indicates that typical leachate indicator parameters have been stable at both OW11-16 and OW12-97 since their installations. The reported analytical results from the current monitoring period continue to indicate long-term stable trends that are consistent with historical values indicating that groundwater quality at the background monitoring locations remains unimpacted/uninfluenced by landfill leachate.

10.6. Summary of Water Quality

The groundwater at the site generally flows eastward, with upward gradients in low-lying areas suggesting potential discharge zones. Monitoring wells OW14-14 and OW4-85, located within and immediately downgradient of the landfill, show the most significant leachate impacts, with elevated levels of alkalinity, boron, chloride, DOC, hardness, iron, nitrate, nitrite manganese, sodium and sulphate. Groundwater quality at the north boundary, monitored at OW7-85 and OW6-85, remains stable, with concentrations consistent with background values. Surface water monitoring at SW2, located north of the suite, shows no RUC exceedances.

Along the east (i.e., hydraulically downgradient) property boundary, OW5-85 has historically displayed no leachate impact, though a temporary peak in several parameters was observed in a single sample collected during the spring 2024 sampling event. However, the concentrations returned to historical norms in the fall. The OW13 well nest in the southeastern portion of the landfill has historically exhibited elevated alkalinity, chloride, nitrate, ammonia and hardness, though a recent decreasing trend is noted, likely due to the interim landfill closure. Nitrate and nitrite remain below RUC limit, though ammonia continues to show a slight upward trend. Two additional offsite wells, OW15 and OW-16, were installed in 2016 to assess potential leachate migration offsite. OW-15 has shown slight influence from landfill leachate in the past. However, recent sampling results indicate a noticeable decline in the concentrations of alkalinity, iron, hardness, and DOC. The measured groundwater quality at the location of OW-16 remains consistent with background values, indicating that leachate attenuation is occurring downgradient of the Site, with compliance inferred between OW-13 and OW-15. Surface water at SW1, located upstream, recorded no RUC exceedances except for iron in the spring, which is not attributed to landfill operations.

Groundwater along the west property boundary, monitored at OW11-16 and OW12-97, remains unaffected by landfill operations due to the predominately easterly flow direction. The historical and most recent data confirms stable groundwater quality and long-term trends at the upgradient boundary. Overall, the monitoring program indicates that leachate impacts are primarily confined to the onsite wells near the landfill, with attenuation occurring further downgradient. Continued monitoring at OW5-85 and the OW13 well nest is recommended to assess long-term trends, particularly once landfilling operations recommence at the disposal site.

11. Landfill Gas Generation

Methane is a colorless and odourless gas formed by the decomposition of organic matter under oxygen poor (anaerobic) conditions and is commonly associated with landfills. It is produced by anaerobic bacteria, which become active only when the oxygen in the landfill has been completely consumed. The primary concern related to this parameter is that, under certain conditions, the mixture of methane in air can be explosive within a confined area. Methane gas is measured relative to the lower explosive limit (LEL) which corresponds to 5% the concentration of methane in air.

Gas sampling at the three gas monitoring locations GP1, GP2, and GP3 (located around the perimeter of the site) has historically indicated that there is no off-site migration of methane gas. The Lower Explosive Limit (LEL) have been measured in each gas probe since 2006, and most recently, methane and oxygen levels have also been recorded. Results are summarized in Table 7.

In the current monitoring year, the oxygen levels remained greater than 19% (measured as % by volume), with the exception of GP1 and GP2 during the spring sampling. It is noted that the more oxygen present in a landfill, the longer aerobic bacteria can decompose waste producing only carbon dioxide and water as by-products. LEL measurements for all gas monitoring locations produced readings of 0%. Historically, LEL measurements from the gas probes have typically produced readings of zero (0). Based on the relatively high levels of oxygen recorded in each gas probe, it appears that the system is aerobic in the vicinity of the gas probes. In general, methane gas is not detected within the gas monitors, and we expect that landfill gases being produced are readily vented to the surface through the soils.

12. Conclusions

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

- The landfill site encompasses a total area of 6.0 hectares (ha), of which 3.9 ha has been approved for landfilling.

- Based on a site survey completed by others prior to temporary closure in 2006, the landfill has an approved remaining airspace capacity of 137,300 m^3 for waste and daily and final cover material.

- No waste placement operations are occurring at the Site, but the facility is operating as a transfer site. Waste received at the Kinloss Landfill Site is transferred to the Huron Landfill Site.

- When active landfilling operations resume at the Site, it will likely be accepting waste from Huron/Kinloss wards (i.e., from the entire Township). The anticipated fill rate once the landfill becomes active again is expected to be in the range of 9,333 m^3/year. At this average annual fill rate, this would correspond to a site life of approximately 15 years.

- The water quality at the surface water location SW2, inferred to be located downgradient of the landfill site, remains similar to the background surface water quality and does not exhibit influence or impact from landfill leachate.

- Based on the groundwater chemistry observed at monitoring wells OW14-14 and OW4-85, the main leachate indicator parameters for the closed portion and active landfill area are: alkalinity, boron, chloride, dissolved organic carbon (DOC), hardness, iron, nitrate, nitrite, manganese, sodium and sulphate.

- Groundwater quality at OW5-85, OW6-85, OW7-85, OW11-16, OW12-97 and OW-16 are all similar to background conditions with no indications of leachate influence. Based on the observed concentrations at OW-15, it appears that leachate impacted groundwater is limited downgradient of the closed and capped landfilled area.

- Leachate influence in the groundwater is evident to the east of the landfill footprint at well OW4-85. Historical data indicates that leachate indicator parameter trends are stable to slightly decreasing. Since the landfill area upgradient of OW4-85 is closed and capped, leachate influence at this location is anticipated to decrease over time.

13. Recommendations

1. Closed and capped areas of the landfill should continue to be inspected on a semi-annual basis to ensure the integrity of the cover material.

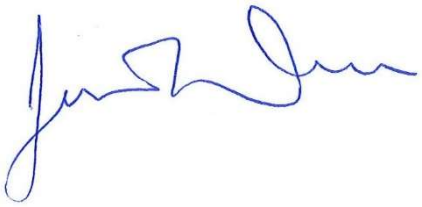
2. Once landfilling resumes, ensure that the areal extent of the active landfilling cells are kept to a minimal and manageable area and that final cover is applied progressively. Application of final cover should be applied to areas that have reached about 0.75 m below final contours to allow for the placement of final cap (600 mm thickness) and topsoil (150 mm thickness).

3. Ensure that accumulations of recyclable materials, including waste tires and scrap metal, are efficiently managed, appropriate wood wastes are shredded and/or burned as appropriate and windblown litter is collected on a routine basis.

4. The continuation of the established groundwater and surface water sampling program at the site as summarized below:

Groundwater Sample Location	Recommended Groundwater Parameters
OW4 OW5 OW6 OW7 OW11-16 OW12 OW13S OW13I OW13D OW14-14 OW15 OW16	Alkalinity, Ammonia, Anions – Cl, NO2, NO3, SO4 Conductivity, Dissolved Metals DOC, Hardness, Phenols, pH TKN
Surface Water Sample Location	**Recommended Surface Water Parameters**
SW1 SW2	Alkalinity, Ammonia, Anions (CL, NO2, NO3, SO4), Conductivity, Dissolved Metals, Total Phosphorus DOC, Hardness, Phenols, pH, TKN
	Field Parameters: Conductivity, pH, Temperature

All of which is respectfully submitted,
GEI Consultants Canada Ltd.
Per:



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Tables

Figures

Appendix A **Environmental Compliance Approval No. A272801**

Appendix B Supporting Documents & Correspondence

Appendix C GEI Landfill Inspection Reports

Appendix D Monitoring Well Installation Details

Appendix E Historic Summary of Water Level Elevations

Appendix F Historical Groundwater Quality Data

Appendix G Historical Surface Water Quality Data

Appendix H Laboratory Certificate of Analysis

Tables

TABLE 1
SUMMARY OF BOREHOLE LOGS AND MONITORING WELL INSTALLATION DETAILS

Well ID	Year Installed	WELL LOCATION		Stick Up Elevation (mast)	ELEVATION		WELL SCREEN DETAILS							Depth Interval of Each Unit				Description of Unit Encountered
		Easting (X)	Northing (Y)		Ground	ToPVC	BH Btm	Top		Bottom		Diameter	Length	From	To	From	To	
					mast	masl	mbgs	mbgs	masl	mbgs	masl	inches	ft	mbgs		masl		
MONITORING LOCATIONS																		
GP1	2006	463712	4872253	-	-	-	3.65	1.2	-	2.7	-	1	4.9	0.00	0.45	-	-	Medium brown fine sandy silt, trace clay, compact, moist
														0.45	3.65	-	-	Medium brown fine sandy silt with 3 to 20 cm thich layers of light brown very fine sand some silt, and light brown fine to medium sand, compact, moist
GP2	2006	463663	4872161	-	-	-	3.65	1.5	-	3.00	-	1	4.9	0.00	0.40	-	-	Medium brown fine sandy silt, trace clay, very stiff, moist
														0.40	1.00	-	-	Medium brown silty fine sand, compact, moist
														1.00	1.20	-	-	Medium brown fine sandy silt, trace gravel, firm, moist
														1.20	1.50	-	-	Medium brown fine sandy silt, some gravel, non-plastic, firm, moist (appears disturbed - fill?)
														1.50	2.25	-	-	Medium brown sandy silt, some gravel, non-plastic, firm, moist
														2.25	2.45	-	-	Light brown fine sand, trace silt, loost, moist
														2.45	3.60	-	-	Light brown fine sand, some silt, layered with thin layers of medium sand and sandy silt, loose, moist
														3.60	3.65	-	-	Medium brown fine sandy silt, non-plastic, firm, moist
GP3	2006	463685	4872127	-	-	-	2.45	0.8	-	2.3	-	1	4.9	0.00	0.10	-	-	Light brown gravelly sand, some silt, trace organic matter, loose, dry
														0.10	0.55	-	-	Medium red-brown fine sand, trace silt, loose, moist
														0.55	1.2	-	-	Light brown fine sand, trace silt, loose, moist
														1.200	2.150			Light brown fine sand, trace silt, layered with thin seams of fine sand some silt, and silty fine sand, loose, moist
														2.15	2.45	-	-	Medium brown fine sand silt, non-plastic, compact, moist
OW12-97	1997	463694	4872249	0.92	97.80	98.72	19.240	15.8	82.00	18.8	79.00	-	9.8	0.00	7.16	97.80	90.64	Compact to very dense rown fine sand, trace silt
														7.16	8.08	90.64	89.72	Dense grey-brown medium sand, trace silt, trace gravel
														8.08	8.84	89.72	88.96	Very dense brown fine sand, trace silt
														8.84	16.40	88.96	81.40	Dense to very dense grey-brown medium sand, trace gravel, trace silt
														16.40	17.22	81.40	80.58	Very dense brown silt trace gravel
														17.22	19.24	80.58	78.56	Very dense grey silt with gravel (till)
OW13-97	1997	463813	4872100	0.9	80.33	81.23	3.05	1.45	78.88	3.05	77.28	-	5.2	0.00	1.37	80.33	78.96	Firm brown fibrous peat
														1.37	2.13	78.96	78.20	Soft grey clayey silt, trace gravel (till)
														2.13	3.05	78.20	77.28	Very dense grey sandy silt, trace gravel, trace clay and cobbles (till)
OW14 - Leachate	2003	-	-	-	-	-	11.94	8.9	-	11.94	-	2	10.0	0.00	0.60	-	-	Gravel - dry
														0.60	4.57	-	-	Waste fill - black, strong odour, plastic and wire in cuttings and dry
														4.57	7.52	-	-	Fine sand - brown, dense, well sorted & dry
														7.52	11.94	-	-	Fine sand - brown, dense, well sorted & saturated
OW13D-04	2004	463802	4872096	0.74	80.36	81.1	9.6	7.4	72.96	8.9	71.46	2	4.9	0.00	1.20	80.36	79.16	Peat - black, saturated
														1.20	2.60	79.16	77.76	Silt - with trace of clay, medium brown becoming mottled grey-brown with depth, saturated
														2.60	5.80	77.76	74.56	Gravel - with sand, some silt, some cobbles to 4.3 m, 0.15 to 0.20 m thick layers of silt with some sand and angular gravel, brown with red iron staining 5.63m to 5.80m, loose, saturated.
														5.80	9.60	74.56	70.76	Till - silt with some sand and gravel, trace of clay, medium grey, compact becoming very dense with depth, wet becoming moist with depth.
OW13I-04	2004	463808	4872098	0.7	80.42	81.12	5.92	4.4	76.02	5.92	74.5	2	5.0	0.00	1.20	80.42	79.22	Peat - black, saturated
														1.20	2.60	79.22	77.82	Silt - with trace of clay, medium brown becoming mottled grey-brown with depth, saturated
														2.60	5.80	77.82	74.62	Gravel - with sand, some silt, some cobbles to 4.3 m, 0.15 to 0.20 m thick layers of silt with some sand and angular gravel, brown with red iron staining 5.63m to 5.80m, loose, saturated.
														5.80	5.92	74.62	74.50	Till - silt with some sand and gravel, trace of clay, medium grey, compact becoming very dense with depth, wet becoming moist with depth.
OW14-14	2014	463722	4872175	-	-	-	12.52	9.5	-	12.52	-	2	9.9	0.00	0.45	-	-	Silty fill - dry
														0.45	4.10	-	-	Waste fill - black, strong odour, plastic in cuttings - dry
														4.10	11.90	-	-	Sand - medium grey grading to brown in colour with depth, very fine to fine grained sand, moist. Soil has a distinct chemical odour.
														11.90	12.52	-	-	Silty very fine sand - brown, saturated.
OW11-16	2016	463660	4872218	0.8	96.2	96.98	19.8	15.2	81	18.3	77.9	-	10.2	0.00	0.60	96.20	95.60	Topsoil: 600mm, silty sand, trace organics, wet
														0.60	1.60	95.60	94.60	Sand and gravel: coarse, some silt, brown, wet
														1.60	3.20	94.60	93.00	Silty clay: some gravel, occasional sand pockets, light brown, moist to wet
														3.20	3.60	93.00	92.60	Silty sand and gravel: medium, light brown, moist
														3.60	3.90	92.60	92.30	Sand and gravel: coarse, greyish brown, moist to wet
														3.90	5.30	92.30	90.90	Silty clay till: some sand, some gravel, light brown, moist
														5.30	5.60	90.90	90.60	Sand and gravel, coarse, light brown, moist
														5.60	6.10	90.60	9.10	Silt clay till: some gravel, some medium sand pockets, brown, moist
														6.10	7.20	90.10	89.00	Silty clay: alternating layers of some gravel and medium sand layers
														7.20	7.70	89.00	88.50	Silty sand and gravel: medium, light brown, dry to moist
														7.70	8.30	88.50	87.90	Silty clay: some gravel, medium sand pockets, brown, moist
														8.30	9.10	87.90	87.00	Silty sand and gravel: medium, brown, dry to moist
														9.10	9.50	87.00	86.70	Sandy silt and gravel: some clay, brown, moist
														9.50	10.20	86.70	86.00	and: fine to medium, some gravel, some silt, brown, dry to moist
														10.20	17.70	86.00	78.50	Silty sand and gravel: medium, some clay, brown, moist
														17.70	19.80	78.50	76.40	Saturated
OW15	2016	463840	4872078	1.01	80.00	81.01	2.6	0.61	79.39	2.125	77.875	-	5.0	0.00	0.30	80.00	79.70	Topsoil: 300mm, trace organis, wet to saturated
														0.30	0.80	79.70	79.20	Silty clay: grey, some brown weathering, wet, dense
														0.80	1.40	79.20	78.70	Dark grey, some gravel, moist to wet, some root channels
														1.40	1.70	78.70	78.30	Sand and gravel: some silt, some clay, grey, saturated
														1.70	2.30	78.30	77.70	Silty clay: some sand, some gravel, brown, wet, dense
														2.30	2.60	77.70	77.40	Sand and gravel: coarse, brown, saturated
OW16	2016	463848	4872065	0.83	80.00	80.83	2.6	0.8	79.2	2.3	77.7	-	4.9	0.00	0.40	80.00	79.60	Topsoil: 360mm, trace organics, saturated
														0.40	0.50	79.60	79.50	Silt: layered with silty clay, rust staining in silt lenses, light grey, moist, dense
														0.50	0.80	79.50	79.20	Silty clay: some gravel, some coarse sand, greenish grey, moist, dense
														0.80	2.00	79.20	78.00	Dark grey and light grey mottled, smooth
														2.00	2.40	78.00	77.60	Sand and gravel: some silt, coarse brown saturated
														2.40	2.50	77.60	77.50	Silty clay: gdark grey
														2.50	2.60	77.50	77.40	Sand and gravel: coarse, saturated
TP4 (OW4-85)	1985	-	-	0.979	80.301	81.28	1.43	1.219	79.082	1.4	78.901	-	0.6	0.00	0.406	80.301	79.895	Peat
														0.406	0.762	79.895	79.539	Ywllow to grey silty sand with gravel
														0.762	1.430	79.539	78.871	Sandy gravel, some cobble
TP5 (OW5-85)	1985	-	-	0.024	80.286	80.31	2.57	1.85	78.44	2.025	78.261	2	0.6	0.00	0.20	80.286	80.083	Peat
														0.20	0.61	80.083	79.676	Light brown fine to medium sand, some gravel
														0.61	1.324	79.676	78.962	Silty sand, some gravel
														1.324	2.57	78.962	77.716	Grey sandy silt
TP6 (OW6-81)	1985	-	-	-	79.601	-	2.34	1.5	78.1	2.15	77.451	2	2.1	0.00	0.20	79.601	79.398	Black topsoil
														0.20	0.91	79.398	78.687	Light brown, silty sand
														0.91	2.34	78.687	77.261	Grey silty sand, some gravel
TP7 (OW7-85)	1985	-	-	0.151	83.022	83.173	2.563	1.4	81.622	2.14	80.9	2	2.4	0.00	0.20	83.022	82.819	Topsoil
														0.20	0.61	82.819	82.412	Brown silty sand, some gravel
														0.61	1.22	82.412	81.803	Greyish brown fine to medium sand
														1.22	2.44	81.803	80.584	Dense light brown silty sand
														2.44	2.56	80.584	80.459	Silt

Note - Information presented within this table has been obtained from Borehole logs prepared by others (WSP Annual Reports).
- HSA = Hollow Stem Auger

Shaded cells are values estimated from Borehole logs prepared by others (WSP Annual Reports)

TABLE 4
SUMMARY OF SURFACE WATER ANALYTICAL RESULTS

	PWQO	SW-1		SW-2	
Sampling Date	mg/L	May-24	Nov-24	May-24	Nov-24
Alkalinity	See Note	310	220	270	270
Chloride	NV	12.0	7.1	4.6	7.5
Nitrate	NV	0.19	<0.10	<0.10	<0.10
Nitrite	NV	<0.010	<0.010	<0.010	<0.010
Ammonia	NV	<0.050	<0.050	<0.050	<0.050
Un-ionized ammonia	0.02	<0.02	<0.02	<0.02	<0.02
Total Phosphorous	0.03*	<100	<0.020	<100	<0.020
Phenols	0.001	<0.0010	<0.0010	<0.0010	<0.0010
Dissolved Organic Carbon	NV	4.5	8.6	3.9	4.6
Conductivity (µS/cm)	NV	610	440	510	520
pH (unitless)	6.5 to 8.5	8.3	8.2	8.4	8.4
Sulphate	NV	7.6	9.4	4.1	9.6
Calc. Hardness (CaCO3)	NV	350	250	290	310
Barium	NV	20	16	31	27
Boron	0.2*	0.018	<10	0.015	0.017
Cadmium	0.0005*	--	--	--	--
Calcium	NV	84	63	79	76
Iron	0.3	**0.41**	0.15	0.27	<0.1
Lead	0.005*	--	--	--	--
Magnesium	NV	26	19	23	23
Manganese	NV	0.15	0.05	0.04	0.01
Potassium	NV	2.3	1.7	0.9	1.5
Sodium	NV	9.6	2.3	6.4	3.2
Field Tempurature (°C)	NA	12.00	5.9	12.90	5.8
Field Conductivity (µS/cm)	NV	490.00	500	489.00	590
Field pH (unitless)	6.5 to 8.5	7.45	7.75	8.23	8.18

Notes:

1. PWQO refers to the Provincial Water Quality Objectives established by the Ministry of the Environme
2. * denotes IPWQO - Interim Provincial Water Quality Objective (July 1994)
3. Alkalinity should not be decreased by more than 25% of the natural background concentration
4. A Total Phosphorous concentration of 0.03 mg/L applies to streams and rivers
5. Un-ionized ammonia calculated using pH and Temperature per PWQO Guidelines
6. NM = Not Monitored; NV = No value specified; NA = Not Applicable
7. Concentrations in mg/L unless otherwise specified; µS/cm = microsiemens per centimeter
8. Values shaded and in bold represent results greater than the PWQO

TABLE 5
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Parameter	Background (mg/L)	ODWS (mg/L)	RUC (mg/L)	Upgardient Monitoring Locations							
				OW6		OW7		OW12		OW11-16	
				8-May-24	27-Nov-24	8-May-24	27-Nov-24	8-May-24	27-Nov-24	8-May-24	27-Nov-24
Alkalinity (OG)	323	500	412	260	310	270		320	330	310	300
Chloride (AO)	3.46	250	127	3.2	3.5	1.6		2.1	1.9	2.6	1.5
Nitrate (MAC)	1.98	10	0.30	<0.10	<0.10	0.29		0.35	0.31	4.96	0.91
Nitrite (MAC)	0.06	1.0	3.99	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Ammonia	0.03	NV	NA	0.19	0.36	<0.05		<0.05	<0.05	<0.05	<0.05
Total Kjeldahl Nitrogen	0.25	NV	NA	0.39	0.70	<0.10		0.11	0.15	<0.20	1.5
DOC (AO)	1.7	5.0	3.4	0.94	1.5	0.68		1.0	1.2	0.5	1.2
Conductivity (uS/cm)	618	NV	NA	530	600	500		690	670	620	550
pH (Unitless)	7.89	6.5 to 8.5		8.17	8.06	8.19	ISW	8.17	8.13	7.95	7.94
Sulphate (AO)	5.46	500	253	15	12	2.1		49	47	3.5	3.4
Hardness (OG)	358	80-100	358	**250**	**330**	**280**		**370**	**360**	**380**	**340**
Boron (MAC)	0.03	5.0	1.3	0.03	0.02	<0.01		0.40	0.37	<0.01	0.03
Calcium	96	NV	NA	63	87	76		68	67	100	92
Iron (AO)	0.02	0.3	0.16	<0.10	<0.10	<0.10		<0.10	<0.10	<0.10	<0.10
Magnesium	28.8	NV	NA	23	28	22		50	48	30	27
Potassium	0.46	NV	NA	0.79	0.91	0.56		8.6	9.5	0.49	0.45
Sodium (AO)	2.7	200	101	9.0	6.6	1.4		5.6	5.1	1.7	1.4
Field Measurements											
Conductivity (Field-uS/cm)	495	NV	NV	509	640	506		663	730	653	620
pH (Field-Unitless)	7.54	6.5 to 8.5		7.83	7.49	7.63		7.56	7.61	7.49	7.65

Parameter	Background (mg/L)	ODWS (mg/L)	RUC (mg/L)	Downgradient Monitoring Locations															
				OW4		OW5		OW13S		OW13I		OW13D		OW14		OW15		OW16	
				8-May-24	27-Nov-24	8-May-24	27-Nov-24	8-May-24	27-Nov-24	8-May-24	27-Nov-24	8-May-24	27-Nov-24	8-May-24	27-Nov-24	8-May-24	27-Nov-24	8-May-24	27-Nov-24
Alkalinity (OG)	323	500	412	300	**650**	340	250	400	**510**	450	450	230	250	**630**		430	340	280	350
Chloride (AO)	3.46	250	127	12	10	98	<1.0	7.1	11	14	10	6.5	6.4	34		39	9.0	7.5	4.7
Nitrate (MAC)	1.98	10	0.30	<0.10	1.2	0.15	<0.10	0.80	1.4	<0.10	3.2	0.11	<0.10	0.11		<0.10	<0.10	0.26	<0.10
Nitrite (MAC)	0.06	1.0	3.99	<0.01	0.03	<0.01	<0.01	0.05	0.06	<0.01	0.08	<0.01	<0.01	<0.01		<0.01	<0.01	0.02	<0.01
Ammonia	0.03	NV	NA	<0.05	28	<0.05	0.07	3.0	7.8	5.2	2.2	0.06	0.20	2.8		0.16	0.06	<0.050	0.10
Total Kjeldahl Nitrogen	0.25	NV	NA	0.10	30	0.10	0.23	3.4	8.5	5.7	3.6	0.15	0.26	3.6		1.0	0.88	0.73	0.55
DOC (AO)	1.7	5.0	3.4	1.7	**7.6**	2.2	1.6	2.4	3.9	3.1	3.3	0.7	1.0	**23**		3.8	**12**	1.5	**8.0**
Conductivity (uS/cm)	618	NV	NA	810	1200	1000	490	900	1100	1000	980	540	580	1300		1200	690	590	620
pH (Unitless)	7.89	6.5 to 8.5		8.2	7.7	8.2	8.3	8.0	7.8	7.9	7.9	8.2	8.2	7.6	ISW	8.0	8.0	8.1	8.1
Sulphate (AO)	5.46	500	253	110	9.4	30	14	68	69	78	73	42	45	56		180	32	22	2.0
Hardness (OG)	358	80-100	358	**400**	**590**	**420**	**260**	**460**	**560**	**590**	**530**	**220**	**260**	**670**		**570**	**380**	**310**	**370**
Boron (MAC)	0.03	5.0	1.3	0.06	0.37	0.13	0.02	0.42	0.47	0.54	0.47	0.04	0.06	0.17		0.27	0.10	0.01	0.02
Calcium	96	NV	NA	90	180	87	62	110	130	130	120	53	64	210		130	96	84	99
Iron (AO)	0.02	0.3	0.16	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		<0.10	<0.10	<0.10	<0.10
Magnesium	28.8	NV	NA	43	32	49	26	45	55	63	55	21	25	34		60	33	25	29
Potassium	0.46	NV	NA	1.3	17	1.5	0.90	19	25	21	23	0.8	1.4	15		2.3	2.6	1.1	0.7
Sodium (AO)	2.7	200	101	17	25	38	3	10	16	22	16	13	14	25		29	6.5	2.9	3.2
Field Measurements																			
Conductivity (uS/cm)	495	NV	NV	1200	1270	497	550	903	1120	1126	1090	532	610	1331		1140	750	533	660
pH (Unitless)	7.54	6.5 to 8.5		6.86	6.91	8.02	8.08	7.19	7.03	7.14	7.26	7.78	7.67	6.76		7.12	7.29	7.49	7.46

Notes:
1. ODWS = Ontario Drinking Water Standards (June 2003, Revised June 2006)
2. AO: Aesthetic Objective; OG = Operational Guideline; MAC = Maximum Acceptable Concentration; IMAC = Interim Maximum Acceptable Concentration
3. NV = No value specified
4. NM = Not Measured
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 Bureau Veritas Laboratories
8. Results presented in mg/L unless otherwise specified; µS/cm = microsiemens per centimeter

TABLE 6
REASONABLE USE CRITERIA

GROUNDWATER INDICATOR PARAMETERS KINLOSS LANDFILL SITE					
Parameter	**Units**	**Background Concentration (Cb)**	**Maximum Concentration (Cr)**	**ODWS Classification**	**Objective Level (Cm)**
Conductivity	µS/cm	619	NV	NV	NV
Hardness	mg/L	358	80 to 100	OG	358
pH	unitless	7.89	6.5 to 8.5	OG	6.5-8.5
Alkalinity	mg/L	323	500	OG	412
Chloride	mg/L	3.46	250	AO	127
Nitrate	mg/L	1.98	10	MAC	3.99
Nitrite	mg/L	0.06	1	MAC	0.30
DOC	mg/L	1.74	5	AO	3.37
Ammonia	mg/L	0.03	NV	NA	NV
TKN	mg/L	0.25	NV	NA	NV
Boron	mg/L	0.02	5	IMAC	1.27
Sulphate	mg/L	5.46	500	AO	253
Iron	mg/L	0.02	0.3	AO	0.16
Sodium	mg/L	2.69	200	AO	101

Notes:
Background concentrations are derived from the averages of OW11-16 from 2016 to 2024
NV = No Value
AO = Aesthetic Objective
OG = Operational Guideline
MAC = Maximum Acceptable Concentration (Health Related Paramater)
Concentrations in mg/L unless otherwise specified

MOE Procedure B-7-1

Cm = Cb+x (Cr-Cb)

Where:

Cm = Maximum Concentration Acceptable in Groundwater at Property Line
Cb = Background Concentrations taken from OW11-16
Cr = Maximum Concentration Acceptable as per the Ontario Drinking Water Standards (ODWS)
x = A Constant, 0.5 for Non-Health related Parameters, and 0.25 for Helath Related Parameters

TABLE 7
SUMMARY OF GAS MONITORING RESULTS

DATE	Oxygen (% by volume)			Methane (% by volume)			LEL (% by volume)		
	GP1	GP2	GP3	GP1	GP2	GP3	GP1	GP2	GP3
July-07	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
January-08	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
July-08	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
January-09	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
December-09	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
March-10	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
February-11	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
March-12	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
February-13	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
January-14	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
January-15	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
February-16	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
June-16	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
November-16	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
February-17	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
June-17	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
November-17	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
February-18	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
May-18	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
November-18	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
February-19	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
June-19	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
November-19	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
February-20	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
July-20	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
November-20	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
February-21	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
June-21	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
November-21	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
February-22	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
June-22	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
November-22	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
May-23	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
September-23	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
February-23	NM	NM	NM	NM	NM	NM	0.0	0.0	0.0
April-24	19.6	19.4	19.6	0.0	0.0	0.00	0.0	0.0	0.0
October-24	16.3	10.8	20.3	0.0	0.0	0.00	0.0	0.0	0.0

Notes:
1. NM = Not Monitored.
2. LEL = Lower Explosive Limit

Figures

SITE LOCATION PLAN

KINLOSS LANDFILL SITE

Figure No. 1

GEI Consultants
GEI CONSULTANTS, CANADA, LTD.
1260-2ND AVENUE EAST
OWEN SOUND, ONTARIO N4K 2J3
(519)376-1805

2402749
MARCH 2025
Scale: 1:15000 | NAD 1983 UTM Zone 17N

FILE:B:\Working\HURON KINLOSS ON, TWP OF\2402749 - 2240581 Annual Monitoring & Reporting - Kinloss Landfill Site\Drawings\2402749 - Figure 1 - Site Location.dwg LAYOUT:Site Location
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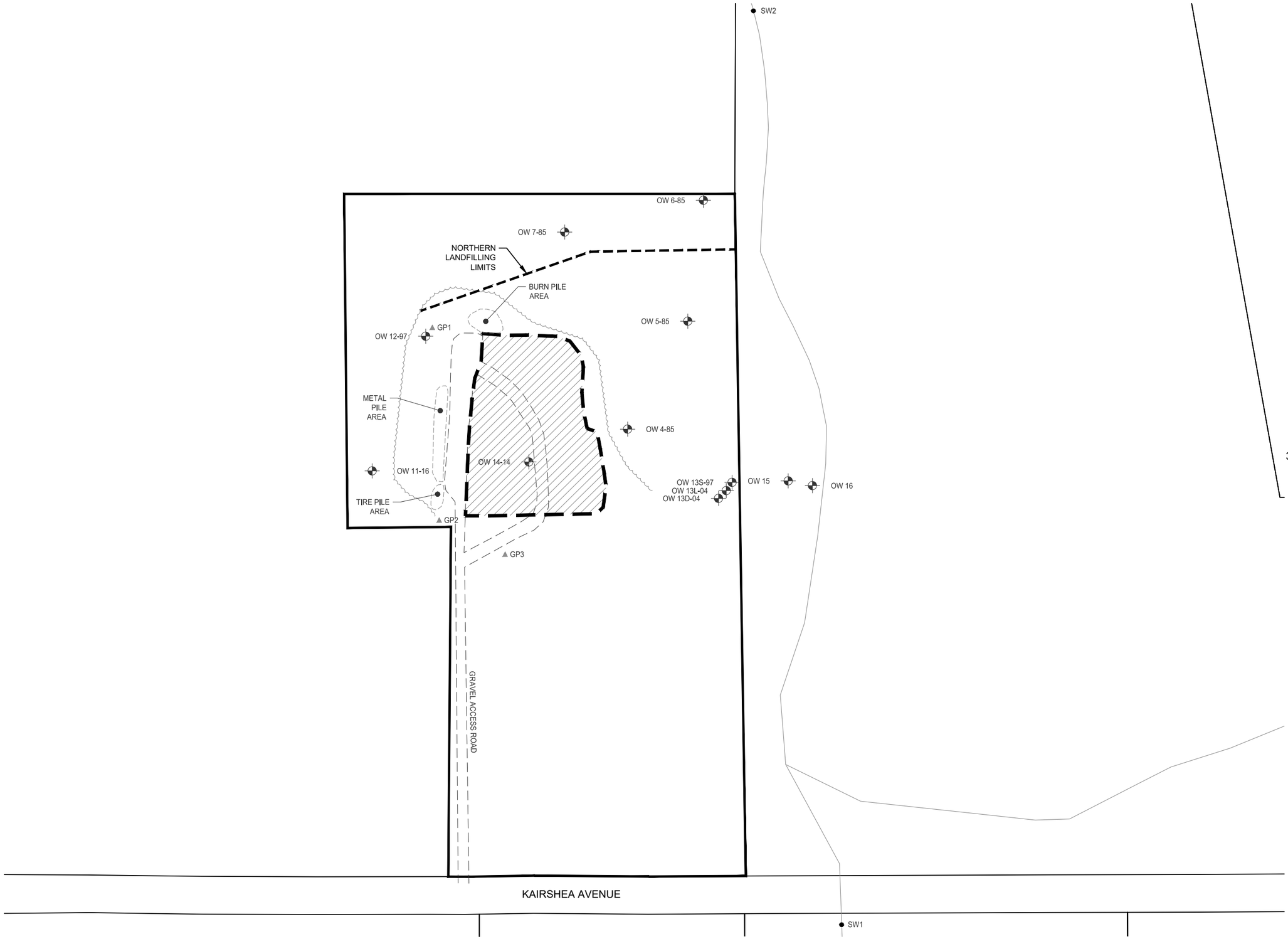


HURON-KINLOSS TOWNSHIP

LEGEND

- PROPERTY LINE
- WATERCOURSE
- SITE BOUNDARY
- WASTE BOUNDARY
- EDGE OF GRAVEL
- GP# GAS PROBE
- OW## OBSERVATION WELL
- SW# SURFACE WATER SAMPLING LOCATION

30 0 20 40 80

1:2000 (m)

SITE LAYOUT

KINLOSS LANDFILL SITE

Figure No. 2

GEI Consultants
GEI CONSULTANTS, CANADA, LTD.
1260-2ND AVENUE EAST
OWEN SOUND, ONTARIO N4K 2J3
(519)376-1805

2402749
MARCH 2025
Scale: 1:2000 | NAD 1983 UTM Zone 17N

SURFACE WATER SAMPLING LOCATION SW2 LOCATED NORTH EAST OF SITE

HURON-KINLOSS TOWNSHIP

OW 6-85

OW 7-85

NORTHERN LANDFILLING LIMITS

BURN PILE AREA

OW 5-85

GP1

OW 12-97

ACTIVE LANDFILLING AREA

METAL PILE AREA

OW 4-85

OW 14-14

OW 11-16

TIRE PILE AREA

GP2

GP3

OW 13S-97

OW 13L-04

OW 13D-04

OW 15

OW 16

LEGEND

- PROPERTY LINE
- WATERCOURSE
- SITE BOUNDARY
- WASTE BOUNDARY
- EDGE OF GRAVEL
- GP# GAS PROBE
- OW## OBSERVATION WELL

30 0 20 40 80

1:2000 (m)

SURFACE WATER SAMPLING LOCATION SW1 LOCATED SOUTH OF KAIRSHEA AVE

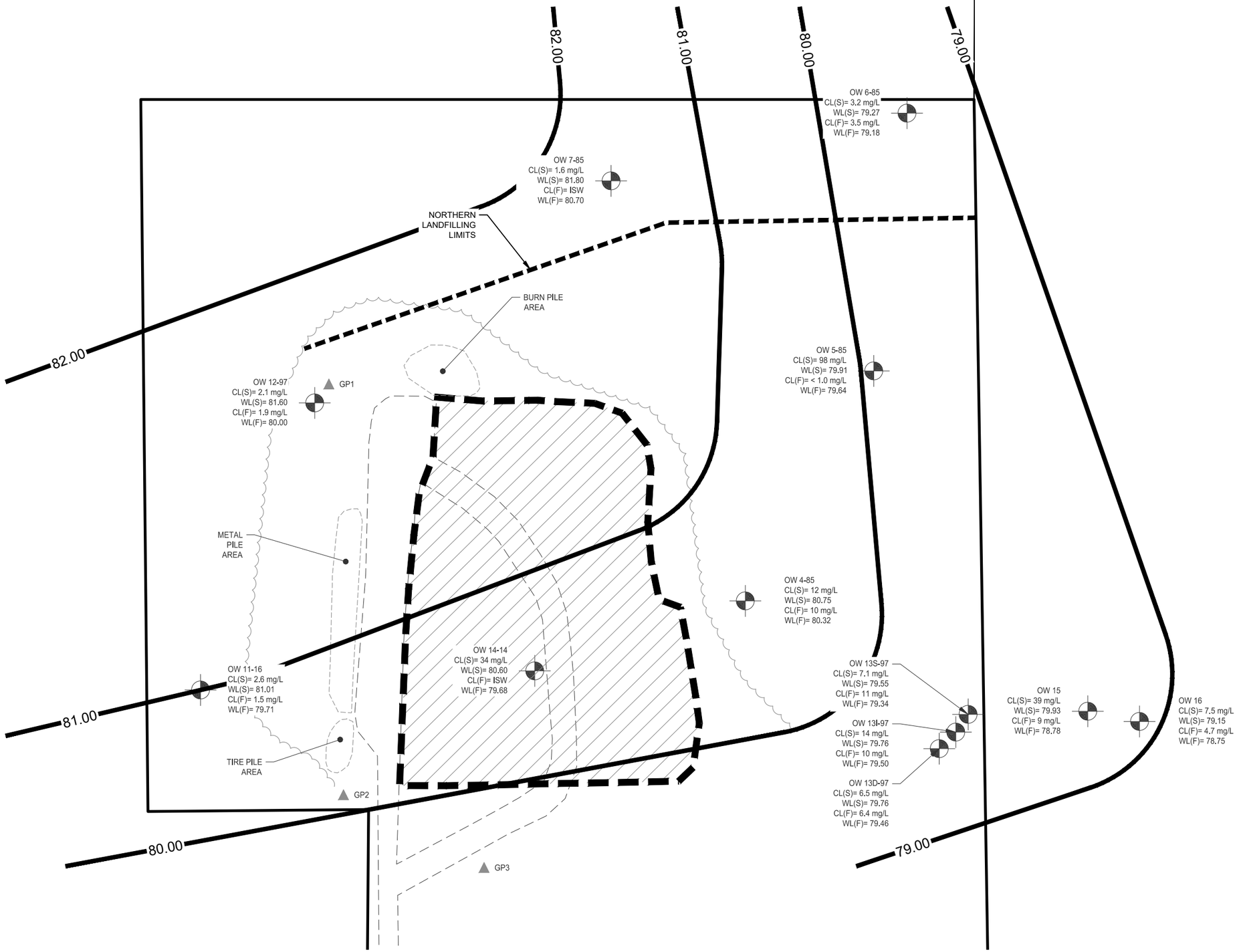
EXISTING CONDITIONS

KINLOSS LANDFILL SITE

Figure No. 3

GEI Consultants
GEI CONSULTANTS, CANADA, LTD.
1260-2ND AVENUE EAST
OWEN SOUND, ONTARIO N4K 2J3
(519)376-1805

2402749
MARCH 2025
Scale: 1:1000 | NAD 1983 UTM Zone 17N



HURON-KINLOSS TOWNSHIP

LEGEND

- PROPERTY LINE
- WATERCOURSE
- SITE BOUNDARY
- WASTE BOUNDARY
- EDGE OF GRAVEL
- GP# GAS PROBE
- OW## OBSERVATION WELL
- 80.00 GROUND WATER CONTOUR

15 0 10 20 40

1:1000 (m)

GROUND WATER FLOW MAP

KINLOSS LANDFILL SITE

Figure No. 4

GEI Consultants
GEI CONSULTANTS, CANADA, LTD.
1260-2ND AVENUE EAST
OWEN SOUND, ONTARIO N4K 2J3
(519)376-1805

2402749
MARCH 2025
Scale: 1:1000 | NAD 1983 UTM Zone 17N

FILE:B:\Working\HURON KINLOSS ON, TWP OF\2402749 - 2240581 Annual Monitoring & Reporting - Kinloss Landfill Site\Drawings\2402749 - Figure 4 - GW Flow Map.dwg LAYOUT:GW Flow Map
LAST SAVED BY:Chrpol4099, 3/26/2025 1:34:22 PM PLOTTED BY:Polhamus, Christopher 3/26/2025 1:36:21 PM

Appendix A **Environmental Compliance Approval No. A272801**

Ministry of the Environment
Ontario

Provisional Certificate No. A 272801

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 Kinloss
Holyrood, Ontario
N0G 2B0

for the use and operation of a 6 hectare (15 acre) landfilling site

all in accordance with the following plans and specifications: 1.Plan of operation submitte to the Owen Sound District Office of MOE under cover of a letter dated August 23, 197 2. Site plan entitled "Kinloss Township Waste Disposal Site."

Located: Part Lot 16, Concession 6
Township of Kinloss
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 10% non-hazardous solid industrial (limited to miscellaneous debris from agriculture such as wire, stumps and scrap metal) wastes.

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 1st day of October 1980

Director, Section 39.

Ontario

NOTICE

TO: Township of Kinloss
Holyrood, Ontario
N0G 2B0

You are hereby notified that Provisional Certificate of Approval No. A 272801 has been issued to you subject to the conditions outlined therein.

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

The reason for the condition requiring registration of the Certificate is that Section 46 of The Environmental Protection Act, 1971 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 the 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.

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.

This Notice should be served upon:

The Secretary,
Environmental Appeal Board,
1 St. Clair Ave. West,
5th Floor,
Toronto, Ontario.
M4V 1K7

AND

The Director,
Section 39
Ministry of the Environment,

DATED this 1st day of October , 1980 .

NOTICE OF AMENDMENT

TO: Township of Kinloss
Holyrood, Ontario
N0G 2B0

You are hereby notified that the approval issued to you under Certificate of Approval No. A2728 *dated* October 1, 1980 *is hereby amended as follows:*

The following Condition and corresponding reason is added to the Provisional Certificate of Approv

2. *the Municipality shall submit an* annual report prepared by their consultar to the Owen Sound District Officer, Ministry of the Environment addressing the following requirements:

   1) volumes of waste received; remaining capacity and site lif expectancy;

   2) review of operating procedures, and any deficiencies therein

   3) the results of any surface water or ground water monitorin programs which may be initiated; and

   4) the extent and success of the recycling program established by the Township.

This report is to be submitted each year by March 31st, commencing March 31, 1993.

The reason for this addition is to ensure that the necessary studies are completed in order to ensure the protection of the natural environment.

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

The portions of the approval or each term or condition in the approval in respect of which the hearing required, and;
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:

The name of the appellant;
The address of the appellant;
The Certificate of Approval number;
The date of the Certificate of Approval;
The name of the Director;
The municipality within which the sewage works are located;

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

This Notice must be served upon:

Secretary,
onmental Appeal Board,
t. Clair Avenue West,
te 502,
oronto, Ontario.
V 1N3

AND

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

ATED AT LONDON this 12th *day of* February, 1993

Director
Section 39,
Environmental Protection Act

W. Page
Director, Approvals Branch
Director, Waste Management Branch
File

NOTICE OF AMENDMENT

TO: Township of Kinloss
Holyrood, Ontario
N0G 2B0

You are hereby notified that the approval issued under Certificate of Approval No. A272801 dated October 1, 1980, including all revisions, is hereby amended to the following:

The following conditions are added:

3. Monitoring of groundwater and surface water at the waste disposal site shall be carried out each year to the satisfaction of the Director of the Southwestern Region of the Ministry of the Environment and Energy.

4. Any changes to the monitoring programs for groundwater or surface water must be approved by the Director of the Southwestern Region of the Ministry of the Environment and Energy in writing.

The reasons for the addition of these conditions are:

3. The reason for Condition 3 is to ensure that the appropriate monitoring takes place so that the environmental impact of the waste disposal site can be assessed.

4. The reason for Condition 4 is to ensure that any changes made to the monitoring programs accurately reflect the impact of the waste disposal site on the natural environment.

The following document is added as supporting information to this Certificate of Approval:

"Township of Kinloss Waste Disposal Site Plan of Operation & Development and Hydrogeologic Assessment" dated December 1991 and prepared by Paragon Engineering Ltd.

This Notice shall constitute part of the approval issued under Certificate of Approval No. A272801 dated October 1, 1980, including all revisions.

You may by written notice served upon me and the Environmental Appeal Board within 1: days after receipt of this Notice, require a hearing by the Board. Section 142, of the Environmen Protection Act, R.S.O., 1990, c. E-19, as amended, provides that the Notice requiring the hearin 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 works are located;

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

This Notice must be served upon:

The Secretary,
Environmental Appeal Board,
112 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 27th day of February, 1996

D. Richardson

Director,
Section 39,
Environmental Protection Act

Ministry of the Environment
Environmental Assessment and
Approvals Branch
Floor 12A
2 St Clair Ave W
Toronto ON M4V 1L5
Fax: (416)314-8462
Telephone:

Ministère de l'Environnement
Direction des évaluations et des
autorisations environnementales
Étage 12A
2 av St Clair O
Toronto ON M4V 1L5
Télécopieur: (416)314-8462
Téléphone :

Ontario

April 30, 2003

Mary Rose Walden, Adminstrator
PO Box 130
Ripley, Ontario
N0G 2R0

Dear Sir/Madam:

Re: Notification of Change of Name/Address
MOE Reference Number 1923-5M4HNL

The Ministry of the Environment (the "Ministry") acknowledges receipt of your letter dated April 10, 2003 requesting a change in company name/address:

FROM: The Township of Kinloss
Holyrood, Ontario
N0G 2B0

TO: The Corporation of the Township of Huron-Kinloss
PO Box 130
Ripley, Ontario
N0G 2R0

By this letter, the Ministry advises you that your notification of change in company name/address has been registered in our records for the following Certificate(s) of Approval:

Certificate(s) of Approval for Waste Disposal Sites, Section 27, EPA:

A272801

The Ministry will not be providing you with an amended certificate(s) to reflect the change in company name/address. Therefore, this letter must be appended to its corresponding Certificate(s) of Approval. The name/address change will be included in any future amended Certificate(s) of Approval.

If you have any questions regarding the above, please contact me at the above phone number.

Yours truly,

Michael Durst
Application Processor

cc: District Manager, Owen Sound

File Storage Number: 0899

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A272801
Issue Date: January 12, 2024

The Corporation of the Township of Huron-Kinloss
21 Queen St Ripley
Huron-Kinloss, Ontario
N0G 2R0

Site Location: Kinloss Landfill Site
Lot 16, Concession 6
Huron-Kinloss Township, County of Bruce, ON

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the use and operation of a 3.9 hectare area of a total site area of 6.0 ha for landfilling of domestic, commcerical and 10% non-hazardous solid industrial (limited to miscellaneous debris from agriculture such as wire, stumps and scrap metal) wastes.

For the purpose of this environmental compliance approval, the following definitions apply:

"Adverse Effect" is as defined in the Environmental Protection Act, R.S.O. 1990.
"Director " means any Ministry employee appointed in writing by the Minister pursuant to section 5 of
the EPA as a Director for the purposes of Part V of the EPA;
"District Manager" means the District Manager of the local district office of the Ministry for the Region in which the Site is geographically located;
"Environmental Compliance Approval" or "ECA" or "Approval" means this entire provisional Environmental Compliance Approval document, issued in accordance with Section 20.3 of the EPA , and includes any schedules to it, the application and the supporting documentation listed in schedule "A";
"EPA " or "Act" means Environmental Protection Act , R.S.O. 1990, c. E. 19, as amended from time to time;
“MECP” or “Ministry” refers to the Ontario Ministry of the Environment, Conservation and Parks;
"NMA" means the Nutrient Management Act, 2002, S.O. 2002, c. 4, as amended;
"OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c.0.40;
"Operator " means any person, other than the Owner's employees, authorized by the Owner as having the charge, management or control of any aspect of the site;
"Owner" or "Company" means any person that is responsible for the establishment or operation of the site being approved by this ECA, and includesThe Corporation of the

Township of Huron-Kinloss, its successors and assigns;
“PA ” means the Pesticides Act, R.S.O. 1990, c. P-11, as amended from time to time;
“Provincial Officer” means any person designated in writing by the Minister as a provincial officer pursuant to Section 5 of the OWRA, Section 5 of the EPA, Section 17 of the PA, Section 4 of the NMA, or Section 8 of the SDWA;
"Site" means the entire Kinloss Landfill Site, described in this ECA, located on Lot 16, Concession 6, Huron-Kinloss Township, County of Bruce, Ontario.
"SDWA" means the Safe Drinking Water Act, 2002, S.O. 2002, c. 32, as amended;
"Trained Personnel" means knowledgeable in the following through instruction and/or practice:

a. relevant waste management legislation, regulations and guidelines;
b. major environmental concerns and their management , including fire hazard, pertaining to the waste to be handled and that is stored at the Site;
c. occupational health and safety concerns pertaining to the processes and wastes to be handled;
d. management procedures including the use and operation of equipment for the processes and wastes to be handled;
e. emergency response procedures;
f. specific written procedures for the control of nuisance conditions; and
g. the requirements of this ECA.

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

TERMS AND CONDITIONS

I GENERAL

Compliance

1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Site is notified of the ECA and the conditions herein and shall take all reasonable measures to ensure the person complies with the same.
2. Any person authorized to carry out work on or operate any aspect of the Site shall comply with the conditions of this ECA .

In Accordance

3. Except as otherwise provided for in this ECA , the Site shall be designed, developed, constructed, operated and maintained in accordance with the applications for this ECA and the supporting documentation incorporated into this ECA in Schedule “A”.

Other Legal Obligations

4. The issuance of, and compliance with, this ECA does not:
a. relieve any person of any obligation to comply with any provision of the EPA or any other applicable statute, regulation or other legal requirement; or
b. limit in any way the authority of the Ministry to require certain steps be taken or to

request that any further information related to compliance with this ECA be provided to the Ministry ;
unless a provision of this ECA specifically refers to the other requirement or authority and clearly states that the other requirement or authority is to be replaced or limited by this ECA.

Adverse Effect

5. The Owner or Operator remain responsible for any contravention of any other condition of this ECA or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused an adverse effect or impairment of air and/or water quality.

Furnish Information

6. Any information requested by the Director or a Provincial Officer concerning the Site and its operation under this ECA , including but not limited to any records required to be kept by this ECA shall be provided in a timely manner.

7. The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action, under this ECA or under any statute, regulation or subordinate legal instrument, in relation to the information, shall not be construed as:

a. an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any condition of this ECA or any statute, regulation or other subordinate legal requirement; or

b. acceptance by the Ministry of the information's completeness or accuracy.

8. Any information related to this ECA 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, RSO 1990, CF-31.

Interpretation

9. This ECA revokes and replaces the previous waste approvals and all subsequent amendments issued to this Site.

10. Where there is a conflict between a provision of any document, including the application, referred to in this ECA and the conditions of this ECA, the conditions in this ECA shall take precedence.

11. Where there is a conflict between the application and a provision in any documents listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and that the Ministry approved the amendment in writing **.**

12. Where there is a conflict between any two documents listed in Schedule "A", other than the application, the document bearing the most recent date shall take precedence.

13. The conditions of this ECA are severable. If any condition of this ECA , or the application of any condition of this ECA to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this ECA shall not be affected thereby.

Certificate of Requirement

14. Pursuant to Section 197 of the EPA , no person having an interest in the Site shall

deal with the Site in any way without first giving a copy of this ECA to each person acquiring an interest in the Site as a result of the dealing.
15. By January 31st, 2025, a copy of completed Certificate of Requirement, containing a registerable description of the Site, shall be submitted to the Director for approval.
16. In the event any additional land is acquired that will be included as part of the Site as discussed in Condition 15 then the Certificate of Requirement shall be registered in the appropriate land registry office on title to the Site and a duplicate registered copy shall be submitted to the Director within ten (10) calendar days of receiving the Certificate of Requirement signed by the Director.

Certificate of Withdrawal of Requirement

17. If the Owner wants to withdraw the Certificate of Requirement, the Owner shall:
(a) submit to the Director, a completed Certificate of Withdrawal of Requirement; and its supporting documents, outlining the reasons for the Withdrawal of the Requirement.
(b) submit to the Director:

(i) a plan of survey of the area where waste was deposited sealed by an Ontario Land Surveyor and for the Site;
(ii) a letter signed by a member of the Law Society of Upper Canada or other qualified legal practitioner acceptable to the Director verifying the legal description of the Certificate of Withdrawal of Requirement,
(iii) the legal abstract of the property; and
(iv) completed Certificate of Withdrawal of Requirement containing a registerable description of the Site.

(b) within fifteen (15) calendar days of receiving a Certificate of Withdrawal of Requirement authorized by the Director, the Owner may:

(i) register the Certificate of Withdrawal of Requirement in the appropriate Land Registry Office on the title to the property; and
(ii) submit to the Director and District Manager, written verification that the Certificate of Requirement has been registered on title.

No Transfer or Encumbrance

18. No portion of this Site shall be transferred or encumbered prior to or after closing of the Site unless the Director is notified in advance and is satisfied with the arrangements made to ensure that all conditions of this ECA will be carried out and that sufficient financial assurance is deposited with the Ministry to ensure that these conditions will be carried out.

Change of Owner

19. The Owner shall notify the Director, in writing, and forward a copy of the notification to the District Manager , within 30 days of the occurrence of any changes in the following information:
a. the ownership of the Site;
b. the Operator of the Site;
c. the address of the Owner or Operator;
d. the 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 , R. S. O. 1990, c. B.17, shall be included in the notification; and
e. the name of the corporation where the Owner or Operator is or at any time becomes a corporation, other than a municipal 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.

20. In the event of any change in the ownership of the Site, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this ECA, and a copy of such notice shall be forward to the Director and District Manager .

Inspections by the Ministry

21. No person shall hinder or obstruct a Provincial Officer from carrying out any and all inspections authorized by the OWRA, the EPA, or the PA, of any place to which this Approval relates, and without limiting the foregoing:
a. to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this Approval are kept;
b. to have access to, inspect, and copy any records required to be kept by the conditions of this Approval;
c. to inspect the Site, related equipment and appurtenances;
d. to inspect the practices, procedures, or operations required by the conditions of this Approval; and
e. to sample and monitor for the purposes of assessing compliance with the terms and conditions of this Approval or the EPA, the OWRA or the PA.

Operations

22. A sign shall be posted, such that it is visible from the nearest public road, with the following information:
a. Name of the Site and Owner;
b. Approval Number for the Site;
c. Days and hours of operation;

d. Allowable and prohibited waste types in the landfill;
e. Contact telephone number(s) in the event of an emergency and/or complaint; and
f. Warning against unauthorized access and against dumping outside the Site.
23. The Owner shall ensure that:
a. access to the Site is restricted by fencing and/or natural features;
b. fencing and lockable gate are kept in good repair; and
c. the Site is screened from public view on all sites.
24. The Owner shall clearly post the hours of operation at the landfill gate. Hours of operation may be changed by the Owner at any time provided that the hours are correctly posted at the landfill gate and that suitable public notice is given of any change.
25. No waste shall be received at the Site except during the hours of operation and under the supervision of an attendant.
26. The Owner shall ensure that during non-operating hours, the entrance/exit gate shall be locked to prevent access by unauthorized persons.
27. During non-operating hours, the Owner may conduct equipment maintenance and on-site activity, as required, provided that these activities take place during daylight hours.

Design and Operations Report

28. At least two years prior to the commencment of the landfilling operations at the Site, the Owner shall submit for the Director's approval, a Design and Operations Report including contamination attenuation zone (CAZ) assessment that includes as a minimum the following information:
a. landfill design including the footprint, final contours, capacity and an estimate of the amount of existing waste;
b. an estimate of waste types and quantities to be landfilled at the site including recycling and resource recovering activities at the Site;
c. location and description of the access road and the on-site roads at the Site;
d. description and location of the fencing and the gate(s);
e. screening of the Site from the public, both visual and the protection from the noise impact;
f. details of the surface water drainage from the Site and any works required to prevent extraneous surface water from contacting the active working face;
g. description of the fill method, the equipment used at the Site, the areas used for various fill methods of landfilling, and timelines for various phases of the Site development;
h. the operating hours of the Site and the hours for the various activities to be undertaken at the Site, including waste compaction, waste coverage and other activities within the Site;
i. Contamination Attenuation Zone (CAZ) and its extent;
j. the equipment used and the procedures used for waste deposition, spreading and covering;
k. details on supervision and monitoring of the activities at the Site;

l. details on handling of other wastes, including the types and amounts of wastes handled, storage locations, storage facility design/description and the frequency of removal from the Site;
m. details on housekeeping practices undertaken to control noise, dust, litter, odour, rodents, insects and other disease vectors, scavenging birds or animals;
n. details on the closure of the Site, including the description of the final cover and its estimated permeability, its thickness, the source of the final cover material, the thickness of the top soil and the vegetation proposed for the closed waste mound, as well as the timeframe for the progressive waste coverage;
o. monitoring program for the surface and ground water, landfill gases and leachate;
p. site-specific trigger mechanism program for the implementation of the groundwater and surface water, contingency measures and a description of such measures;
q. landfill gas control or management required at the Site;
r. maintenance activities proposed for the Site and for the monitoring well network, including the type of the activities, the frequency of the activities and the personnel responsible for them;
s. inspection activities proposed for the Site, including the frequency of the activities and the personnel responsible for them;
t. details of training provided for the personnel responsible for the activities at the Site;
u. contingency plans for the emergency situations that may occur at the Site;
v. storm water management, including the location and the design of any works required; and
w. any other information relevant to the design and operation of the Site or the information required by the District Manager.
The Design and Operations Report shall be retained, kept up to date through periodic revisions, and made available for inspection by Ministry staff. Changes to the Design and Operations Report other than the relocation of the storage areas shall be submitted to the Director for approval.
29. The Site is temporarily closed and the Owner shall not receive any waste at the Site. Should the Owner wish to recommence landfilling operations at the Site, the Owner would first have to obtain an amendment Approval to this ECA.

Nuisance Control

30. The Owner shall operate and maintain the Site in a manner which ensures the health and safety of all persons and the protection of the environment through active prevention of any possible environmental adverse effects, including but not be limited to odours, dust, litter, vectors, vermin, rodents and noise.
31. Open fire burning of wood waste on a wood waste disposal site is not permitted.

Emergency Response and Reporting

32. The Owner shall ensure that Site attendant(s) has access to a reliable means of summoning assistance (e.g. telephone, cellular phone, mobile radio) at all times.
33. (a) The Owner shall promptly take all necessary steps to contain and clean up any spills or upsets, including uncontrolled run-off to tile beds, drains, surface-water and groundwater supplies and wells, which result from this operation.

(b) All spills, as defined in the Act, shall be immediately reported to the Ministry's Spill Action Centre at 1-800-268-6060 and shall be recorded in a written log or an electronic file format, as to the nature of the spill and action taken for clean-up, correction and prevention of future occurrences.

Training

34. Owner shall ensure that all Site attendants are trained, through instruction and practice, with respect to the following areas:
a. terms, conditions and operating requirements of this Approval;
b. operation and management of the Site;
c. any environmental concerns pertaining to the wastes and recyclable/reusable materials to be accepted at the Site;
d. proper receiving and recording procedures (including recording procedures of wastes which are refused at the Site);
e. proper storage, handling, sorting and shipping/manifesting procedures;
f. relevant waste management legislation, including but not limited to Ontario Regulation 347, R.R.O. 1990, and
g. procedures to be followed in the event of an emergency situation including notification requirements.

Complaints

35. If at any time, the Owner receives complaints regarding the operation of the Site which could result in an environmental or public health or safety concern, the Owner shall respond to these complaints according to the following procedure:
a. The Owner shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint;
b. The Owner, upon notification of the complaint, shall initiate appropriate steps to determine all possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint and forward a formal reply to the complainant; and
c. The Owner shall complete and retain a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and any recommendations for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents. These shall be made available to a Provincial Officer upon request.

Record Keeping and Inspections

36. The Owner shall maintain, at the Company office or Site, a log book which records the following information for the previous two (2) years:
a. date of record;
b. record of any monitoring of surface water or ground water at the Site;

c. a record of site inspection required by Conditions 34 & 35.
37. The Owner shall conduct monthly inspections of the equipment and facilities while the site is actively operated or at least twice a year to ensure that all equipment and facilities at the Site are operated in a manner that will not negatively impact the environment. Any deficiencies that might negatively impact the environment, or be detected during these regular inspections must be promptly corrected. A written record must be maintained at the Company office, which includes the following:
a. name and signature of trained personnel conducting the inspection;
b. date and time of the inspection;
c. list of equipment inspected and all deficiencies that might negatively impact the environment observed;
d. observation of condition of the Site, including any observation of fire hazards or leachate discharging from the landfill site;
e. recommendations for remedial action and actions undertaken;
f. date and time of maintenance activity; and
g. a detailed description of the maintenance activity.

Site Monitoring

38. The groundwater and surface water samples shall be carried out each year to the satisfaction of the District Manager.
39. The frequency of the groundwater and surface water monitoring program may be amended from time to time subject to the District Manager's written approval.
40. In the event a result of a monitoring test carried out under a monitoring program does not comply with the trigger criteria developed in accordance with the Ministry's regulations and guidelines and approved by the Ministry, the Owner shall:
a. conduct an investigation into the cause of the adverse result and submit a report to the District Manager within 30 days that includes an assessment of whether contingency measures need to be carried out; and
b. if contingency measures are needed, submit detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures, and a schedule as to when these measures will be implemented, to the Director and notify District Manager; and
c. implement the required contingency measures upon approval by the Director.

Annual Report

41. By **March 31** of each calendar year, the Owner shall submit to the District Manager an annual report which shall include at least the following information:

a. total volume of waste received at the Site;

b. the results and an interpretive analysis of the results of all groundwater and/or surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs;

c. remaining capacity and site life expectancy, based on topograpghic survey;
d. the extent and success of the recylcing program established by the Township;
e. a calculation of the remaining capacity of the Site;
f. a summary of any complaints received and the responses made;
g. a discussion of any operational problems encountered at the Site and corrective action taken;
h. a report on the status of all monitoring wells and a statement as to compliance with Ontario Regulation 903; and
i. any other information with respect to the Site which the Director may require from time to time.

Closure Plan

42. At least 3 years prior to the anticipated date of closure of this Site, the Owner shall submit to the Director for approval, with copies to the District Manager, a detailed Site closure plan pertaining to the termination of landfilling operations at this Site, post-closure inspection, maintenance and monitoring, and end use. The plan shall include but not be limited to the following information:

a. a plan showing Site appearance after closure;
b. a description of the proposed end use of the Site;
c. a description of the procedures for closure of the Site, including:

(i) advance notification of the public of the landfill closure;
(ii) posting of a sign at the Siteentrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;
(iii) completion, inspection and maintenance of the final cover and landscaping;
(iv) Site security;
(v) removal of unnecessary landfill-related structures, buildings and facilities;
(vi) final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas; and
(vii) a schedule indicating the time-period for implementing sub-conditions (i) to (vi) above;

d. descriptions of the procedures for post-closure care of the Site, including:

(i) operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate,

groundwater, surface water and landfill gas;
(ii) record keeping and reporting; and
(iii) complaint contact and response procedures;

e. an assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas; and
f. an updated estimate of the contaminating life span of the Site, based on the results of the monitoring programs to date.

43. The Site shall be closed in accordance with the closure plan as approved by the Director.

Schedule "A"

1. Application and supporting materials for existing Certificate of Approvals and Notices provided between 1980 to 1996.

2. Application for Environmental Compliance Approval for Waste Disposal Site dated October 12, 2023 including technical supporting document entitled: Township of Huron-Kinloss, Kinloss Landfill, Amendment to ECA A272801, dated October 12, 2023, prepared by WSP.

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

1. The reason for inclusion of the definitions is to define the specific meaning of terms and simplify the wording of conditions in this ECA.
2. The reason for Conditions 1 and 2 is to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.
3. The reason for Conditions 3, 4, 5, 9, 10, 11, 12 and 13 is to clarify the legal rights and responsibilities of the Owner under this ECA.
4. Conditions 6 and 7 are included to ensure that the appropriate Ministry staff have ready access to information and the operations of the Site, which are approved under this ECA.
5. Condition 8 has been included in order to clarify what information may be subject to the Freedom of Information Act.
6. Conditions 14 to 17 inclusive are included, pursuant to subsection 197(1) of the EPA, to provide that any persons having an interest in the Site are aware that the land has been approved and used for the purposes of waste disposal.
7. The reasons for Condition 18 are to restrict potential transfer or encumbrance of the

Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this ECA.

8. The reasons for Conditions 19 and 20 are to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the Director is informed of any changes.

9. The reason for Condition 21 is to ensure that appropriate Ministry staff have ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this ECA. This condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the EPA and OWRA.

11. The reason for Conditions 22 through 27 is to ensure that users of the Site are fully aware of important information and restrictions related to Site operations and access under this Approval.

12. The reason for Conditions 28 is to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.

13. The reason for Condition 29 is to reflect the current conditions of the Site. If the Owner wish to accept waste at the Site in future, an amendment to the ECA shall be required.

14. The reasons for Condition 30 are to ensure that the Site is operated and maintained in a manner which does not result in a hazard or nuisance to the natural environment or any person.

15. The reason for Conditions 31 is to ensure the site is properly maintained to prevent fire hazard.

16. The reason for Conditions 32 and 33 is to ensure that the Owner follows a plan with an organized set of procedures for identifying and responding to unexpected but possible problems at the Site. A remedial action / contingency plan is necessary to ensure protection of the natural environment.

17. The reasons for Condition 34 are to ensure that the Site is supervised by a trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person and to ensure the controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no site attendant is on duty

18. Condition 35 is included to ensure the Owner has a procedure established to address possible complaints about the Site.

19. The reason for Conditions 36 and 37 is to ensure that the Site is properly inspected and that detailed records of Site inspections and operations are recorded and maintained for inspection and information purposes.

20. The reason for Conditions 38, 39 and 40 are to ensure that groundwater monitors are installed and maintained, to allow for assessment of potential environmental effects from the Site; and that decommissioning is carried out in accordance with Ministry requirements.

21. The reason for Condition 41 is to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.
22. The reason for Condition 42 & 43 is to ensure that closure plans for the Site are prepraed and the site is closed as per the approved closure plan.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A272801 issued on October 1, 1980

In accordance with Section 139 of the *Environmental Protection Act,* you may by written notice served upon me and the Ontario Land Tribunal within 15 days after receipt of this notice, require a hearing by the Tribunal. Section 142 of the *Environmental Protection Act* provides that the notice requiring the hearing ("the Notice") shall state:

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

Pursuant to subsection 139(3) of the *Environmental Protection Act,* a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

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

This Notice must be served upon:

Registrar*
Ontario Land Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5
OLT.Registrar@ontario.ca

and

The Director appointed for the purposes of Part II.1 of the *Environmental Protection Act*
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Ontario Land Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349 or 1 (866) 448-2248, or** www.oltt.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the *Environmental Protection Act.*

DATED AT TORONTO this 12th day of January, 2024

Mohsen Keyvani, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

AQ/
c: District Manager, MECP Owen Sound
Sarah Hutchensson P. Eng., WSP Canada Inc.

Appendix B Supporting Documents & Correspondence

Ministry of the Environment
Southwestern Region
Barrie District Office
1580 20th St E
Owen Sound ON N4K 6H6
Fax: (519)371-2905
Telephone: (519) 371-6191

Ministère de l'Environnement
Direction régionale du Sud-Ouest
Bureau du district de Barrie
1580 rue 20th E
Owen Sound ON N4K 6H6
Télécopieur: (519)371-2905
Téléphone : (519) 371-6191

Ontario

July 16, 2007

Mr. Hugh Nicol
Township of Huron-Kinloss
21 Queen Street
PO Box 130
Ripley, ON, N0G 2R0

RE: Kinloss Landfill Site - 2006 Annual Report

Dear Mr. Nicol,

We have received a copy of the report titled "Township of Huron-Kinloss 2006 Annual Operations and Monitoring Report, Kinloss Landfill Site", dated March 2007 and prepared by R.J. Burnside & Associates Limited. A copy of the report was sent to the Ministry's technical support section for their review and their comments follow:

The landfill does not appear to be resulting in any major impacts to ground water quality. However, there are some issues that should be addressed in time for the next annual monitoring report.

- Two wells (OW7 and OW12) have traditionally been considered to be "background" wells. Well OW7 is quite often dry during the sampling events, and is thus not ideal as a background well. Well OW12, even though apparently up-gradient of the waste and exhibiting low concentrations of chloride, still exhibits concentrations of some parameters (eg. nitrate, total dissolved solids, sulphate) that are considerably higher than exhibited at other wells (OW5, OW6, OW7). Thus, it is possible that this well samples water that has been impacted by leachate. We are not convinced that either OW7 or OW12 are ideal as background wells.

  A discussion about whether another well (eg. OW6) may be more appropriate should be provided. Samples obtained from this well have consistently shown concentrations of indicator parameters that are lower than in waters from OW12. Could this well be considered to be "cross-gradient" to the waste and thus useful as a "background" well?

- The concentrations of sulphate in waters sampled by OW13 and OW13INT are typically elevated, sometimes above the calculated RUG. The consultant has suggested that these are not representative of leachate impact because sulphate concentrations were much lower at Well OW4, which is otherwise more clearly impacted by leachate (eg. elevated

chloride, TDS, etc). Could these high sulphate concentrations be the result of a redox transition along the flowpath between OW4 and OW13? Consider that 1) iron, manganese and ammonia are elevated at OW4, but are significantly less at OW13; and, 2) nitrate and sulphate are not detected and lower, respectively, at OW4, whereas they are both elevated at OW13. These two patterns suggest that reducing conditions prevail around OW4, while oxidizing conditions prevail around OW13. Are the elevated sulphate concentrations a leachate impact? Is there an RUG issue at the eastern property boundary?

- Future reports would benefit from the inclusion of a hydrgeologic cross section. This is a useful tool for the visualization of topopgraphy and stratigraphy, and the relationship between the location of the waste, observation wells and property boundaries.

- Are the lands to the east that are leased by the Township a part of a formal Contaminant Attenuation Zone?

The ministry's surface water review did not identify any concerns with the report.

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 Area Office

File Storage Number: SI BR HK C6 610

cc. David Hopkins - Burnside & Associates, Guelph
Mark Harris/Scott Abernethy - MOE, London
Helmut Pfeiffer - MOE, Owen Sound

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

Ontario

AUG 2 4 2015

August 20, 2015

Mr. Hugh Nichol
Township of Huron-Kinloss
PO Box 130
21 Queen Street
Ripley, ON N0G 2R0

Dear Mr. Nichol,

RE: Kinloss Landfill Site - 2014 Annual Report

We have received a copy of the report titled "Annual Monitoring Report – 2014, Kinloss Landfill Site, Township of Huron-Kinloss" dated March 2015 and prepared by WSP Canada Inc. A copy of this report was forwarded to our Regional Technical Support Section and comments from our Regional Hydrogeologist are provided in the attached memorandum.

If you have any questions concerning the attached, 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 HK C6 610

enclosure

cc. Simon Thuss, MOECC, London
Neil McLean, WSP, Owen Sound
Natasha Munn, MOECC, Owen Sound

Ministry of the Environment and Climate Change

733 Exeter Road
London ON N6E 1L3
Tel': 519 873-5000
Fax: 519 873-5020

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

733, rue Exeter
London ON N6E 1L3
Tél.: 519 873-5000
Fax: 519 873-5020

Ontario

MEMORANDUM

File No. SI BR HK C6 610

TO: Ian Mitchell
District Engineer
Owen Sound District

FROM: Simon Thuss
Hydrogeologist
Water Resources Unit – Technical Support Section

DATE: August 14, 2015

RE: Annual Monitoring Report - 2014
Kinloss Landfill Site, Township of Huron-Kinloss
IDS Reference No. 0481-9V5RQD

As requested, I have reviewed the following report:

- "Annual Monitoring Report – 2014, Kinloss Landfill Site, Township of Huron-Kinloss" dated March 2015 and prepared by WSP Canada Inc.

The review was limited to the hydrogeological aspects of the landfill monitoring program as presented in the report.

The landfill site is situated on the south half of Lot 16, Concession 6 in the former Township of Kinloss, now within the amalgamated Township of Huron-Kinloss. The landfill site is operated under Provisional Certificate of Approval (C of A) No. A272801, most recently amended in April 2003. It is understood that the acceptance of household waste was discontinued in 2002; however, the site has not been permanently closed. Currently, only recyclable and burnable materials are collected at the site.

The current monitoring network includes eleven monitoring wells and two surface water monitoring stations. Groundwater level monitoring and sample collection is carried out twice per year (typically July and October).

The stratigraphy at the site generally consists of surficial sand or sand and gravel (up to 16.5 metres in

thickness), overlying lower permeability silt till. The shallow groundwater flow within the surficial granular deposit is indicated to be towards the east.

Landfill leachate impacts are observed within the surficial granular deposit downgradient of the landfill at monitoring wells OW4, OW13S and OW13I. Samples collected from these locations are characterized by elevated concentrations of several leachate indicator parameters, including: alkalinity, hardness, chloride, sulphate, nitrate, ammonia, TKN, organic nitrogen, DOC, boron, sodium, iron and manganese.

A Reasonable Use assessment was completed using the measured concentrations of alkalinity, boron, chloride, DOC and sodium. Consistent with previous results, the alkalinity and DOC concentrations at the downgradient monitoring wells continue to exceed the corresponding Reasonable Use Guideline (RUG) criteria.

The Township holds a 99-year lease on a portion of the property to the east of the site for the purpose of establishing a buffer zone for contaminant attenuation; however, the C of A for the site has not been amended to formally recognize this area as a Contaminant Attenuation Zone (CAZ).

Upon completing the review of the 2014 report, the following comments are provided:

1. In a previous letter dated July 16, 2012, the Consultant indicated to the Ministry that the exceedances of the RUG criteria at the OW13 well nest were anticipated to be representative of a "slug" of leachate impacted groundwater flowing past the monitoring point. At that time, the Consultant proposed an additional three years of monitoring to evaluate the groundwater quality at the downgradient property boundary. Given the ongoing exceedances of the RUG criteria at this location, additional work should now be undertaken to delineate the leachate plume and confirm that the impacts are sufficiently attenuated within the buffer area. Ideally, this would be achieved through the installation of additional monitoring wells downgradient of the property boundary; however, it is understood that the area may not be readily accessible by drilling rig. The Consultant is encouraged to discuss the monitoring plan with the Ministry prior to proceeding with the work.

2. As illustrated on Map 3 in the report, the shallow groundwater flow direction is inferred to be towards the east; however, the map indicates that a "drainage divide" is present near the western limit of the landfilled area, suggesting that there may also be a component of groundwater flow to the west in this portion of the site. Consideration should be given to the installation of an additional monitoring well to the west of the fill area to characterize the groundwater quality and flow direction in this area.

3. Monitoring wells OW9 and OW11 are reported to be "inactive" and are not included in the

monitoring program. Based on the borehole logs included in the report, these wells were not installed to a sufficient depth to intersect the shallow groundwater table. Since these wells are not suitable for monitoring, they should be properly abandoned in accordance with Ontario Regulation 903.

4. Monitoring wells OW4 to OW11 were reportedly constructed with slotted ABS pipe installed in excavated test pits. There is some potential that precipitation and surface runoff may "short-circuit" to these wells since the permeability of the backfill would be enhanced relative to the undisturbed native deposits. As such, the groundwater chemistry observed at these locations may not fully represent the ambient shallow groundwater conditions at the site. The Consultant should comment on the integrity of these wells and any implications for the data collected at these locations. Consideration should be given to supplementing the existing monitoring network with properly constructed monitoring wells at key locations to confirm the groundwater conditions in the shallow overburden.

5. The report indicates that hardness, iron and manganese were excluded from the Reasonable Use assessment because the background concentrations of these parameters have typically been elevated relative to the corresponding Ontario Drinking Water Quality Standards (ODWQS). Although the background concentrations may be slightly elevated, the concentrations of these parameters increase significantly downgradient of the landfill and are considered to be representative of leachate impacts. For example, the iron concentration at downgradient well OW4 generally ranges from 10 to 20 mg/L, while the background concentration appears to be less than 1 mg/L. Appropriate RUG criteria for hardness, iron and manganese should be developed and included in the assessment for future reports.

6. Sulphate was not included in the Reasonable Use assessment as this parameter is reportedly present in elevated concentrations in background well OW6; however, a review of the historical data does not support this conclusion. The sulphate concentration in OW6 has ranged between approximately 10 and 26 mg/L over the period of record and appears to be representative of the background groundwater quality. In comparison, the sulphate concentration at downgradient wells OW13S and OW13I have ranged between 252 and 626 mg/L. As such, the elevated sulphate appears to be representative of leachate impacts and should be included in the Reasonable Use assessment going forward.

7. Ammonia appears to be elevated downgradient of the landfill, with concentrations ranging between 15 and 40 mg/L at OW4. Ammonia can be nitrified to produce nitrate and nitrite in aerobic environments. Historically, nitrate concentrations as high as 10 mg/L have been measured in samples collected from OW13S and OW13I, and low concentrations of nitrite have also been occasionally detected in samples from these locations. In comparison, nitrate and nitrite

are typically not detected in the background well OW6. The elevated nitrate and relatively low ammonia concentrations at OW13S / OW13I suggest that nitrification of ammonia is actively occurring in the leachate plume downgradient of the landfill. As such, nitrate and nitrite should also be included in the Reasonable Use assessment.

8. A review of the historical data for OW13S and OW13I suggests that the conditions within the plume at the southeast property boundary may be becoming more reducing over time. Since approximately 2011, the concentration of ammonia in these wells has followed an increasing trend, with a corresponding decrease in the concentrations of nitrate and sulphate. Future monitoring reports should include a discussion of these trends and include time series plots for all key leachate indicator parameters.

9. Several minor editorial errors were noted in the report. Figure 4 (Indicator Parameters – Fall) appears to be missing from the report, and the data for downgradient wells OW13S and OW13I was not included on Figure 3 (Indicator Parameters – Spring). Appendix C appears to be missing the borehole logs for OW13S, OW13I and OW13D.

If you have any questions or require clarification on any of the points provided herein, please contact me at Simon.Thuss@ontario.ca or 519-873-5033.

Yours truly,

Simon Thuss, P.Geo.
Hydrogeologist
Technical Support Section
Southwestern Region

Limitations:
The purpose of the preceding review is to provide advice to the Ministry of the Environment and Climate Change 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.

101-16945-00

October 8, 2015

Mr. Ian Mitchell, P. Eng., District Engineer
Ministry of the Environment and Climate Change
Owen Sound District Office
Third Floor
101 17th Street East
OWEN SOUND, ON
N4K 0A5

Re: MOECC Response to Kinloss Landfill Site – 2014 Annual Monitoring Report

Dear Mr. Mitchell:

The Township of Huron Kinloss (Township) has asked WSP Canada Ltd. (WSP) to form a response to the technical memorandum generated by Mr. Simon Thuss on August 14, 2015 regarding the Kinloss Landfill Site. The following nine (9) points are intended to be in response to the nine (9) points in Mr. Thuss' memorandum:

1. The continued presence of impacts at OW13S and OW13I suggest landfill impacted water may persist in this portion of the Site. WSP agrees with the Ministry of the Environment and Climate Change (MOECC) recommendation for installation of additional monitoring wells downgradient of the OW13 well nest. However, as the lands are within the leased buffer lands (Legal CON 6 PT LOT 17 PT LOT 18, comprising 43.5 ha or 107.5 ac owned by Barry Johnston), which act as a contaminant attenuation zone (CAZ), some discussion with the landowner may be required. The presence of the small tributary of Kinloss Creek and the high water table in the vicinity of the OW13 well nest are factors that must be taken into consideration. WSP recommends the installation of one (1) shallow (+/-6 m) monitoring well adjacent to the west side of the tributary, directly downgradient of the OW13 well nest. This monitoring well would be installed in order to investigate the groundwater adjacent to the tributary. WSP proposes one (1) additional shallow (+/-6 m) monitoring well be installed on the east side of the tributary. This well will serve as confirmation that leachate impacts to groundwater are not leaving the buffer lands, and will also allow refinement for increased interpretation of the groundwater contours and flow direction in the buffer lands. These two (2) monitoring wells will allow RUG compliance to be determined at the eastern boundary.

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Drilling of the proposed monitoring wells within a wetland may pose access challenges requiring road construction and winter drilling to enable O. Reg. 903 to be complied with, regarding water around the casing. WSP proposes to scout suitable locations for the wells during the Fall 2015 monitoring event at the landfill.

2. The drainage divide represented in Maps of the Kinloss Waste Disposal Site is expected to impact overland surface water flow at the Site, but not significantly impact groundwater flow, which is predominantly to the east, and largely affected by the soil stratigraphy. Furthermore, the waste is landfilled downgradient (east) of this divide.

3. The Township will explore the option of deepening wells OW9 and OW11 to intersect the water table at these locations. This would further refine groundwater contours upgradient of the waste and provide insight into the possible impacts of the nearby run off water divide on the nearby flow direction of groundwater, as discussed by the MOECC in Comment 2.

4. WSP acknowledges that implementation of wells in test pits is not an ideal method of installation and may lead to biased sampling results. However, OW11-85 is one of the upgradient "dry" monitoring points. Effectively, it is unlikely that leachate will be able to impact this location. Further, the wells were installed in 1985. Ergo, it is reasonable to assume that they have established an equilibrium with the surrounding shallow aquifer. Effectively, WSP recommends retaining the shallow OW4-85, referenced by the MOECC in Comment 4, as is, in order to continue to evaluate the long term trend of groundwater down gradient of the waste without changing the well, which may alter the existing trend.

   In addition, WSP inspects the wells during each field monitoring event. Any required maintenance or well conditions that are felt to not reflect actual groundwater conditions are reported and passed on to the Township. The Township then deals with these concerns within a reasonable time frame. WSP proposes to continue the field screening of well integrity in the future and continuation of this method of maintenance.

5. WSP acknowledges that iron, hardness and manganese are commonly used in defining leachate impacts. WSP will give further consideration to the inclusion of these parameters in future RUG guidelines.

6. WSP acknowledges that sulphate is commonly used in defining leachate impacts. WSP will give further consideration to the inclusion of this parameter in future RUG guidelines.

7. Ammonia may be nitrified to produce nitrate and nitrite in oxidizing environments. As noted by the MOECC in Comment 5, iron and manganese are elevated in the downgradient groundwater. The dissolved presence of iron and manganese parameters is only possible in reduced environments, albeit, this only typically occurs at a lower pH than observed in the field and laboratory sampling. Effectively, the groundwater environment downgradient of the landfill appears to be highly reduced.

   WSP suspects that other factors may be affecting the concentration of nitrate at this location, and that mixing of oxidized and reduced groundwater may be occurring in this location. This statement formed a part of the reasoning behind the original suspicion of the leachate impacts at OW13S and OW13I being a slug moving through the down gradient area. WSP believes that further investigation should be conducted on this topic before acceptance of these parameters in the RUG.

8. WSP agrees with Comment 8 and suggests incorporation of our response for this comment with those of Comment 7.

9. Editorial comments noted.

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

Yours truly,

WSP Canada Inc.

Neil McLean, M.Sc., P. Geo.
Geoscientist
/nrm/dlw
cc Mr. Stephen Cobean, P.Eng., WSP Canada Inc.
Mr. Hugh Nichol – Township of Huron Kinloss

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Ministère de l'Environnement et de l'Action en matière de changement climatique
Direction régionale du Sud-Ouest
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Ontario

August 16, 2016

Mr. Hugh Nichol
Township of Huron-Kinloss
PO Box 130
21 Queen Street
Ripley, ON N0G 2R0

Dear Mr. Nichol,

RE: Kinloss Landfill Site - 2015 Annual Report

We have received a copy of the report titled "Annual Monitoring Report – 2015, Kinloss Landfill Site, Township of Huron-Kinloss" dated March 2016 and prepared by WSP Canada Inc. A copy of this report was forwarded to our Regional Technical Support Section and comments from our Regional Hydrogeologist are provided in the attached memorandum.

If you have any questions concerning the attached, 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 HK C6 610

enclosure

cc. Simon Thuss, MOECC, London
Neil McLean, WSP, Owen Sound
Sierra Gillies, MOECC, Owen Sound

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Ontario

MEMORANDUM

File No. SI BR HK C6 610

AUG 18 2016

TO: Ian Mitchell
District Engineer
Owen Sound District

FROM: Simon Thuss
Hydrogeologist
Water Resources Unit – Technical Support Section

DATE: August 9, 2016

RE: Annual Monitoring Report - 2015
Kinloss Landfill Site, Township of Huron-Kinloss
IDS Reference No. 3866-A7VQEQ

As requested, I have reviewed the following report:

- "Annual Monitoring Report – 2015, Kinloss Landfill Site, Township of Huron-Kinloss" dated March 2016 and prepared by WSP Canada Inc.

The review was limited to the hydrogeological aspects of the landfill monitoring program as presented in the report.

The landfill site is situated on the south half of Lot 16, Concession 6 in the former Township of Kinloss, now within the amalgamated Township of Huron-Kinloss. The landfill site is operated under Provisional Certificate of Approval (C of A) No. A272801, most recently amended in April 2003. It is understood that the acceptance of household waste was discontinued in 2002; however, the site has not been permanently closed. Currently, only recyclable and burnable materials are collected at the site.

I previously reviewed the 2014 Annual Report for the Kinloss Landfill Site, with comments provided in a memorandum dated August 14, 2015. WSP Canada Inc. responded to these previous comments in a letter dated October 8, 2015.

In response to my previous comments, the Consultant has proposed to carry out some additional site

work in 2016. As detailed in the October 8, 2015 letter and the 2015 Annual Report, monitoring wells OW9 and OW11 will be deepened/replaced, facilitating better characterization of the background groundwater quality and the groundwater flow direction in the western portions of the site. In addition, two new monitoring wells will be installed downgradient of the OW13 well nest to evaluate groundwater quality within the leased buffer lands to the east of the site.

Consistent with data collected in previous years, in 2015 landfill leachate impacts were observed within the surficial granular deposit downgradient of the landfill at monitoring wells OW4, OW13S and OW13I. Samples collected from these locations are characterized by elevated concentrations (relative to background) of several leachate indicator parameters, including: alkalinity, hardness, chloride, sulphate, nitrate, ammonia, TKN, organic nitrogen, DOC, boron, sodium, iron and manganese.

A Reasonable Use assessment was completed using the measured concentrations of alkalinity, boron, chloride, DOC and iron. Consistent with previous results, concentrations of alkalinity (at OW13S and OW13I) and DOC (at OW13I spring 2015 only) continue to exceed the corresponding Reasonable Use Guideline (RUG) criteria.

Upon completing the review of the 2015 report, the following comments are provided:

1. In response to my previous comments, the Consultant re-evaluated the RUG criteria and added iron to the list of parameters used in the assessment for the 2015 annual report. I maintain my opinion that several other parameters (including at least hardness, manganese and sulphate) should also be included in the RUG assessment as these parameters are elevated in the downgradient wells and are thus indicative of leachate impacts at the Kinloss Landfill site.

   For example, using the average background concentrations measured at OW6 between 2007 and 2015, the RUG criteria for hardness and sulphate would be approximately 285 and 133 mg/L, respectively. A RUG criterion of 0.23 mg/L for manganese could also be developed using the maximum background concentration observed at OW6 (May 2015).

   Given these values, the current concentrations of hardness and sulphate at both OW13S and OW13I would exceed the RUG criteria (in addition to the exceedances of alkalinity and DOC identified by the Consultant). Though not considered a compliance point, samples from OW4 would also exceed the RUG criteria for alkalinity, DOC, hardness, iron and manganese. The inclusion of these additional parameters in the RUG assessment provides a more comprehensive evaluation of the leachate impacts to groundwater quality downgradient of the landfill.

   All relevant indicator parameters (i.e. all parameters which are elevated above background concentrations within the leachate or downgradient of the landfill) should be included in the RUG

assessment for future monitoring reports. This will be of particular importance when evaluating the groundwater quality within the leased buffer lands to the east of the site.

2. The elevated concentrations of ammonia in samples from OW4 (typically >20 mg/L) and OW13S/OW13I (typically 0.5 to 3.6 mg/L) are indicative of leachate impacts. Although reducing conditions are anticipated within the leachate plume near OW4 and OW13, it is anticipated that the ammonia may be converted to nitrate where the plume mixes with more oxic groundwater downgradient of the site. Accordingly, my previous comments recommended that nitrate and nitrite should be included in the RUG assessment in future reports.

   It is acknowledged that the RUG assessment may be complicated by the presence of organic nitrogen within the shallow aquifer. For example, elevated concentrations of organic nitrogen and TKN have been historically measured in samples from the background well OW6. However, concentrations of other nitrogen compounds (ammonia, nitrate, nitrite) are typically low at this location (<0.3 mg/L for ammonia, nitrate and nitrite not detected).

   The use of nitrate and nitrite in the RUG assessment should be reconsidered once additional data is available to characterize groundwater quality upgradient and downgradient of the landfill (i.e. new wells to be installed in 2016).

3. The 2015 annual report suggests that groundwater quality appears to be improving at OW13S and OW13I since (aside from alkalinity), only DOC was identified above the RUG criteria in OW13I during the spring 2015 monitoring event. However, as detailed in the two comments above, this evaluation does not consider the other relevant leachate indicator parameters.

   A review of the historical data suggests that the concentration of several leachate indicator parameters (primarily chloride, sulphate, hardness, alkalinity and conductivity) at OW13S and OW13I peaked in approximately 2007. The chloride concentration has since decreased significantly and is now starting to approach background concentrations. Although hardness, sulphate and conductivity have also followed a declining trend since approximately 2007, these parameters are still significantly elevated relative to background conditions. This data suggest that while there has been some improvement in groundwater quality at the OW13 well nest since 2007, this location remains impacted by leachate.

   Future reports should include time-series plots for key indicator parameters (in addition to chloride) to further characterize any trends in groundwater quality at the site.

4. There appears to be two minor errors in the calculated RUG criteria as summarized in Table 4 of the 2015 annual report. Since boron is considered a "health-related" parameter, a constant of 0.25

should be used in the RUG calculation. Accordingly, given the average background concentration of 0.023 mg/L, and an ODWS IMAC of 5 mg/L, the RUG criterion for boron should be 1.27 mg/L.

The RUG criterion for iron (0.5 mg/L) is less than the average background concentration (0.7 mg/L). In cases where the background concentration exceeds the applicable ODWS, it is suggested that the RUG criterion be set at the maximum observed background concentration (1.4 mg/L for iron at OW6).

All RUG criteria should be re-evaluated once additional background data becomes available.

If you have any questions or require clarification on any of the points provided herein, please contact me at Simon.Thuss@ontario.ca or 519-873-5033.

Yours truly,

Simon Thuss, P.Geo.
Hydrogeologist
Technical Support Section
Southwestern Region

Limitations:
The purpose of the preceding review is to provide advice to the Ministry of the Environment and Climate Change 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.

101-16945-00

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Ontario

RECEIVED
SEP 17 2018

September 13, 2018

Mr. Hugh Nicol
Township of Huron-Kinloss
PO Box 130
21 Queen Street
Ripley ON N0G 2R0

Dear Mr. Nicol,

RE: Kinloss Landfill 2017 Annual Report

We have received a copy of the report titled "Annual Monitoring Report (2017), Kinloss Landfill Site" dated March 2018 and prepared by WSP. Staff from our technical support section reviewed the above report, as well as the 2016 annual report, and our regional hydrogeologist provides the following comments on the hydrogeological aspects of the 2016 and 2017 annual reports. Our hydrogeologist attended the site on September 5, 2018, to supplement his understanding of the conditions on the site and surrounding area.

Consistent with data collected in previous years, the 2016/2017 data indicates leachate impacts within the surficial granular deposit downgradient of the landfill at monitoring wells OW4, OW13S and OW13I. Samples collected from these locations are characterized by elevated concentrations (relative to background) of several leachate indicator parameters, including: alkalinity, hardness, sulphate, nitrate, ammonia, TKN, DOC, boron, sodium, iron and manganese.

Based on data collected from the new downgradient monitoring wells, offsite leachate impacts appear to extend to at least OW15, with elevated concentrations of several leachate indicator parameters at this location. The groundwater chemistry observed at OW16 appears to be consistent with background conditions at the site. It is noted that the saturated organic soils in the area of OW15 and OW16 may influence the shallow groundwater chemistry for these wells (e.g. DOC, manganese).

Upon reviewing the 2016 and 2017 monitoring reports for the Kinloss landfill site, the following comments are provided:

1. In response to previous review comments, the Consultant has argued that it is "excessive" to include several parameters (including nitrate and nitrite) in the Reasonable Use Assessment. The Consultant has claimed that certain parameters (e.g. manganese and

sodium) are redundant since other parameters (iron and chloride) are already being evaluated. Based on this response, it appears that there may be some misunderstanding regarding the purpose of the Reasonable Use assessment. The Reasonable Use assessment is not intended as a simple test to identify the presence or absence of leachate in groundwater. The Reasonable Use Guideline establishes procedures for determining what constitutes the reasonable use of groundwater on property adjacent to sources of contaminants, and establishes limits on the discharge of contaminants from landfill sites and other waste disposal facilities. Given the many factors that can affect the geochemical conditions within the leachate plume (e.g. heterogeneous distribution of waste, weathering/decomposition of waste over time, changing redox conditions over time and/or distance along the plume), the critical contaminants with respect to Reasonable Use may vary by time and monitoring location at a given site.

For these reasons, the Reasonable Use assessment should consider all contaminants that potentially originate from the landfill site. In general, the standard practice used at other similar landfill sites is to develop Reasonable Use criteria for all parameters that have corresponding drinking water standards. In completing the assessment, consideration is given to other sources of contamination that may affect specific monitoring locations (e.g. road salt impacts adjacent to roadways).

If the Consultant requires additional guidance on this issue, a teleconference or meeting can be scheduled to discuss these concerns.

2. Specific to nitrate and nitrite, the Consultant believes that these parameters should not be included in the Reasonable Use Assessment "due to the typical lack of these parameters in reducing groundwater conditions, typically associated with leachate impacted groundwater".

   It is our hydrogeologist's opinion, as previously stated, that elevated concentrations of ammonia have been observed downgradient of the landfill, and that ammonia may potentially be nitrified to produce nitrate and nitrite as the plume mixes with more oxic groundwater downgradient of the site. Accordingly, nitrate and nitrite should be included in the Reasonable Use assessment. It is acknowledged that nearby sources (e.g. agricultural activities or decomposition of organic nitrogen) may also contribute to nitrate in groundwater.

3. There appears to be a calculation error in the Reasonable Use criterion for hardness. As shown in Table 4, the Reasonable Use criterion for hardness (248 mg/L) is less than the background concentration measured at OW11-16 (396 mg/L). In cases where the background concentration exceeds the applicable drinking water standard, it is suggested that the Reasonable Use criterion be set at the maximum observed background concentration.

4. The report should include an updated east-west cross-section, including the new wells OW11-16, OW15 and OW16. The cross-section should include the interpreted stratigraphy, limits of the waste, and current groundwater levels.

5. The ECA should be amended to formally recognize the leased buffer lands as a Contaminant Attenuation Zone for the site.

6. As previously recommended, the report should include time series plots for several key indicator parameters (in addition to chloride). The purpose of these plots is to further characterize any groundwater quality trends at the site.

Please contact me at (519) 371-6191, if you would like to arrange a teleconference to discuss the above comments or if you have any questions concerning this letter.

Yours truly,

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

File Storage Number: SI BR HK C6 610

cc. Natasha Munn, MECP Owen Sound
Simon Thuss, MECP London
Norm Bell, WSP, Owen Sound

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Ontario

RECEIVED
OCT 17 2018

October 2, 2018

Mr. John Yungblut
Township of Huron-Kinloss
PO Box 130
21 Queen Street
Ripley ON N0G 2R0

Dear Mr. Yungblut

RE: Kinloss Landfill 2017 Annual Report

Further to my letter to the municipality dated September 13, 2018, containing groundwater comments for the Kinloss Landfill Site 2017 Annual Monitoring Report, our regional surface water specialist has reviewed the annual report and provides the following comments:

This site is currently mothballed. The site is currently capped and the landfill has not accepted waste since August 2002. Only recyclables are collected and transferred from the site (page 2). Surface water sampling is completed in spring and fall from two sites (upstream and downstream) from a creek running adjacent to the landfill.

Page 13 of the report notes that only zinc exceeded the PWQO in the downstream (SW2) location. A subsequent duplicate was collected and it was determined that upstream (SW1) also exceeded the PWQO for zinc.

All sampled parameters remain within historical norms (Appendix G.2); accordingly there are no surface water issues associated with the site.

No changes are recommended to the surface water monitoring program for 2018 (page 18). Our surface water reviewer has no additional comments.

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

Yours truly,

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

File Storage Number: SI BR HK C6 610

cc. Natasha Munn, MECP Owen Sound
Hugh Geurts, MECP London
Norm Bell, WSP, Owen Sound

December 13, 2018

Mr. Ian Mitchell, District Engineer
Ministry of the Environment, Conservation and Parks
101 17th Street East
3rd Floor
OWEN SOUND, ON
N4K 0A5

Subject: Response to MECP Comments on 2017 Annual Monitoring Report - Kinloss Landfill

Dear Mr. Mitchell:

Thank you for providing WSP Canada Inc. (WSP) with the opportunity to review the comments prepared by the Ontario Ministry of the Environment, Conservation and Parks (MECP) (Southwestern Region) on September 13, 2018 following their hydrogeologist's review of the 2017 Annual Monitoring Report (2017 AMR), Kinloss Landfill Site (Site), dated March 2018 as prepared by WSP. WSP has also received comments from MECP dated October 2, 2018 relating to the surface water monitoring.

WSP have reviewed the September 13, 2018 comments (restated below in italics) and have prepared the following responses for your consideration. These responses may influence the scope of work required by WSP to address these comments to the satisfaction of the MECP. No comments are required with respect to the October 2, 2018 letter.

In preparing our response to the September 13, 2018 comments, WSP reviewed the content of the 2017 AMR and consulted our team responsible for landfill monitoring in other jurisdictions. We have proposed a solution to become more consistent with the MECP expectations and to provide more clarity with respect to the task of monitoring to identify potential impacts related to the inactive landfill. In addition to a response to each comment, WSP has prepared a concise list of recommended actions to be followed for the preparation of the 2018 AMR, pending direction from the Township of Huron-Kinloss (Township) and agreement from MECP (where appropriate).

1 *In response to previous comments, the consultant has argued that it is "excessive" to include several parameters (including nitrate and nitrite) in the Reasonable Use Assessment. The Consultant has claimed that certain parameters (e.g. manganese and sodium) are redundant since other parameters (iron and chloride) are already being evaluated. Based on this response, it appears that there may be some misunderstanding regarding the purpose of the Reasonable Use assessment. The Reasonable Use assessment is not intended as a simple test to identify the presence or absence of leachate in groundwater. The Reasonable Use Guideline establishes procedures for determining what constitutes the reasonable use of groundwater on property adjacent to sources of comtaminants, and establishes limits on the discharge of contaminants from landfill sites and other waste disposal facilities. Given the many factors within the leachate plume (e.g. heterogeneous distribution of waste, weathering/decomposition of waste over time, changing*

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wsp.com

redox conditions over time and/or distance along the plume), the critical contaminants with respect to Reasonable Use may vary by time and monitoring location at a given site.

For these reasons the Reasonable Use assessment should consider all contaminants that potentially originate from the landfill site. In general, the standard practice used at other similar landfill sites is to develop Reasonable Use criteria for all parameters that have corresponding drinking water standards. In completing the assessment, consideration is given to other sources of contamination that may affect specific monitoring locations (e.g. road salt impacts adjacent to roadways).

If the Consultant requires additional guidance on this issue, a teleconference or meeting can be scheduled to discuss these concerns.

WSP understands the purpose of the Reasonable Use Assessment process. It is our experience that there is some flexibility in the application of this approach between MECP jurisdictions. The approach followed at this site has been based on observations that this is an inactive landfill site where the impacts from ongoing generation of landfill leachate appear to be reducing naturally (see discussion in response to point 6) and the interest of our client to work to minimize efforts related to ongoing monitoring and reporting associated with inactive landfills.

Review of the available monitoring data indicates that the current monitoring program includes the following parameters that have an Ontario Drinking Water Quality Standard (ODWQS) value:

- Alkalinity
- Chloride
- Nitrate*
- Nitrite*
- Organic Nitrogen*
- Dissolved Organic Carbon
- Sulphate
- Hardness
- Aluminum*
- Barium*
- Boron
- Cadmium*
- Chromium*
- Copper*
- Iron
- Lead*
- Manganese
- Sodium*; and
- Zinc*.

In response to the MECP comment, WSP proposes to calculate Reasonable Use Criteria (RUC) for this entire suite of parameters based on the concentrations measured at background well (OW11-16). Parameters marked with an asterisk are not currently included in the evaluation of reasonable use criteria (Tables 4 and 4A). Note that the observed concentrations of many of the metals parameters are less than the method detection limits.

Specific to nitrate and nitrite, the Consultant believes that these parameters should not be included in the Reasonable Use Assessment "due to the typical lack of these parameters in reducing groundwater conditions, typically associated with leachate impacted groundwater.

It is our hydrogeologist's opinion, as previously stated, that elevated concentrations of ammonia have been identified downgradient of the landfill and that ammonia may potentially be nitrified to produce nitrate and nitrite as the plume mixes with more oxic groundwater downgradient of the site. Accordingly, nitrate and nitrate should be included in the Reasonable Use assessment, It is acknowledged that nearby sources off agricultulral activities or decomponsition of organic nitrogen) may also contribute to nitrate in groundwater.

WSP agrees that RUC values are to be calculated for nitrate and nitrite as there is a drinking water quality objective for these values. WSP has consulted our team involved in landfill monitoring across Ontario and have found that a variety of approaches are used to monitor nitrogen transformations in areas where there is anaerobic water in which ammonia is the stable form of nitrogen species (and where nitrate and nitrite are typically absent). As there is no drinking water standard available for ammonia, WSP proposes to use the RUC calculated for nitrate (as N) to identify situations when concentrations of ammonia (as N) have potential to transform to nitrate. This approach may show some historical circumstances where elevated ammonia concentrations have been elevated relative to the RUC value, but overall recent samples are likely to comply. WSP would like to have confirmation from MECP that this approach will be acceptable.

2 *There appears to be a calculation error in the Reasonable Use criterion for hardness. As shown in Table 4, the Reasonable Use criterion for hardness (248 mg/L) is less than the background concentration measured at OW11-16 (396 mg/L). In cases where the background concentration exceeds the applicable drinking water standard, it is suggested that the Reasonable Use criterion be set at the maximum observed background concentration.*

WSP has reviewed Tables 4 and 4A in the 2017 AMR and have observed that some of the RUC reported in the 2017 AMR are in error.

Firstly, the method employed by WSP to calculate the RUC for Hardness as presented in Table 4 is based on the average parameter values observed at OW6 between 2007 and 2015. The value for Hardness shown in Table 4 was obtained using the formula provided in the guidance is 179 mg/L. This value does not reflect the direction that a maximum background value is to be used when background concentrations are greater than the ODWQS value. Note that the background concentrations were considered for some parameters (eg. Iron and manganese).

To be correct in terms of the MECP comment provided above, this value is to reflect the maximum hardness value observed, which would be 284 mg/L. The RUC values for hardness presented in Table 4 have not been updated to reflect monitoring data obtained since 2016 and have consistently used the calculated value for hardness and not the maximum value.

Secondly, Table 4A in the 2017 AMR presents the RUC calculated using OW11-16 as the background monitor and this table shows a RUC for Hardness of 248 mg/L. This RUC value was calculated using the formula provided in the guidance, and does not reflect the maximum background value. Use of the maximum value observed at OW11-16 would increase the RUC value to 296 mg/L and would reduce the number of occurrences of an exceedance of the RUC in the monitoring. Hardness continues to be elevated in the monitoring wells downgradient of the landfill.

Review of the chloride concentrations for OW11-16 indicates that this well can reasonably be considered as reflecting background water quality, however the hardness values are elevated relative to OW5, OW6, OW7, OW13-D (most events); and OW16. Hardness values appear to be elevated at wells where landfill leachate is present.

Table 4 has continued to be used to present reasonable use values based on OW6 as background as there is a longer data record available for OW6 relative to OW11-16. This practice is explained in the

2017 AMR. WSP understands that OW11-16 was installed with the expectation that this would be used in the future as the background well once sufficient data is available (three years).

WSP proposes that for the 2018 report, that the reasonable use calculations be updated to reflect use of OW11 as the background well and to ensure that the calculation consistently reflects the practice of assuming the maximum value when the background value is higher than the drinking water quality objective. This is a reasonable approach for Hardness in Ontario, as most groundwater has hardness values that are greater than the range for the ODWQS.

In review of the RUC calculations, WSP also noted that the RUC for Manganese in Table 4 did not reflect that background concentrations at OW6 were greater than the ODWQS. The corrected value for the RUC is 0.23 mg/L.

3 *The report should include an updated east-west cross-section, including the new wells OW11-15, OW15 and OW16. The cross-section should include the interpreted stratigraphy, limits of the waste, and current groundwater levels.*

The current cross-section was prepared by a previous consultant, prior to the installation of OW11-15, OW15 and OW16. WSP agrees that this section line can be updated to reflect new data along an "approximate flowpath" from OW11-16 through OW14, OW4, OW13 (3 levels), OW15 and OW16. WSP also recommends including the surface water feature on the cross-section to better reflect the groundwater flow path.

Although WSP agrees that this section line can be updated, we do not believe that presentation of this section line will change the understanding of conditions, although it will more clearly illustrate the current distribution of monitoring points along the primary groundwater flowpath beneath and downgradient of the landfill and discharge relationships to the stream.

4 *The ECA should be amended to formally recognize the leased buffer lands as a Contaminant Attenuation Zone for the site.*

WSP notes that this landfill is currently operating under amended Certificate of Approval No. A272901. WSP agrees that it is appropriate to update the amended Certificate of Approval No. A272901 for this site to an Environmental Compliance Approval (ECA) to recognize the leased buffer lands as a Contaminant Attenuation Zone (CAZ). Assistance from MECP is requested to ensure that the Township understands the technical effort, including costs to negotiate with MECP, associated with submitting the request to update the Certificate of Approval to an ECA.

5 *As previously recommended, the report should include time series plots for several key indicator parameters (in addition to chloride). The purpose of these plots is to further characterize any groundwater quality trends at the site.*

The trend plots presented for chloride illustrate an interesting trend for the conservative contaminant parameters associated with landfill leachate. Chloride concentrations show that a pulse of elevated concentrations passed OW4 between 2000 and 2010. Since 2010, the chloride concentrations at this location have remained low. A similar pulse has been observed to pass through other monitoring locations (OW14 – 2003-2007; OW13D – 2013; OW13-I – 2004-2014 (although tail continues to 2017). These data show that the highest concentrations at downgradient monitors is substantially lower than was observed at OW4-85. These trends are consistent with what would be expected from a landfill that closed in 2002.

This type of trend indicates that the primary release of contaminants from this source occurred as a pulse that is now reflected by concentrations that are less elevated relative to background than the original.

With this as the typical behaviour shown for a conservative parameter from the landfill, a non-conservative parameter would be expected to behave in one of two ways:

1. Follow a similar trend of a pulse passing through with a lower peak concentration and a shorter time (due to degradation/transformation). Peak concentrations would be observed at distances further downgradient along the flowpath.
2. For a parameter that is stable in anoxic conditions within a landfill leachate, the above trend could be accompanied by an increase in concentrations of the oxygenated species (for example ammonia would transform to nitrate/nitrite; sulphide would transform to sulphate). Typically, the profile of the second species would also form a pulse (potentially with a longer tail).

WSP agrees that there may be benefit in revisiting the presentation of trend plots, to confirm that these "pulse trends" are occurring and that there are no trends of increasing parameter concentrations in a downgradient well. The current trend plots (Figure 4) do not clearly show the pulses, nor allow the reader to distinguish trends at different spots along the flow path.

WSP proposes to replace the current trend plot in Figure 4 (Chloride vs time) with additional trend plots for select parameters along a profile that corresponds to the primary flow path through the site. This flowpath would be defined by OW11-16 (upgradient) OW14; OW4; OW13-I; OW15 and OW16. Concentration trend plots for selected parameter would be plotted on an individual graph and presented on a single page for these six monitors. A page would be prepared for the following parameters: Chloride, Boron, Barium, Sulphate, Ammonia, Nitrate, and DOC. WSP has prepared this list based on the list of indicator parameters and the suitability of these parameters to reflect the presence of potential contaminants in both an anaerobic or aerobic groundwater state and a range of solute velocities in groundwater. Other parameters can be plotted in the event that evidence of an increasing trend is observed at a downgradient monitor. The graph scales will be selected to be consistent for the available monitoring record and for the observed concentration range of each parameter.

RECOMMENDED ACTIONS

Pending authorization from the Township of Huron-Kinloss and agreement of MECP, WSP proposes to consider incorporating the following changes in the 2018 AMR.

1. Prepare updated RUC calculations for all parameters with a drinking water standard. The complete list of parameters is presented in response to comment 1. A Reasonable Use criterion value for ammonia (as N) will be developed based on the Nitrate (as N) concentration and ODWQS to reflect the potential risks associated with transformation of ammonia to nitrate. Updated RUC calculations will reflect average background concentrations at OW11-16 and, where background values are higher than the drinking water quality objective, the maximum value observed at OW11-16. The RUC will be updated in each annual report as new background values are calculated each year. These are values are expected to be relatively stable moving forward as a longer data record is available for OW11-16. Moving forward, Table 4A will replace Table 4.
2. Prepare an updated plan and cross-section along the groundwater flow path as requested by MECP. This updated section will illustrate the new wells and will include the surface water course. This drawing will need to be regenerated as the current drawing was prepared by others and has not been updated regularly.
3. Initiate the process to amend the ECA to formally recognize the leased buffer lands as a Contaminant Attenuation Zone for the site.
4. Replace Figure 4 with a series of trend plots to illustrate parameter concentration changes over time at key points in the groundwater flow path for a series of parameters that are associated with the landfill leachate. Plots would be prepared to illustrate parameter concentration trends for:

OW11-16 (upgradient) OW14; OW4; OW13-I; OW15 and OW16 in separate graphs presented on a single page. Graphs would be prepared for the following parameters that reflect the presence of landfill impacts: Chloride; Boron, Barium, Sulphate; Ammonia; Nitrate; and DOC. Plots on each page will be prepared with consistent time scales and concentration scales to illustrate the changes in concentration alongn the flow path over time. Review of this figure will focus on identifying potential presence of increasing parameter trends, particularly in locations downgradient of the landfill. When increasing trends are observed, WSP shall review data for other parameters and prepare additional trend plots.

5 WSP believes that these updated concentration trend plots will effectively replace the current bar graphs presented as Figure 3 as well as Figure 4, and request that MECP provide direction that the current Figure 3 may also be removed/replaced.

WSP will be pleased to provide the Township with a fee estimate to reflect the additional effort required to address the MECP concerns and update the 2018 reports in accordance with these recommendations upon agreement to the proposed changes by MECP and to prepare the ECA amendment.

Please feel free to contact us to discuss these comments.

Yours truly,

Norman A. Bell, P.Geo.
Senior Hydrogeologist / Project Geoscientist

Lloyd A. Lemon, M.Sc., P.Geo.
Senior Project Geoscientist, Team Lead - Environmental Management

LAL/NAB
cc: Mr. John Yungblut, Township of Huron-Kinloss
Ms. Natasha Munn, MECP
Mr. Simon Thuss, MECP

WSP ref.: 121-60018-11

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Ministry of the Environment, Conservation & Parks
Owen Sound District Office

101 17th Street East, 3rd Floor
Owen Sound ON N4K 0A5
Tel.: 519-371-2901
Fax.: 519-371-2905

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Bureau de district d'Owen Sound

101 17ème rue Est, 3e étage
Owen Sound ON N4K 0A5
Tél. : 519-371-2901
Téléc. : 519-371-2905

Ontario

November 30, 2020

Mr. John Yungblut
Township of Huron-Kinloss
PO Box 130
21 Queen Street
Ripley ON N0G 2R0

Via email: jyungblut@huronkinloss.com

Dear Mr. Yungblut,

Re: Kinloss Landfill 2019 Annual Report
MOE File: SI BR HK C6 610

We have received a copy of the report titled "2019 Annual Monitoring Report, Kinloss Landfill Site", dated July 2020, and prepared by WSP. A copy of this report was forwarded to our Regional Technical Support Section for review. Our Regional Hydrogeologist reviewed the report and provides the following comments limited to the hydrogeological aspects of the landfill monitoring program as presented in the 2019 report.

The results of the 2019 groundwater monitoring program were generally consistent with data collected in previous years. Leachate impacts are observed in monitoring wells downgradient of the landfill, including OW4, OW13S, OW13I and OW15. Samples collected from these locations are characterized by elevated concentrations of several leachate indicator parameters in excess of the Reasonable Use Guideline (RUG) criteria, including alkalinity, hardness, iron, DOC and manganese. Iron, DOC, and manganese are also slightly elevated at several upgradient or cross-gradient locations, indicating that there is some natural variability in the background concentration of these parameters. Samples collected at OW16 continue to return results similar to background groundwater quality, indicating that the leachate plume is sufficiently attenuated on the downgradient property.

Upon reviewing the 2019 monitoring reports for the Kinloss landfill site, the following comments are provided:

1. Section 3.5 of the report argues that it is "excessive" to include several parameters (including nitrate and nitrite) in the Reasonable Use Assessment. However, as detailed in the December 13, 2018 letter from WSP, the consultant has previously agreed to include these parameters in the assessment. As mentioned previously, if the Consultant requires additional guidance on this issue, it is recommended that a teleconference be scheduled to discuss these concerns.

2. As detailed in the December 13, 2018 letter from WSP, the consultant has proposed to use the RUG criterion for nitrate (as N) to set a compliance limit for the concentration of ammonia at the boundary well locations. It is suggested that that a compliance criterion for ammonia is not needed at this time, provided that the downgradient ammonia concentration remains low and nitrate and nitrite are included in the RUG assessment going forward.

In the letter dated December 13, 2018, from WSP, they acknowledged that the ECA should be amended to formally recognize the CAZ on the leased lands located to the east of the site. Could you please provide an update on the status of the ECA amendment application to recognize the leased buffer lands as CAZ.

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

Sincerely,

Ian Mitchell
District Engineer
Owen Sound District

cc. Stephen Taziar, WSP Owen Sound, Stephen.Taziar@wsp.com
Lisa Hines, MECP, Owen Sound
Simon Thuss, MECP, London

Ministry of the Environment, Conservation & Parks
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Bureau de district d'Owen Sound

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Owen Sound ON N4K 0A5
Tél. : 519-371-2901
Téléc. : 519-371-2905

Ontario

December 4, 2020

Mr. John Yungblut
Township of Huron-Kinloss
PO Box 130
21 Queen Street
Ripley ON N0G 2R0

Via email: jyungblut@huronkinloss.com

Dear Mr. Yungblut,

Re: Kinloss Landfill 2019 Annual Report
MOE File: SI BR HK C6 610

Further to my letter to you dated November 30, 2020, containing groundwater comments for the Kinloss Landfill Site 2019 Monitoring Report, our regional surface water specialist has reviewed the 2019 annual report.

During 2019 monitoring year, surface water samples were collected on June 12 and November 20 from SW1 and SW2 locations. The samples were analyzed for field parameters, general chemistry, nutrients and selected metals. The following is a summary of analytical results:

- The PWQO for aluminum exceeded in both SW1 and SW2 samples collected on June 12, 2019.
- The PWQO for iron also exceeded in SW1 sample collected on November 20, 2019.
- Other water quality parameters were measured below PWQO, where available.

Our surface water reviewer has the following comments based the 2019 surface water monitoring data for the Kinloss Landfill Site:

1. Measured concentrations of aluminum and iron in 2019 samples were slightly higher than their concentrations reported for past monitoring events. Since levels higher than PWQO were also measured in samples collected from the upstream location, no action is required at this time.
2. In general, water quality measured at both, upstream and downstream, surface water monitoring locations is similar and therefore suggest that the landfill Site does not have significant adverse effects on the Creek's water quality.
3. It is agreed that surface water monitoring should continue as per the requirements of the current ECA.

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

Sincerely,

Ian Mitchell
District Engineer
Owen Sound District

cc. Stephen Taziar, WSP Owen Sound, Stephen.Taziar@wsp.com
Lisa Hines, MECP, Owen Sound
Nilima Gandhi, MECP, London

Kinloss Landfill

,

Inspection Report

System Number:	
Inspection Start Date:	11/18/2021
Inspection End Date:	12/02/2021
Inspected By:	Ian Mitchell
Badge #:	701

(signature)

NON-COMPLIANCE/NON-CONFORMANCE ITEMS

The following item(s) have been identified as non-compliance/non-conformance, based on a "No" response captured for a legislative or best management practice (BMP) question (s), respectively.

Question Group: Other Inspection Findings

Question ID	949100	
Question	**Question Type**	**Legislative Requirement**
Were the inspection questions sufficient to address other identified non-compliance items?	Legislative	Not Applicable
Observation/Corrective Action(s)		
The following instances of non-compliance were also noted during the inspection: The Environmental Compliance Approval should reflect the current status of the site. In this case the site is temporarily closed. The ECA does not reflect this situation and needs to be amended. It appears this amendment requirement was missed when the site changed operational status a number of years ago.		

Question Group: Records / Reports

Question ID	OOL 45	
Question	**Question Type**	**Legislative Requirement**
Has the Certificate of Requirement been registered on Title?	Legislative	EPA | 27 | (1)
Observation/Corrective Action(s)		
No Appendix H of the 2020 annual report documents there is a registration on title of a lease which appears to be for buffer lands. Documentation confirming the actual landfill site is registered on title could not be located in the Ministry's file. The Township should ensure that the landfill Site is registered on title. The Township should provide confirmation in writing that the Site is registered on title, including a copy of the Certificate of Prohibition by December 31, 2021. If the actual site is not registered on title, then this will need to be done.		

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: Regulated Activity: WASTE : Landfills

Question ID	OOL 1	
Question	**Question Type**	**Legislative Requirement**
Does the Open landfill site have an Environmental Compliance Approval (ECA)?	Legislative	EPA | 27 | (1)
Observation		
Yes Certificate of Approval A272801 dated October 1, 1980 and amended in 1993 for submission of annual report. The ECA was also amended 1996 requiring groundwater and surface water monitoring.		

Question ID	OOL 5	
Question	**Question Type**	**Legislative Requirement**
Is the landfill required to take and test monitoring well samples to determine the quality of the ground water?	Information	Not Applicable
Observation		
Yes		

Question ID	OOL 6	
Question	**Question Type**	**Legislative Requirement**
Are monitoring well samples taken and tested to determine the quality of the groundwater?	Legislative	EPA | 27 | (1), EPA | R.R.O. 1990, Reg. 347 | 11 | (7)
Observation		
Yes		

Question ID	OOL 7	
Question	**Question Type**	**Legislative Requirement**
Is the ministry satisfied with the groundwater monitoring program at the site?	Legislative	EPA | 27 | (1), EPA | R.R.O. 1990, Reg. 347 | 11 | (7)
Observation		
Yes		

Question ID	OOL 10	
Question	**Question Type**	**Legislative Requirement**
Are measures taken to manage leachate to prevent off-site contamination?	Legislative	EPA | 27 | (1), EPA | R.R.O. 1990, Reg. 347 | 11 | (7)
Observation		
Yes 30 acres of buffer lands to the east allow for leachate attenuation. The agreement to allow these lands to be used for contamination attenuation (99 year lease) was registered on title by instrument # 264927, dated February 28, 1990.		

Question ID	OOL 12	
Question	**Question Type**	**Legislative Requirement**
Is the landfill required to manage landfill gas generated at the site?	Information	Not Applicable
Observation		
Yes There are three gas monitoring probes on site		

Question ID	OOL 34	
Question	**Question Type**	**Legislative Requirement**
Has an annual operations report been submitted?	Legislative	EPA | 27 | (1)
Observation		
Yes The 2020 Annual Monitoring report was submitted on July 7, 2021		

Question ID	OOL 35	
Question	**Question Type**	**Legislative Requirement**
Is the ministry satisfied with the annual report submitted?	Legislative	EPA | 27 | (1)
Observation		
Yes		

Question ID	OOL 37	
Question	**Question Type**	**Legislative Requirement**
Is there an ECA condition requiring financial assurance?	Information	Not Applicable
Observation		
No		

Question ID	OOL 45

Question	**Question Type**	**Legislative Requirement**
Has the Certificate of Requirement been registered on Title?	Legislative	EPA | 27 | (1)

Observation

No Appendix H of the 2020 annual report documents there is a registration on title of a lease which appears to be for buffer lands. Documentation confirming the actual landfill site is registered on title could not be located in the Ministry's file. The Township should ensure that the landfill Site is registered on title. The Township should provide confirmation in writing that the Site is registered on title, including a copy of the Certificate of Prohibition by December 31, 2021. If the actual site is not registered on title, then this will need to be done.

Question ID	949100

Question	**Question Type**	**Legislative Requirement**
Were the inspection questions sufficient to address other identified non-compliance items?	Legislative	Not Applicable

Observation

The following instances of non-compliance were also noted during the inspection: The Environmental Compliance Approval should reflect the current status of the site. In this case the site is temporarily closed. The ECA does not reflect this situation and needs to be amended. It appears this amendment requirement was missed when the site changed operational status a number of years ago.

4.

182357 The Registry Act

DECLARATION UNDER
SECTION 23 OF THE ACT

I...W.F..Hawthorne.....of the Township of Kinloss do solemnly declare that I am a party to Provisional Certificate of Approval Waste Disposal Site (Prov. Cert. No. A 272801) which affects the following lands

All and Singular that certain parcel or tract of land and premises, situate, lying and being in the Township of Kinloss, in the County of Bruce, and being composed of part of Lot 16 in the Sixth Concession of the said Township more particularly described as follows:

BEGINNING at the southeast angle of said Lot 16;

THENCE northerly along the easterly limit of said Lot 16, a distance of 610.5 feet to the point of commencement of the parcel herein conveyed;

THENCE westerly parallel to the southerly limit of said Lot 16, a distance of 709.5 feet;

THENCE northerly parallel to the easterly limit of Lot 16, a distance of 585.75 feet;

THENCE easterly parallel to the southerly limit of said Lot 16, a distance of 709.5 feet more or less to the easterly limit of said Lot 16;

THENCE southerly along the easterly limit of said Lot 16, a distance of 585.75 feet more or less to the point of commencement.

TOGETHER WITH a right-of-way for persons, animals and vehicles in favour of the Grantee, its successors and assigns and their invitees and licencees, over part of Lot 16 more particularly described as follows:

BEGINNING at the southeast angle of Lot 16;

THENCE northerly along the easterly limit of Lot 16, a distance of 610.5 feet;

THENCE westerly parallel to the southerly limit of Lot 16, a distance of 528.0 feet to the point of commencement of said right-of-way;

THENCE continuing westerly parallel to the southerly limit of said Lot 16, a distance of 20 feet;

THENCE southerly parallel to the easterly limit of said Lot 16, a distance of 610.5 feet more or less to the southerly limit of Lot 16;

THENCE easterly along the southerly limit of Lot 16, a distance of 20 feet;

THENCE northerly parallel to the easterly limit of Lot 16, a distance of 610.5 feet more or less to the point of commencement of said right-of-way.

\- - -

I make this solemn declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath.

Declared before me

at the Village of Ripley

this 24th day of November

1980

Marlene Colling
A Commissioner, etc.

Seal

Signature of Clerk
Township of Kinloss

Ministry of the Environment
Ontario

Provisional Certificate No. A 272801

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 Kinloss
Holyrood, Ontario
N0G 2B0

for the use and operation of a 6 hectare (15 acre) landfilling site

all in accordance with the following plans and specifications: 1.Plan of operation submitted to the Owen Sound District Office of MOE under cover of a letter dated August 23, 1979. 2. Site plan entitled "Kinloss Township Waste Disposal Site."

Located: Part Lot 16, Concession 6
Township of Kinloss
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 10% non-hazardous solid industrial (limited to miscellaneous debris from agriculture such as wire, stumps and scrap metal) wastes.

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.

Seal

Dated this 1st day of October, 1980.

Director, Section 39,
The Environmental Protection Act, 1971

MOE 1406 (10/79)

Ministry of the Environment

Ontario

NOTICE

TO: Township of Kinloss
Holyrood, Ontario
N0G 2B0

You are hereby notified that Provisional Certificate of Approval No. A 272801 has been issued to you subject to the conditions outlined therein.

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

The reason for the condition requiring registration of the Certificate is that Section 46 of The Environmental Protection Act, 1971 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 the 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.

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.

This Notice should be served upon:

The Secretary,
Environmental Appeal Board,
1 St. Clair Ave. West,
5th Floor,
Toronto, Ontario.
M4V 1K7

AND

The Director,
Section 39
Ministry of the Environment,

DATED this 1st day of October , 1980..

Director,
Section 39
Ministry of the Environment.

MOE 1944 8/76

182357

Kinloss

DATED THE 1st DAY OF

OCTOBER

182357

No.

Land Registry Division of Bruce (No. 3)

I CERTIFY that this instrument is registered as of

10:52 A.M.

NOV 25 1980

in the

Land Registry Office at Walkerton, Ontario.

DEPUTY LAND REGISTRAR

BETWEEN

THE DIRECTOR

-and-

TOWNSHIP OF KINLOSS

PROPERTY OF
L.R.O. #3

INDEX 3 FOLIO 52

ENTERED CHEKD

FILMED PAGES 4

PROVISIONAL CERTIFICATE

OF APPROVAL

UNDER

THE ENVIRONMENTAL

PROTECTION ACT, 1971

10:52

PART LOT 16, CONCESSION 6

TOWNSHIP OF KINLOSS

COUNTY OF BRUCE

TOWNSHIP OF KINLOSS

HOLYROOD, ONTARIO

N0G 2B0

REGISTRATION FEE	15	00
LAND TRANSFER TAX		
RETAIL SALES TAX		

Appendix C GEI Landfill Inspection Reports

Site Name: Kinloss
File No: 224058-1
Date: 2024/05/06
Inspector: JW/PQ/BTO

GAMSBY AND MANNEROW LIMITED
LANDFILL INSPECTION REPORT

		YES	NO	COMMENTS
1.	Site Open:	☐	☒	
2.	Access Control:	☒	☐	
3.	Supervisor On-Site:	☐	☒	
4.	Signs Posted:			
	Entrance	☑	☐	
	Waste Disposal Area	☐	☐	
	Tires	☐	☐	Closed site
	Brush	☐	☐	
	Appliances	☐	☐	
	Metals	☐	☐	
	Other	☐	☐	
5.	Litter:			
	On-Site	☐	☒	
	Off-Site	☐	☒	
6.	Rodent/Vector Evidence:	☐	☒	
7.	Scavenging:	☐	☒	
8.	Monitoring Wells			

NOTES:

		ACCEPTABLE	NOT ACCEPTABLE	COMMENTS
9.	Access Road Condition:	☒	☐	
10.	Screening from Public View:	☒	☐	
11.	Working Face:			
	Compaction	☐	☐	
	Daily Cover	☐	☐	closed site
12.	Segregation of Wastes:	☐	☐	
13.	Finished Areas:			
	Final Cover	☒	☐	
	Seeding	☒	☐	
14.	Burning:			
	Burn Pile Size	☒	☐	
	Wood Wastes Only	☒	☐	
	Ashes Removed	☒	☐	
15.	Leachate Management:	☒	☐	
16.	Recycleables:			
	Tires	☒	☐	
	Appliances	☐	☐	
	Metals	☒	☐	
	Blue Box	☐	☐	
	Other	☐	☐	

NOTES:

Site Name: Kinloss
File No: 224058-1
Date: 2024/Nov/27
Inspector: BID/GK/PQ

GAMSBY AND MANNEROW LIMITED
LANDFILL INSPECTION REPORT

		YES	NO	COMMENTS
1.	Site Open:	☐	☒	
2.	Access Control:	☒	☐	
3.	Supervisor On-Site:	☐	☒	
4.	Signs Posted:			
	Entrance	☒	☐	
	Waste Disposal Area	☐	☐	
	Tires	☐	☐	
	Brush	☐	☐	
	Appliances	☐	☐	Closed site.
	Metals	☐	☐	
	Other	☐	☐	
5.	Litter:			
	On-Site	☐	☒	
	Off-Site	☐	☒	
6.	Rodent/Vector Evidence:	☐	☒	
7.	Scavenging:	☐	☒	
8.	Monitoring Wells			

NOTES:

		ACCEPTABLE	NOT ACCEPTABLE	COMMENTS
9.	Access Road Condition:	☒	☐	
10.	Screening from Public View:	☒	☐	
11.	Working Face:			
	Compaction	☐	☐	
	Daily Cover	☐	☐	
12.	Segregation of Wastes:	☐	☐	Closed Site.
13.	Finished Areas:			
	Final Cover	☒	☐	
	Seeding	☒	☐	
14.	Burning:			
	Burn Pile Size	☒	☐	
	Wood Wastes Only	☒	☐	
	Ashes Removed	☒	☐	
15.	Leachate Management:	☒	☐	
16.	Recycleables:			
	Tires	☒	☐	
	Appliances	☐	☐	
	Metals	☒	☐	
	Blue Box	☐	☐	
	Other	☐	☐	

NOTES: _____

Appendix D Monitoring Well Installation Details

Project No.: LNE08508
Location: North Half Part Lot 16, Concession 6, Kinloss Township
Drilling Company: Noll Drilling Inc.
Drilling Method: Geoprobe
Sampling Interval: Continuous
Supervised by: J, Rutherford
Construction: 25 mm diameter threaded-joint PVC pipe with 10 slot PVC screen
capped with slip-on labcock valve
lockable steel protective casing

GP1 Depth	Soil Description	Concrete	Bentonite	Sand	Screen
0.0 - 0.45	Medium brown fine sandy SILT, trace clay; compact; moist	0 - 0.5	0.5 - 0.9	0.9 - 3.7	1.2 - 2.7
0.45 - 3.65	Medium brown fine sandy SILT with 3 to 20 cm thick layers of light brown very fine SAND some silt, and light brown fine to medium sand; compact; moist				
Borehole Location:	North of OW1				
Date Started:	Jun 14, 2006				
Date Completed:	Jun 14, 2006				

GP2 Depth	Soil Description	Concrete	Bentonite	Sand	Screen
0.0 - 0.40	Medium brown fine sandy SILT, trace clay; very stiff; moist	0 - 0.5	0.5 - 1.2	1.2 - 3.7	1.5 - 3
0.40 - 1.00	Medium brown silty fine SAND; compact; moist				
1.00 - 1.20	Medium brown fine sandy SILT, trace gravel; firm; moist				
1.20 - 1.50	Medium brown fine sandy SILT, some gravel; non-plastic; firm; moist (appears disturbed - fill?)				
1.50 - 2.25	Medium brown sandy SILT, some gravel; non-plastic; firm; moist				
2.25 - 2.45	Light brown fine SAND, trace silt; loose; moist				
2.45 - 3.60	Light brown fine SAND, some silt; layered with thin layers of medium sand nad sandy silt; loose; moist				
3.60 - 3.65	Medium brown fine sandy SILT; non-plastic; firm; moist				
Borehole Location:	West side of access road, between page wire fence and tire pile				
Date Started:	Jun 14, 2006				
Date Completed:	Jun 14, 2006				

GP3 Depth	Soil Description	Concrete	Bentonite	Sand	Screen
0.0 - 0.10	Light brown gravelly SAND, some silt; trace organic matter; loose; dry	0 - 0.5	0.5 - 0.6	0.6 - 2.3	0.8 - 2.3
0.10 - 0.55	Medium red-brown fine SAND, trace silt; loose; moist				
0.55 - 1.20	Light brown fine SAND, trace silt; loose; moist				
1.20 - 2.15	Light brown fine SAND, trace silt; layered with thin seams of fine sand some silt, and silty fine sand; loose; moist				
2.15 - 2.45	Medium bown fine sand SILT; non-plastic; compact; moist				
Borehole Location:	Between fill area and lower access road				
Date Started:	Jun 14, 2006				
Date Completed:	Jun 14, 2006				

Paragon Engineering Limited

WELL No. TP

CLIENT Township of Kinloss
PROJECT Kinloss Township Landfill
LOCATION Part Lot 16, Concession VI, Kinloss Township

DATE November 20, 1985
PROJECT No. 5-937

DEPTH METRES	ELEV.	DESCRIPTION	SAMPLE No.	SAMPLE TYPE	SAMPLE "N"	WELL DETAIL	REMARKS
0	82.316	GROUND LEVEL					
0.203	82.313	TOPSOIL					
0.610	81.906	LIGHT BROWN SILTY SAND GRAVEL AND SOME COBBLE	2	G.S.			
1.118	81.398	FINE TO MEDIUM SAND	3	G.S.			
1.524	80.792						
2.032	80.284	END OF TEST PIT					NO GROUND WATER

"T" - THICKEST TUBE, GS - GRAB SAMPLE, SS - SPLIT SPOON, "N" - BLOWS

Paragon Engineering Limited

WELL No. TP

CLIENT Township of Kinloss
PROJECT Kinloss Township Landfill
LOCATION Part Lot 16, Concession VI, Kinloss Township

DATE November 20, 198
PROJECT No. 5-937

DEPTH METRES	ELEV.	DESCRIPTION	SAMPLE No.	TYPE	"N"	WELL DETAIL	REMAR
0	91.24	GROUND LEVEL					
0.20	91.43	TOPSOIL					
		MEDIUM BROWN SAND					
1.29	90.33		1	G.S.			
1.77	90.46					▽ Nov.20	
2.21	89.46	END OF TEST PIT					

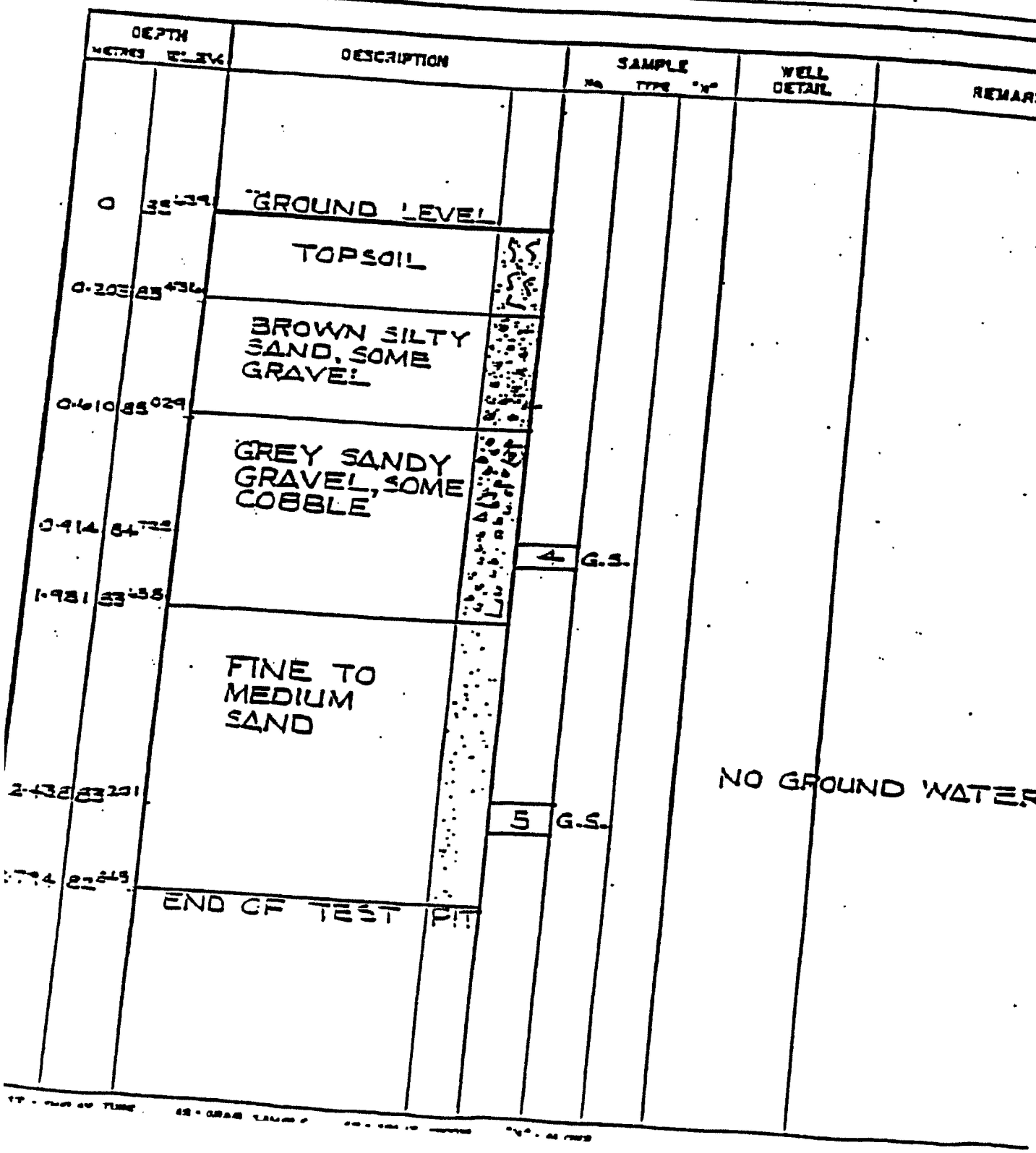
ST - SHELBY TUBE, GS - GRAB SAMPLE, SS - SPLIT SPOON, "N" - BLOWS

Paragon Engineering Limited

WELL No. TP3

CLIENT Township of Kinloss
PROJECT Kinloss Township Landfill
LOCATION Part Lot 16, Concession VI, Kinloss Township

DATE November 20, 1985
PROJECT No. 5-937

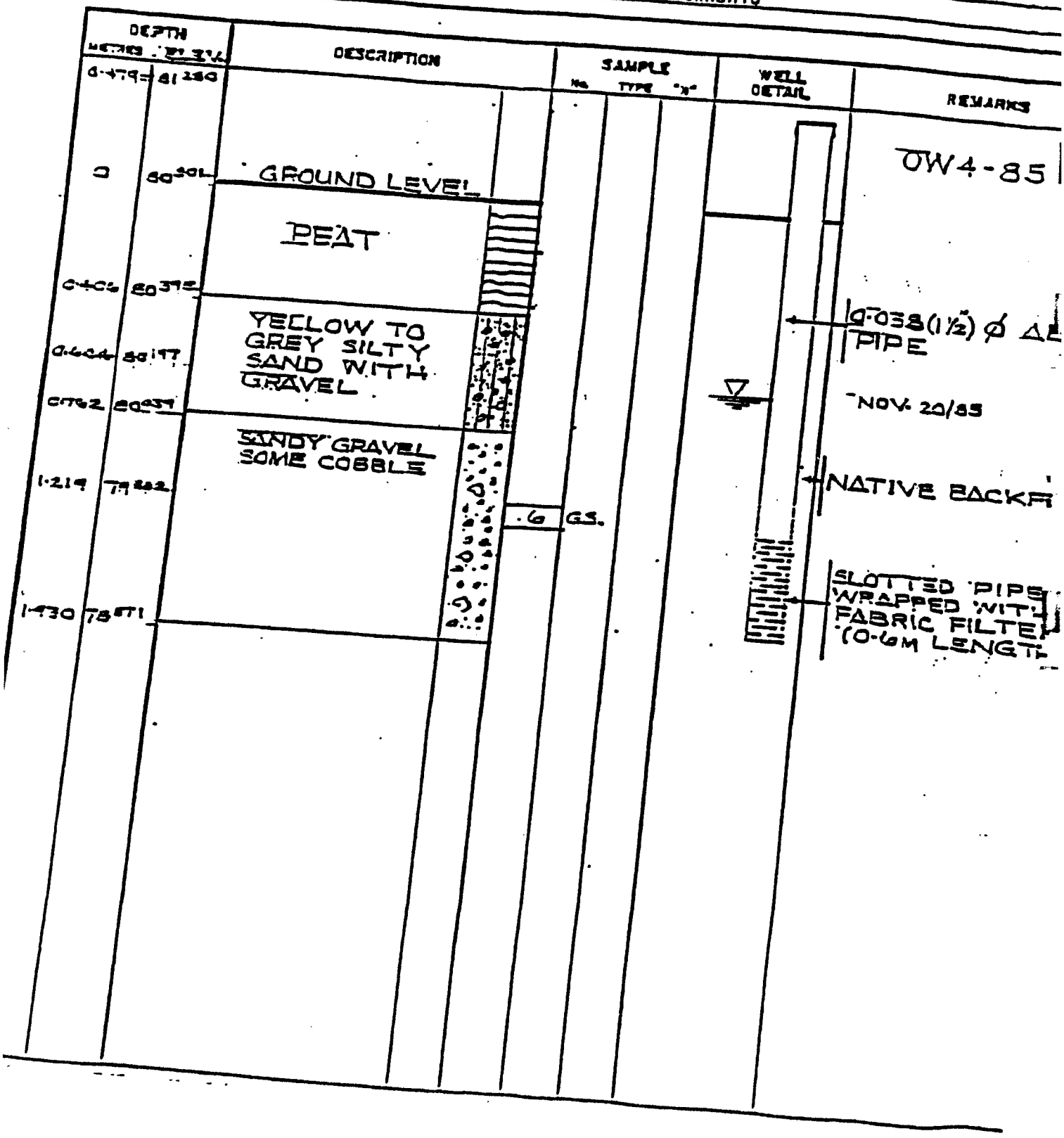


Paragon Engineering Limited

WELL No. TP4

CLIENT Township of Kinloss
PROJECT Kinloss Township Landfill
LOCATION Part Lot 16, Concession VI, Kinloss Township

DATE November 20, 1985
PROJECT No. 5-937



Paragon Engineering Limited

WELL No. TP5-

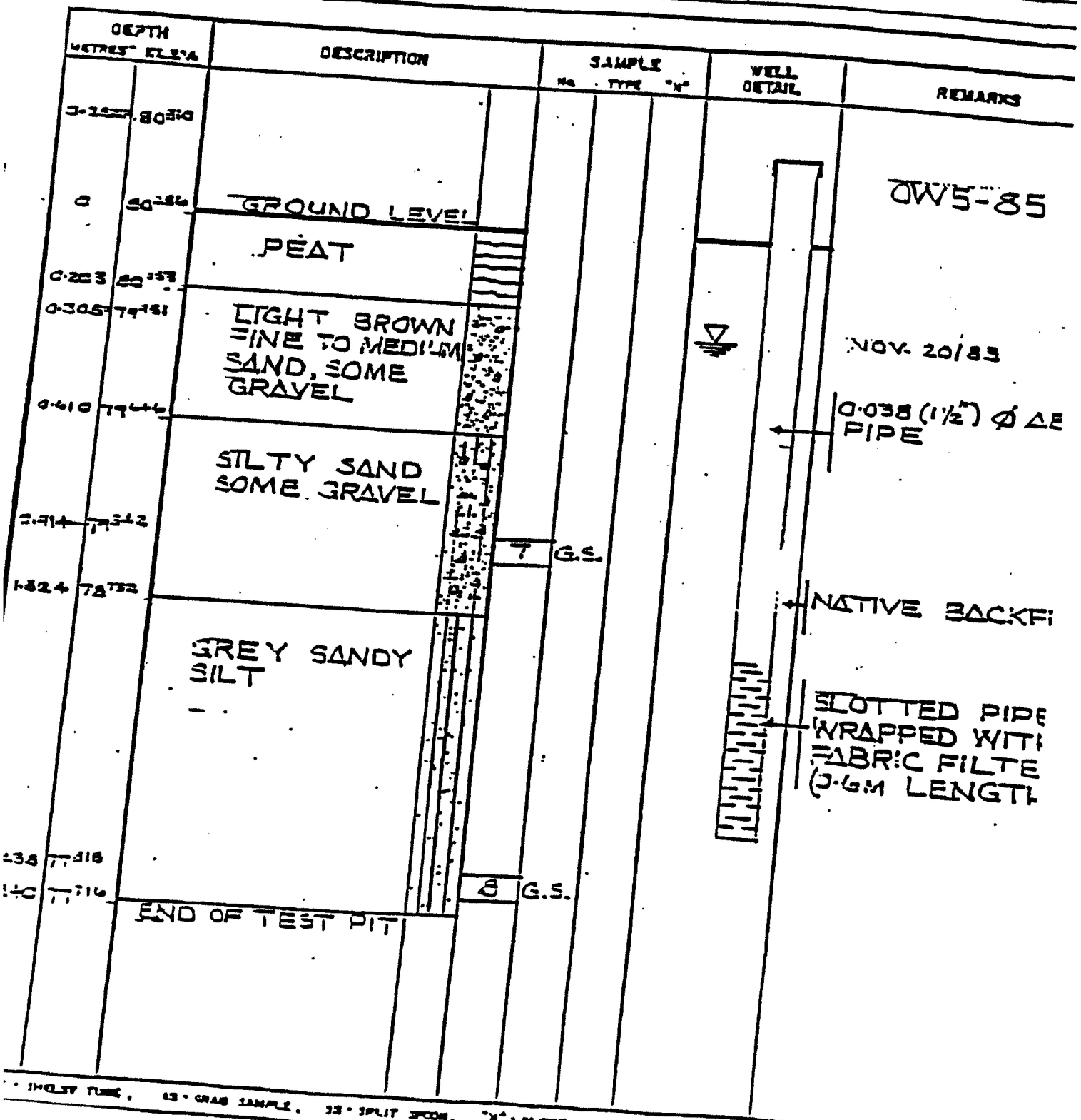
CLIENT Township of Kinloss

PROJECT Kinloss Township Landfill

LOCATION : Part Lot 16, Concession VI, Kinloss Township

DATE November 20, 1985

PROJECT No. 5-937

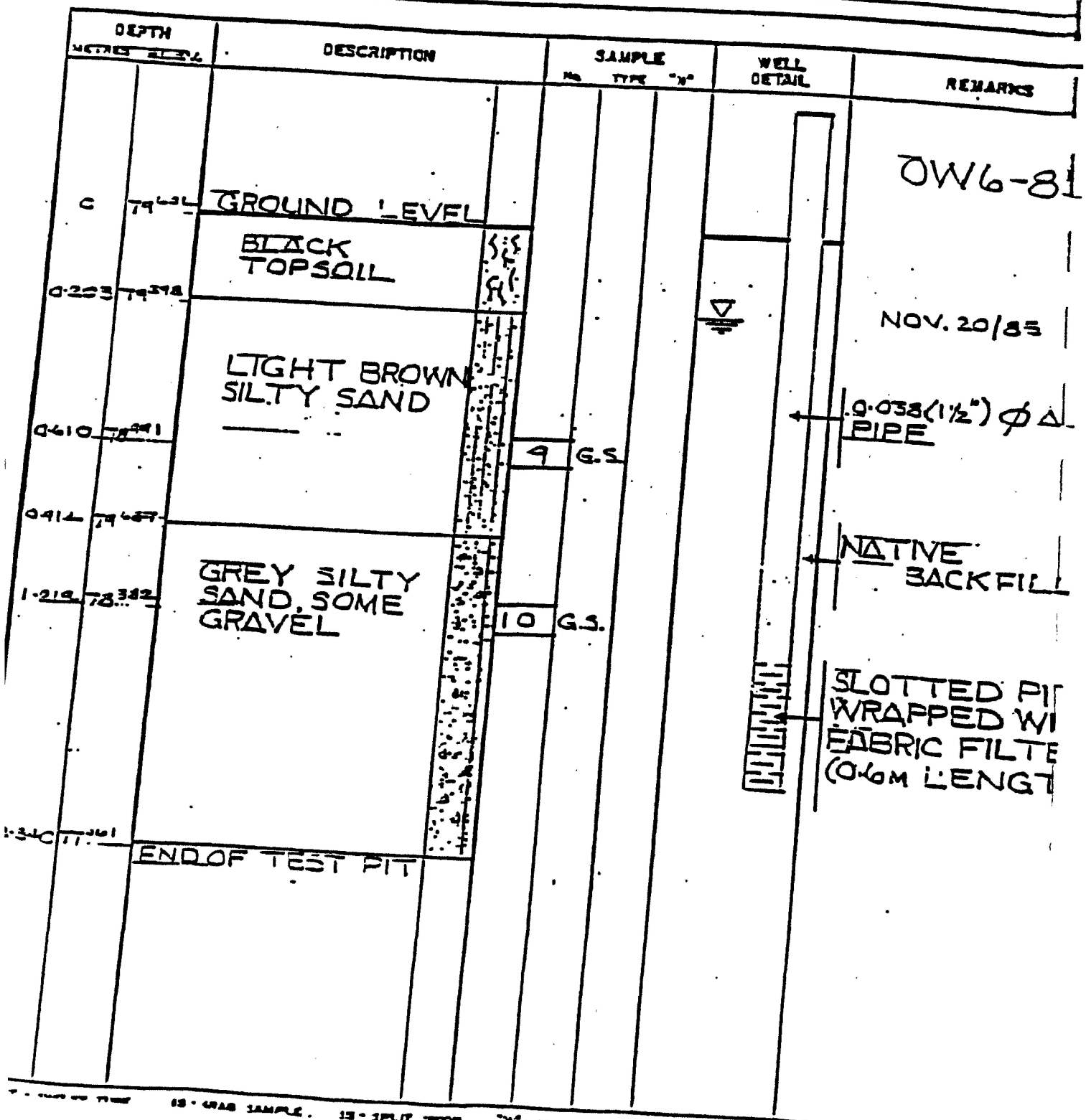


Paragon Engineering Limited

WELL No. TP6

CLIENT Township of Kinloss
PROJECT Kinloss Township Landfill
LOCATION Part Lot 16, Concession VI, Kinloss Township

DATE November 20, 1985
PROJECT No. 5-937

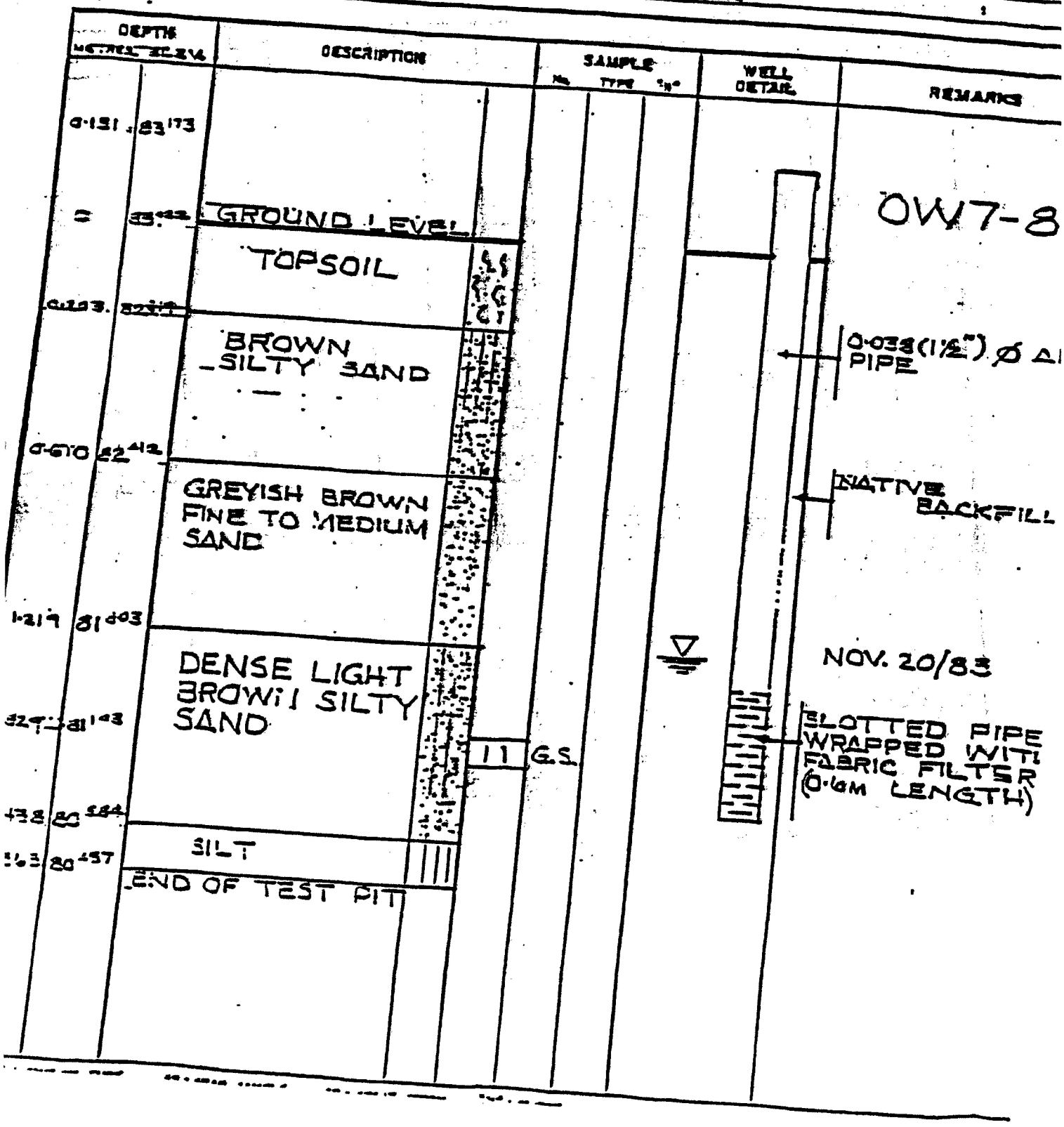


Paragon Engineering Limited

WELL No. TP7-

CLIENT Township of Kinloss
PROJECT Kinloss Township Landfill
LOCATION Part Lot 16, Concession VI, Kinloss Township

DATE November 20, 1985
PROJECT No. 5-937



Paragon Engineering Limited

WELL No. TP6

CLIENT Township of Kinloss
PROJECT Kinloss Township Landfill
LOCATION Part Lot 16, Concession VI, Kinloss Township

DATE November 20, 1985
PROJECT No. 5-937

DEPTH METRES	ELEV.	DESCRIPTION	SAMPLE No.	SAMPLE TYPE	SAMPLE "N"	WELL DETAIL	REMARKS
0	87.364	GROUND LEVEL					
		TOPSOIL					
0.508	87.036						
		BROWN SILTY SAND					
0.914	86.630						
		LIGHT BROWN FINE SAND					NO GROUND WATER
1.219	86.345		12	G.S.			
2.286	85.278						
		DENSE SILTY SAND SOME GRAVEL					
2.591	84.973		13	G.S.			
2.692	84.672	END OF TEST PIT					

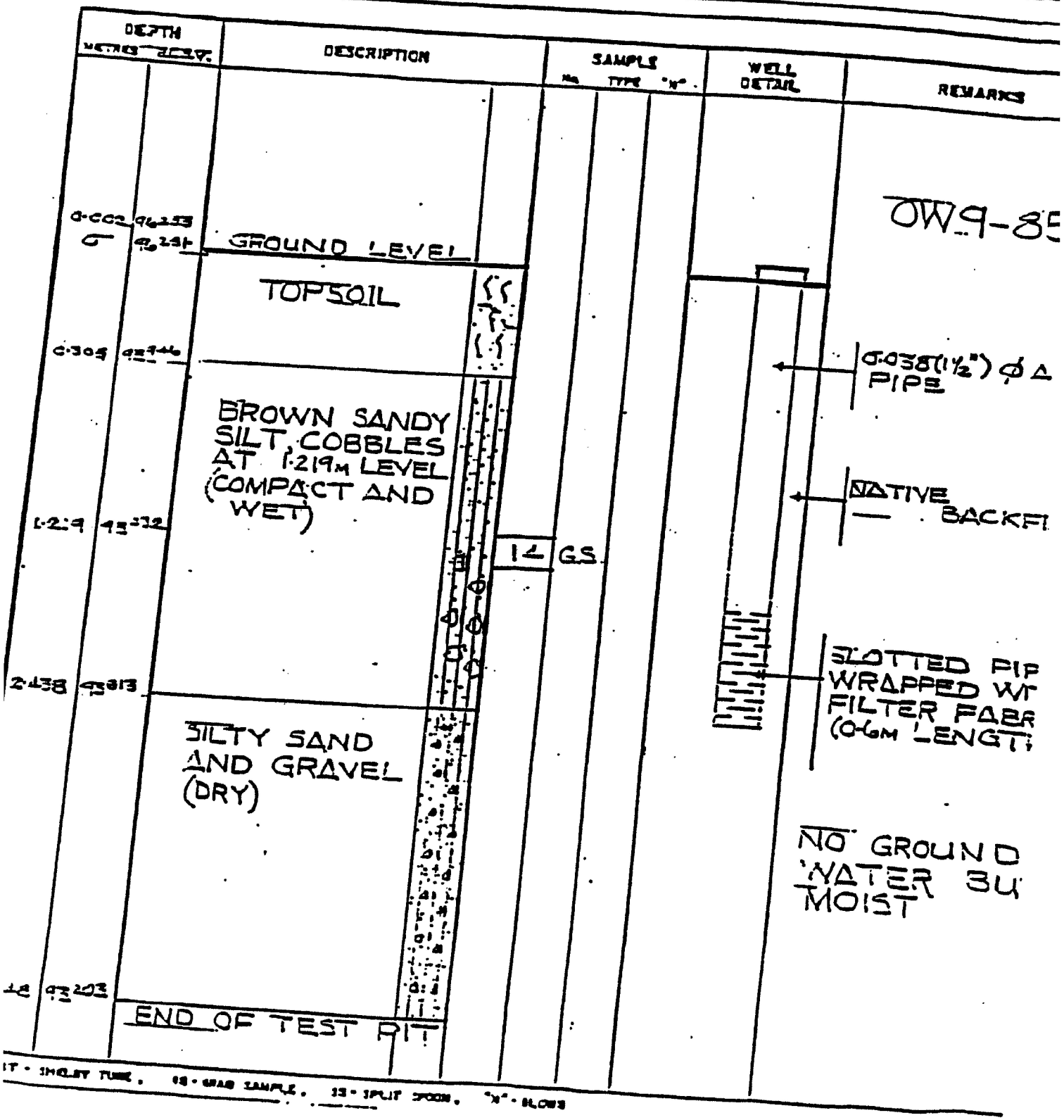
ST - SHELBY TUBE, GS - GRAB SAMPLE, SS - SPLIT SPOON, "N" - BLOWS

Paragon Engineering Limited

WELL No. 1 P2

CLIENT Township of Kinloss
PROJECT Kinloss Township Landfill
LOCATION Part Lot 16, Concession VI, Kinloss Township

DATE November 20, 1985
PROJECT No. 5-937



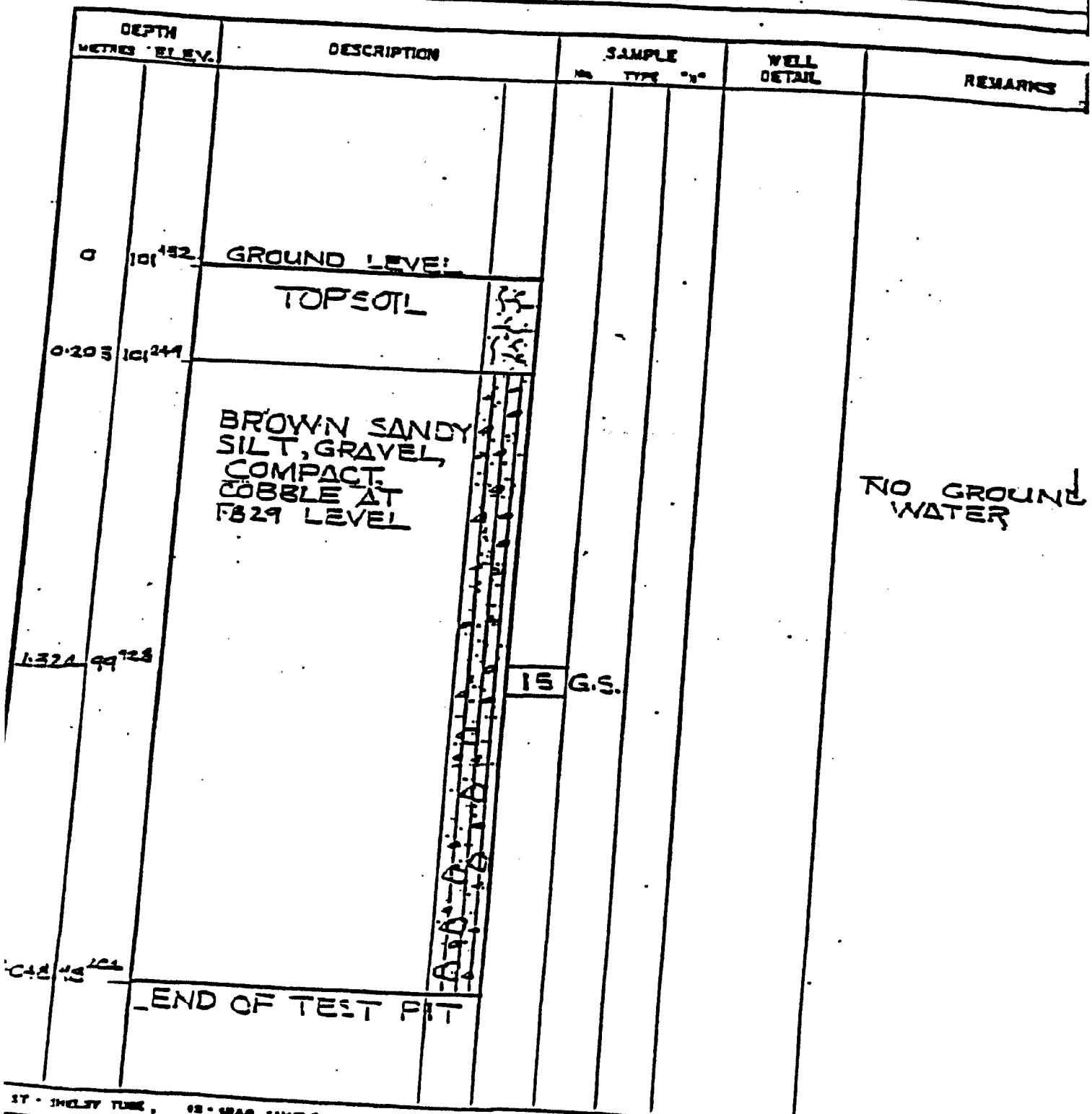
IT - SHELBY TUBE, GS - GRAB SAMPLE, SS - SPLIT SPOON, "N" - BLOWS

Paragon Engineering Limited

WELL No. TP1C

CLIENT Township of Kinloss
PROJECT Kinloss Township Landfill
LOCATION Part Lot 16, Concession VI, Kinloss Township

DATE November 20, 1985
PROJECT No. 5-937



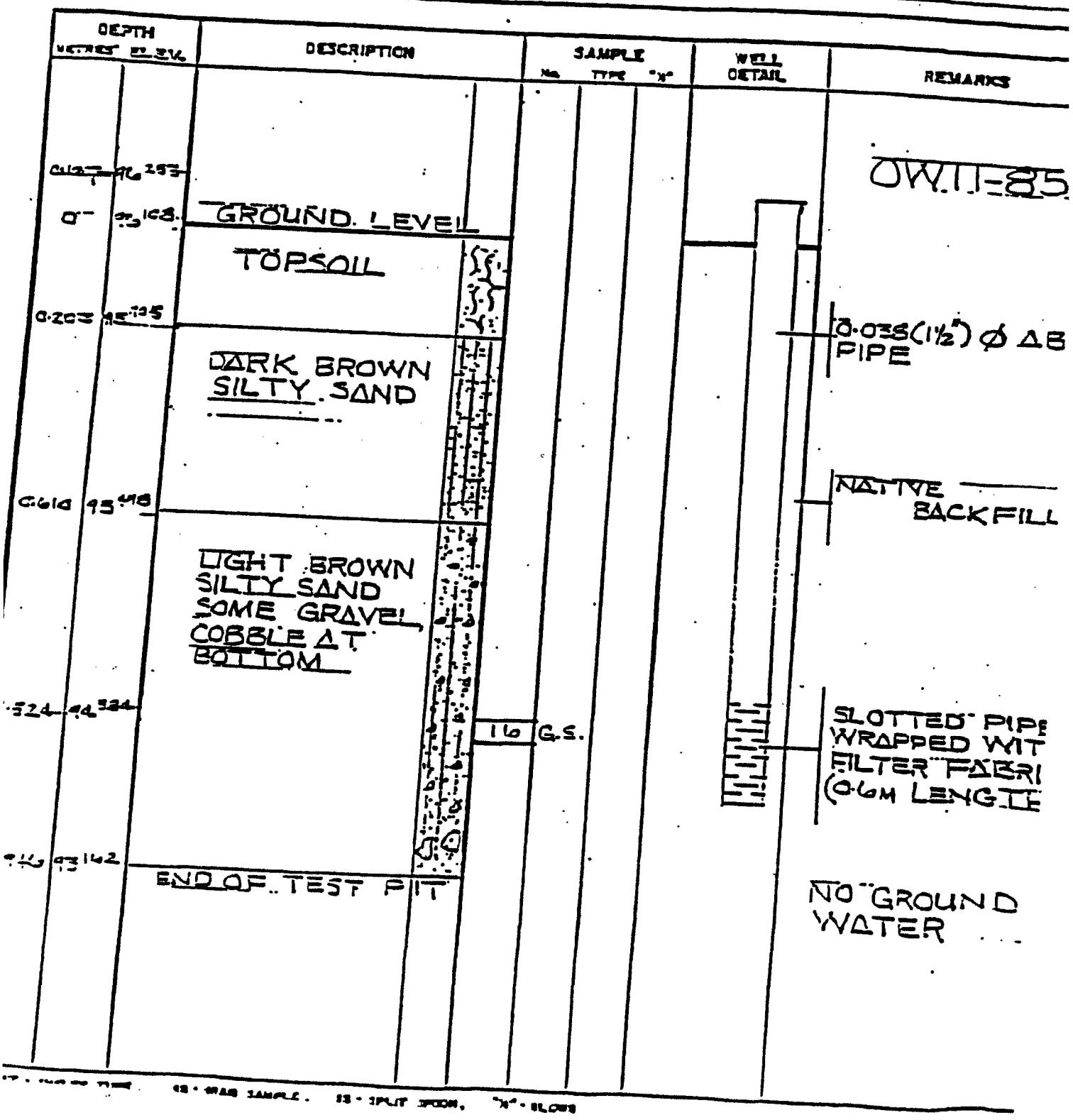
ST - SHELBY TUBE, GS - GRAB SAMPLE, SS - SPLIT SPOON, "N" - BLOWS

Pyrogon Engineering Limited

WELL No. TPII-

CLIENT Township of Kinloss
PROJECT Kinloss Township Landfill
LOCATION Part Lot 16, Concession VI, Kinloss Township

DATE November 20, 1985
PROJECT No. 5-937



SAMPLE HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH	SAMPLES NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	MONITORING INSTALLATIONS GROUNDWATER AND ENVIRONMENTAL OBSERVATIONS
0	POWER AUGER (HOLLOW STEM)	GROUND SURFACE		97.89 0.00					OW12-97
1		Compact to very dense brown fine SAND, trace silt			1	SS	23		
2					2	SS	21		
3					3	SS	28		
4					4	SS	38		
5					5	SS	16		
		Dense grey-brown medium SAND trace silt, trace gravel		90.64 7.16	6	SS	33		
		Very dense brown fine SAND trace silt		89.72 8.08					
				89.06 8.84	7	SS	86		
		Dense to very dense grey-brown medium SAND, trace gravel, trace silt			8	SS	41		
					9	SS	48		
					10	SS	43		
		CONTINUED ON NEXT PAGE							

Top of Pipe Elev. 98.72

Concrete

Bentonite

SCALE

Golder Associates

LOGGED: T.P.

CHECKED: RW

BORING DATE: AUG. 21, 1997

SAMPLE HAMMER, 63.5kg; DROP, 760mm

DATUM: LOCAL

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH	SAMPLES NUMBER	TYPE	BLOWS/0.3m	0	ADDITIONAL LAB. TESTING	MONITORING INSTALLATIONS GROUNDWATER AND ENVIRONMENTAL OBSERVATIONS
14	POWER AUGER (HOLLOW STEM)	CONTINUED FROM PREVIOUS PAGE								OW12-97
15		Dense to very dense grey-brown medium SAND, trace gravel, trace silt			11	38 DO	77			Sand Filter
16										
17		Very dense brown SILT trace gravel		81.34 16.46	12	38 DO	58			
18		Very dense grey SILT with gravel (TILL)		80.58 17.22	13	38 DO	>100			
		END OF BOREHOLE		78.68 19.28						

WATER LEVEL ENCOUNTERED AT ELEV. 81.00 DURING DRILLING ON AUG. 21, 1997

SCALE

Golder Associates

LOGGED: T.P.

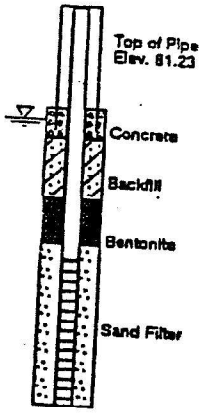
CHECKED: RLV

BORING DATE: AUG. 14, 1997

SAMPLE HAMMER, 63.5kg; DROP, 760mm

DATUM: LOCAL

DEPTH METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	MONITORING INSTALLATIONS: GROUNDWATER AND ENVIRONMENTAL OBSERVATIONS
0	POWER AUGER (HOLLOW STEM)	GROUND SURFACE		80.33 / 0.00					OW13-97
1		Firm brown fibrous PEAT			1	SS DO	8		
2		Soft grey CLAYEY SILT, trace gravel (TILL)		78.96 / 1.37	2	SS DO	3		
3		Very dense grey SANDY SILT, trace gravel, trace clay and cobbles (TILL)		78.20 / 2.13	3	SS DO	54		
		END OF BOREHOLE		77.28 / 3.05					



WATER LEVEL ENCOUNTERED AT ELEV. 80.23 DURING DRILLING ON AUG. 21, 1997.

EPTH SCALE

75

Golder Associates

LOGGED: T.P.

CHECKED: RW

LOG OF DRILLING OPERATIONS

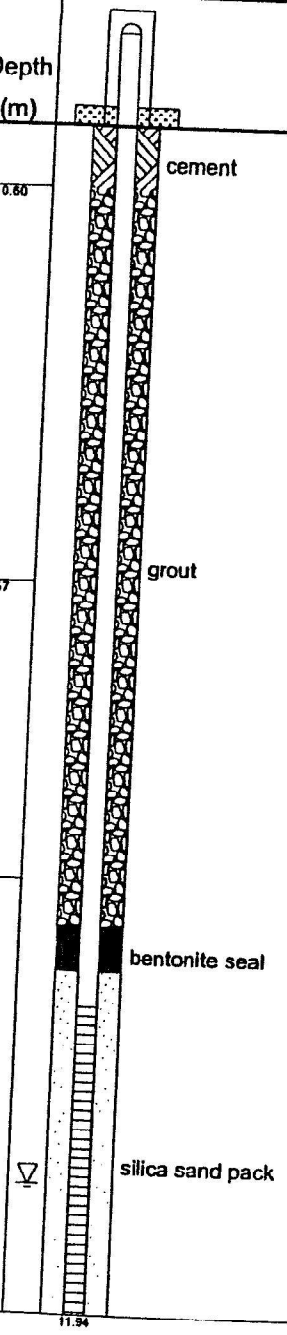
OW 14 - Leachate

BURNSIDE

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Guelph, Ontario N1H 1C4
telephone (519) 823-4995 fax (519) 836-5477

Client: Township of Huron-Kinloss	Project Name: Monitoring Well Installation	Logged by: S Quinlan
Project No.: W99613	Location: Kinloss Landfill	Ground (m amsl):
Drilling Co.: Lantech Drilling Services Inc.	Date Started: 24/07/2003	Static Water Level (m amsl):
Drilling Method: Hollow Stem Auger	Date Completed: 24/07/2003	Sand Pack (m amsl):

Depth Scale (ft)	Depth Scale (m)	Stratigraphic Description	Strat. Plot	Depth (m)
		GRAVEL - Dry.		
5.0	1.0	WASTE FILL - Black, Strong Odour, Plastic and Wire in cuttings & Dry.		0.60
10.0	3.0			
15.0	5.0	FINE SAND - Brown, Dense, Well Sorted & Dry.		4.57
20.0	6.0			
25.0	8.0	FINE SAND - Brown, Dense, Well Sorted & Saturated.		7.62
30.0	9.0			
35.0	11.0			11.94



SAMPLE Num.	Type	Int.	%Recov.
	AC		
	SS		90
	AC		
	SS		60
	AC		
	SS		80
	AC		

Depth Scale (ft) (m): 5.0 / 1.0; 10.0 / 3.0; 15.0 / 4.0; 20.0 / 5.0; 25.0 / 6.0; 30.0 / 7.0; 35.0 / 8.0; 9.0; 10.0; 11.0

Prepared By: **S. Quinlan** Checked By: **D. Hopkins** Date Prepared: **July 25, 03**

This borehole log was prepared for hydrogeological and/or environmental purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by R. J. Burnside & Associates Limited personnel before use by others.

LEGEND

- Water found @ time of drilling
- Static Water Level -

MONITORING WELL DATA

- Pipe: 51 mm dia. PVC
- Screen: 51 mm dia. PVC #10 slot

SAMPLE TYPE

- AC Auger Cutting
- CS Continuous
- RC Rock Core
- SS Split Spoon
- AR Air Rotary
- WC Wash Cuttings

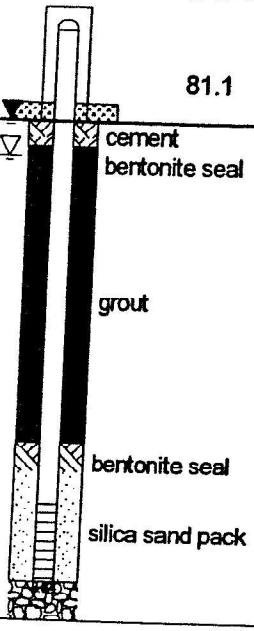
R. J. Burnside & Associates Limited
15 Townline, Orangeville, Ontario L9W 3R4
Telephone (519) 941-5331 Fax (519) 941-8120

LOG OF DRILLING OPERATION

OW13D-0

Client: Township of Huron-Kinloss	Project Name: Kinloss Landfill	Logged by: J. Rutherford
Project No.: W99613.4	Location: PL 16, C 6, former Twp of Kinloss	Ground (m amsl): 80.36
Drilling Co.: Lantech Drilling Services Inc.	Date Started: 6/7/2004	Static Water Level (m amsl): 80.42
Drilling Method: Hollow Stem Auger	Date Completed: 6/7/2004	Sand Pack (m amsl): 71.52 - 73.68

Depth Scale (ft)	Depth Scale (m)	Stratigraphic Description Surface Elevation (m): 80.36	Strat. Plot	Elev. Depth (m)
5.0	1.0	PEAT - black, saturated.		79.16 1.20
10.0	3.0	SILT - with trace of clay, medium brown becoming mottled grey-brown with depth, saturated.		77.76 2.60
15.0	5.0	GRAVEL - with sand, some silt, some cobbles to 4.3 m, 0.15 to 0.20 m thick layers of silt with some sand and angular gravel, brown with red iron staining 5.63 m to 5.80 m, loose, saturated.		74.56 5.80
20.0	6.0	TILL - silt with some sand and gravel, trace of clay, medium grey, compact becoming very dense with depth, wet becoming moist with depth.		
25.0	8.0			
30.0	9.0	END OF BOREHOLE.		70.76 9.60



SAMPLE Num.	Type	Int.	%Recov.
	AC		NA
SS1	SS		7
SS2	SS		44
SS3	SS		0
SS4	SS		67
SS5	SS		42
SS6	SS		89
SS7	SS		75
SS8	SS		47
SS9	SS		117
SS10	SS		56
	AC		
SS11	SS		67

Depth Scale (ft) (m): 5.0 1.0, 10.0 3.0, 15.0 5.0, 20.0 6.0, 25.0 8.0, 30.0 9.0

Prepared By: C. Paterson Checked By: G. Takata Date Prepared: 8/18/2004

This borehole log was prepared for hydrogeological and/or environmental purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by R. J. Burnside & Associates Limited personnel before use by others.

LEGEND
- Water found @ time of drilling
- Static Water Level - 6/7/2004

MONITORING WELL DATA
- Pipe: 51 mm dia. PVC
- Screen: 51 mm dia. PVC #10 slot

SAMPLE TYPE
- AC Auger Cutting
- CS Continuous
- RC Rock Core
- SS Split Spoon
- AR Air Rotary
- WC Wash Cuttings

R. J. Burnside & Associates Limited
15 Townline, Orangeville, Ontario L9W 3R4
telephone (519) 941 5331 fax (519) 941 8120

BURNSIDE

LOG OF DRILLING OPERATIONS

OW13Int-04

Client: Township of Huron-Kinloss	Project Name: Kinloss Landfill	Logged by: J.Rutherford
Project No.: W99613.4	Location: PL 16, C 6, former Twp of Kinloss	Ground (m amsl): 80.42
Drilling Co.: Lantech Drilling Services Inc.	Date Started: 6/7/2004	Static Water Level (m amsl): 80.96
Drilling Method: Hollow Stem Auger	Date Completed: 6/7/2004	Sand Pack (m amsl): 74.50 - 76.31

Depth Scale (ft)	Depth Scale (m)	Stratigraphic Description	Strat. Plot	Elev. / Depth (m)	81.12	SAMPLE Num.	Type	Int.	%Recov.
		Surface Elevation (m): 80.42							
5.0	1.0	PEAT - black, saturated.			cement		AC		NA
	2.0	SILT - with trace of clay, medium brown becoming mottled grey-brown with depth, saturated.		79.22 / 1.20		SS1	SS		7
10.0	3.0	GRAVEL - with sand, some silt, some cobbles to 4.3 m, 0.15 to 0.20 m thick layers of silt with some sand and angular gravel, brown with red iron staining 5.63 m to 5.80 m, loose, saturated.		77.82 / 2.60	bentonite seal	SS2	SS		44
	4.0					SS3	SS		0
15.0	5.0					SS4	SS		57
						SS5	SS		42
						SS6	SS		89
		TILL - silt with some sand and gravel, trace of clay, medium grey, compact becoming very dense with depth, wet becoming moist with depth.		74.62 / 5.80	silica sand pack	SS7	SS		75
		END OF BOREHOLE.		74.50 / 5.92	5.92				

Prepared By: C. Paterson Checked By: G. Takata Date Prepared: 8/18/2004

This borehole log was prepared for hydrogeological and/or environmental purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by R. J. Burnside & Associates Limited personnel before use by others.

LEGEND
- Water found @ time of drilling
- Static Water Level - 6/7/2004

MONITORING WELL DATA
- Pipe: 51 mm dia. PVC
- Screen: 51 mm dia. PVC #10 slot

SAMPLE TYPE
- AC Auger Cutting
- CS Continuous
- RC Rock Core
- SS Split Spoon
- AR Air Rotary
- WC Wash Cuttings

WSP

OW14-14

BOREHOLE LOG

Project: **Kinloss Landfill**

Client: **Township of Huron - Kinloss**

Dia: **197 mm**

Project#: **101-16945-00**

Method: **HSA / Direct Push sampling**

Depth: **12.52 m**

Date: **Oct 28, 14**

Elev: **masl** TOC: **masl**

Supervisor: **E.VanDenKieboom**

Driller: **Strata Soil**

METRES Depth	Stratigraphic Description	Strata Plot	Samples: Sample Interval	Sample No.	Sample Type	SPT - N Value	Well Instrumentation
							Stickup = 0.75 metres
	SILTY FILL - Dry.						0.0 Concrete
							MOE WELL TAG # A171902
	WASTE FILL - Black, strong odour, plastic in cuttings - Dry.						0.6
1							
2							Bentonite Seal (Holeplug)
3							
4							PVC threaded 2 " dia. riser pipe
	SAND - Medium grey grading to brown in colour with depth, very fine to fine grained SAND, moist. Soil has a distinct chemical odour.			1	DP		
5	*Occurence of several very thin SILTY CLAY lenses.*						
6							

WSP

OW14-14

BOREHOLE LOG

Project: **Kinloss Landfill**

Client: **Township of Huron - Kinloss** Dia: **197 mm** Project#: **101-16945-00**

Method: **HSA / Direct Push sampling** Depth: **12.52 m** Date: **Oct 28, 14**

Elev: **masl** TOC: **masl** Supervisor: **E.VanDenKieboom** Driller: **Strata Soil**

METRES Depth	Stratigraphic Description	Strata Plot	Samples: Sample Interval	Samples: Sample No.	Samples: Sample Type	Samples: SPT - N Value	Well Instrumentation
8	*SAND - Medium grey grading to brown in colour with depth, very fine to fine grained SAND, moist. Soil has a distinct chemical odour.*						Bentonite Seal (Holeplug)
							8.2
9							Graded Sandpack
							9.5
10							PVC threaded 2 " dia. 10 slot screen
	Sands are becoming saturated, with some silt.			2	DP		Encountered water @ 10.66 mbgl - Oct 28, 2014
11							
							Static Water Level @ 11.75 mbgl - Oct 29, 2014
12	*SILTY very fine SAND - brown, saturated.*						
	E.O.H. - End of Hole @ 12.52 mbgl						12.5 Bottom of Well @ 12.52 mbgl
13							

LOG OF BOREHOLE OW11-16

PROJECT: Landfill Monitoring
CLIENT: Township of Huron-Kinloss
PROJECT LOCATION: Huron County, Kinloss Landfill
DATUM: Geodetic
BH LOCATION:

DRILLING DATA
Method: Direct Push Continuous Sampler
Diameter: 150
Date: Aug/16/2016

REF. NO.: 101-16945-00
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
96.2							96
0.0 / 95.6	**TOPSOIL:** 600mm, silty sand, trace organics, wet						
0.6 / 94.6	**SAND AND GRAVEL:** coarse, some silt, brown, wet		1	UNDIST			95
1.6 / 93.0	**SILTY CLAY:** some gravel, occasional sand pockets, light brown, moist to wet		2	UNDIST			94
3.2 / 92.6	**SILTY SAND AND GRAVEL:** medium, light brown, moist						93
3.6 / 92.3	**SAND AND GRAVEL:** coarse, greyish brown, moist to wet		3	UNDIST			
3.9 / 90.9	**SILTY CLAY TILL:** some sand, some gravel, light brown, moist						92
5.3 / 90.6	**SAND AND GRAVEL:** coarse, light brown, moist		4	UNDIST			91
5.6 / 90.1	**SILTY CLAY TILL:** some gravel, some medium sand pockets, brown, moist						
6.1 / 89.0	**SILTY CLAY:** alternating layers of some gravel and medium sand layers		5	UNDIST			90
7.2 / 88.5	**SILTY SAND AND GRAVEL:** medium, light brown, dry to moist						89
7.7 / 87.9	**SILTY CLAY:** some gravel, medium sand pockets, brown, moist		6	UNDIST			88
8.3 / 87.0	**SILTY SAND AND GRAVEL:** medium, brown, dry to moist						
9.1 / 86.7	**SANDY SILT AND GRAVEL:** some clay, brown, moist						87
9.5 / 86.0	**SAND:** fine to medium, some gravel, some silt, brown, dry to moist		7	UNDIST			
10.2 / 85.2	**SILTY SAND AND GRAVEL:** medium, some clay, brown, moist						86

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

TOC elevation = 96.98 masl

Drilling supervised by Elaine VanDenKieboom

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

WSP SOIL LOG 101-16945-00 BH LOGS.GPJ SPL.GDT 3/22/17

PROJECT: Landfill Monitoring
CLIENT: Township of Huron-Kinloss
PROJECT LOCATION: Huron County, Kinloss Landfill
DATUM: Geodetic
BH LOCATION:

DRILLING DATA
Method: Direct Push Continuous Sampler
Diameter: 150
Date: Aug/16/2016

REF. NO.: 101-16945-00
ENCL NO.: 2

SOIL PROFILE			SAMPLES										
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
11.0	**SAND:** very fine, trace to some silt, light brown, dry to moist		8	UNDIST			85					
			9	AUGER			84					
							83					
			10	AUGER			82					
						▽	81	W. L. 81.0 m Upon Completion				
			11	AUGER			80					
							79					
78.5 17.7	saturated		12	AUGER								
							78					
			13	AUGER			77					
76.4 19.8	**END OF BOREHOLE:** Notes: 1. At 12.2 mbg, had to swtich to augers due to refusal of the direct push continuous sampler. 2. Borehole caved to 14.3 mbg upon completion. Drillers were able to push well pipe through saturated sand to 19.8 mbg. 3. Installed monitoring well upon completion.											

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

LOG OF BOREHOLE OW15

PROJECT: Landfill Monitoring
CLIENT: Township of Huron-Kinloss
PROJECT LOCATION: Huron County, Kinloss Landfill
DATUM: Geodetic
BH LOCATION:

DRILLING DATA
Method: Sonic Vibration
Diameter: 150
Date: Aug/15/2016

REF. NO.: 101-16945-00
ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
80.0								
0.0 / 79.7	**TOPSOIL:** 300mm, trace organics, wet to saturated		1	SS				TOC elevation = 81.01 masl
0.3 / 79.2	**SILTY CLAY:** grey, some brown weathering, wet, dense					W. L. 79.7 m Upon Completion		
0.8 / 78.7	dark grey, some gravel, mosit to wet, some root channels		2	SS			79	Drilling supervised by Elaine VanDenKieboom
1.4 / 78.3	**SAND AND GRAVEL:** some silt, some clay, grey, saturated							
1.7 / 77.7	**SILTY CLAY:** some sand, some gravel, brown, wet, dense		3	SS			78	
2.3 / 77.4	**SAND AND GRAVEL:** coarse, brown, saturated		4	SS				
2.6	**END OF BOREHOLE:** Notes: 1. Borehole caved to approximately 2.3 mbg upon completion. 2. Installed monitoring well upon completion.							

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100
SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

WSP SOIL LOG 101-16945-00 BH LOGS.GPJ SPL.GDT 3/22/17

LOG OF BOREHOLE OW16

PROJECT: Landfill Monitoring
CLIENT: Township of Huron-Kinloss
PROJECT LOCATION: Huron County, Kinloss Landfill
DATUM: Geodetic
BH LOCATION:

DRILLING DATA
Method: Sonic Vibration
Diameter: 150
Date: Aug/15/2016

REF. NO.: 101-16945-00
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
80.0							
0.0 / 79.6	**TOPSOIL:** 360mm, trace organics, saturated	1	SS				TOC elevation = 80.83 masl
0.4 / 79.5	**SILT:** layered with silty clay, rust staining in silt lenses, light grey, moist, dense						
0.5 / 79.2	**SILTY CLAY:** some gravel, some coarse sand, greenish grey, moist, dense						
0.8	dark grey and light grey mottled, smooth	2	SS				
1					W. L. 79.5 m Upon Completion	79	
		3	SS				Drilling supervised by Elaine VanDenKieboom
2 / 78.0						78	
2.0 / 77.6	**SAND AND GRAVEL:** some silt, coarse, brown, saturated	4	SS				
2.4 / 77.5	**SILTY CLAY:** dark grey						
77.4 / 2.6	**SAND AND GRAVEL:** coarse, saturated						
	END OF BOREHOLE: Notes: 1. Borehole caved to approximately 2.4 mbg upon completion. 2. Installed monitoring well upon completion.						

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

Appendix E Historic Summary of Water Level Elevations

SUMMARY OF WATER LEVEL ELEVATIONS
KINLOSS LANDFILL SITE

Date	Top of Casing Elevation	Nov-85	Dec-87	Nov-89	Dec-89	Aug-90	Jan-91	Apr-91	Jun-91	Oct-91
Monitoring Location		Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation
Unit	(m)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)
Well ID										
OW4	81.30	80.89	80.61	80.66	80.51	80.34	--	80.77	80.73	80.59
OW5	80.30	80.21	80.33	80.25	80.25	79.88	80.31	80.41	80.29	80.17
OW6	79.70	79.60	79.61	79.53	79.56	79.16	79.60	79.61	79.58	79.56
OW7	83.00	82.21	82.57	81.86	81.95	81.34		82.66	81.76	81.35
OW11-16	96.18	--	--	--	--	--	--	--	--	--
OW12	97.90	--	--	--	--	--	--	--	--	--
OW13S	80.40	--	--	--	--	--	--	--	--	--
OW13I	80.40	--	--	--	--	--	--	--	--	--
OW13D	80.40	--	--	--	--	--	--	--	--	--
OW14	91.90	--	--	--	--	--	--	--	--	--
OW15	80.00	--	--	--	--	--	--	--	--	--
OW16	79.99	--	--	--	--	--	--	--	--	--

Notes:

1. Water levels are in meters (compared to generated site datum); mbTOC = meters below top of casing.

3. NI = Not Installed; NM = Not monitored.

4. Top of Casing Elevation Status:

SUMMARY OF WATER LEVEL ELEVATIONS
KINLOSS LANDFILL SITE

Date	Top of Casing Elevation	Jun-92	Jun-93	Sep-93	Jun-94	Oct-94	May-95	Sep-95	May-96	Sep-96
Monitoring Location		Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation
Unit	(m)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)
Well ID										
OW4	81.30	80.48	80.55	80.67	80.45	80.65	80.52	80.37	80.90	80.77
OW5	80.30	80.04	79.97	80.08	79.95	80.03	79.97	79.92	80.32	80.11
OW6	79.70	79.13	79.49	79.50	79.46	79.51	79.47	79.23	79.63	79.53
OW7	83.00	81.52	81.84	81.69	81.18	81.97	81.66	81.54	82.78	81.56
OW11-16	96.18	--	--	--	--	--	--	--	--	--
OW12	97.90	--	--	--	--	--	--	--	--	--
OW13S	80.40	--	--	--	--	--	--	--	--	--
OW13I	80.40	--	--	--	--	--	--	--	--	--
OW13D	80.40	--	--	--	--	--	--	--	--	--
OW14	91.90	--	--	--	--	--	--	--	--	--
OW15	80.00	--	--	--	--	--	--	--	--	--
OW16	79.99	--	--	--	--	--	--	--	--	--

Notes:

1. Water levels are in meters (compared

3. NI = Not Installed; NM = Not monitore

4. Top of Casing Elevation Status:

SUMMARY OF WATER LEVEL ELEVATIONS
KINLOSS LANDFILL SITE

Date	Top of Casing Elevation	May-97	Sep-97	May-98	Sep-98	May-99	Sep-99	May-00	Sep-00	May-01
Monitoring Location		Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation	Water Level Elevation
Unit	(m)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)
Well ID										
OW4	81.30	80.82	80.52	80.71	80.28	80.56	79.95	80.52	80.73	80.84
OW5	80.30	80.12	80.06	80.09	80.13	80.05	79.51	79.96	80.14	80.19
OW6	79.70	79.57	79.38	79.33	78.99	79.40	78.66	79.35	79.50	79.49
OW7	83.00	82.17	81.18	81.74	DRY	81.80	DRY	81.91	82.01	81.83
OW11-16	96.18	--	--	--	--	--	--	--	--	--
OW12	97.90	--	81.45	82.00	81.00	81.09	80.57	81.09	81.45	82.53
OW13S	80.40	--	80.16	80.25	79.99	80.19	79.86	80.15	80.22	80.28
OW13I	80.40	--	--	--	--	--	--	--	--	--
OW13D	80.40	--	--	--	--	--	--	--	--	--
OW14	91.90	--	--	--	--	--	--	--	--	--
OW15	80.00	--	--	--	--	--	--	--	--	--
OW16	79.99	--	--	--	--	--	--	--	--	--

Notes:

1. Water levels are in meters (compared

3. NI = Not Installed; NM = Not monitore

4. Top of Casing Elevation Status:

SUMMARY OF WATER LEVEL ELEVATIONS
KINLOSS LANDFILL SITE

Date	Top of Casing Elevation	Sep-01	May-02	Sep-02	May-03	Oct-03	May-04	Sep-04	May-05	Sep-05
Monitoring Location		Water Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation
Unit	(m)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)
Well ID										
OW4	81.30	80.44	80.84	80.15	80.79	80.62	80.82	80.35	80.58	80.42
OW5	80.30	79.90	79.86	79.55	80.11	80.04	80.11	79.82	80.04	80.02
OW6	79.70	79.26	79.28	78.91	79.56	79.52	79.63	79.02	79.43	79.38
OW7	83.00	DRY	82.11	DRY	82.43	81.37	82.37	81.22	81.89	DRY
OW11-16	96.18	--	--	--	--	--	--	--	--	--
OW12	97.90	81.36	82.51	81.31	81.23	80.96	82.52	81.44	81.89	80.93
OW13S	80.40	80.12	80.31	79.94	80.30	80.22	80.28	80.12	80.32	80.22
OW13I	80.40	--	--	--	--	--	--	80.09	80.26	80.16
OW13D	80.40	--	--	--	--	--	--	80.12	80.31	80.14
OW14	91.90	--	--	--	--	80.80	81.68	81.04	81.40	DRY
OW15	80.00	--	--	--	--	--	--	--	--	--
OW16	79.99	--	--	--	--	--	--	--	--	--

Notes:

1. Water levels are in meters (compared

3. NI = Not Installed; NM = Not monitore

4. Top of Casing Elevation Status:

SUMMARY OF WATER LEVEL ELEVATIONS
KINLOSS LANDFILL SITE

Date	Top of Casing Elevation	Apr-06	Oct-06	Jul-07	Dec-07	Jul-08	Dec-08	Jul-09	Mar-10	Jun-11
Monitoring Location		Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation
Unit	(m)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)
Well ID										
OW4	81.30	80.72	80.35	--	80.68	80.42	80.66	80.48	80.69	80.67
OW5	80.30	80.19	79.97	79.36	79.69	79.62	80.04	79.71	80.15	79.88
OW6	79.70	79.48	79.41	77.95	79.20	79.06	79.47	79.19	79.56	79.40
OW7	83.00	82.57	DRY	81.18	DRY	81.74	82.34	81.62	82.35	81.76
OW11-16	96.18	--	--	--	--	--	--	--	--	--
OW12	97.90	82.32	81.00	81.62	80.53	81.94	81.44	82.32	81.14	82.15
OW13S	80.40	80.39	80.21	80.02	79.90	80.02	80.20	80.17	80.25	80.25
OW13I	80.40	80.35	80.15	79.67	79.89	79.83	80.24	80.28	80.23	80.36
OW13D	80.40	80.41	80.09	79.83	80.01	80.15	80.28	80.25	80.36	80.38
OW14	91.90	81.61	80.70	81.18	80.42	81.44	DRY	81.66	80.97	81.57
OW15	80.00	--	--	--	--	--	--	--	--	--
OW16	79.99	--	--	--	--	--	--	--	--	--

Notes:

1. Water levels are in meters (compared

3. NI = Not Installed; NM = Not monitore

4. Top of Casing Elevation Status:

SUMMARY OF WATER LEVEL ELEVATIONS
KINLOSS LANDFILL SITE

Date	Top of Casing Elevation	Oct-11	Jun-12	Oct-12	Jun-13	Nov-13	Jul-14	Nov-14	May-15	Oct-15
Monitoring Location		Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Water Level Elevation	Water Level Elevation
Unit	(m)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)
Well ID										
OW4	81.30	80.50	80.32	80.25	80.58	80.68	80.66	80.75	80.61	80.22
OW5	80.30	80.15	79.78	80.07	80.17	80.04	79.99	80.33	79.94	79.87
OW6	79.70	79.50	79.12	79.38	79.46	79.55	79.51	79.57	79.41	79.35
OW7	83.00	DRY	81.47	DRY	80.83	82.66	81.71	81.92	81.82	DRY
OW11-16	96.18	--	--	--	--	--	--	--	--	--
OW12	97.90	80.80	81.42	80.53	82.13	81.24	82.33	81.39	81.78	80.73
OW13S	80.40	80.18	80.05	80.06	80.26	80.31	80.31	80.31	80.25	80.06
OW13I	80.40	80.28	80.14	80.13	80.35	80.40	80.40	80.39	80.34	80.13
OW13D	80.40	80.26	80.16	80.10	80.39	80.41	80.41	80.38	80.35	80.10
OW14	91.90	80.81	81.06	80.30	81.55	81.10	81.66	81.02	81.32	80.53
OW15	80.00	--	--	--	--	--	--	--	--	--
OW16	79.99	--	--	--	--	--	--	--	--	--

Notes:

1. Water levels are in meters (compared

3. NI = Not Installed; NM = Not monitore

4. Top of Casing Elevation Status:

SUMMARY OF WATER LEVEL ELEVATIONS
KINLOSS LANDFILL SITE

Date	Top of Casing Elevation	Jun-16	Nov-16	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jul-20
Monitoring Location		Water Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation
Unit	(m)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)
Well ID										
OW4	81.30	80.53	80.28	80.48	80.51	80.67	80.47	80.71	80.47	80.33
OW5	80.30	79.77	79.86	79.84	80.04	80.11	80.14	80.11	80.09	79.72
OW6	79.70	79.16	79.23	79.23	79.53	79.43	79.51	79.52	79.51	79.04
OW7	83.00	81.68	DRY	81.81	81.83	81.94	81.62	81.96	81.46	81.55
OW11-16	96.18	--	80.44	81.55	80.82	82.06	80.73	81.91	80.65	81.14
OW12	97.90	82.20	80.72	81.88	81.11	82.45	81.04	82.27	80.92	81.45
OW13S	80.40	80.17	80.02	80.19	80.23	80.32	80.23	80.34	80.22	80.20
OW13I	80.40	80.26	80.10	80.27	80.31	80.40	80.31	80.42	80.30	80.15
OW13D	80.40	80.30	80.09	80.32	80.30	80.44	80.28	80.45	80.27	80.16
OW14	91.90	81.54	80.52	81.36	80.83	81.70	80.77	81.62	80.73	81.08
OW15	80.00	--	79.91	79.95	79.99	79.98	79.98	80.01	79.97	79.84
OW16	79.99	--	79.66	79.79	79.86	79.93	79.90	79.92	79.95	79.82

Notes:

1. Water levels are in meters (compared

3. NI = Not Installed; NM = Not monitore

4. Top of Casing Elevation Status:

SUMMARY OF WATER LEVEL ELEVATIONS
KINLOSS LANDFILL SITE

Date	Top of Casing Elevation	Nov-20	Jun-21	Nov-21	Jun-22	Nov-22	May-23	Sep-23	May-24	
Monitoring Location		Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Level Elevation	Depth to Water	Level Elevation
Unit	(m)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(masl)	(mbTOC)	(masl)
Well ID										
OW4	81.30	80.40	80.34	80.50	80.57	80.35	80.67	80.30	0.55	80.75
OW5	80.30	80.05	79.78	80.21	79.93	80.03	80.21	79.95	0.39	79.91
OW6	79.70	79.46	79.09	79.55	79.32	79.44	79.48	79.26	0.43	79.27
OW7	83.00	81.12	81.62	82.20	81.76	81.49	82.02	81.43	1.20	81.80
OW11-16	96.18	80.45	81.04	80.58	81.66	80.63	81.71	80.82	15.17	81.01
OW12	97.90	80.70	81.33	80.75	81.99	80.91	82.00	81.14	16.30	81.60
OW13S	80.40	80.17	80.09	80.25	80.25	80.15	80.30	80.10	0.85	79.55
OW13I	80.40	80.25	80.17	80.33	80.27	80.21	80.39	80.17	0.64	79.76
OW13D	80.40	80.23	80.21	80.30	80.35	80.20	80.42	80.17	0.64	79.76
OW14	91.90	80.55	81.00	80.59	81.43	80.68	81.44	80.82	11.30	80.60
OW15	80.00	79.91	79.85	79.95	79.82	79.89	79.93	79.84	1.07	78.93
OW16	79.99	79.88	79.87	79.94	79.78	79.87	79.97	79.85	0.84	79.15

Notes:

1. Water levels are in meters (compared

3. NI = Not Installed; NM = Not monitore

4. Top of Casing Elevation Status:

SUMMARY OF WATER LEVEL ELEVATIONS
KINLOSS LANDFILL SITE

Date	Top of Casing Elevation	Nov-24	
Monitoring Location		Depth to Water	Level Elevation
Unit	(m)	(mbTOC)	(masl)
Well ID			
OW4	81.30	0.98	80.32
OW5	80.30	0.66	79.64
OW6	79.70	0.52	79.18
OW7	83.00	2.30	80.70
OW11-16	96.18	16.47	79.71
OW12	97.90	17.90	80.00
OW13S	80.40	1.06	79.34
OW13I	80.40	0.90	79.50
OW13D	80.40	0.94	79.46
OW14	91.90	12.22	79.68
OW15	80.00	1.22	78.78
OW16	79.99	1.24	78.75

Notes:

1. Water levels are in meters (compared

3. NI = Not Installed; NM = Not monitore

4. Top of Casing Elevation Status:

Appendix F Historical Groundwater Quality Data

HISTORICAL GROUNDWATER QUALITY DATA
OW-4

Parameter	ODWS	RUC	UNITS	Jul-08	Dec-08	Jul-09	Nov-09	Mar-10	Dec-10	Jun-11	Oct-11	Jun-12	Oct-12	Jun-13	Nov-13	Jul-14	Nov-14	May-15	Oct-15	Jun-16	Nov-16
Alkalinity(as CaCO3)	500	411	mg/L	925	922	828	853	709	697	590	792	840	836	756	734	731	718	683	664	973	726
Chloride	250	126.7294	mg/L	120	71.0	47.0	54.0	25.0	19.0	30.4	31.5	27.7	20.9	16.1	28.8	19.3	17.1	14.3	12.7	17.1	14.2
Nitrate(as N)	10	3.985882	mg/L	--	--	--	--	--	0.4	<0.1	<0.1	<0.1	0.3	11.0	<0.1	<0.1	<0.1	<0.25	<0.5	<0.1	<0.1
Nitrite(as N)	1	0.295662	mg/L	--	--	--	--	0.03	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.25	<0.5	<0.1	<0.1
Ammonia(as N)	NV	NA	mg/L	31.8	27.0	28.0	40.0	28.0	19.0	28.6	36.1	25.1	20.8	15.6	22.3	23.8	21.0	21.0	21.2	21.6	18.8
Total Kjeldahl Nitrogen(as N)	NV	NA		27.0	27.0	29.0	33.0	27.0	20.0	34.5	31.1	25.5	26.0	18.2	28.6	27.5	23.2	22.2	22.4	21.9	19.6
Organic Nitrogen	NV	NA		--	--	1.00	--	--	1.00	5.90	<0.01	0.40	5.20	2.60	6.30	3.70	2.20	1.20	1.20	0.30	0.80
Phenols	NV	NA	mg/L	--	0.003	--	0.01	--	<0.001	0.005	0.004	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
DOC	5	3.370588	mg/L	15.5	14.8	11.0	14.7	9.1	6.5	12.6	10.8	11.2	8.6	17.8	23.2	15.0	13.7	8.5	5.9	9.3	8.1
Conductivity	NV	NA	uS/cm	2060	1930	1690	1760	1470	1410	1670	1640	1530	1440	1430	1290	1490	1290	1360	1270	1420	1380
pH	6.5-8.5	NV	Unitless	7.70	7.70	7.50	7.40	7.70	7.50	7.19	7.25	7.33	7.26	7.44	7.48	7.44	7.32	7.87	7.80	7.36	7.35
Sulphate	500	252.7324	mg/L	72	57	85	51	84	79	33	54	32	65	66	56	41	45	29	57	27	60
Hardness	80-100	407	mg/L	710	720	690	650	600	650	699	728	610	688	668	587	664	587	559	607	630	674
Aluminum	0.1	0.074333	mg/L	0.01	0.01	--	0.01	--	<0.005	0.06	0.06	0.05	0.06	0.06	0.07	0.07	0.04	0.02	0.01	0.05	0.06
Barium	1.0	0.27	mg/L	0.29	0.25	0.22	0.25	0.16	0.18	0.24	0.24	0.21	0.20	0.19	0.19	0.21	0.18	0.17	0.18	0.20	0.20
Boron	5.0	1.26	mg/L	0.36	0.35	0.35	0.44	0.34	0.27	0.49	nd	0.42	0.38	0.39	0.37	0.46	0.39	0.40	0.32	0.39	0.40
Cadmium	0.005	0.001254	mg/L	0.0005	--	--	--	0.0006	<0.0001	<0.00002	<0.00002	<0.00002	0.0001	<0.00002	<0.00002	<0.00002	<0.00002	<0.001	<0.001	<0.00002	0.00003
Calcium	NV	NA	mg/L	188	190	190	180	170	190	191	203	165	201	199	172	195	175	166	179	188	205
Chromium	0.05	0.01325	mg/L	--	--	--	--	--	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.003	0.004	<0.002	<0.002
Copper	1.0	0.5	mg/L	0.001	--	--	--	0.001	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	0.0024	<0.002	0.0003	<0.003	<0.003	<0.002	0.0005
Iron	0.3	0.159838	mg/L	13.0	8.8	6.2	17.0	1.6	16.0	19.0	17.2	15.6	14.5	13.9	13.1	18.9	16.1	17.2	13.0	18.7	20.7
Lead	0.01	0.00253	mg/L	--	--	--	--	--	<0.0005	<0.00002	<0.00002	0.00006	0.00003	<0.00002	0.00006	<0.00002	<0.00002	<0.002	<0.002	<0.00002	0.00006
Magnesium	NV	NA	mg/L	57.1	58.0	52.0	51.0	43.0	44.0	52.9	53.5	48.2	45.0	41.7	38.3	43.1	36.5	35.2	38.8	39.2	39.5
Manganese	0.05	0.025941	mg/L	0.56	0.76	0.93	0.76	0.63	0.84	0.91	0.75	0.87	0.76	0.84	0.68	0.94	0.85	0.89	0.79	0.82	0.81
Potassium	NV	NA	mg/L	30.0	32.0	29.0	29.0	27.0	20.0	29.6	33.0	25.6	24.7	21.4	21.3	24.3	21.8	19.1	22.4	21.7	22.8
Sodium	200	101.3441	mg/L	160	110	82.0	87.0	44.0	40.0	61.8	62.3	49.0	46.9	29.2	44.8	45.7	37.6	27.0	25.9	31.4	36.9
Zinc	5.0	2.5	mg/L	0.006	0.01	0.014	--	0.016	0.026	<0.005	<0.005	0.012	0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-4

Parameter	ODWS	RUC	UNITS	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	738	658	663	655	663	605	661	608	641	663	633	712	712	690	300	650	712.62	119.93
Chloride	250	126.7294	mg/L	11.6	8.4	12.4	16.2	10.0	11.9	10.9	9.6	7.9	7.6	7.8	11.9	11.9	7.9	12	9.7	22.17	22.30
Nitrate(as N)	10	3.985882	mg/L	<0.05	<0.1	<0.05	<0.05	<0.05	0.1	0.1	<0.05	<0.05	0.3	<0.05	0.1	0.1	<0.05	<0.10	1.17	0.54	2.10
Nitrite(as N)	1	0.295662	mg/L	0.64	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	0.034	0.07	0.12
Ammonia(as N)	NV	NA	mg/L	21.8	18.2	25.4	26.0	4.0	23.4	24.8	25.8	20.6	14.0	14.9	26.2	26.2	22.8	<0.050	28	23.39	6.50
Total Kjeldahl Nitrogen(as N)	NV	NA		22.9	20.1	25.6	28.3	26.4	31.0	27.4	37.2	20.6	15.0	19.4	28.2	28.2	21.5	0.1	30	24.87	6.58
Organic Nitrogen	NV	NA		1.10	1.90	0.20	2.30	22.43	7.60	2.60	11.40	<0.1	1.00	4.50	2.00	2.00	<0.1	--	--		
Phenols	NV	NA	mg/L	<0.001	<0.001	<0.001	0.012	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	0.0012	2.93	4.48
DOC	5	3.370588	mg/L	<0.2	12.5	8.9	14.0	27.7	10.9	13.1	8.9	12.0	8.1	11.7	8.8	8.8	9.9	1.7	7.6	0.00	0.00
Conductivity	NV	NA	uS/cm	1390	1240	1300	1360	1320	1270	1270	1260	1270	1230	1270	1330	1330	1270	810	1200	11.21	5.17
pH	6.5-8.5	NV	Unitless	7.31	7.41	7.40	7.14	7.48	7.27	7.27	7.19	7.24	7.44	7.25	7.69	7.69	7.47	8.17	7.72	1401.47	227.72
Sulphate	500	252.7324	mg/L	29	27	27	29	19	35	21	29	33	29	15	17	17	25	110	9.4	7.46	0.23
Hardness	80-100	407	mg/L	635	592	576	588	637	561	579	595	667	609	625	581	581	575	400	590	43.08	23.94
Aluminum	0.1	0.074333	mg/L	0.05	0.10	0.09	0.09	0.09	0.08	0.08	0.08	0.11	0.10	0.06	0.05	0.05	0.05	--	--	620.94	62.25
Barium	1.0	0.27	mg/L	0.20	0.18	0.19	0.21	0.19	0.17	0.19	0.19	0.19	0.15	0.17	0.19	0.19	0.15	0.07	0.13	0.19	0.04
Boron	5.0	1.26	mg/L	0.41	0.39	0.43	0.41	0.48	0.36	0.45	0.40	0.40	0.39	0.44	0.47	0.47	0.38	0.06	0.37	0.39	0.08
Cadmium	0.005	0.001254	mg/L	<0.000014	<0.000014	<0.000015	<0.000015	<0.000015	<0.000028	<0.000028	<0.000028	<0.000015	0.000024	<0.000028	<0.000028	<0.000028	<0.000028	--	--	0.00	0.00
Calcium	NV	NA	mg/L	189	177	167	180	191	171	174	178	206	189	194	178	178	175	90	180	181.29	19.75
Chromium	0.05	0.01325	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	--	--	0.00	0.00
Copper	1.0	0.5	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.0028	<0.002	<0.002	0.004	<0.002	0.0027	0.0016	0.0016	<0.0002	--	--	0.00	0.00
Iron	0.3	0.159838	mg/L	17.1	14.3	19.4	19.0	23.5	18.1	21.8	18.2	10.3	9.6	17.0	15.8	15.8	16.7	<0.100	<0.10	15.53	4.51
Lead	0.01	0.00253	mg/L	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00006	0.00006	<0.00004	<0.00002	0.0001	0.00012	0.00006	0.00006	<0.00004	--	--	0.00	0.00
Magnesium	NV	NA	mg/L	39.6	36.4	38.6	33.5	38.8	32.6	34.9	36.3	37.1	33.3	34.2	33.3	33.3	33.2	43.0	32.0	40.80	7.44
Manganese	0.05	0.025941	mg/L	0.66	0.66	0.74	0.68	0.78	0.63	0.70	0.67	0.64	0.60	0.82	0.66	0.66	0.61	<0.002	0.56	0.74	0.11
Potassium	NV	NA	mg/L	23.1	21.9	23.2	22.7	21.0	20.8	20.6	21.5	20.1	18.0	15.4	19.6	19.6	15.6	1.3	17.0	22.24	5.72
Sodium	200	101.3441	mg/L	35.0	24.1	30.3	41.8	26.3	24.3	20.4	25.7	21.5	17.2	17.8	3.3	3.3	16.7	17.0	25.0	40.33	31.02
Zinc	5.0	2.5	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	<0.005	<0.005	<0.005	--	--	0.01	0.01

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-5

Parameter	ODWS	RUC	UNITS	Jul-07	Dec-07	Jul-08	Dec-08	Jul-09	Nov-09	Mar-10	Jun-11	Oct-11	Jun-12	Oct-12	Jun-13	Nov-13	Jul-14	Nov-14	May-15	Oct-15	Jun-16	Nov-16
Alkalinity(as CaCO3)	500	411	mg/L	250	288	237	243	248	242	281	263	263	247	295	244	250	236	243	240	265	257	273
Chloride	250	126.7294	mg/L	6.0	4.0	4.0	4.0	3.0	3.0	4.0	2.8	2.8	2.7	2.6	2.7	2.4	2.3	2.8	2.6	3.2	2.3	2.0
Nitrate(as N)	10	3.985882	mg/L	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.10	<0.1	0.10	<0.05	<0.10	<0.1	0.10
Nitrite(as N)	1	0.295662	mg/L	--	--	--	--	--	--	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.10	<0.1	<0.1
Ammonia(as N)	NV	NA	mg/L	0.14	nd	0.16	0.13	0.07	--	<0.05	0.03	0.11	0.11	0.07	0.09	0.07	0.08	0.06	<0.02	0.07	0.07	0.07
Total Kjeldahl Nitrogen(as N)	NV	NA	mg/L	0.50	0.20	0.90	0.70	0.90	0.50	0.60	0.90	0.25	0.50	0.38	0.80	0.22	0.20	0.14	<0.10	0.23	0.12	0.23
Organic Nitrogen	NV	NA	mg/L	0.36	0.00	0.74	0.57	0.83	0.50	<0.55	0.87	0.14	0.39	0.31	0.71	0.15	0.12	0.08	<0.10	0.16	0.05	0.16
Phenols	NV	NA	mg/L	--	--	--	--	--	--	<0.001	0.00	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
DOC	5	3.370588	mg/L	1.9	0.8	1.0	0.7	0.8	1.1	0.8	0.8	1.2	1.3	2.3	12.6	3.0	2.7	2.3	1.1	0.8	2.5	1.0
Conductivity	NV	NA	uS/cm	498	556	493	504	513	509	560	520	537	497	518	501	426	501	470	497	502	491	519
pH	6.5-8.5	NV	Unitless	8.20	8.20	8.10	8.00	7.90	8.10	8.20	7.76	7.86	8.01	7.87	7.94	8.01	7.96	7.90	8.44	7.84	7.95	7.91
Sulphate	500	252.7324	mg/L	25	11	28	28	29	28	29	26	19	25	8	23	23	24	24	24	22	23	12
Hardness	80-100	407	mg/L	270	290	240	250	270	260	250	254	302	258	284	257	240	277	260	243	257	262	303
Aluminum	0.1	0.074333	mg/L	--	--	--	--	--	--	<0.005	0.0200	0.0300	0.0200	0.0300	0.0300	0.0400	0.1100	0.0200	0.0050	0.0040	0.0300	0.0300
Barium	1.0	0.27	mg/L	0.08	0.08	0.07	0.07	0.09	0.08	0.07	0.08	0.09	0.08	0.09	0.08	0.08	0.09	0.08	0.07	0.09	0.09	0.10
Boron	5.0	1.26	mg/L	--	0.02	0.01	0.01	0.02	0.02	0.01	0.02	-	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.01
Cadmium	0.005	0.001254	mg/L	--	0.00110	--	0.00030	--	0.00020	0.00010	<0.00002	<0.00002	<0.00002	0.00004	<0.00002	<0.00002	<0.00002	<0.00002	<0.001	<0.001	0.00003	0.00
Calcium	NV	NA	mg/L	64.0	68.0	54.0	58.0	61.0	60.0	56.0	55.0	70.7	58.8	66.3	59.3	55.4	65.7	60.6	56.4	61.2	60.7	71.9
Chromium	0.05	0.01325	mg/L	--	--	--	--	--	--	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.003	<0.003	<0.002	<0.002
Copper	1.0	0.5	mg/L	nd	0.0020	nd	0.0010	--	0.0010	0.0040	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.002	0.0002	<0.003	<0.003	<0.002	<0.0001
Iron	0.3	0.159838	mg/L	0.13	--	0.13	--	--	--	<0.1	0.01	0.04	0.05	0.16	0.32	0.07	0.21	0.13	0.27	0.14	0.18	0.16
Lead	0.01	0.00253	mg/L	--	--	--	--	--	--	<0.0005	0.00	0.00	<0.00002	0.00003	<0.00002	<0.00002	<0.00002	<0.00002	<0.002	<0.002	<0.00002	<0.00002
Magnesium	NV	NA	mg/L	28.0	29.0	27.0	26.0	28.0	27.0	27.0	28.3	30.6	27.0	28.8	26.4	24.6	27.4	26.4	24.7	25.3	26.8	30.0
Manganese	0.05	0.025941	mg/L	0.28	0.01	0.22	0.38	0.56	0.00	0.20	0.22	0.28	0.22	0.20	0.35	0.21	0.33	0.20	0.26	0.25	0.27	0.23
Potassium	NV	NA	mg/L	0.87	0.92	2.30	0.93	0.84	0.83	1.10	0.80	1.00	0.80	0.80	0.70	0.70	0.80	0.90	0.71	0.90	0.70	0.90
Sodium	200	101.3441	mg/L	3.4	3.4	6.4	3.3	5.2	3.3	31.0	15.6	3.7	3.5	3.2	3.3	2.9	3.5	3.2	3.0	3.2	3.5	4.0
Zinc	5.0	2.5	mg/L	0.01	--	0.01	0.07	--	0.02	0.11	0.26	0.14	0.03	0.02	<0.005	0.02	0.01	0.01	0.01	0.01	<0.005	0.01

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-5

Parameter	ODWS	RUC	UNITS	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	239	253	240	235	226	238	238	225	231	293	236	298	257	262	340	250	255.03	24.44
Chloride	250	126.7294	mg/L	3.7	2.7	2.3	1.9	2.0	2.0	2.4	2.5	2.3	1.6	1.8	1.7	2.2	2.7	98.0	<1.0	5.41	16.14
Nitrate(as N)	10	3.985882	mg/L	<0.05	<0.1	0.06	<0.05	0.09	0.11	0.06	<0.05	<0.05	0.10	<0.05	0.11	<0.05	0.11	0.15	<0.10	0.06	0.03
Nitrite(as N)	1	0.295662	mg/L	<0.05	0.20	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.010	0.04	0.03
Ammonia(as N)	NV	NA	mg/L	0.10	0.08	0.17	0.17	0.23	0.15	0.10	0.10	0.14	0.16	0.18	0.06	0.16	0.15	<0.050	0.068	0.10	0.05
Total Kjeldahl Nitrogen(as N)	NV	NA	mg/L	0.11	0.30	0.20	0.20	0.20	0.10	0.20	0.20	0.10	0.20	0.30	0.40	0.30	0.30	0.10	0.23	0.34	0.25
Organic Nitrogen	NV	NA	mg/L	0.01	0.22	0.03	0.03	<0.05	<0.05	0.10	0.10	<0.1	0.04	0.12	0.34	0.14	0.15	--	--	0.24	0.25
Phenols	NV	NA	mg/L	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	0.00	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.00	0.00
DOC	5	3.370588	mg/L	1.2	2.4	1.4	2.1	2.3	2.7	1.9	1.1	2.2	2.2	2.3	2.9	1.9	3.2	2.2	1.6	2.07	1.98
Conductivity	NV	NA	uS/cm	498	490	476	512	489	512	483	486	482	545	494	558	503	516	1000	490	518.46	87.74
pH	6.5-8.5	NV	Unitless	7.95	7.98	8.05	7.88	7.90	7.95	7.96	8.08	8.05	8.26	7.82	7.86	7.86	7.55	8.17	8.29	7.99	0.17
Sulphate	500	252.7324	mg/L	19	14	24	17	22	14	22	18	21	16	20	15	20.00	18.00	30	14	21.00	5.60
Hardness	80-100	407	mg/L	277	269	249	267	272	263	252	275	277	261	257	200	252	250	420	260	266.51	32.58
Aluminum	0.1	0.074333	mg/L	0.0200	0.0400	0.0500	0.0500	0.0400	0.0500	0.02	0.0300	0.0400	0.0300	0.0100	0.0300	<0.01	0.02	--	--	0.03	0.02
Barium	1.0	0.27	mg/L	0.10	0.10	0.09	0.10	0.08	0.09	0.09	0.10	0.09	0.09	0.09	0.09	0.08	0.09	0.10	0.09	0.09	0.01
Boron	5.0	1.26	mg/L	0.01	0.02	0.02	0.02	0.01	0.02	0.02	<0.005	0.02	0.03	0.01	0.02	0.01	0.02	0.13	0.02	0.02	0.02
Cadmium	0.005	0.001254	mg/L	0.00	<0.000014	0.00004	0.00013	<0.000015	0.00004	<0.000015	0.00002	0.00002	0.00002	<0.000015	0.00004	0.00	<0.000015	--	--	0.00	0.00
Calcium	NV	NA	mg/L	64.0	62.3	55.7	63.6	62.9	61.6	57.1	62.3	63.9	58.4	59.0	59.9	56.4	57.6	87.0	62.0	61.62	6.15
Chromium	0.05	0.01325	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	--	--	0.00	0.00
Copper	1.0	0.5	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.00	<0.002	<0.002	0.01	<0.002	0.00	0.0010	0.00	0.00	--	--	0.00	0.00
Iron	0.3	0.159838	mg/L	0.14	0.13	0.09	0.07	0.24	0.03	0.11	0.02	0.05	<0.005	0.12	<0.005	<0.005	0.05	<0.100	<0.10	0.10	0.08
Lead	0.01	0.00253	mg/L	<0.00002	<0.00002	0.00003	<0.00002	0.00010	0.00	0.00003	0.00003	0.00006	0.00007	<0.00002	0.00012	<0.00002	<0.00002	--	--	0.01	0.03
Magnesium	NV	NA	mg/L	28.5	27.6	26.8	26.3	28.0	26.6	26.7	29.1	28.5	27.9	26.7	26.2	26.9	25.9	49.0	26.0	27.86	3.92
Manganese	0.05	0.025941	mg/L	0.38	0.27	0.21	0.08	0.24	0.08	0.17	0.02	0.05	0.04	0.26	0.02	0.05	0.14	<0.002	0.003	0.19	0.13
Potassium	NV	NA	mg/L	0.70	0.80	0.60	0.70	0.70	0.80	0.80	1.00	0.70	1.10	0.80	0.90	0.80	0.80	1.50	0.90	0.89	0.29
Sodium	200	101.3441	mg/L	3.8	3.4	3.6	3.5	3.6	3.4	3.5	3.5	3.6	26.2	4.3	21.9	5.3	3.7	38.0	3.3	6.95	8.66
Zinc	5.0	2.5	mg/L	0.01	<0.005	<0.005	0.01	<0.005	0.01	<0.005	0.01	<0.005	0.02	<0.005	0.07	0.02	0.01	--	--	0.03	0.05

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-6

Parameter	ODWS	RUC	UNITS	Jul-07	Dec-07	Jul-08	Dec-08	Jul-09	Nov-09	Mar-10	Jun-11	Oct-11	Jun-12	Oct-12	Jun-13	Nov-13	Jul-14	Nov-14	May-15	Oct-15	Jun-16	Nov-16
Alkalinity(as CaCO3)	500	411	mg/L	254	246	251	255	245	257	259	278	265	270	271	274	265	271	291	308	306	287	284
Chloride	250	127	mg/L	8.0	9.0	5.0	5.0	4.0	3.0	6.0	3.1	3.3	3.3	4.1	3.7	3.2	3.1	2.9	3	4	3.5	3.1
Nitrate(as N)	10	3.99	mg/L	--	--	--	--	--	--	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.1	<0.1
Nitrite(as N)	1	0.3	mg/L	--	--	--	--	--	--	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.1	<0.1
Ammonia(as N)	NV	NA	mg/L	0.24	0.16	0.38	0.19	0.27	0.3	0.22	0.11	0.29	0.28	0.25	0.30	0.21	0.33	0.23	0.21	0.26	0.18	0.17
Total Kjeldahl Nitrogen(as ...)	NV	NA		0.4	0.4	5.0	1.3	4.0	7.0	7.0	1.17	2.06	0.61	5.17	5.6	21.8	2.58	1.32	0.4	0.5	0.2	0.36
Organic Nitrogen	NV	NA		0.16	0.24	4.62	1.11	3.73	6.7	6.78	1.06	1.77	0.33	4.92	5.31	21.59	2.25	1.09	0.22	0.25	0.05	0.19
Phenols	NV	NA	mg/L	--	--	--	--	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
DOC	5	3.37	mg/L	1.4	0.8	1.8	0.6	0.8	1.0	0.8	1.1	1.5	0.9	1.6	3.0	3.4	2.9	3.2	1.9	1.1	1.2	0.7
Conductivity	NV	NA	uS/cm	507	534	518	508	496	512	513	528	543	522	509	535	436	547	531	585	571	528	551
pH	6.5-8.5	NV	Unitless	8.1	8.1	8.0	8.1	7.8	7.9	7.9	7.6	7.8	8.1	7.8	7.9	8.0	7.9	7.8	8.4	8.1	7.9	7.9
Sulphate	500	253	mg/L	21	26	24	20	20	20	17	14	16	13	17	13	14	11	10	7	15	15	13
Hardness	80-100	407	mg/L	270	230	240	250	230	240	240	267	285	257	263	249	227	280	283	285	280	266	303
Aluminum	0.1	0.07	mg/L	0.01	--	--	--	--	--	<0.005	0.03	0.04	0.02	0.04	0.030	0.04	0.05	0.02	0	<0.004	0.020	0.03
Barium	1.0	0.27	mg/L	0.09	0.07	0.08	0.07	0.07	0.06	0.06	0.07	0.08	0.07	0.08	0.08	0.08	0.08	0.07	0.06	0.08	0.07	0.08
Boron	5.0	1.26	mg/L	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	-	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Cadmium	0.005	0	mg/L	--	--	0.0001	--	--	--	<0.0001	<0.00002	<0.00002	<0.00002	<0.00002	0.00002	<0.00002	<0.00002	<0.00002	<0.001	<0.001	<0.00002	<0.00002
Calcium	NV	NA	mg/L	68	57	58	61	58	59	58	67	73	65	68	63	57	72	73	75	73	68	79
Chromium	0.05	0.01	mg/L	--	--	--	--	--	--	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.003	<0.003	<0.002	<0.002
Copper	1.0	0.5	mg/L	--	--	--	0.001	--	0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	0.0001	<0.002	<0.0001	<0.003	<0.003	<0.002	<0.0001
Iron	0.3	0.16	mg/L	0.24	0.63	0.59	0.24	0.95	--	0.54	0.98	0.57	0.73	0.15	0.91	0.26	0.95	1.1	1.4	0.40	0.44	0.74
Lead	0.01	0	mg/L	--	0.0026	--	--	0.0017	--	0.0005	<0.00002	<0.00002	<0.00002	0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.002	<0.002	<0.00002	<0.00002
Magnesium	NV	NA	mg/L	25	22	22	23	21	22	23	24	25	23	23	23	21	24	25	24	24	24	26
Manganese	0.05	0.03	mg/L	0.06	0.07	0.06	0.05	0.04	0.02	0.05	0.09	0.10	0.09	0.09	0.09	0.09	0.11	0.13	0.23	0.14	0.10	0.11
Potassium	NV	NA	mg/L	1.1	0.83	2.6	1	0.8	0.82	0.7	0.8	1.1	0.9	0.9	0.8	0.8	1	0.9	0.71	0.93	0.7	0.9
Sodium	200	101	mg/L	14	12	14	11	11	10	9.1	8.3	9.8	8.3	8.7	9.2	8	8.9	6.6	5.32	6.45	8.6	9.8
Zinc	5.0	2.5	mg/L	--	--	0.01	--	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	0.01	<0.005	0.03

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-6

Parameter	ODWS	RUC	UNITS	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	259	298	293	279	277	258	265	241	259	292	286	294	285	295	260	310	273.94	18.90
Chloride	250	127	mg/L	4.9	2.8	2.7	2.2	2.4	3.1	4.5	4.6	4.4	3	3.1	2.3	3.3	3.4	3.2	3.5	3.80	1.45
Nitrate(as N)	10	3.99	mg/L	<0.05	<0.1	<0.05	<0.05	0.08	0.13	0.11	<0.05	0.08	<0.05	<0.05	0.13	0.05	<0.05	<0.10	<0.10	0.06	0.03
Nitrite(as N)	1	0.3	mg/L	<0.05	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.010	0.07	0.05
Ammonia(as N)	NV	NA	mg/L	0.08	0.2	0.3	0.4	0.4	0.35	0.33	0.26	0.33	0.38	0.38	0.33	0.3	0.44	0.19	0.36	0.27	0.08
Total Kjeldahl Nitrogen(as N)	NV	NA		0.31	0.5	0.8	1.7	2.4	0.5	0.4	0.3	1.4	3.8	3.5	1	0.7	1.2	0.39	0.7	2.47	3.90
Organic Nitrogen	NV	NA		0.23	0.26	0.49	1.34	2.00	0.15	0.07	0.04	1.07	3.42	3.12	0.67	0.4	0.76	--	--	2.31	3.99
Phenols	NV	NA	mg/L	<0.001	<0.001	<0.001	0.0	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.00	0.00
DOC	5	3.37	mg/L	1.3	3.0	1.9	2.9	4.8	4.2	2.3	1.7	2.2	2.3	3.1	0.8	1.0	2.8	0.94	1.5	1.90	1.07
Conductivity	NV	NA	uS/cm	527	563	545	578	556	544	526	523	525	548	577	551	539	569	530	600	536.43	29.97
pH	6.5-8.5	NV	Unitless	7.9	7.8	7.9	7.6	8.1	7.9	7.8	7.9	8.0	7.9	7.8	7.8	8.0	7.6	8.2	8.1	7.92	0.17
Sulphate	500	253	mg/L	14	8.0	9.0	10	9.0	13	17	18	17	12	11	11	13	11	15	12	14.46	4.43
Hardness	80-100	407	mg/L	269	284	282	322	286	274	269	274	287	309	285	282	294	266	250	330	271.66	24.70
Aluminum	0.1	0.07	mg/L	0.02	0.05	0.05	0.18	0.05	0.06	0.02	0.12	0.07	0.15	0.02	0.06	0.2	0.04	--	--	0.05	0.05
Barium	1.0	0.27	mg/L	0.07	0.08	0.07	0.08	0.06	0.06	0.08	0.08	0.08	0.08	0.07	0.08	0.07	0.08	0.07	0.09	0.07	0.01
Boron	5.0	1.26	mg/L	0.02	0.03	0.02	0.02	0.02	0.02	0.03	<0.005	0.02	0.03	0.01	0.03	0.02	0.03	0.03	0.02	0.02	0.00
Cadmium	0.005	0	mg/L	<0.000014	<0.000014	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	0.000037	0.000024	<0.000015	<0.000015	0.000017	0.000016	--	--	0.00	0.00
Calcium	NV	NA	mg/L	68	72	71	85	74	71	67	67	73	79	73	71	72	68	63	87	68.85	7.40
Chromium	0.05	0.01	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	--	--	0.00	0.00
Copper	1.0	0.5	mg/L	<0.002	<0.002	<0.002	<0.002	0.005	0.0003	<0.002	<0.002	0.012	<0.002	<0.0001	0.0006	0.003	0.0002	--	--	0.00	0.00
Iron	0.3	0.16	mg/L	1.0	0.90	1.3	1.4	1.2	0.98	0.78	0.46	1.1	1.3	1.0	0.42	1.15	1.01	<0.100	<0.10	0.80	0.35
Lead	0.01	0	mg/L	<0.00002	<0.00002	<0.00002	0.00023	0.00005	<0.00002	0.00016	0.00013	0.00011	0.0002	0.00003	0.00006	0.00042	<0.00002	--	--	0.00	0.00
Magnesium	NV	NA	mg/L	24	25	26	27	25	23	25	26	26	27	25	25	28	24	23	28	24.24	1.78
Manganese	0.05	0.03	mg/L	0.09	0.12	0.14	0.13	0.11	0.11	0.07	0.04	0.07	0.11	0.11	0.09	0.08	0.06	0.01	0.02	0.09	0.04
Potassium	NV	NA	mg/L	0.7	0.9	0.7	0.8	0.7	0.7	1.0	1.0	0.8	0.9	0.9	1.0	0.8	0.9	0.79	0.91	0.91	0.32
Sodium	200	101	mg/L	10.5	8.2	8.2	7.2	7.7	6.3	8.8	11	10	8.5	7.6	9.0	9.0	8.3	9.0	6.6	8.97	1.91
Zinc	5.0	2.5	mg/L	0.03	0.02	0.03	0.08	0.06	0.13	0.03	0.01	0.03	0.04	0.02	0.02	0.04	0.01	--	--	0.03	0.03

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-7

Parameter	ODWS	RUC	UNITS	Jul-07	Jul-08	Dec-08	Jul-09	Dec-09	Mar-10	Jun-11	Jun-12	Jun-13	Nov-13	Jul-14	Nov-14	May-15	Jun-16
Alkalinity(as CaCO3)	500	411	mg/L	269	248	278	242	349	284	252	273	269	288	262	312	259	288
Chloride	250	126.7294	mg/L	4.0	2.0	2.0	4.0	--	3.0	0.9	0.9	1.1	0.8	1.0	1.4	1.4	1.1
Nitrate(as N)	10	3.985882	mg/L	--	--	--	0.1	--	<0.1	<0.1	<0.1	0.10	0.10	0.1	<0.1	<0.10	0.10
Nitrite(as N)	1	0.295662	mg/L	--	--	--	--	--	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.1
Ammonia(as N)	NV	NA	mg/L	--	0.08	0.06	0.08	--	<0.05	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
Total Kjeldahl Nitrogen(as N)	NV	NA		--	2.1	0.7	4.0	2.0	3.0	0.8	0.1	4.5	31	1.0	0.4	<0.10	<0.05
Organic Nitrogen	NV	NA		--	2.0	0.6	3.9	2.0	<2.95	<0.77	0.1	4.5	31	1.0	0.4	<0.10	<0.05
Phenols	NV	NA	mg/L	--	--	--	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
DOC	5	3.370588	mg/L	--	3.1	0.9	0.8	1.2	0.9	0.8	0.8	3.7	3.4	2.8	4.5	1.2	1.7
Conductivity	NV	NA	uS/cm	478	459	502	458	626	526	457	493	497	442	504	549	478	497
pH	6.5-8.5	NV	Unitless	8.2	8.1	7.9	7.8	7.9	7.9	7.6	8.1	7.9	7.9	7.9	7.7	8.5	7.9
Sulphate	500	252.7324	mg/L	4.0	4.0	4.0	4.0	2.0	3.0	3.0	2.0	3.0	3.0	2.0	1.0	2.2	3.0
Hardness	80-100	407	mg/L	250	250	280	220	370	290	259	288	268	264	299	324	248	286
Aluminum	0.1	0.074333	mg/L	--	--	--	--	--	<0.005	0.02	0.03	0.03	0.03	0.03	0.02	0.00	0.02
Barium	1.0	0.27	mg/L	--	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Boron	5.0	1.26	mg/L	--	--	--	--	--	<0.01	0.01	0.01	0.01	<0.005	<0.005	0.01	<0.010	0.01
Cadmium	0.005	0.001254	mg/L	--	--	--	0.00110	0.00030	0.00020	0.00005	0.00003	0.00008	<0.00002	<0.00002	<0.00002	<0.001	0.00002
Calcium	NV	NA	mg/L	--	69	76	61	100	79	71	80	74	73	83	89	69	78
Chromium	0.05	0.01325	mg/L	--	--	--	--	--	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.003	<0.002
Copper	1.0	0.5	mg/L	--	0.001	0.001	0.002	--	0.001	<0.002	<0.002	<0.002	0.000	<0.002	0.000	<0.003	<0.002
Iron	0.3	0.159838	mg/L	--	--	--	--	--	<0.1	<0.005	0.02	0.01	0.01	0.01	0.21	<0.010	0.01
Lead	0.01	0.00253	mg/L	--	--	--	--	--	<0.0005	<0.00002	<0.00002	<0.00002	<0.00002	0.0	<0.00002	<0.002	<0.00002
Magnesium	NV	NA	mg/L	--	19	21	15	28	23	20	22	20	20	22	25	19	22
Manganese	0.05	0.025941	mg/L	--	0.01	0.01	0.03	0.03	0.24	0.10	0.04	0.12	0.18	0.24	0.33	0.11	0.08
Potassium	NV	NA	mg/L	--	2.20	0.67	0.61	0.54	0.62	0.50	0.70	0.70	0.40	0.70	0.70	0.41	0.50
Sodium	200	101.3441	mg/L	--	3.9	1.2	1.2	0.9	4.2	0.9	0.8	1.6	0.8	1.1	1.0	0.8	1.0
Zinc	5.0	2.5	mg/L	--	0.01	--	0.01	--	0.01	<0.005	<0.005	0.04	<0.005	0.01	<0.005	<0.005	<0.005

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-7

Parameter	ODWS	RUC	UNITS	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	283	376	270	362	291	304	282	313	279	342	270	339	280	355	270		292.72	36.12
Chloride	250	126.7294	mg/L	2.9	1.8	1.0	0.7	0.8	0.5	1.3	1.6	1.7	0.8	0.9	1.2	1.7	2.3	1.6		1.59	0.92
Nitrate(as N)	10	3.985882	mg/L	<0.05	<0.1	<0.05	<0.05	0.08	0.27	0.11	0.07	0.08	<0.05	0.06	0.13	0.15	0.13	0.29		0.20	0.18
Nitrite(as N)	1	0.295662	mg/L	<0.05	0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010		0.20	0.23
Ammonia(as N)	NV	NA	mg/L	<0.01	<0.01	0.02	0.04	0.20	0.05	0.05	0.03	0.02	0.05	0.02	<0.01	<0.01	<0.05	<0.050		0.05	0.03
Total Kjeldahl Nitrogen(as N)	NV	NA		0.1	0.2	0.5	0.5	0.9	0.3	0.3	0.2	0.7	1.0	0.7	0.9	0.6	0.4	<0.10		2.05	5.77
Organic Nitrogen	NV	NA		0.1	0.2	0.5	0.5	0.7	0.3	0.3	0.2	0.7	1.0	0.7	0.9	0.6	0.4	--		2.11	6.10
Phenols	NV	NA	mg/L	<0.001	<0.001	<0.001	0.0	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010		0.00	0.00
DOC	5	3.370588	mg/L	1.6	3.5	1.4	2.6	3.8	3.5	2.4	1.9	2.6	5	2.5	0.9	1	3.4	0.68		2.24	1.27
Conductivity	NV	NA	uS/cm	524	663	489	704	524	606	517	608	528	601	534	602	496	648	500		534.83	68.30
pH	6.5-8.5	NV	Unitless	7.8	7.8	8.0	7.4	8.0	7.8	7.8	8.0	7.9	7.8	7.8	7.9	7.9	7.5	8.2		7.88	0.21
Sulphate	500	252.7324	mg/L	3.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0	1.0	2.0	3.0	2.0	2.0	2.1		2.49	0.82
Hardness	80-100	407	mg/L	311	396	281	398	310	389	293	367	319	342	295	356	156	333	280		300.76	54.70
Aluminum	0.1	0.074333	mg/L	0.02	0.06	0.05	0.07	0.04	0.25	0.03	0.05	0.06	0.06	0.02	0.05	0.02	0.07	--	ISW	0.05	0.05
Barium	1.0	0.27	mg/L	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01		0.01	0.00
Boron	5.0	1.26	mg/L	<0.005	0.01	0.01	0.01	<0.005	0.01	0.01	<0.005	0.01	0.01	<0.005	0.01	<0.005	0.01	<0.010		0.01	0.01
Cadmium	0.005	0.001254	mg/L	0.00007	0.00002	<0.000015	0.00003	0.00002	0.00009	0.00002	0.00036	0.00002	0.00004	0.00003	0.00003	<0.000015	<0.000015	--		0.00	0.00
Calcium	NV	NA	mg/L	85	110	75	111	84	105	79	100	87	94	79	97	73	91	76		83.83	13.02
Chromium	0.05	0.01325	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	--		0.00	0.00
Copper	1.0	0.5	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.002	0.01	<0.002	0.001	0.003	0.007	0.001	--		0.00	0.00
Iron	0.3	0.159838	mg/L	<0.005	0.09	0.01	0.09	<0.005	0.29	0.02	<0.005	0.02	0.02	<0.005	0.03	<0.005	0.26	<0.100		0.10	0.15
Lead	0.01	0.00253	mg/L	<0.00002	0.0	<0.00002	<0.00002	0.0005	0.0006	0.00003	0.0003	0.0001	0.00003	0.00003	0.0001	0.00002	0.0001	--		0.00	0.00
Magnesium	NV	NA	mg/L	24	29	23	29	25	31	23	28	25	26	24	28	22	26	22		23.50	3.69
Manganese	0.05	0.025941	mg/L	0.02	0.21	0.004	0.20	0.02	0.05	0.18	0.00	0.06	0.05	0.02	0.01	<0.001	0.2	<0.002		0.09	0.09
Potassium	NV	NA	mg/L	0.50	0.50	0.40	0.30	0.40	0.50	0.50	0.40	0.50	0.50	0.60	0.60	0.50	0.50	0.56		0.59	0.33
Sodium	200	101.3441	mg/L	1.1	1.0	1.0	0.8	1.1	1.0	0.9	0.8	1.0	5.3	1.3	1.2	2.7	12	1.4		1.85	2.26
Zinc	5.0	2.5	mg/L	0.01	<0.005	<0.005	<0.005	0.01	0.01	<0.005	0.01	<0.005	0.10	0.01	0.01	<0.005	0.02	--		0.01	0.02

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW11-16

Parameter	ODWS	RUC	UNITS	Nov-16	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	340	323	329	342	313	309	302	326	291	317	339	324	327	357	338	310	300	322.76	17.40
Chloride	250	126.7294	mg/L	5.2	3.6	7.2	1.8	5.4	1.6	8.6	4.4	4.8	2.3	1.5	1.4	2.1	2.3	2.5	2.6	1.5	3.46	2.15
Nitrate(as N)	10	3.985882	mg/L	2.4	0.97	2.30	0.87	2.53	0.87	4.79	1.49	2.82	0.8	1.04	0.75	2.47	2.05	1.66	4.96	0.91	1.98	1.30
Nitrite(as N)	1	0.295662	mg/L	<0.1	<0.05	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.010	0.06	0.12
Ammonia(as N)	NV	NA	mg/L	<0.01	<0.01	<0.01	0.08	0.03	0.16	0.06	0.04	0.01	0.02	0.01	<0.01	<0.01	<0.01	<0.05	<0.050	<0.050	0.03	0.04
Total Kjeldahl Nitrogen(as N)	NV	NA		0.17	0.12	0.20	0.60	0.20	0.20	0.10	0.10	0.10	0.10	0.10	0.20	0.20	0.10	0.20	<0.20	1.5	0.25	0.34
Organic Nitrogen	NV	NA		0.17	0.12	0.2	0.52	0.17	0.04	0.04	0.06	0.09	0.08	0.09	0.20	0.20	0.10	0.20	--	--	0.15	0.12
Phenols	NV	NA	mg/L	<0.001	<0.001	<0.001	<0.001	0.016	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.001	0.004
DOC	5	3.370588	mg/L	0.40	1.0	2.5	1.0	1.4	3.5	1.9	2.8	1.1	2.6	1.9	2.3	0.50	1.0	4.0	0.5	1.2	1.74	1.07
Conductivity	NV	NA	uS/cm	659	609	613	577	655	597	674	621	607	610	610	632	612	646	627	620	550	619	30
pH	6.5-8.5	NV	Unitless	7.88	7.91	7.96	7.97	7.65	8.07	7.85	7.83	7.75	7.99	7.96	7.88	7.87	7.92	7.81	7.95	7.94	7.89	0.10
Sulphate	500	252.7324	mg/L	14	5.0	6.0	3.0	10	3.0	8.0	7.0	4.0	5.0	5.0	3.0	4.0	5.0	4.0	3.5	3.4	5.46	2.92
Hardness	80-100	407	mg/L	396	362	349	327	354	368	356	360	357	380	376	362	354	355	325	380	340	358.88	18.30
Aluminum	0.1	0.074333	mg/L	0.04	0.03	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.07	0.07	0.07	0.05	0.02	0.05	--	--	0.05	0.01
Barium	1.0	0.27	mg/L	0.03	0.03	0.03	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.00
Boron	5.0	1.26	mg/L	0.04	<0.005	0.02	0.01	0.02	<0.005	0.02	0.01	<0.005	0.01	0.02	<0.005	0.02	0.005	0.024	<0.010	0.027	0.02	0.01
Cadmium	0.005	0.001254	mg/L	<0.00002	<0.000014	<0.000014	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	--	--	0.000005	0.000
Calcium	NV	NA	mg/L	110	97	95	85	96	98	96	95	95	102	101	96	94	93	87	100	92	96.02	5.60
Chromium	0.05	0.01325	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	0.001	<0.001	<0.001	--	--	0.0010	0.000
Copper	1.0	0.5	mg/L	0.000	<0.002	<0.002	<0.002	<0.002	0.002	0.001	<0.002	0.002	<0.002	<0.002	0.001	0.001	0.0008	0.0006	--	--	0.0010	0.0005
Iron	0.3	0.159838	mg/L	<0.005	<0.005	<0.005	0.03	<0.005	<0.005	0.01	0.01	0.01	<0.005	0.06	0.05	0.04	<0.005	0.006	<0.100	<0.10	0.02	0.02
Lead	0.01	0.00253	mg/L	<0.00002	<0.00002	<0.00002	0.00004	<0.00002	0.00004	<0.00002	0.00011	0.00003	<0.00002	0.00011	0.0001	0.00008	<0.00002	<0.00002	--	--	0.00	0.00
Magnesium	NV	NA	mg/L	30	29	27	28	28	30	28	30	29	30	30	29	29	30	26	30	27	28.84	1.29
Manganese	0.05	0.025941	mg/L	0.003	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.009	0.006	0.004	<0.001	<0.001	<0.002	<0.002	0.002	0.003
Potassium	NV	NA	mg/L	0.5	0.4	0.4	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.49	0.45	0.46	0.06
Sodium	200	101.3441	mg/L	6.5	2.1	2.6	1.7	4.1	2.0	3.6	2.4	3.2	2.6	3.2	1.7	2.3	1.8	2.8	1.7	1.4	2.69	1.23
Zinc	5.0	2.5	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	--	--	0.0025	0.00

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-12

Parameter	ODWS	RUC	UNITS	Jul-07	Dec-07	Jul-08	Dec-08	Jul-09	Nov-09	Mar-10	Jun-11	Oct-11	Jun-12	Oct-12	Jun-13	Nov-13	Jul-14	Nov-14	May-15	Oct-15	Jun-16	Nov-16
Alkalinity(as CaCO3)	500	411	mg/L	381	359	359	383	365	372	369	384	366	360	365	359	357	327	337	334	343	368	368
Chloride	250	126.7294	mg/L	21	17	19	17	17	9.0	11	4.7	6.2	7.1	6.1	4.9	5.7	3.7	6.0	6.9	7.5	4.1	4.1
Nitrate(as N)	10	3.985882	mg/L	4.4	3.9	4.8	4.4	4.1	3.4	3	1.7	2	1.7	1.5	1.5	1.5	1.1	2.00	2.37	1.98	1.20	1.3
Nitrite(as N)	1	0.295662	mg/L	--	0.01	--	--	--	--	0.04	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.25	<0.1	<0.1
Ammonia(as N)	NV	NA	mg/L	0.19	--	0.11	--	0.06	--	0.09	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.01
Total Kjeldahl Nitrogen(as N)	NV	NA		0.7	--	3.0	0.80	6.0	--	4.0	0.79	1.0	0.49	0.16	1.2	0.95	0.65	0.21	0.22	0.18	0.05	0.28
Organic Nitrogen	NV	NA		0.51	--	2.89	--	5.94	--	3.91	<0.79	<1.00	0.46	0.16	1.21	0.95	0.65	0.21	0.22	0.18	0.05	0.28
Phenols	NV	NA	mg/L	--	--	--	--	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
DOC	5	3.370588	mg/L	6.1	--	2.0	2.0	2.3	--	2.2	1.4	1.9	2.1	1.8	5	5.4	3.3	3.9	2.0	1.8	2.1	1.6
Conductivity	NV	NA	uS/cm	942	977	1000	994	993	919	904	813	914	873	831	821	709	726	770	827	772	745	782
pH	6.5-8.5	NV	Unitless	8.2	8.1	8.1	8.0	7.8	7.9	7.9	7.6	7.8	8.0	7.8	7.9	8.0	7.9	7.8	8.4	8.1	8.0	8.0
Sulphate	500	252.7324	mg/L	157	148	164	157	160	120	130	84	125	127	119	89	109	52	93	100	97	75	90
Hardness	80-100	407	mg/L	580	490	530	560	550	470	490	459	538	487	478	426	405	378	428	407	397	410	458
Aluminum	0.1	0.074333	mg/L	--	--	--	--	--	--	<0.005	0.03	0.04	0.02	0.04	0.03	0.03	0.02	0.02	0.00	<0.004	0.02	0.03
Barium	1.0	0.27	mg/L	0.08	0.07	0.08	0.09	0.09	--	0.08	0.07	0.08	0.08	0.07	0.08	0.07	0.04	0.07	0.07	0.07	0.07	0.08
Boron	5.0	1.26	mg/L	0.52	0.48	0.45	0.46	0.53	--	0.44	0.42	-	0.55	0.49	0.33	0.44	0.32	0.50	0.51	0.37	0.38	0.49
Cadmium	0.005	0.001254	mg/L	0.0006	0.0003	nd	0.0002	0.0002	--	0.0001	<0.00002	<0.00002	0.00003	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.001	<0.001	<0.00002	<0.00002
Calcium	NV	NA	mg/L	98	88	89	92	95	--	80	89	90	84	83	79	71	71	74	71	71	75	82
Chromium	0.05	0.01325	mg/L	--	--	--	--	--	--	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.003	<0.003	<0.002	<0.002
Copper	1.0	0.5	mg/L	0.002	0.001	0.002	0.001	0.001	--	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	0.0008	<0.002	0.0015	<0.003	<0.003	<0.002	0.0007
Iron	0.3	0.159838	mg/L	--	--	--	--	--	--	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.010	<0.010	<0.005	<0.005
Lead	0.01	0.00253	mg/L	--	--	--	--	--	--	<0.0005	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00002	<0.002	<0.002	<0.00002	<0.00002
Magnesium	NV	NA	mg/L	82	65	74	81	76	--	70	58	76	67	66	56	55	49	59	56	54	54	61
Manganese	0.05	0.025941	mg/L	0.003	0.08	0.002	nd	nd	--	0.037	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	0.001	<0.001
Potassium	NV	NA	mg/L	12	9.6	14	15	14	--	12	11	16	12	11	12	9	11	12	14	12	10	12
Sodium	200	101.3441	mg/L	9.7	8.0	12	11	11	--	9.2	8.1	10.5	9.4	9.1	6.2	7.7	5.8	7.5	7.7	7.1	6.6	8.3
Zinc	5.0	2.5	mg/L	--	--	0.006	--	--	--	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-12

Parameter	ODWS	RUC	UNITS	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	339	317	339	312	319	316	326	302	317	338	327	332	346	339	320	330	345.00	22.50
Chloride	250	126.7294	mg/L	5.2	4.4	3.7	3.8	3.4	3.6	4.4	3.6	3.2	3.3	2.8	2.8	3.4	3.8	2.1	1.9	6.67	5.17
Nitrate(as N)	10	3.985882	mg/L	1.26	2.00	1.68	1.63	1.66	1.38	0.87	0.63	0.73	0.56	0.51	0.44	0.47	0.42	0.35	0.31	1.79	1.27
Nitrite(as N)	1	0.295662	mg/L	<0.05	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.010	0.19	0.23
Ammonia(as N)	NV	NA	mg/L	<0.01	<0.01	0.06	0.02	0.060	0.05	0.1	0.03	0.02	0.02	<0.01	<0.01	<0.01	0.09	<0.050	<0.050	0.03	0.04
Total Kjeldahl Nitrogen(as N)	NV	NA		0.32	0.3	0.50	0.20	0.30	0.20	0.20	0.20	0.60	0.60	0.20	0.60	0.2	0.2	0.11	0.15	0.77	1.24
Organic Nitrogen	NV	NA		0.32	0.3	0.44	0.18	0.24	0.15	0.1	0.17	0.58	0.58	0.2	0.6	0.2	0.11	--	--	0.76	1.28
Phenols	NV	NA	mg/L	<0.001	<0.001	<0.001	0.003	0.056	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.00	0.01
DOC	5	3.370588	mg/L	1.9	4.0	2.0	3.2	5.6	3.8	3.0	4.6	3.7	2.4	3.0	1.3	2.5	4.6	1.0	1.2	2.85	1.36
Conductivity	NV	NA	uS/cm	778	776	709	762	732	736	739	700	712	718	728	698	707	722	690	670	796.83	99.62
pH	6.5-8.5	NV	Unitless	8.0	8.0	8.0	7.8	8.1	8.0	7.9	8.0	8.1	8.1	8.0	8.1	8.0	7.8	8.2	8.13	7.99	0.15
Sulphate	500	252.7324	mg/L	69	71	59	75	63	65	76	64	64	69	60	60	59	61	49	47	91.61	35.66
Hardness	80-100	407	mg/L	443	434	396	410	427	398	415	423	435	419	400	423	376	378	370	360	441.37	57.02
Aluminum	0.1	0.074333	mg/L	0.02	0.05	0.05	0.06	0.05	0.06	0.03	0.05	0.07	0.08	0.02	0.14	0.02	0.04	--	--	0.04	0.03
Barium	1.0	0.27	mg/L	0.07	0.07	0.07	0.07	0.06	0.07	0.08	0.08	0.08	0.07	0.07	0.08	0.065	0.075	0.071	0.079	0.07	0.01
Boron	5.0	1.26	mg/L	0.46	0.46	0.34	0.43	0.41	0.39	0.46	0.43	0.44	0.43	0.39	0.44	0.39	0.44	0.40	0.37	0.44	0.06
Cadmium	0.005	0.001254	mg/L	<0.000014	<0.000014	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	<0.000015	0.00002	--	--	0.00	0.00
Calcium	NV	NA	mg/L	78	75	77	73	79	76	71	72	79	76	72	77	66	68	68	67	78.06	8.37
Chromium	0.05	0.01325	mg/L	<0.002	0.002	<0.002	<0.002	<0.002	0.001	<0.002	<0.002	<0.002	<0.002	0.002	0.002	0.001	0.001	--	--	0.00	0.00
Copper	1.0	0.5	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.0032	<0.002	0.002	<0.002	<0.002	0.0015	0.0018	0.0014	0.001	--	--	0.00	0.00
Iron	0.3	0.159838	mg/L	<0.005	0.005	<0.005	0.046	<0.005	<0.005	<0.005	0.061	0.042	0.068	0.006	0.245	0.007	<0.005	<0.100	<0.10	0.02	0.05
Lead	0.01	0.00253	mg/L	<0.00002	<0.00002	<0.00002	0.00004	0.00017	0.00006	0.00004	0.00008	0.00004	0.0001	0.00003	0.00019	0.00003	0.00002	--	--	0.00	0.00
Magnesium	NV	NA	mg/L	61	60	50	55	56	51	58	59	58	56	54	56	52	51	50	48	59.75	9.28
Manganese	0.05	0.025941	mg/L	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	0.002	0.003	0.005	<0.001	0.016	<0.001	<0.001	<0.002	<0.002	0.01	0.01
Potassium	NV	NA	mg/L	11	12	9.4	12	10	10	11	11	11	10	10	11	10	11	8.6	10	11.39	1.68
Sodium	200	101.3441	mg/L	7.9	7.2	6.3	6.9	6.3	5.9	6.5	6.4	6.5	6.5	5.5	5.9	5.6	5.9	5.6	5.1	7.50	1.80
Zinc	5.0	2.5	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	--	--	0.00	0.00

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-13S

Parameter	ODWS	RUC	UNITS	Jul-07	Dec-07	Jul-08	Dec-08	Jul-09	Dec-09	Jun-11	Oct-11	Jun-12	Oct-12	Jun-13	Nov-13	Jul-14	Nov-14	May-15	Oct-15	Jun-16	Nov-16
Alkalinity(as CaCO3)	500	411	mg/L	381	385	376	371	378	391	417	512	424	495	387	448	421	385	400	484	472	518
Chloride	250	126.7294	mg/L	74	80	63	54	39	32	20	27	20	22	12	7.7	4.9	13	<0.50	18	12	14
Nitrate(as N)	10	3.985882	mg/L	5.50	6.7	6.3	7.9	5.8	10	3.0	2.4	3.8	3.4	2.6	3.7	2.9	4.1	3.3	2.3	1.6	1.7
Nitrite(as N)	1	0.295662	mg/L	0.02	0.04	--	--	0.02	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.25	<0.25	<0.1	<0.1
Ammonia(as N)	NV	NA	mg/L	0.16	0.10	0.11	0.10	0.21	0.62	<0.01	2.6	0.6	3.6	0.4	2.0	1.0	1.6	0.5	1.1	1.3	6.2
Total Kjeldahl Nitrogen(as N)	NV	NA		0.60	0.60	3.0	5.0	6.0	4.0	1.5	4.6	0.9	7.4	2.5	4.6	1.7	2.1	0.8	2.5	1.7	6.8
Organic Nitrogen	NV	NA		0.44	0.50	2.9	4.9	5.8	3.4	<1.51	2.02	0.27	3.8	2.1	2.6	0.73	0.45	0.32	1.4	0.44	0.66
Phenols	NV	NA	mg/L	--	--	--	--	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
DOC	5	3.370588	mg/L	3.4	3.4	3.7	3.9	3.7	4.1	2.9	4.6	3.1	4.0	6.2	8.7	6.8	5.7	3.3	2.9	4.1	4.3
Conductivity	NV	NA	uS/cm	1680	2020	1840	1870	1620	1740	1300	1520	1390	1460	1210	1170	1290	1220	1230	1280	1140	1280
pH	6.5-8.5	NV	Unitless	8.0	7.9	7.9	7.8	7.6	7.7	7.4	7.6	7.6	7.6	7.8	7.7	7.7	7.6	8.3	8.0	7.7	7.6
Sulphate	500	252.7324	mg/L	546	626	585	632	450	510	306	295	352	335	264	303	257	299	269	279	189	192
Hardness	80-100	407	mg/L	1100	1100	920	1000	860	850	712	847	722	889	609	621	692	647	573	626	585	679
Aluminum	0.1	0.074333	mg/L	0.014	--	--	--	--	--	0.04	0.05	0.04	0.05	0.040	0.06	0.04	0.03	0	0.005	0.040	0.04
Barium	1.0	0.27	mg/L	0.09	81.00	0.08	0.08	0.07	0.06	0.06	0.07	0.07	0.06	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.07
Boron	5.0	1.26	mg/L	1.2	1.2	1.2	1.20	1.1	1.2	0.95	-	1.1	1.0	0.88	0.83	0.98	1.01	0.97	0.93	0.72	0.86
Cadmium	0.005	0.001254	mg/L	0.0013	0.0003	--	0.0002	--	--	<0.00002	<0.00002	0.00015	0.00002	<0.00002	0.00004	<0.00002	<0.00002	<0.001	<0.001	<0.00002	<0.00002
Calcium	NV	NA	mg/L	220	230	190	220	170	170	145	176	134	197	130	131	148	136	121	137	127	151
Chromium	0.05	0.01325	mg/L	--	--	--	--	--	--	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.003	<0.003	<0.002	<0.002
Copper	1.0	0.5	mg/L	0.002	0.002	0.003	0.002	0.001	0.002	<0.002	0.003	0.002	0.003	0.003	0.0038	<0.002	0.0021	0.004	<0.003	0.003	0.0026
Iron	0.3	0.159838	mg/L	--	--	--	--	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.010	<0.010	<0.005	<0.005
Lead	0.01	0.00253	mg/L	--	--	--	--	--	--	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.002	<0.002	<0.00002	<0.00002
Magnesium	NV	NA	mg/L	130	120	110	120	100	100	85	99	94	96	69	72	78	75	66	69	65	74
Manganese	0.05	0.025941	mg/L	0.06	0.05	--	--	0.04	0.26	0.09	0.05	0.04	0.12	0.04	0.05	0.07	0.05	0.04	0.06	0.05	0.06
Potassium	NV	NA	mg/L	30	37	32	36	33	33	32	40	34	36	26	27	30	29	26	31	26	34
Sodium	200	101.3441	mg/L	53	48	46	48	39	37	23	33	24	27	17	20	23	17	15	19	18	26
Zinc	5.0	2.5	mg/L	--	--	--	--	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-13S

Parameter	ODWS	RUC	UNITS	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	409	432	444	426	385	463	456	546	379	444	417	567	445	526	400	510	438.06	54.49
Chloride	250	126.7294	mg/L	8.7	7.8	10	10	7.9	12	11	15	6.2	7.1	7.7	11	7.0	10	7.1	11	20.04	19.82
Nitrate(as N)	10	3.985882	mg/L	2.0	2.4	1.2	1.8	1.7	1.4	1.0	<0.05	1.1	1.4	0.6	0.7	1.0	0.3	0.8	1.4	2.81	2.32
Nitrite(as N)	1	0.295662	mg/L	0.24	0.20	0.07	<0.05	0.33	0.25	0.12	<0.05	0.07	0.12	<0.05	<0.05	0.06	<0.05	0.05	0.06	0.25	0.21
Ammonia(as N)	NV	NA	mg/L	0.8	3.2	2.6	5.6	1.8	7.5	2.8	8.0	2.4	3.8	2.9	6.7	2.9	6.5	3.0	7.8	2.66	2.48
Total Kjeldahl Nitrogen(as N)	NV	NA		1.7	3.9	2.9	5.6	2.2	7.9	3.2	9.7	2.8	4.7	3.2	5.1	4.3	8.1	3.4	8.5	3.93	2.43
Organic Nitrogen	NV	NA		0.96	0.75	0.34	0.04	0.38	0.41	0.36	1.7	0.38	0.86	0.31	<0.05	1.4	1.6	--	--	1.36	1.46
Phenols	NV	NA	mg/L	<0.001	<0.001	<0.001	0.0	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.00	0.00
DOC	5	3.370588	mg/L	3.2	6.9	3.6	6.2	10.3	6.8	5.3	5.3	5.0	5.1	4.8	3.9	4.4	8.7	2.4	3.9	4.84	1.84
Conductivity	NV	NA	uS/cm	1100	1160	1030	1160	1010	1190	1060	1240	951	1010	975	1150	937	1110	900	1100	1274.79	286.57
pH	6.5-8.5	NV	Unitless	7.8	7.7	7.7	7.3	8.0	7.6	7.5	7.2	7.8	7.7	7.6	7.7	7.8	7.6	8.0	7.8	7.71	0.20
Sulphate	500	252.7324	mg/L	168	174	134	173	144	158	125	95	128	121	83	86	90	76	68	69	252.38	167.91
Hardness	80-100	407	mg/L	598	617	517	587	563	595	560	647	553	549	487	551	463	508	460	560	671.97	173.06
Aluminum	0.1	0.074333	mg/L	0.04	0.06	0.07	0.07	0.07	0.07	0.06	0.07	0.08	0.08	0.04	0.08	0.03	0.08	--	--	0.05	0.02
Barium	1.0	0.27	mg/L	0.05	0.06	0.05	0.06	0.05	0.07	0.07	0.10	0.06	0.07	0.07	0.10	0.06	0.09	0.09	0.11	2.45	13.88
Boron	5.0	1.26	mg/L	0.79	0.83	0.56	0.68	0.65	0.65	0.63	0.61	0.60	0.59	0.47	0.55	0.45	0.52	0.42	0.47	0.81	0.25
Cadmium	0.005	0.001254	mg/L	<0.000014	<0.000014	<0.000015	<0.000015	<0.000015	<0.000015	0.00002	<0.000028	<0.000015	0.00002	0.00003	<0.000028	<0.000015	<0.000015	--	--	0.00	0.00
Calcium	NV	NA	mg/L	131	134	111	134	127	135	124	143	127	127	111	125	106	119	110	130	144.91	32.73
Chromium	0.05	0.01325	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	--	--	0.00	0.00
Copper	1.0	0.5	mg/L	<0.002	0.002	<0.002	0.002	0.01	0.0068	<0.002	0.004	0.007	<0.002	0.002	0.004	0.003	0.003	--	--	0.00	0.00
Iron	0.3	0.159838	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	0.026	<0.005	<0.005	<0.005	0.009	0.048	<0.005	0.006	<0.100	<0.10	0.04	0.13
Lead	0.01	0.00253	mg/L	<0.00002	<0.00002	<0.00002	<0.00002	0.00031	0.00008	0.00012	0.00004	0.00007	0.00003	0.00004	0.0001	0.00003	<0.00004	--	--	0.00	0.00
Magnesium	NV	NA	mg/L	66	69	58	61	60	63	61	71	57	56	51	58	48	51	45	55	75.02	22.46
Manganese	0.05	0.025941	mg/L	0.07	0.09	0.07	0.09	0.07	0.11	0.12	0.12	0.13	0.18	0.12	0.12	0.13	0.22	0.01	0.05	0.09	0.05
Potassium	NV	NA	mg/L	26	30	26	29	24	32	25	32	24	26	22	28	19	25	19	25	28.95	4.96
Sodium	200	101.3441	mg/L	17	19	16	18	13	20	15	25	12	14	12	18	10	16	10	16	23.01	11.74
Zinc	5.0	2.5	mg/L	0.017	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	--	--	0.00	0.00

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-13I

Parameter	ODWS	RUC	UNITS	Jul-07	Dec-07	Jul-08	Dec-08	Jul-09	Nov-09	Jun-11	Oct-11	Jun-12	Oct-12	Jun-13	Nov-13	Jul-14	Nov-14	May-15	Oct-15	Jun-16	Nov-16
Alkalinity(as CaCO3)	500	411	mg/L	372	370	350	327	355	374	430	511	510	535	507	523	487	501	490	496	568	601
Chloride	250	126.7294	mg/L	66	74	55	53	39	38	30	34	34	33	27	19	10	28	26	23	22	19
Nitrate(as N)	10	3.985882	mg/L	3.8	5.1	4.5	5.1	5.4	6.0	2.5	1.5	1.8	1.6	1.3	0.70	1.2	1.3	1.7	1.6	0.70	0.40
Nitrite(as N)	1	0.295662	mg/L	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.25	<0.25	<0.1	<0.1
Ammonia(as N)	NV	NA	mg/L	--	--	0.10	0.16	0.08	0.07	<0.01	0.11	0.88	1.33	1.16	1.08	1.41	1.55	1.26	1.48	2.10	2.97
Total Kjeldahl Nitrogen(as N)	NV	NA		0.4	0.4	1.4	3.0	5.0	5.0	0.62	1.0	1.3	2.6	3.4	2.9	2.2	2.2	2.3	2.5	2.6	4.0
Organic Nitrogen	NV	NA		--	--	1.3	2.8	4.9	4.9	<0.62	0.89	0.42	1.22	2.2	1.8	0.79	0.7	1.0	1.0	0.45	0.98
Phenols	NV	NA	mg/L	--	--	--	--	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	0.0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
DOC	5	3.370588	mg/L	2.9	2.8	3.0	3.0	2.7	4.0	2.9	3.8	3.9	4.6	9.2	10.9	6.9	7.5	4.1	3.0	4.6	4.3
Conductivity	NV	NA	uS/cm	1530	1830	1690	1610	890	1680	1440	1550	1520	1470	1470	1260	1450	1350	1390	1310	1320	1320
pH	6.5-8.5	NV	Unitless	8.1	7.9	7.9	8	7.7	7.7	7.39	7.55	7.7	7.49	7.69	7.75	7.69	7	8.16	8.04	7.66	8
Sulphate	500	252.7324	mg/L	475	546	533	512	470	500	378	317	345	317	298	268	268	252	279	281	214	182
Hardness	80-100	407	mg/L	1000	990	840	770	890	910	791	909	809	884	737	714	767	725	664	662	676	731
Aluminum	0.1	0.074333	mg/L	--	--	--	--	--	0.006	0.04	0.06	0.04	0.05	0.05	0.05	0.04	0.030	0.058	<0.004	0.04	0
Barium	1.0	0.27	mg/L	0.08	0.09	0.06	0.06	0.07	0.07	0.06	0.07	0.08	0.07	0.06	0.06	0.07	0.06	0.07	0.07	0.07	0.07
Boron	5.0	1.26	mg/L	1.10	1.10	0.92	0.86	1.20	1.20	0.99	-	1.06	0.95	0.85	0.81	0.86	0.90	0.90	0.88	0.77	0.89
Cadmium	0.005	0.001254	mg/L	0.00040	0.00020	0.00070	0.00020	--	0.00010	0.00004	<0.00002	<0.00002	<0.00002	0.00004	<0.00002	<0.00002	<0.00002	<0.001	<0.001	0.00002	0.00003
Calcium	NV	NA	mg/L	220	220	180	160	180	180	162	188	154	193	160	152	166	154	137	145	144	160
Chromium	0.05	0.01325	mg/L	--	--	--	--	--	--	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.003	<0.003	<0.002	<0.002
Copper	1.0	0.5	mg/L	0.002	0.002	0.002	0.002	0.002	0.002	<0.002	<0.002	0.003	0.003	<0.002	0.003	0.002	0.003	<0.003	<0.003	0.004	0.003
Iron	0.3	0.159838	mg/L	--	--	--	--	--	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.010	<0.010	<0.005	0.01
Lead	0.01	0.00253	mg/L	--	--	--	--	--	--	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00005	<0.002	<0.002	<0.00002	<0.00002
Magnesium	NV	NA	mg/L	120	110	98	90	110	110	93	107	103	98	82	82	86	83	78	73	77	81
Manganese	0.05	0.025941	mg/L	--	--	--	--	0.00	--	0.02	0.01	0.03	0.05	0.09	0.09	0.12	0.12	0.13	0.13	0.17	0.18
Potassium	NV	NA	mg/L	26	26	25	25	30	28	25	32	27	29	23	22	23	24	25	28	24	30
Sodium	200	101.3441	mg/L	52	48	44	37	40	40	31	40	38	34	34	33	35	30	30	25	29	31
Zinc	5.0	2.5	mg/L	--	--	0.007	0.008	--	--	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.005	<0.005

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-13I

Parameter	ODWS	RUC	UNITS	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	571	513	504	517	497	510	556	512	526	533	517	555	593	545	450	450	489.88	71.95
Chloride	250	126.7294	mg/L	17	14	20	19	18	21	19	15	15	14	15	14	16	12	14	9.5	25.91	15.74
Nitrate(as N)	10	3.985882	mg/L	0.62	0.6	0.19	0.3	0.42	0.31	0.19	0.07	0.11	0.24	<0.05	0.18	0.11	0.14	<0.10	3.2	1.62	1.79
Nitrite(as N)	1	0.295662	mg/L	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	0.078	0.27	0.24
Ammonia(as N)	NV	NA	mg/L	3.09	2.99	2.91	3.57	3.71	4.27	4.16	4.840	3.86	0.02	4.57	2.97	5.17	4.63	5.2	2.2	2.38	1.71
Total Kjeldahl Nitrogen(as N)	NV	NA		3.3	3.3	3.3	3.9	4.4	4.3	4.6	4.9	5.2	2.4	5.5	3.0	5.0	4.2	5.7	3.6	3.21	1.50
Organic Nitrogen	NV	NA		0.23	0.31	0.39	0.33	0.69	0.03	0.44	0.06	1.3	2.4	0.93	0.03	<0.1	<0.1	--	--	1.21	1.29
Phenols	NV	NA	mg/L	<0.001	<0.001	<0.001	0.023	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.00	0.00
DOC	5	3.370588	mg/L	4.6	7.3	3.8	6.4	5.9	8.0	7.4	4.5	6.7	4.3	6.3	3.3	5.8	9.3	3.1	3.3	5.12	2.18
Conductivity	NV	NA	uS/cm	1350	1250	1200	1270	1220	1260	1250	1210	1200	1150	1210	1170	1220	1160	1000	980	1328.82	206.01
pH	6.5-8.5	NV	Unitless	8	8	7.69	7.28	8.01	7.66	7.53	7.44	7.51	7.65	7.5	7.64	7.7	7.51	7.91	7.9	7.70	0.21
Sulphate	500	252.7324	mg/L	168	155	165	147	153	139	135	121	125	118	113	99	101	90	78	73	247.50	146.81
Hardness	80-100	407	mg/L	717	669	603	645	667	1050	662	656	666	626	626	557	601	538	590	530	731.53	135.28
Aluminum	0.1	0.074333	mg/L	0.050	0.080	0.07	0.07	0.07	0.34	0.08	0.1	0.08	0.1	0.1	0.04	0.04	0.07	--	--	0.07	0.06
Barium	1.0	0.27	mg/L	0.07	0.07	0.06	0.07	0.07	0.09	0.08	0.08	0.08	0.08	0.09	0.07	0.08	0.08	0.09	0.087	0.07	0.01
Boron	5.0	1.26	mg/L	0.81	0.78	0.62	0.68	0.68	0.67	0.66	0.64	0.64	0.62	0.57	0.56	0.55	0.53	0.54	0.47	0.80	0.20
Cadmium	0.005	0.001254	mg/L	0.00002	<0.000014	0.00002	0.00002	0.00002	0.00006	<0.000028	0.00013	0.00002	<0.000015	0.00004	<0.000028	<0.000028	<0.000015	--	--	0.00	0.00
Calcium	NV	NA	mg/L	153	144	128	144	146	252	143	141	148	142	140	123	133	121	130	120	157.74	29.73
Chromium	0.05	0.01325	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.001	<0.002	<0.002	<0.002	<0.002	0.002	<0.001	<0.001	<0.001	--	--	0.00	0.00
Copper	1.0	0.5	mg/L	0.003	<0.002	<0.002	<0.002	0.002	0.006	<0.002	0.004	0.007	<0.002	0.004	0.002	0.002	0.002	--	--	0.00	0.00
Iron	0.3	0.159838	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.60	0.05	0.05	<0.005	0.03	<0.005	<0.005	<0.005	<0.005	<0.100	<0.10	0.06	0.17
Lead	0.01	0.00253	mg/L	<0.00002	<0.00002	<0.00002	0.00086	<0.00002	0.00104	0.00015	0.0001	0.00004	<0.00002	0.00076	<0.00004	<0.00004	<0.00004	--	--	0.00	0.00
Magnesium	NV	NA	mg/L	81	75	69	69	74	103	74	74	72	66	67	61	65	57	63	55	82.50	17.15
Manganese	0.05	0.025941	mg/L	0.22	0.20	0.19	0.20	0.24	0.37	0.30	0.27	0.30	0.21	0.09	0.13	0.31	0.24	0.33	0.07	0.17	0.10
Potassium	NV	NA	mg/L	27	27	25	26	25	27	26	28	28	27	25	24	23	24	21	23	25.68	2.47
Sodium	200	101.3441	mg/L	32	27	28	27	27	25	27	24	25	22	25	22	23	20	22	16	30.70	8.13
Zinc	5.0	2.5	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	--	--	0.00	0.00

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-13D

Parameter	ODWS	RUC	UNITS	Jul-07	Dec-07	Jul-08	Dec-08	Jul-09	Nov-09	Mar-10	Jun-11	Oct-11	Jun-12	Oct-12	Jun-13	Nov-13	Jul-14	Nov-14	May-15	Oct-15	Jun-16	Nov-16
Alkalinity(as CaCO3)	500	411	mg/L	240	288	231	235	234	260	240	244	274	254	349	234	268	219	256	263	357	249	341
Chloride	250	126.7294	mg/L	10	31	8.0	10	7.0	13	10	6.6	12	9.6	20	6.6	9.8	6.6	9.7	10	16	6.6	12
Nitrate(as N)	10	3.985882	mg/L	--	--	0.10	--	0.10	0.10	0.10	<0.1	<0.1	<0.1	<0.1	0.10	<0.1	<0.1	<0.1	<0.10	<0.25	0.10	<0.1
Nitrite(as N)	1	0.295662	mg/L	--	0.0	--	0.3	--	--	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.25	<0.1	<0.1
Ammonia(as N)	NV	NA	mg/L	0.13	0.15	0.22	0.28	0.26	0.25	<0.05	0.03	0.09	0.13	0.06	0.09	0.09	0.10	0.10	0.03	0.17	0.08	0.19
Total Kjeldahl Nitrogen(as N)	NV	NA		0.20	0.40	1.00	1.50	5.00	--	0.50	0.35	0.33	0.15	0.51	0.90	0.22	0.22	0.31	0.11	0.28	0.07	0.30
Organic Nitrogen	NV	NA		0.07	0.25	0.78	1.2	4.7	--	<0.45	0.32	0.24	0.02	0.45	0.81	0.13	0.12	0.21	0.08	0.11	-	0.11
Phenols	NV	NA	mg/L	--	--	--	--	--	--	nd	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
DOC	5	3.370588	mg/L	1.0	2.0	1.0	0.7	0.7	1.6	0.9	0.7	2.7	1.0	2.3	2.6	3.9	2.5	4.1	1.8	1.5	1.0	1.6
Conductivity	NV	NA	uS/cm	516	1000	546	538	544	764	575	545	750	624	934	547	569	536	612	647	911	543	824
pH	6.5-8.5	NV	Unitless	8.2	8.1	8.2	8.2	8.0	8.0	8.0	7.7	7.9	8.1	7.7	8.0	8.0	8.0	7.9	8.4	7.9	8.1	7.8
Sulphate	500	252.7324	mg/L	45	193	42	47	44	130	62	50	111	75	172	51	85	46	79	70	148	51	112
Hardness	80-100	407	mg/L	260	640	230	240	220	340	230	235	367	284	445	224	278	237	293	270	457	233	412
Aluminum	0.1	0.074333	mg/L	--	--	--	--	--	--	--	0.03	0.05	0.02	0.05	0.03	0.04	0.02	0.02	<0.004	<0.004	0.02	0.04
Barium	1.0	0.27	mg/L	0.10	0.22	0.09	0.09	0.08	0.12	0.09	0.09	0.13	0.11	0.16	0.09	0.10	0.08	0.10	0.09	0.16	0.09	0.15
Boron	5.0	1.26	mg/L	0.04	0.45	0.04	0.06	0.04	0.19	0.05	0.05	-	0.10	0.29	0.06	0.13	0.05	0.14	0.11	0.30	0.06	0.27
Cadmium	0.005	0.001254	mg/L	0.0004	0.001	--	--	0.0003	--	0.0	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.001	<0.001	<0.00002	0.0
Calcium	NV	NA	mg/L	61	140	54	55	51	79	55	56	87	67	104.0	53	65	58	69	64	105.0	56	98
Chromium	0.05	0.01325	mg/L	--	--	--	--	--	--	--	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.003	<0.003	<0.002	<0.002
Copper	1.0	0.5	mg/L	--	0.002	--	0.001	--	0.001	--	<0.002	<0.002	<0.002	<0.002	<0.002	0.0	<0.002	0.0	<0.003	<0.003	<0.002	0.0
Iron	0.3	0.159838	mg/L	0.46	0.72	--	--	0.64	1.2	--	0.11	0.61	0.36	0.80	0.38	0.60	0.27	0.59	0.12	0.77	0.25	0.75
Lead	0.01	0.00253	mg/L	--	--	--	--	--	--	0.0006	<0.00002	<0.00002	<0.00002	0.0001	<0.00002	<0.00002	<0.00002	<0.00002	<0.002	<0.002	<0.00002	<0.00002
Magnesium	NV	NA	mg/L	26	69	23	24	21	36	23	23	36	28	45	22	28	23	29	27	47	23	41
Manganese	0.05	0.025941	mg/L	0.01	0.03	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.03	0.02	0.03
Potassium	NV	NA	mg/L	1.0	3.6	0.86	1.0	0.82	1.3	0.91	1.0	1.7	1.3	2.5	1.1	1.6	1.0	1.6	1.7	3.9	1.1	3.3
Sodium	200	101.3441	mg/L	16	39	14	15	14	19	14	14	21	16	24	14	16	14	17	16	24	15	24
Zinc	5.0	2.5	mg/L	--	--	--	--	--	--	--	<0.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-13D

Parameter	ODWS	RUC	UNITS	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	237	274	227	278	222	289	235	304	237	340	227	285	243	265	230	250	262.26	37.35
Chloride	250	126.7294	mg/L	7.2	7.6	6.6	9.8	6.8	11	7.6	10	6.4	10	6.3	7.6	7.1	7.8	6.5	6.4	9.68	4.71
Nitrate(as N)	10	3.985882	mg/L	<0.05	0.2	<0.05	0.05	0.19	0.22	0.14	0.13	0.11	0.22	0.06	0.21	0.08	0.15	0.11	<0.10	0.24	0.19
Nitrite(as N)	1	0.295662	mg/L	<0.05	0.3	<0.05	<0.05	0.1	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.010	0.23	0.23
Ammonia(as N)	NV	NA	mg/L	<0.01	0.13	0.14	0.28	0.20	0.31	0.19	0.46	0.22	0.53	0.20	0.34	0.15	0.22	0.06	0.2	0.17	0.12
Total Kjeldahl Nitrogen(as N)	NV	NA		0.09	0.40	0.20	0.40	0.20	0.40	0.30	0.60	0.30	0.70	0.60	0.50	0.20	1.70	0.15	0.26	0.57	0.86
Organic Nitrogen	NV	NA		0.09	0.27	0.06	0.12	-	0.09	0.11	0.14	0.08	0.17	0.40	0.16	0.05	1.5	--	--	0.44	0.90
Phenols	NV	NA	mg/L	<0.001	<0.001	<0.001	0.0	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.00	0.00
DOC	5	3.370588	mg/L	1.2	3.1	1.3	2.3	14.4	2.8	4.1	2.5	2.0	2.3	1.7	1.2	2.0	3.6	0.7	1	2.28	2.33
Conductivity	NV	NA	uS/cm	560	677	521	716	545	730	539	763	572	760	547	643	542	606	540	580	639.03	128.92
pH	6.5-8.5	NV	Unitless	8.0	8.0	8.1	7.7	8.0	7.9	8.0	7.8	8.1	7.9	7.8	7.9	7.9	7.7	8.2	8.2	7.97	0.17
Sulphate	500	252.7324	mg/L	42	59	46	74	46	74	48	79	52	76	46	60	48	51	42	45	71.45	38.06
Hardness	80-100	407	mg/L	257	330	220	321	245	324	246	373	271	357	233	300	221	243	220	260	294.74	88.78
Aluminum	0.1	0.074333	mg/L	0.02	0.05	0.03	0.05	0.03	0.06	0.02	0.04	0.05	0.08	0.02	0.03	0.01	0.04	--	--	0.04	0.02
Barium	1.0	0.27	mg/L	0.09	0.12	0.08	0.12	0.08	0.12	0.09	0.14	0.10	0.13	0.08	0.11	0.08	0.09	0.08	0.10	0.11	0.03
Boron	5.0	1.26	mg/L	0.07	0.19	0.05	0.16	0.06	0.17	0.07	0.19	0.09	0.20	0.06	0.14	0.04	0.07	0.04	0.06	0.12	0.10
Cadmium	0.005	0.001254	mg/L	<0.000014	<0.000014	<0.000015	<0.000015	<0.000015	<0.000015	0.0	<0.000015	<0.000015	0.0	<0.000015	<0.000015	<0.000015	<0.000015	--	--	0.00	0.00
Calcium	NV	NA	mg/L	61	77	51	77	58	76	57	84	63	84	55	70	52	58	53	64	68.96	19.38
Chromium	0.05	0.01325	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	--	--	0.00	0.00
Copper	1.0	0.5	mg/L	<0.002	<0.002	<0.002	<0.002	0.008	0.001	<0.002	<0.002	0.012	<0.002	0.0003	0.0004	0.0002	0.0004	--	--	0.00	0.00
Iron	0.3	0.159838	mg/L	0.15	0.58	0.17	0.57	0.21	0.72	0.22	0.59	0.16	0.56	0.36	0.51	0.07	0.46	<0.100	<0.10	0.47	0.25
Lead	0.01	0.00253	mg/L	<0.00002	<0.00002	<0.00002	0.01	0.00003	0.0001	0.00002	0.00003	0.0004	0.0001	0.00003	0.00003	<0.00002	0.00002	--	--	0.00	0.00
Magnesium	NV	NA	mg/L	26	34	23	32	24	33	25	40	27	36	24	30	22	24	21	25	29.70	9.77
Manganese	0.05	0.025941	mg/L	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01
Potassium	NV	NA	mg/L	1.7	2.7	1.3	2.5	1.5	2.8	2.0	3.6	1.8	3.4	1.6	2.5	1.0	1.0	0.79	1.4	1.80	0.91
Sodium	200	101.3441	mg/L	17	19	15	19	15	18	15	21	17	18	14	17	13	15	13	14	17.25	4.90
Zinc	5.0	2.5	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	--	--	0.00	0.00

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-14

Parameter	ODWS	RUC	UNITS	Jul-07	Jul-08	Jul-09	Nov-09	Mar-10	Jun-11	Oct-11	Jun-12	Oct-12	Jun-13	Nov-13	Jul-14	Nov-14	May-15	Oct-15	Jun-16	Nov-16
Alkalinity(as CaCO3)	500	411	mg/L	702	633	600	--	619	590	548	550	--	581	535	523	597	506	531	677	519
Chloride	250	126.7294	mg/L	11	8.0	9.0	--	12	3.4	3.0	4.3	--	5.3	2.8	2.9	7.7	4.8	3.8	5.6	16.7
Nitrate(as N)	10	3.985882	mg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	--	0.2	<0.1	0.1	0.1	<0.25	<0.25	0.1	<0.1
Nitrite(as N)	1	0.295662	mg/L	--	--	--	--	<0.01	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.1	<0.1	<0.25	<0.25	<0.1	<0.1
Ammonia(as N)	NV	NA	mg/L	15	11	16	--	11	8.4	7.1	6.1	--	4.7	4.4	6.4	5.7	4.5	1.7	5.3	5.2
Total Kjeldahl Nitrogen(as N)	NV	NA		12	11	14	--	11	11	7.2	6.8	--	8.1	7.2	7.9	6.5	5.4	4.7	5.7	6.0
Organic Nitrogen	NV	NA		--	--	--	--	--	2.24	0.08	0.72	--	3.33	2.82	1.55	0.73	0.94	2.94	0.39	0.78
Phenols	NV	NA	mg/L	0.006	0.001	0.004	--	0.004	0.007	0.006	0.004	--	0.006	0.006	0.003	0.003	<0.001	<0.001	0.00	<0.001
DOC	5	3.370588	mg/L	8.7	9.2	8.9	--	8.2	9.3	8.2	7.7	--	21	16	16	9.8	7.0	5.0	7.1	6.0
Conductivity	NV	NA	uS/cm	1160.00	1190.00	1120.00	--	1170.00	1040.00	1050.00	1050.00	--	988.00	857.00	1060	1080	970.00	948.00	1020.00	81
pH	6.5-8.5	NV	Unitless	8.0	7.8	7.4	--	7.4	7.1	7.2	7.3	--	7.3	7.3	7.4	7.5	7.8	7.8	7.2	7.3
Sulphate	500	252.7324	mg/L	16	35	1.0	--	34	8.0	5.0	22	--	8.0	22	19	34	15	26	9.0	18
Hardness	80-100	407	mg/L	590	560	520	--	560	528	556	512	--	499	499	559	574	471	505	516	578
Aluminum	0.1	0.074333	mg/L	0.009	0.007	0.007	--	0.006	0.05	0.06	0.05	--	0.05	0.06	0.05	0.04	0.01	0.01	0.05	0.05
Barium	1.0	0.27	mg/L	0.07	0.07	0.09	--	0.07	0.09	0.08	0.06	--	0.05	0.05	0.06	0.24	0.05	0.04	0.06	0.05
Boron	5.0	1.26	mg/L	0.45	0.35	0.39	--	0.3	0.286	-	0.329	--	0.17	0.142	0.23	0.22	0.19	0.16	0.22	0.17
Cadmium	0.005	0.001254	mg/L	0.0002	--	0.0003	--	0.0001	<0.00002	<0.00002	0.00004	--	0.00004	0.0001	<0.00002	0.00004	<0.001	<0.001	<0.00002	<0.00002
Calcium	NV	NA	mg/L	160	160	160	--	170	142	181	159	--	166	167	182	184	158	169	165	192
Chromium	0.05	0.01325	mg/L	--	--	--	--	--	<0.002	<0.002	<0.002	--	<0.002	<0.002	<0.002	0.003	<0.003	<0.003	<0.002	<0.002
Copper	1.0	0.5	mg/L	0.001	0.001	nd	--	0.002	<0.002	<0.002	<0.002	--	<0.002	0.0004	<0.002	0.0012	<0.003	<0.003	<0.002	0.0002
Iron	0.3	0.159838	mg/L	0.69	1.9	6.5	--	12	20	24	19	--	33	25	37	0	17	3	39	10
Lead	0.01	0.00253	mg/L	--	--	--	--	--	<0.00002	0.00002	<0.00002	--	0.00005	<0.00002	<0.00002	<0.00002	<0.002	<0.002	<0.00002	<0.00002
Magnesium	NV	NA	mg/L	44	38	30	--	33	42	25	28	--	21	20	25	28	19	20	25	24
Manganese	0.05	0.025941	mg/L	4.7	5.3	2.7	--	2	0.8	0.7	0.3	--	0.9	0.4	0.7	0.7	0.3	0.3	0.3	0.3
Potassium	NV	NA	mg/L	25	22	22	--	18	26.1	28.9	18.3	--	9.1	9.4	11.3	15.7	9.33	8.68	8.7	9.8
Sodium	200	101.3441	mg/L	45	34	18	--	15	8.2	6.9	8.4	--	5.8	4.0	6.7	7.9	4.91	3.64	4.5	3.9
Zinc	5.0	2.5	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-14

Parameter	ODWS	RUC	UNITS	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	530	501	519	458	510	460	491	445	479	512	488	517	573	619	630		548.10	64.81
Chloride	250	126.7294	mg/L	8.8	6.8	10.4	6.5	7.1	21.6	14.1	13.7	19.9	25.5	60.8	60.4	51.6	42.8	34		16.14	16.92
Nitrate(as N)	10	3.985882	mg/L	<0.05	<0.1	0.05	0.07	<0.05	0.09	0.08	<0.05	<0.05	<0.05	<0.05	0.13	0.09	0.08	0.11		0.18	0.19
Nitrite(as N)	1	0.295662	mg/L	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010		0.21	0.24
Ammonia(as N)	NV	NA	mg/L	3.6	3.6	4.9	4.6	4.4	3.6	2.7	2.2	2.6	2.2	4.7	2.8	5.8	2.3	2.8		5.49	3.51
Total Kjeldahl Nitrogen(as N)	NV	NA		4.0	3.9	5.3	4.6	5.2	4.0	3.5	2.7	3.0	2.8	5.9	4.4	6.0	3.4	3.6		6.21	2.94
Organic Nitrogen	NV	NA		0.43	0.31	0.4	-	0.8	0.39	0.76	0.46	0.36	0.65	1.19	1.58	0.25	1.11	--		1.05	0.91
Phenols	NV	NA	mg/L	<0.001	<0.001	0.003	0.015	<0.002	0.002	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.0015		0.003	0.00
DOC	5	3.370588	mg/L	7.4	10.3	15.3	9.6	10.1	11.6	10.3	8.9	11.2	9.3	10	15.4	9.1	18	23		10.93	4.35
Conductivity	NV	NA	uS/cm	1050	1020	1000	940	981	1030	976	968	1000	1020	1200	1270	1270	1400	1300		1040.30	218.74
pH	6.5-8.5	NV	Unitless	7.29	7.41	7.29	7.2	7.33	7.42	7.22	7.28	7.22	7.51	7.32	7.32	7.35	7.23	7.55		7.39	0.21
Sulphate	500	252.7324	mg/L	22	49	34	13	13	54	36	40	33	44	49	132	83	97	56		34.24	28.71
Hardness	80-100	407	mg/L	580	572	523	506	554	534	553	553	600	595	613	700	607	705	670		563.07	56.51
Aluminum	0.1	0.074333	mg/L	0.06	0.10	0.09	0.08	0.09	0.08	0.14	0.09	0.10	0.10	0.07	0.06	0.06	0.12	--	ISW	0.06	0.04
Barium	1.0	0.27	mg/L	0.06	0.05	0.06	0.05	0.05	0.04	0.05	0.03	0.04	0.03	0.06	0.05	0.06	0.06	0.05		0.06	0.04
Boron	5.0	1.26	mg/L	0.16	0.16	0.21	0.16	0.18	0.14	0.19	0.10	0.17	0.17	0.20	0.19	0.16	0.18	0.17		0.21	0.08
Cadmium	0.005	0.001254	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.00002	<0.00002	<0.00002	<0.00001	--		0.00	0.00
Calcium	NV	NA	mg/L	193	189	172	170	186	179	185	184	198	196	200	231	197	223	210		180.93	20.03
Chromium	0.05	0.01325	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	--		0.00	0.00
Copper	1.0	0.5	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.0047	<0.002	<0.002	<0.002	<0.002	0.0014	0.0008	0.0006	0.0009	--		0.00	0.00
Iron	0.3	0.159838	mg/L	24	26	29	30	29	23	32	3	34	14	45	22	35	22	<0.100		21.27	12.49
Lead	0.01	0.00253	mg/L	<0.00002	<0.00002	0.00002	<0.00002	<0.00002	0.00007	0.00022	0.00003	<0.00002	0.00005	0.00012	<0.00004	<0.00004	<0.00004	--		0.00	0.00
Magnesium	NV	NA	mg/L	24	24	23	20	22	21	22	23	26	26	27	30	28	36	34		26.84	6.59
Manganese	0.05	0.025941	mg/L	0.4	0.2	0.5	0.2	0.4	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.1		0.81	1.27
Potassium	NV	NA	mg/L	7.8	7.2	9.1	8.5	7.8	7.1	5.8	5.7	5.2	5.00	8.8	8.2	8.3	6.6	15		11.95	6.81
Sodium	200	101.3441	mg/L	5.1	5.5	7.0	7.0	7.2	6.1	7.6	7.5	6.9	6.7	14	29	20	32	25		12.09	10.61
Zinc	5.0	2.5	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	<0.005	0.008	--		0.01	0.00

Notes: Provided on Page 1 of Appendix F

HISTORICAL GROUNDWATER QUALITY DATA
OW-15

Parameter	ODWS	RUC	UNITS	Nov-16	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	505	534	548	553	499	513	466	490	355	499	436	491	409	493	450	430	340	471.24	61.33
Chloride	250	126.7294	mg/L	55	58	42	70	46	65	50	68	19	57	29	57	8.8	55	6.6	39	9.0	43.12	21.25
Nitrate(as N)	10	3.985882	mg/L	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	0.10	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.10	<0.10	0.07	0.12
Nitrite(as N)	1	0.295662	mg/L	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.010	0.06	0.12
Ammonia(as N)	NV	NA	mg/L	0.10	0.08	0.11	0.39	0.20	0.53	0.27	0.47	0.11	0.30	0.05	0.42	0.05	0.20	0.16	0.16	0.06	0.22	0.16
Total Kjeldahl Nitrogen(as N)	NV	NA		0.56	0.46	0.70	3.4	3.3	2.3	0.70	0.70	0.60	8.9	12	3.8	15	3.2	3.6	1.0	0.88	3.55	4.22
Organic Nitrogen	NV	NA		0.46	0.38	0.59	3.0	3.1	1.8	0.43	0.23	0.49	8.6	12	3.4	15	3.0	3.4	--	--	3.67	4.43
Phenols	NV	NA	mg/L	<0.001	<0.001	<0.001	<0.001	0.021	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	0.002	<0.001	<0.001	<0.0010	<0.0010	0.002	0.00
DOC	5	3.370588	mg/L	6.0	6.4	14	5.6	12	6.9	13	5.1	17	6	12	5.2	20	4.4	22	3.8	12	10.02	5.62
Conductivity	NV	NA	uS/cm	1370	1540	1360	1530	1320	1520	1250	1500	842	1490	1000	1510	756	1360	816	1200	690	1238	300.19
pH	6.5-8.5	NV	Unitless	7.7	7.61	7.76	7.75	7.5	7.9	7.72	7.52	7.59	7.76	7.77	7.76	7.78	7.88	7.68	8.03	7.95	7.74	0.14
Sulphate	500	252.7324	mg/L	212	217	157	267	156	277	162	291	62	235	105	248	4.0	256	3.0	180	32	168.5	96.19
Hardness	80-100	407	mg/L	766	768	684	748	676	805	576	810	411	819	564	839	439	680	439	570	380	645.5	156.45
Aluminum	0.1	0.074333	mg/L	0.05	0.05	0.09	0.09	0.08	0.08	0.07	0.10	0.05	0.11	0.09	0.58	0.25	0.04	0.07	--	--	0.12	0.14
Barium	1.0	0.27	mg/L	0.24	0.23	0.13	0.19	0.12	0.16	0.09	0.21	0.07	0.18	0.1	0.18	0.07	0.15	0.08	0.15	0.09	0.14	0.06
Boron	5.0	1.26	mg/L	0.26	0.26	0.21	0.30	0.22	0.35	0.17	0.37	0.05	0.35	0.20	0.36	0.07	0.31	0.08	0.27	0.10	0.23	0.11
Cadmium	0.005	0.001254	mg/L	0.00003	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00002	<0.00002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001	<0.00002	<0.00001	--	--	0.00	0.00
Calcium	NV	NA	mg/L	184	178	164	164	163	180	139	178	102	186	137	190	112	152	114	130	96	151.1	31.34
Chromium	0.05	0.01325	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	0.002	0.001	<0.001	<0.001	--	--	0.00	0.00
Copper	1.0	0.5	mg/L	0.0008	<0.002	<0.002	<0.002	<0.002	<0.002	0.0043	<0.002	0.003	0.004	<0.002	0.0021	0.0014	0.0005	0.0008	--	--	0.00	0.00
Iron	0.3	0.159838	mg/L	0.08	0.33	0.62	0.35	1.0	0.33	1.2	0.42	0.81	0.84	0.89	1.6	1.2	0.43	2.5	<0.10	<0.10	0.74	0.63
Lead	0.01	0.00253	mg/L	<0.00002	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0009	0.0006	0.0001	0.0003	--	--	0.0003	0.00
Magnesium	NV	NA	mg/L	74	79	67	82	65	86	56	89	38	86	54	89	39	73	37	60	33	65.15	19.57
Manganese	0.05	0.025941	mg/L	0.85	0.41	0.47	0.29	0.47	0.33	0.39	0.38	0.26	0.41	0.37	0.46	0.31	0.37	0.40	0.22	0.04	0.38	0.16
Potassium	NV	NA	mg/L	1.9	2.4	2.9	2.5	3.1	2.7	3.1	2.9	3.1	3.2	3.6	3.2	3.3	2.4	3.1	2.3	2.6	2.84	0.44
Sodium	200	101.3441	mg/L	48	51	39	55	42	52	30	52	14	52	28	45	9.4	38	7.9	29	6.5	35.14	17.02
Zinc	5.0	2.5	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	--	--	0.003	0.00

Notes: Provided on Page 1 of Appendix F

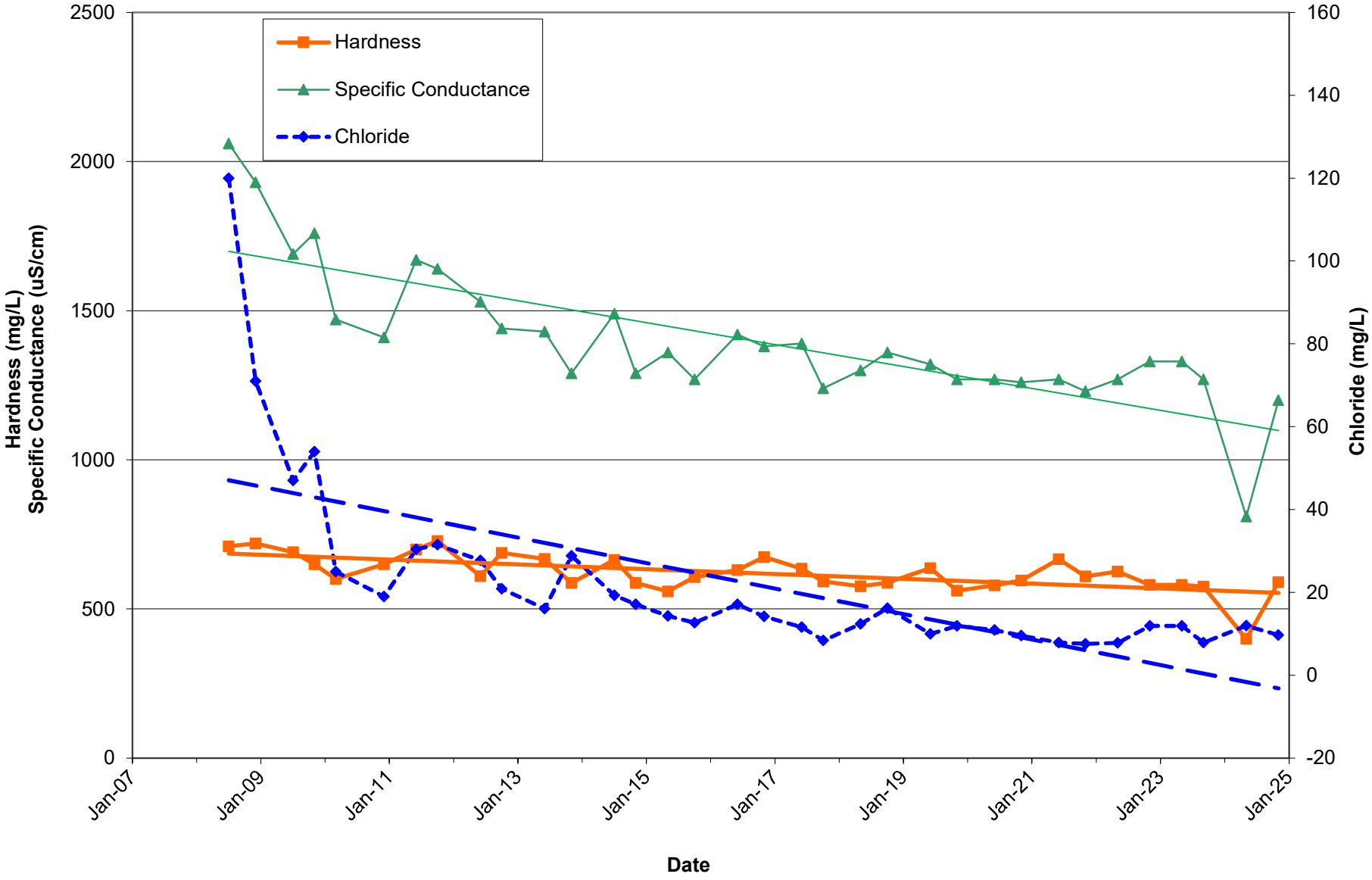
HISTORICAL GROUNDWATER QUALITY DATA
OW-16

Parameter	ODWS	RUC	UNITS	Nov-16	Jun-17	Oct-17	May-18	Oct-18	Jun-19	Nov-19	Jun-20	Nov-20	Jun-21	Nov-21	May-22	Nov-22	May-23	Sep-23	May-24	Nov-24	Average	Std. Dev.
Alkalinity(as CaCO3)	500	411	mg/L	303	289	280	274	263	263	268	271	262	265	275	272	302	295	311	280	350	283.71	22.94
Chloride	250	126.7294	mg/L	6.7	7.4	6.1	8.4	7.6	7.8	9.2	8.3	7.1	7.3	7.4	7.3	6.6	7.7	6.9	7.5	4.7	7.29	0.99
Nitrate(as N)	10	3.985882	mg/L	0.60	0.68	0.20	0.48	0.38	0.27	0.21	0.68	0.33	0.41	0.35	0.75	0.44	0.59	0.28	0.26	<0.10	0.44	0.17
Nitrite(as N)	1	0.295662	mg/L	0.20	0.33	0.30	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.02	<0.010	0.07	0.10
Ammonia(as N)	NV	NA	mg/L	0.04	<0.01	0.06	0.10	0.12	0.19	0.2	0.17	0.08	0.06	<0.01	0.08	0.03	0.01	0.12	<0.050	0.10	0.08	0.06
Total Kjeldahl Nitrogen(as N)	NV	NA		0.37	0.27	0.30	19	3.2	0.50	0.50	0.40	0.30	23	34	5.7	27	8.5	<0.1	0.73	0.55	7.30	11.05
Organic Nitrogen	NV	NA		0.33	0.27	0.24	19	3.1	0.31	0.30	0.23	0.22	23	34	5.6	27	8.5	<0.1	--	--	8.11	11.53
Phenols	NV	NA	mg/L	<0.001	<0.001	<0.001	<0.001	0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.00	0.01
DOC	5	3.370588	mg/L	3.9	2.2	3.2	1.5	4.4	8.5	4.3	2.7	4.3	4.6	2.3	2.7	5.7	3.9	8.3	1.5	8.0	4.24	2.24
Conductivity	NV	NA	uS/cm	585	573	569	554	573	558	572	550	563	557	551	568	579	575	607	590	620	573.18	19.10
pH	6.5-8.5	NV	Unitless	8.0	7.9	8.0	8.0	7.8	8.0	8.0	7.8	7.8	8.0	8.0	7.9	7.9	8.1	7.6	8.1	8.1	7.93	0.14
Sulphate	500	252.7324	mg/L	10	7.0	16	12	15	26	39	13	13	14	18	13	16	15	16	22	2.0	15.71	8.02
Hardness	80-100	407	mg/L	338	325	314	275	325	315	315	305	332	326	305	324	347	300	327	310	370	320.76	20.77
Aluminum	0.1	0.074333	mg/L	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.03	0.05	0.07	0.05	0.15	0.04	0.02	0.06	--	--	0.05	0.03
Barium	1.0	0.27	mg/L	0.08	0.07	0.07	0.06	0.08	0.06	0.08	0.09	0.10	0.09	0.08	0.07	0.10	0.08	0.09	0.09	0.08	0.08	0.01
Boron	5.0	1.26	mg/L	0.01	<0.005	0.01	0.009	0.01	0.007	0.01	0.01	<0.005	0.01	0.01	<0.005	0.01	0.008	0.02	0.01	0.02	0.01	0.00
Cadmium	0.005	0.001254	mg/L	0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	--	--	0.00	0.00
Calcium	NV	NA	mg/L	91	86	84	71	89	83	85	80	86	87	81	86	92	79	87	84	99	85.22	5.94
Chromium	0.05	0.01325	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	--	--	0.00	0.00
Copper	1.0	0.5	mg/L	0.0303	<0.002	<0.002	<0.002	<0.002	0.006	0.0027	<0.002	0.012	<0.002	<0.002	0.001	0.0011	0.0003	0.0007	--	--	0.00	0.01
Iron	0.3	0.159838	mg/L	0.023	<0.005	0.005	0.01	0.023	0.005	0.146	0.046	0.132	0.076	0.12	0.29	0.257	0.052	0.177	<0.100	<0.10	0.09	0.09
Lead	0.01	0.00253	mg/L	<0.00002	<0.00002	<0.00002	0.00006	0.00005	0.00002	0.00007	0.00006	0.00007	0.00003	0.00007	0.00023	0.00007	0.00002	0.00005	--	--	0.00	0.00
Magnesium	NV	NA	mg/L	27	27	26	24	25	26	25	26	28	27	25	27	29	25	27	25	29	26.19	1.45
Manganese	0.05	0.025941	mg/L	0.37	0.22	0.12	0.12	0.18	0.07	0.14	0.10	0.15	0.10	0.12	0.09	0.19	0.11	0.19	0.2	0.25	0.16	0.07
Potassium	NV	NA	mg/L	0.90	1.0	1.0	0.90	0.80	1.0	0.80	1.2	1.0	0.90	0.90	1.1	1.0	1.0	0.80	1.1	0.70	0.95	0.13
Sodium	200	101.3441	mg/L	4.7	3.7	3.2	3.1	3.7	3.1	3.3	3.0	3.6	3.1	3.0	2.7	3.6	2.9	3.6	2.9	3.2	3.32	0.47
Zinc	5.0	2.5	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	--	--	0.00	0.00

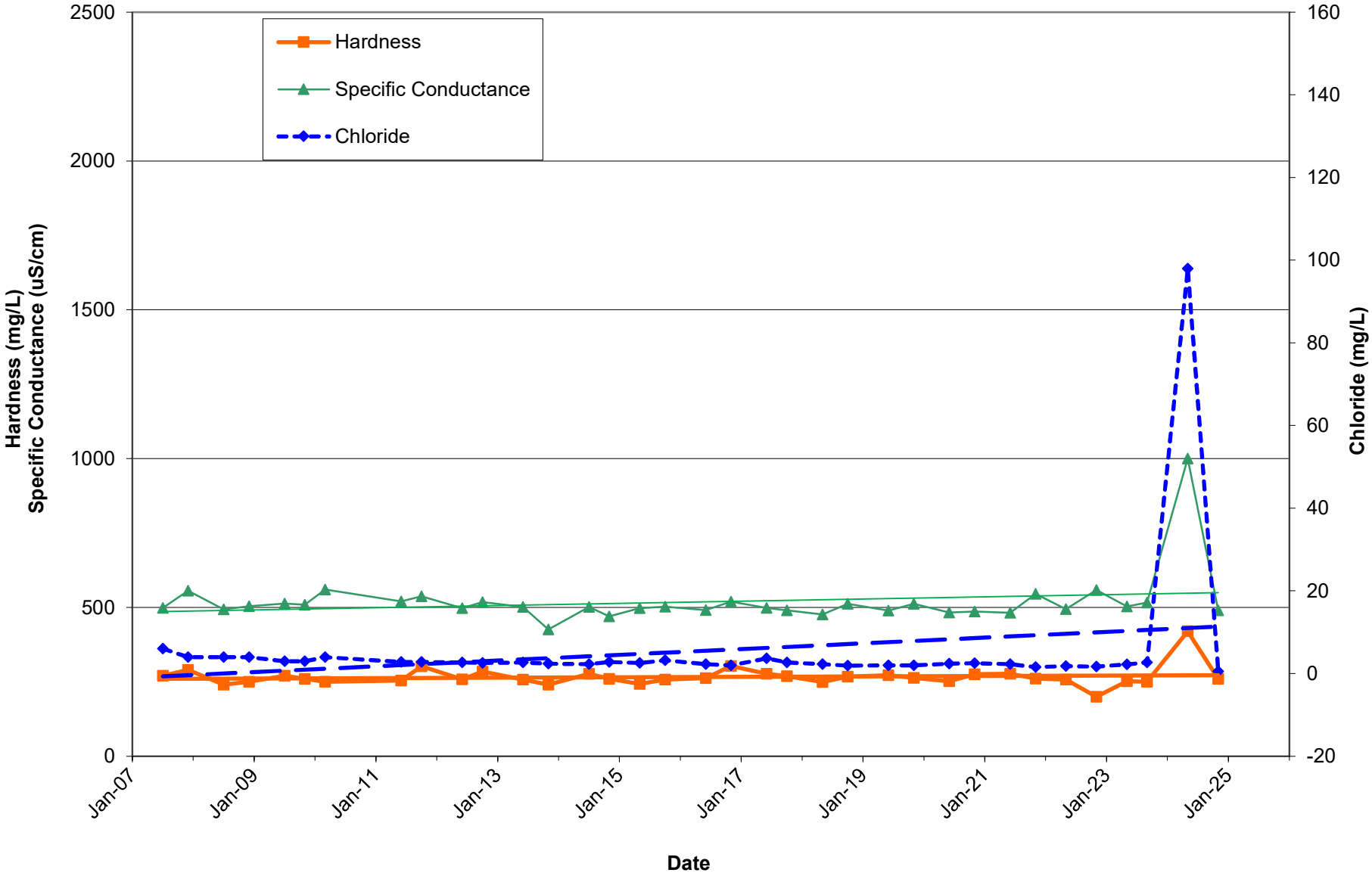
Notes: Provided on Page 1 of Appendix F

Notes:

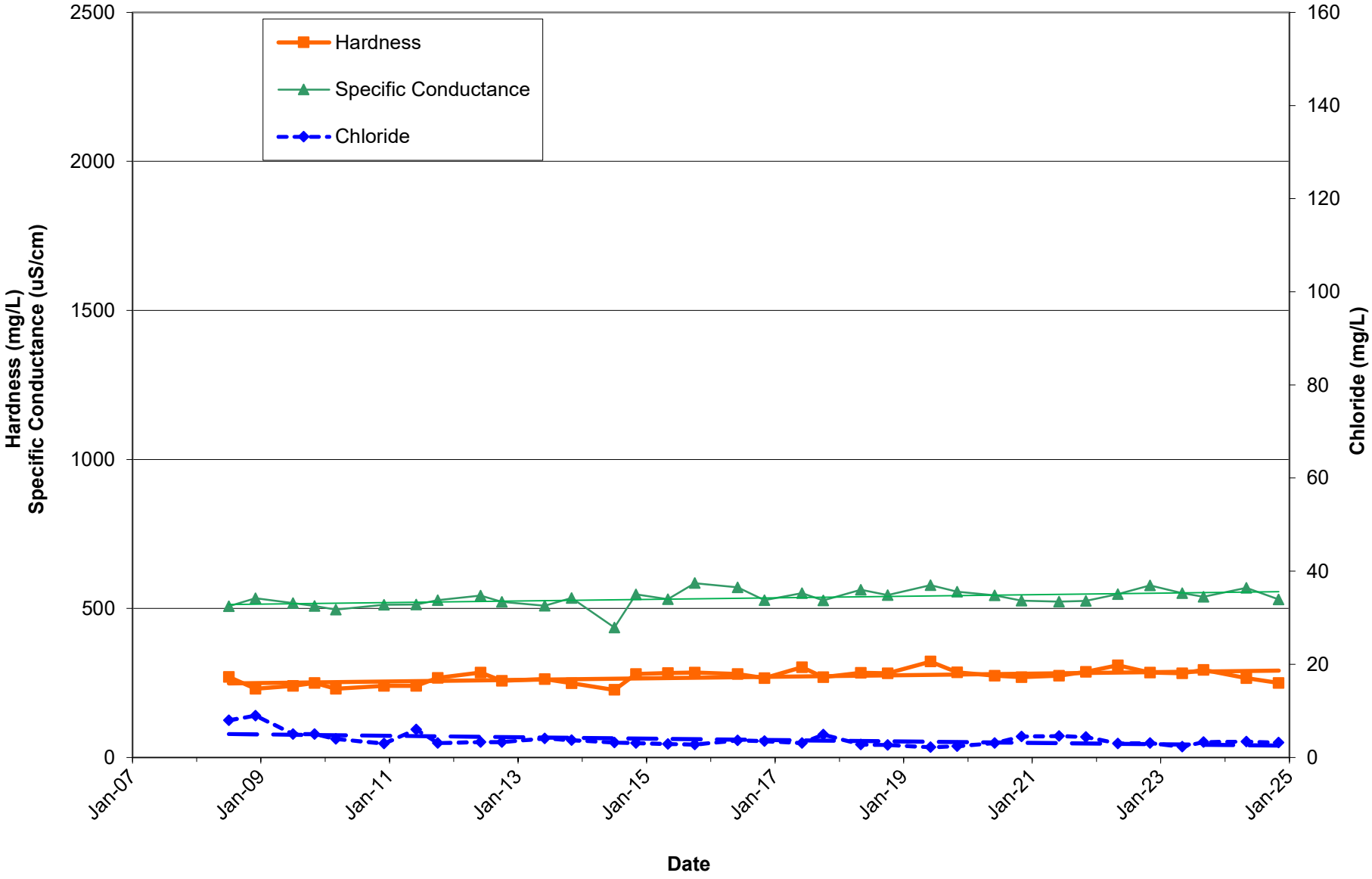
1. ODWS= Ontario Drinking Water Standards (June 2003, Revised June 2006)
2. NM = Not Measured; NV = No Value; NR = Not Required
3. ND = Not Detected; NA = Not Applicable
4. * indicates outlier interpreted as sample or lab error.
5. Data prior to 2024 from Annual Monitoring Report (2023), WSP Canada Inc.
6. Values reported as less than detection limits used as 1/2 detection limit for calculation of averages and plotting.
7. Values in bold represent results greater than the ODWS
8. Shaded values represent results greater than the Reasonable Use Criteria (RUC).
9. Results presented in mg/L unless otherwise specified; conductivity in µS/cm = microsiemens per centimeter; pH = Unitless.

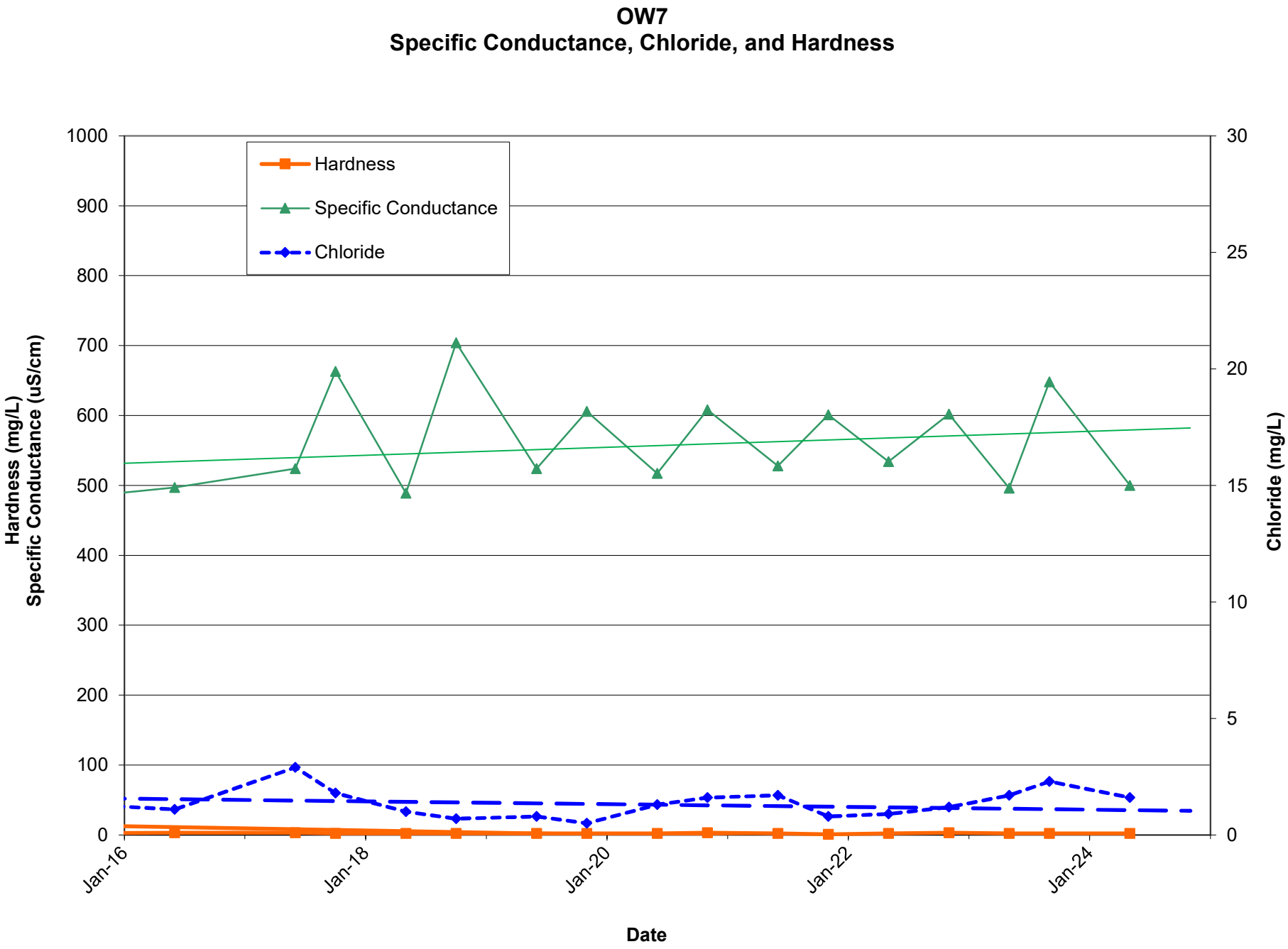

OW4
Specific Conductance, Chloride, and Hardness
Hardness
Specific Conductance
Chloride
Hardness (mg/L)
Specific Conductance (uS/cm)
Chloride (mg/L)
Date
2500
2000
1500
1000
500
0
160
140
120
100
80
60
40
20
0
-20
Jan-07
Jan-09
Jan-11
Jan-13
Jan-15
Jan-17
Jan-19
Jan-21
Jan-23
Jan-25

OW5
Specific Conductance, Chloride, and Hardness

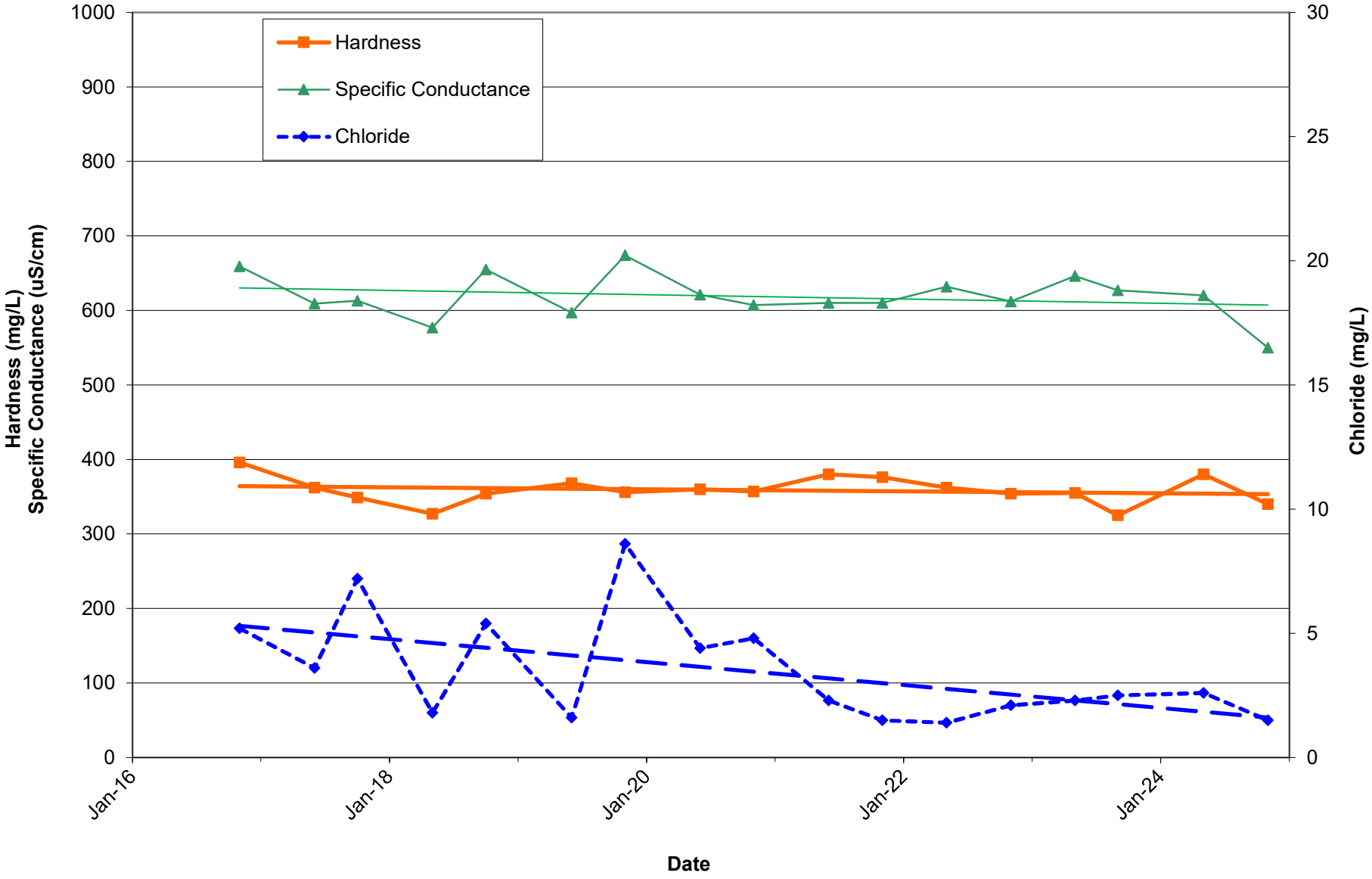


OW6
Specific Conductance, Chloride, and Hardness

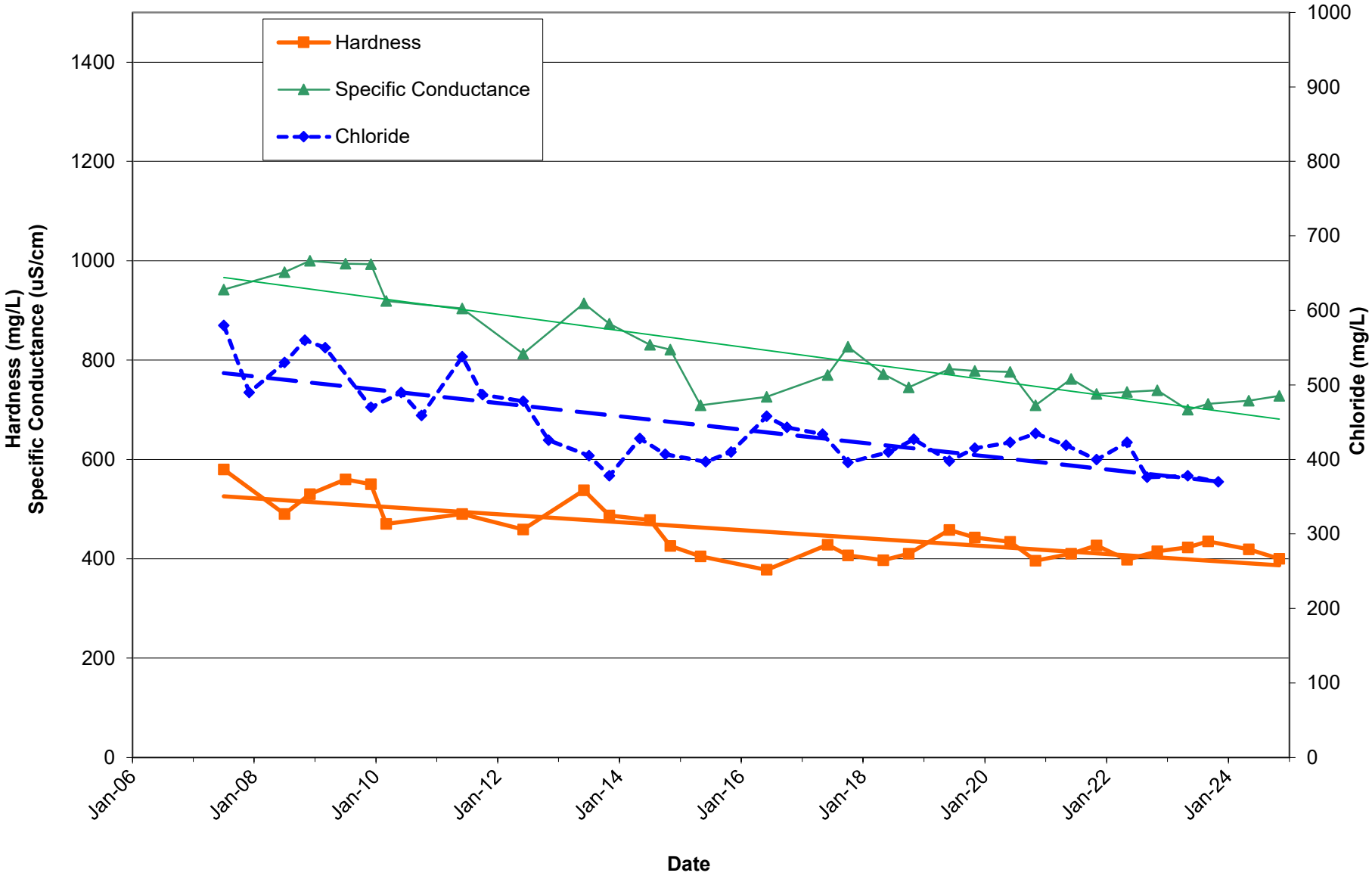



OW7
Specific Conductance, Chloride, and Hardness
Hardness
Specific Conductance
Chloride
Hardness (mg/L)
Specific Conductance (uS/cm)
Chloride (mg/L)
1000
900
800
700
600
500
400
300
200
100
0
30
25
20
15
10
5
0
Jan-16
Jan-18
Jan-20
Jan-22
Jan-24
Date

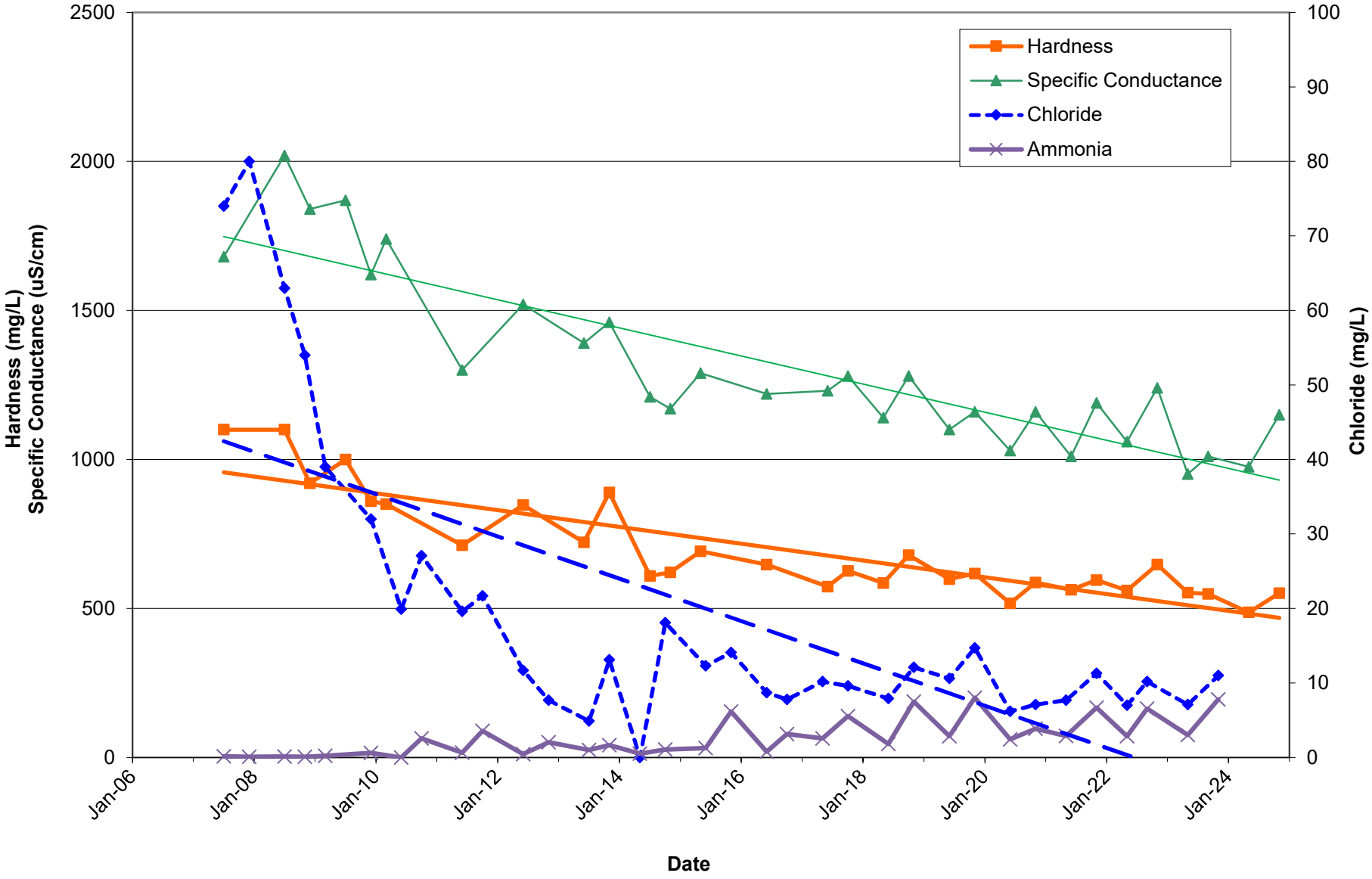
OW11-16
Specific Conductance, Chloride, and Hardness

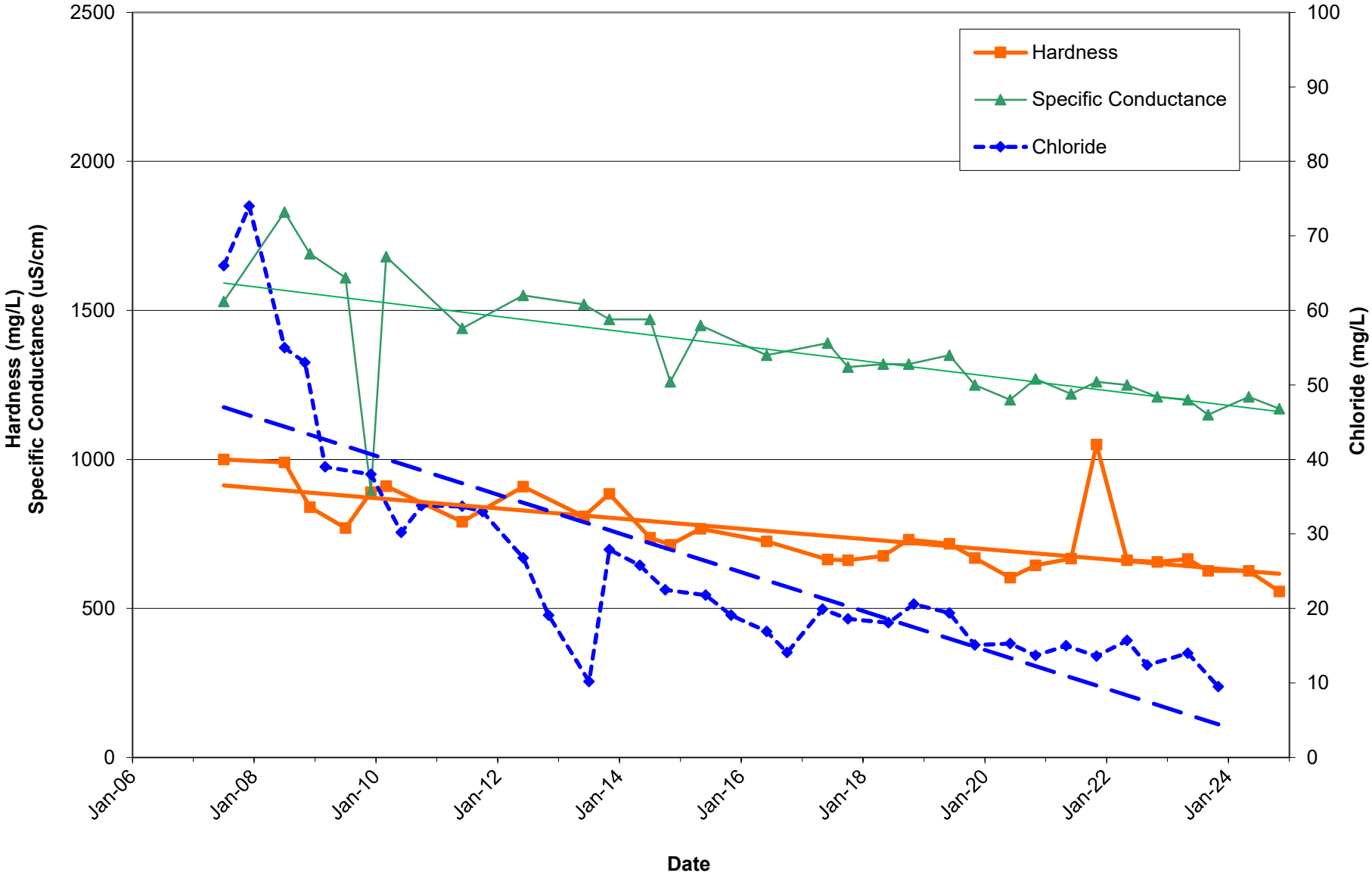


OW12
Specific Conductance, Chloride, and Hardness

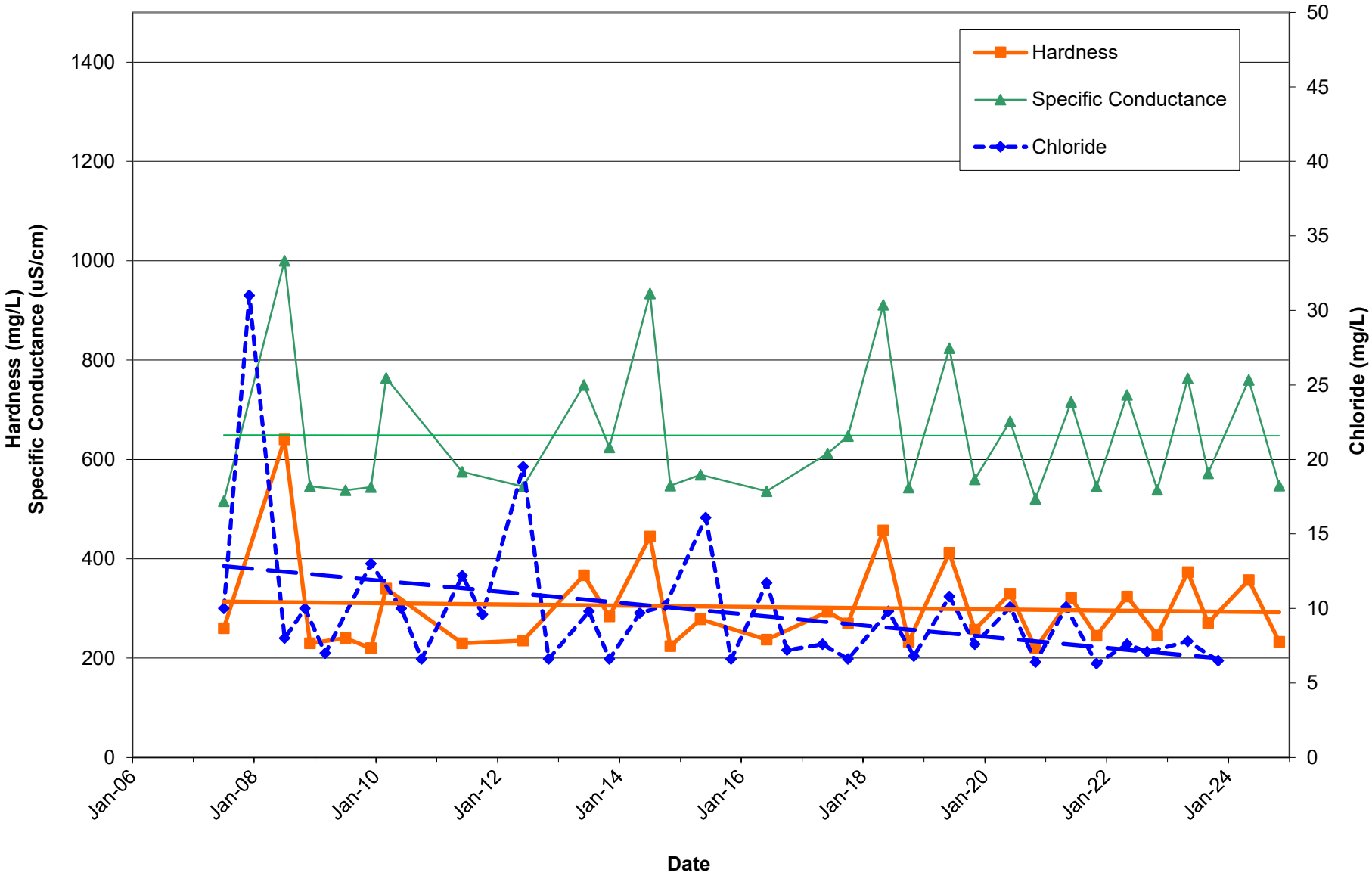


OW13S
Specific Conductance, Chloride, and Hardness

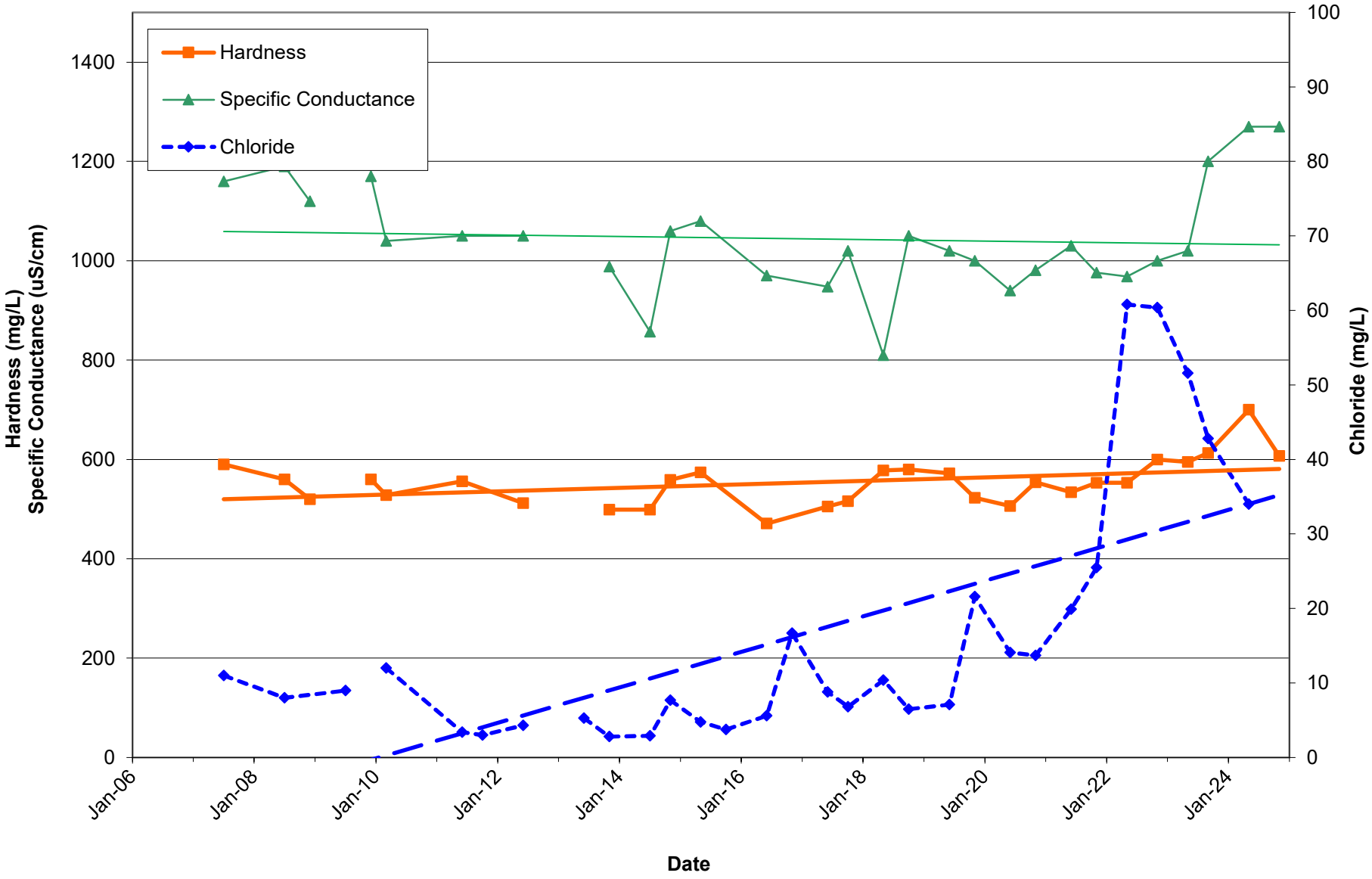



OW13I
Specific Conductance, Chloride, and Hardness
Hardness
Specific Conductance
Chloride
Hardness (mg/L)
Specific Conductance (uS/cm)
Chloride (mg/L)
Date
2500
2000
1500
1000
500
0
100
90
80
70
60
50
40
30
20
10
0
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
Jan-20
Jan-22
Jan-24

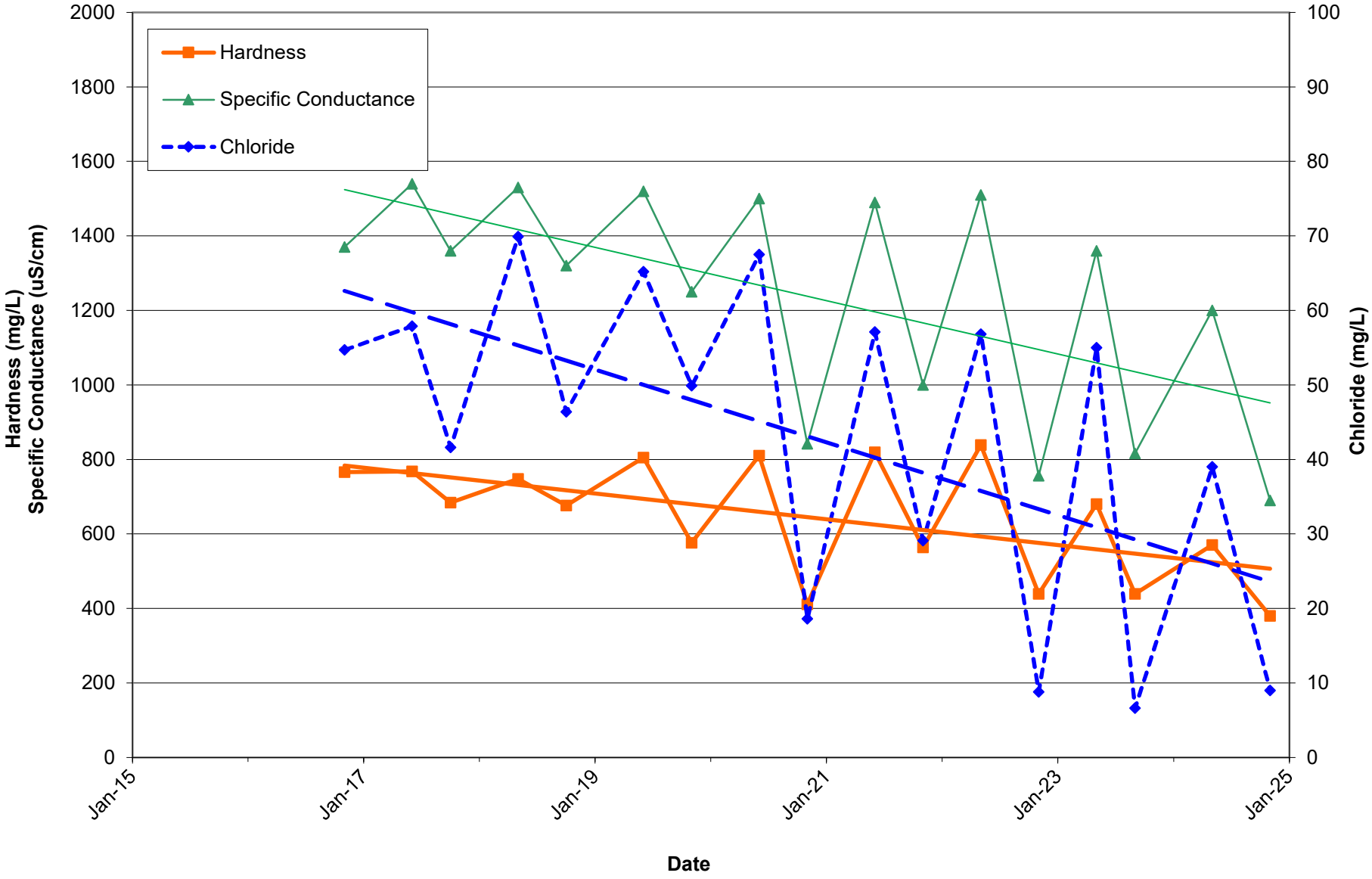
OW13D
Specific Conductance, Chloride, and Hardness



OW14
Specific Conductance, Chloride, and Hardness



OW15
Specific Conductance, Chloride, and Hardness



Appendix G Historical Surface Water Quality Data

HISTORICAL SURFACE WATER QUALITY DATA

PARAMETER / SAMPLE DATE	Units	PWQO	SW1 Jul-07	SW1 Dec-07	SW1 Jul-08	SW1 Dec-08	SW1 Jul-09	SW1 Dec-09	SW1 Mar-10	SW1 Jun-11	SW1 Oct-11	SW1 Jun-12	SW1 Oct-12	SW1 Jun-13	SW1 Nov-13	SW-1 Jul-14	SW-1 Oct-14	SW-1 May-15	SW-1 Oct-15	SW-1 Jun-16
Alkalinity	mg/L	See Notes	287	183	257	229	260	200	213	256	212	274	200	253	223	233	230	238	248	283
Chloride	mg/L	NV	8.0	9.0	5.0	5.0	5.0	4.0	5.0	4.1	4.3	5.4	6.5	4.1	4.4	2.3	3.9	<0.10	8.0	2.6
Nitrate	mg/L	NV	0.20	0.10	ND	0.40	ND	0.10	0.30	<0.1	<0.1	<0.1	<0.1	<0.1	0.20	<0.1	0.10	<0.05	<0.10	<0.1
Nitrite	mg/L	NV	ND	ND	ND	ND	ND	ND	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.10	<0.1
Ammonia	mg/L	NV	0.06	ND	0.05	0.05	0.05	ND	<0.05	<0.01	<0.01	0.03	<0.01	0.02	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01
Unionized Ammonia	mg/L	0.02	0.003	0.000	0.002	0.001	0.001	-	<0.004	<0.01	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phosphorus (Total)	mg/L	0.02 (I)	NA	NA	NA	0.01	0.01	ND	<0.002	<0.01	<0.01	0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenols	mg/L	0.005 (I)	ND	ND	ND	ND	ND	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Organic Carbon	mg/L	NV	3.6	8.8	10	4.7	7.1	8.3	5.0	8.0	12.3	2.0	12	12	9.5	12	10	5.7	5.5	8.0
Conductivity	uS/cm	NV	538	449	476	435	487	385	403	469	440	532	450	479	371	455	432	447	464	485
pH	unitless	6.5 to 8.5	8.30	8.10	8.10	8.10	7.90	8.20	8.10	7.72	7.94	8.07	7.37	7.97	8.09	8.05	7.97	8.44	8.08	7.92
Sulphate	mg/L	NV	13	43	ND	2.0	ND	ND	<1	1.0	11	<1	61	1.0	4.0	<1	1.0	1.0	3.0	<1
Hardness (as CaCO3)	mg/L	NV	--	--	--	--	--	--	210	299	251	295	288	221	216	305	224	231	249	287
Aluminum	ug/L	NV	9200	6	ND	ND	11	ND	<5	30	20	20	50	20	30	30	20	8.0	<4	20
Barium	ug/L	NV	18	13	27	12	25	12	16	24	17	32	26	20	11	26	15	20	16	-
Boron	ug/L	0.2 (I)	ND	ND	ND	ND	ND	ND	<10	10	99	8	<5	10	<5	7.0	<5	<10	<10	6.0
Cadmium	ug/L	0.0002 / 0.0005 (I)	680	2.50	0.10	ND	0.50	0.20	<0.1	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.1	<0.1	<0.02
Calcium	ug/L	NV	35000	60000	76000	65000	75000	58000	60000	81300	68200	80400	80100	60200	57500	84900	60000	63300	68800	78000
Chromium	ug/L	0.0089	ND	ND	ND	ND	ND	ND	<5	<2	<2	<2	<2	<2	<2	<2	<2	<3	<3	<2
Copper	ug/L	0.005 / 0.005 (I)	69	0.00	ND	ND	1.00	ND	<1	<2	<2	0.30	<2	2.00	0.30	<0.1	<0.1	<2	<2	<0.1
Iron	ug/L	0.3	300	ND	ND	ND	220	ND	<100	59	32	912	24	47	7.0	76	53	<10	100	98
Lead	ug/L	0.025 / 0.005 (I)	150	ND	ND	ND	ND	ND	<0.5	<0.02	<0.02	0.03	0.04	0.03	<0.02	<0.02	<0.02	<1	<1	<0.02
Magnesium	ug/L	NV	89000	18000	22000	21000	23000	18000	18000	23300	19700	22900	21300	17100	17500	22600	18100	17700	18800	22500
Manganese	ug/L	NV	14000	3.0	110	ND	140	2.0	7.0	18	13	1030	13	26	2.0	30	14	28	24	82
Potassium	ug/L	NV	8000	360	540	390	230	600	520	400	1000	300	700	300	400	600	800	320	550	100
Sodium	ug/L	NV	4800	1400	1300	1200	1400	1100	1200	1500	1400	2100	2500	1600	1600	1600	1600	1640	2580	2000
Zinc	ug/L	0.03 / 0.02(I)	270000	ND	ND	ND	8.00	ND	<5	<5	<5	<5	<5	<5	<5	8.0	6.0	<5	<5	<2
Field Measurements																				
Temperature (field)	ºC	NV	22.5	1.3	19.2	1.6	15.2	3.1	10.6	24.2	9.86	25	15	25	2.6	24	9.0	18	8.6	21
Conductivity (field)	uS/cm	NV	580	700	590	490	510	260	400	430	404	493	448	511	356	442	416	427	436	511
pH (field)	unitless	6.5 to 8.5	7.20	7.79	7.99	8.00	8.07	8.58	8.60	8.30	7.55	7.15	7.65	7.65	7.90	7.39	7.8	7.58	7.36	7.62

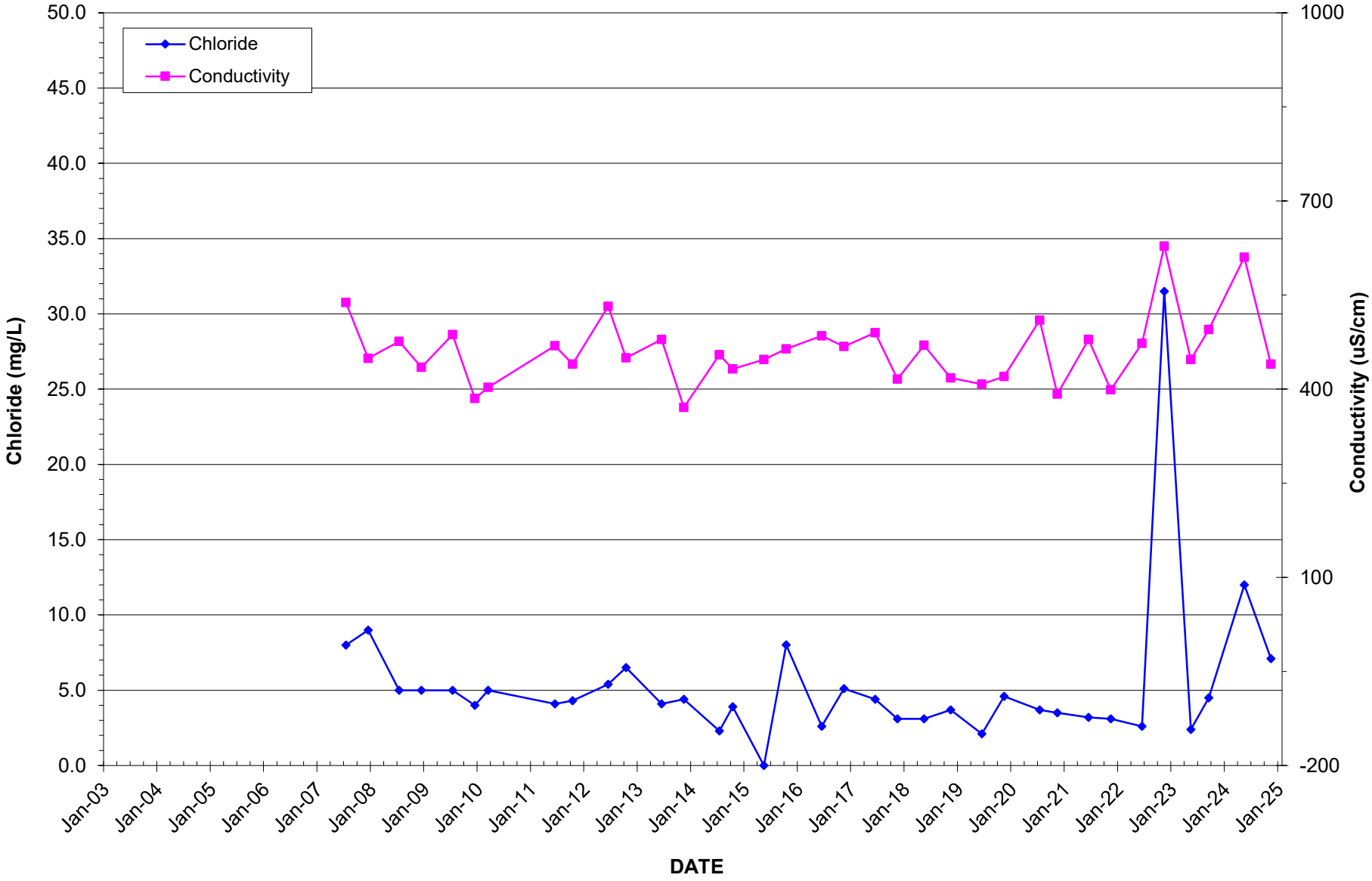
Notes: Refer to last page of Appendix.

HISTORICAL SURFACE WATER QUALITY DATA

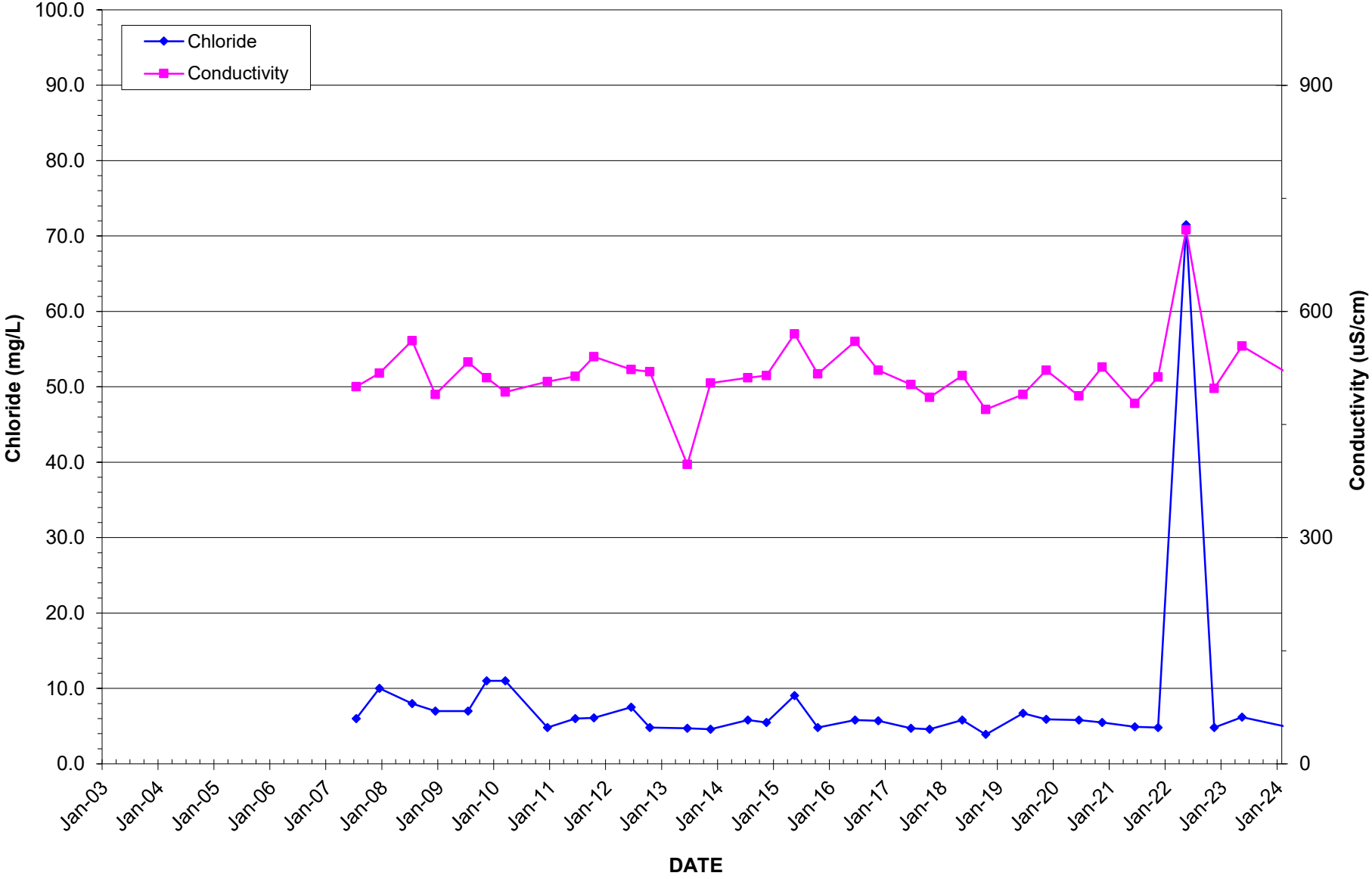
PARAMETER / SAMPLE DATE	Units	PWQO	SW-1 Nov-16	SW-1 Jun-17	SW-1 Nov-17	SW-1 May-18	SW-1 Nov-18	SW-1 Jun-19	SW-1 Nov-19	SW-1 Jul-20	SW-1 Nov-20	SW-1 Jun-21	SW-1 Nov-21	SW-1 Jun-22	SW-1 Nov-22	SW-1 May-23	SW-1 Sep-23	SW-1 May-24	SW-1 Nov-24
Alkalinity	mg/L	See Notes	243	265	224	251	214	213	206	272	201	248	217	262	258	252	273	310	220
Chloride	mg/L	NV	5.1	4.4	3.1	3.1	3.7	2.1	4.6	3.7	3.5	3.2	3.1	2.6	32	2.4	4.5	12	7.1
Nitrate	mg/L	NV	0.10	<0.05	<0.05	<0.05	<0.05	0.05	0.16	0.08	<0.05	<0.05	<0.05	<0.05	4.17	0.08	<0.05	0.19	<0.10
Nitrite	mg/L	NV	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.010	<0.010
Ammonia	mg/L	NV	0.02	<0.01	0.01	0.02	0.04	0.11	0.03	0.03	0.01	0.03	0.02	<0.01	0.02	<0.01	<0.05	<0.050	<0.050
Unionized Ammonia	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phosphorus (Total)	mg/L	0.02 (I)	0.02	<0.01	0.01	0.14	<0.01	0.01	0.02	0.02	0.05	<0.01	<0.01	<0.01	0.05	0.01	0.01	<100	<0.020
Phenols	mg/L	0.005 (I)	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010
Dissolved Organic Carbon	mg/L	NV	7.7	8.1	11.4	7.0	13	8.1	8.1	11	10	9.0	11	8.8	5.8	7.6	13	4.5	8.6
Conductivity	uS/cm	NV	468	490	416	470	418	408	420	510	392	479	399	473	628	447	495	610	440
pH	unitless	6.5 to 8.5	7.97	7.98	8.03	8.44	8.01	8.03	8.07	7.81	8.14	8.09	8.08	8.14	7.82	7.92	7.46	8.33	8.20
Sulphate	mg/L	NV	5.0	<1	2.0	<1	1.0	<1	2.0	<1	2.0	1.0	1.0	<1	22	1.0	<1	7.6	9.4
Hardness (as CaCO3)	mg/L	NV	288	265	233	287	258	257	218	275	214	266	230	267	300	233	279	350	250
Aluminum	ug/L	NV	30	30	50	50	50	90	40	30	40	20	30	60	100	20	70	--	--
Barium	ug/L	NV	-	22	16	37	45	41	15	36	13	25	13	20	30	20	31	20	16
Boron	ug/L	0.2 (I)	<5	34	<5	9.0	5.0	108	5.0	9.0	<5	<5	5	<5	28	7.0	<5	18	<10
Cadmium	ug/L	0.0002 / 0.0005 (I)	<0.2	<0.014	<0.014	<0.015	0.03	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	--	--
Calcium	ug/L	NV	79000	72500	61300	78700	70200	71400	58900	74900	59000	72900	62700	74000	78200	63900	77300	84000	63000
Chromium	ug/L	0.0089	<2	<1	<1	<2	<2	<1	2.00	<2	<2	3.00	<2	<1	<1	<1	<1	--	--
Copper	ug/L	0.005 / 0.005 (I)	<0.1	0.20	<0.1	<0.1	4.6	0.10	1.0	6.0	0.10	0.10	0.20	0.30	1.50	0.20	0.50	--	--
Iron	ug/L	0.3	819	94	49	213	3630	130	411	931	88	143	41	57	155	116	507	410	150
Lead	ug/L	0.025 / 0.005 (I)	0.09	0.03	<0.02	<0.02	0.49	0.03	0.14	0.25	<0.02	0.04	<0.02	0.24	0.12	0.05	0.02	--	--
Magnesium	ug/L	NV	22100	20300	19400	22000	20100	19200	17100	21500	16100	20400	17800	20000	25400	17700	20800	26000	19000
Manganese	ug/L	NV	382	125	24	129	823	19	164	1440	94	181	15	38	10	62	293	150	50
Potassium	ug/L	NV	200	300	500	500	700	300	400	400	400	400	400	400	4300	300	200	2300	1700
Sodium	ug/L	NV	3000	2000	1500	2800	2800	2900	1800	1900	1300	1800	1700	2100	13900	1600	2300	9600	2300
Zinc	ug/L	0.03 / 0.02(I)	<5	<5	<5	18	17	12	25	<5	<5	<5	19	5.0	<5	5.0	48	--	--
Field Measurements																			
Temperature (field)	ºC	NV	7.2	25	6.8	24	7.1	21	4.1	18.6	8.0	20.1	5.0	15	5.3	18	18	12	5.9
Conductivity (field)	uS/cm	NV	434	483	447	460	366	460	420	531	335	476	393	455	382	417	493	490	500
pH (field)	unitless	6.5 to 8.5	7.38	7.15	7.65	7.11	7.88	7.43	7.45	6.85	7.81	7.54	7.30	7.23	8.06	7.79	7.37	7.45	7.75

Notes: Refer to last page of Appendix.

HISTORICAL SURFACE WATER QUALITY TRENDS
SURFACE WATER SAMPLING LOCATION - SW1



HISTORICAL SURFACE WATER QUALITY TRENDS
SURFACE WATER SAMPLING LOCATION - SW2



Appendix H Laboratory Certificate of Analysis

Your Project #: KINLOSS (224058-1)
Your C.O.C. #: C#1018424-01-01

Attention: Reporting Contacts

GEI Consultants
1260 - 2nd Ave E
Unit 1
Owen Sound, ON
CANADA N4K 2J3

Report Date: 2024/12/09
Report #: R8438044
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4AQ362
Received: 2024/11/29, 09:15

Sample Matrix: Ground Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	6	N/A	2024/12/04	CAM SOP-00448	SM 24 2320 B m
Alkalinity	4	N/A	2024/12/06	CAM SOP-00448	SM 24 2320 B m
Chloride by Automated Colourimetry	5	N/A	2024/12/03	CAM SOP-00463	SM 24 4500-Cl E m
Chloride by Automated Colourimetry	5	N/A	2024/12/04	CAM SOP-00463	SM 24 4500-Cl E m
Conductivity	6	N/A	2024/12/04	CAM SOP-00414	SM 24 2510 m
Conductivity	4	N/A	2024/12/06	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	6	N/A	2024/12/02	CAM SOP-00446	SM 24 5310 B m
Dissolved Organic Carbon (DOC) (1)	4	N/A	2024/12/03	CAM SOP-00446	SM 24 5310 B m
Hardness (calculated as CaCO3)	6	N/A	2024/12/05	CAM SOP 00102/00408/00447	SM 2340 B
Hardness (calculated as CaCO3)	4	N/A	2024/12/06	CAM SOP 00102/00408/00447	SM 2340 B
Lab Filtered Metals by ICPMS	6	2024/12/04	2024/12/05	CAM SOP-00447	EPA 6020B m
Lab Filtered Metals by ICPMS	4	2024/12/05	2024/12/06	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	10	N/A	2024/12/04	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	10	N/A	2024/12/02	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	6	2024/12/02	2024/12/04	CAM SOP-00413	SM 24th - 4500H+ B
pH (3)	4	2024/12/02	2024/12/06	CAM SOP-00413	SM 24th - 4500H+ B
Phenols (4AAP)	9	N/A	2024/12/06	CAM SOP-00444	OMOE E3179 m
Phenols (4AAP)	1	N/A	2024/12/07	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Turbidimetry	5	N/A	2024/12/03	CAM SOP-00464	SM 24 4500-SO42- E m
Sulphate by Automated Turbidimetry	5	N/A	2024/12/04	CAM SOP-00464	SM 24 4500-SO42- E m
Total Kjeldahl Nitrogen in Water	1	2024/12/03	2024/12/04	CAM SOP-00938	SM 4500-N B m
Total Kjeldahl Nitrogen in Water	5	2024/12/05	2024/12/06	CAM SOP-00938	SM 4500-N B m
Total Kjeldahl Nitrogen in Water	4	2024/12/05	2024/12/09	CAM SOP-00938	SM 4500-N B m

Sample Matrix: Surface Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2024/12/04	CAM SOP-00448	SM 24 2320 B m

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Your Project #: KINLOSS (224058-1)
Your C.O.C. #: C#1018424-01-01

Attention: Reporting Contacts

GEI Consultants
1260 - 2nd Ave E
Unit 1
Owen Sound, ON
CANADA N4K 2J3

Report Date: 2024/12/09
Report #: R8438044
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4AQ362
Received: 2024/11/29, 09:15

Sample Matrix: Surface Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2024/12/06	CAM SOP-00448	SM 24 2320 B m
Chloride by Automated Colourimetry	1	N/A	2024/12/03	CAM SOP-00463	SM 24 4500-Cl E m
Chloride by Automated Colourimetry	1	N/A	2024/12/04	CAM SOP-00463	SM 24 4500-Cl E m
Conductivity	1	N/A	2024/12/04	CAM SOP-00414	SM 24 2510 m
Conductivity	1	N/A	2024/12/06	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2024/12/02	CAM SOP-00446	SM 24 5310 B m
Hardness (calculated as CaCO3)	2	N/A	2024/12/04	CAM SOP 00102/00408/00447	SM 2340 B
Total Metals Analysis by ICPMS	2	2024/12/05	2024/12/05	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	2	N/A	2024/12/04	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	2	N/A	2024/12/02	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	1	2024/12/02	2024/12/04	CAM SOP-00413	SM 24th - 4500H+ B
pH (3)	1	2024/12/02	2024/12/06	CAM SOP-00413	SM 24th - 4500H+ B
Phenols (4AAP)	2	N/A	2024/12/07	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Turbidimetry	1	N/A	2024/12/03	CAM SOP-00464	SM 24 4500-SO42- E m
Sulphate by Automated Turbidimetry	1	N/A	2024/12/04	CAM SOP-00464	SM 24 4500-SO42- E m
Total Kjeldahl Nitrogen in Water	2	2024/12/05	2024/12/06	CAM SOP-00938	SM 4500-N B m
Total Phosphorus (Colourimetric)	2	2024/12/05	2024/12/06	CAM SOP-00407	SM 24 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report.

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Your Project #: KINLOSS (224058-1)
Your C.O.C. #: C#1018424-01-01

Attention: Reporting Contacts

GEI Consultants
1260 - 2nd Ave E
Unit 1
Owen Sound, ON
CANADA N4K 2J3

Report Date: 2024/12/09
Report #: R8438044
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4AQ362

Received: 2024/11/29, 09:15

Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.

(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

(3) "The CCME method and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) holding time. Bureau Veritas endeavors to analyze samples as soon as possible after receipt."

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Ashton Gibson, Project Manager
Email: ashton.gibson@bureauveritas.com
Phone# (905)817-5765

==========

This report has been generated and distributed using a secure automated process.
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas Job #: C4AQ362
Report Date: 2024/12/09

GEI Consultants
Client Project #: KINLOSS (224058-1)
Sampler Initials: BT

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		AKIF46			AKIF46		
Sampling Date		2024/11/27			2024/11/27		
COC Number		C#1018424-01-01			C#1018424-01-01		
	UNITS	OW4	RDL	QC Batch	OW4 Lab-Dup	RDL	QC Batch
Calculated Parameters							
Hardness (CaCO3)	mg/L	590	1.0	9798513			
Inorganics							
Total Ammonia-N	mg/L	28	0.25	9804566			
Conductivity	umho/cm	1200	1.0	9799871			
Total Kjeldahl Nitrogen (TKN)	mg/L	30	2.0	9809646			
Dissolved Organic Carbon	mg/L	7.6	0.40	9798990			
pH	pH	7.72		9799872			
Phenols-4AAP	mg/L	0.0012	0.0010	9812569	0.0017	0.0010	9812569
Dissolved Sulphate (SO4)	mg/L	9.4	1.0	9800518			
Alkalinity (Total as CaCO3)	mg/L	650	1.0	9799867			
Dissolved Chloride (Cl-)	mg/L	9.7	1.0	9800512			
Nitrite (N)	mg/L	0.034	0.010	9799880			
Nitrate (N)	mg/L	1.17	0.10	9799880			
Nitrate + Nitrite (N)	mg/L	1.20	0.10	9799880			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C4AQ362
Report Date: 2024/12/09

GEI Consultants
Client Project #: KINLOSS (224058-1)
Sampler Initials: BT

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		AKIF47			AKIF47		
Sampling Date		2024/11/27			2024/11/27		
COC Number		C#1018424-01-01			C#1018424-01-01		
	UNITS	OW5	RDL	QC Batch	OW5 Lab-Dup	RDL	QC Batch
Calculated Parameters							
Hardness (CaCO3)	mg/L	260	1.0	9798513			
Inorganics							
Total Ammonia-N	mg/L	0.068	0.050	9804566			
Conductivity	umho/cm	490	1.0	9800535			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.23	0.10	9809646	0.24	0.10	9809646
Dissolved Organic Carbon	mg/L	1.6	0.40	9798990			
pH	pH	8.29		9800539			
Phenols-4AAP	mg/L	<0.0010	0.0010	9812569			
Dissolved Sulphate (SO4)	mg/L	14	1.0	9800525			
Alkalinity (Total as CaCO3)	mg/L	250	1.0	9800532			
Dissolved Chloride (Cl-)	mg/L	<1.0	1.0	9800522			
Nitrite (N)	mg/L	<0.010	0.010	9800548	<0.010	0.010	9800548
Nitrate (N)	mg/L	<0.10	0.10	9800548	<0.10	0.10	9800548
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	9800548	<0.10	0.10	9800548

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C4AQ362
Report Date: 2024/12/09

GEI Consultants
Client Project #: KINLOSS (224058-1)
Sampler Initials: BT

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		AKIF48			AKIF48		
Sampling Date		2024/11/27			2024/11/27		
COC Number		C#1018424-01-01			C#1018424-01-01		
	UNITS	OW6	RDL	QC Batch	OW6 Lab-Dup	RDL	QC Batch
Calculated Parameters							
Hardness (CaCO3)	mg/L	330	1.0	9798513			
Inorganics							
Total Ammonia-N	mg/L	0.36	0.050	9804574			
Conductivity	umho/cm	600	1.0	9799871			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.70	0.10	9809646			
Dissolved Organic Carbon	mg/L	1.5	0.40	9799885			
pH	pH	8.06		9799872			
Phenols-4AAP	mg/L	<0.0010	0.0010	9813456	<0.0010	0.0010	9813456
Dissolved Sulphate (SO4)	mg/L	12	1.0	9800518			
Alkalinity (Total as CaCO3)	mg/L	310	1.0	9799867			
Dissolved Chloride (Cl-)	mg/L	3.5	1.0	9800512			
Nitrite (N)	mg/L	<0.010	0.010	9799880			
Nitrate (N)	mg/L	<0.10	0.10	9799880			
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	9799880			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Bureau Veritas Job #: C4AQ362
Report Date: 2024/12/09

GEI Consultants
Client Project #: KINLOSS (224058-1)
Sampler Initials: BT

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		AKIF49		AKIF50			AKIF51		
Sampling Date		2024/11/27		2024/11/27			2024/11/27		
COC Number		C#1018424-01-01		C#1018424-01-01			C#1018424-01-01		
	UNITS	OW11-16	QC Batch	OW12	RDL	QC Batch	OW13S	RDL	QC Batch
Calculated Parameters									
Hardness (CaCO3)	mg/L	340	9798513	360	1.0	9798513	560	1.0	9798513
Inorganics									
Total Ammonia-N	mg/L	<0.050	9804574	<0.050	0.050	9804574	7.8	0.050	9804574
Conductivity	umho/cm	550	9799871	670	1.0	9800535	1100	1.0	9799871
Total Kjeldahl Nitrogen (TKN)	mg/L	1.5	9809646	0.15	0.10	9809646	8.5	0.50	9809646
Dissolved Organic Carbon	mg/L	1.2	9798990	1.2	0.40	9799190	3.9	0.40	9799190
pH	pH	7.94	9799872	8.13		9800539	7.84		9799872
Phenols-4AAP	mg/L	<0.0010	9812569	<0.0010	0.0010	9812569	<0.0010	0.0010	9812569
Dissolved Sulphate (SO4)	mg/L	3.4	9800518	47	1.0	9800525	69	1.0	9800518
Alkalinity (Total as CaCO3)	mg/L	300	9799867	330	1.0	9800532	510	1.0	9799867
Dissolved Chloride (Cl-)	mg/L	1.5	9800512	1.9	1.0	9800522	11	1.0	9800512
Nitrite (N)	mg/L	<0.010	9799880	<0.010	0.010	9800548	0.058	0.010	9799880
Nitrate (N)	mg/L	0.91	9799880	0.31	0.10	9800548	1.40	0.10	9799880
Nitrate + Nitrite (N)	mg/L	0.91	9799880	0.31	0.10	9800548	1.46	0.10	9799880

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C4AQ362
Report Date: 2024/12/09

GEI Consultants
Client Project #: KINLOSS (224058-1)
Sampler Initials: BT

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		AKIF52			AKIF53		
Sampling Date		2024/11/27			2024/11/27		
COC Number		C#1018424-01-01			C#1018424-01-01		
	UNITS	OW13I	RDL	QC Batch	OW13D	RDL	QC Batch
Calculated Parameters							
Hardness (CaCO3)	mg/L	530	1.0	9798513	260	1.0	9798513
Inorganics							
Total Ammonia-N	mg/L	2.2	0.050	9804566	0.20	0.050	9804574
Conductivity	umho/cm	980	1.0	9800535	580	1.0	9799871
Total Kjeldahl Nitrogen (TKN)	mg/L	3.6	0.20	9809646	0.26	0.10	9809646
Dissolved Organic Carbon	mg/L	3.3	0.40	9799190	1.0	0.40	9799204
pH	pH	7.90		9800539	8.16		9799872
Phenols-4AAP	mg/L	<0.0010	0.0010	9812569	<0.0010	0.0010	9812569
Dissolved Sulphate (SO4)	mg/L	73	1.0	9800525	45	1.0	9800525
Alkalinity (Total as CaCO3)	mg/L	450	1.0	9800532	250	1.0	9799867
Dissolved Chloride (Cl-)	mg/L	9.5	1.0	9800522	6.4	1.0	9800522
Nitrite (N)	mg/L	0.078	0.010	9800548	<0.010	0.010	9799880
Nitrate (N)	mg/L	3.20	0.10	9800548	<0.10	0.10	9799880
Nitrate + Nitrite (N)	mg/L	3.28	0.10	9800548	<0.10	0.10	9799880

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		AKIF54			AKIF55		
Sampling Date		2024/11/27			2024/11/27		
COC Number		C#1018424-01-01			C#1018424-01-01		
	UNITS	OW15	RDL	QC Batch	OW16	RDL	QC Batch
Calculated Parameters							
Hardness (CaCO3)	mg/L	380	1.0	9798513	370	1.0	9798513
Inorganics							
Total Ammonia-N	mg/L	0.062	0.050	9804574	0.10	0.050	9804574
Conductivity	umho/cm	690	1.0	9799871	620	1.0	9800535
Total Kjeldahl Nitrogen (TKN)	mg/L	0.88	0.20	9802456	0.55	0.10	9809646
Dissolved Organic Carbon	mg/L	12	0.40	9799204	8.0	0.40	9798990
pH	pH	7.95		9799872	8.07		9800539
Phenols-4AAP	mg/L	<0.0010	0.0010	9812569	<0.0010	0.0010	9812569
Dissolved Sulphate (SO4)	mg/L	32	1.0	9800518	2.0	1.0	9800525
Alkalinity (Total as CaCO3)	mg/L	340	1.0	9799867	350	1.0	9800532
Dissolved Chloride (Cl-)	mg/L	9.0	1.0	9800512	4.7	1.0	9800522
Nitrite (N)	mg/L	<0.010	0.010	9799880	<0.010	0.010	9800548
Nitrate (N)	mg/L	<0.10	0.10	9799880	<0.10	0.10	9800548
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	9799880	<0.10	0.10	9800548

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Bureau Veritas ID		AKIF46			AKIF47			AKIF48		
Sampling Date		2024/11/27			2024/11/27			2024/11/27		
COC Number		C#1018424-01-01			C#1018424-01-01			C#1018424-01-01		
	UNITS	OW4	RDL	QC Batch	OW5	RDL	QC Batch	OW6	RDL	QC Batch
Metals										
Dissolved Barium (Ba)	ug/L	130	2.0	9809233	94	2.0	9806382	86	2.0	9809233
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	9809233	<1.0	1.0	9806382	<1.0	1.0	9809233
Dissolved Boron (B)	ug/L	370	10	9809233	19	10	9806382	18	10	9809233
Dissolved Calcium (Ca)	ug/L	180000	200	9809233	62000	400	9806382	87000	1000	9809233
Dissolved Iron (Fe)	ug/L	<100	100	9809233	<100	100	9806382	<100	100	9809233
Dissolved Magnesium (Mg)	ug/L	32000	50	9809233	26000	50	9806382	28000	50	9809233
Dissolved Manganese (Mn)	ug/L	560	2.0	9809233	3.1	2.0	9806382	24	2.0	9809233
Dissolved Phosphorus (P)	ug/L	<100	100	9809233	<100	100	9806382	<100	100	9809233
Dissolved Potassium (K)	ug/L	17000	200	9809233	900	200	9806382	910	200	9809233
Dissolved Sodium (Na)	ug/L	25000	100	9809233	3300	100	9806382	6600	100	9809233

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		AKIF49	AKIF50	AKIF51	AKIF52		
Sampling Date		2024/11/27	2024/11/27	2024/11/27	2024/11/27		
COC Number		C#1018424-01-01	C#1018424-01-01	C#1018424-01-01	C#1018424-01-01		
	UNITS	OW11-16	OW12	OW13S	OW13I	RDL	QC Batch
Metals							
Dissolved Barium (Ba)	ug/L	24	79	110	87	2.0	9806382
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	9806382
Dissolved Boron (B)	ug/L	27	370	470	470	10	9806382
Dissolved Calcium (Ca)	ug/L	92000	67000	130000	120000	200	9806382
Dissolved Iron (Fe)	ug/L	<100	<100	<100	<100	100	9806382
Dissolved Magnesium (Mg)	ug/L	27000	48000	55000	55000	50	9806382
Dissolved Manganese (Mn)	ug/L	<2.0	<2.0	49	71	2.0	9806382
Dissolved Phosphorus (P)	ug/L	<100	<100	<100	<100	100	9806382
Dissolved Potassium (K)	ug/L	450	9500	25000	23000	200	9806382
Dissolved Sodium (Na)	ug/L	1400	5100	16000	16000	100	9806382

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Bureau Veritas ID		AKIF53			AKIF54		AKIF55		
Sampling Date		2024/11/27			2024/11/27		2024/11/27		
COC Number		C#1018424-01-01			C#1018424-01-01		C#1018424-01-01		
	UNITS	OW13D	RDL	QC Batch	OW15	QC Batch	OW16	RDL	QC Batch
Metals									
Dissolved Barium (Ba)	ug/L	96	2.0	9809233	85	9806382	84	2.0	9809233
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	9809233	<1.0	9806382	<1.0	1.0	9809233
Dissolved Boron (B)	ug/L	60	10	9809233	100	9806382	16	10	9809233
Dissolved Calcium (Ca)	ug/L	64000	1000	9809233	96000	9806382	99000	200	9809233
Dissolved Iron (Fe)	ug/L	<100	100	9809233	<100	9806382	<100	100	9809233
Dissolved Magnesium (Mg)	ug/L	25000	50	9809233	33000	9806382	29000	50	9809233
Dissolved Manganese (Mn)	ug/L	15	2.0	9809233	43	9806382	250	2.0	9809233
Dissolved Phosphorus (P)	ug/L	<100	100	9809233	<100	9806382	<100	100	9809233
Dissolved Potassium (K)	ug/L	1400	200	9809233	2600	9806382	700	200	9809233
Dissolved Sodium (Na)	ug/L	14000	100	9809233	6500	9806382	3200	100	9809233

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C4AQ362
Report Date: 2024/12/09

GEI Consultants
Client Project #: KINLOSS (224058-1)
Sampler Initials: BT

RESULTS OF ANALYSES OF SURFACE WATER

Bureau Veritas ID		AKIF56			AKIF56			AKIF57		
Sampling Date		2024/11/27			2024/11/27			2024/11/27		
COC Number		C#1018424-01-01			C#1018424-01-01			C#1018424-01-01		
	UNITS	SW1	RDL	QC Batch	SW1 Lab-Dup	RDL	QC Batch	SW2	RDL	QC Batch
Calculated Parameters										
Hardness (CaCO3)	mg/L	250	1.0	9797216				310	1.0	9798513
Inorganics										
Total Ammonia-N	mg/L	<0.050	0.050	9804566				<0.050	0.050	9804574
Conductivity	umho/cm	440	1.0	9800535				520	1.0	9799871
Total Kjeldahl Nitrogen (TKN)	mg/L	0.23	0.10	9809646				0.16	0.10	9809646
Dissolved Organic Carbon	mg/L	8.6	0.40	9799204				4.6	0.40	9799190
pH	pH	8.20		9800539				8.36		9799872
Phenols-4AAP	mg/L	<0.0010	0.0010	9812569				<0.0010	0.0010	9812569
Total Phosphorus	mg/L	<0.020	0.020	9808480				<0.020	0.020	9808480
Dissolved Sulphate (SO4)	mg/L	9.4	1.0	9800525	9.3	1.0	9800525	9.6	1.0	9800518
Alkalinity (Total as CaCO3)	mg/L	220	1.0	9800532				270	1.0	9799867
Dissolved Chloride (Cl-)	mg/L	7.1	1.0	9800522	6.8	1.0	9800522	7.5	1.0	9800512
Nitrite (N)	mg/L	<0.010	0.010	9800548				<0.010	0.010	9799880
Nitrate (N)	mg/L	<0.10	0.10	9800548				<0.10	0.10	9799880
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	9800548				<0.10	0.10	9799880

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		AKIF57		
Sampling Date		2024/11/27		
COC Number		C#1018424-01-01		
	UNITS	SW2 Lab-Dup	RDL	QC Batch
Inorganics				
Nitrite (N)	mg/L	<0.010	0.010	9799880
Nitrate (N)	mg/L	<0.10	0.10	9799880
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	9799880

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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ELEMENTS BY ATOMIC SPECTROSCOPY (SURFACE WATER)

Bureau Veritas ID		AKIF56	AKIF57		
Sampling Date		2024/11/27	2024/11/27		
COC Number		C#1018424-01-01	C#1018424-01-01		
	UNITS	SW1	SW2	RDL	QC Batch
Metals					
Total Barium (Ba)	ug/L	16	27	2.0	9807822
Total Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	9807822
Total Boron (B)	ug/L	<10	17	10	9807822
Total Calcium (Ca)	ug/L	63000	76000	200	9807822
Total Iron (Fe)	ug/L	150	<100	100	9807822
Total Magnesium (Mg)	ug/L	19000	23000	50	9807822
Total Manganese (Mn)	ug/L	50	14	2.0	9807822
Total Phosphorus (P)	ug/L	<100	<100	100	9807822
Total Potassium (K)	ug/L	1700	1500	200	9807822
Total Sodium (Na)	ug/L	2300	3200	100	9807822

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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TEST SUMMARY

Bureau Veritas ID: AKIF46 **Collected:** 2024/11/27
Sample ID: OW4 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9799867	N/A	2024/12/04	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800512	N/A	2024/12/03	Massarat Jan
Conductivity	AT	9799871	N/A	2024/12/04	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9798990	N/A	2024/12/03	Gyulshen Idriz
Hardness (calculated as CaCO3)		9798513	N/A	2024/12/06	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9809233	2024/12/05	2024/12/06	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	9804566	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9799880	N/A	2024/12/02	Chandra Nandlal
pH	AT	9799872	2024/12/02	2024/12/04	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/06	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800518	N/A	2024/12/03	Massarat Jan
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/09	Rajni Tyagi

Bureau Veritas ID: AKIF46 Dup **Collected:** 2024/11/27
Sample ID: OW4 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/06	Madhav Somani

Bureau Veritas ID: AKIF47 **Collected:** 2024/11/27
Sample ID: OW5 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9800532	N/A	2024/12/06	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800522	N/A	2024/12/04	Alina Dobreanu
Conductivity	AT	9800535	N/A	2024/12/06	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9798990	N/A	2024/12/03	Gyulshen Idriz
Hardness (calculated as CaCO3)		9798513	N/A	2024/12/05	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9806382	2024/12/04	2024/12/05	Gagandeep Rai
Total Ammonia-N	SKAL/NH4	9804566	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9800548	N/A	2024/12/02	Chandra Nandlal
pH	AT	9800539	2024/12/02	2024/12/06	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/06	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800525	N/A	2024/12/04	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/06	Rajni Tyagi

Bureau Veritas ID: AKIF47 Dup **Collected:** 2024/11/27
Sample ID: OW5 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrate & Nitrite as Nitrogen in Water	LACH	9800548	N/A	2024/12/02	Chandra Nandlal
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/06	Rajni Tyagi

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TEST SUMMARY

Bureau Veritas ID: AKIF48 **Collected:** 2024/11/27
Sample ID: OW6 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9799867	N/A	2024/12/04	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800512	N/A	2024/12/03	Massarat Jan
Conductivity	AT	9799871	N/A	2024/12/04	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9799885	N/A	2024/12/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		9798513	N/A	2024/12/06	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9809233	2024/12/05	2024/12/06	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	9804574	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9799880	N/A	2024/12/02	Chandra Nandlal
pH	AT	9799872	2024/12/02	2024/12/04	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9813456	N/A	2024/12/07	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800518	N/A	2024/12/03	Massarat Jan
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/09	Rajni Tyagi

Bureau Veritas ID: AKIF48 Dup **Collected:** 2024/11/27
Sample ID: OW6 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Phenols (4AAP)	TECH/PHEN	9813456	N/A	2024/12/07	Madhav Somani

Bureau Veritas ID: AKIF49 **Collected:** 2024/11/27
Sample ID: OW11-16 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9799867	N/A	2024/12/04	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800512	N/A	2024/12/03	Massarat Jan
Conductivity	AT	9799871	N/A	2024/12/04	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9798990	N/A	2024/12/03	Gyulshen Idriz
Hardness (calculated as CaCO3)		9798513	N/A	2024/12/05	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9806382	2024/12/04	2024/12/05	Gagandeep Rai
Total Ammonia-N	SKAL/NH4	9804574	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9799880	N/A	2024/12/02	Chandra Nandlal
pH	AT	9799872	2024/12/02	2024/12/04	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/06	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800518	N/A	2024/12/03	Massarat Jan
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/06	Rajni Tyagi

Bureau Veritas ID: AKIF50 **Collected:** 2024/11/27
Sample ID: OW12 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9800532	N/A	2024/12/06	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800522	N/A	2024/12/04	Alina Dobreanu

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TEST SUMMARY

Bureau Veritas ID: AKIF50 **Collected:** 2024/11/27
Sample ID: OW12 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	9800535	N/A	2024/12/06	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9799190	N/A	2024/12/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		9798513	N/A	2024/12/05	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9806382	2024/12/04	2024/12/05	Gagandeep Rai
Total Ammonia-N	SKAL/NH4	9804574	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9800548	N/A	2024/12/02	Chandra Nandlal
pH	AT	9800539	2024/12/02	2024/12/06	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/06	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800525	N/A	2024/12/04	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/06	Rajni Tyagi

Bureau Veritas ID: AKIF51 **Collected:** 2024/11/27
Sample ID: OW13S **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9799867	N/A	2024/12/04	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800512	N/A	2024/12/03	Massarat Jan
Conductivity	AT	9799871	N/A	2024/12/04	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9799190	N/A	2024/12/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		9798513	N/A	2024/12/05	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9806382	2024/12/04	2024/12/05	Gagandeep Rai
Total Ammonia-N	SKAL/NH4	9804574	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9799880	N/A	2024/12/02	Chandra Nandlal
pH	AT	9799872	2024/12/02	2024/12/04	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/06	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800518	N/A	2024/12/03	Massarat Jan
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/09	Rajni Tyagi

Bureau Veritas ID: AKIF52 **Collected:** 2024/11/27
Sample ID: OW13I **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9800532	N/A	2024/12/06	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800522	N/A	2024/12/04	Alina Dobreanu
Conductivity	AT	9800535	N/A	2024/12/06	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9799190	N/A	2024/12/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		9798513	N/A	2024/12/05	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9806382	2024/12/04	2024/12/05	Gagandeep Rai
Total Ammonia-N	SKAL/NH4	9804566	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9800548	N/A	2024/12/02	Chandra Nandlal
pH	AT	9800539	2024/12/02	2024/12/06	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/06	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800525	N/A	2024/12/04	Alina Dobreanu

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TEST SUMMARY

Bureau Veritas ID: AKIF52 **Collected:** 2024/11/27
Sample ID: OW13I **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/09	Rajni Tyagi

Bureau Veritas ID: AKIF53 **Collected:** 2024/11/27
Sample ID: OW13D **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9799867	N/A	2024/12/04	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800522	N/A	2024/12/04	Alina Dobreanu
Conductivity	AT	9799871	N/A	2024/12/04	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9799204	N/A	2024/12/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		9798513	N/A	2024/12/06	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9809233	2024/12/05	2024/12/06	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	9804574	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9799880	N/A	2024/12/02	Chandra Nandlal
pH	AT	9799872	2024/12/02	2024/12/04	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/06	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800525	N/A	2024/12/04	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/06	Rajni Tyagi

Bureau Veritas ID: AKIF54 **Collected:** 2024/11/27
Sample ID: OW15 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9799867	N/A	2024/12/04	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800512	N/A	2024/12/03	Massarat Jan
Conductivity	AT	9799871	N/A	2024/12/04	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9799204	N/A	2024/12/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		9798513	N/A	2024/12/05	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9806382	2024/12/04	2024/12/05	Gagandeep Rai
Total Ammonia-N	SKAL/NH4	9804574	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9799880	N/A	2024/12/02	Chandra Nandlal
pH	AT	9799872	2024/12/02	2024/12/04	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/06	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800518	N/A	2024/12/03	Massarat Jan
Total Kjeldahl Nitrogen in Water	SKAL	9802456	2024/12/03	2024/12/04	Rajni Tyagi

Bureau Veritas ID: AKIF55 **Collected:** 2024/11/27
Sample ID: OW16 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9800532	N/A	2024/12/06	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800522	N/A	2024/12/04	Alina Dobreanu

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TEST SUMMARY

Bureau Veritas ID: AKIF55 **Collected:** 2024/11/27
Sample ID: OW16 **Shipped:**
Matrix: Ground Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	9800535	N/A	2024/12/06	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9798990	N/A	2024/12/03	Gyulshen Idriz
Hardness (calculated as CaCO3)		9798513	N/A	2024/12/06	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9809233	2024/12/05	2024/12/06	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	9804574	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9800548	N/A	2024/12/02	Chandra Nandlal
pH	AT	9800539	2024/12/02	2024/12/06	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/06	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800525	N/A	2024/12/04	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/06	Rajni Tyagi

Bureau Veritas ID: AKIF56 **Collected:** 2024/11/27
Sample ID: SW1 **Shipped:**
Matrix: Surface Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9800532	N/A	2024/12/06	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800522	N/A	2024/12/04	Alina Dobreanu
Conductivity	AT	9800535	N/A	2024/12/06	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9799204	N/A	2024/12/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		9797216	N/A	2024/12/04	Automated Statchk
Total Metals Analysis by ICPMS	ICP/MS	9807822	2024/12/05	2024/12/05	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	9804566	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9800548	N/A	2024/12/02	Chandra Nandlal
pH	AT	9800539	2024/12/02	2024/12/06	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/07	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800525	N/A	2024/12/04	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/06	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9808480	2024/12/05	2024/12/06	Sachi Patel

Bureau Veritas ID: AKIF56 Dup **Collected:** 2024/11/27
Sample ID: SW1 **Shipped:**
Matrix: Surface Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	SKAL	9800522	N/A	2024/12/04	Alina Dobreanu
Sulphate by Automated Turbidimetry	SKAL	9800525	N/A	2024/12/04	Alina Dobreanu

Bureau Veritas ID: AKIF57 **Collected:** 2024/11/27
Sample ID: SW2 **Shipped:**
Matrix: Surface Water **Received:** 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9799867	N/A	2024/12/04	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9800512	N/A	2024/12/03	Massarat Jan

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TEST SUMMARY

Bureau Veritas ID: AKIF57
Sample ID: SW2
Matrix: Surface Water

Collected: 2024/11/27
Shipped:
Received: 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	9799871	N/A	2024/12/04	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9799190	N/A	2024/12/02	Gyulshen Idriz
Hardness (calculated as CaCO3)		9798513	N/A	2024/12/04	Automated Statchk
Total Metals Analysis by ICPMS	ICP/MS	9807822	2024/12/05	2024/12/05	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	9804574	N/A	2024/12/04	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9799880	N/A	2024/12/02	Chandra Nandlal
pH	AT	9799872	2024/12/02	2024/12/04	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9812569	N/A	2024/12/07	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9800518	N/A	2024/12/03	Massarat Jan
Total Kjeldahl Nitrogen in Water	SKAL	9809646	2024/12/05	2024/12/06	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9808480	2024/12/05	2024/12/06	Sachi Patel

Bureau Veritas ID: AKIF57 Dup
Sample ID: SW2
Matrix: Surface Water

Collected: 2024/11/27
Shipped:
Received: 2024/11/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrate & Nitrite as Nitrogen in Water	LACH	9799880	N/A	2024/12/02	Chandra Nandlal

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.3°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9798990	Dissolved Organic Carbon	2024/12/03	93	80 - 120	96	80 - 120	<0.40	mg/L	11	20		
9799190	Dissolved Organic Carbon	2024/12/02	93	80 - 120	95	80 - 120	<0.40	mg/L	1.6	20		
9799204	Dissolved Organic Carbon	2024/12/02	93	80 - 120	94	80 - 120	<0.40	mg/L	4.6	20		
9799867	Alkalinity (Total as CaCO3)	2024/12/04			93	85 - 115	<1.0	mg/L	1.1	20		
9799871	Conductivity	2024/12/04			99	85 - 115	<1.0	umho/cm	0.44	10		
9799872	pH	2024/12/04			102	98 - 103			0.034	N/A		
9799880	Nitrate (N)	2024/12/02	93	80 - 120	99	80 - 120	<0.10	mg/L	NC	20		
9799880	Nitrite (N)	2024/12/02	102	80 - 120	106	80 - 120	<0.010	mg/L	NC	20		
9799885	Dissolved Organic Carbon	2024/12/02	95	80 - 120	97	80 - 120	<0.40	mg/L	7.1	20		
9800512	Dissolved Chloride (Cl-)	2024/12/03	82	80 - 120	94	80 - 120	<1.0	mg/L	5.0	20		
9800518	Dissolved Sulphate (SO4)	2024/12/03	NC	75 - 125	92	80 - 120	<1.0	mg/L	0.066	20		
9800522	Dissolved Chloride (Cl-)	2024/12/04	93	80 - 120	97	80 - 120	<1.0	mg/L	3.8	20		
9800525	Dissolved Sulphate (SO4)	2024/12/04	91	75 - 125	99	80 - 120	<1.0	mg/L	1.1	20		
9800532	Alkalinity (Total as CaCO3)	2024/12/06			98	85 - 115	<1.0	mg/L	0.027	20		
9800535	Conductivity	2024/12/06			101	85 - 115	<1.0	umho/cm	0.60	10		
9800539	pH	2024/12/06			102	98 - 103			0.077	N/A		
9800548	Nitrate (N)	2024/12/02	93	80 - 120	98	80 - 120	<0.10	mg/L	NC	20		
9800548	Nitrite (N)	2024/12/02	104	80 - 120	107	80 - 120	<0.010	mg/L	NC	20		
9802456	Total Kjeldahl Nitrogen (TKN)	2024/12/03	99	80 - 120	100	80 - 120	<0.10	mg/L	3.7	20	103	80 - 120
9804566	Total Ammonia-N	2024/12/04	95	75 - 125	99	80 - 120	<0.050	mg/L	2.0	20		
9804574	Total Ammonia-N	2024/12/04	89	75 - 125	99	80 - 120	<0.050	mg/L	0.34	20		
9806382	Dissolved Barium (Ba)	2024/12/05	101	80 - 120	101	80 - 120	<2.0	ug/L	4.8	20		
9806382	Dissolved Bismuth (Bi)	2024/12/05	99	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
9806382	Dissolved Boron (B)	2024/12/05	99	80 - 120	98	80 - 120	<10	ug/L	7.7	20		
9806382	Dissolved Calcium (Ca)	2024/12/05	NC	80 - 120	98	80 - 120	<200	ug/L	5.2	20		
9806382	Dissolved Iron (Fe)	2024/12/05	102	80 - 120	102	80 - 120	<100	ug/L	NC	20		
9806382	Dissolved Magnesium (Mg)	2024/12/05	96	80 - 120	98	80 - 120	<50	ug/L	4.2	20		
9806382	Dissolved Manganese (Mn)	2024/12/05	101	80 - 120	100	80 - 120	<2.0	ug/L	7.3	20		
9806382	Dissolved Phosphorus (P)	2024/12/05	105	80 - 120	102	80 - 120	<100	ug/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9806382	Dissolved Potassium (K)	2024/12/05	98	80 - 120	97	80 - 120	<200	ug/L	3.5	20		
9806382	Dissolved Sodium (Na)	2024/12/05	96	80 - 120	98	80 - 120	<100	ug/L	3.3	20		
9807822	Total Barium (Ba)	2024/12/05	92	80 - 120	92	80 - 120	<2.0	ug/L	NC	20		
9807822	Total Bismuth (Bi)	2024/12/05	91	80 - 120	92	80 - 120	<1.0	ug/L	NC	20		
9807822	Total Boron (B)	2024/12/05	95	80 - 120	94	80 - 120	<10	ug/L	NC	20		
9807822	Total Calcium (Ca)	2024/12/05	95	80 - 120	93	80 - 120	<200	ug/L	NC	20		
9807822	Total Iron (Fe)	2024/12/05	95	80 - 120	96	80 - 120	<100	ug/L	NC	20		
9807822	Total Magnesium (Mg)	2024/12/05	98	80 - 120	97	80 - 120	<50	ug/L	NC	20		
9807822	Total Manganese (Mn)	2024/12/05	94	80 - 120	95	80 - 120	<2.0	ug/L	NC	20		
9807822	Total Phosphorus (P)	2024/12/05	94	80 - 120	92	80 - 120	<100	ug/L	NC	20		
9807822	Total Potassium (K)	2024/12/05	96	80 - 120	96	80 - 120	<200	ug/L	NC	20		
9807822	Total Sodium (Na)	2024/12/05	96	80 - 120	97	80 - 120	<100	ug/L	NC	20		
9808480	Total Phosphorus	2024/12/06	92	80 - 120	101	80 - 120	<0.020	mg/L	3.4	20	104	80 - 120
9809233	Dissolved Barium (Ba)	2024/12/06	92	80 - 120	94	80 - 120	<2.0	ug/L				
9809233	Dissolved Bismuth (Bi)	2024/12/06	89	80 - 120	95	80 - 120	<1.0	ug/L				
9809233	Dissolved Boron (B)	2024/12/06	86	80 - 120	90	80 - 120	<10	ug/L				
9809233	Dissolved Calcium (Ca)	2024/12/06	93	80 - 120	97	80 - 120	<200	ug/L				
9809233	Dissolved Iron (Fe)	2024/12/06	94	80 - 120	93	80 - 120	<100	ug/L				
9809233	Dissolved Magnesium (Mg)	2024/12/06	86	80 - 120	96	80 - 120	<50	ug/L				
9809233	Dissolved Manganese (Mn)	2024/12/06	92	80 - 120	92	80 - 120	<2.0	ug/L				
9809233	Dissolved Phosphorus (P)	2024/12/06	95	80 - 120	101	80 - 120	<100	ug/L				
9809233	Dissolved Potassium (K)	2024/12/06	95	80 - 120	96	80 - 120	<200	ug/L				
9809233	Dissolved Sodium (Na)	2024/12/06	95	80 - 120	94	80 - 120	<100	ug/L				
9809646	Total Kjeldahl Nitrogen (TKN)	2024/12/06	97	80 - 120	101	80 - 120	<0.10	mg/L	4.3	20	100	80 - 120
9812569	Phenols-4AAP	2024/12/06	100	80 - 120	103	80 - 120	<0.0010	mg/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9813456	Phenols-4AAP	2024/12/07	102	80 - 120	103	80 - 120	<0.0010	mg/L	NC	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

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Your Project #: KINLOSS (224058-1)
Your C.O.C. #: C#987613-01-01

Attention: Reporting Contacts

GM BluePlan Engineering Limited
1260 - 2nd Ave E
Unit 1
Owen Sound, ON
CANADA N4K 2J3

Report Date: 2024/05/16
Report #: R8152206
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4D9337
Received: 2024/05/09, 09:35

Sample Matrix: Water
Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	13	N/A	2024/05/15	CAM SOP-00448	SM 24 2320 B m
Alkalinity	1	N/A	2024/05/16	CAM SOP-00448	SM 24 2320 B m
Chloride by Automated Colourimetry	4	N/A	2024/05/13	CAM SOP-00463	SM 24 4500-Cl E m
Chloride by Automated Colourimetry	10	N/A	2024/05/16	CAM SOP-00463	SM 24 4500-Cl E m
Conductivity	13	N/A	2024/05/15	CAM SOP-00414	SM 24 2510 m
Conductivity	1	N/A	2024/05/16	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	13	N/A	2024/05/10	CAM SOP-00446	SM 24 5310 B m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2024/05/11	CAM SOP-00446	SM 24 5310 B m
Hardness (calculated as CaCO3)	14	N/A	2024/05/15	CAM SOP 00102/00408/00447	SM 2340 B
Lab Filtered Metals by ICPMS	12	2024/05/13	2024/05/15	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	2	2024/05/14	2024/05/14	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	14	N/A	2024/05/14	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2024/05/10	CAM SOP-00440	SM 24 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (2)	13	N/A	2024/05/11	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	13	2024/05/10	2024/05/15	CAM SOP-00413	SM 24th - 4500H+ B
pH (3)	1	2024/05/10	2024/05/16	CAM SOP-00413	SM 24th - 4500H+ B
Phenols (4AAP)	14	N/A	2024/05/10	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Turbidimetry	4	N/A	2024/05/13	CAM SOP-00464	SM 24 4500-SO42- E m
Sulphate by Automated Turbidimetry	10	N/A	2024/05/16	CAM SOP-00464	SM 24 4500-SO42- E m
Total Kjeldahl Nitrogen in Water	9	2024/05/10	2024/05/13	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	5	2024/05/10	2024/05/14	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	2	2024/05/10	2024/05/15	CAM SOP-00407	SM 24 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are

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Your Project #: KINLOSS (224058-1)
Your C.O.C. #: C#987613-01-01

Attention: Reporting Contacts

GM BluePlan Engineering Limited
1260 - 2nd Ave E
Unit 1
Owen Sound, ON
CANADA N4K 2J3

Report Date: 2024/05/16
Report #: R8152206
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4D9337

Received: 2024/05/09, 09:35

reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(3) "The CCME method and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) holding time. Bureau Veritas endeavors to analyze samples as soon as possible after receipt."

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Ashton Gibson, Project Manager
Email: Ashton.Gibson@bureauveritas.com
Phone# (905)817-5765

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Bureau Veritas Job #: C4D9337
Report Date: 2024/05/16

GM BluePlan Engineering Limited
Client Project #: KINLOSS (224058-1)

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		ZCX292	ZCX293	ZCX294	ZCX295		
Sampling Date		2024/05/08	2024/05/08	2024/05/08	2024/05/08		
COC Number		C#987613-01-01	C#987613-01-01	C#987613-01-01	C#987613-01-01		
	UNITS	OW4	OW5	OW6	OW7	RDL	QC Batch
Calculated Parameters							
Hardness (CaCO3)	mg/L	400	420	250	280	1.0	9384627
Inorganics							
Total Ammonia-N	mg/L	<0.050	<0.050	0.19	<0.050	0.050	9386196
Conductivity	umho/cm	810	1000	530	500	1.0	9386223
Total Kjeldahl Nitrogen (TKN)	mg/L	0.10	0.10	0.39	<0.10	0.10	9386710
Dissolved Organic Carbon	mg/L	1.7	2.2	0.94	0.68	0.40	9385791
pH	pH	8.17	8.17	8.17	8.19		9386224
Phenols-4AAP	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9386779
Dissolved Sulphate (SO4)	mg/L	110	30	15	2.1	1.0	9387252
Alkalinity (Total as CaCO3)	mg/L	300	340	260	270	1.0	9386222
Dissolved Chloride (Cl-)	mg/L	12	98	3.2	1.6	1.0	9387242
Nitrite (N)	mg/L	<0.010	<0.010	<0.010	<0.010	0.010	9387087
Nitrate (N)	mg/L	<0.10	0.15	<0.10	0.29	0.10	9387087
Nitrate + Nitrite (N)	mg/L	<0.10	0.15	<0.10	0.29	0.10	9387087

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C4D9337
Report Date: 2024/05/16

GM BluePlan Engineering Limited
Client Project #: KINLOSS (224058-1)

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		ZCX295			ZCX296			ZCX297		
Sampling Date		2024/05/08			2024/05/08			2024/05/08		
COC Number		C#987613-01-01			C#987613-01-01			C#987613-01-01		
	UNITS	OW7 Lab-Dup	RDL	QC Batch	OW11-16	RDL	QC Batch	OW12	RDL	QC Batch
Calculated Parameters										
Hardness (CaCO3)	mg/L				380	1.0	9384627	370	1.0	9384627
Inorganics										
Total Ammonia-N	mg/L				<0.050	0.050	9386196	<0.050	0.050	9386196
Conductivity	umho/cm	510	1.0	9386223	620	1.0	9386223	690	1.0	9386223
Total Kjeldahl Nitrogen (TKN)	mg/L				<0.20 (1)	0.20	9386710	0.11	0.10	9386710
Dissolved Organic Carbon	mg/L				0.50	0.40	9385791	1.0	0.40	9385791
pH	pH	8.16		9386224	7.95		9386224	8.17		9386224
Phenols-4AAP	mg/L				<0.0010	0.0010	9386779	<0.0010	0.0010	9386779
Dissolved Sulphate (SO4)	mg/L				3.5	1.0	9387252	49	2.0	9387166
Alkalinity (Total as CaCO3)	mg/L	270	1.0	9386222	310	1.0	9386222	320	1.0	9386222
Dissolved Chloride (Cl-)	mg/L				2.6	1.0	9387242	2.1	1.0	9387160
Nitrite (N)	mg/L				<0.010	0.010	9387087	<0.010	0.010	9387087
Nitrate (N)	mg/L				4.96	0.10	9387087	0.35	0.10	9387087
Nitrate + Nitrite (N)	mg/L				4.96	0.10	9387087	0.35	0.10	9387087

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Due to a high concentration of NOx, the sample required dilution. The detection limit was adjusted accordingly.

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		ZCX298		ZCX299			ZCX300		
Sampling Date		2024/05/08		2024/05/08			2024/05/08		
COC Number		C#987613-01-01		C#987613-01-01			C#987613-01-01		
	UNITS	OW13S	QC Batch	OW13I	RDL	QC Batch	OW13D	RDL	QC Batch
Calculated Parameters									
Hardness (CaCO3)	mg/L	460	9384627	590	1.0	9384627	220	1.0	9384627
Inorganics									
Total Ammonia-N	mg/L	3.0	9386196	5.2	0.050	9386196	0.058	0.050	9386196
Conductivity	umho/cm	900	9386223	1000	1.0	9385804	540	1.0	9386223
Total Kjeldahl Nitrogen (TKN)	mg/L	3.4	9386710	5.7	0.20	9386710	0.15	0.10	9386710
Dissolved Organic Carbon	mg/L	2.4	9385791	3.1	0.40	9385791	0.68	0.40	9385791
pH	pH	7.98	9386224	7.91		9385807	8.24		9386224
Phenols-4AAP	mg/L	<0.0010	9386779	<0.0010	0.0010	9386779	<0.0010	0.0010	9386779
Dissolved Sulphate (SO4)	mg/L	68	9387252	78	1.0	9387252	42	1.0	9387252
Alkalinity (Total as CaCO3)	mg/L	400	9386222	450	1.0	9385794	230	1.0	9386222
Dissolved Chloride (Cl-)	mg/L	7.1	9387242	14	1.0	9387242	6.5	1.0	9387242
Nitrite (N)	mg/L	0.049	9387087	<0.010	0.010	9385882	<0.010	0.010	9387087
Nitrate (N)	mg/L	0.80	9387087	<0.10	0.10	9385882	0.11	0.10	9387087
Nitrate + Nitrite (N)	mg/L	0.85	9387087	<0.10	0.10	9385882	0.11	0.10	9387087

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		ZCX301			ZCX302	ZCX303		
Sampling Date		2024/05/08			2024/05/08	2024/05/08		
COC Number		C#987613-01-01			C#987613-01-01	C#987613-01-01		
	UNITS	OW14-14	RDL	QC Batch	OW15	OW16	RDL	QC Batch
Calculated Parameters								
Hardness (CaCO3)	mg/L	670	1.0	9384627	570	310	1.0	9384627
Inorganics								
Total Ammonia-N	mg/L	2.8	0.050	9386196	0.16	<0.050	0.050	9386196
Conductivity	umho/cm	1300	1.0	9386223	1200	590	1.0	9386223
Total Kjeldahl Nitrogen (TKN)	mg/L	3.6	0.10	9386710	1.0	0.73	0.20	9386710
Dissolved Organic Carbon	mg/L	23	0.40	9385791	3.8	1.5	0.40	9385791
pH	pH	7.55		9386224	8.03	8.09		9386224
Phenols-4AAP	mg/L	0.0015	0.0010	9386779	<0.0010	<0.0010	0.0010	9386779
Dissolved Sulphate (SO4)	mg/L	56	1.0	9387252	180	22	1.0	9387166
Alkalinity (Total as CaCO3)	mg/L	630	1.0	9386222	430	280	1.0	9386222
Dissolved Chloride (Cl-)	mg/L	34	1.0	9387242	39	7.5	1.0	9387160
Nitrite (N)	mg/L	<0.010	0.010	9387087	<0.010	0.020	0.010	9387087
Nitrate (N)	mg/L	0.11	0.10	9387087	<0.10	0.26	0.10	9387087
Nitrate + Nitrite (N)	mg/L	0.11	0.10	9387087	<0.10	0.28	0.10	9387087

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		ZCX304			ZCX304			ZCX305		
Sampling Date		2024/05/08			2024/05/08			2024/05/08		
COC Number		C#987613-01-01			C#987613-01-01			C#987613-01-01		
	UNITS	SW1	RDL	QC Batch	SW1 Lab-Dup	RDL	QC Batch	SW2	RDL	QC Batch
Calculated Parameters										
Hardness (CaCO3)	mg/L	350	1.0	9384627				290	1.0	9384627
Inorganics										
Total Ammonia-N	mg/L	<0.050	0.050	9386196				<0.050	0.050	9386196
Conductivity	umho/cm	610	1.0	9386223				510	1.0	9386223
Total Kjeldahl Nitrogen (TKN)	mg/L	0.28	0.10	9386710	0.29	0.10	9386710	0.17	0.10	9386710
Dissolved Organic Carbon	mg/L	4.5	0.40	9386413				3.9	0.40	9385791
pH	pH	8.33		9386224				8.40		9386224
Phenols-4AAP	mg/L	<0.0010	0.0010	9386779				<0.0010	0.0010	9386779
Total Phosphorus	mg/L	<0.020	0.020	9386749	<0.020	0.020	9386749	<0.020	0.020	9386749
Dissolved Sulphate (SO4)	mg/L	7.6	1.0	9387252				4.1	1.0	9387166
Alkalinity (Total as CaCO3)	mg/L	310	1.0	9386222				270	1.0	9386222
Dissolved Chloride (Cl-)	mg/L	12	1.0	9387242				4.6	1.0	9387160
Nitrite (N)	mg/L	<0.010	0.010	9387087				<0.010	0.010	9387087
Nitrate (N)	mg/L	0.19	0.10	9387087				<0.10	0.10	9387087
Nitrate + Nitrite (N)	mg/L	0.19	0.10	9387087				<0.10	0.10	9387087

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		ZCX305		
Sampling Date		2024/05/08		
COC Number		C#987613-01-01		
	UNITS	SW2 Lab-Dup	RDL	QC Batch
Inorganics				
Total Ammonia-N	mg/L	<0.050	0.050	9386196
Dissolved Sulphate (SO4)	mg/L	3.8	1.0	9387166
Dissolved Chloride (Cl-)	mg/L	4.5	1.0	9387160

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		ZCX292	ZCX293		ZCX294		ZCX295		
Sampling Date		2024/05/08	2024/05/08		2024/05/08		2024/05/08		
COC Number		C#987613-01-01	C#987613-01-01		C#987613-01-01		C#987613-01-01		
	UNITS	OW4	OW5	RDL	OW6	RDL	OW7	RDL	QC Batch
Metals									
Dissolved Barium (Ba)	ug/L	74	98	2.0	66	2.0	10	2.0	9390355
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	9390355
Dissolved Boron (B)	ug/L	55	130	10	26	10	<10	10	9390355
Dissolved Calcium (Ca)	ug/L	90000	87000	200	63000	1000	76000	200	9390355
Dissolved Iron (Fe)	ug/L	<100	<100	100	<100	100	<100	100	9390355
Dissolved Magnesium (Mg)	ug/L	43000	49000	50	23000	50	22000	50	9390355
Dissolved Manganese (Mn)	ug/L	<2.0	<2.0	2.0	6.0	2.0	<2.0	2.0	9390355
Dissolved Phosphorus (P)	ug/L	<100	<100	100	<100	100	<100	100	9390355
Dissolved Potassium (K)	ug/L	1300	1500	200	790	200	560	200	9390355
Dissolved Sodium (Na)	ug/L	17000	38000	100	9000	100	1400	100	9390355

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		ZCX296	ZCX297	ZCX298	ZCX299		ZCX300		
Sampling Date		2024/05/08	2024/05/08	2024/05/08	2024/05/08		2024/05/08		
COC Number		C#987613-01-01	C#987613-01-01	C#987613-01-01	C#987613-01-01		C#987613-01-01		
	UNITS	OW11-16	OW12	OW13S	OW13I	RDL	OW13D	RDL	QC Batch
Metals									
Dissolved Barium (Ba)	ug/L	27	71	86	86	2.0	75	2.0	9390355
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	1.0	9390355
Dissolved Boron (B)	ug/L	<10	400	420	540	10	40	10	9390355
Dissolved Calcium (Ca)	ug/L	100000	68000	110000	130000	200	53000	1000	9390355
Dissolved Iron (Fe)	ug/L	<100	<100	<100	<100	100	<100	100	9390355
Dissolved Magnesium (Mg)	ug/L	30000	50000	45000	63000	50	21000	50	9390355
Dissolved Manganese (Mn)	ug/L	<2.0	<2.0	10	330	2.0	18	2.0	9390355
Dissolved Phosphorus (P)	ug/L	<100	<100	<100	<100	100	<100	100	9390355
Dissolved Potassium (K)	ug/L	490	8600	19000	21000	200	790	200	9390355
Dissolved Sodium (Na)	ug/L	1700	5600	10000	22000	100	13000	100	9390355

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		ZCX301		ZCX302		ZCX303			ZCX304		
Sampling Date		2024/05/08		2024/05/08		2024/05/08			2024/05/08		
COC Number		C#987613-01-01		C#987613-01-01		C#987613-01-01			C#987613-01-01		
	UNITS	OW14-14	RDL	OW15	RDL	OW16	RDL	QC Batch	SW1	RDL	QC Batch
Metals											
Dissolved Barium (Ba)	ug/L	51	2.0	150	2.0	89	2.0	9390355			
Total Barium (Ba)	ug/L								20	2.0	9391144
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	9390355			
Total Bismuth (Bi)	ug/L								<1.0	1.0	9391144
Dissolved Boron (B)	ug/L	170	10	270	10	11	10	9390355			
Total Boron (B)	ug/L								18	10	9391144
Dissolved Calcium (Ca)	ug/L	210000	200	130000	1000	84000	200	9390355			
Total Calcium (Ca)	ug/L								84000	200	9391144
Dissolved Iron (Fe)	ug/L	<100	100	<100	100	<100	100	9390355			
Total Iron (Fe)	ug/L								410	100	9391144
Dissolved Magnesium (Mg)	ug/L	34000	50	60000	50	25000	50	9390355			
Total Magnesium (Mg)	ug/L								26000	50	9391144
Dissolved Manganese (Mn)	ug/L	130	2.0	220	2.0	200	2.0	9390355			
Total Manganese (Mn)	ug/L								150	2.0	9391144
Dissolved Phosphorus (P)	ug/L	<100	100	<100	100	<100	100	9390355			
Total Phosphorus (P)	ug/L								<100	100	9391144
Dissolved Potassium (K)	ug/L	15000	200	2300	200	1100	200	9390355			
Total Potassium (K)	ug/L								2300	200	9391144
Dissolved Sodium (Na)	ug/L	25000	100	29000	100	2900	100	9390355			
Total Sodium (Na)	ug/L								9600	100	9391144

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		ZCX305		
Sampling Date		2024/05/08		
COC Number		C#987613-01-01		
	UNITS	SW2	RDL	QC Batch
Metals				
Total Barium (Ba)	ug/L	31	2.0	9391144
Total Bismuth (Bi)	ug/L	<1.0	1.0	9391144
Total Boron (B)	ug/L	15	10	9391144
Total Calcium (Ca)	ug/L	79000	200	9391144
Total Iron (Fe)	ug/L	270	100	9391144
Total Magnesium (Mg)	ug/L	23000	50	9391144
Total Manganese (Mn)	ug/L	38	2.0	9391144
Total Phosphorus (P)	ug/L	<100	100	9391144
Total Potassium (K)	ug/L	910	200	9391144
Total Sodium (Na)	ug/L	6400	100	9391144

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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TEST SUMMARY

Bureau Veritas ID: ZCX292
Sample ID: OW4
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387242	N/A	2024/05/16	Geetee Noorzaad
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387252	N/A	2024/05/16	Geetee Noorzaad
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/13	Rajni Tyagi

Bureau Veritas ID: ZCX293
Sample ID: OW5
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387242	N/A	2024/05/16	Geetee Noorzaad
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387252	N/A	2024/05/16	Geetee Noorzaad
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/13	Rajni Tyagi

Bureau Veritas ID: ZCX294
Sample ID: OW6
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387242	N/A	2024/05/16	Geetee Noorzaad
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal

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TEST SUMMARY

Bureau Veritas ID: ZCX294
Sample ID: OW6
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphate by Automated Turbidimetry	SKAL	9387252	N/A	2024/05/16	Geetee Noorzaad
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/13	Rajni Tyagi

Bureau Veritas ID: ZCX295
Sample ID: OW7
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387242	N/A	2024/05/16	Geetee Noorzaad
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387252	N/A	2024/05/16	Geetee Noorzaad
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/13	Rajni Tyagi

Bureau Veritas ID: ZCX295 Dup
Sample ID: OW7
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil

Bureau Veritas ID: ZCX296
Sample ID: OW11-16
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387242	N/A	2024/05/16	Geetee Noorzaad
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387252	N/A	2024/05/16	Geetee Noorzaad

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TEST SUMMARY

Bureau Veritas ID: ZCX296
Sample ID: OW11-16
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/14	Rajni Tyagi

Bureau Veritas ID: ZCX297
Sample ID: OW12
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387160	N/A	2024/05/13	Alina Dobreanu
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387166	N/A	2024/05/13	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/13	Rajni Tyagi

Bureau Veritas ID: ZCX298
Sample ID: OW13S
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387242	N/A	2024/05/16	Geetee Noorzaad
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387252	N/A	2024/05/16	Geetee Noorzaad
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/14	Rajni Tyagi

Bureau Veritas ID: ZCX299
Sample ID: OW13I
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9385794	N/A	2024/05/16	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387242	N/A	2024/05/16	Geetee Noorzaad
Conductivity	AT	9385804	N/A	2024/05/16	Nachiketa Gohil

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TEST SUMMARY

Bureau Veritas ID: ZCX299
Sample ID: OW13I
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9385882	N/A	2024/05/10	Jinal Chavda
pH	AT	9385807	2024/05/10	2024/05/16	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387252	N/A	2024/05/16	Geetee Noorzaad
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/14	Rajni Tyagi

Bureau Veritas ID: ZCX300
Sample ID: OW13D
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387242	N/A	2024/05/16	Geetee Noorzaad
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387252	N/A	2024/05/16	Geetee Noorzaad
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/13	Rajni Tyagi

Bureau Veritas ID: ZCX301
Sample ID: OW14-14
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387242	N/A	2024/05/16	Geetee Noorzaad
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387252	N/A	2024/05/16	Geetee Noorzaad
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/13	Rajni Tyagi

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TEST SUMMARY

Bureau Veritas ID: ZCX302
Sample ID: OW15
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387160	N/A	2024/05/13	Alina Dobreanu
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387166	N/A	2024/05/13	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/14	Rajni Tyagi

Bureau Veritas ID: ZCX303
Sample ID: OW16
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387160	N/A	2024/05/13	Alina Dobreanu
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	9390355	2024/05/13	2024/05/15	Azita Fazaeli
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387166	N/A	2024/05/13	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/14	Rajni Tyagi

Bureau Veritas ID: ZCX304
Sample ID: SW1
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387242	N/A	2024/05/16	Geetee Noorzaad
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9386413	N/A	2024/05/11	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Total Metals Analysis by ICPMS	ICP/MS	9391144	2024/05/14	2024/05/14	Nan Raykha
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal

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TEST SUMMARY

Bureau Veritas ID: ZCX304
Sample ID: SW1
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphate by Automated Turbidimetry	SKAL	9387252	N/A	2024/05/16	Geetee Noorzaad
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9386749	2024/05/10	2024/05/15	Muskan

Bureau Veritas ID: ZCX304 Dup
Sample ID: SW1
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9386749	2024/05/10	2024/05/15	Muskan

Bureau Veritas ID: ZCX305
Sample ID: SW2
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9386222	N/A	2024/05/15	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9387160	N/A	2024/05/13	Alina Dobreanu
Conductivity	AT	9386223	N/A	2024/05/15	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9385791	N/A	2024/05/10	Gyulshen Idriz
Hardness (calculated as CaCO3)		9384627	N/A	2024/05/15	Automated Statchk
Total Metals Analysis by ICPMS	ICP/MS	9391144	2024/05/14	2024/05/14	Nan Raykha
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Nitrate & Nitrite as Nitrogen in Water	LACH	9387087	N/A	2024/05/11	Jinal Chavda
pH	AT	9386224	2024/05/10	2024/05/15	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9386779	N/A	2024/05/10	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9387166	N/A	2024/05/13	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	9386710	2024/05/10	2024/05/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9386749	2024/05/10	2024/05/15	Muskan

Bureau Veritas ID: ZCX305 Dup
Sample ID: SW2
Matrix: Water

Collected: 2024/05/08
Shipped:
Received: 2024/05/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	SKAL	9387160	N/A	2024/05/13	Alina Dobreanu
Total Ammonia-N	LACH/NH4	9386196	N/A	2024/05/14	Massarat Jan
Sulphate by Automated Turbidimetry	SKAL	9387166	N/A	2024/05/13	Alina Dobreanu

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.3°C
Package 2	6.3°C
Package 3	4.7°C
Package 4	4.7°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9385791	Dissolved Organic Carbon	2024/05/10	95	80 - 120	97	80 - 120	<0.40	mg/L	0.52	20		
9385794	Alkalinity (Total as CaCO3)	2024/05/16			96	85 - 115	<1.0	mg/L	5.3	20		
9385804	Conductivity	2024/05/16			101	85 - 115	<1.0	umho/cm				
9385807	pH	2024/05/16			102	98 - 103			0.28	N/A		
9385882	Nitrate (N)	2024/05/10	93	80 - 120	99	80 - 120	<0.10	mg/L	3.3	20		
9385882	Nitrite (N)	2024/05/10	100	80 - 120	101	80 - 120	<0.010	mg/L	1.8	20		
9386196	Total Ammonia-N	2024/05/14	99	75 - 125	100	80 - 120	<0.050	mg/L	NC	20		
9386222	Alkalinity (Total as CaCO3)	2024/05/15			95	85 - 115	<1.0	mg/L	2.8	20		
9386223	Conductivity	2024/05/15			102	85 - 115	<1.0	umho/cm	2.7	10		
9386224	pH	2024/05/15			102	98 - 103			0.31	N/A		
9386413	Dissolved Organic Carbon	2024/05/10	90	80 - 120	93	80 - 120	<0.40	mg/L	0.44	20		
9386710	Total Kjeldahl Nitrogen (TKN)	2024/05/13	103	80 - 120	98	80 - 120	<0.10	mg/L	3.5	20	98	80 - 120
9386749	Total Phosphorus	2024/05/15	93	80 - 120	99	80 - 120	<0.020	mg/L	NC	20	97	80 - 120
9386779	Phenols-4AAP	2024/05/10	104	80 - 120	104	80 - 120	<0.0010	mg/L	0	20		
9387087	Nitrate (N)	2024/05/11	92	80 - 120	96	80 - 120	<0.10	mg/L	NC	20		
9387087	Nitrite (N)	2024/05/11	98	80 - 120	100	80 - 120	<0.010	mg/L	NC	20		
9387160	Dissolved Chloride (Cl-)	2024/05/13	103	80 - 120	101	80 - 120	<1.0	mg/L	3.3	20		
9387166	Dissolved Sulphate (SO4)	2024/05/13	100	75 - 125	99	80 - 120	<1.0	mg/L	8.6	20		
9387242	Dissolved Chloride (Cl-)	2024/05/16	NC	80 - 120	93	80 - 120	<1.0	mg/L	2.6	20		
9387252	Dissolved Sulphate (SO4)	2024/05/16	NC	75 - 125	94	80 - 120	<1.0	mg/L	0.48	20		
9390355	Dissolved Barium (Ba)	2024/05/15	103	80 - 120	98	80 - 120	<2.0	ug/L	0.96	20		
9390355	Dissolved Bismuth (Bi)	2024/05/15	101	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
9390355	Dissolved Boron (B)	2024/05/15	109	80 - 120	101	80 - 120	<10	ug/L	2.2	20		
9390355	Dissolved Calcium (Ca)	2024/05/15	NC	80 - 120	102	80 - 120	<200	ug/L	4.2	20		
9390355	Dissolved Iron (Fe)	2024/05/15	107	80 - 120	102	80 - 120	<100	ug/L	NC	20		
9390355	Dissolved Magnesium (Mg)	2024/05/15	101	80 - 120	99	80 - 120	<50	ug/L	3.3	20		
9390355	Dissolved Manganese (Mn)	2024/05/15	104	80 - 120	99	80 - 120	<2.0	ug/L	NC	20		
9390355	Dissolved Phosphorus (P)	2024/05/15	109	80 - 120	98	80 - 120	<100	ug/L	NC	20		
9390355	Dissolved Potassium (K)	2024/05/15	105	80 - 120	103	80 - 120	<200	ug/L	5.7	20		
9390355	Dissolved Sodium (Na)	2024/05/15	101	80 - 120	100	80 - 120	<100	ug/L	0.79	20		

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			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9391144	Total Barium (Ba)	2024/05/14	97	80 - 120	97	80 - 120	<2.0	ug/L	6.2	20		
9391144	Total Bismuth (Bi)	2024/05/14	96	80 - 120	96	80 - 120	<1.0	ug/L	NC	20		
9391144	Total Boron (B)	2024/05/14	99	80 - 120	98	80 - 120	<10	ug/L	0.25	20		
9391144	Total Calcium (Ca)	2024/05/14	98	80 - 120	99	80 - 120	<200	ug/L	1.9	20		
9391144	Total Iron (Fe)	2024/05/14	100	80 - 120	96	80 - 120	<100	ug/L	NC	20		
9391144	Total Magnesium (Mg)	2024/05/14	100	80 - 120	99	80 - 120	<50	ug/L	2.2	20		
9391144	Total Manganese (Mn)	2024/05/14	99	80 - 120	96	80 - 120	<2.0	ug/L	4.2	20		
9391144	Total Phosphorus (P)	2024/05/14	101	80 - 120	94	80 - 120	<100	ug/L	1.3	20		
9391144	Total Potassium (K)	2024/05/14	103	80 - 120	98	80 - 120	<200	ug/L	1.0	20		
9391144	Total Sodium (Na)	2024/05/14	NC	80 - 120	98	80 - 120	<100	ug/L	1.2	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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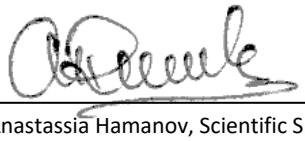
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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