2025 Groundwater and Soil Vapour Monitoring Report
Red Deer College Site
Southeast Corner of Section 08-38-27 W4M
Red Deer, Alberta

PRESENTED TO
City of Red Deer

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EXECUTIVE SUMMARY

The City of Red Deer (The City) retained Tetra Tech Canada Inc. (Tetra Tech) to conduct the 2025 groundwater, surface water, and vapour monitoring and sampling programs at a former landfill known as the Red Deer College (RDC) historical waste disposal site (the Site). The Site is located near Red Deer Polytechnic (RDP), formerly Red Deer College, located at Lot 1, Block 1, Plan 012 0303 within the southeast quarter of Section 08-38-27 W4M.

The objectives of the 2025 monitoring program included:

- Assessing the environmental condition of the Site;
- Evaluating potential impacts on the environment and adjacent receptors (i.e., humans and/or ecological receptors such as wildlife, surface water, or groundwater that could potentially be affected by the Site) related to the Site's former use as a landfill; and
- Providing recommendations for risk management activities.

Tetra Tech's scope of work for the 2025 monitoring and sampling program at the Site included: an annual surface erosion survey including measurements of surface emissions; conducting annual soil vapour monitoring at on-site soil vapour monitoring wells; annual sampling at selected locations for soil vapour; surface water sampling of Waskasoo Creek; updating the hazard quotients; reviewing and updating previous recommendations for the Site; and preparing an annual report.

Surface water samples were collected from Waskasoo Creek at one location upstream (SW-02) and two locations downstream (SW-01 and SW-03) of the Site in October 2025. The analytical surface water parameters included pH, electrical conductivity (EC), major ions, total dissolved solids (TDS), nutrients, metals (total for surface water), benzene, toluene, ethylbenzene, and xylenes (BTEX), petroleum hydrocarbon (PHC) fractions F1 and F2, and volatile organic compounds (VOCs).

The current vapour monitoring network consists of six vapour monitoring wells (VW-01 to VW-05 and 22VW-06). Soil vapour samples were collected and analyzed from vapour wells VW-02, VW-03, and 22VW-06 in November 2025, which are located at or beyond the southern and northern extents of the waste footprint. Soil vapour wells VW-01 and VW-05 are not regularly sampled as they are screened within the waste and do not help identify what may reach nearby receptors. Soil vapour well VW-04 is not screened within the waste, but its location is not useful for the identification of what may reach nearby receptors. Conversely, soil vapour well VW-02 is sampled regularly because of its proximity to the residences and 22VW-06 and VW-03 because of their proximity to potential preferential pathways in the form of buried infrastructure as well as the residential area north of 32 Street. The analytical vapour parameters included matrix gases including oxygen, carbon dioxide, methane, and nitrogen, VOCs, BTEX, and PHCs.

Based upon the results of the groundwater, surface water, and soil vapour monitoring and sampling programs conducted in 2025 and previous years, Tetra Tech has developed the following conclusions:

- In 2025, Tetra Tech did not conduct groundwater monitoring or sampling, in accordance with the scope of work. The groundwater flow direction inferred from contoured groundwater elevations during the most recent groundwater monitoring event (September 2024) was to the east-northeast, towards Waskasoo Creek east of Taylor Drive, with an average horizontal hydraulic gradient of approximately 0.04 m/m, consistent with previous findings.
- Surface water analytical results in 2025 along Waskasoo Creek suggest that the surface water quality has not been impacted by groundwater from the Site as most concentrations were higher upstream than downstream.

- Landfill gas (LFG) is present within the waste footprint of the Site, similar to results from previous years:
  - Soil vapour samples were analyzed for BTEX, PHCs, and VOCs. Concentrations less than the soil vapour screening criteria were measured in samples VW-02 and 22VW-06, situated south and north, respectively, of the landfill footprint.
  - The VOCs cis-1,2-Dichloroethene (DCE) and vinyl chloride exceeded the soil vapour screening criteria at VW-03, situated at the northern boundary of the Site and immediately adjacent to the waste footprint. In November 2025, methane at VW-03 was 3.0% by volume, which is below the lower explosive limit (LEL) of 5% by volume in air, or 50,000 parts per million (ppm).
  - The field-measured methane concentration at VW-05 was 54.6%, which was above the upper explosive limit (UEL) of 15% by volume in air, or 150,000 ppm. Vapour well VW-05 is positioned in the centre of the historical waste disposal area, approximately 180 m north of the nearest buildings (RDP Residences).
  - Chloroform continues to be detected at vapour well 22VW-06, although concentrations remain below target risk levels and generic criteria. Chloroform is not a common landfill contaminant and should continue to be monitored during future soil vapour monitoring events.
  - The soil vapour sample collected from VW-03 exceeded the cumulative cancer risk target of 1.0×10^{-5} and the cumulative hazard quotient target of 1.0 by one order of magnitude. In 2025, the VW-03 cumulative cancer risk was 2.3×10^{-4} (primarily driven by vinyl chloride), and the cumulative hazard quotient was 11.3 (primarily driven by cis-1,2-DCE). Samples from VW-02 and 22VW-06 were within both the cumulative and individual limits for the estimated cancer risk and estimated hazard quotient targets.
- The Site walkover and surface emissions survey results for October 16, 2025, included localized methane detections in surface cracks, up to a maximum of 42% by volume, when the probe was inserted into cracks on the eastern slope near 21MW-08, where dead vegetation was observed. At a second distressed vegetation area south of 21MW-08, methane in cracks was measured at values of up to approximately 2% by volume. No ambient methane was detected. During the walkover, uneven ground settlement was noted north of MW-06 and areas of sparse or distressed vegetation and cracking were observed, including larger patches on the eastern slope near the waste limit. No exposed waste was observed.

Six of the eight groundwater monitoring wells at the Site are located within the waste footprint, and either screened within (MW-04, MW-05, 21MW-08, and 21MW-09) or below (MW-03 and MW-06) the waste. Each of these six wells, either presently or in previous years, have been identified as impacted by leachate.

Waskasoo Creek is considered a receptor of any groundwater passing through the Site. Based on the results from 2025 and previous years, there is a strong correlation between the observed impacts and the waste footprint, and results indicate that impacts in groundwater may be migrating east towards Waskasoo Creek. However, the 2025 surface water results from upstream and downstream Waskasoo Creek do not suggest that leachate from the Site is affecting the surface water quality. The surface waters of Waskasoo Creek should continue to be monitored.

Landfill gas impacts were identified at one of the three vapour wells (VW-03) sampled in 2025 and have been identified at VW-05 in previous years. Impacts are evidenced by elevated concentrations of methane, carbon dioxide, and VOCs, and low concentrations of oxygen. The highest concentrations were measured at VW-05, located centrally within the waste mass, with elevated concentrations noted at VW-03, located immediately adjacent to the waste mass at the northeast corner of the Site and bounded by a road intersection to the north and east.

Current and previous soil vapour results from the two wells closest to the residences (VW-01 and VW-02) do not indicate a vapour intrusion risk to the RDP residences. The measured contaminant concentrations were less than the target cumulative risks and hazard levels for residential land use. The residences themselves are not considered to be at risk based on the presence of vapour management infrastructure implemented by, and as far as is known, managed by, the RDP. These measures include passive vapour barriers below the buildings and a passive venting system.

The vapour sample collected in 2021 at VW-05 from within the waste mass exceeded the target risk and hazard levels and confirmed that LFG concentrations typical of a municipal landfill were present. With field-monitored methane concentrations up to 54.6% in November 2025 at VW-05, evidence of the ongoing presence of LFG has been confirmed. The vapours at VW-03, at the northeast end of the Site, are also indicative of LFG. Although a building is unlikely to be constructed near VW-03, the potential extent of LFG migration off site in this direction is not known. The methane gas concentrations measured to date at VW-03 have been considerably less than those measured within the waste mass (e.g., at VW-05); however, they are still considered to be elevated. Buried landfill waste remains in place at the Site and impacts to both groundwater and LFG are present. The depth to groundwater measured to date at the monitoring wells and the elevation of the creek bottom suggest that Waskasoo Creek to the east of the Site, the original creek bank to the west and south, and the road cuts to the north and east may act as potential barriers to LFG migration.

The 2025 LFG monitoring results have shown that surface emissions are occurring in the vicinity of surface cracks along the eastern side of the Site; however, emissions were non-detectable in the air above the surface and thus are not considered to be an immediate threat to outdoor users of the area at this time. Should any trench-work be required in this area, this hazard should be considered and appropriate steps taken to protect workers and infrastructure. The extent to which LFG is being released through the landfill cover should continue to be assessed with repeated, more detailed (finer-grid) monitoring proximate to areas of greater emissions as outlined in the next section.

Ongoing risk management is recommended, including the following risk management elements.

Site Monitoring:

- Conduct groundwater monitoring in 2026 of all accessible groundwater monitoring wells and sampling of hydraulically down-gradient monitoring wells MW-05, 21MW-08, and 21MW-09 for routine groundwater chemistry parameters, ammonia, dissolved metals, VOCs, BTEX, and PHCs to monitor trends and assess the potential risk to receptors. As the inferred groundwater flow direction and groundwater quality have been well defined, a reduced frequency of monitoring and sampling is proposed as shown in Table E-1.

- Conduct annual surface water sampling of Waskasoo Creek upstream and downstream of the Site, including the additional downstream location SW-03, to assess potential impacts from leachate impacted groundwater entering the creek from the Site. This sampling will continue to be completed in conjunction with the Red Deer Motors (RDM) monitoring and sampling program, and the surface water results will be shared with the RDM site report. Surface water samples should be analyzed for pH, EC, routine water chemistry parameters, ammonia, total metals, BTEX, PHC fractions F1 and F2, and VOCs.

- Continue annual monitoring at all vapour wells (VW-01 to 22VW-06) and sampling of the perimeter vapour probes VW-02, VW-03, and 22VW-06 under frozen conditions (November or December 2026). The rationale behind winter soil vapour sampling is that it will allow assessment of conditions when vapours may be trapped beneath frozen ground and unable to vent to the atmosphere. However, the generation of LFG can be greater under warm weather conditions and thus completing monitoring during warmer months (summer or early fall), when LFG generation and vapour migration may be greater can allow for better assessment of potential peak conditions for LFG.

- Conduct an annual surface emissions survey in 2026 to continue delineating and characterizing LFG emissions from the ground surface at the Site. This work should include detailed monitoring proximate to areas where emissions have been previously noted, and careful mapping of the locations with respect to cracks, holes, evidence of stressed vegetation, and other pertinent observations. The surface emissions survey should be conducted in summer or fall when there is no snow covering the ground surface.

Additional Assessment and Risk Management:

During the annual monitoring event, conduct a site walkover to review the integrity of the surface material, to document any vegetation die-off and exposed soils which may lead to potential erosion, cracking, and/or exposed waste. This information may be used to evaluate whether vegetation cover improvements or potential repairs to the cap are necessary.

The City should liaise with the landowner to consider cover improvement works in the area near Taylor Drive, to mitigate emissions and support vegetation growth where stressed/dead vegetation has previously been observed. Continued annual surface emissions surveys would follow to monitor the performance of the cover improvement works.

Table E-1: Proposed Site Condition, Surface Water, Groundwater, and Vapour Monitoring Program

Activity	2026	2027	2028	2029	2030
Annual Site Walkover (Summer), Including Surface Emissions Survey	X	X	X	X	X
Annual (Summer) Groundwater Monitoring and Sampling Event of Three Wells (MW-05, 21MW-08, and 21MW-09)	X			X	
Annual (Summer) Surface Water Sampling Event of Three Locations (SW-01, SW-02 and SW-03)	X	X	X	X	X
Annual (Winter) Vapour Monitoring of Six Wells (VW-01, VW-02, VW-03, VW-04, VW-05, and 22VW-06) and Sampling of Three Wells (VW-02, VW-03, and 22VW-06) [1]	X	X	X	X	X

Notes:
The proposed monitoring program is to be reviewed on an annual basis as new information becomes available.
[1] Vapour monitoring frequency to be revised pending completion of cover improvement works.

Administrative Actions:

- Ensure that the Site is clearly identified within The City's Land Use Bylaw and appropriate administrative requirements are met for the Site in accordance with The City policies and Provincial Regulations.
- Ensure that the Site is clearly identified within The City's utility mapping system. Elevated gas concentrations may be present in the subsurface proximate to the Taylor Drive and 32 Street rights-of-way. Future activities in this vicinity (e.g., utility work, repairs, paving) should consider the potential presence of gas and a site-specific safety plan should be developed for work undertaken to limit the potential for exposure to site workers.

The Site presently has a grass cover, and the status of the cover should be reviewed on an ongoing basis to ensure that the cover remains intact, and drainage remains positive to prevent ponding and subsequent infiltration and leachate generation from rainfall. Repairs or maintenance should be undertaken as required to maintain the Site.

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LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of The City of Red Deer and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than The City of Red Deer, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

1.0 INTRODUCTION

The City of Red Deer (The City) retained Tetra Tech Canada Inc. (Tetra Tech) to conduct the 2025 groundwater, surface water, and vapour monitoring and sampling programs at a former landfill known as the Red Deer College (RDC) historical waste disposal site (the Site). The Site is located near Red Deer Polytechnic (RDP), formerly Red Deer College, located at Lot 1, Block 1, Plan 012 0303 within the southeast quarter of Section 08-38-27 W4M.

The objectives of the monitoring program are to assess the environmental condition of the Site, potential impacts on the environment and adjacent receptors (i.e., human and/or ecological receptors such as wildlife, surface water, or groundwater, that could potentially be affected by the Site) related to the Site's former use as a landfill, and to provide recommendations related to risk management activities.

The scope of work for 2025, presented in Section 1.1, was based on Tetra Tech's 2024 groundwater and soil vapour monitoring and sampling program conducted at the Site, along with communications between The City and Alberta Environment and Protected Areas (AEPA; formerly Alberta Environment and Parks [AEP]) following the submission of the 2024 report. The 2024 results were presented in the 2024 Groundwater and Soil Vapour Monitoring Report – Red Deer College (Tetra Tech 2025a).

The field components of the monitoring program were completed under Tetra Tech's detailed work plans encompassing the scope of work outlined in Section 1.1. The current report was completed under Tetra Tech's Limitations on the Use of this Document for conducting environmental work. A copy of these conditions is provided in Appendix A.

1.1 Scope of Work

Based on the 2024 findings and recommendations, the work conducted in 2025 included the following:

- Surface emissions survey in October 2025.
- Annual vapour monitoring in November 2025, including measurement of headspace vapours and groundwater levels within each vapour monitoring well and observing vapour well integrity.
- Annual vapour sampling in November 2025, collecting vapour samples from VW-02, VW-03, and 22VW-06 into Summa canisters for analysis.
- Collection of one duplicate soil vapour sample for quality assurance/quality control (QA/QC) purposes.
- Annual surface water sampling in October 2025 from upstream (SW-02) and adjacent downstream points (SW-01 and SW-03) on Waskasoo Creek, measuring field parameters at the time of sampling.
- A Site walkover during the October 2025 monitoring event to evaluate the cover for potential erosion, cracking, and/or exposed wastes.
- Preparation of an annual report summarizing the field activities, interpreting the surface water and soil vapour analytical results, and providing recommendations for future monitoring activities at the Site.

2.0 BACKGROUND INFORMATION

2.1 General Information

The Site is located within SE 08-38-27 W4M, at Lot 1, Block 1, Plan 0120303. The Site location is shown on Figure 1. The Site is zoned PS – Public Service (Institutional and Government) District and is located on the east side of the RDP campus. The Site is located at the southwest corner of Taylor Drive and 32 Street. Waskasoo Creek is present to the south and east of the Site and flows north along the east side of Taylor Drive. Waskasoo Creek discharges to the Red Deer River, approximately 1.7 km north of the Site. A Site plan, including the surrounding land use, is shown on Figure 2. The area around the Site has been developed, and includes RDP buildings, student residences, a running track, sports fields, walking paths, and paved and unpaved parking surfaces. These developments are outside (south and west) of the interpreted former waste disposal area, except for a portion of a gravelled/unpaved parking lot. The surrounding land use consists of Environmental Preservation District, Residential (Low Density) District, and Commercial (Major Arterial) District. A residential subdivision is located northwest of the Site. Natural areas at the Site consist of grasses and trees. Additional information on the Site history, historical groundwater monitoring investigations, geology, and hydrogeology can be found in Appendix B. Cross-sections prepared by Tiamat Environmental Consultants Ltd. (Tiamat; 2014) using the wells previously installed at the Site in 2013 are included in Appendix C. Borehole logs by Agra Earth & Environmental Ltd. (Agra; 1999), Tiamat (2013), and Tetra Tech (2021; 2022) are included in Appendix D.

2.2 Conceptual Site Model Summary

The selection of comparative guidelines is based on the conceptual site model (CSM), first described in the 2021 Groundwater and Soil Vapour Monitoring Report (Tetra Tech 2022) and updated in the 2024 Groundwater and Soil Vapour Monitoring Report (Tetra Tech 2025a) and the 2025 Risk Management Plan (Tetra Tech 2025b). The CSM outlines the rationale for the selection of applicable exposure pathways and receptors at the Site, based on guidance from the Alberta Tier 1 Soil and Groundwater Remediation Guidelines (AEPA 2024). The guidelines contained in the 2024 document are referred to hereafter as “Tier 1” or “the Guidelines”. The CSM included the following items:

- Description of any identified environmental issues including a description of processes or activities undertaken at or near the Site and a listing of chemicals of potential concern (COPCs) identified in earlier investigations.
- Description of known and reported historical releases, including locations and status of any subsequent environmental site assessments (ESAs) and remediation.
- Identification of applicable exposure pathways and receptors.

The following table (Table 2-1) presents a summary of the relevant receptors and exposure pathways identified in the CSM.

Table 2-1: Summary of Conceptual Site Model

Release Mechanism	COPC	Migration Pathway	Potential Receptor
Groundwater affected by buried waste. Seepage of groundwater into Waskasoo Creek.	▪ Chloride	Migration to Waskasoo Creek via groundwater or surface seeps.	Freshwater aquatic life (FAL) in Waskasoo Creek.
	▪ Sodium ▪ Chloride ▪ Total Ammonia ▪ Benzene ▪ Ethylbenzene ▪ Xylenes ▪ 1,2-Dichlorobenzene ▪ Vinyl Chloride	Migration to Waskasoo Creek via groundwater or surface seeps.	Users of potable water from Waskasoo Creek.
Groundwater affected by buried waste. Upward or lateral migration of vapour from groundwater.	▪ Benzene ▪ Ethylbenzene ▪ Xylenes ▪ 1,2-Dichlorobenzene ▪ Vinyl Chloride	Vapour inhalation via vapour intrusion/collection into/in confined spaces.	Workers in excavations/trenches. Residences to the south.
Human direct soil contact. Exposure to buried waste and the leachate it contains.	▪ Petroleum Hydrocarbon (PHC) F1 ▪ Ethylbenzene ▪ Total Xylenes ▪ Chloroform ▪ Dichloromethane ▪ 1,2-DCE ▪ cis-1,2-DCE❖ ▪ trans-1,2-DCE❖	Prolonged contact of affected soil with exposed skin.	Workers in excavations/trenches. Site users, if cover is eroded.
Landfill gas (LFG) emission	▪ Methane	Vapour intrusion/collection into/in confined spaces. Explosive at a 5% to15% concentration if in presence of ignition source.	Workers in excavations/trenches.
	▪ Cis-1,2-DCE ▪ Vinyl Chloride	Vapour inhalation; vapour intrusion/collection into/in confined spaces.	Workers in excavations/trenches.

Notes:

❖The Tier 1 Guideline is for 1,2-dichloroethene (DCE) and not its isomers, cis- and trans-. The isomers were assessed using the Tier 1 Guideline for 1,2-dichloroethene.

2.2.1 Data Evaluation

To establish the appropriate guidelines for the Site, residential land use criteria was used. The receptors are a combination of the degree of potential exposure, the exposure pathway, and the contaminants of concern. Active human receptor pathways applicable to the Site were identified as direct soil contact, vapour inhalation, and potable water via off-site migration. Ecological receptor pathways considered active included the FAL pathway via off-site migration. Through previous investigations at the Site, Tetra Tech has determined that the dominant soil stratigraphy governing potential contaminant transport at the Site is coarse grained.

As recommended by the AEPA, the soil vapour results obtained during the investigation were compared to generic soil vapour criteria developed from information contained in the Tier 1 Guidelines as well as documents by the Canadian Council of Ministers of the Environment (CCME; 2014), Health Canada (2021), and the United States Environmental Protection Agency (US EPA; 2024). To determine the appropriate guidelines for comparison against the vapour sampling results, indoor air risks were calculated, and methane explosive risks were evaluated.

Based on the CSM, the most applicable guidelines for groundwater and vapour results for the Site included the following:

- Groundwater concentrations at the Site were compared to the Tier 1 Guidelines (AEPA 2024a) under residential/parkland land uses for coarse-grained soils.
- Surface water analytical results were compared to the most conservative values for the protection of FAL as set out in the AEP document Environmental Quality Guidelines for Alberta Surface Waters (AEP 2018). Surface water quality results for 2021, 2022, 2024, and the 2025 sampling event, are included in Table 5A.
- Soil vapour analytical results were compared to soil vapour screening criteria under residential land use for both slab-on-grade and basement for coarse-grained soils, developed from the CCME document A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures Via Inhalation of Vapours (CCME 2014). Soil vapour screening criteria for vapour intrusion into indoor air spaces were updated as of 2024, using current toxicity reference values (TRVs) from Health Canada (2021) and the US EPA (2024).
- For the hazard quotient evaluation, cumulative target risk and hazard levels were determined in accordance with Alberta Tier 2 Guidelines (AEPA 2024b). For carcinogens, the target risk level is 1×10^{-5}, as this value is considered by Health Canada to represent a negligible risk. This risk level applies to both individual compounds and a summation (i.e., cumulative) of individual compounds risks. For non-carcinogens, a cumulative target hazard level of 1.0 is used as potential exposures that result in cumulative hazard indices equal to or less than 1.0 signify negligible potential for adverse health effects. For individual compounds, a hazard index of 0.2 was used. Each sampling location was screened individually for every chemical detected, and the results evaluated relative to both individual and cumulative risks and hazard levels. For some compounds, both carcinogenic and non-carcinogenic effects require calculation.

2.3 Monitoring Well Network

The current groundwater monitoring network at the Site consists of eight monitoring wells (MW-02 to MW-07, 21MW-08, and 21MW-09). Monitoring wells 21MW-08 and 21MW-09 were installed in 2021. Monitoring well MW-01 was damaged shortly after installation and was decommissioned in 2024 by removing the polyvinyl chloride (PVC) casing and backfilling with bentonite to the ground surface. Monitoring well completion details are summarized in Table 1. The monitoring wells were reported to be in good condition in 2025.

Surface water locations along Waskasoo Creek were sampled upstream (SW-02), adjacent/downstream (SW-01), and downstream (SW-03) of the Site. SW-03 was added for the 2025 monitoring event approximately 100 m downstream of SW-01 to provide additional downstream characterization beyond the Site boundary.

The vapour monitoring network consists of six vapour monitoring wells (VW-01 to VW-05 and 22VW-06). The soil vapour wells were noted to be in good condition during the monitoring event in November 2025.

Monitoring wells MW-03 to MW-06, 21MW-08, and 21MW-09, and VW-05 were installed within the historical waste disposal area; only a subset of these wells is included in the monitoring program (MW-05, 21MW-08, 21MW-09, and VW-05). Accordingly, results from these wells reflect conditions within or immediately adjacent to the waste mass and may not be representative of concentrations that could reach potential receptors.

Groundwater and soil vapour monitoring well locations, and surface water sampling locations, are shown on Figure 2.

3.0 FIELD MONITORING AND SAMPLING METHODOLOGY

A discussion of the methods used for the fieldwork and laboratory testing is presented in the following sections. Borehole logs for both groundwater and soil vapour monitoring wells are presented in Appendix D.

3.1 Groundwater Monitoring and Sampling

In 2025, Tetra Tech did not conduct groundwater monitoring or sampling, in accordance with the scope of work detailed in Section 1.1.

3.2 Surface Water Sampling

Tetra Tech conducted surface water sampling on October 16, 2025, at Waskasoo Creek.

Surface water samples were collected at three locations along Waskasoo Creek: upstream (SW-02), cross-gradient/downstream (SW-01), and downstream (SW-03) of the Site. Surface water sampling locations are presented on Figure 2.

The methodology for surface water sampling included the following:

- Flow and water level of Waskasoo Creek were observed prior to sampling.
- Surface water samples were collected midstream by submerging the sampling bottle halfway between the water surface and the bottom of the creek bed, with the mouth of the bottle facing upstream.
- Samples were collected into appropriate laboratory-supplied sterile glass and plastic vials and bottles for the required analytical package. Samples were filtered and/or preserved in the field as required.
- Field measurements were taken for pH, electrical conductivity (EC), and temperature at the time of sampling.
- A duplicate sample was collected from SW-01 during the surface water sampling event for QA/QC purposes.
- Samples were submitted in iced coolers to ALS in Calgary, Alberta, for laboratory analysis under chain-of-custody (COC) documentation.

3.2.1 Surface Water Analytical Program

The analytical program for the surface water sampling locations is summarized below:

- Routine water chemistry.
- Total ammonia.
- Total metals.
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) and PHC fractions F1 and F2.
- Volatile organic compounds (VOCs).

3.3 Vapour Field Program

Tetra Tech conducted soil vapour monitoring and sampling on November 11, 2025, from the soil vapour wells.

Vapour monitoring at the vapour probes consisted of measuring and recording soil gas pressure and composition (methane, carbon dioxide, oxygen, hydrogen sulphide, and balance gas) on a percent volumetric basis. A blinded well is one in which the well screen is partially or entirely submerged—below the water table—producing soil vapour measurements that are not representative. Consequently, the groundwater level in the soil vapour wells was measured to confirm whether water was present above the screened interval to determine if they were partially or completely blinded. Soil vapour well VW-01 was blinded in June 2023 and consequently monitoring results for methane, etc. were not recorded as they were unlikely to be representative. This well has not been sampled since November 2021, and thus the blinding did not affect the planned vapour sampling.

Each soil vapour probe was inspected for visible signs of damage and the position of the sampling labcock was noted. Soil gas pressure was recorded using a digital manometer. Once the soil gas pressure was recorded, the soil gas probe was purged of three well volumes of air. The soil vapour probes were purged directly with a CES Landtec GEM 5000 (GEM) LFG analyzer.

After purging, gas composition measurements were recorded using the GEM LFG analyzer. After recording soil gas concentrations, the probe/well depths and water levels (if present) were measured and recorded to confirm that the water level within the probe was beneath the screen portion of the soil gas well (i.e., the well was not blinded).

A leak detection test was completed to ensure the vapour probe was sealed properly. The test was completed using a helium gas tracer to inspect the testing probe and apparatus for any leaks. If there was a leak beyond the acceptable range of 2% helium concentration, the connections were tightened, and the leak test was conducted again.

Sampling of the soil vapour wells was based on the methodology of the CCME sampling guidelines (CCME 2016a, 2016b), and is summarized as follows:

- Prior to collecting the soil vapour well samples, the well was purged of three well volumes or until headspace readings stabilized.
- A 1.4 L Summa vacuum canister was used for sample collection at the soil vapour well monitoring location.
- Sample data was recorded on the provided sample tag for each canister.
- Sample tubing that was used to connect the canister to the soil vapour well was low in VOCs and only used once to prevent sample contamination.
- When beginning sample collection, the end cap was removed, and a 60-minute flow controller was attached to the canister. Start time and starting pressure were recorded on the sample tag.
- When sampling was complete, the valve was closed and the flow controller was removed. The end time and final pressure were recorded on the sample tag.
- The protective end cap was replaced back on the canister.
- Canisters, flow controllers, and pressure gauges were placed in the original shipping container and returned to the laboratory under COC.
- The soil vapour probe sampling port was returned to the closed position, and the well was securely locked.

The vapour samples were transferred to ALS for chemical analysis. A duplicate sample was collected from 22VW-06 during the vapour sampling event for QA/QC purposes.

3.3.1 Vapour Well Analytical Program

The analytical program for the vapour monitoring probes is summarized below:

- VOCs.
- Matrix gases including oxygen, carbon dioxide, methane, and nitrogen.
- BTEX and PHCs.
- Naphthalene.

3.4 Site Walkover and Surface Emissions Survey

A Site walkover was conducted on October 16, 2025, to review the integrity of the surface material to evaluate for potential erosion, settlement, cracking, and/or exposed wastes. This work was initiated after RDP staff had raised concerns about settlement around the Site.

Measurements of surface emissions were made on October 16, 2025, within the historical waste disposal area to evaluate the nature and extent of emissions. The Site was walked over from north to south in lines approximately 20 m from each other and methane surface emissions were recorded along these lines near surface using a GEM LFG analyzer, calibrated for methane. At select locations where cracks or holes in the surface cover were noted, additional measurements were taken.

4.0 RESULTS AND DISCUSSION

This section presents the results of the fieldwork conducted in 2025 at the Site and discussions of these results.

4.1 Groundwater Well Headspace Monitoring

In 2025, Tetra Tech did not conduct groundwater monitoring or sampling, in accordance with the scope of work detailed in Section 1.1.

Historical methane headspace concentrations measured at the groundwater monitoring wells during previous monitoring events are presented in Table 2.

4.2 Site Walkover and Surface Emissions Survey

On October 16, 2025, Tetra Tech conducted a surface emissions survey using a GEM LFG analyzer calibrated for methane. During the surface emissions survey, methane concentrations measured ranged from below the instrument's detection limit at most locations to a maximum of 42% by volume exceeding, both the lower explosive limit (LEL) of 5% by volume and the upper explosive limit (UEL) of 15% by volume.

Cracks in the soil cover and areas of dead vegetation were observed on the eastern slope near monitoring well 21MW-08. When the probe was inserted into the cracks in this area, readings were consistently greater than 30% by volume, reaching a maximum of 42% by volume in one crack. Methane concentrations decreased to 0% by volume

when measurements were made approximately 10 cm above the same cracks. Ambient methane was not detected but there was an ambient odour of waste in this area.

A second area of distressed dead vegetation south of 21MW-08 exhibited methane in surface cracks ranging from 5,000 parts per million (ppm) to 20,000 ppm (approximately 0.5% to 2% by volume, equivalent to approximately 10% to 40% of the LEL). Methane was only detected in this area when the probe was inserted into a crack. Thus, neither ambient methane nor ambient odour were detected.

Two areas in the north portion of the Site which either lacked vegetation or had distressed vegetation were assessed during the walkover. Methane was not detected in this area.

The approximate area of the highest methane concentrations measured on Site in October 2025 is outlined on Figure 2. It is anticipated that some of the compounds for which risks from vapour intrusion to indoor air are calculated are also present where these surface emissions were measured.

During the walkover, uneven ground settlement was noted north of MW-06 in the northern portion of the Site. Areas of sparse or distressed vegetation were observed across the Site, with larger patches of absent vegetation and more pronounced cracking on the eastern slope near the waste limit. No exposed waste was observed.

4.3 Groundwater Elevations

In 2025, Tetra Tech did not conduct groundwater monitoring, in accordance with the scope of work detailed in Section 1.1.

Historical measured groundwater levels and calculated groundwater elevations from previous monitoring events are presented in Table 2. The groundwater elevations and interpreted contours from the most recent groundwater monitoring event (September 2024) are shown on Figure 4. The inferred groundwater flow direction in September 2024 was to the east-northeast towards Waskasoo Creek, consistent with historical results, and the average horizontal gradient was approximately 0.04 m/m (Tetra Tech 2025a).

4.4 Groundwater Field Parameters

In 2025, Tetra Tech did not conduct groundwater sampling, in accordance with the scope of work detailed in Section 1.1.

Historical field measurements for temperature, pH, and EC collected at the groundwater monitoring wells during previous monitoring events are presented in Table 3A.

4.5 Groundwater Analytical Results

In 2025, Tetra Tech did not conduct groundwater sampling, in accordance with the scope of work detailed in Section 1.1.

Groundwater analytical results from the most recent groundwater monitoring event (September 2024), along with previous results available for review, are summarized in Table 3A to Table 3C. The 2024 groundwater QA/QC results are included in Table 4. Tiamat historical tables are included in Appendix F.

4.6 Surface Water Field Parameters and Analytical Results

The 2025 surface water field parameter data for pH, EC, and temperature are presented in Table 5A. The 2025 surface water analytical data is summarized in Table 5A to Table 5C. The 2025 laboratory analytical reports are included in Appendix E.

Surface water field parameters were as follows:

- Temperatures were 9.47°C (SW-02), 10.43°C (SW-01), and 5.91°C (SW-03).
- The pH values were 7.98 (SW-02), 7.94 (SW-01), and 8.25 (SW-03). Field pH measurements were lower than the laboratory pH at all three monitoring locations.
- EC measurements were 905 µS/cm (SW-01), 928 µS/cm (SW-02), and 807 µS/cm (SW-03). Field EC results were higher than the laboratory measured EC results at all three monitoring locations.

Chloride concentrations at the upstream (SW-02) and downstream (SW-01 and SW-03) surface water locations were below the Guideline of 120 mg/L. Marginal exceedances have been observed at SW-02 and SW-01 during previous monitoring events. It is not uncommon to have elevated chloride concentrations in an urban setting due to the use of road salt and other anthropogenic sources.

Low concentrations of nitrate and nitrite were detected at SW-01, SW-02, and SW-03, and concentrations were below the Guideline at all three locations.

Alkalinity exceeded the Guideline of 20 mg/L at SW-01, SW-02, and SW-03 in 2025, consistent with previous sampling events. This is consistent with typically hard water conditions in Alberta.

Total aluminum, iron, and zinc concentrations exceeded their respective Guidelines of 0.05 mg/L, 0.3 mg/L, and 0.03 mg/L. Aluminum exceeded the Guideline at SW-02 and SW-03, iron exceeded the Guideline at SW-01, SW-02, and SW-03, and zinc exceeded the Guideline at SW-02. For aluminum and iron, this is consistent with previous results. Aluminum and iron are naturally present in clay, and the measured concentrations may be related to suspended solids present in the total metals samples. Exceedances were also observed at the upstream location, and the zinc exceedance was limited to the upstream location, suggesting metals concentrations were not originating from the Site.

Concentrations of BTEX, PHC fractions F1 and F2, and VOCs were less than the analytical detection limits at all three surface water sampling locations. This is consistent with previous results.

Surface water analytical results for samples collected in 2025 from upstream and downstream locations along Waskasoo Creek suggest that water quality is similar upstream and downstream of the Site, and the measured concentrations do not indicate impacts from the buried waste onsite.

4.7 Soil Vapour Monitoring Results

The 2025 and historical soil vapour monitoring results are presented in Table 7.

During the November 2025 monitoring event, all vapour wells were monitored. It should be noted that vapour well VW-01 was reported as blinded in June 2023, at which time representative soil vapour measurements could not be collected or recorded for monitoring.

Methane concentrations were measured using a GEM LFG analyzer at the vapour wells, with results below the instrument detection limit (non-detect) at VW-01, VW-02, VW-04, and 22VW-06. The methane concentration at VW-03 was 3.0% by volume, below the LEL, and at VW-05 was 54.6% by volume, exceeding the UEL. The elevated methane at VW-05 is consistent with previous results and is likely elevated due to VW-05 having been installed within the waste. Overall, methane concentrations in November 2025 were consistent with previous results.

Wellhead pressures at most vapour wells were negligible during the monitoring event in November 2025. A slight negative pressure was recorded at VW-01 (-1.18 mmHg).

Concentrations of carbon dioxide, oxygen, and balance gas at all vapour monitoring wells were consistent with previous monitoring results.

4.8 Soil Vapour Analytical Results

As indicated in Section 2.3, the current vapour monitoring network consists of vapour monitoring wells VW-01 to VW-05 and 22VW-06. Soil vapour samples were collected and analyzed from vapour wells VW-02, VW-03, and 22VW-06 in November 2025, which are located at or beyond the southern and northern extents of the waste footprint. Soil vapour wells VW-01 and VW-05 are not regularly sampled as they are screened within the waste and do not help identify what may reach nearby receptors. Soil vapour well VW-04 is not screened within the waste, but its location is not useful for the identification of what may reach nearby receptors. Conversely, soil vapour well VW-02 is sampled regularly because of its proximity to the residences and 22VW-06 and VW-03 because of their proximity to potential preferential pathways in the form of buried infrastructure as well as the residential area north of 32 Street. Table 8 presents a summary of the soil vapour analytical results collected in November 2025 from VW-02, VW-03, and 22VW-06, located at or beyond the southern and northern extents of the waste footprint. The analytical results were compared to the soil vapour screening criteria protective of vapour intrusion into indoor air, based on a residential land use with coarse-grained soil. The 2025 laboratory analytical reports are included in Appendix E.

Detectable concentrations of BTEX and PHC fractions F1 and F2 were present in samples from VW-02, VW-03, and 22VW-06 at concentrations below the soil vapour criteria.

At VW-03, adjacent to the northern boundary of the waste area, both cis-1,2-DCE (2,580 µg/m^3) and vinyl chloride (1,560 µg/m^3) were detected at concentrations above the soil vapour screening criteria. Concentrations of cis-1,2-DCE and vinyl chloride decreased in 2025 compared to 2024, and vinyl chloride concentrations at VW-03 have shown a decreasing trend since 2019. However, at this point in time it cannot firmly be said to be decreasing overall as the rate and time of the generation of LFG is often irregular and there is a possibility that the decreasing trend may plateau or even reverse in future.

Several other VOC parameters were detected in the samples collected from VW-02, VW-03, and 22VW-06, but at concentrations significantly below the soil vapour screening criteria.

Methane concentrations in the gas samples were similar to the field measured values: non-detect at VW-02; 2.49% by volume at VW-03 compared to the field measured value of 3% by volume, and 0.051% by volume at 22VW-06 where the field-measured value was below the detection limit.

It should be noted that preferential selection of the higher of the two concentrations of the primary and duplicate sample results from 22VW-06 were used for comparison to the adopted criteria to obtain a more conservative assessment of soil vapour results.

4.9 Quality Assurance/Quality Control

4.9.1 Methods

Tetra Tech's QA/QC procedures include reviewing the data collected for precision and accuracy and following the appropriate field protocols.

The field procedures for QA/QC involved:

- Changing nitrile gloves between collection of sets of samples;
- Using sample containers provided by the laboratory;
- Cleaning monitoring and sampling tools between sample locations;
- Filling sample containers for PHC analysis with no headspace (air) when the containers were closed;
- Collecting a duplicate surface water and soil vapour sample during the sampling program;
- Conducting leak testing at vapour wells prior to the collection of vapour samples; and
- Documenting field procedures and sampling activities.

4.9.2 Results

The surface water and soil vapour QA/QC results are included in Table 6 and Table 8, respectively. The duplicate samples were submitted for analysis of the same parameters as the primary samples.

The duplicate results are compared via relative percent difference (RPD). The RPD is calculated using the following equation:

$$\text{RPD} = \left[\frac{(V_1 - V_2)}{\frac{(V_1 + V_2)}{2}}\right] * 100\%$$

Where:

V_1 = Parent Sample

V_2 = Duplicate Sample

Chemical parameters were considered as having passed the QA/QC reproducibility procedure if the RPD was less than or equal to 20% for surface water and 50% for soil vapour, indicating a close correlation between the sample duplicate pair.

The RPD values were not calculated if one or both of the sample-duplicate concentrations were between the reportable detection limit (RDL) and five times the RDL. In these cases, chemical parameters were still considered as having passed the QA/QC reproducibility procedure if the sample-duplicate concentration difference was less than one RDL value.

For the surface water duplicate sample at SW-01 in October 2025, RPDs were less than 20% for the reported concentrations.

For the vapour well duplicate sample at 22VW-06 in November 2025, RPDs were less than 50% for the reported concentrations.

Based on the QA/QC results, the sample methods and results are considered reliable overall.

5.0 HAZARD QUOTIENT RESULTS

Using the soil vapour screening levels and calculations described in the 2024 Groundwater and Soil Vapour Monitoring Report (Tetra Tech 2025a), the soil vapour sampling results, estimated cancer risks (for carcinogens), and estimated hazard quotients (for non-carcinogens) were calculated for the Site.

Table 10 summarizes the properties of the compounds being assessed. Table 11 summarizes the soil properties used for calculations. Table 12 summarizes the building properties used for the calculations and Table 13 presents the generic soil vapour criteria calculated. Table 14 presents the estimated risk and hazard for the volatile compounds that were detected in soil vapour.

The cumulative risk indices for carcinogens in samples from VW-02, VW-03, and 22VW-06 were 2.8×10^{-7}, 2.3×10^{-4}, and 5.0×10^{-6}, respectively. A parent and duplicate samples were collected at 22VW-06, and the greater of the measured concentrations for a given parameter was selected for the calculations. The VW-03 cumulative risk level is higher than the target risk level of 1×10^{-5}, primarily due to the vinyl chloride concentration of 1,560 µg/m^3. This is lower than the 2024 result, and the cumulative risk level at VW-03 has shown a decreasing trend in recent years. It should be kept in mind, however, that despite the apparent decreasing trend the generation of LFG is often irregular and there is a possibility that the decreasing trend may plateau or even reverse in future. At 22VW-06, the greatest individual risk was associated with chloroform, which remained below the target risk level.

The cumulative hazard index for non-carcinogens at VW-03 was 11.3, exceeding the target hazard level of 1.0. The cumulative hazard indices for VW-02 and 22VW-06 were 0.002 and 0.016, respectively, and were below the target hazard level of 1.0. The elevated hazard at VW-03 was primarily related to cis-1,2-DCE, which had an individual hazard quotient of 10.7. Vinyl chloride also exceeded the individual hazard quotient screening level of 0.2 at VW-03, with an individual hazard quotient of 0.5. These results are consistent with previous results, with lower cancer risks and hazard quotients at VW-03 in 2025 compared to 2024.

As shown in Table 14, the estimated individual and cumulative risk and hazard indices associated with soil vapour samples from VW-02 and 22VW-06 did not exceed the corresponding target risk and hazard levels. The estimated individual and cumulative risks and hazards associated with soil vapour sample VW-03 indicate a potential risk from vapour intrusion to indoor air. Soil vapour well VW-03 is located in the northeast corner of the Site and is bounded by roads on the north and east. It is approximately 230 m from the nearest residential building and approximately 170 m from the nearest commercial building; however, utility corridors are present along the road rights-of-way (ROWs), which could act as preferential pathways for soil vapour. It is expected that the distance to buildings will decrease the soil vapour concentrations at the point of potential exposure from VW-03. The vapour concentrations in these wells should continue to be assessed for potential trends and to evaluate hazards.

6.0 EVALUATION OF SITE CONDITIONS

6.1 Summary of Site Conditions

Based on the 2025 monitoring program and historical data for the Site, there are concerns related to the presence of the historical RDC landfill. With respect to groundwater quality, hydraulically down-gradient monitoring wells have exhibited elevated concentrations of parameters typical of municipal solid waste (MSW) leachate, including chloride and VOCs, during past groundwater monitoring (most recently in September 2024). The inferred groundwater flow

direction is towards Waskasoo Creek. However, surface water results from upstream and downstream locations along Waskasoo Creek do not suggest impacts from the buried waste to creek water quality.

Soil vapour monitoring and sampling has revealed the presence of elevated methane and several VOCs including vinyl chloride and cis-1,2-DCE. These elevated concentrations are most notable at VW-03, installed north of the Site adjacent to the waste area, and are known to be present within the waste area based on previous results from VW-05.

The vapour sampling results have also shown elevated methane and VOCs in the area of the landfill footprint. There is a potential for lateral migration of vapours at the Site and emissions at the surface. Field-measured methane concentrations at the southerly wells near the adjacent RDP residences (VW-01 and VW-02) were less than the instrument detection limit, i.e., 0.0%, in November 2025. In addition, Waskasoo Creek to the east of the Site is likely to act as a physical barrier to lateral subsurface gas migration in these directions, based on historical groundwater elevations and the elevation of the creek bottom. The original creek bank to the west and south may provide a potential natural barrier to gas migration. Risk of subsurface vapour migration to the south and east of the Site are considered low.

The methane concentration at the more recently installed vapour well to the north (22VW-06) was less than the instrument detection limit (0.0%) in November 2025. Vapour well 22VW-06 is the closest monitoring location to the residential area to the north of the Site, across 32 Street. Chloroform continues to be detected at 22VW-06, at concentrations below target risk levels and generic criteria. Chloroform is not a common landfill contaminant and should continue to be monitored during future soil vapour monitoring events.

A site walkover was conducted to assess the thin soil cover identified in the earlier work by Tiamat and to evaluate for potential erosion, cracking, and/or exposed wastes. During the walkover, uneven ground settlement was noted in the northern portion of the Site north of MW-06. Areas of sparse or distressed vegetation were observed across the Site, including areas of dead vegetation on the eastern slope near 21MW-08, with larger patches of absent vegetation and more extensive cracking on the eastern slope near the waste limit. Methane was detected in surface cracks during the surface emissions survey when the probe was inserted into cracks; however, no ambient methane was detected. No exposed waste was observed.

Based on the 2025 soil vapour monitoring results, surface water results, and historical groundwater and soil vapour data from previous years, groundwater and soil vapour have been affected by the buried waste onsite to an extent that is not considered to pose an unacceptable risk to human health or the environment. Waskasoo Creek is believed to be a receptor of any leachate-impacted groundwater and should continue to be monitored. Vapour monitoring should also continue to assess risks, both to construction/shallow trench workers in the vicinity of the buried wastes, and to the RDP residences who have the potential to be exposed to vapour intrusion via indoor air.

6.2 Summary of Hazard Quotient Results

A summary of the hazard quotient approach used for the Site, including the 2019 hazard quotient calculations and a summary of the historical hazard quotients from Tiamat's 2014 Risk Management Plan, is provided in Appendix B. In general, where a hazard quotient exceeds the applicable target hazard level, the result indicates a potential concern and suggests that further evaluation and/or risk management may be warranted. However, hazard quotients greater than the target hazard level do not necessarily indicate that adverse health effects will occur, as conservative assumptions are used in estimating concentrations and establishing the target values. Hazard quotients that are less than the target hazard level indicate that exposure is within acceptable levels and no further risk management is necessary in relation to those results.

For consistency with XCG Consulting Limited's (XCG's) approach (XCG 2018), the individual hazard quotients listed in Table 13 were compared with the individual target hazard level of 0.2 used by XCG. Based on the 2025 program, the greatest individual hazard quotient calculated for the Site was 10.7 for cis-1,2-DCE at VW-03, exceeding the individual target hazard level of 0.2. The greatest cumulative hazard quotient was 11.3 at VW-03, exceeding the target hazard level of 1.0, and the greatest estimated cancer risk was 2.3×10^{-4} at VW-03, exceeding the target risk of 1.0×10^{5}. Although VW-03 continues to have the highest cumulative risk and hazard quotient on the Site, both values were lower in 2025 than in 2024, consistent with the decreasing trend observed in vinyl chloride concentrations at this location.

Development at the Site is not currently proposed. However, for illustrative purposes, what might be required for development within the setback area is considered. Based on the hazard quotients and cancer risk levels calculated from the 2025 vapour data, passive Level C measures (passive sub-slab depressurization system with a minimum depressurization of 4 Pa to 10 Pa) would be required. The 2019 vapour data included samples collected at VW-05, located centrally within the historical waste pile, and indicated that active Level E measures (installation of a geomembrane and active soil vapour extraction with system fault notification alarm) would be necessary. The 2025 hazard quotients and risks have been based on samples collected from the perimeter vapour wells VW-02 (adjacent the RDP residences), VW-03, and 22VW-06 (immediately northeast and north of the landfill footprint). This approach does not consider methane concentrations, or analytical results for vapour wells located within the historical waste pile.

The Site contains buried waste which will remain in perpetuity. The results of assessment to date have identified the presence of LFG at the Site including methane and VOCs which present potential explosive and human health risks. Any proposed development or re-development proximate to this historical landfill must include an evaluation of risk to future site users/occupants relative to LFG. Future applications for development of sensitive land use within the setback are subject to review by The City. The developer's team would be responsible for reviewing and verifying the available data relative to their proposed development. The mitigative measures presented above are generic and can be used as a general guide for expectations by The City; however, a development-specific evaluation must be undertaken by the developer. That evaluation must consider both human health and explosive risk. A qualified professional will be required to evaluate these risks relative to the development proposed, to provide recommendations for development (e.g., use of building protective measures such as liners), and to be retained to oversee and verify that mitigative measures are appropriately implemented.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of the groundwater, surface water, and soil vapour monitoring and sampling programs conducted in 2025 and previous years, Tetra Tech has developed the following conclusions:

- In 2025, Tetra Tech did not conduct groundwater monitoring or sampling, in accordance with the scope of work. The groundwater flow direction inferred from contoured groundwater elevations during the most recent groundwater monitoring event (September 2024) was to the east-northeast, towards Waskasoo Creek east of Taylor Drive, with an average horizontal hydraulic gradient of approximately 0.04 m/m, consistent with previous findings.
- Surface water analytical results in 2025 along Waskasoo Creek suggest that the surface water quality has not been impacted by groundwater from the Site as most concentrations were higher upstream than downstream.

- Landfill gas is present within the waste footprint of the Site, similar to results from previous years:
  - Soil vapour samples were analyzed for BTEX, PHCs, and VOCs. Concentrations less than the soil vapour screening criteria were measured in samples VW-02 and 22VW-06, situated south and north, respectively, of the landfill footprint.
  - The VOCs cis-1,2-DCE and vinyl chloride exceeded the soil vapour screening criteria at VW-03, situated at the northern boundary of the Site and immediately adjacent to the waste footprint. In November 2025, methane at VW-03 was 3.0% by volume, which is below the LEL of 5% by volume in air, or 50,000 ppm.
  - The field-measured methane concentration at VW-05 was 54.6%, which was above the UEL of 15% by volume in air, or 150,000 ppm. Vapour well VW-05 is positioned in the centre of the historical waste disposal area, approximately 180 m north of the nearest buildings (RDP Residences).
  - Chloroform continues to be detected at vapour well 22VW-06, although concentrations remain below target risk levels and generic criteria. Chloroform is not a common landfill contaminant and should continue to be monitored during future soil vapour monitoring events.
  - The soil vapour sample collected from VW-03 exceeded the cumulative cancer risk target of 1.0×10^{-5} and the cumulative hazard quotient target of 1.0 by one order of magnitude. In 2025, the VW-03 cumulative cancer risk was 2.3×10^{-4} (primarily driven by vinyl chloride), and the cumulative hazard quotient was 11.3 (primarily driven by cis-1,2-DCE). Samples from VW-02 and 22VW-06 were within both the cumulative and individual limits for the estimated cancer risk and estimated hazard quotient targets.
- The Site walkover and surface emissions survey results for October 16, 2025, included localized methane detections in surface cracks, up to a maximum of 42% by volume when the probe was inserted into cracks on the eastern slope near 21MW-08 where dead vegetation was observed. At a second distressed vegetation area south of 21MW-08, methane in cracks was measured at values of up to approximately 2% by volume. No ambient methane was detected. During the walkover, uneven ground settlement was noted north of MW-06 and areas of sparse or distressed vegetation and cracking were observed, including larger patches on the eastern slope near the waste limit. No exposed waste was observed.

Six of the eight groundwater monitoring wells at the Site are located within the waste footprint, and either screened within (MW-04, MW-05, 21MW-08, and 21MW-09) or below (MW-03 and MW-06) the waste. Each of these six wells, either presently or in previous years, have been identified as impacted by leachate.

Waskasoo Creek is considered a receptor of any groundwater passing through the Site. Based on the results from 2025 and previous years, there is a strong correlation between the observed impacts and the waste footprint, and results indicate that impacts in groundwater may be migrating east towards Waskasoo Creek. However, the 2025 surface water results from upstream and downstream Waskasoo Creek do not suggest that leachate from the Site is affecting the surface water quality. The surface waters of Waskasoo Creek should continue to be monitored.

Impacts of LFG were identified at one of the three vapour wells (VW-03) sampled in 2025 and have been identified at VW-05 in previous years. Impacts are evidenced by elevated concentrations of methane, carbon dioxide, and VOCs, and low concentrations of oxygen. The highest concentrations were measured at VW-05, located centrally within the waste mass, with elevated concentrations noted at VW-03, located immediately adjacent to the waste mass at the northeast corner of the Site and bounded by a road intersection to the north and east.

Current and previous soil vapour results from the two wells closest to the residences (VW-01 and VW-02) do not indicate a vapour intrusion risk to the RDP residences. The measured contaminant concentrations were less than the target cumulative risks and hazard levels for residential land use. The residences themselves are not considered to be at risk based on the presence of vapour management infrastructure implemented by, and as far as is known,

managed by, the RDP. These measures include passive vapour barriers below the buildings and a passive venting system.

The vapour sample collected in 2021 at VW-05 from within the waste mass exceeded the target risk and hazard levels and confirmed that LFG concentrations typical of a municipal landfill were present. With field-monitored methane concentrations up to 54.6% in November 2025 at VW-05, evidence of the ongoing presence of LFG has been confirmed. The vapours at VW-03, at the northeast end of the Site, are also indicative of LFG. Although a building is unlikely to be constructed near VW-03, the potential extent of LFG migration off site in this direction is not known. The methane gas concentrations measured to date at VW-03 have been considerably less than those measured within the waste mass (e.g., at VW-05); however, they are still considered to be elevated. Buried landfill waste remains in place at the Site and impacts to both groundwater and LFG are present. The depth to groundwater measured to date at the monitoring wells and the elevation of the creek bottom suggest that Waskasoo Creek to the east of the Site, the original creek bank to the west and south, and the road cuts to the north and east may act as potential barriers to LFG migration.

The 2025 LFG monitoring results have shown that surface emissions are occurring in the vicinity of surface cracks along the eastern side of the Site; however, emissions were non-detectable in the air above the surface and thus are not considered to be an immediate threat to outdoor users of the area at this time. Should any trench-work be required in this area, this hazard should be considered and appropriate steps taken to protect workers and infrastructure. The extent to which LFG is being released through the landfill cover should continue to be assessed with repeated, more detailed (finer-grid) monitoring proximate to areas of greater emissions as outlined in the next section.

Ongoing risk management is recommended, including the following risk management elements.

Site Monitoring:

- Conduct groundwater monitoring in 2026 of all accessible groundwater monitoring wells and sampling of hydraulically down-gradient monitoring wells MW-05, 21MW-08, and 21MW-09 for routine groundwater chemistry parameters, ammonia, dissolved metals, VOCs, BTEX, and PHCs to monitor trends and assess the potential risk to receptors. As the inferred groundwater flow direction and groundwater quality have been well defined, a reduced frequency of monitoring and sampling is proposed as shown in Table 7-1.

- Conduct annual surface water sampling of Waskasoo Creek upstream and downstream of the Site, including the additional downstream location SW-03, to assess potential impacts from leachate impacted groundwater entering the creek from the Site. This sampling will continue to be completed in conjunction with the Red Deer Motors (RDM) monitoring and sampling program, and the surface water results will be shared with the RDM site report. Surface water samples should be analyzed for pH, EC, routine water chemistry parameters, ammonia, total metals, BTEX, PHC fractions F1 and F2, and VOCs.

- Continue annual monitoring at all vapour wells (VW-01 to 22VW-06) and sampling of the perimeter vapour probes VW-02, VW-03, and 22VW-06 under frozen conditions (November or December 2026). The rationale behind winter soil vapour sampling is that it will allow assessment of conditions when vapours may be trapped beneath frozen ground and unable to vent to the atmosphere. However, the generation of LFG can be greater under warm weather conditions and thus completing monitoring during warmer months (summer or early fall), when LFG generation and vapour migration may be greater can allow for better assessment of potential peak conditions for LFG.

- Conduct an annual surface emissions survey in 2026 to continue delineating and characterizing LFG emissions from the ground surface at the Site. This work should include detailed monitoring proximate to areas where emissions have been previously noted, and careful mapping of the locations with respect to cracks, holes,

evidence of stressed vegetation, and other pertinent observations. The surface emissions survey should be conducted in summer or fall when there is no snow covering the ground surface.

Additional Assessment and Risk Management:

- During the annual monitoring event, conduct a site walkover to review the integrity of the surface material, to document any vegetation die-off and exposed soils which may lead to potential erosion, cracking, and/or exposed waste. This information may be used to evaluate whether vegetation cover improvements or potential repairs to the cap are necessary.

The City should liaise with the landowner to consider cover improvement works in the area near Taylor Drive, to mitigate emissions and support vegetation growth where stressed/dead vegetation has previously been observed. Continued annual surface emissions surveys would follow to monitor the performance of the cover improvement works.

Table 7-1: Proposed Site Condition, Surface Water, Groundwater, and Vapour Monitoring Program

Activity	2026	2027	2028	2029	2030
Annual Site Walkover (Summer), Including Surface Emissions Survey	X	X	X	X	X
Annual (Summer) Groundwater Monitoring and Sampling Event of Three Wells (MW-05, 21MW-08, and 21MW-09)	X			X	
Annual (Summer) Surface Water Sampling Event of Three Locations (SW-01, SW-02, and SW-03)	X	X	X	X	X
Annual (Winter) Vapour Monitoring of Six Wells (VW-01, VW-02, VW-03, VW-04, VW-05, and 22VW-06) and Sampling of Three Wells (VW-02, VW-03, and 22VW-06) [1]	X	X	X	X	X

Notes:
The proposed monitoring program is to be reviewed on an annual basis as new information becomes available.
[1] Vapour monitoring frequency to be revised pending completion of cover improvement works.

Administrative Actions:

- Ensure that the Site is clearly identified within The City's Land Use Bylaw and appropriate administrative requirements are met for the Site in accordance with The City policies and Provincial Regulations.

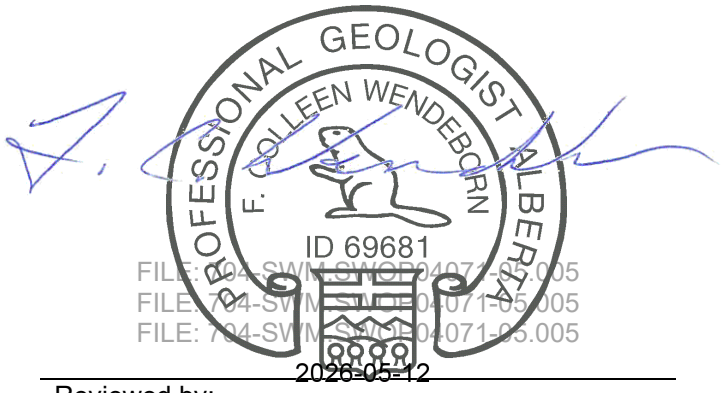
- Ensure that the Site is clearly identified within The City's utility mapping system. Elevated gas concentrations may be present in the subsurface proximate to the Taylor Drive and 32 Street ROWs. Future activities in this vicinity (e.g., utility work, repairs, paving) should consider the potential presence of gas and a site-specific safety plan should be developed for work undertaken to limit the potential for exposure to site workers.

The Site presently has a grass cover, and the status of the cover should be reviewed on an ongoing basis to ensure that the cover remains intact, and drainage remains positive to prevent ponding and subsequent infiltration and leachate generation from rainfall. Repairs or maintenance should be undertaken as required to maintain the Site.

8.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.



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TETRA TECH CANADA INC.
RM SIGNATURE: _____
RM APEGA ID #: 2026-05-12
DATE: Member 62764
PERMIT NUMBER: P013774
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

/as

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Table 1: Soil Vapour and Groundwater Monitoring Well Construction and Surveyed Elevation Details

Test Location	End of Hole (EOH; mbgs)	Well Depth (mbgs)	Ground (masl)	Top of Pipe (masl)	Screen Interval				Screen Length (m)	Installation Date	Damaged/ Destroyed
					(mbgs)		(masl)				
					Top	Bottom	Top	Bottom			
GW-01	16.8	5.6	883.693	884.788	0.5	5.6	883.193	878.093	5.1	8-Nov-99	Aug 2013
GW-02	12.2	12.0	883.679	884.674	0.5	12.0	883.179	871.679	11.5	8-Nov-99	--
GW-03	6.1	6.1	877.577	878.182	0.5	6.1	877.077	871.477	5.6	8-Nov-99	--
MW-01	4.6	4.6	876.982	877.785	2.5	4.6	874.482	872.382	2.1	8-Nov-99	Aug 2013
MW-02	4.6	4.6	877.851	878.281	2.5	4.6	875.351	873.251	2.1	8-Nov-99	Aug 2013
MW-03	10.7	10.7	877.169	878.135	7.6	10.7	869.569	866.469	3.1	8-Nov-99	--
MW-04	9.0	8.7	876.013	876.986	5.6	8.7	870.413	867.313	3.1	9-Nov-99	--
MW-05	7.6	7.5	872.454	873.306	4.4	7.5	868.054	864.954	3.1	9-Nov-99	--
MW-06	9.2	9.2	877.914	878.754	6.1	9.2	871.814	868.714	3.1	9-Nov-99	--
MW-07 (TH-06)	6.1	6.1	877.413	878.174	1.5	6.1	875.913	871.303	4.6	28-Jun-13	--
22MW-08	6.0	6.0	873.079	873.087	3.0	6.0	870.079	867.079	3.0	5-May-21	--
22MW-09	6.0	6.0	874.289	874.286	3.0	6.0	871.289	868.289	3.0	5-May-21	--
VW-01 (TH-02)	4.6	2.6	877.333	--	2.3	2.6	875.033	874.733	0.3	28-Jun-13	--
VW-02 (TH-03)	6.1	4.3	877.190	--	4.0	4.3	873.190	872.890	0.3	28-Jun-13	--
VW-03 (TH-04)	4.6	2.7	872.690	--	2.4	2.7	870.290	869.990	0.3	28-Jun-13	--
VW-04 (TH-07)	3.0	2.4	877.445	--	2.1	2.4	875.345	875.045	0.3	28-Jun-13	--
VW-05 (TH-08)	10.7	2.4	877.724	--	2.1	2.4	875.624	875.324	0.3	28-Jun-13	--
22VW-06	3.0	2.4	--	--	1.4	2.4	--	--	1.0	5-Dec-22	--
TH-01	3.0	--	877.319	--	--	--	--	--	--	28-Jun-13	--
TH-05	6.1	--	877.163	--	--	--	--	--	--	28-Jun-13	--
TH-09	9.1	--	877.869	--	--	--	--	--	--	29-Jun-13	--
TH-10	4.6	--	876.835	--	--	--	--	--	--	29-Jun-13	--
TH-11	6.1	--	878.046	--	--	--	--	--	--	29-Jun-13	--
TH-12	6.1	--	877.927	--	--	--	--	--	--	10-Jul-13	--
TH-13	6.1	--	877.941	--	--	--	--	--	--	10-Jul-13	--
TH-14	6.1	--	878.119	--	--	--	--	--	--	10-Jul-13	--
TH-15	6.1	--	878.554	--	--	--	--	--	--	10-Jul-13	--
TH-16	6.1	--	877.755	--	--	--	--	--	--	10-Jul-13	--
TH-17	6.1	--	876.876	--	--	--	--	--	--	10-Jul-13	--
TH-18	6.1	--	877.253	--	--	--	--	--	--	10-Jul-13	--
TH-19	6.1	--	878.104	--	--	--	--	--	--	10-Jul-13	--
TH-20	9.1	--	876.195	--	--	--	--	--	--	10-Jul-13	--

Notes:

1999 wells by AGRA (1999); 2013 wells and test holes by Tiamat (2014); 2021, 2022 wells by Tetra Tech (2022, 2024).

2013 Geodetic elevations determined from multiple Alberta Survey Control Marker (ASCM) datums. ASCM Nos. 269191, 376673, and 384792.

GW - Landfill Gas Monitoring Well.

masl - Meters above sea level.

mbgs - Meters below ground surface.

MW - Monitoring Well.

TH - Test hole.

VW - Soil Vapour Well.

-- - No value.

Table 2: Groundwater Monitoring Results

Monitoring Well		GW-01	GW-03	MW-01	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	21MW-08	21MW-09
Total Drilled Depth (m)		16.8	6.1	4.6	4.6	10.7	8.7	7.5	9.2	6.1	6.0	6.0
Top of Screened Interval (mbg)		0.5	0.5	2.5	2.5	7.6	5.6	4.4	6.1	1.5	3.0	3.0
Bottom of Screened Interval (mbg)		5.6	6.1	4.6	4.6	10.7	8.7	7.5	9.2	6.1	6.0	6.0
Stick up (m)		1.10	0.61	0.80	0.43	0.97	0.97	0.85	0.84	0.76	0.00	0.00
Ground Elevation (m)		883.69	877.58	876.98	877.85	877.17	876.01	872.45	877.91	877.41	873.08	874.29
TPC Elevation (m)		884.79	878.18	877.79	878.28	878.14	876.99	873.31	878.75	878.17	873.09	874.29
Depth to Groundwater (mBTPC)	Aug-13	Damaged	1.66	Damaged	CNO	4.89	6.02	2.07	2.79	2.76	N/A	N/A
	May-19	Damaged	N/M	Damaged	2.58	5.72	7.09	3.43	4.32	4.71	N/A	N/A
	Jun-19	Damaged	N/M	Damaged	2.58	5.70	7.09	3.44	4.22	4.70	N/A	N/A
	Sep-19	Damaged	N/M	Damaged	2.42	5.75	7.11	3.58	3.96	4.93	N/A	N/A
	Dec-19	Damaged	N/M	Damaged	2.78	5.74	7.11	3.78	4.05	4.85	N/A	N/A
	Jul-21	Damaged	N/M	Damaged	2.15	5.51	7.05	3.58	4.08	4.67	3.31	4.14
	Nov-21	Damaged	N/M	Damaged	2.75	5.46	7.09	3.75	4.03	5.13	3.41	4.42
	Jun-23	Damaged	N/M	Damaged	2.68	5.44	7.08	3.52	4.01	3.94	3.33	4.28
	Sep-24	Damaged	N/M	Damaged	2.63	5.65	7.13	3.75	3.96	4.91	3.36	4.37
Groundwater Elevation (m)	Aug-13	Damaged	875.91	Damaged	CNO	872.28	869.99	870.39	875.12	874.66	N/A	N/A
	May-19	Damaged	N/M	Damaged	875.70	872.41	869.90	869.88	874.44	873.47	N/A	N/A
	Jun-19	Damaged	N/M	Damaged	875.70	872.44	869.89	869.87	874.53	873.47	N/A	N/A
	Sep-19	Damaged	N/M	Damaged	875.86	872.39	869.88	869.72	874.80	873.25	N/A	N/A
	Dec-19	Damaged	N/M	Damaged	875.50	872.40	869.88	869.53	874.70	873.32	N/A	N/A
	Jul-21	Damaged	N/M	Damaged	876.13	872.62	869.93	869.73	874.68	873.50	869.77	870.15
	Nov-21	Damaged	N/M	Damaged	875.53	872.68	869.89	869.55	874.73	873.05	869.68	869.87
	Jun-23	Damaged	N/M	Damaged	875.60	872.70	869.90	869.78	874.74	874.23	869.76	870.00
	Sep-24	Damaged	N/M	Damaged	875.65	872.48	869.86	869.55	874.80	873.26	869.72	869.92
Volatile Organic Compounds* (VOCs) (ppm)	Aug-13	0	0	Damaged	CNO	89	4	ND	ND	ND	-	-
	May-19	N/M	N/M	Damaged	ND	ND	1	5	ND	ND	-	-
	Jun-19	N/M	N/M	Damaged	ND	ND	1	1	ND	15	-	-
	Sep-19	N/M	N/M	Damaged	ND	ND	1	5	ND	10	-	-
	Dec-19	N/M	N/M	Damaged	ND	ND	ND	2	1	ND	-	-
Combustile Vapour Concentrations* (CVC; ppm)	Aug-13	410	80	Damaged	CNO	2,450	45	230	ND	ND	-	-
	May-19	N/M	N/M	Damaged	ND	ND	ND	ND	ND	ND	-	-
	Jun-19	N/M	N/M	Damaged	ND	ND	ND	30	ND	35	-	-
	Sep-19	N/M	N/M	Damaged	ND	5	10	45	ND	ND	-	-
	Dec-19	N/M	N/M	Damaged	ND	5	5	5	5	50	-	-
Methane Concentrations** (ppm)	Jul-21	N/M	N/M	Damaged	200	160	85	ND	15	450	>50,000	>50,000
	Nov-21	N/M	N/M	Damaged	260	55	330	230	ND	ND	>50,000	>50,000
	Jun-23	N/M	N/M	Damaged	ND	110	ND	150	5	150	80	37% LEL
	Sep-24	Damaged	N/M	Damaged	ND	75	ND	ND	ND	ND	17750	93% LEL

Notes:

CNO - Could not open.
mbg - Metres below grade.
mBTPC - Metres below top of plastic pipe casing.
N/A - Not applicable; prior to well installation.
N/M - Not measured.
ND - Non-detect.
ppm - Parts per million.

GW01 and GW03 are no longer part of the current groundwater monitoring network.
*- Measured using RKI Eagle II calibrated to hexane and isobutylene and operated in methane elimination mode.
**- Measured using RKI Eagle II calibrated to methane.
The RKI Eagle detection limit ranges from 5 parts per million (ppm) to >100% of the lower explosive limit (LEL).
For methane, 500 ppm is equivalent to 1% LEL; 20% LEL is equivalent to 1% Gas.

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Table 3A: Groundwater Quality Monitoring and Analytical Results - General Water Quality

Parameter	Unit	GW-03	MW-02		MW-03			MW-04			MW-05				
		14-Aug-13	6-Dec-19	19-Nov-21	15-Aug-13	6-Dec-19	19-Nov-21	14-Aug-13	6-Dec-19	19-Nov-21	14-Aug-13	6-Dec-19	19-Nov-21	2-Jun-23	7-Sep-24
Field															
Field Temperature	°C	-	6.50	9.48	-	8.60	5.93	-	5.82	7.44	-	7.25	7.35	8.20	10.50
Field pH	pH Units	-	**9.07**	7.50	-	7.58	6.98	-	**8.77**	6.78	-	**9.32**	7.46	8.01	7.15
Field Electrical Conductivity (EC)	µS/cm	-	533	763	-	2,103	2,866	-	2,376	3,468	-	1,281	1,157	1,323	1,320
Routine															
pH	pH Units	7.48	8.14	8.21	7.76	7.37	7.56	7.11	7.01	7.32	6.92	7.96	8.14	7.98	7.85
Electrical Conductivity (EC)	µS/cm	1,300	744	747	1,000	2,580	3,190	4,900	3,840	3,770	2,600	1,350	1,300	1,300	1,180
Total Dissolved Solids (TDS)	mg/L	1,108	443	443	**899**	**949**	**2,010**	**3,736**	**1,490**	**2,280**	**2,072**	**836**	**840**	**881**	**816**
Hardness as CaCO3	mg/L	558	377	363	485	1,090	1,180	1,570	1,550	1,240	867	258	213	242	207
Alkalinity (total)	mg/L	620	428	395	530	1,150	1,490	1,700	1,580	1,500	1,100	658	570	548	550
Bicarbonate	mg/L	750	523	481	650	1,400	1,820	2,000	1,930	1,830	1,400	803	695	668	671
Carbonate	mg/L	<0.50	<5.0	<1.0	<0.50	<5.0	<1.0	<0.50	<5.0	<1.0	<0.50	<5.0	<1.0	<1.0	<1.0
Hydroxide	mg/L	<0.50	<5.0	<1.0	<0.50	<5.0	<1.0	<0.50	<5.0	<1.0	<0.50	<5.0	<1.0	<1.0	<1.0
Calcium	mg/L	120	66.4	65.4	120	287	293	200	186	160	150	61.6	51.3	59.7	50.1
Magnesium	mg/L	63.0	51.3	48.5	45.0	91.1	109	260	264	205	120	25.3	20.7	22.5	20
Potassium	mg/L	2.10	2.77	2.70	6.80	11.7	12.5	9.5	13.8	9.6	31.0	5.52	3.71	3.73	3.39
Sodium	mg/L	56.0	26.6	26.7	51.0	**275**	**310**	**450**	**431**	**354**	110	**217**	**235**	**254**	**220**
Chloride	mg/L	45.0	3.75	3.20	19.0	**271**	**330**	**770**	**593**	**520**	**200**	14.2	4.54	5.61	5.09
Fluoride	mg/L	-	0.35	0.43	-	<0.10	0.11	-	0.16	0.23	-	0.28	0.37	0.47	0.424
Sulphate	mg/L	66.0	19.7	18.3	<1.0	13.4	9.73	<1.0	<1.5	<3	<1.0	117	167	184	173
Ionic Balance	%	-	93.7	101	-	111	101	-	107	101	-	94.6	101	109	93.2
Nutrients															
Total Ammonia as N	mg/L	<0.050	<0.050	0.013	**1.30**	**4.56**	**6.22**	**22.0**	**22.9**	**19.9**	**77.0**	**5.80**	**1.07**	**4.68**	-
Nitrate (as NO3-N)	mg/L	**3.90**	**3.46**	**3.79**	**0.036**	<0.10	<0.10	0.065	0.14	<0.20	0.055	<0.10	<0.10	<0.020	<0.100
Nitrite (as NO2-N)	mg/L	0.025	<0.010	<0.010	0.0086	<0.050	<0.050	<0.0030	<0.050	<0.10	<0.015	<0.050	<0.050	<0.010	-
Nitrate and Nitrite (as N)	mg/L	3.90	3.46	-	0.044	<0.11	-	0.065	0.14	-	0.055	<0.11	-	<0.0224	<0.050
Total Kjeldahl Nitrogen (TKN)	mg/L	1.20	0.69	-	15.0	14.4	-	23.0	24.1	-	73.0	6.00	-	-	<0.112
Total Nitrogen	mg/L	5.20	-	-	15.0	-	-	23.0	-	-	73.0	-	-	-	-
Total Phosphorus	mg/L	0.74	0.105	-	24.0	3.61	-	0.65	0.783	-	0.60	0.34	-	-	-
Dissolved Phosphorus	mg/L	-	-	<0.050	-	-	<0.25	-	-	<0.50	-	-	<0.25	-	-
Carbon															
Dissolved Organic Carbon (DOC) (filtered)	mg/L	-	6.60	-	-	43.8	-	-	48.9	-	-	10.3	-	-	-
Total Organic Carbon (TOC)	mg/L	9.40	-	-	21.0	-	-	68.0	-	-	58.0	-	-	-	-
Biochemical Oxygen Demand (BOD)	mg/L	<2.0	-	-	14.0	-	-	35.0	-	-	41.0	-	-	-	-
Chemical Oxygen Demand (COD)	mg/L	35.0	-	-	110	-	-	240	-	-	220	-	-	-	-
Trace Organics															
Acetic Acid	mg/L	<50	<10	-	<50	<10	-	<50	<10	-	<50	<10	-	-	-
Butyric Acid (Butanoic Acid)	mg/L	-	<1	-	-	<1	-	-	<1	-	-	<1	-	-	-
Formic Acid	mg/L	<50	<50	-	<50	<50	-	<50	<50	-	<50	<50	-	-	-
Hexanoic Acid (Caproic Acid)	mg/L	-	<1	-	-	<1	-	-	<1	-	-	<1	-	-	-
iso-Butyric Acid	mg/L	-	<1.0	-	-	<1.0	-	-	<1.0	-	-	<1.0	-	-	-
Isovaleric acid (3-Methylbutanoic Acid)	mg/L	-	<1.0	-	-	<1.0	-	-	<1.0	-	-	<1.0	-	-	-
Propionic Acid	mg/L	<50	<5.0	-	<50	<5.0	-	<50	<5.0	-	<50	<5.0	-	-	-
Valeric Acid (Pentanoic Acid)	mg/L	-	<1	-	-	<1	-	-	<1	-	-	<1	-	-	-
Adsorbable Organic Halogen (AOX)	mg/L	0.083	<10	-	0.040	<10	-	1.22	<10	-	2.41	<10	-	-	-

Notes:

[1] Alberta Environment and Parks (AEP). 2024. *Alberta Tier 1 Soil and Groundwater Remediation Guidelines*. Land Policy Branch, Policy and Planning Division. 169 pp. Referenced guidelines are for coarse-textured soils under Residential/Parkland land use.

[#1] Guideline varies with hardness. Values shown based on site background hardness range of 363 mg/L to 760 mg/L.
[#2] Guideline varies with pH and temperature. Values shown based on site background field pH range of 7.04 to 7.50 and temperature range of 6.82°C to 9.48°C.
[#3] Guideline varies with chloride. Values shown based on site background chloride range of 3.20 mg/L to 16.0 mg/L.
[#4] Guideline varies with pH. Values shown based on site background pH range of 7.04 to 7.50.

"-" No applicable guideline.
"ND" Non-detected.
BOLD - Greater than Tier 1 Guideline.
N/A - Not applicable.

TETRA TECH

Table 3A: Groundwater Quality Monitoring and Analytical Results - General Water Quality

Parameter	Unit	Tier 1 Guideline [1]	MW-06		MW-07			21MW-08			21MW-09		
			6-Dec-19	19-Nov-21	13-Aug-13	6-Dec-19	19-Nov-21	19-Nov-21	2-Jun-23	7-Sep-24	19-Nov-21	2-Jun-23	7-Sep-24
Field													
Field Temperature	°C	-	5.89	6.78	-	5.30	6.82	8.00	8.20	13.9	7.01	9.90	12.2
Field pH	pH Units	6.5 to 8.5	**8.75**	6.51	-	**9.81**	7.04	6.64	8.05	**6.33**	6.66	8.05	**6.35**
Field Electrical Conductivity (EC)	µS/cm	-	2,671	2,487	-	734	1,084	2,919	3,440	3,310	3,738	3,750	4,160
Routine													
pH	pH Units	6.5-8.5	6.85	7.11	7.54	7.79	7.81	6.95	6.82	7.04	7.05	7.01	7.28
Electrical Conductivity (EC)	µS/cm	-	2,500	2,690	1,300	1,130	1,160	3,150	3,130	3,010	4,150	3,850	4,000
Total Dissolved Solids (TDS)	mg/L	500	**872**	**1,600**	**830**	**712**	**732**	**1,920**	**2,120**	**1,850**	**2,750**	**2,650**	**2,900**
Hardness as CaCO3	mg/L	-	1,230	1,180	760	634	590	1,210	1,490	1,230	1,590	1,450	1,760
Alkalinity (total)	mg/L	-	1,040	1,060	610	605	620	1,420	1,450	1,400	1,480	1,360	1,250
Bicarbonate	mg/L	-	1,270	1,300	750	738	757	1,730	1,770	1,710	1,800	1,660	1,530
Carbonate	mg/L	-	<5.0	<1.0	<0.50	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hydroxide	mg/L	-	<5.0	<1.0	<0.50	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Calcium	mg/L	-	240	222	160	144	132	208	248	211	362	281	430
Magnesium	mg/L	-	154	153	90.0	66.6	63.2	167	211	170	166	182	167
Potassium	mg/L	-	18.5	16.2	8.50	7.66	7.62	33	43.8	34.4	14.0	15.0	13.9
Sodium	mg/L	200	104	112	25.0	26.1	29.8	188	**233**	178	**382**	**398**	**378**
Chloride	mg/L	120	**335**	**329**	16.0	7.10	6.72	**316**	**322**	**314**	**510**	**482**	**478**
Fluoride	mg/L	1.5	<0.10	0.11	-	<0.10	0.10	0.11	0.14	0.13	<0.20	0.19	<0.200
Sulphate	mg/L	429[#1]	20.8	45.3	170	97.2	89.7	<1.5	8.37	<1.50	375	402	**642**
Ionic Balance	%	-	101	100	97.0	97.8	104	101	123	95.9	102	98.2	101
Nutrients													
Total Ammonia as N	mg/L	0.58[#2]	**17.9**	**16.7**	<0.050	0.13	0.33	**37.6**	**46.5**	-	**13.2**	**13.5**	-
Nitrate (as NO3-N)	mg/L	3	<0.10	<0.10	0.072	<0.10	<0.10	<0.10	<0.10	<0.100	<0.20	<0.10	<0.200
Nitrite (as NO2-N)	mg/L	0.08[#3]	<0.050	<0.050	<0.0030	<0.050	<0.050	<0.050	<0.050	<0.050	**<0.10**	<0.050	**<0.100**
Nitrate and Nitrite (as N)	mg/L	-	<0.11	-	0.072	<0.11	-	-	<0.112	<0.112	-	<0.112	<0.224
Total Kjeldahl Nitrogen (TKN)	mg/L	-	24.3	-	1.20	24.6	-	-	-	-	-	-	-
Total Nitrogen	mg/L	-	-	-	1.30	-	-	-	-	-	-	-	-
Total Phosphorus	mg/L	-	1.14	-	1.30	26.2	-	-	-	-	-	-	-
Dissolved Phosphorus	mg/L	-	-	0.32	-	-	<0.050	0.77	-	-	<0.50	-	-
Carbon													
Dissolved Organic Carbon (DOC) (filtered)	mg/L	-	24.7	-	-	5.60	-	-	-	-	-	-	-
Total Organic Carbon (TOC)	mg/L	-	-	-	10.0	-	-	-	-	-	-	-	-
Biochemical Oxygen Demand (BOD)	mg/L	-	-		<2.0	-	-	-	-	-	-	-	-
Chemical Oxygen Demand (COD)	mg/L	-	-		25.0	-	-	-	-	-	-	-	-
Trace Organics													
Acetic Acid	mg/L	-	<10	-	<50	<10	-	-	-	-	-	-	-
Butyric Acid (Butanoic Acid)	mg/L	-	<1	-	-	<1	-	-	-	-	-	-	-
Formic Acid	mg/L	-	<50	-	<50	<50	-	-	-	-	-	-	-
Hexanoic Acid (Caproic Acid)	mg/L	-	<1	-	-	<1	-	-	-	-	-	-	-
iso-Butyric Acid	mg/L	-	<1.0	-	-	<1.0	-	-	-	-	-	-	-
Isovaleric acid (3-Methylbutanoic Acid)	mg/L	-	<1.0	-	-	<1.0	-	-	-	-	-	-	-
Propionic Acid	mg/L	-	<5.0	-	<50	<5.0	-	-	-	-	-	-	-
Valeric Acid (Pentanoic Acid)	mg/L	-	<1	-	-	<1	-	-	-	-	-	-	-
Adsorbable Organic Halogen (AOX)	mg/L	-	<10	-	0.012	<10	-	-	-	-	-	-	-

Notes:

[1] Alberta Environment and Parks (AEP). 2024. *Alberta Tier 1 Soil and Groundwater Remediation Guidelines*. Land Policy Branch, Policy and Planning Division. 169 pp. Referenced guidelines are for coarse-textured soils under Residential/Parkland land use.

[#1] Guideline varies with hardness. Values shown based on site background hardness range of 363 mg/L to 760 mg/L.

[#2] Guideline varies with pH and temperature. Values shown based on site background field pH range of 7.04 to 7.50 and temperature range of 6.82°C to 9.48°C.

[#3] Guideline varies with chloride. Values shown based on site background chloride range of 3.20 mg/L to 16.0 mg/L.

[#4] Guideline varies with pH. Values shown based on site background pH range of 7.04 to 7.50.

"-" No applicable guideline.
"ND" Non-detected.
BOLD - Greater than Tier 1 Guideline.
N/A - Not applicable.

Table 3B: Groundwater Analytical Results - Dissolved Metals

Parameter	Unit	Tier 1 Guideline [1]	GW-03	MW-02		MW-03			MW-04			MW-05				
			14-Aug-13	6-Dec-19	19-Nov-21	15-Aug-13	6-Dec-19	19-Nov-21	14-Aug-13	6-Dec-19	19-Nov-21	14-Aug-13	6-Dec-19	19-Nov-21	2-Jun-23	7-Sep-24
Dissolved Metals																
Aluminum	mg/L	0.05[#4]	<0.0030	0.0019	0.0010	<0..015	0.015	0.0065	<0.015	<0.0010	<0.010	<0.015	0.0058	0.010	0.0020	<0.0010
Antimony	mg/L	0.006	<0.00060	<0.00010	<0.00010	<0.0030	0.00048	<0.00050	<0.0030	0.00023	<0.0010	<0.0030	<0.00010	<0.00050	<0.00010	<0.00010
Arsenic	mg/L	0.005	0.00037	0.00035	0.00031	**0.014**	**0.0073**	**0.013**	**0.044**	0.0041	**0.055**	**0.043**	**0.0072**	**0.0099**	**0.014**	**0.0102**
Barium	mg/L	2	0.13	0.15	0.13	1.50	0.25	0.29	1.40	1.14	1.36	0.78	0.11	0.049	0.036	0.0400
Beryllium	mg/L	-	<0.0010	-	<0.000020	<0.0050	-	<0.00010	<0.0050	-	<0.00020	<0.0050	-	<0.00010	-	-
Bismuth	mg/L	-	-	-	<0.000050	-	-	<0.00025	-	-	<0.00050	-	-	<0.00025	-	-
Boron	mg/L	1.5	0.094	0.076	0.080	0.048	0.39	0.46	0.38	0.38	0.39	0.39	0.23	0.22	0.23	0.205
Cadmium	mg/L	0.00037[#1]	**0.00048**	0.000017	0.000020	<0.00025	0.000096	<0.000025	<0.000025	<0.0000050	<0.000050	<0.000025	<0.0000050	<0.000025	<0.0000050	<0.0000050
Chromium	mg/L	0.05	<0.0010	<0.00010	<0.00050	<0.0050	0.00079	<0.0025	<0.0050	0.00076	<0.0050	<0.0050	0.00025	<0.0025	<0.00050	<0.00050
Cobalt	mg/L	-	<0.00030	-	<0.00010	0.0031	-	0.0037	0.0042	-	0.0032	0.0085	-	<0.00050	-	-
Copper	mg/L	0.007	0.0046	0.0012	0.0013	0.0024	0.0049	<0.0010	<0.0010	0.0035	<0.0020	<0.0010	0.00027	<0.0010	0.00030	<0.00020
Iron	mg/L	0.3	<0.060	<0.010	<0.010	**1.90**	**8.63**	**13.7**	**40.0**	0.10	**42.9**	**56.0**	**2.32**	**1.23**	**1.18**	**1.02**
Lead	mg/L	0.007[#1]	<0.00020	<0.000050	<0.000050	<0.0010	0.0021	<0.00025	<0.0010	<0.000050	<0.00050	<0.0010	0.00012	<0.00025	<0.000050	0.000058
Lithium	mg/L	-	0.13	-	0.084	<0.020	-	0.14	0.058	-	0.060	0.031	-	0.032	-	-
Manganese	mg/L	0.02	0.0041	0.0054	0.0062	**1.00**	**0.63**	**0.73**	**0.30**	**0.38**	**0.30**	**0.36**	**0.19**	**0.17**	**0.19**	**0.177**
Mercury	mg/L	0.000005	-	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	-	0.00089	-	0.0012	0.0055	-	0.014	0.0016	-	0.0030	<0.0010	-	0.0080	-	-
Nickel	mg/L	0.17[#1]	0.0017	0.0013	0.0015	0.0044	0.015	0.018	0.044	0.035	0.028	0.020	0.0013	<0.0025	<0.00050	<0.00050
Phosphorus	mg/L	-	<0.10	0.11	<0.050	<0.10	3.61	<0.25	0.35	0.78	<0.50	0.45	0.34	<0.25	-	-
Selenium	mg/L	0.002	0.00032	0.00039	0.00026	<0.0010	0.00022	0.00033	<0.0010	0.00040	0.00053	<0.0010	0.00013	<0.00025	<0.000050	0.000054
Silicon	mg/L	-	7.20	-	8.96	7.80	-	11.4	21.0	-	23.9	16.0	-	4.84	-	-
Silver	mg/L	0.00025	<0.00010	<0.000010	<0.000010	<0.00050	<0.000010	<0.000050	<0.00050	<0.000010	<0.00010	<0.00050	<0.000010	<0.000050	<0.000010	<0.000010
Strontium	mg/L	-	1.10	-	0.74	0.74	-	2.56	2.90	-	2.64	1.70	-	0.61	-	-
Thallium	mg/L	-	<0.00020	-	<0.000010	<0.0010	-	<0.000050	<0.0010	-	<0.00010	<0.0010	-	<0.000050	-	-
Tin	mg/L	-	<0.0010	-	<0.00010	<0.0050	-	0.00084	<0.0050	-	<0.0010	0.0078	-	<0.00050	-	-
Titanium	mg/L	-	<0.0010	-	<0.00030	<0.0050	-	<0.0015	<0.0050	-	<0.0030	<0.0050	-	<0.0015	-	-
Uranium	mg/L	0.015	**0.086**	**0.016**	0.015	0.00092	0.0015	0.0036	<0.0050	0.000048	<0.00010	<0.0050	0.0018	0.0029	0.0026	0.00298
Vanadium	mg/L	-	<0.0010	-	<0.00050	<0.0050	-	<0.0025	<0.0050	-	<0.0050	<0.0050	-	<0.0025	-	-
Zinc	mg/L	0.03	0.0035	<0.0010	0.0028	<0.015	0.030	<0.0050	<0.015	0.0018	<0.010	<0.015	<0.0010	<0.0050	0.0012	0.0016

Notes:

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[#1] Guideline varies with hardness. Values shown based on site hardness range of 213 mg/L to 1,590 mg/L.

[#2] Guideline varies with pH and temperature. Values shown based on field pH range of 6.51 to 9.81 and temperature range of 5.30°C to 9.90°C. An average temperture of 6.15°C was used to calculate the appropriate guideline for MW-03.

[#3] Guideline varies with chloride. Values shown based on site chloride range of 3.20 mg/L to 593 mg/L.

[#4] Guideline varies with pH. Values shown based on site pH range of 6.51 to 9.81.

"-" No applicable guideline.
"ND" Non-detected.
BOLD - Greater than Tier 1 Guideline.
N/A - Not applicable.

TETRA TECH

Table 3B: Groundwater Analytical Results - Dissolved Metals

Parameter	Unit	Tier 1 Guideline [1]	MW-06		MW-07			21MW-08			21MW-09		
			6-Dec-19	19-Nov-21	13-Aug-13	6-Dec-19	19-Nov-21	19-Nov-21	2-Jun-23	7-Sep-24	19-Nov-21	2-Jun-23	7-Sep-24
Dissolved Metals													
Aluminum	mg/L	0.05[#4]	0.0042	0.021	<0.0030	0.0022	0.0016	0.019	0.022	0.0156	0.013	0.0054	<0.0050
Antimony	mg/L	0.006	0.00024	<0.00050	<0.00060	0.00017	0.00011	<0.00050	0.00028	0.00026	<0.0010	0.00026	<0.00050
Arsenic	mg/L	0.005	**0.012**	**0.0087**	0.00031	0.00050	0.0035	**0.022**	**0.018**	**0.0219**	0.0044	**0.0053**	0.00334
Barium	mg/L	2	0.58	0.51	0.21	0.20	0.18	1.01	1.23	1.12	0.31	0.32	0.0866
Beryllium	mg/L	-	-	<0.00010	<0.0010	-	<0.000020	<0.00010	-	-	<0.00020	-	-
Bismuth	mg/L	-	-	<0.00025	-	-	<0.000050	<0.00025	-	-	<0.00050	-	-
Boron	mg/L	1.5	0.23	0.24	0.030	0.059	0.068	0.35	0.31	0.366	0.39	0.21	0.380
Cadmium	mg/L	0.00037[#1]	<0.0000050	<0.000025	0.000032	0.000080	0.000020	<0.000025	<0.0000050	<0.0000100	0.00018	0.000095	0.000237
Chromium	mg/L	0.05	0.00067	<0.0025	<0.0010	<0.00010	<0.00050	<0.0025	0.0016	0.00135	<0.0050	0.0011	<0.00250
Cobalt	mg/L	-	-	0.0027	<0.00030	-	0.0078	0.0078	-	-	0.014	-	-
Copper	mg/L	0.007	0.00021	<0.0010	0.0023	0.0062	0.0011	<0.0010	0.00026	0.00095	<0.0020	0.00083	0.00289
Iron	mg/L	0.3	**24.8**	**24.4**	**0.17**	0.019	**1.13**	**59.6**	**72.1**	**59.2**	**3.88**	**13.5**	**3.09**
Lead	mg/L	0.007[#1]	0.000066	<0.00025	<0.00020	0.00020	<0.000050	<0.00025	0.00014	<0.000100	<0.00050	<0.000050	<0.000250
Lithium	mg/L	-	-	0.13	0.059	-	0.067	0.048	-	-	0.16	-	-
Manganese	mg/L	0.02	**2.91**	**2.93**	0.0084	**0.39**	**2.99**	**0.61**	**0.80**	**0.722**	**4.45**	**4.61**	**4.44**
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	-	-	0.00067	0.00088	-	0.0014	0.00074	-	-	0.0014	-	-
Nickel	mg/L	0.17[#1]	0.015	0.015	0.0015	0.0058	0.025	0.010	0.010	0.0107	0.046	0.035	0.0404
Phosphorus	mg/L	-	1.14	0.32	<0.10	26.2	<0.050	0.77	-	-	<0.50	-	-
Selenium	mg/L	0.002	0.00035	0.00030	0.00061	0.000052	0.000088	0.00058	0.00082	0.000577	<0.00050	0.00073	0.000613
Silicon	mg/L	-	-	14.3	8.10	-	9.85	17.3	-	-	11.9	-	-
Silver	mg/L	0.00025	<0.000010	<0.000050	<0.00010	<0.000010	<0.000010	<0.000050	0.000011	<0.000020	<0.00010	0.000014	<0.000050
Strontium	mg/L	-	-	2.37	0.88	-	0.95	2.21	-	-	2.96	-	-
Thallium	mg/L	-	-	<0.000050	<0.00020	-	0.000082	<0.000050	-	-	<0.00010	-	-
Tin	mg/L	-	-	0.0011	<0.0010	-	0.00016	0.0014	-	-	<0.0010	-	-
Titanium	mg/L	-	-	0.0020	<0.0010	-	<0.00030	0.0031	-	-	<0.0030	-	-
Uranium	mg/L	0.015	0.0061	0.0082	0.014	**0.017**	0.015	0.00030	0.000097	0.000432	**0.016**	0.0073	**0.0166**
Vanadium	mg/L	-	-	<0.0025	<0.0010	-	<0.00050	<0.0025	-	-	<0.0050	-	-
Zinc	mg/L	0.03	0.0015	0.0063	0.0054	0.0040	0.0041	0.0052	0.0031	0.0046	<0.010	0.0099	0.0138

Notes:

[1] Alberta Environment and Parks (AEP). 2024. *Alberta Tier 1 Soil and Groundwater Remediation Guidelines*. Land Policy Branch, Policy and Planning Division. 169 pp. Referenced guidelines are for coarse-textured soils under Residential/Parkland land use.

[#1] Guideline varies with hardness. Values shown based on site hardness range of 213 mg/L to 1,590 mg/L.

[#2] Guideline varies with pH and temperature. Values shown based on field pH range of 6.51 to 9.81 and temperature range of 5.30°C to 9.90°C. An average temperture of 6.15°C was used to calculate the appropriate guideline for MW-03.

[#3] Guideline varies with chloride. Values shown based on site chloride range of 3.20 mg/L to 593 mg/L.

[#4] Guideline varies with pH. Values shown based on site pH range of 6.51 to 9.81.

"-" No applicable guideline.
"ND" Non-detected.
BOLD - Greater than Tier 1 Guideline.
N/A - Not applicable.

Table 3C: Groundwater Analytical Results - Volatile Organic Compounds

Parameter	Unit	Tier 1 Guideline [1]	GW-03	MW-02	MW-03			MW-04			MW-05					MW-06		MW-07		21MW-08			21MW-09		
			14-Aug-13	6-Dec-19	15-Aug-13	6-Dec-19	19-Nov-21	14-Aug-13	6-Dec-19	19-Nov-21	14-Aug-13	6-Dec-19	19-Nov-21	2-Jun-23	7-Sep-24	6-Dec-19	19-Nov-21	13-Aug-13	6-Dec-19	19-Nov-21	2-Jun-23	7-Sep-24	19-Nov-21	2-Jun-23	7-Sep-24
Hydrocarbons																									
Benzene	mg/L	0.0050	<0.00040	<0.00050	<0.00040	0.0019	0.0016	**0.011**	**0.014**	**0.0095**	**0.0370**	0.0042	0.00053	<0.00050	<0.00050	**0.0090**	**0.0072**	<0.00040	<0.00050	**0.027**	**0.042**	**0.0389**	0.0024	0.0031	0.00176
Toluene	mg/L	0.021	<0.00040	<0.00050	<0.00040	0.0018	0.0016	0.0033	0.0016	0.00090	**0.040**	0.0018	<0.00050	<0.00050	<0.00050	0.0032	0.0015	<0.00040	<0.00050	0.0012	0.0031	0.00261	0.00061	0.00067	<0.00050
Ethylbenzene	mg/L	0.0016	<0.00040	<0.00050	<0.00040	**0.0019**	**0.0025**	0.0015	0.00084	0.00076	**0.046**	**0.0045**	**0.0017**	<0.00050	<0.00050	**0.013**	**0.015**	<0.00040	<0.00050	**0.0047**	**0.0065**	**0.00423**	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	<0.00040	<0.00050	<0.00040	<0.00050	0.00045	0.0023	0.0012	0.00095	0.086	0.0026	0.00060	<0.00030	<0.00030	0.0060	0.0070	<0.00040	<0.00050	0.0050	0.0058	0.00357	<0.00030	<0.00030	<0.00030
Xylenes (m & p)	mg/L	-	<0.00080	<0.00050	<0.00080	<0.00050	<0.00040	0.0036	0.0015	0.0010	0.17	0.0066	0.0011	<0.00040	<0.00040	0.020	0.022	<0.00080	<0.00050	0.0044	0.010	0.00704	<0.00040	<0.00040	<0.00040
Xylenes Total	mg/L	0.020	<0.00080	<0.00071	<0.00080	<0.00071	<0.00050	0.0062	0.0026	0.0020	**0.26**	0.0092	0.0017	<0.00050	<0.00050	**0.026**	**0.029**	<0.00080	<0.00071	0.0094	0.016	0.0106	<0.00050	<0.00050	<0.00050
Styrene	mg/L	0.072	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C6-C10_)	mg/L	-	<0.10	<0.10	<0.10	<0.10	<0.10	0.30	<0.10	<0.10	1.40	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.010	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.1
F1 (C6-C10) - BTEX	mg/L	0.81	<0.10	<0.10	<0.10	<0.10	<0.10	0.32	<0.10	<0.10	**0.99**	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.010	<0.10	<0.10	-	<0.1	<0.10	-	<0.1
F2 (C10-C16 Hydrocarbons)	mg/L	1.1	<0.10	<0.10	0.15	0.54	0.26	<0.10	0.10	0.15	**2.30**	0.31	<0.10	**1.39**	<0.1	0.51	0.29	<0.10	<0.10	0.23	0.30	0.24	<0.10	0.13	<0.1
Total BTEX	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0010	-	-	-	-	-	-	0.0564	-	-	0.0018
Polycyclic Aromatic Hydrocarbons (PAHs)																									
Naphthalene	mg/L	0.0010	-	-	-	-	**0.0013**	-	-	<0.0010	-	-	**0.0032**	-	-	-	**0.0017**	-	-	**0.0036**	-	-	<0.0010	-	-
Volatile Organic Compounds (VOCs)																									
Bromobenzene	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromochloromethane	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromodichloromethane	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromoform	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane	mg/L	-	<0.0020	<0.0010	<0.0020	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
n-Butylbenzene	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
sec-Butylbenzene	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
tert-Butylbenzene	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Carbon tetrachloride	mg/L	0.0015	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Chlorobenzene	mg/L	0.0013	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	0.00097	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.045	0.040	0.018	0.0055	<0.0010	<0.0010	<0.0010	<0.0010	0.0079	0.0033	<0.0010	<0.0010	0.0020	0.0018	0.0012	<0.0010	<0.0010	<0.0010
Chloroform	mg/L	0.018	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloromethane	mg/L	-	<0.0020	<0.0010	<0.0020	<0.0010	<0.005	<0.0020	<0.0010	<0.0050	<0.0020	<0.0010	<0.0050	<0.0050	<0.0050	<0.0010	<0.0050	<0.0020	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2-Chlorotoluene	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Chlorotoluene	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dibromochloromethane	mg/L	0.19	<0.0010	<0.00050	<0.0010	<0.00050	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dibromo-3-chloropropane	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dibromoethane	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dibromomethane	mg/L	-	-	<0.00050	-	<0.00050	<0.0010	-	<0.00050	<0.0010	-	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	-	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/L	0.0007	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	**0.0025**	**0.0040**	**0.0014**	0.00067	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	**0.0011**	**0.0010**	**0.00090**	<0.00050	<0.00050	<0.00050
1,3-Dichlorobenzene	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/L	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00055	0.00074	<0.0010	**0.0020**	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethane	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	0.0011	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloroethane	mg/L	0.005	<0.00050	<0.0010	<0.00050	<0.0010	<0.0010	**0.0094**	**0.011**	**0.0068**	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0025	0.0014	<0.00050	<0.0010	0.0016	0.0017	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethene	mg/L	0.014	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloroethene (cis)	mg/L	-	<0.00050	<0.0010	0.0017	1.75	1.29	1.70	2.11	1.35	3.00	0.0014	<0.0010	<0.0010	<0.0010	0.029	0.020	<0.00050	<0.0010	1.14	0.091	0.0170	1.45	0.64	0.431
1,2-Dichloroethene (trans)	mg/L	-	<0.00050	<0.00050	<0.00050	0.011	0.0064	<0.00050	0.041	0.025	<0.00050	0.00060	<0.0010	<0.0010	<0.0010	0.0049	0.0030	<0.00050	<0.00050	0.016	0.016	0.0146	0.036	0.045	0.0290
Dichlorodifluoromethane	mg/L	-	-	<0.00050	-	0.00067	<0.0010	-	0.0039	<0.0010	-	<0.00050	<0.0010	<0.0010	<0.0010	0.079	0.014	-	<0.00050	<0.0010	<0.0010	<0.0010	0.0011	0.0016	0.0011
1,2-Dichloropropane	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<1.60	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropane	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2,2-Dichloropropane	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloropropene	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropene	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0015	-	-	-	-	-	-	<0.0015	-	-	<0.0015
1,3-Dichloropropene [cis]	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropene [trans]	mg/L	-	<0.00050	<0.0010	<0.00050	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Hexachlorobutadiene	mg/L	0.0013	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
p-Isopropyltoluene	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Methyl t-Butyl Ether (MTBE)	mg/L	0.015	<0.00050	-	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Methylene Chloride (Dichloromethane)	mg/L	0.05	<0.0020	<0.0010	<0.0020	0.0023	0.0016	0.0078	0.0051	0.0030	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	0.0017	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	0.0014
iso-Propylbenzene (cumene)	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
n-Propylbenzene	mg/L	-	-	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1,2-Tetrachloroethane	mg/L	-	<0.0020	<0.0010	<0.0020	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/L	-	<0.0020	<0.00050	<0.0020	<0.00050	<0.0010	<0.0020	<0.00050	<0.0010	<0.0020	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0020	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethene	mg/L	0.01	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,3-Trichlorobenzene	mg/L	0.008	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,4-Trichlorobenzene	mg/L	0.015	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1-Trichloroethane	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichloroethene	mg/L	0.00032	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	**0.00077**	**0.0010**	<0.0010	**0.00062**	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichlorofluoromethane	mg/L	-	<0.00050	<0.0010	<0.00050	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trihalomethanes, Total	mg/L	0.1	<0.0020	-	<0.0020	-	<0.0020	<0.0020	-	<0.0020	<0.0020	-	<0.0020	<0.0020	<0.0020	-	<0.0020	<0.0020	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
1,2,3-Trichloropropane	mg/L	-	-	<0.00050	-	<0.00050	<0.0010	-	<0.00050	<0.0010	-	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	-	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,4-Trimethylbenzene	mg/L	-	<0.00050	<0.0010	<0.00050	<0.0010	<0.0010	0.00059	<0.0010	<0.0010	0.089	0.0058	0.0016	<0.0010	<0.0010	0.0089	0.0040	<0.00050	<0.0010	0.0024	0.0050	0.0030	<0.0010	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/L	-	<0.00050	<0.0010	<0.00050	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	0.017	<0.0010	<0.0010	<0.0010	<0.0010	0.0014	<0.0010	<0.00050	<0.0010	0.0012	0.0022	0.0011	<0.0010	<0.0010	<0.0010
Vinyl chloride	mg/L	0.0011	<0.00050	<0.00050	<0.00050	**0.014**	**0.077**	**0.011**	**0.026**	**0.12**	**0.47**	**0.0029**	<0.0010	<0.0010	<0.0010	**0.091**	**0.036**	<0.00050	<0.00050	**0.019**	**0.021**	**0.0030**	**0.0077**	**0.078**	**0.0483**

Notes:

[1] Alberta Environment and Parks (AEP). 2024. *Alberta Tier 1 Soil and Groundwater Remediation Guidelines.* Land Policy Branch, Policy and Planning Division. 169 pp.
Referenced guidelines are for coarse-textured soils under Residential/Parkland land use.

"-" No applicable guideline.
"ND" Non-detected.

BOLD - Greater than Tier 1 Guideline.
N/A - Not applicable.

TETRA TECH

Table 4: Groundwater Quality Assurance/Quality Control Analytical Results

Paramaters	Unit	RDL	MW-05	DUPLICATE	RPD (%)
			7-Sep-24	7-Sep-24	
Routine					
pH	pH Units	0.1	7.85	-	-
Electrical Conductivity (EC)	µS/cm	1	1,180	-	-
Total Dissolved Solids (TDS)	mg/L	1	816	-	-
Hardness as $CaCO_3$	mg/L	0.5	207	-	-
Alkalinity (total as $CaCO_3$)	mg/L	1	550	-	-
Alkalinity (Bicarbonate as $CaCO_3$)	mg/L	1	671	-	-
Alkalinity (Carbonate as $CaCO_3$)	mg/L	1	<1.0	-	-
Alkalinity (Hydroxide) as $CaCO_3$	mg/L	1	<1.0	-	-
Calcium	mg/L	0.05	50.1	52.1	4
Magnesium	mg/L	0.005	20	20	0
Potassium	mg/L	0.05	3.39	3.48	3
Sodium	mg/L	0.05	220	222	0.9
Chloride	mg/L	2.5	5.09	-	-
Fluoride	mg/L	0.1	0.424	-	-
Sulphate	mg/L	1.5	173	-	-
Anions Total	meq/L	0.1	14.8	-	-
Cations Total	meq/L	0.1	13.8	-	-
Cation - Anion Balance	%	0.01	-3.5	-	-
Ionic Balance	%	0.01	93.2	-	-
Dissolved Metals					
Aluminum	mg/L	0.001	<0.0010	0.001	-
Antimony	mg/L	0.0001	<0.00010	<0.00010	-
Arsenic	mg/L	0.0001	0.0102	0.00946	8
Barium	mg/L	0.0001	0.04	0.0427	7
Boron	mg/L	0.01	0.205	0.209	2
Cadmium	mg/L	0.000005	<0.0000050	<0.0000050	-
Chromium	mg/L	0.0005	<0.00050	<0.00050	-
Copper	mg/L	0.0002	<0.00020	<0.00020	-
Iron	mg/L	0.01	1.02	0.911	11
Lead	mg/L	0.00005	0.000058	0.000062	-
Manganese	mg/L	0.0001	0.177	0.179	1
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	-
Nickel	mg/L	0.0005	<0.00050	<0.00050	-
Selenium	mg/L	0.00005	0.000054	<0.000050	-
Silver	mg/L	0.00001	<0.000010	<0.000010	-
Uranium	mg/L	0.00001	0.00298	0.00296	0.7
Zinc	mg/L	0.001	0.0016	0.0014	-

Notes:

RDL - Reportable detection limit.

RPD - Relative Percentage Difference calculated as
RPD(%)=(|V1-V2|)/[(V1+V2)/2])*100
where V1,V2 = concentrations of parent and duplicate sample, respectively.

N/A - Not applicable.

BOLD - RPD value greater than 20%.

"-" Indicates RPD not calculated. RPDs have only been considered where both concentrations are greater than 5 times the RDL.

Table 5A: Surface Water Quality Monitoring and Analytical Results - General Water Quality

Parameter	Unit	Guideline[1]	SW-01 DOWNSTREAM						SW-02 UPSTREAM					SW-03 DOWNSTREAM
			13-Jul-21	9-Sep-21	10-Nov-22	7-Sep-24	16-Oct-25	16/Oct/25 DUP	13-Jul-21	9-Sep-21	10-Nov-22	7-Sep-24	16-Oct-25	16-Oct-25
Field Parameters														
Field pH	pH Units	6.5-9	-	8.43	8.35	8.14	7.94	-	-	7.99	8.83	7.84	7.98	8.25
Field Temperature	°C	-	-	16.72	-0.3	20.5	10.43	-	-	13.88	-0.1	18.7	9.47	5.91
Field Electrical Conductivity	µS/cm	-	-	1,004	1,734	1,038	905	-	-	1,034	2,350	1,318	928	807
Routine														
pH	pH Units	6.5-9	8.28	8.47	8.15	8.49	8.49	8.46	8.41	8.41	8.17	8.28	8.51	8.46
Electrical Conductivity (EC)	µS/cm	-	1,130	1,140	1,210	950	876	872	1,110	1,260	1,200	1,240	912	797
Total Dissolved Solids (TDS)	mg/L	-	680	664	793	568	500	499	672	763	786	761	520	454
Hardness as CaCO3	mg/L	-	457	469	552	414	390	385	440	573	550	565	400	336
Alkalinity (total as CaCO3)	mg/L	20	**390**	**325**	**460**	**317**	**298**	**300**	**386**	**413**	**462**	**445**	**315**	**276**
Bicarbonate	mg/L	-	475	364	561	368	334	337	442	474	563	537	351	310
Carbonate	mg/L	-	<5.0	15.7	<1.0	8.9	14.3	14.3	14.3	14.9	<1.0	2.8	16.4	13.6
Hydroxide	mg/L	-	<5.0	<5.0	<1.0	<1.0	<0.3	<0.3	<5.0	<5.0	<1.0	<1.0	<0.3	<0.3
Calcium	mg/L	-	93.5	77.4	120	74.2	80.9	79.8	89.6	119	119	117	82.2	70.9
Magnesium	mg/L	-	54.4	67.0	61.2	57.3	45.7	45.2	52.5	67.0	61.4	72	47.4	38.7
Potassium	mg/L	-	6.56	7.18	8.83	5.58	5.18	5.11	6.49	7.06	8.84	6.66	5.41	4.5
Sodium	mg/L	-	78.1	76.2	86.7	60	47.3	46.7	78.1	74.5	86.5	72.2	47.3	44.1
Chloride	mg/L	120	120	**146**	**139**	115	90	90	119	**146**	**136**	**141**	90.6	80.2
Fluoride	mg/L	-	0.20	0.14	0.20	0.228	0.168	0.158	0.20	0.16	0.20	0.187	0.155	0.17
Sulphate	mg/L	429[#1]	87.2	90.5	75.0	60.2	36.6	36.6	90.1	92.8	70.9	63.3	38.3	36.2
Anions Total	meq/L	-	-	-	-	-	9.31	9.35	-	-	-	-	9.71	8.59
Cations Total	meq/L	-	-	-	-	-	9.99	9.87	-	-	-	-	10.2	8.76
Cation - Anion Balance	%	-	-	-	-	-	3.52	2.71	-	-	-	-	2.46	0.98
Ionic Balance	%	-	97.1	102	101	101	107	106	94.8	103	103	102	105	102
Nutrients														
Ammonia as N	mg/L	0.29-0.95[#2]	-	<0.050	0.087	-	-	-	-	0.058	0.079	-	-	-
Nitrate (as NO3-N)	mg/L	3	1.34	1.01	1.41	0.642	0.612	0.611	0.90	1.96	1.36	1.64	0.716	0.655
Nitrite (as NO2-N)	mg/L	0.2[#3]	<0.050	<0.050	<0.050	<0.050	0.024	0.023	<0.050	<0.050	<0.050	<0.050	0.064	0.025
Nitrate and Nitrite (as N)	mg/L	-	1.34	1.01	1.41	0.642	0.636	0.634	0.90	1.96	1.36	1.64	0.78	0.68

Notes:

[1] Government of Alberta. 2018. *Environmental Quality Guidelines for Alberta Surface Waters*. Water Policy Branch, Alberta Environment and Parks. Edmonton, Alberta.
Table 1: Surface water quality guidelines for the protection of freshwater aquatic life (PAL). Most conservative values applied (chronic or acute).

[#1] Guideline varies with hardness. Values shown based on hardness range of 336 mg/L to 573 mg/L.

[#2] Guideline varies with pH and temperature. Values shown based on pH range of 7.84 to 8.83 and temperature range of -0.3°C 20.5°C.

[#3] Guideline varies with chloride. Values shown based on chloride range of 80.2 mg/L to 146 mg/L.

"-" No applicable guideline.

BOLD - Greater than Tier 1 Guideline.

N/A - Not applicable.

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Table 5B: Surface Water Analytical Results - Total Metals

Parameter	Unit	Guideline[1]	SW-01 DOWNSTREAM						SW-02 UPSTREAM					SW-03 DOWNSTREAM
			13-Jul-21	9-Sep-21	10-Nov-22	7-Sep-24	16-Oct-25	16/Oct/25 DUP	13-Jul-21	9-Sep-21	10-Nov-22	7-Sep-24	16-Oct-25	16-Oct-25
Dissolved Metals														
Iron	mg/L	0.3	-	-	-	-	0.035	0.034	-	-	-	-	0.143	0.052
Manganese	mg/L	-	-	-	-	-	0.0732	0.0724	-	-	-	-	0.373	0.0918
Total Metals														
Aluminum	mg/L	0.05[#4]	0.039	0.0090	0.028	0.0468	0.0419	0.0438	0.019	**0.055**	**0.059**	**0.448**	**0.0587**	**0.0606**
Antimony	mg/L	-	0.00023	0.00034	0.00023	0.00035	0.00046	0.00044	0.00023	0.00047	0.00021	0.00035	0.00041	0.00049
Arsenic	mg/L	0.005	0.0033	0.0016	0.0012	0.00121	0.00096	0.00099	0.0024	0.0022	0.0018	0.00217	0.00161	0.00106
Barium	mg/L	-	0.20	0.22	0.20	0.166	0.17	0.169	0.17	0.31	0.20	0.277	0.192	0.157
Boron	mg/L	1.5	0.063	0.084	0.078	0.088	0.065	0.065	0.061	0.085	0.082	0.107	0.075	0.059
Cadmium	mg/L	0.00037[#1]	0.000017	<0.0000050	<0.0000050	0.0000057	0.0000072	0.0000076	0.000069	0.000012	0.000013	0.0000195	0.0000089	0.0000069
Calcium	mg/L	-	-	-	-	-	81	79.7	-	-	-	-	83.3	72.7
Chromium	mg/L	0.001	-	-	-	-	<0.00050	<0.00050	-	-	-	-	<0.00050	<0.00050
Chromium, Trivalent (Cr^{3+})	mg/L	0.0089	0.00015	0.00014	<0.00050	<0.00050	-	-	0.00013	0.00022	<0.00050	0.00076	-	-
Copper	mg/L	0.052-0.088[#1]	0.0011	0.0014	0.0012	0.00148	0.00169	0.0017	0.0012	0.0019	0.0012	0.00174	0.00172	0.00189
Iron	mg/L	0.3	**0.35**	0.23	**0.36**	0.164	**0.334**	**0.346**	0.18	**0.53**	**0.55**	**0.95**	**0.566**	**0.381**
Lead	mg/L	0.007[#1]	0.00013	<0.000050	0.000054	0.000074	0.000077	0.000081	0.000089	0.00010	0.000090	0.000749	0.000101	0.000171
Magnesium	mg/L	-	-	-	-	-	43.9	43.9	-	-	-	-	45	38
Manganese	mg/L	-	0.089	0.019	0.043	0.0115	0.0792	0.0792	0.017	0.10	0.090	0.152	0.383	0.0998
Mercury	mg/L	0.000005	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Nickel	mg/L	0.15-0.23[#1]	0.0026	0.0026	0.0031	0.00232	0.00318	0.00323	0.0024	0.0029	0.0031	0.0039	0.00379	0.00301
Potassium	mg/L	-	-	-	-	-	5.02	5.02	-	-	-	-	5.27	4.46
Selenium	mg/L	0.002	0.00050	0.00081	0.00033	0.000385	0.000166	0.000194	0.00040	0.00085	0.00038	0.000527	0.000212	0.000167
Silver	mg/L	0.00025	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	-	-	-	-	-	46.1	45.9	-	-	-	-	46	42.5
Uranium	mg/L	0.015	0.0055	0.0082	0.0059	0.00637	0.00433	0.00444	0.0050	0.0082	0.0059	0.00812	0.00453	0.00376
Zinc	mg/L	0.03	0.011	0.0030	0.0082	0.0062	0.0257	0.0255	0.0059	0.014	0.011	**0.132**	**0.122**	0.03

Notes:

[1] Government of Alberta. 2018. *Environmental Quality Guidelines for Alberta Surface Waters*. Water Policy Branch, Alberta Environment and Parks. Edmonton, Alberta.
Table 1: Surface water quality guidelines for the protection of freshwater aquatic life (PAL). Most conservative values applied (chronic or acute).

[#1] Guideline varies with hardness. Values shown based on hardness range of 336 mg/L to 573 mg/L.

[#4] Guideline varies with pH. Values shown based on pH range of 7.99 to 8.51.

"-" No applicable guideline.

BOLD - Greater than Tier 1 Guideline.

N/A - Not applicable.

TETRA TECH

Table 5C: Surface Water Analytical Results - Volatile Organic Compounds

Parameter	Unit	Guideline[1]	SW-01 DOWNSTREAM						SW-02 UPSTREAM					SW-03 DOWNSTREAM
			13-Jul-21	9-Sep-21	10-Nov-22	7-Sep-24	16-Oct-25	16/Oct/25 DUP	13-Jul-21	9-Sep-21	10-Nov-22	7-Sep-24	16-Oct-25	16-Oct-25
Hydrocarbons														
Benzene	mg/L	0.04	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	0.09	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylene (o)	mg/L	-	<0.00050	<0.00050	<0.00030	<0.00030	<0.00030	<0.00030	<0.00050	<0.00050	<0.00030	<0.00030	<0.00030	<0.00030
Xylenes (m & p)	mg/L	-	<0.00050	<0.00050	<0.00040	<0.00040	<0.00040	<0.00040	<0.00050	<0.00050	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes Total	mg/L	0.03	<0.00071	<0.00071	<0.00050	<0.00050	<0.00050	<0.00050	<0.00071	<0.00071	<0.00050	<0.00050	<0.00050	<0.00050
Styrene	mg/L	0.072	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
F1 (C6-C10_)	mg/L	-	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1
F1 (C6-C10) - BTEX	mg/L	0.15	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1
F2 (C10-C16 Hydrocarbons)	mg/L	0.11	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1
Total BTEX	mg/L	-	-	-	<0.0010	<0.0010	-	-	-	-	<0.0010	<0.0010	-	-
Volatile Organic Compounds (VOCs)														
Bromobenzene	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromochloromethane	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromodichloromethane	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
Bromoform	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
n-Butylbenzene	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
sec-Butylbenzene	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
tert-Butylbenzene	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Carbon tetrachloride	mg/L	0.0133	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050
Chlorobenzene	mg/L	0.0013	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	mg/L	0.0018	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
Chloromethane	mg/L	-	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050
2-Chlorotoluene	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Chlorotoluene	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dibromochloromethane	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dibromo-3-chloropropane	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dibromoethane	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
Dibromomethane	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/L	0.0007	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
1,3-Dichlorobenzene	mg/L	0.15	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/L	0.026	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethane	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloroethane	mg/L	0.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethene	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloroethene (cis)	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloroethene (trans)	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
Dichlorodifluoromethane	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloropropane	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropane	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2,2-Dichloropropane	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloropropene	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropene	mg/L	-	-	-	<0.0015	<0.0015	<0.0015	<0.0015	-	-	<0.0015	<0.0015	<0.0015	<0.0015
1,3-Dichloropropene [cis]	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropene [trans]	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Hexachlorobutadiene	mg/L	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
p-Isopropyltoluene	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Methyl t-Butyl Ether (MTBE)	mg/L	10	-	-	<0.00050	<0.00050	<0.00050	<0.00050	-	-	<0.00050	<0.00050	<0.00050	<0.00050
Methylene Chloride	mg/L	0.0981	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
iso-Propylbenzene (cumene)	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
n-Propylbenzene	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1,2-Tetrachloroethane	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethene	mg/L	0.11	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,2,3-Trichlorobenzene	mg/L	0.008	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,4-Trichlorobenzene	mg/L	0.024	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1-Trichloroethane	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
Trichloroethene	mg/L	0.021	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
Trichlorofluoromethane	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trihalomethanes	mg/L	-	-	-	<0.0020	<0.0020	<0.0020	<0.0020	-	-	<0.0020	<0.0020	<0.0020	<0.0020
1,2,3-Trichloropropane	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
1,2,4-Trimethylbenzene	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/L	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Vinyl chloride	mg/L	-	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010

Notes:

[1] Government of Alberta. 2018. *Environmental Quality Guidelines for Alberta Surface Waters*. Water Policy Branch, Alberta Environment and Parks. Edmonton, Alberta.
Table 1: Surface water quality guidelines for the protection of freshwater aquatic life (PAL). Most conservative values applied (chronic or acute).

[#1] Guideline varies with hardness. Values shown based on hardness range of 440 mg/L to 573 mg/L.

[#2] Guideline varies with pH and temperature. Values shown based on pH range of 7.99 to 8.43 and temperature range of -0.3°C 16.7°C.

[#3] Guideline varies with chloride. Values shown based on chloride range of 119 mg/L to 146 mg/L.

[#*] Guideline varies with pH. Values shown based on pH range of 7.99 to 8.43.

"-" No applicable guideline.

BOLD - Greater than Tier 1 Guideline.

N/A - Not applicable.

Table 6: Surface Water Quality Assurance/Quality Control Analytical Results

Paramaters	Unit	RDL	SW-01	DUPLICATE	RPD (%)
			16-Oct-25	16-Oct-25	
Routine					
pH	pH Units	0.1	8.49	8.46	0.4
Electrical Conductivity (EC)	µS/cm	1	876	872	0.5
Total Dissolved Solids (TDS)	mg/L	1	500	499	0.2
Dissolved Hardness as $CaCO_3$	mg/L	0.5	390	385	1
Alkalinity (total as $CaCO_3$)	mg/L	1	298	300	1
Alkalinity (Bicarbonate)	mg/L	1	334	337	1
Alkalinity (Carbonate)	mg/L	1	14.3	14.3	0
Hydroxide	mg/L	1	<0.3	<0.3	-
Calcium	mg/L	0.05	80.9	79.8	1
Magnesium	mg/L	0.005	45.7	45.2	1
Potassium	mg/L	0.05	5.18	5.11	1
Sodium	mg/L	0.05	47.3	46.7	1.3
Chloride	mg/L	2.5	90	90	0
Fluoride	mg/L	0.1	0.168	0.158	-
Sulphate	mg/L	1.5	36.6	36.6	0
Anions Total	meq/L	0.1	9.31	9.35	0.4
Cations Total	meq/L	0.1	9.99	9.87	1
Nutrients					
Nitrate (as NO_3-N)	mg/L	0.02	0.612	0.611	0.2
Nitrite (as NO_2-N)	mg/L	0.01	0.024	0.023	-
Nitrate and Nitrite (as N)	mg/L	0.05	0.636	0.634	0.3

Notes:

RDL - Reportable detection limit.

RPD - Relative Percentage Difference calculated as RPD(%)=(|V1-V2|)/[(V1+V2)/2])*100 where V1,V2 = concentrations of parent and duplicate sample, respectively.

"-" Indicates RPD not calculated. RPDs have only been considered where both concentrations are greater than 5 times the RDL.

N/A - Not applicable.

BOLD - RPD value greater than 20%.

Table 6: Surface Water Quality Assurance/Quality Control Analytical Results

Paramaters	Unit	RDL	SW-01	DUPLICATE	RPD (%)
			16-Oct-25	16-Oct-25	
Dissolved Metals					
Iron	mg/L	0.01	0.035	0.034	-
Manganese	mg/L	0.0001	0.0732	0.0724	1
Total Metals					
Aluminum	mg/L	0.003	0.0419	0.0438	4
Antimony	mg/L	0.0001	0.00046	0.00044	-
Arsenic	mg/L	0.0001	0.00096	0.00099	3
Barium	mg/L	0.0001	0.17	0.169	1
Boron	mg/L	0.01	0.065	0.065	0
Cadmium	mg/L	0.000005	0.0000072	0.0000076	-
Calcium	mg/L	0.05	81	79.7	2
Chromium	mg/L	0.0005	<0.00050	<0.00050	-
Copper	mg/L	0.0005	0.00169	0.0017	-
Iron	mg/L	0.01	0.334	0.346	4
Lead	mg/L	0.00005	0.000077	0.000081	-
Magnesium	mg/L	0.005	43.9	43.9	0
Manganese	mg/L	0.0001	0.0792	0.0792	0
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	-
Nickel	mg/L	0.0005	0.00318	0.00323	2
Potassium	mg/L	0.05	5.02	5.02	0
Selenium	mg/L	0.00005	0.000166	0.000194	-
Silver	mg/L	0.00001	<0.000010	<0.000010	-
Sodium	mg/L	0.05	46.1	45.9	0.4
Uranium	mg/L	0.00001	0.00433	0.00444	3
Zinc	mg/L	0.003	0.0257	0.0255	1
Hydrocarbons					
Benzene	mg/L	0.0005	<0.00050	<0.00050	-
Toluene	mg/L	0.0005	<0.00050	<0.00050	-
Ethylbenzene	mg/L	0.0005	<0.00050	<0.00050	-
Xylene (o)	mg/L	0.0003	<0.00030	<0.00030	-
Xylenes (m & p)	mg/L	0.0004	<0.00040	<0.00040	-
Xylenes Total	mg/L	0.0005	<0.00050	<0.00050	-
Styrene	mg/L	0.0005	<0.00050	<0.00050	-
F1 (C_6-C_{10})	mg/L	0.1	<0.1	<0.1	-
F1 (C_6-C_{10}) - BTEX	mg/L	0.1	<0.1	<0.1	-
F2 (C_{10}-C_{16})	mg/L	0.1	<0.1	<0.1	-

Notes:

RDL - Reportable detection limit.

RPD - Relative Percentage Difference calculated as RPD(%)=(|V1-V2|)/[(V1+V2)/2])*100 where V1,V2 = concentrations of parent and duplicate sample, respectively.

"-" Indicates RPD not calculated. RPDs have only been considered where both concentrations are greater than 5 times the RDL.

N/A - Not applicable.

BOLD - RPD value greater than 20%.

Table 6: Surface Water Quality Assurance/Quality Control Analytical Results

Paramaters	Unit	RDL	SW-01	DUPLICATE	RPD (%)
			16-Oct-25	16-Oct-25	
Volatile Organic Compounds (VOCs)					
Bromobenzene	mg/L	0.001	<0.0010	<0.0010	-
Bromochloromethane	mg/L	0.001	<0.0010	<0.0010	-
Bromodichloromethane	mg/L	0.001	<0.0010	<0.0010	-
Bromoform	mg/L	0.001	<0.0010	<0.0010	-
Bromomethane	mg/L	0.001	<0.0010	<0.0010	-
n-Butylbenzene	mg/L	0.001	<0.0010	<0.0010	-
sec-Butylbenzene	mg/L	0.001	<0.0010	<0.0010	-
tert-Butylbenzene	mg/L	0.001	<0.0010	<0.0010	-
Carbon tetrachloride	mg/L	0.0005	<0.00050	<0.00050	-
Chlorobenzene	mg/L	0.001	<0.0010	<0.0010	-
Chloroethane	mg/L	0.001	<0.0010	<0.0010	-
Chloroform	mg/L	0.001	<0.0010	<0.0010	-
Chloromethane	mg/L	0.005	<0.0050	<0.0050	-
2-Chlorotoluene	mg/L	0.001	<0.0010	<0.0010	-
4-Chlorotoluene	mg/L	0.001	<0.0010	<0.0010	-
Dibromochloromethane	mg/L	0.001	<0.0010	<0.0010	-
1,2-Dibromo-3-chloropropane	mg/L	0.001	<0.0010	<0.0010	-
1,2-Dibromoethane	mg/L	0.001	<0.0010	<0.0010	-
Dibromomethane	mg/L	0.001	<0.0010	<0.0010	-
1,2-Dichlorobenzene	mg/L	0.0005	<0.00050	<0.00050	-
1,3-Dichlorobenzene	mg/L	0.001	<0.0010	<0.0010	-
1,4-Dichlorobenzene	mg/L	0.001	<0.0010	<0.0010	-
1,1-Dichloroethane	mg/L	0.001	<0.0010	<0.0010	-
1,2-Dichloroethane	mg/L	0.001	<0.0010	<0.0010	-
1,1-Dichloroethene	mg/L	0.001	<0.0010	<0.0010	-
1,2-Dichloroethene (cis)	mg/L	0.001	<0.0010	<0.0010	-
1,2-Dichloroethene (trans)	mg/L	0.001	<0.0010	<0.0010	-
Dichlorodifluoromethane	mg/L	0.001	<0.0010	<0.0010	-
1,2-Dichloropropane	mg/L	0.001	<0.0010	<0.0010	-
1,3-Dichloropropane	mg/L	0.001	<0.0010	<0.0010	-
2,2-Dichloropropane	mg/L	0.001	<0.0010	<0.0010	-
1,1-Dichloropropene	mg/L	0.001	<0.0010	<0.0010	-
1,3-Dichloropropene	mg/L	0.0015	<0.0015	<0.0015	-
1,3-Dichloropropene [cis]	mg/L	0.001	<0.0010	<0.0010	-
1,3-Dichloropropene [trans]	mg/L	0.001	<0.0010	<0.0010	-
Hexachlorobutadiene	mg/L	0.001	<0.0010	<0.0010	-
p-Isopropyltoluene	mg/L	0.001	<0.0010	<0.0010	-
Methyl t-Butyl Ether (MTBE)	mg/L	0.0005	<0.00050	<0.00050	-
Methylene Chloride	mg/L	0.001	<0.0010	<0.0010	-
iso-Propylbenzene (cumene)	mg/L	0.001	<0.0010	<0.0010	-
n-Propylbenzene	mg/L	0.001	<0.0010	<0.0010	-
1,1,1,2-Tetrachloroethane	mg/L	0.001	<0.0010	<0.0010	-
1,1,2,2-Tetrachloroethane	mg/L	0.001	<0.0010	<0.0010	-
Tetrachloroethene	mg/L	0.001	<0.0010	<0.0010	-
1,2,3-Trichlorobenzene	mg/L	0.001	<0.0010	<0.0010	-
1,2,4-Trichlorobenzene	mg/L	0.001	<0.0010	<0.0010	-
1,1,1-Trichloroethane	mg/L	0.001	<0.0010	<0.0010	-
1,1,2-Trichloroethane	mg/L	0.001	<0.0010	<0.0010	-
Trichloroethene	mg/L	0.001	<0.0010	<0.0010	-
Trichlorofluoromethane	mg/L	0.001	<0.0010	<0.0010	-
Trihalomethanes	mg/L	0.002	<0.0020	<0.0020	-
1,2,3-Trichloropropane	mg/L	0.001	<0.0010	<0.0010	-
1,2,4-Trimethylbenzene	mg/L	0.001	<0.0010	<0.0010	-
1,3,5-Trimethylbenzene	mg/L	0.001	<0.0010	<0.0010	-
Vinyl chloride	mg/L	0.001	<0.0010	<0.0010	-

Notes:

RDL - Reportable detection limit.

RPD - Relative Percentage Difference calculated as RPD(%)=(|V1-V2|)/[(V1+V2)/2])*100 where V1,V2 = concentrations of parent and duplicate sample, respectively.

"-" Indicates RPD not calculated. RPDs have only been considered where both concentrations are greater than 5 times the RDL.

N/A - Not applicable.

BOLD - RPD value greater than 20%.

Table 7: Soil Vapour Monitoring Results

Parameter	VW-01											
	15-Aug-13	9-May-19	26-Jun-19	1-Sep-19	6-Dec-19	28-May-21	9-Jul-21	8-Sep-21	19-Nov-21	1-Jun-23	5-Dec-24	13-Nov-25
Stickup (m)	0.91											
Ground Elevation (m)	877.33											
Top of Screened Interval (mbg)[1]	875.03											
Bottom of Screened Interval (mbg)[1]	874.73											
Well Diameter (mm)	25											
Screen Length (m)	0.3											
Depth to Bottom (mbtoc)[2]	3.36	3.36	3.36	3.48	3.49	3.41				3.37	3.36	3.37
Static Water Level (mbtoc)[2]	N/A	2.42	2.10	2.22	2.71	2.27	2.06	2.39	2.58	2.37	3.19	2.99
Static Water Level Elevation (m)[1]	N/A	875.82	876.14	876.03	875.53	875.97	876.18	875.85	875.66	875.87	875.05	875.25
Pressure (mmHg)[3]	N/A	0	0	0	0.60	-0.10	0	0.17	5.30	gas	0	-1.18
CH_4 (%)	N/A	0	0	0	0	0	0	0	0	Blinded	0	0
CO (ppm)[4]	N/A	0	0	0	0	0	0	1.00	0		0	0
CO_2 (%)	N/A	0	0	1.80	0.10	1.80	0.10	0.80	1.80		2.40	0.60
O_2 (%)	N/A	22.0	19.9	18.6	19.1	18.8	20.6	20.0	21.5		19.6	20.5
Balance (% v/v)	N/A	78.0	80.1	79.6	80.8	79.3	79.3	79.2	78.2		77.9	78.9
Blinded (Yes/No)	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

[1] m - Metres.

[2] mbtoc - Meters below top of casing.

[3] mmHg - Millimetre of mercury.

[4] ppm - Parts per million.

N/A - Not applicable - well can not be accessed to obtain measurement.

NS - Not surveyed.

Blinded - Top of well screen below water table.

Table 7: Soil Vapour Monitoring Results

Parameter	VW-02											
	15-Aug-13	9-May-19	26-Jun-19	1-Sep-19	6-Dec-19	28-May-21	9-Jul-21	8-Sep-21	19-Nov-21	1-Jun-23	5-Dec-24	13-Nov-25
Stickup (m)	0.70											
Ground Elevation (m)	877.19											
Top of Screened Interval (mbg)[1]	873.19											
Bottom of Screened Interval (mbg)[1]	872.89											
Well Diameter (mm)	25											
Screen Length (m)	0.30											
Depth to Bottom (mbtoc)[2]	4.94	4.94	5.90	5.02	0.75	5.20				4.89	4.88	4.89
Static Water Level (mbtoc)[2]	N/A	4.15	3.97	4.67	Dry	4.24	4.36	-	4.80	4.60	Dry	4.86
Static Water Level Elevation (m)[1]	N/A	873.74	873.92	873.22	Dry	873.65	873.54	-	873.09	873.29	Dry	873.03
Pressure (mmHg)[3]	N/A	0	0	0	0	0	0	0	0.05	0	0	0
CH_4 (%)	N/A	0	0	0	0	0	0	0	0	0	0	0
CO (ppm)[4]	N/A	0	8.00	0	0	1.00	1.00	1.00	0	0	0	0
CO_2 (%)	N/A	0.10	0	0	0.10	0.70	0.10	1.00	4.40	2.40	3.80	4.30
O_2 (%)	N/A	21.4	20.1	20.2	18.7	19.4	20.1	19.5	19.2	18.2	19.6	18.0
Balance (% v/v)	N/A	78.6	79.9	79.8	81.2	79.9	79.8	79.5	76.5	79.4	77.9	77.7
Blinded (Yes/No)	N/A	Yes	Yes	Yes	Yes	Yes	Yes	N/A	No	No	No	No

Notes:

[1] m - Metres.

[2] mbtoc - Meters below top of casing.

[3] mmHg - Millimetre of mercury.

[4] ppm - Parts per million.

N/A - Not applicable - well can not be accessed to obtain measurement.

NS - Not surveyed.

Blinded - Top of well screen below water table.

Table 7: Soil Vapour Monitoring Results

Parameter	VW-03											
	15-Aug-13	9-May-19	26-Jun-19	1-Sep-19	6-Dec-19	28-May-21	9-Jul-21	8-Sep-21	19-Nov-21	1-Jun-23	5-Dec-24	13-Nov-25
Stickup (m)	0.74											
Ground Elevation (m)	872.69											
Top of Screened Interval (mbg)[1]	870.29											
Bottom of Screened Interval (mbg)[1]	869.99											
Well Diameter (mm)	25.0											
Screen Length (m)	0.30											
Depth to Bottom (mbtoc)[2]	3.33	3.37	3.37	3.48	3.49	3.41				3.37	3.36	3.36
Static Water Level (mbtoc)[2]	-	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Static Water Level Elevation (m)[1]	-	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Pressure (mmHg)[3]	-	0	0	0	0	0	0	0	0.16	0.01	0	0
CH_4 (%)	5.50	2.00	3.40	2.00	0	3.40	5.00	7.30	5.60	2.00	4.50	3.00
CO (ppm)[4]	-	3.00	12.0	0	0	2.00	2.00	3.00	0	1.00	0	0
CO_2 (%)	15.1	14.3	11.0	5.20	1.30	15.4	17.6	21.4	19.5	16.8	20.0	20.6
O_2 (%)	8.00	0.40	6.30	15.8	19.8	0.20	0.10	0	0.30	0.20	0.0	0
Balance (% v/v)	71.8	83.3	79.3	77.0	78.8	81.0	77.3	71.3	74.7	80.1	75.5	76.4
Blinded (Yes/No)	No	No	No	No	No	No	No	No	No	No	No	No

Notes:

[1] m - Metres.

[2] mbtoc - Meters below top of casing.

[3] mmHg - Millimetre of mercury.

[4] ppm - Parts per million.

N/A - Not applicable - well can not be accessed to obtain measurement.

NS - Not surveyed.

Blinded - Top of well screen below water table.

Table 7: Soil Vapour Monitoring Results

Parameter	VW-04											
	15-Aug-13	9-May-19	26-Jun-19	1-Sep-19	6-Dec-19	28-May-21	9-Jul-21	8-Sep-21	19-Nov-21	1-Jun-23	5-Dec-24	13-Nov-25
Stickup (m)	1.02											
Ground Elevation (m)	877.45											
Top of Screened Interval (mbg)[1]	875.35											
Bottom of Screened Interval (mbg)[1]	875.05											
Well Diameter (mm)	25											
Screen Length (m)	0.30											
Depth to Bottom (mbtoc)[2]	3.40	3.57	3.36	3.37	3.48	3.44				3.36	3.34	3.36
Static Water Level (mbtoc)[2]	-	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Static Water Level Elevation (m)[1]	-	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Pressure (mmHg)[3]	-	0	0.01	0	0	0	0	0	0.06	-0.01	-0.01	0
CH_4 (%)	0	0	0.40	0	0	0	0.50	0	0	0	0.10	0
CO (ppm)[4]	-	1.00	20.0	0	0	0	1.00	0	0	0	0	0
CO_2 (%)	2.30	2.10	0.40	3.90	0.40	2.30	3.20	4.80	3.90	1.30	3.60	3.80
O_2 (%)	20.7	20.0	19.7	18.0	20.2	18.7	17.7	16.5	19.4	19.6	19.1	19.4
Balance (% v/v)	77.0	78.0	80.8	78.1	79.4	79.0	78.7	78.7	76.6	79.1	77.2	76.8
Blinded (Yes/No)	-	No	No	No	No	No	No	No	No	No	No	No

Notes:

[1] m - Metres.

[2] mbtoc - Meters below top of casing.

[3] mmHg - Millimetre of mercury.

[4] ppm - Parts per million.

N/A - Not applicable - well can not be accessed to obtain measurement.

NS - Not surveyed.

Blinded - Top of well screen below water table.

Table 7: Soil Vapour Monitoring Results

Parameter	VW-05											
	15-Aug-13	9-May-19	26-Jun-19	1-Sep-19	6-Dec-19	28-May-21	9-Jul-21	8-Sep-21	19-Nov-21	1-Jun-23	5-Dec-24	13-Nov-25
Stickup (m)	1.00											
Ground Elevation (m)	877.72											
Top of Screened Interval (mbg)[1]	875.62											
Bottom of Screened Interval (mbg)[1]	875.32											
Well Diameter (mm)	25											
Screen Length (m)	0.30											
Depth to Bottom (mbtoc)[2]	3.34	3.37	3.37	3.48	3.48	3.41				3.36	3.36	3.37
Static Water Level (mbtoc)[2]	N/A	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	3.33	3.35
Static Water Level Elevation (m)[1]	N/A	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	875.40	875.37
Pressure (mmHg)[3]	N/A	0	0.01	0	0	0	0	0	0.03	-0.01	0	0
CH_4 (%)	N/A	64.8	66.6	63.9	6.10	31.6	15.9	59.2	52.1	21.5	53.3	54.6
CO (ppm)[4]	N/A	45.0	29.4	0	0	27.0	18.0	58.0	40.0	77.0	51.0	18.0
CO_2 (%)	N/A	29.8	31.2	35.8	4.50	16.6	8.40	33.9	28.6	18.9	27.9	30.2
O_2 (%)	N/A	0.60	0.40	0.10	18.1	10.0	15.6	1.00	3.80	7.20	3.90	2.70
Balance (% v/v)	N/A	4.60	1.10	0.20	71.2	41.8	60.0	5.10	15.8	52.6	15.0	12.4
Blinded (Yes/No)	N/A	No	No	No	No	No	No	No	No	No	No	No

Notes:

[1] m - Metres.

[2] mbtoc - Meters below top of casing.

[3] mmHg - Millimetre of mercury.

[4] ppm - Parts per million.

N/A - Not applicable - well can not be accessed to obtain measurement.

NS - Not surveyed.

Blinded - Top of well screen below water table.

Table 7: Soil Vapour Monitoring Results

Parameter	22VW-06		
	1-Jun-23	5-Dec-24	13-Nov-25
Stickup (m)	-0.02		
Ground Elevation (m)	NS		
Top of Screened Interval (mbg)[1]	NS		
Bottom of Screened Interval (mbg)[1]	NS		
Well Diameter (mm)	25		
Screen Length (m)	0.30		
Depth to Bottom (mbtoc)[2]	2.21	2.20	2.18
Static Water Level (mbtoc)[2]	Dry	Dry	Dry
Static Water Level Elevation (m)[1]	Dry	Dry	Dry
Pressure (mmHg)[3]	-0.01	-0.01	0
CH_4 (%)	0	0	0
CO (ppm)[4]	0	0	0
CO_2 (%)	2.70	1.90	6.10
O_2 (%)	8.10	19.7	17.6
Balance (% v/v)	84.1	78.3	76.3
Blinded (Yes/No)	No	No	No

Notes:

[1] m - Metres.

[2] mbtoc - Meters below top of casing.

[3] mmHg - Millimetre of mercury.

[4] ppm - Parts per million.

N/A - Not applicable - well can not be accessed to obtain measurement.

NS - Not surveyed.

Blinded - Top of well screen below water table.

Table 8: Soil Vapour Analytical Results

Location Code		Generic Soil Vapour Criteria - Residential Coarse-Grained ($\mu g/m^3$)[1]	VW-01	VW-01	VW-02	VW-02	VW-02	VW-02	DUPLICATE	VW-02	VW-03	VW-03	VW-03	VW-03	DUPLICATE	VW-03	VW-03
Field ID			VW-01	VW-01	VW-02	VW-02	VW-02	VW-02	DUPLICATE	VW-02	VW-03	VW-03	VW-03	VW-03	DUPLICATE	VW-03	VW-03
Sample Date			06 Dec 2019	19 Nov 2021	06 Dec 2019	19 Nov 2021	01 Jun 2023	05 Dec 2024	05 Dec 2024	11 Nov 2025	13 Aug 2013	06 Dec 2019	19 Nov 2021	01 Jun 2023	01 Jun 2023	05 Dec 2024	11 Nov 2025
Lab Report Number			L2393575	L2671030	L2393575	L2671030	CG2307273	CG2418080	CG2418080	CG2516684	SR7630	L2393575	L2671030	CG2307273	CG2307273	CG2418080	CG2516684
Laboratory ID			L2393575-1 / L2393575-7	L2671030-1	L2393575-2 / L2393575-8	L2671030-2	CG2307273-001	CG2418080-001	CG2418080-004	CG2516684-001	B3D6164	L2393575-3 / L2393575-9	L2671030-3	CG2307273-002	CG2307273-004	CG2418080-002	CG2516684-002
Parameter	**Unit**																
Field Tests																	
Air Volume	L	-	0.06	-	0.06	-	-	-	-	-	-	0.06	-	-	-	-	-
Initial Pressure / Pressure on Receipt	in Hg	-	-5.3	-10.0	-10.2	-3.50	-7.56	-11	-10.4	-2.05	-4.00	-8.80	-8.00	-9.19	-8.99	-10.20	-7.76
Aliphatic/Aromatic PHC Sub-Fractionation																	
Aliphatics (>C_5-C_6)	$\mu g/m^3$	-	-	-	-	-	-	-	-	-	176	-	-	-	-	-	-
Aliphatics (C_6-C_8)	$\mu g/m^3$	740,737	73	-	45	-	19	146	70	18	231	615	-	362	368	493	614
Aliphatics (>C_8-C_{10})	$\mu g/m^3$	40,257	101	-	27	-	29	75	59	58	68.4	223	-	339	351	304	300
Aliphatics (>C_{10}-C_{12})	$\mu g/m^3$	40,257	17	-	<15	-	22	16	<15	<15	226	<30	-	150	157	55	180
Aliphatics (>C_{12}-C_{16})	$\mu g/m^3$	40,257	<30	-	<30	-	<30	<30	<30	<30	58.6	65	-	17	15	22	<30
Aromatics (C_6-C_8)	$\mu g/m^3$	805	<15	-	<15	-	<15	22	<15	<15	<5.0	65	-	16	<15	23	<15
Aromatics (>C_8-C_{10})	$\mu g/m^3$	805	<15	-	<15	-	<15	<15	<15	<15	50.7	<15	-	<15	<15	<15	<15
Aromatics (>C_{10}-C_{12})	$\mu g/m^3$	8,051	<15	-	<15	-	<15	<15	<15	<15	62.5	<30	-	<30	<30	<30	<15
Aromatics (>C_{12}-C_{16})	$\mu g/m^3$	8,051	<30	-	<30	-	<30	<30	<30	<30	<5.0	-	-	-	-	794	<30
CWS TVOC (C_6-C_8)	$\mu g/m^3$	NG	-	-	-	-	-	168	70	18	-	-	-	-	-	794	614
CWS TVOC (>C_8-C_{10})	$\mu g/m^3$	NG	-	-	-	-	-	75	59	58	-	-	-	-	-	516	300
CWS TVOC (>C_{10}-C_{12})	$\mu g/m^3$	NG	-	-	-	-	-	16	<15	<15	-	-	-	-	-	304	180
CWS TVOC (>C_{12}-C_{16})	$\mu g/m^3$	NG	-	-	-	-	-	<30	<30	<30	-	-	-	-	-	55	<30
Linear & Cyclic Methyl Siloxanes																	
Hexamethylcyclotrisiloxane, D3 (CVMS)	$\mu g/m^3$	NG	<170	-	<170	-	-	-	-	-	-	<170	-	-	-	-	-
Octamethylcyclotetrasiloxane, D4 (CVMS)	$\mu g/m^3$	NG	<170	-	<170	-	-	-	-	-	-	<170	-	-	-	-	-
Decamethylcyclopentasiloxane, D5 (CVMS)	$\mu g/m^3$	NG	<170	-	<170	-	-	-	-	-	-	<170	-	-	-	-	-
Dodecamethylcyclohexasiloxane, D6 (CVMS)	$\mu g/m^3$	NG	<170	-	210	-	-	-	-	-	-	<170	-	-	-	-	-
Hexamethyldisiloxane, MM (LVMS)	$\mu g/m^3$	NG	<170	-	<170	-	-	-	-	-	-	<170	-	-	-	-	-
Octamethyltrisiloxane, MDM (LVMS)	$\mu g/m^3$	NG	<170	-	<170	-	-	-	-	-	-	<170	-	-	-	-	-
Decamethyltetrasiloxane, MD2M (LVMS)	$\mu g/m^3$	NG	<170	-	<170	-	-	-	-	-	-	<170	-	-	-	-	-
Dodecamethylpentasiloxane, MD3M (LVMS)	$\mu g/m^3$	NG	<170	-	320	-	-	-	-	-	-	<170	-	-	-	-	-
Hydrocarbons																	
Benzene	$\mu g/m^3$	41	9.62	3.06	1.41	0.77	5.08	14.3	4.28	1.15	2.19	11.6	<15	11.5	10.9	18.8	13
Toluene	$\mu g/m^3$	75,190	18.7	3.0	1.05	0.76	0.75	15.8	5.05	1.51	10.6	8.91	<36	6.9	6.1	8.93	3.54
Ethylbenzene	$\mu g/m^3$	68,650	<0.87	96.2	<0.87	<0.87	<0.43	1.56	0.78	<0.43	5.69	2.42	<42	0.56	<0.43	1.91	0.74
Xylenes (m & p)	$\mu g/m^3$	NG	3.1	129	<1.7	<1.7	<0.43	4.6	2.95	1.39	25.2	35	<84	1.3	0.87	6.9	2.65
Xylene (o)	$\mu g/m^3$	NG	<0.87	3.28	<0.87	<0.87	<0.87	1.48	1.08	0.48	10.1	7.62	<42	3.43	1.04	2.34	1.17
Xylenes Total	$\mu g/m^3$	3,520	3.1	132	<2.0	<2.0	<1.3	6.1	4	1.9	35.2	42.7	<96	4.7	1.9	9.2	3.8
Styrene	$\mu g/m^3$	3,220	<0.85	<0.85	<0.85	<0.85	<0.85	<0.94	<0.89	<0.85	0.86	<0.85	<41	<0.85	<0.85	<0.89	<0.85
Total BTEX	$\mu g/m^3$	NG	-	-	-	-	-	37.8	14.2	0.0045	53.7	-	-	-	-	38.9	0.0211
F1 (C_6-C_{10})	$\mu g/m^3$	867,383	175	2420	63	387	53	227	126	76	580	1,410	9820	816	782	1220	808
F1 (C_6-C_{10}) - BTEX	$\mu g/m^3$	867,383	-	-	-	-	-	-	-	0.072	-	-	-	-	-	-	0.787
F2 (C_{10}-C_{16})	$\mu g/m^3$	52,495	38	737	<15	77	30	28	29	<15	347	375	<720	530	551	447	218
F2-NAPHTHALENE	$\mu g/m^3$	52,495	-	-	-	-	-	-	-	<15	-	-	-	-	-	-	218
Alcohols																	
Ethanol	$\mu g/m^3$	-	-	-	-	-	-	-	-	-	270	-	-	-	-	-	-
Isopropanol	$\mu g/m^3$	6,219	3.6	-	<2.5	-	-	-	-	-	8.64	<2.5	-	-	-	-	-
High Level Fixed Gases																	
Nitrogen	%	NG	79.7	76.9	78	76.8	78.8	70.8	72.6	72.8	71.8	74	73.3	80.2	80.3	74	69.4
Oxygen	%	NG	21.5	22.2	21.1	21.2	20.4	18	19.1	-	8.00	2.58	1.64	2.42	2.43	1.8	-
Carbon Dioxide	%	NG	0.190	0.164	0.404	2.08	0.548	2.93	3.08	-	15.1	16.1	19.1	15.6	15.7	17.6	-
Carbon Monoxide	%	NG	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	<0.20	<0.050	<0.050	<0.050	<0.050	<0.050	-
Methane	%	NG	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	5.20	4.63	5.14	3.36	3.37	3.42	2.49
Hydrocarbon Gases (C_1 to C_5)																	
Methane	%	NG	0.00026	0.00017	0.00023	<0.00010	<0.050	-	-	-	-	-	-	3.36	3.37	-	-
Ethane	%	NG	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-	-	-	<0.00020	<0.00020	-	-	-	-
Ethene	%	NG	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-	-	-	<0.00020	<0.00020	-	-	-	-
Propane	%	NG	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-	-	-	<0.00020	<0.00020	-	-	-	-
Propene	%	NG	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-	-	-	<0.00020	<0.00020	-	-	-	-
Butane	%	NG	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-	-	-	<0.00020	<0.00020	-	-	-	-
Pentane	%	NG	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-	-	-	<0.00020	<0.00020	-	-	-	-

Table 8: Soil Vapour Analytical Results

Location Code		Generic Soil Vapour Criteria - Residential Coarse-Grained ($\mu g/m^3$)[1]	VW-01		VW-02						VW-03						
Field ID			VW-01	VW-01	VW-02	VW-02	VW-02	VW-02	DUPLICATE	VW-02	VW-03	VW-03	VW-03	VW-03	DUPLICATE	VW-03	VW-03
Sample Date			06 Dec 2019	19 Nov 2021	06 Dec 2019	19 Nov 2021	01 Jun 2023	05 Dec 2024	05 Dec 2024	11 Nov 2025	13 Aug 2013	06 Dec 2019	19 Nov 2021	01 Jun 2023	01 Jun 2023	05 Dec 2024	11 Nov 2025
Lab Report Number			L2393575	L2671030	L2393575	L2671030	CG2307273	CG2418080	CG2418080	CG2516684	SR7630	L2393575	L2671030	CG2307273	CG2307273	CG2418080	CG2516684
Laboratory ID			L2393575-1 / L2393575-7	L2671030-1	L2393575-2 / L2393575-8	L2671030-2	CG2307273-001	CG2418080-001	CG2418080-004	CG2516684-001	B3D6164	L2393575-3 / L2393575-9	L2671030-3	CG2307273-002	CG2307273-004	CG2418080-002	CG2516684-002
Parameter	**Unit**																
Polycyclic Aromatic Hydrocarbons (PAHs)																	
Naphthalene	$\mu g/m^3$	380	<2.6	<1.0	<2.6	<1.0	<0.52	0.94	0.94	<0.52	-	<2.6	<50	<0.52	<0.52	0.94	<0.52
Volatile Organic Compounds (VOCs)																	
1,1,1-Trichloroethane	$\mu g/m^3$	1,693,510	<1.1	<1.1	<1.1	<1.1	<1.1	<1.2	<1.1	<1.1	<1.64	<1.1	<52	<1.1	<1.1	<1.1	<1.1
1,1,2,2-Tetrachloroethane	$\mu g/m^3$	11	<1.4	<1.4	<1.4	<1.4	<1.4	<1.5	<1.4	<1.4	<1.37	<1.4	<66*	<1.4	<1.4	<1.4	<1.4
1,1,2-Trichloroethane	$\mu g/m^3$	7	<1.1	<1.1	<1.1	<1.1	<1.1	<1.2	<1.1	<1.1	<0.818	<1.1	<52*	<1.1	<1.1	<1.1	<1.1
1,1-Dichloroethane	$\mu g/m^3$	430	<0.81	<0.81	<0.81	<0.81	<0.81	<0.89	<0.85	<0.81	<0.809	<0.81	<39	<0.81	<0.81	<0.85	<0.81
1,1-Dichloroethene	$\mu g/m^3$	6,470	<0.79	<0.79	<0.79	<0.79	<0.79	<0.87	<0.83	<0.79	<0.991	<0.79	<38	<0.79	<0.79	<0.83	<0.79
1,2,4-Trichlorobenzene	$\mu g/m^3$	365	<1.5	<1.5	<1.5	<1.5	<1.5	<1.6	<1.6	<1.5	<14.8	<1.5	<71	<1.5	<1.5	<1.6	<1.5
1,2,4-Trimethylbenzene	$\mu g/m^3$	2,235	<0.98	14.7	<0.98	0.99	<1.0	2	1.9	<1.0	11.3	7.07	<47	1.2	<1.0	3.3	2.2
1,2-Dibromoethane	$\mu g/m^3$	2.2	<1.5	<1.5	<1.5	<1.5	<1.5	<1.7	<1.6	<1.5	<1.31	<1.5	<74*	<1.5	<1.5	<1.6	<1.5
1,2-Dichlorobenzene	$\mu g/m^3$	7,072	<1.2	<1.2	<1.2	<1.2	<1.2	<1.3	<1.3	<1.2	<2.40	<1.2	<58	<1.2	<1.2	<1.3	<1.2
1,2-Dichloroethane	$\mu g/m^3$	24	<0.81	<0.81	<0.81	<0.81	<0.81	<0.89	<0.85	<0.81	<0.809	<0.81	<39*	<0.81	<0.81	<0.85	<0.81
1,2-Dichloroethene (cis)	$\mu g/m^3$	242	<0.79	1.05	<0.79	<0.79	<0.79	<0.87	<0.83	<0.79	5.45	**3,140**	**3400**	**1,820**	**2,000**	**3,210**	**2,580**
1,2-Dichloroethene (trans)	$\mu g/m^3$	1,400	<0.79	<0.79	<0.79	<0.79	<0.79	<0.87	<0.83	<0.79	<0.793	116	229	156	163	210	223
1,2-Dichloropropane	$\mu g/m^3$	135	<0.92	<0.92	<0.92	<0.92	<0.9	<1.0	<1.0	<0.9	<1.85	<0.92	<44	<0.9	<0.9	<1.0	<0.9
1,2-Dichlorotetrafluoroethane	$\mu g/m^3$	566,335	<1.4	<1.4	<1.4	<1.4	<1.4	<1.5	<1.5	<1.4	76.7	48.3	<67	26.8	20.5	18	10.4
1,3,5-Trimethylbenzene	$\mu g/m^3$	2,235	<0.98	12.9	<0.98	<0.98	<1.0	<1.1	<1.0	<1.0	6.77	3.24	<47	1.1	<1.0	1.5	<1.0
1,3-Butadiene	$\mu g/m^3$	17	<0.44	<0.44	<0.44	<0.44	<0.44	<0.49	<0.46	<0.44	<1.11	<0.44	<21*	<3.27	<1.77	<3.54	<3.76
1,3-Dichlorobenzene	$\mu g/m^3$	64	<1.2	<1.2	<1.2	<1.2	<1.2	<1.3	<1.3	<1.2	<2.40	<1.2	<58	<1.2	<1.2	<1.3	<1.2
1,3-Dichloropropene	$\mu g/m^3$	NG	-	-	-	-	-	<2.0	<1.9	<1.8	-	-	-	-	-	<1.9	<1.8
1,3-Dichloropropene [cis]	$\mu g/m^3$	163	<0.91	<0.91	<0.91	<0.91	<0.9	<1.0	<1.0	<0.9	<0..817	<0.91	<44	<0.9	<0.9	<1.0	<0.9
1,3-Dichloropropene [trans]	$\mu g/m^3$	149	<0.91	<0.91	<0.91	<0.91	<0.9	<1.0	<1.0	<0.9	<0.772	<0.91	<44	<0.9	<0.9	<1.0	<0.9
1,4-Dichlorobenzene	$\mu g/m^3$	64	<1.2	<1.2	<1.2	<1.2	<1.2	<1.3	<1.3	<1.2	<2.40	<1.2	<58	<1.2	<1.2	<1.3	<1.2
1,4-Dioxane	$\mu g/m^3$	105	<0.72	<0.72	<0.72	<0.72	<0.72	<0.79	<0.76	<0.72	<7.21	<0.72	<35	<0.72	<0.72	<0.76	<0.72
1-Methyl-4 ethyl benzene	$\mu g/m^3$	14,461	<0.98	6.52	<0.98	<0.98	<1.0	<1.1	<1.0	<1.0	<10.8	1.59	<47	<1.0	<1.0	1.2	<1.0
Methyl Butyl Ketone (MBK; 2-Hexanone)	$\mu g/m^3$	1,053	<4.1	<4.1	<4.1	<4.1	<4.10	<4.51	<4.10	<4.10	<8.19	<5.4	<200	<5.74	<5.74	7.37	<4.10
Methyl Ethyl Ketone (MEK, 2-Butanone)	$\mu g/m^3$	167,364	1.67	1.2	0.78	1.01	2.03	<0.65	0.65	<0.59	<8.85	0.87	<28	<0.59	<0.59	0.86	<0.71
Methyl Isobutyl Ketone (MIBK)	$\mu g/m^3$	102,977	<0.82	<0.82	<0.82	<0.82	<0.82	<0.90	<0.86	<0.82	<13.1	<0.82	<39	<5.16	<5.24	<0.86	<0.82
Acetone (2-Propanone)	$\mu g/m^3$	918,788	22.8	4.5	8.0	2.7	16.6	5.2	5.2	9.5	61.2	<9.8	<57	<17.8	<14.5	3.1	2.6
Allyl chloride	$\mu g/m^3$	32	<0.63	<0.63	<0.63	<0.63	<0.63	<0.69	<0.66	<0.63	-	<0.63	<30	<0.63	<0.63	<0.66	0.97
Benzyl chloride	$\mu g/m^3$	34	<1.0	<1.0	<1.0	<1.0	<1.0	<1.1	<1.1	<1.0	<5.18	<1.0	<50*	<1.0	<1.0	<1.1	<1.0
Bromodichloromethane	$\mu g/m^3$	28	<1.3	<1.3	<1.3	<1.3	<1.3	<1.5	<1.4	<1.3	<1.34	<1.3	<64*	<1.3	<1.3	<1.4	<1.3
Bromoform	$\mu g/m^3$	1,494	<2.1	<2.1	<2.1	<2.1	<2.1	<2.3	<2.2	<2.1	<2.07	<2.1	<99	<2.1	<2.1	<2.2	<2.1
Bromomethane	$\mu g/m^3$	173	<0.78	<0.78	<0.78	<0.78	<0.78	<0.85	<0.82	<0.78	<0.699	<0.78	<37	<0.78	<0.78	<0.82	<0.78
Carbon disulfide	$\mu g/m^3$	21,713	1.97	<0.62	3.67	0.75	8	<1.7	<1.6	<1.6	5.58	3.84	<30	4.4	4	<1.6	<1.6
Carbon tetrachloride	$\mu g/m^3$	113	<1.3	<1.3	<1.3	<1.3	<1.26	<1.38	<1.32	<1.26	<1.89	<1.3	<61	<1.26	<1.26	<1.32	<1.26
Chlorobenzene	$\mu g/m^3$	347	<0.92	<0.92	<0.92	<0.92	<0.92	<1.01	<0.97	<0.92	<0.921	<0.92	<44	<0.92	<0.92	<0.97	<0.92
Chloroethane	$\mu g/m^3$	124,080	<0.53	<0.53	<0.53	<0.53	<0.53	<0.58	<0.55	<0.53	1.36	11.8	<25	<6.86	<6.86	6.6	3.8
Chloroform	$\mu g/m^3$	27	<0.98	<0.98	<0.98	<0.98	<0.98	<1.07	<1.02	<0.98	<0.732	<0.98	<47*	<0.98	<0.98	<1.02	<0.98
Chloromethane	$\mu g/m^3$	2,657	1.39	0.80	1.46	2.12	3.53	2.95	3.08	1.4	6.38	1.32	<20	<0.41	<0.41	<0.43	<0.41
Cyclohexane	$\mu g/m^3$	201,510	3.66	2.6	0.72	<0.69	<0.69	7.57	4.06	<0.69	40.9	71.8	103	54	52.3	69.9	71.6
Dibromochloromethane	$\mu g/m^3$	6,070	<1.7	<1.7	<1.7	<1.7	<1.7	<1.9	<1.8	<1.7	<1.70	<1.7	<82	<1.7	<1.7	<1.8	<1.7
Dichlorodifluoromethane (FREON 12)	$\mu g/m^3$	3,584	5.73	2.52	2.42	2.68	2.3	2.8	2.8	2.6	14.0	18.7	<48	14.3	10.8	12.9	11.2
Ethyl acetate	$\mu g/m^3$	2,509	5.75	<0.72	<0.72	<0.72	7.57	<0.79	<0.76	<0.72	<7.93	<0.72	<35	<2.09	<2.09	<0.76	<0.72
Heptane	$\mu g/m^3$	14,461	2.38	11.3	<0.82	<0.82	<0.82	10.9	4.63	<0.82	11.4	17.6	<39	13.1	12.4	21.4	4.55
Hexachlorobutadiene	$\mu g/m^3$	51	<2.1	<2.1	<2.1	<2.1	<2.1	<2.3	<2.2	<2.1	<32.0	<2.1	<100*	<2.1	<2.1	<2.2	<2.1
Hexane	$\mu g/m^3$	18,839	7.59	3.67	1.6	0.92	1.09	14.9	6.87	0.88	48.8	46.3	68	28.4	27.1	47.9	19.2
Isooctane (2,2,4-trimethylpentane)	$\mu g/m^3$	14,917	<0.93	<0.93	<0.93	<0.93	<0.9	<1.0	<1.0	<0.9	23.9	29.7	<45	<21.5	<20.6	28.1	29.9
iso-Propylbenzene (cumene)	$\mu g/m^3$	14,461	1.13	5.51	<0.98	<0.98	<1.0	<1.1	<1.0	<1.0	-	<0.98	<47	<1.0	<1.0	<1.0	<1.0
Methyl t-Butyl Ether (MTBE)	$\mu g/m^3$	1,153	4.72	<0.72	<0.72	<0.72	<0.72	<0.79	<0.76	<0.72	<0.721	<0.72	<35	<0.72	<0.72	<0.76	<0.72
Methylene Chloride (Dichloromethane)	$\mu g/m^3$	18,764	1.80	<0.69	<0.69	<0.69	1.15	<0.76	<0.73	<0.69	3.38	<0.69	<33	0.73	<0.69	<0.73	<0.69
Propene	$\mu g/m^3$	91,723	<0.34	<4.6	<0.34	<2.6	<13.8	<0.38	<0.36	<2.65	<0.516	<0.34	182	<104	<119	99.3	96.7
Tetrachloroethene	$\mu g/m^3$	1,390	<1.4	<1.4	<1.4	6.4	<1.4	10.8	10.5	<1.4	<1.36	<1.4	<65	<1.4	<1.4	<1.4	<1.4
Tetrahydrofuran	$\mu g/m^3$	62,828	<0.59	<0.59	<0.59	<0.59	7.49	<0.65	<0.62	<0.59	<1.18	<0.59	<28	5.78	2	<0.62	<0.59
Trichloroethene	$\mu g/m^3$	70	<1.1	<1.1	<1.1	<1.1	<1.1	4.2	4.5	11.5	<1.61	<1.1	<52	<1.1	<1.1	4.7	4.6
Trichlorofluoromethane (FREON 11)	$\mu g/m^3$	34,325	1.3	1.1	1.8	1.7	1.1	<1.2	1.2	1.3	<1.12	<1.1	<54	<1.1	<1.1	<1.2	<1.1
Trichlorotrifluoroethane (FREON 113)	$\mu g/m^3$	230,627	<1.5	<1.5	<1.5	<1.5	<1.5	<1.7	<1.6	<1.5	<1.15	<1.5	<74	<1.5	<1.5	<1.6	<1.5
Vinyl acetate	$\mu g/m^3$	6,586	<1.8	<1.8	<1.8	<1.8	<1.8	<1.9	<1.8	<1.8	<0.704	<1.8	<85	<19.7	<19.5	<12.0	<9.2
Vinyl bromide (Bromoethene)	$\mu g/m^3$	40	<0.87	<0.87	<0.87	<0.87	<0.9	<1.0	<0.9	<0.9	<0.875	<0.87	<42*	<0.9	<0.9	<0.9	<0.9
Vinyl chloride	$\mu g/m^3$	70	<0.51	<0.51	<0.51	<0.51	<0.51	<0.56	<0.54	<0.51	7.70	**5,220**	**5020**	**4,010**	**3,760**	**3,580**	**1,560**

Notes:

[1] Canadian Council of Ministers of the Environment (CCME). 2014. *A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures via Inhalation of Vapours.* Refer to Tables 8 to 11 for further information.

NG - No applicable criteria.
BOLD - Greater than criteria.
* = Detection limit raised above criteria.

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Table 8: Soil Vapour Analytical Results

Location Code		Generic Soil Vapour Criteria - Residential Coarse-Grained ($\mu g/m^3$)[1]	VW-04				VW-05			22VW-06			
Field ID			VW-04	VW-04	VW-04	DUPLICATE	VW-05	19DUP01	VW-05	22VW-06	22VW-06	22VW-06	Duplicate
Sample Date			13 Aug 2013	06 Dec 2019	19 Nov 2021	19 Nov 2021	06 Dec 2019	06 Dec 2019	19 Nov 2021	01 Jun 2023	05 Dec 2024	11 Nov 2025	11 Nov 2025
Lab Report Number			SR7631	L2393575	L2671030	L2671030	L2393575	L2393575	L2671030	CG2307273	CG2418080	CG2516684	CG2516684
Laboratory ID			B3D6164	L2393575-4 / L2393575-10	L2671030-4	L2671030-6	L2393575-5 / L2393575-11	L2393575-6	L2671030-5	CG2307273-003	CG2418080-003	CG2516684-003	CG2516684-004
Parameter	**Unit**												
Field Tests													
Air Volume	L	-	-	0.06	-	-	0.06	-	-	-	-	-	-
Initial Pressure / Pressure on Receipt	in Hg	-	-3.00	-9.40	-8.40	-3.50	-6.10	-6.70	-4.10	-10.00	-10.40	-6.95	-6.95
Aliphatic/Aromatic PHC Sub-Fractionation													
Aliphatics (>C_5-C_6)	$\mu g/m^3$	-	15.7	-	-	-	-	-	-	-	-	-	-
Aliphatics (C_6-C_8)	$\mu g/m^3$	740,737	59.7	196	-	-	56,900	50,600	-	226	<15	<15	<15
Aliphatics (>C_8-C_{10})	$\mu g/m^3$	40,257	36.6	247	-	-	**331,000**	**290,000**	-	201	119	<15	<15
Aliphatics (>C_{10}-C_{12})	$\mu g/m^3$	40,257	95.0	<15	-	-	37,500	32,800	-	66	<15	<15	<15
Aliphatics (>C_{12}-C_{16})	$\mu g/m^3$	40,257	25.3	<30	-	-	<750	<750	-	<30	<30	<30	<30
Aromatics (C_6-C_8)	$\mu g/m^3$	805	<5.0	45	-	-	**121,000**	**104,000**	-	<15	<15	<15	<15
Aromatics (>C_8-C_{10})	$\mu g/m^3$	805	23.9	45	-	-	**121,000**	**104,000**	-	<15	<15	<15	<15
Aromatics (>C_{10}-C_{12})	$\mu g/m^3$	8,051	22.7	<15	-	-	5,780	5,080	-	<15	<15	<15	<15
Aromatics (>C_{12}-C_{16})	$\mu g/m^3$	8,051	<5.0	<30	-	-	<750	<750	-	<30	<30	<30	<30
CWS TVOC (C_6-C_8)	$\mu g/m^3$	NG	-	-	-	-	-	-	-	-	<15	<15	<15
CWS TVOC (>C_8-C_{10})	$\mu g/m^3$	NG	-	-	-	-	-	-	-	-	119	<15	<15
CWS TVOC (>C_{10}-C_{12})	$\mu g/m^3$	NG	-	-	-	-	-	-	-	-	<15	<15	<15
CWS TVOC (>C_{12}-C_{16})	$\mu g/m^3$	NG	-	-	-	-	-	-	-	-	<30	<30	<30
Linear & Cyclic Methyl Siloxanes													
Hexamethylcyclotrisiloxane, D3 (CVMS)	$\mu g/m^3$	NG	-	<170	-	-	<170	-	-	-	-	-	-
Octamethylcyclotetrasiloxane, D4 (CVMS)	$\mu g/m^3$	NG	-	<170	-	-	<170	-	-	-	-	-	-
Decamethylcyclopentasiloxane, D5 (CVMS)	$\mu g/m^3$	NG	-	<170	-	-	<170	-	-	-	-	-	-
Dodecamethylcyclohexasiloxane, D6 (CVMS)	$\mu g/m^3$	NG	-	<170	-	-	<170	-	-	-	-	-	-
Hexamethyldisiloxane, MM (LVMS)	$\mu g/m^3$	NG	-	<170	-	-	<170	-	-	-	-	-	-
Octamethyltrisiloxane, MDM (LVMS)	$\mu g/m^3$	NG	-	<170	-	-	<170	-	-	-	-	-	-
Decamethyltetrasiloxane, MD2M (LVMS)	$\mu g/m^3$	NG	-	<170	-	-	<170	-	-	-	-	-	-
Dodecamethylpentasiloxane, MD3M (LVMS)	$\mu g/m^3$	NG	-	170	-	-	<170	-	-	-	-	-	-
Hydrocarbons													
Benzene	$\mu g/m^3$	41	2.09	6.56	<0.32	<0.51	**1,570**	**1,500**	**1,460**	7.09	1.6	0.96	0.51
Toluene	$\mu g/m^3$	75,190	11.0	2.15	<0.75	22.1	1,280	1,230	135	1.02	1.88	0.45	0.83
Ethylbenzene	$\mu g/m^3$	68,650	4.18	1.08	<0.87	2.2	12,600	11,500	15,200	0.52	0.69	<0.43	<0.43
Xylenes (m & p)	$\mu g/m^3$	NG	15.0	59	<1.7	4.1	106,000	95,800	19,800	0.65	2.65	<0.87	<0.87
Xylene (o)	$\mu g/m^3$	NG	5.12	2.23	<0.87	<1.4	7,400	6,700	352	1.39	1.04	<0.43	<0.43
Xylenes Total	$\mu g/m^3$	3,520	20.1	61.2	<2.0	4.1	**113,000**	**102,000**	**20,200**	2	3.7	<1.3	<1.3
Styrene	$\mu g/m^3$	3,220	<0.852	<0.85	<0.85	<1.4	<280	<280	<41	<0.85	<0.89	<0.85	<0.85
Total BTEX	$\mu g/m^3$	NG	37.4	-	-	-	-	-	-	-	7.9	<0.0024	<0.0024
F1 (C_6-C_{10})	$\mu g/m^3$	867,383	149	448	<15	40	543,000	478,000	291,000	404	130	15	<15
F1 (C_6-C_{10}) - BTEX	$\mu g/m^3$	867,383	-	-	-	-	-	-	-	-	-	0.015	<0.015
F2 (C_{10}-C_{16})	$\mu g/m^3$	52,495	120	<15	<15	34	**67,600**	**59,700**	**96,100**	72	19	<15	<15
F2-NAPHTHALENE	$\mu g/m^3$	52,495	-	-	-	-	-	-	-	-	-	<15	<15
Alcohols													
Ethanol	$\mu g/m^3$	-	191	-	-	-	-	-	-	-	-	-	-
Isopropanol	$\mu g/m^3$	6,219	<7.37	6.0	-	-	<61	<61	-	-	-	-	-
High Level Fixed Gases													
Nitrogen	%	NG	77.0	75.8	75.7	76.7	3.4	2.4	30.7	82.7	74.6	71	70.3
Oxygen	%	NG	20.7	19.6	20.2	21.3	0.87	0.57	8.09	15.2	20.1	-	-
Carbon Dioxide	%	NG	2.30	2.84	3.58	1.85	30.6	26.7	22	2.24	1.59	-	-
Carbon Monoxide	%	NG	<0.20	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	-	-
Methane	%	NG	<0.20	<0.050	<0.050	<0.050	57.8	58.8	40.1	<0.050	0.069	0.051	<0.050
Hydrocarbon Gases (C_1 to C_5)													
Methane	%	NG	-	0.0108	0.00075	0.00416	-	-	-	<0.050	-	-	-
Ethane	%	NG	-	<0.00020	<0.00020	<0.00020	0.0079	0.00747	0.00705	-	-	-	-
Ethene	%	NG	-	<0.00020	<0.00020	<0.00020	0.0216	0.0223	0.0102	-	-	-	-
Propane	%	NG	-	<0.00020	<0.00020	<0.00020	0.00027	0.00028	0.00022	-	-	-	-
Propene	%	NG	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-	-
Butane	%	NG	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-	-
Pentane	%	NG	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	-	-	-

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Table 8: Soil Vapour Analytical Results

Location Code		Generic Soil Vapour Criteria - Residential Coarse-Grained ($\mu g/m^3$)[1]	VW-04				VW-05			22VW-06			
Field ID			VW-04	VW-04	VW-04	DUPLICATE	VW-05	19DUP01	VW-05	22VW-06	22VW-06	22VW-06	Duplicate
Sample Date			13 Aug 2013	06 Dec 2019	19 Nov 2021	19 Nov 2021	06 Dec 2019	06 Dec 2019	19 Nov 2021	01 Jun 2023	05 Dec 2024	11 Nov 2025	11 Nov 2025
Lab Report Number			SR7631	L2393575	L2671030	L2671030	L2393575	L2393575	L2671030	CG2307273	CG2418080	CG2516684	CG2516684
Laboratory ID			B3D6164	L2393575-4 / L2393575-10	L2671030-4	L2671030-6	L2393575-5 / L2393575-11	L2393575-6	L2671030-5	CG2307273-003	CG2418080-003	CG2516684-003	CG2516684-004
Parameter	**Unit**												
Polycyclic Aromatic Hydrocarbons (PAHs)													
Naphthalene	$\mu g/m^3$	380	-	<2.6	<1.0	<1.7	<860*	<860*	<50	<0.52	<0.52	<0.52	<0.52
Volatile Organic Compounds (VOCs)													
1,1,1-Trichloroethane	$\mu g/m^3$	1,693,510	<1.64	<1.1	<1.1	<1.7	<360	<360	<52	<1.1	<1.1	<1.1	<1.1
1,1,2,2-Tetrachloroethane	$\mu g/m^3$	11	<1.37	<1.4	<1.4	<2.2	<450*	<450*	<66*	<1.4	<1.4	<1.4	<1.4
1,1,2-Trichloroethane	$\mu g/m^3$	7	<0.818	<1.1	<1.1	<1.7	<360*	<360*	<52*	<1.1	<1.1	<1.1	<1.1
1,1-Dichloroethane	$\mu g/m^3$	430	<0.809	<0.81	<0.81	<1.3	<260	<260	<39	<0.81	<0.85	<0.81	<0.81
1,1-Dichloroethene	$\mu g/m^3$	6,470	<0.991	<0.79	<0.79	<1.3	<260	<260	<38	<0.79	<0.83	<0.79	<0.79
1,2,4-Trichlorobenzene	$\mu g/m^3$	365	<14.8	<1.5	<1.5	<2.4	<490*	<490*	<71	<1.5	<1.6	<1.5	<1.5
1,2,4-Trimethylbenzene	$\mu g/m^3$	2,235	5.28	1.38	<0.98	<1.6	**9,100**	**7,400**	**4,480**	<1.0	2	<1.0	<1.0
1,2-Dibromoethane	$\mu g/m^3$	2.2	<1.31	<1.5	<1.5	<2.5*	<500*	<500*	<74*	<1.5	<1.6	<1.5	<1.5
1,2-Dichlorobenzene	$\mu g/m^3$	7,072	<2.40	<1.2	<1.2	<1.9	<390	<390	<58	<1.2	<1.3	<1.2	<1.2
1,2-Dichloroethane	$\mu g/m^3$	24	<0.809	<0.81	<0.81	<1.3	<260*	<260*	<39*	<0.81	<0.85	<0.81	<0.81
1,2-Dichloroethene (cis)	$\mu g/m^3$	242	2.35	1.14	<0.79	<1.3	<260*	<260*	188	<0.79	<0.83	<0.79	<0.79
1,2-Dichloroethene (trans)	$\mu g/m^3$	1,400	<0.793	5.18	<0.79	<1.3	1,100	1,110	778	<0.79	0.99	<0.79	<0.79
1,2-Dichloropropane	$\mu g/m^3$	135	<1.85	<0.92	<0.92	<1.5	<300*	<300*	<44	<0.9	<1.0	<0.9	<0.9
1,2-Dichlorotetrafluoroethane	$\mu g/m^3$	566,335	<1.19	3.6	<1.4	4.2	2,980	3,020	8,550	<1.4	<1.5	<1.4	<1.4
1,3,5-Trimethylbenzene	$\mu g/m^3$	2,235	2.66	1.28	<0.98	<1.6	**5,090**	**4,250**	**3410**	<1.0	<1.0	<1.0	<1.0
1,3-Butadiene	$\mu g/m^3$	17	<1.11	<0.44	<0.44	<0.71	<140*	<140*	<60*	<0.44	<0.46	<0.44	<0.44
1,3-Dichlorobenzene	$\mu g/m^3$	64	<2.40	<1.2	<1.2	<1.9	<390*	<390*	<58	<1.2	<1.3	<1.2	<1.2
1,3-Dichloropropene	$\mu g/m^3$	NG	-	-	-	-	-	-	-	-	<1.9	<1.8	<1.8
1,3-Dichloropropene [cis]	$\mu g/m^3$	163	<0.817	<0.91	<0.91	<1.5	<300*	<300*	<44	<0.9	<1.0	<0.9	<0.9
1,3-Dichloropropene [trans]	$\mu g/m^3$	149	8.65	<0.91	<0.91	<1.5	<300*	<300*	<44	<0.9	<1.0	<0.9	<0.9
1,4-Dichlorobenzene	$\mu g/m^3$	64	<2.40	<1.2	<1.2	<1.9	<390*	<390*	**105**	<1.2	<1.3	<1.2	<1.2
1,4-Dioxane	$\mu g/m^3$	105	<7.21	<0.72	<0.72	<1.2	<240*	<240*	<35	<0.72	<0.76	<0.72	<0.72
1-Methyl-4 ethyl benzene	$\mu g/m^3$	14,461	<10.8	<0.98	<0.98	<1.6	1,890	1,510	1,660	<1.0	<1.0	<1.0	<1.0
Methyl Butyl Ketone (MBK; 2-Hexanone)	$\mu g/m^3$	1,053	<8.19	<4.1	<4.1	<6.6	<1,600*	<1,600*	<200	<4.10	<4.10	<4.10	<4.10
Methyl Ethyl Ketone (MEK, 2-Butanone)	$\mu g/m^3$	167,364	10.3	1.76	0.90	<0.94	<190	<190	<28	1.39	<0.62	<1.47	<1.06
Methyl Isobutyl Ketone (MIBK)	$\mu g/m^3$	102,977	<13.1	<0.82	<0.82	<1.3	<270*	<270*	<39	<4.10	<0.86	<0.82	<0.82
Acetone (2-Propanone)	$\mu g/m^3$	918,788	50.2	14.6	2.1	23.5	840	<390	<57	12.8	14.5	28.3	29
Allyl chloride	$\mu g/m^3$	32	-	<0.63	<0.63	<1.0	<200*	<200*	<30	<0.63	<0.66	<0.63	<0.63
Benzyl chloride	$\mu g/m^3$	34	<5.18	<1.0	<1.0	<1.7	<340*	<340*	<50*	<1.0	<1.1	<1.0	<1.0
Bromodichloromethane	$\mu g/m^3$	28	<1.34	<1.3	<1.3	<2.1	<440*	<440*	<64*	<1.3	<1.4	<1.3	<1.3
Bromoform	$\mu g/m^3$	1,494	<2.07	<2.1	<2.1	<3.3	<680	<680	<99	<2.1	<2.2	<2.1	<2.1
Bromomethane	$\mu g/m^3$	173	<0.699	<0.78	<0.78	<1.2	<250*	<250*	<37	<0.78	<0.82	<0.78	<0.78
Carbon disulfide	$\mu g/m^3$	21,713	115	4.41	<0.62	<1.0	<200	<200	<30	33.6	<1.6	<1.6	<1.6
Carbon tetrachloride	$\mu g/m^3$	113	<1.89	<1.3	<1.3	<2.0	<410*	<410*	<61	<1.26	<1.32	<1.26	<1.26
Chlorobenzene	$\mu g/m^3$	347	<0.921	<0.92	<0.92	<1.5	<300	<300	<44	<0.92	<0.97	<0.92	<0.92
Chloroethane	$\mu g/m^3$	124,080	<0.792	1.82	<0.53	<0.84	430	470	441	<0.53	<0.55	<0.53	<0.53
Chloroform	$\mu g/m^3$	27	<0.732	<0.98	<0.98	<1.6	<320*	<320*	<47*	20.8	6.49	12.8	11.5
Chloromethane	$\mu g/m^3$	2,657	3.09	1.98	<0.41	<0.66	<140	<140	<20	1.26	<0.43	<0.41	<0.41
Cyclohexane	$\mu g/m^3$	201,510	7.61	11.8	<0.69	<1.1	2,290	2,380	2,230	8.67	<0.72	<0.69	<0.69
Dibromochloromethane	$\mu g/m^3$	6,070	<1.70	<1.7	<1.7	<2.7	<560	<560	<82	<1.7	<1.8	<1.7	<1.7
Dichlorodifluoromethane (FREON 12)	$\mu g/m^3$	3,584	5.68	128	4.23	6.1	**217,000**	**241,000**	**9,160**	2.6	2.1	2.3	2.4
Ethyl acetate	$\mu g/m^3$	2,509	<7.93	-	<0.72	3.2	<240	<240	<35	<1.37	<0.76	<0.72	1.19
Heptane	$\mu g/m^3$	14,461	5.37	12.4	<0.82	<1.3	6,100	6,100	6,760	<0.82	<0.86	<0.82	1.89
Hexachlorobutadiene	$\mu g/m^3$	51	<32.0	<2.1	<2.1	<3.4	<700*	<700*	<100*	<2.1	<2.2	<2.1	<2.1
Hexane	$\mu g/m^3$	18,839	6.44	14.5	<0.70	3.9	2,940	2,890	3,200	2.04	0.88	<0.70	<0.70
Isooctane (2,2,4-trimethylpentane)	$\mu g/m^3$	14,917	4.69	2.68	<0.93	<1.5	520	540	465	<2.5	<1.0	<0.9	<0.9
iso-Propylbenzene (cumene)	$\mu g/m^3$	14,461	-	<0.98	<0.98	<1.6	990	880	941	4.3	<1.0	1.9	1.8
Methyl t-Butyl Ether (MTBE)	$\mu g/m^3$	1,153	<0.721	<0.72	<0.72	<1.2	<240	<240	<35	<0.72	<0.76	<0.72	<0.72
Methylene Chloride (Dichloromethane)	$\mu g/m^3$	18,764	<2.78	<0.69	0.85	4.8	<230	<230	<33	<0.69	<0.73	<0.69	0.9
Propene	$\mu g/m^3$	91,723	19.9	<0.34	<0.34	<0.86	<110	<110	2,540	<38.2	<2.92	<0.38	<0.41
Tetrachloroethene	$\mu g/m^3$	1,390	<1.36	<1.4	<1.4	<2.2	<440	<440	<65	<1.4	<1.4	<1.4	<1.4
Tetrahydrofuran	$\mu g/m^3$	62,828	<1.18	<0.59	<0.59	<0.94	<190	<190	<28	<0.59	<0.62	<0.59	<0.59
Trichloroethene	$\mu g/m^3$	70	<1.61	<1.1	<1.1	<1.7	<350*	<350*	<52	<1.1	2	1.6	4.2
Trichlorofluoromethane (FREON 11)	$\mu g/m^3$	34,325	3.31	3.5	2.4	2.1	<370	<370	<54	2	<1.2	<1.1	<1.1
Trichlorotrifluoroethane (FREON 113)	$\mu g/m^3$	230,627	<1.15	<1.5	<1.5	<2.5	<500	<500	<74	<1.5	<1.6	<1.5	<1.5
Vinyl acetate	$\mu g/m^3$	6,586	<0.704	<1.8	<1.8	<2.8	<580	<580	<85	<3.4	<1.8	<1.8	<1.8
Vinyl bromide (Bromoethene)	$\mu g/m^3$	40	<0.875	<0.87	<0.87	<1.4	<290*	<290*	<42*	<0.9	<0.9	<0.9	<0.9
Vinyl chloride	$\mu g/m^3$	70	2.13	2.44	<0.51	<0.82	**550**	**570**	**1,000**	<0.51	<0.54	<0.51	<0.51

Notes:

[1] Canadian Council of Ministers of the Environment (CCME). 2014. *A Protocol for the Derivatic for Protection of Human Exposures via Inhalation of Vapours.* Refer to Tables 8 to 11 for furt

NG - No applicable criteria.
BOLD - Greater than criteria.
* = Detection limit raised above criteria.

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Table 9: Soil Vapour Quality Assurance/Quality Control Analytical Results

		Location Code	VW-02			22VW-06		
		Field ID	VW-02	DUPLICATE	RPD	22VW-06	Duplicate	RPD
		Sample Date	05 Dec 2024	05 Dec 2024		11 Nov 2025	11 Nov 2025	
		Lab Report Number	CG2418080	CG2418080		CG2516684	CG2516684	
		Laboratory ID	CG2418080-001	CG2418080-004		CG2516684-003	CG2516684-004	
Parameter	**Unit**	**RDL**						
Aliphatic/Aromatic PHC Sub-Fractionation								
Aliphatics (C_6-C_8)	µg/m^3	15	146	70	-	<15	<15	-
Aliphatics (>C_8-C_{10})	µg/m^3	15	75	59	-	<15	<15	-
Aliphatics (>C_{10}-C_{12})	µg/m^3	15	16	<15	-	<15	<15	-
Aliphatics (>C_{12}-C_{16})	µg/m^3	30	<30	<30	-	<30	<30	-
Aromatics (C_6-C_8)	µg/m^3	15	22	<15	-	<15	<15	-
Aromatics (>C_8-C_{10})	µg/m^3	15	<15	<15	-	<15	<15	-
Aromatics (>C_{10}-C_{12})	µg/m^3	15	<15	<15	-	<15	<15	-
Aromatics (>C_{12}-C_{16})	µg/m^3	30	<30	<30	-	<30	<30	-
CWS TVOC (C_6-C_8)	µg/m^3	15	168	70	-	<15	<15	-
CWS TVOC (>C_8-C_{10})	µg/m^3	15	75	59	-	<15	<15	-
CWS TVOC (>C_{10}-C_{12})	µg/m^3	15	16	<15	-	<15	<15	-
CWS TVOC (>C_{12}-C_{16})	µg/m^3	30	<30	<30	-	<30	<30	-
Hydrocarbons								
Benzene	µg/m^3	0.32	14.3	4.28	**108**	0.96	0.51	-
Toluene	µg/m^3	0.38	15.8	5.05	**103**	0.45	0.83	-
Ethylbenzene	µg/m^3	0.43	1.56	0.78	-	<0.43	<0.43	-
Xylenes (m & p)	µg/m^3	0.87	4.6	2.95	-	<0.87	<0.87	-
Xylene (o)	µg/m^3	0.43	1.48	1.08	-	<0.43	<0.43	-
Xylenes Total	µg/m^3	1.3	6.1	4	-	<1.3	<1.3	-
Styrene	µg/m^3	0.85	<0.94	<0.89	-	<0.85	<0.85	-
Total BTEX	µg/m^3	0.0024	37.8	14.2	**91**	<0.0024	<0.0024	-
F1 (C_6-C_{10})	µg/m^3	15	227	126	**57**	15	<15	-
F1 (C_6-C_{10}) - BTEX	µg/m^3	15			-	15	<15	-
F2 (C_{10}-C_{16})	µg/m^3	15	28	29	-	<15	<15	-
F2-NAPHTHALENE	µg/m^3	15	27	28	-	<15	<15	-
High Level Fixed Gases								
Nitrogen	%	1	70.8	72.6	3	71	70.3	1
Methane	%	0.05	<0.050	<0.050	-	0.051	<0.050	-
Polycyclic Aromatic Hydrocarbons (PAHs)								
Naphthalene	µg/m3	0.52	0.94	0.94	-	<0.52	<0.52	-
Volatile Organic Compounds (VOCs)								
1,2-Dichlorotetrafluoroethane	µg/m^3	1.4	<1.5	<1.5	-	<1.4	<1.4	-
1,3-Butadiene	µg/m^3	0.44	<0.49	<0.46	-	<0.44	<0.44	-
1,4-Dioxane	µg/m^3	0.72	<0.79	<0.76	-	<0.72	<0.72	-
1-Methyl-4 ethyl benzene	µg/m^3	1	<1.1	<1.0	-	<1.0	<1.0	-
Benzyl chloride	µg/m^3	1	<1.1	<1.1	-	<1.0	<1.0	-
Carbon disulfide	µg/m^3	1.6	<1.7	<1.6	-	<1.6	<1.6	-
Cyclohexane	µg/m^3	0.69	7.57	4.06	**60**	<0.69	<0.69	-
Ethyl acetate	µg/m^3	0.72	<0.79	<0.76	-	<0.72	1.19	-
Freon 113	µg/m^3	1.5	<1.7	<1.6	-	<1.5	<1.5	-
Heptane	µg/m^3	0.82	10.9	4.63	**81**	<0.82	1.89	-
Hexane	µg/m^3	0.7	14.9	6.87	**74**	<0.70	<0.70	-
Isooctane	µg/m^3	0.9	<1.0	<1.0	-	<0.9	<0.9	-
Propene	µg/m^3	0.38	<0.38	<0.36	-	<0.38	<0.41	-
Tetrahydrofuran	µg/m^3	0.59	<0.65	<0.62	-	<0.59	<0.59	-
Vinyl acetate	µg/m^3	1.8	<1.9	<1.8	-	<1.8	<1.8	-
Vinyl bromide (bromoethene)	µg/m^3	0.9	<1.0	<0.9	-	<0.9	<0.9	-
Acetone	µg/m^3	2.4	5.2	5.2	-	28.3	29	2
Allyl chloride	µg/m^3	0.63	<0.69	<0.66	-	<0.63	<0.63	-

Notes:

RDL - Reportable detection limit.

RPD - RPD is Relative Percentage Difference calculated as RPD(%)=(|V1-V2|)/[(V1+V2)/2])*100 where V1,V2 = concentrations of parent and duplicate sample, respectively.

"-" Indicates RPD not calculated. RPDs have only been considered where both concentrations are greater than 5 times the RDL.

N/A - Not applicable.

BOLD - RPD value greater than 50%.

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Table 9: Soil Vapour Quality Assurance/Quality Control Analytical Results

		Location Code	VW-02		RPD	22VW-06		RPD
		Field ID	VW-02	DUPLICATE		22VW-06	Duplicate	
		Sample Date	05 Dec 2024	05 Dec 2024		11 Nov 2025	11 Nov 2025	
		Lab Report Number	CG2418080	CG2418080		CG2516684	CG2516684	
		Laboratory ID	CG2418080-001	CG2418080-004		CG2516684-003	CG2516684-004	
Parameter	**Unit**	**RDL**						
Volatile Organic Compounds (VOCs)								
Bromodichloromethane	µg/m^3	1.3	<1.5	<1.4	-	<1.3	<1.3	-
Bromoform	µg/m^3	2.1	<2.3	<2.2	-	<2.1	<2.1	-
Bromomethane	µg/m^3	0.78	<0.85	<0.82	-	<0.78	<0.78	-
2-Butanone (MEK)	µg/m^3	0.59	<0.65	0.65	-	<1.47	<1.06	-
Carbon tetrachloride	µg/m^3	1.3	<1.38	<1.32	-	<1.26	<1.26	-
Chlorobenzene	µg/m^3	0.92	<1.01	<0.97	-	<0.92	<0.92	-
Chloroethane	µg/m^3	0.53	<0.58	<0.55	-	<0.53	<0.53	-
Chloroform	µg/m3	0.98	<1.07	<1.02	-	12.8	11.5	11
Chloromethane	µg/m^3	0.41	2.95	3.08	4	<0.41	<0.41	-
Dibromochloromethane	µg/m^3	1.7	<1.9	<1.8	-	<1.7	<1.7	-
1,2-Dibromoethane	µg/m^3	1.5	<1.7	<1.6	-	<1.5	<1.5	-
1,2-Dichlorobenzene	µg/m^3	1.2	<1.3	<1.3	-	<1.2	<1.2	-
1,3-Dichlorobenzene	µg/m^3	1.2	<1.3	<1.3	-	<1.2	<1.2	-
1,4-Dichlorobenzene	µg/m^3	1.2	<1.3	<1.3	-	<1.2	<1.2	-
1,1-Dichloroethane	µg/m^3	0.81	<0.89	<0.85	-	<0.81	<0.81	-
1,2-Dichloroethane	µg/m^3	0.81	<0.89	<0.85	-	<0.81	<0.81	-
1,1-Dichloroethene	µg/m^3	0.79	<0.87	<0.83	-	<0.79	<0.79	-
1,2-Dichloroethene (cis)	µg/m^3	0.79	<0.87	<0.83	-	<0.79	<0.79	-
1,2-Dichloroethene (trans)	µg/m^3	0.79	<0.87	<0.83	-	<0.79	<0.79	-
Dichlorodifluoromethane	µg/m^3	1	2.8	2.8	-	2.3	2.4	-
1,2-Dichloropropane	µg/m^3	0.9	<1.0	<1.0	-	<0.9	<0.9	-
1,3-Dichloropropene	µg/m^3	1.3	<2.0	<1.9	-	<1.8	<1.8	-
1,3-Dichloropropene [cis]	µg/m^3	0.9	<1.0	<1.0	-	<0.9	<0.9	-
1,3-Dichloropropene [trans]	µg/m^3	0.9	<1.0	<1.0	-	<0.9	<0.9	-
Hexachlorobutadiene	µg/m^3	2.1	<2.3	<2.2	-	<2.1	<2.1	-
2-Hexanone (MBK)	µg/m^3	4.1	<4.51	<4.10	-	<4.10	<4.10	-
Methyl t-Butyl Ether (MTBE)	µg/m^3	0.72	<0.79	<0.76	-	<0.72	<0.72	-
Methylene Chloride	µg/m^3	0.69	<0.76	<0.73	-	<0.69	0.9	-
4-Methyl-2-pentanone (MIBK)	µg/m^3	0.82	<0.90	<0.86	-	<0.82	<0.82	-
iso-Propylbenzene (cumene)	µg/m^3	1	<1.1	<1.0	-	1.9	1.8	-
1,1,2,2-Tetrachloroethane	µg/m^3	1.4	<1.5	<1.4	-	<1.4	<1.4	-
Tetrachloroethene	µg/m^3	1.4	10.8	10.5	3	<1.4	<1.4	-
1,2,4-Trichlorobenzene	µg/m^3	1.5	<1.6	<1.6	-	<1.5	<1.5	-
1,1,1-Trichloroethane	µg/m^3	1.1	<1.2	<1.1	-	<1.1	<1.1	-
1,1,2-Trichloroethane	µg/m^3	1.1	<1.2	<1.1	-	<1.1	<1.1	-
Trichloroethene	µg/m^3	1.1	4.2	4.5	7	1.6	4.2	-
Trichlorofluoromethane	µg/m^3	1.1	<1.2	1.2	-	<1.1	<1.1	-
1,2,4-Trimethylbenzene	µg/m^3	1	2	1.9	5	<1.0	<1.0	-
1,3,5-Trimethylbenzene	µg/m^3	1	<1.1	<1.0	-	<1.0	<1.0	-
Vinyl chloride	µg/m^3	0.51	<0.56	<0.54	-	<0.51	<0.51	-

Notes:

RDL - Reportable detection limit.

RPD - RPD is Relative Percentage Difference calculated as RPD(%)=(|V1-V2|)/[(V1+V2)/2])*100 where V1,V2 = concentrations of parent and duplicate sample, respectively.

"-" Indicates RPD not calculated. RPDs have only been considered where both concentrations are greater than 5 times the RDL.

N/A - Not applicable.

BOLD - RPD value greater than 50%.

Table 10: Chemical, Physical, and Toxicological Properties

Parameter		TC	RsC	H'	D_{air}	D_{water}	BAF	MF		
		Tolerable Concentration	Risk-Specific Concentration	Unitless Henry's Law Constant	Pure Component Molecular Diffusivity in Air	Pure Component Molecular Diffusivity in Water	Bioattenuation Factor	Mass Fraction in Soil (Coarse and Fine)	Mass Fraction in Soil Vapour - Coarse Soil	Mass Fraction in Soil Vapour - Fine Soil
Table		mg/m^3	mg/m^3	unitless	cm^2/s	cm^2/s	unitless	unitless	unitless	unitless
Benzene		--	0.00063	0.23	0.088	0.000010	10	--	--	--
Toluene		2.3	--	0.27	0.087	0.0000092	10	--	--	--
Ethylbenzene		2.0	--	0.36	0.075	0.0000085	10	--	--	--
Xylenes		0.10	--	0.25	0.078	0.0000099	10	--	--	--
Naphthalene		0.010	--	0.017	0.059	0.0000075	10	--	--	--
F1	Aliphatic C>6-C8	18	--	50	0.050	0.000010	10	0.55	0.85	0.84
	Aliphatic C>8-C10	1.0	--	80	0.050	0.000010	10	0.36	0.14	0.15
	Aromatic C>8-C10	0.20	--	0.48	0.050	0.000010	10	0.090	0.0050	0.0050
F2	Aliphatic C>10-C12	1.0	--	120	0.050	0.000010	10	0.36	0.77	0.77
	Aliphatic C>12-C16	1.0	--	520	0.050	0.000010	10	0.44	0.21	0.21
	Aromatic C>10-C12	0.20	--	0.14	0.050	0.000010	10	0.090	0.023	0.023
	Aromatic C>12-C16	0.20	--	0.053	0.050	0.000010	10	0.11	0.0050	0.0050
1,1,1-Trichloroethane		5.0	--	0.69	0.078	0.0000088	10	--	--	--
1,1,2,2-Tetrachloroethane		--	0.00017	0.019	0.071	0.0000079	10	--	--	--
1,1,2-Trichloroethane		0.00020	0.00063	0.038	0.078	0.0000088	10	--	--	--
1,1-Dichloroethane		--	0.0063	0.24	0.074	0.000011	10	--	--	--
1,1-Dichloroethene		0.20	--	0.94	0.090	0.000010	10	--	--	--
1,2,4-Trichlorobenzene		0.0070	--	0.11	0.030	0.0000082	10	--	--	--
1,2,4-Trimethylbenzene		0.060	--	0.23	0.061	0.0000079	10	--	--	--
1,2-Dibromoethane		0.0093	0.000017	0.027	0.022	0.000012	10	--	--	--
1,2-Dichlorobenzene		0.20	--	0.072	0.069	0.0000079	10	--	--	--
1,2-Dichloroethane		0.0070	0.00038	0.049	0.10	0.0000099	10	--	--	--
1,2-Dichloropropane		0.0040	0.0027	0.11	0.078	0.0000087	10	--	--	--
1,3,5-Trimethylbenzene		0.060	--	0.36	0.060	0.0000079	10	--	--	--
1,3-Butadiene		0.0020	0.00033	3.0	0.25	0.000011	10	--	--	--
1,3-Dichlorobenzene		0.095	0.00091	0.13	0.069	0.0000079	10	--	--	--
1,4-Dichlorobenzene		0.060	0.00091	0.098	0.069	0.0000079	10	--	--	--
1,4-Dioxane		0.030	0.0020	0.00030	0.23	0.000010	10	--	--	--
2-Hexanone		0.030	--	0.0038	0.070	0.0000084	10	--	--	--
Acetone		31	--	0.0016	0.12	0.000011	10	--	--	--
Allyl chloride		0.0010	--	0.45	0.094	0.000011	10	--	--	--
Benzyl chloride		0.0010	--	0.017	0.075	0.0000078	10	--	--	--
Bromodichloromethane		--	0.00027	0.098	0.030	0.000011	10	--	--	--
Bromoform		--	0.0091	0.024	0.015	0.000010	10	--	--	--
Bromomethane		0.0050	--	0.25	0.073	0.000012	10	--	--	--
Carbon Disulfide		0.70	--	0.71	0.10	0.000010	10	--	--	--
Carbon Tetrachloride		0.10	0.0017	1.2	0.078	0.0000088	10	--	--	--
Chlorobenzene		0.010	--	0.15	0.073	0.0000087	10	--	--	--
Chloroethane		4.0	--	0.073	0.27	0.000012	10	--	--	--
Chloroform		0.028	0.00043	0.15	0.10	0.000010	10	--	--	--
Chloromethane		0.090	--	0.39	0.13	0.0000065	10	--	--	--
cis-1,2-Dichloroethene		0.0070	--	0.30	0.074	0.000011	10	--	--	--
cis-1,3-Dichloropropene		0.020	0.0025	0.053	0.087	0.0000096	10	--	--	--
Cyclohexane		6.0	--	7.6	0.080	0.0000090	10	--	--	--
Dibromochloromethane		0.089	--	0.040	0.020	0.000011	10	--	--	--
Dichlorodifluoromethane		0.10	--	16	0.067	0.0000099	10	--	--	--
4-Ethyltoluene		0.40	--	0.21	0.065	0.0000071	10	--	--	--
Ethyl acetate		0.070	--	0.0055	0.067	0.0000099	10	--	--	--
Freon 113		5.0	--	21.5	0.038	0.0000086	10	--	--	--
Freon 114		17	--	115	0.082	0.0000086	10	--	--	--
Heptane		0.40	--	84	0.065	0.0000070	10	--	--	--
Hexachlorobutadiene		--	0.00045	0.42	0.027	0.0000070	10	--	--	--
Isooctane		0.40	--	31	0.060	0.0000073	10	--	--	--
Isopropyl alcohol		0.20	--	0.00033	0.10	0.000011	10	--	--	--
Isopropylbenzene		0.40	--	0.59	0.065	0.0000071	10	--	--	--
Methyl ethyl ketone		5.0	--	0.0015	0.081	0.0000098	10	--	--	--
Methyl isobutyl ketone		3.0	--	0.0062	0.075	0.0000078	10	--	--	--
Methylene chloride		0.60	1.0	0.15	0.10	0.000012	10	--	--	--
MTBE		0.037	--	0.028	0.10	0.000011	10	--	--	--
n-Hexane		0.70	--	74	0.20	0.0000078	10	--	--	--
Propylene		3.0	--	8.0	0.11	0.000011	10	--	--	--
Styrene		0.092	--	0.13	0.071	0.0000080	10	--	--	--
Tetrachloroethylene		0.040	0.038	1.1	0.072	0.0000082	10	--	--	--
Tetrahydrofuran		2.0	--	0.0029	0.099	0.000011	10	--	--	--
trans-1,2-Dichloroethene		0.040	--	0.28	0.071	0.000012	10	--	--	--
trans-1,3-Dichloropropene		0.020	0.0025	0.053	0.087	0.0000096	10	--	--	--
Trichloroethylene		0.0020	0.0024	0.48	0.079	0.0000091	10	--	--	--
Trichlorofluoromethane		1.05	--	5.2	0.087	0.0000097	10	--	--	--
Vinyl acetate		0.20	--	0.024	0.085	0.0000092	10	--	--	--
Vinyl bromide		0.0030	0.00067	0.26	0.10	0.000012	10	--	--	--
Vinyl chloride		0.10	0.0011	3.2	0.11	0.000012	10	--	--	--
Hydrogen Sulfide		0.0020	--	0.35	0.19	0.000022	10	--	--	--

Notes:

cm^2/s Square centimetres per second.
F1 Fraction 1 (C6-C10).
F2 Fraction 2 (C>10-C16).
mg/m^3 Milligrams per cubic metre.
PHC Petroleum hydrocarbon.
-- Not applicable.

References: Canadian Council of Ministers of the Environment (CCME). 2014. *A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures via Inhalation of Vapours.*
Alberta Environment and Protected Areas (EPA). 2024. *Alberta Tier 2 Soil and Groundwater Remediation Guidelines.*
Health Canada. 2021. *Federal contaminated site risk assessment in Canada: Toxicological reference values (TRVs), Version 3.0.*
United States Environmental Protection Agency (US EPA). 2024. *Regional Screening Levels for Chemical Contaminants at Superfund Sites.*

Table 11: Soil Properties for Evaluation of Vapour Transport

Parameter		Units	Coarse-Grained Soil	Fine-Grained Soil
θ_a	Vapour-filled porosity	unitless	0.31	0.303
ρ_b	Dry bulk density	g/cm^3	1.7	1.4
n	Total soil porosity	unitless	0.36	0.47
θ_w	Moisture-filled porosity	unitless	0.05	0.167
Q_{soil}	Soil gas flow rate	cm^3/s	167	16.7

Notes:

Values from CCME (2014).

cm Centimetre.

cm^2 Square centimetre.

g/cm^3 Grams per cubic centimetre.

PHC Petroleum hydrocarbon.

References: Canadian Council of Ministers of the Environment (CCME). 2014. *A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures via Inhalation of Vapours.*

Alberta Environment and Protected Areas (EPA). 2024. *Alberta Tier 2 Soil and Groundwater Remediation Guidelines.*

Table 12: Building Properties for Evaluation of Vapour Transport

Parameter		Units	Residential Land Use
			Basement
L_B	Building length	cm	1,225
W_B	Building width	cm	1,225
A_B	Building area exposed to soil, including basement wall area	cm^2	2.7E+06
H_B	Building height	cm	360
L_{crack}	Thickness of the foundation	cm	11.25
A_{crack}	Area of cracks through which contaminant vapours enter the building	cm^2	994.5
ACH	Air exchanges per hour	h^{-1}	0.5

Notes:

Values taken from CCME (2014).

cm Centimetre.

cm^2 Square centimetre.

h^{-1} Per hour.

References: Canadian Council of Ministers of the Environment (CCME). 2014. *A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures via Inhalation of Vapours.*

Alberta Environment and Protected Areas (EPA). 2024. *Alberta Tier 2 Soil and Groundwater Remediation Guidelines.*

Table 13: Generic Soil Vapour Criteria

Parameter	Units	Residential Land Use		
		Basement and Slab-on-Grade		
		Coarse-Grained	Units	Coarse-Grained
Benzene	mg/m^3	0.041	µg/m^3	41
Toluene		75		75,190
Ethylbenzene		69		68,650
Xylenes		3.5		3,520
PHC F1		867		867,380
PHC F2		53		52,500
Naphthalene		0.38		380
Isopropanol		6.2		6,219
1,1,1-Trichloroethane		1,694		1,693,510
1,1,2,2-Tetrachloroethane		0.011		11
1,1,2-Trichloroethane		0.0070		7.0
1,1-Dichloroethane		0.43		430
1,1-Dichloroethene		6.5		6,470
1,2,4-Trichlorobenzene		0.36		365
1,2,4-Trimethylbenzene		2.2		2,235
1,2-Dibromoethane		0.0022		2.2
1,2-Dichlorobenzene		7.1		7,072
1,2-Dichloroethane		0.020		24
1,2-Dichloroethene (cis)		0.24		242
1,2-Dichloroethene (trans)		1.4		1,400
1,2-Dichloropropane		0.14		135
1,3,5-Trimethylbenzene		2.2		2,235
1,3-Butadiene		0.020		17
1,3-Dichlorobenzene		0.060		64
1,3-Dichloropropene [cis]		0.16		163
1,3-Dichloropropene [trans]		0.15		149
1,4-Dichlorobenzene		0.064		64
1,4-Dioxane		0.11		105
1-Methyl-4 ethyl benzene		14		14,461
2-Butanone (MEK)		167		167,364
2-Hexanone (MBK)		1.1		1,053
4-Methyl-2-pentanone (MIBK)		103		102,977
Acetone		919		918,788
Allyl chloride		0.030		32
Benzyl chloride		0.030		34
Bromodichloromethane		0.030		28
Bromoform		1.5		1,494
Bromomethane		0.17		173
Carbon disulfide		22		21,713
Carbon tetrachloride		0.11		113
Chlorobenzene		0.35		347
Chloroethane		124		124,080
Chloroform		0.030		27
Chloromethane		2.7		2,657
Cyclohexane		202		201,510
Dibromochloromethane		6.1		6,070
Dichlorodifluoromethane		3.6		3,584
Ethyl acetate		2.5		2,509
Freon 113		231		230,627
Freon 114		566		566,335
Heptane		14		14,461
Hexachlorobutadiene		0.050		51
Hexane		19		18,839
Isooctane		15		14,917
iso-Propylbenzene (cumene)		14		14,461
Methyl t-Butyl Ether (MTBE)		1.2		1,153
Methylene Chloride		19		18,764
Propylene		92		91,723
Styrene		3.2		3,220
Tetrachloroethene		1.4		1,390
Tetrahydrofuran		63		62,828
Trichloroethene		0.070		70
Trichlorofluoromethane		34		34,325
Vinyl acetate		6.6		6,586
Vinyl bromide (bromoethene)		0.040		40
Vinyl chloride		0.070		70

Notes:

mg/m^3 milligrams per cubic metre.
µg/m^3 micrograms per cubic metre.

References:

[1] Canadian Council of Ministers of the Environment (CCME). 2014. *A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures via Inhalation of Vapours.*

[2] Alberta Environment and Protected Areas (EPA). 2024. *Alberta Tier 1 Soil and Groundwater Remediation Guidelines.*

[3] Health Canada. 2021. *Federal contaminated site risk assessment in Canada: Toxicological reference values (TRVs), Version 3.0.*

[4] United States Environmental Protection Agency (US EPA). 2024. *Regional Screening Levels for Chemical Contaminants at Superfund Sites.*

Table 14: Soil Vapour Risk Evaluation

Parameter	Unit	Soil Vapour Screening Criteria [a]	Soil Vapour Results (µg/m³)																				
			VW-01		VW-02					VW-03						VW-04			VW-05		22VW-06			
			6-Dec-19	19-Nov-21	6-Dec-19	19-Nov-21	1-Jun-23	5-Dec-24	11-Nov-25	13-Aug-13	6-Dec-19	19-Nov-21	1-Jun-23	5-Dec-24	11-Nov-25	13-Aug-13	6-Dec-19	19-Nov-21	6-Dec-19	19-Nov-21	1-Jun-23	5-Dec-24	11-Nov-25	11-Nov-25 DUP
Benzene	µg/m³	41	9.62	3.06	1.41	0.77	5.08	14.3	1.15	2.19	11.6	<15.0	11.5	18.8	13	2.09	6.56	<0.32	**1,570**	**1,460**	7.09	1.60	0.96	0.51
Toluene	µg/m³	75,190	18.7	3.00	1.05	0.76	0.75	15.8	1.51	10.6	8.91	<36.0	6.90	8.93	3.54	11.0	2.15	22.1	1,280	135	1.02	1.88	0.45	0.83
Ethylbenzene	µg/m³	68,650	<0.87	96.2	<0.87	<0.87	<0.43	1.56	<0.43	5.69	2.42	<42.0	0.56	1.91	0.74	4.18	1.08	2.20	12,600	15,200	0.52	0.69	<0.43	<0.43
Xylenes Total	µg/m³	3,520	3.10	132	<2.00	<2.00	<1.30	6.10	1.9	25.20	42.7	<96.0	4.70	9.20	3.8	15.00	61.2	4.10	**113,000**	**20,200**	2.00	3.70	<1.3	<1.3
F1 (C_6-C_{10})	µg/m³	867,383	175	2,420	63.0	387	53.0	227	76	10	1,410	9,820	816	1,220	808	5	448	40.0	543,000	291,000	404	130	15	<15
F2 (C_{10}-C_{16})	µg/m³	52,495	38.0	737	<15.0	77.0	30.0	29.0	<15	347	375	<720	551	447	218	120	<15.0	34.0	**67,600**	96,100	72.0	19.0	<15	<15
Aliphatics (C_6-C_8)	µg/m³	740,737	73.0	-	45.0	-	19.0	146	18	231	912	-	479	772	614	59.7	196	-	56,900	-	226	<15.0	<15	<15
Aliphatics (>C_8-C_{10})	µg/m³	40,257	101	-	27.0	-	29.0	75.0	58	68.4	615	-	368	493	300	36.6	247	-	**331,000**	-	201	119	<15	<15
Aliphatics (>C_{10}-C_{12})	µg/m³	40,257	17.0	-	<15.0	-	22.0	16.0	<15	226	223	-	351	304	180	95.0	<15.0	-	37,500	-	66.0	<15.0	<15	<15
Aliphatics (>C_{12}-C_{16})	µg/m³	40,257	<30	-	<30.0	-	<30.0	<30.0	<30	58.6	<30.0	-	157	55.0	<30	25.3	<30.0	-	<750	-	<30.0	<30.0	<30	<30
Aromatics (>C_8-C_{10})	µg/m³	805	<15	-	<15.0	-	<15.0	<15.0	<15	50.7	65.0	-	16.0	23.0	<15	23.9	45.0	-	**121,000**	-	<15.0	<15.0	<15	<15
Aromatics (>C_{10}-C_{12})	µg/m³	8,051	<15	-	<15.0	-	<15.0	<15.0	<15	62.5	<15.	-	<15.0	<15.0	<15	22.7	<15.0	-	5,780	-	<15.0	<15.0	<15	<15
Isopropanol	µg/m³	6,219	3.60	-	<2.50	-	-	-	-	8.64	<2.50	-	-	-	-	<7.37	6.00	-	<61.0	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/m³	2,235	<0.98	14.7	<0.98	0.99	<1.00	2.00	<1.0	11.3	7.07	<47.0	1.20	3.30	2.2	5.28	1.38	<0.98	**9,100**	**4,480**	<1.00	2.00	<1.0	<1.0
1,2-Dichloroethene (cis)	µg/m³	242	<0.79	1.05	<0.79	<0.79	<0.79	<0.87	<0.79	5.45	**3,140**	**3,400**	**2,000**	**3,210**	**2,580**	**2.35**	1.14	<0.79	<260*	188	<0.79	<0.83	<0.79	<0.79
1,2-Dichloroethene (trans)	µg/m³	1,400	<0.79	<0.79	<0.79	<0.79	<0.79	<0.87	<0.79	<0.793	116	229	163	210	223	<0.793	5.18	<0.79	1,110	778	<0.79	0.99	<0.79	<0.79
1,2-Dichlorotetrafluoroethane	µg/m³	566,335	<1.40	<1.40	<1.40	<1.40	<1.40	<1.50	<1.4	76.7	48.3	<67.0	26.8	18.0	10.4	<1.19	3.60	4.20	3,020	8,550	<1.40	<1.50	<1.4	<1.4
1,3,5-Trimethylbenzene	µg/m³	2,235	<0.98	12.9	<0.98	<0.98	<1.00	<1.10	<1.0	6.77	3.24	<47.0	1.10	1.50	<1.0	2.66	1.28	<0.98	**5,090**	**3,410**	<1.00	<1.00	<1.0	<1.0
1,4-Dichlorobenzene	µg/m³	2,121 / 64[e]	<1.20	<1.20	<1.20	<1.20	<1.20	<1.30	<1.2	<2.40	<1.20	<58.0	<1.20	<1.30	<1.2	<2.40	<1.20	<1.20	<390*	**105**	<1.20	<1.30	<1.2	<1.2
1-Methyl-4 ethyl benzene	µg/m³	14,461	<0.98	6.52	<0.98	<0.98	<1.00	<1.10	<1.0	<10.8	1.59	<47.0	<1.00	1.20	<1.0	<10.8	<0.98	<0.98	1,890	1,660	<1.00	<1.00	<1.0	<1.0
2-Butanone (MEK)	µg/m³	167,364	1.67	1.20	0.78	1.01	2.03	0.65	<0.59	<8.85	0.87	<28.0	<0.59	0.86	<0.71	10.3	1.76	0.90	<190	<28.0	1.39	<0.62	<1.47	<1.06
2-Hexanone (MBK)	µg/m³	1,053	<4.10	<4.10	<4.10	<4.10	<4.10	<4.51	<4.10	<8.19	<5.40	<200	<5.74	7.37	<4.10	<8.19	<4.10	<4.10	<1,600*	<200	<4.10	<4.10	<4.10	<4.10
Acetone	µg/m³	918,788	22.8	4.50	8.00	2.70	16.6	5.20	9.5	61.2	<9.80	<57.0	<17.8	3.10	2.6	50.2	14.6	23.5	840	<57.0	12.8	14.5	28.3	29
Carbon disulfide	µg/m³	21,713	1.97	<0.62	3.67	0.75	8.00	<1.70	<1.6	5.58	3.84	<30.0	4.40	<1.60	<1.6	115	4.41	<0.62	<200	<30.0	33.6	<1.60	<1.6	<1.6
Chloroethane	µg/m³	124,080	<0.53	<0.53	<0.53	<0.53	<0.53	<0.58	<0.53	1.36	11.8	<25.0	<6.86	6.60	3.8	<0.792	1.82	<0.53	470	441	<0.53	<0.55	<0.53	<0.53
Chloroform	µg/m³	869 / 27 [e]	<0.98	<0.98	<0.98	<0.98	<0.98	<1.07	<0.98	<0.732	<0.98	<47.0*	<0.98	<1.02	<0.98	<0.732	<0.98	<0.98	<320*	<47.0*	20.8	6.49	12.8	11.5
Chloromethane	µg/m³	2,657	1.39	0.80	1.46	2.12	3.53	3.08	1.4	6.38	1.32	<20.0	<0.41	<0.43	<0.41	3.09	1.98	<0.41	<140	<20.0	1.26	<0.43	<0.41	<0.41
Cyclohexane	µg/m³	201,510	3.66	2.60	0.72	<0.69	<0.69	7.57	<0.69	40.9	71.8	103	54.0	69.9	71.6	7.61	11.8	<0.69	2,380	2,230	8.67	<0.72	<0.69	<0.69
Dichlorodifluoromethane	µg/m³	3,584	5.73	2.52	2.42	2.68	2.30	2.80	2.6	14.0	18.7	<48.0	14.3	12.9	11.2	5.68	128	6.10	**241,000**	**9,160**	2.60	2.10	2.3	2.4
Ethyl acetate	µg/m³	2,509	5.75	<0.72	<0.72	<0.72	7.57	<0.79	<0.72	<7.93	<0.72	<35.0	<2.09	<0.76	<0.72	<7.93	-	3.20	<240	<35.0	<1.37	<0.76	<0.72	1.19
Heptane	µg/m³	14,461	2.38	11.3	<0.82	<0.82	<0.82	10.9	<0.82	11.4	17.6	<39.0	13.1	21.4	4.55	5.37	12.4	<1.30	6,100	6,760	<0.82	<0.86	<0.82	1.89
Hexane	µg/m³	18,839	7.59	3.67	1.60	0.92	1.09	14.9	0.88	48.8	46.3	68.0	28.4	47.9	19.2	6.44	14.5	3.90	2,940	3,200	2.04	0.88	<0.70	<0.70
Isooctane	µg/m³	14,917	<0.93	<0.93	<0.93	<0.93	<0.90	<1.00	<0.9	23.9	29.7	<45.0	<21.5	28.1	29.9	4.69	2.68	<1.50	540	465	<2.50	<1.00	<0.9	<0.9
iso-Propylbenzene (cumene)	µg/m³	14,461	1.13	5.51	<0.98	<0.98	<1.00	<1.10	<1.0	-	<0.98	<47.0	<1.00	<1.00	<1.0	-	<0.98	<1.60	990	941	4.30	<1.00	1.9	1.8
Methyl t-Butyl Ether (MTBE)	µg/m³	1,153	4.72	<0.72	<0.72	<0.72	<0.72	<0.79	<0.72	<0.721	<0.72	<35.0	<0.72	<0.76	<0.72	<0.721	<0.72	<1.20	<240	<35.0	<0.72	<0.76	<0.72	<0.72
Methylene Chloride	µg/m³	18,764 / 62,546[e]	1.80	<0.69	<0.69	<0.69	1.15	<0.76	<0.69	3.38	<0.69	<33.0	0.73	<0.73	<0.69	<2.78	<0.69	4.80	<230	<33.0	<0.69	<0.73	<0.69	0.9
Naphthalene	µg/m3	380	-	-	-	-	-	0.94	<0.52	-	-	-	-	0.94	<0.52	-	-	-	-	-	-	<0.52	<0.52	<0.52
Propene	µg/m³	91,723	<0.34	<4.60	<0.34	<2.60	<13.8	<0.38	<2.65	<0.516	<0.34	182	<104	99.3	96.7	19.9	<0.34	<0.86	<110	2,540	<38.2	<2.92	<0.38	<0.41
Tetrachloroethene	µg/m³	1,392 / 2679 [e]	<1.40	<1.40	<1.40	6.40	<1.40	10.8	<1.4	<1.36	<1.40	<65.0	<1.40	<1.40	<1.4	<1.36	<1.40	<2.20	<440	<65.0	<1.40	<1.40	<1.4	<1.4
Tetrahydrofuran	µg/m³	62,828	<0.59	<0.59	<0.59	<0.59	7.49	<0.65	<0.59	<1.18	<0.59	<28.0	5.78	<0.62	<0.59	<1.18	<0.59	<0.94	<190	<28.0	<0.59	<0.62	<0.59	<0.59
Trichlorofluoromethane	µg/m³	34,325	1.30	1.10	1.80	1.70	1.10	1.20	1.3	<1.12	<1.10	<54.0	<1.10	<1.20	<1.1	3.31	3.50	2.40	<370	<54.0	2.00	<1.20	<1.1	<1.1
Vinyl chloride	µg/m³	3,086 / 70[e]	<0.51	<0.51	<0.51	<0.51	<0.51	<0.56	<0.51	7.70	**5,220**	**5,020**	**4,010**	**3,580**	1,560	2.13	2.44	<0.51	**570**	**1,000**	<0.51	<0.54	<0.51	<0.51
Cumulative Risk																								
Target Risk																								

Notes:

The greater of the concentrations measured in the parent and duplicate sample collected was selected for use in subsequent calcuations.

< – not detected. Listed value is the corresponding detection limit.

- = screening criteria not calculated as appropriate toxicity data not available.

Bold = identifies estimated risks and hazards that exceed the individual hazard quotient 0.2 and target risk level of 1 x 10^{-5} or target hazard level of 1.

* = Detection limit raised above the criteria.

[a] Listed soil vapour screening criteria derived in accordance with CCME, 2014.

[b] Estimated cancer risk = (soil vapour concentration/cancer soil vapour screening level) x 10^{-5}.

[c] Estimated hazard quotient = (soil vapour concentration/non-cancer soil vapour screening level).

[d] Cumulative risk and hazard index represent the sum of chemical-specific cancer risks and hazard quotients.

[e] Soil vapour screening criteria shows both the threshold criteria and non-threshold criteria. . Target risk and hazard levels are calculated with the appropriate criteria.

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Table 14: Soil Vapour Risk Evaluation

Parameter	Unit	Soil Vapour Screening Criteria [a]	Comparisons of Soil Vapour Measurements to Soil Vapour Criteria																				
			Estimated Cancer Risk [b]																				
			VW-01		VW-02					VW-03						VW-04			VW-05		22VW-06		
			6-Dec-19	19-Nov-21	6-Dec-19	19-Nov-21	1-Jun-23	5-Dec-24	11-Nov-25	13-Aug-13	6-Dec-19	19-Nov-21	1-Jun-23	5-Dec-24	11-Nov-25	13-Aug-13	6-Dec-19	19-Nov-21	6-Dec-19	19-Nov-21	1-Jun-23	5-Dec-24	11-Nov-25
Benzene	µg/m^3	41	2.3E-06	7.5E-07	3.4E-07	1.9E-07	1.2E-06	3.5E-06	2.8E-07	5.3E-07	2.8E-06	ND	2.8E-06	4.6E-06	3.2E-06	5.1E-07	1.6E-06	ND	**3.8E-04**	**3.6E-04**	1.7E-06	3.9E-07	2.3E-07
Toluene	µg/m^3	75,190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/m^3	68,650	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes Total	µg/m^3	3,520	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F1 (C_6-C_{10})	µg/m^3	867,383	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F2 (C_{10}-C_{16})	µg/m^3	52,495	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aliphatics (C_6-C_8)	µg/m^3	740,737	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aliphatics (>C_8-C_{10})	µg/m^3	40,257	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aliphatics (>C_{10}-C_{12})	µg/m^3	40,257	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aliphatics (>C_{12}-C_{16})	µg/m^3	40,257	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aromatics (>C_8-C_{10})	µg/m^3	805	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aromatics (>C_{10}-C_{12})	µg/m^3	8,051	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropanol	µg/m^3	6,219	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/m^3	2,235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene (cis)	µg/m^3	242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene (trans)	µg/m^3	1,400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorotetrafluoroethane	µg/m^3	566,335	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/m^3	2,235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/m^3	2,121 / 64[e]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.6E-05**	ND	ND	ND
1-Methyl-4 ethyl benzene	µg/m^3	14,461	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (MEK)	µg/m^3	167,364	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Hexanone (MBK)	µg/m^3	1,053		-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
Acetone	µg/m^3	918,788	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	µg/m^3	21,713	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	µg/m^3	124,080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	µg/m^3	869 / 27 [e]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.7E-06	2.4E-06	4.7E-06
Chloromethane	µg/m^3	2,657	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclohexane	µg/m^3	201,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	µg/m^3	3,584	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethyl acetate	µg/m^3	2,509	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptane	µg/m^3	14,461	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexane	µg/m^3	18,839	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isooctane	µg/m^3	14,917	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
iso-Propylbenzene (cumene)	µg/m^3	14,461	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl t-Butyl Ether (MTBE)	µg/m^3	1,153	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylene Chloride	µg/m^3	18,764 / 62,546[e]	2.9E-10	ND	ND	ND	1.8E-10	ND	ND	5.40E-10	ND	ND	1.2E-10	ND	ND	ND	ND	7.7E-10	ND	ND	ND	ND	1.4E-10
Naphthalene	µg/m3	380		-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
Propene	µg/m^3	91,723	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	µg/m^3	1,392 / 2679 [e]	ND	ND	ND	2.4E-08	ND	4.0E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrahydrofuran	µg/m^3	62,828	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	µg/m^3	34,325	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	µg/m^3	3,086 / 70[e]	ND	ND	ND	ND	ND	ND	ND	1.1E-06	**7.5E-04**	**7.2E-04**	**5.7E-04**	**5.1E-04**	**2.2E-04**	**3.0E-07**	3.5E-07	ND	**8.1E-05**	**1.4E-04**	ND	ND	ND
Cumulative Risk			2.3E-06	7.5E-07	3.4E-07	2.1E-07	1.2E-06	3.5E-06	2.8E-07	1.6E-06	**7.5E-04**	**7.2E-04**	**5.8E-04**	**5.2E-04**	**2.3E-04**	8.1E-07	1.9E-06	7.7E-10	**4.6E-04**	**5.2E-04**	9.4E-06	2.8E-06	5.0E-06
Target Risk			**1.0 x 10^{-5}**																				

Notes:

The greater of the concentrations measured in the parent and duplicate sample collected was selected for use in subsequent calcuations.

< – not detected. Listed value is the corresponding detection limit.

- = screening criteria not calculated as appropriate toxicity data not available.

Bold = identifies estimated risks and hazards that exceed the individual hazard quotient 0.2 and target risk level of 1 x 10^{-5} or target hazard level of 1.

* = Detection limit raised above the criteria.

[a] Listed soil vapour screening criteria derived in accordance with CCME, 2014.

[b] Estimated cancer risk = (soil vapour concentration/cancer soil vapour screening level) x 10^{-5}.

[c] Estimated hazard quotient = (soil vapour concentration/non-cancer soil vapour screening level).

[d] Cumulative risk and hazard index represent the sum of chemical-specific cancer risks and hazard quotients.

[e] Soil vapour screening criteria shows both the threshold criteria and non-threshold criteria. . Target risk and hazard levels are calculated with the appropriate criteria.

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Table 14: Soil Vapour Risk Evaluation

Parameter	Unit	Soil Vapour Screening Criteria [a]	Comparisons of Soil Vapour Measurements to Soil Vapour Criteria																				
			Estimated Hazard Quotients [c]																				
			VW-01		VW-02					VW-03						VW-04			VW-05		22VW-06		
			6-Dec-19	19-Nov-21	6-Dec-19	19-Nov-21	1-Jun-23	5-Dec-24	11-Nov-25	13-Aug-13	6-Dec-19	19-Nov-21	1-Jun-23	5-Dec-24	11-Nov-25	13-Aug-13	6-Dec-19	19-Nov-21	6-Dec-19	19-Nov-21	1-Jun-23	5-Dec-24	11-Nov-25
Benzene	µg/m^3	41	--	--	--	--	--	--	--	--	--	--	--			--	--	--	--	--	--		
Toluene	µg/m^3	75,190	2.49E-04	3.99E-05	1.40E-05	1.01E-05	9.97E-06	2.10E-04	2.01E-05	1.41E-04	1.18E-04	ND	9.18E-05	1.19E-04	4.71E-05	1.46E-04	2.86E-05	2.94E-04	1.70E-02	1.80E-03	1.36E-05	2.50E-05	1.10E-05
Ethylbenzene	µg/m^3	68,650	ND	1.40E-03	ND	ND	ND	2.27E-05	ND	8.29E-05	3.53E-05	ND	8.16E-06	2.78E-05	1.08E-05	6.09E-05	1.57E-05	3.20E-05	0.18	**0.22**	7.57E-06	1.01E-05	ND
Xylenes Total	µg/m^3	3,520	8.81E-04	3.75E-02	ND	ND	ND	1.73E-03	5.40E-04	7.16E-03	1.21E-02	ND	1.34E-03	2.61E-03	1.08E-03	4.26E-03	1.74E-02	1.16E-03	**32.1**	**5.7**	5.68E-04	1.05E-03	ND
F1 (C_6-C_{10})	µg/m^3	867,383	2.02E-04	2.79E-03	7.26E-05	4.46E-04	6.11E-05	2.62E-04	8.76E-05	1.16E-05	1.63E-03	1.13E-02	9.41E-04	1.41E-03	9.32E-04	5.90E-06	5.16E-04	4.61E-05	**0.63**	**0.34**	4.66E-04	1.50E-04	1.73E-05
F2 (C_{10}-C_{16})	µg/m^3	52,495	7.24E-04	1.40E-02	ND	1.47E-03	5.71E-04	5.52E-04	ND	6.61E-03	7.14E-03	ND	1.05E-02	8.52E-03	4.15E-03	2.29E-03	ND	6.48E-04	**1.3**	**1.8**	1.37E-03	3.62E-04	ND
Aliphatics (C_6-C_8)	µg/m^3	740,737	9.86E-05	-	6.08E-05	-	2.57E-05	1.97E-04	2.43E-05	3.12E-04	1.23E-03	-	6.47E-04	1.04E-03	8.29E-04	8.06E-05	2.65E-04	-	7.68E-02	-	3.05E-04	ND	ND
Aliphatics (>C_8-C_{10})	µg/m^3	40,257	2.51E-03	-	6.71E-04	-	7.20E-04	1.86E-03	1.44E-03	1.70E-03	1.53E-02	-	9.14E-03	1.22E-02	7.45E-03	9.09E-04	6.14E-03	-	**8.2**	-	4.99E-03	2.96E-03	ND
Aliphatics (>C_{10}-C_{12})	µg/m^3	40,257	4.22E-04	-	ND	-	5.46E-04	3.97E-04	ND	5.61E-03	5.54E-03	-	8.72E-03	7.55E-03	4.47E-03	2.36E-03	ND	-	**0.93**	-	1.64E-03	ND	ND
Aliphatics (>C_{12}-C_{16})	µg/m^3	40,257	ND	-	ND	-	ND	ND	ND	1.46E-03	ND	-	3.90E-03	1.37E-03	ND	6.28E-04	ND	-	ND	-	ND	ND	ND
Aromatics (>C_8-C_{10})	µg/m^3	805	ND	-	ND	-	ND	ND	ND	6.30E-02	8.07E-02	-	1.99E-02	2.86E-02	ND	2.97E-02	5.59E-02	-	**150**	-	ND	ND	ND
Aromatics (>C_{10}-C_{12})	µg/m^3	8,051	ND	-	ND	-	ND	ND	ND	7.76E-03	ND	-	ND	ND	ND	2.82E-03	ND	-	**0.72**	-	ND	ND	ND
Isopropanol	µg/m^3	6,219	5.79E-04	-	ND	-	ND	ND	ND	1.39E-03	ND	-	ND	ND	ND	ND	9.65E-04	-	ND	-	ND	ND	ND
1,2,4-Trimethylbenzene	µg/m^3	2,235	ND	6.58E-03	ND	4.43E-04	ND	8.95E-04	ND	5.06E-03	3.16E-03	ND	5.37E-04	1.48E-03	9.84E-04	2.36E-03	6.17E-04	ND	**4.1**	**2.0**	ND	8.95E-04	ND
1,2-Dichloroethene (cis)	µg/m^3	242	ND	4.34E-03	ND	ND	ND	ND	ND	2.25E-02	**13.0**	**14.1**	**8.3**	**13.3**	**10.7**	9.72E-03	4.71E-03	ND	ND	**0.78**	ND	ND	ND
1,2-Dichloroethene (trans)	µg/m^3	1,400	ND	ND	ND	ND	ND	ND	ND	ND	8.29E-02	0.16	0.12	0.15	1.59E-01	ND	3.70E-03	ND	**0.79**	**0.56**	ND	7.07E-04	ND
1,2-Dichlorotetrafluoroethane	µg/m^3	566,335	ND	ND	ND	ND	ND	ND	ND	1.35E-04	8.53E-05	ND	4.73E-05	3.18E-05	1.84E-05	ND	6.36E-06	7.42E-06	5.33E-03	1.51E-02	ND	ND	ND
1,3,5-Trimethylbenzene	µg/m^3	2,235	ND	5.77E-03	ND	ND	ND	ND	ND	3.03E-03	1.45E-03	ND	4.92E-04	6.71E-04	ND	1.19E-03	5.73E-04	ND	**2.3**	**1.5**	ND	ND	ND
1,4-Dichlorobenzene	µg/m^3	2,121 / 64[e]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1-Methyl-4 ethyl benzene	µg/m^3	14,461	ND	4.51E-04	ND	ND	ND	ND	ND	ND	1.10E-04	ND	ND	8.30E-05	ND	ND	ND	ND	0.13	0.11	ND	ND	ND
2-Butanone (MEK)	µg/m^3	167,364	9.98E-06	7.17E-06	4.66E-06	6.03E-06	1.21E-05	ND	ND	ND	5.20E-06	ND	ND	5.14E-06	ND	6.15E-05	1.05E-05	5.38E-06	ND	ND	8.31E-06	ND	ND
2-Hexanone (MBK)	µg/m^3	1,053	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.00E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	µg/m^3	918,788	2.48E-05	4.90E-06	8.71E-06	2.94E-06	1.81E-05	5.66E-06	1.03E-05	6.66E-05	ND	ND	ND	3.37E-06	2.83E-06	5.46E-05	1.59E-05	2.56E-05	9.14E-04	ND	1.39E-05	1.58E-05	3.16E-05
Carbon disulfide	µg/m^3	21,713	9.07E-05	ND	1.69E-04	3.45E-05	3.68E-04	ND	ND	2.57E-04	1.77E-04	ND	2.03E-04	ND	ND	5.30E-03	2.03E-04	ND	ND	ND	1.55E-03	ND	ND
Chloroethane	µg/m^3	124,080	ND	ND	ND	ND	ND	ND	ND	1.10E-05	9.51E-05	ND	ND	5.32E-05	3.06E-05	ND	1.47E-05	ND	3.79E-03	3.55E-03	ND	ND	ND
Chloroform	µg/m^3	869 / 27[e]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.39E-02	ND	1.47E-02
Chloromethane	µg/m^3	2,657	5.23E-04	3.01E-04	5.49E-04	7.98E-04	1.33E-03	1.16E-03	5.27E-04	2.40E-03	4.97E-04	ND	ND	ND	ND	1.16E-03	7.45E-04	ND	ND	ND	4.74E-04	ND	ND
Cyclohexane	µg/m^3	201,510	1.82E-05	1.29E-05	3.57E-06	ND	ND	3.76E-05	ND	2.03E-04	3.56E-04	5.11E-04	2.68E-04	3.47E-04	3.55E-04	3.78E-05	5.86E-05	ND	1.18E-02	1.11E-02	4.30E-05	ND	ND
Dichlorodifluoromethane	µg/m^3	3,584	1.60E-03	7.03E-04	6.75E-04	7.48E-04	6.42E-04	7.81E-04	7.25E-04	3.91E-03	5.22E-03	ND	3.99E-03	3.60E-03	3.13E-03	1.58E-03	3.57E-02	1.70E-03	**67.2**	**2.6**	7.25E-04	5.86E-04	6.70E-04
Ethyl acetate	µg/m^3	2,509	2.29E-03	ND	ND	ND	3.02E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.28E-03	ND	ND	ND	ND	4.74E-04
Heptane	µg/m^3	14,461	1.65E-04	7.81E-04	ND	ND	ND	7.54E-04	ND	7.88E-04	1.22E-03	ND	9.06E-04	1.48E-03	3.15E-04	3.71E-04	8.57E-04	ND	**0.42**	**0.47**	ND	ND	1.31E-04
Hexane	µg/m^3	18,839	4.03E-04	1.95E-04	8.49E-05	4.88E-05	5.79E-05	7.91E-04	4.67E-05	2.59E-03	2.46E-03	3.61E-03	1.51E-03	2.54E-03	1.02E-03	3.42E-04	7.70E-04	2.07E-04	0.16	0.17	1.08E-04	4.67E-05	ND
Isooctane	µg/m^3	14,917	ND	ND	ND	ND	ND	ND	ND	1.60E-03	1.99E-03	ND	ND	1.88E-03	2.00E-03	3.14E-04	1.80E-04	ND	3.62E-02	3.12E-02	ND	ND	ND
iso-Propylbenzene (cumene)	µg/m^3	14,461	7.81E-05	3.81E-04	ND	ND	ND	ND	ND	-	ND	ND	ND	ND	ND	-	ND	ND	6.85E-02	6.51E-02	2.97E-04	ND	1.31E-04
Methyl t-Butyl Ether (MTBE)	µg/m^3	1,153	4.09E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	µg/m^3	18,764 / 62,546[e]	9.59E-05	ND	ND	ND	6.13E-05	ND	ND	1.80E-04	ND	ND	3.89E-05	ND	ND	ND	ND	2.56E-04	ND	ND	ND	ND	4.80E-05
Naphthalene	µg/m3	380	ND	ND	ND	ND	ND	2.47E-03	ND	-	ND	ND	ND	2.47E-03	ND	-	ND	ND	ND	ND	ND	ND	ND
Propene	µg/m^3	91,723	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.98E-03	ND	1.08E-03	1.05E-03	2.17E-04	ND	ND	ND	2.77E-02	ND	ND	ND
Tetrachloroethene	µg/m^3	1,392 / 2679 [e]	ND	ND	ND	4.60E-03	ND	7.76E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrahydrofuran	µg/m^3	62,828	ND	ND	ND	ND	1.19E-04	ND	ND	ND	ND	ND	9.20E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	µg/m^3	34,325	3.79E-05	3.20E-05	5.24E-05	4.95E-05	3.20E-05	3.50E-05	3.79E-05	ND	ND	ND	ND	ND	ND	9.64E-05	1.02E-04	6.99E-05	ND	ND	5.83E-05	ND	ND
Vinyl chloride	µg/m^3	3,086 / 70[e]	ND	ND	ND	ND	ND	ND	ND	2.50E-03	**1.7**	**1.6**	**1.3**	**1.2**	**0.5**	6.90E-04	7.91E-04	ND	0.18	**0.32**	ND	ND	ND
Cumulative Risk			1.2E-02	7.5E-02	1.6E-03	8.7E-03	6.3E-03	1.7E-02	2.0E-03	6.1E-02	**14.8**	**15.9**	**9.7**	**14.6**	**11.3**	3.0E-02	6.8E-02	5.7E-03	**110**	**16.8**	3.0E-02	3.8E-03	1.6E-02
Target Risk			**1.00**																				

Notes:

The greater of the concentrations measured in the parent and duplicate sample collected was selected for use in subsequent calcuations.

< – not detected. Listed value is the corresponding detection limit.

- = screening criteria not calculated as appropriate toxicity data not available.

Bold = identifies estimated risks and hazards that exceed the individual hazard quotient 0.2 and target risk level of 1 x 10^{-5} or target hazard level of 1.

* = Detection limit raised above the criteria.

[a] Listed soil vapour screening criteria derived in accordance with CCME, 2014.

[b] Estimated cancer risk
= (soil vapour concentration/cancer soil vapour screening level) x 10^{-5}.

[c] Estimated hazard quotient = (soil vapour concentration/non-cancer soil vapour screening level).

[d] Cumulative risk and hazard index represent the sum of chemical-specific cancer risks and hazard quotients.

[e] Soil vapour screening criteria shows both the threshold criteria and non-threshold criteria. . Target risk and hazard levels are calculated with the appropriate criteria.

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FIGURES

Figure 1 Site Location Plan
Figure 2 Site Plan and Surrounding Land Use
Figure 3 Historical Groundwater Elevations (Groundwater Monitoring Wells)
Figure 4 Groundwater Elevation Contours 2024

LEGEND

- Site Location
- Highway
- Main Road
- Local Road
- Resource/Recreational Road
- Railway
- Power Line
- Runway
- Building
- Park
- Residential Area
- Contour (10 m)
- Watercourse
- Waterbody
- Urban Area

NOTES
Base data source: CanVec 1:50,000.

2025 GROUNDWATER AND SOIL VAPOUR MONITORING REPORT RED DEER COLLEGE

Site Location Plan

PROJECTION	DATUM	CLIENT
3TM 114	NAD83	THE CITY OF Red Deer

Scale: 1:50,000
1 0.5 0 1
Kilometres

FILE NO. SWOP04071-05_Fig01_SiteLocation.mxd

OFFICE	DWN	CKD	APVD	REV
Tt-EDM	DS	SL	CW	0

DATE	PROJECT NO.
January 13, 2026	SWM.SWOP04071-05.005

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Figure 1

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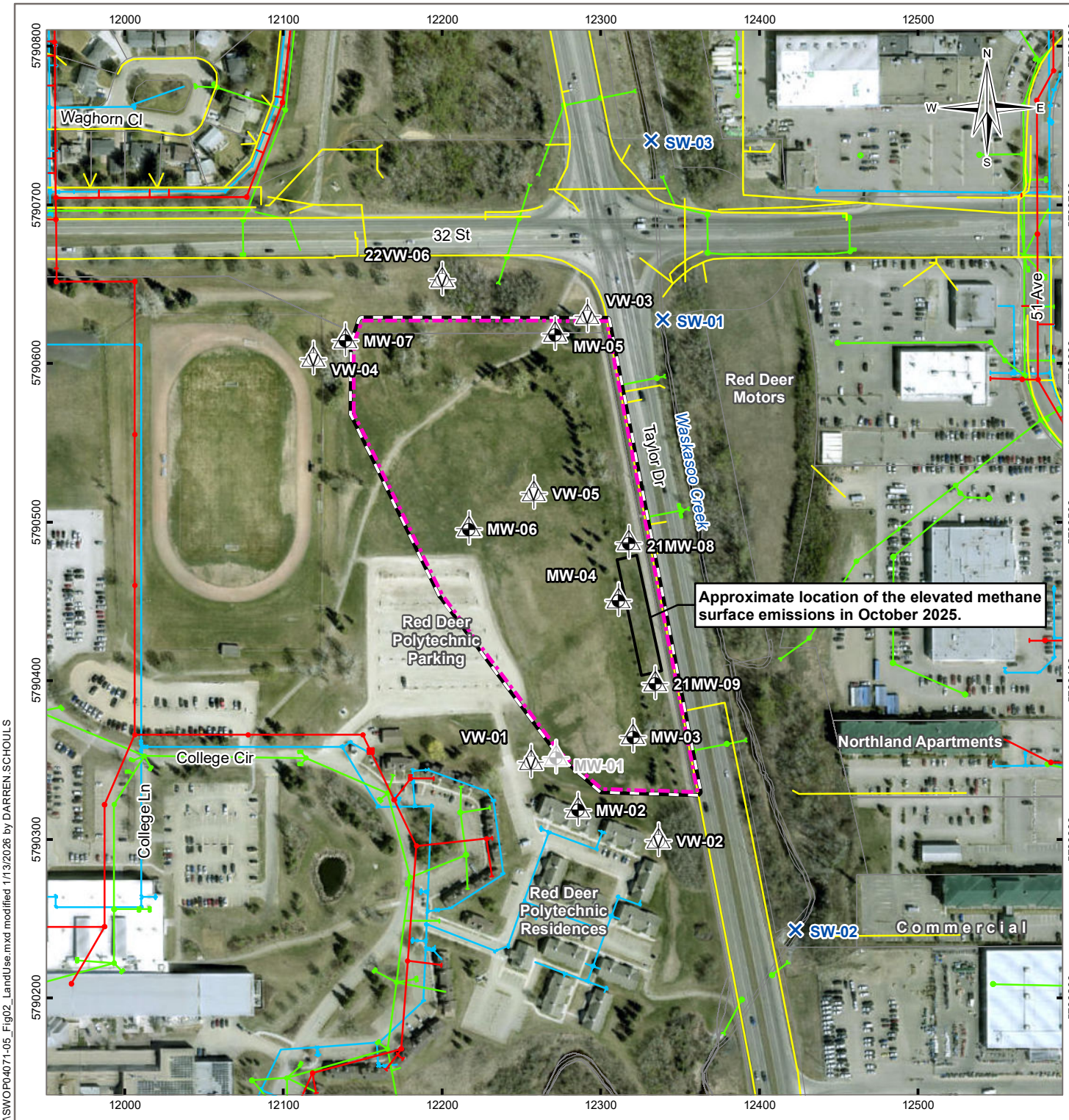


LEGEND

- Monitoring Well
- Decommissioned Monitoring Well
- Vapour Well
- Surface Water
- Site Boundary
- Historic Waste Disposal (Provided by Tiamat, 2014)
- Lot Boundary

Utilities

- Electrical
- Sanitary
- Storm
- Water

NOTES

Base data source: Imagery provided by ESRI; Red Deer County (2024)
Roads from City of Red Deer Open Data, 2018
Utilities provided by City of Red Deer.
Locations have not been field verified, and should not be used for construction or other intrusive field activities.

2025 GROUNDWATER AND SOIL VAPOUR MONITORING REPORT RED DEER COLLEGE

Site Plan and Surrounding Land Use

PROJECTION	DATUM	CLIENT
3TM 114	NAD83	The City of Red Deer

Scale: 1:3,500

60 30 0 60

Metres

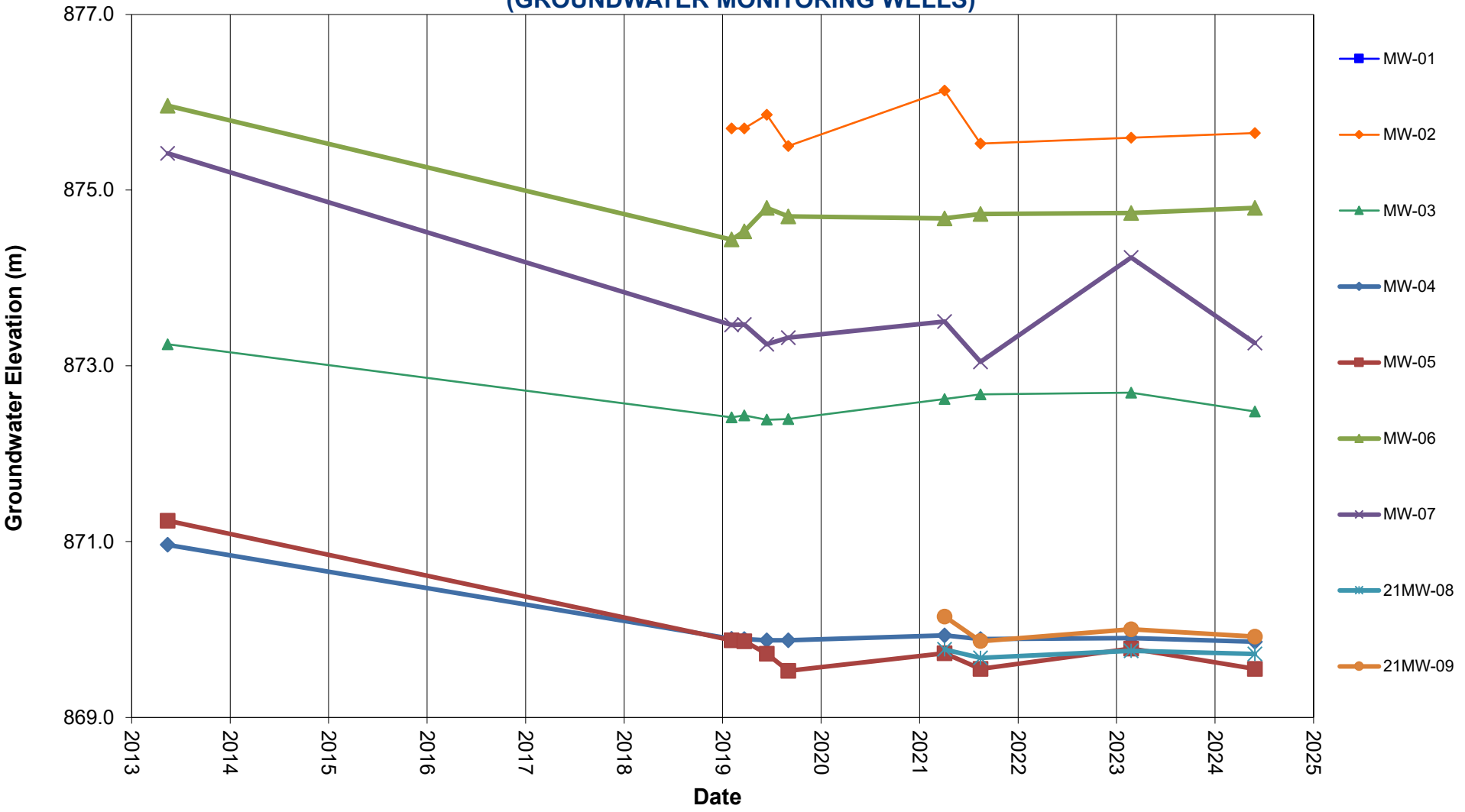
TETRA TECH

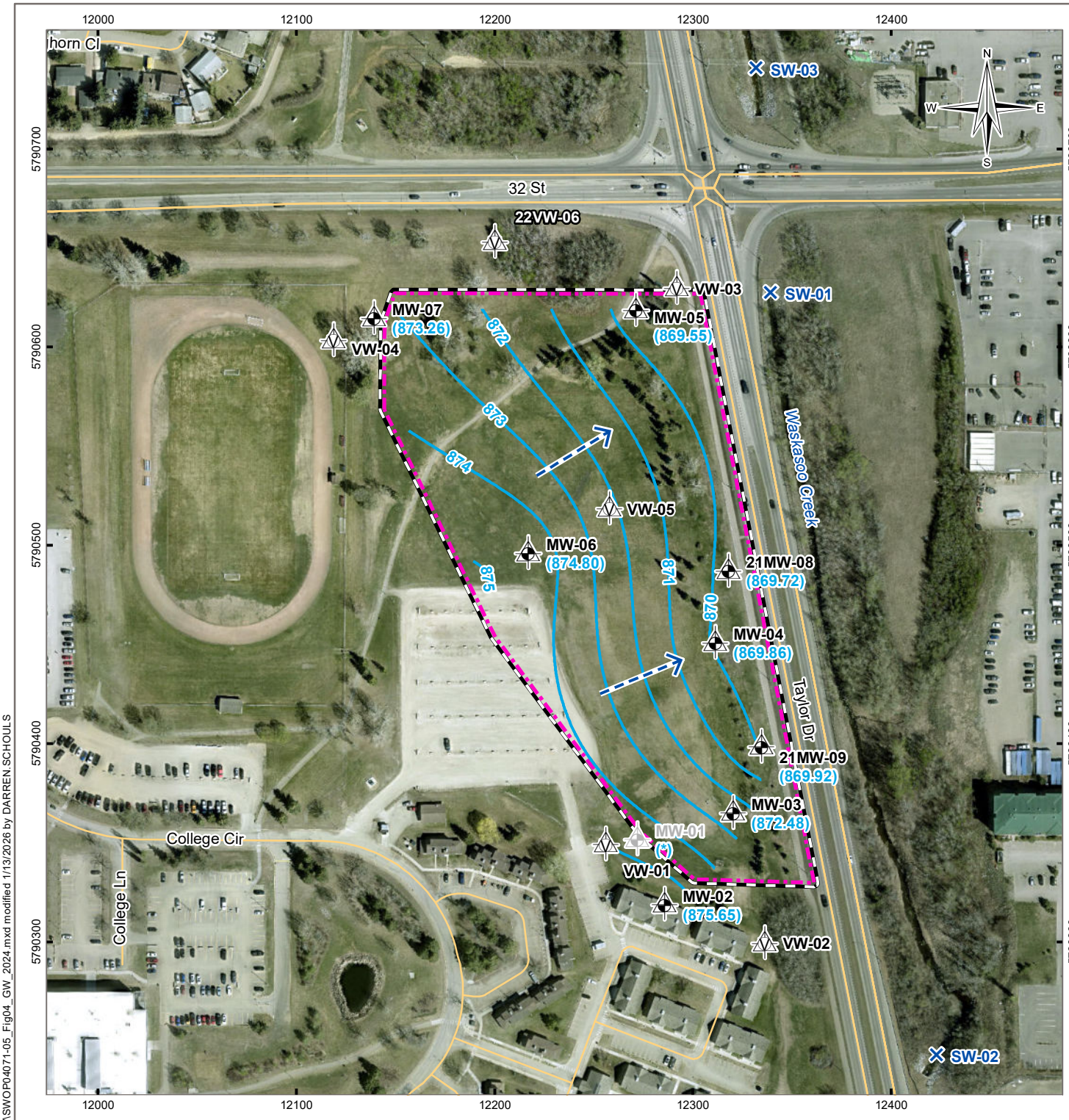
FILE NO.				
SWOP04071-05_Fig02_LandUse.mxd				
OFFICE	**DWN**	**CKD**	**APVD**	**REV**
Tt-VANC	DS	SL	CW	0
DATE	**PROJECT NO.**			
January 13, 2026	SWM.SWOP04071-05.005			

Figure 2

G:\SOLID_WASTE\SWOP\SWOP04071-05\GIS\Maps\005_RDC_SoilGW\SWOP04071-05_Fig02_LandUse.mxd modified 1/13/2026 by DARREN.SCHOULS

FIGURE 3
HISTORICAL GROUNDWATER ELEVATIONS
(GROUNDWATER MONITORING WELLS)





LEGEND

- Monitoring Well
- Decommissioned Monitoring Well
- Vapour Well
- Surface Water
- Inferred Groundwater Flow Direction
- Groundwater Elevation Contour (1 masl)
- (8XX.XX) Groundwater Elevation (masl)
- Site Boundary
- Historic Waste Disposal (Provided by Tiamat, 2014)
- Road

NOTES
Base data source: Imagery provided by ESRI; Red Deer County (2024)
Roads from City of Red Deer Open Data, 2018
masl - metres above sea level
* - damaged

2025 GROUNDWATER AND SOIL VAPOUR MONITORING REPORT RED DEER COLLEGE

Groundwater Elevation Contours September 2024

PROJECTION	DATUM	CLIENT
3TM 114	NAD83	The City of Red Deer

Scale: 1:2,800
50 25 0 50
Metres

TETRA TECH

FILE NO.
SWOP04071-05_Fig04_GW_2024.mxd

OFFICE	DWN	CKD	APVD	REV
Tt-EDM	DS	SL	CW	0

DATE
January 13, 2026

PROJECT NO.
SWM.SWOP04071-05.005

Figure 4

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APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

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Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this report, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.

APPENDIX B

SITE SETTING AND HISTORICAL INFORMATION

1.0 SITE HISTORY

The following section summarizes the history of the Red Deer College (RDC) site and was developed for the 2019 groundwater and soil vapour monitoring report[1].

Municipal records indicate that the waste disposal at the site occurred from 1970 to 1972. Historical information indicates the waste as being municipal solid waste (MSW) including a mix of plastics, cans, paper, scrap metals, wires, and glass.

Based on information in a Phase I environmental site assessment (ESA) report[2], Waskasoo Creek originally meandered through the area that was proposed for waste disposal. Since the construction of Taylor Drive, circa late 1980s early 1990s, Waskasoo Creek flows north in a straight channel immediately east of Taylor Drive. The report stated that the east edge of the landfill is near the west curb of Taylor Drive and that previous studies concluded that the rerouting of Waskasoo Creek may have altered the natural flow pattern of groundwater from the northeast to an easterly flow pattern.

The Phase I ESA report describes that investigations were conducted prior to the construction of the RDC residence buildings south the former landfill. Specifically: "*The housing development is not expected to be adversely impacted by soil gas or leachate. Protective measures include the passive sub-foundation venting and regular perimeter monitoring, per the setback relaxation approval*".

Historical waste disposal was identified during the 2014 Phase II ESA[3] to extend from the north end of site near 32 Street to the student residence buildings on the south end of the site. The south end of site has a large mound of waste that is mixed with fill material and covered with sod and loam. During the drilling investigation, MSW was identified primarily in the north and central parts of the site. The former landfill is closed and inactive. The historical waste area was calculated to be approximately 38,530 m^2. The estimated waste area is shown on Figure 2.

The Phase II ESA indicated that the buried wastes were overlain by surficial sod and loam; in some locations, silty sand and clay fill was encountered below the sod to a depth of approximately 3 m. However, at some borehole locations practically no soil cover was noted below the sod. Bedrock was not encountered at any testholes through the maximum drilling depth of 10.7 m.

The results of the Phase II ESA indicated that leachate constituents were present in the groundwater at monitoring wells along Taylor Drive. Tiamat Environmental Consultants Ltd. (Tiamat) stated: "*The results indicate a plume of the leachate constituents to be principally organic hydrocarbons and nutrient compounds. Various VOCs were detected in the local groundwater during this sampling event. The interpreted extent of the plume appears to extend beyond the current monitoring network and towards Waskasoo Creek*."

[1] Tetra Tech Canada Inc. 2020. 2019 Groundwater and Soil Vapour Monitoring Report – Red Deer College. Prepared for The City of Red Deer. October 2020. Project Number: 704-SWM.SWOP04071-01.005.

[2] Tiamat Environmental Consultants Ltd. 2013. Phase I Environmental Site Assessment, Historic Waste Disposal Site, Red Deer College, The City of Red Deer. September 24, 2013.

[3] Tiamat Environmental Consultants Ltd. 2014. Phase II Environmental Site Assessment, Historic Waste Disposal Site, Red Deer College, The City of Red Deer. February 12, 2014.

2.0 HISTORICAL GROUNDWATER MONITORING AND INVESTIGATION SUMMARY

Previous reports prepared by Tiamat for the site include the following:

- Phase I Environmental Site Assessment, Historic Waste Disposal Site, Red Deer College, The City of Red Deer. September 24, 2013[2].
- Phase II Environmental Site Assessment, Historic Waste Disposal Site, Red Deer College, The City of Red Deer. February 26, 2014[3].
- Environmental Risk Management Plan, Historic Waste Disposal Sites, Red Deer College & Red Deer Motors, The City of Red Deer. November 27, 2014[4].

Fourteen testholes (TH-01, TH-05, TH-09 to TH-15) were advanced in June 2013 as part of the Phase II ESA, five vapour wells (VW-01 to VW-05), and seven monitoring wells (MW-01 to MW-07) were installed.

The results of the Phase II ESA[3] indicated the following:

- No obvious activities pose a high risk to the site from the adjacent land uses. The historical waste boundary is within the college campus.
- The historical waste area is estimated to be 38,530 m^2.
- The hydraulically down-gradient groundwater monitoring wells had concentrations of petroleum hydrocarbons (PHCs), volatile organic compounds (VOCs), and chlorinated hydrocarbons greater than Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Tier 1 Guidelines).
- Soil vapour concentrations from two vapour wells on site were determined to be mild to moderate. The results indicated concentrations of VOCs, aliphatic and aromatic hydrocarbons, and siloxanes. The concentrations could pose a risk on the water quality within the Waskasoo Creek.

The recommendations of the Phase II ESA[3] were as follows:

- Monitor groundwater elevations and soil vapour data quarterly for one hydrogeological cycle.
- In consultation with the Alberta Environment and Sustainable Resource Development (ESRD; currently Alberta Environment and Protected Areas [AEPA]), determine if surface water sampling should be included along with additional groundwater monitoring locations to better define flow patterns and to determine exposure from leachate contaminants in Waskasoo Creek.
- Collect an additional set of soil vapour and groundwater analytical data, groundwater elevations, and volatile headspace measurements during the winter months to determine seasonal changes in soil vapour concentrations.
- Develop a site-specific risk management plan (RMP) to consider future land uses and address environmental concerns.
- Review all data to update the RMP with new information.

[4] Tiamat Environmental Consultants Ltd. 2014b. Environmental Risk Management Plan, Historic Waste Disposal Sites, Red Deer College and Red Deer Motors Landfill Sites, The City of Red Deer. November 27, 2014.

The RMP prepared by Tiamat in 2014 stated: "t*he outcomes of the RMP confirm the identified chemicals of concern and relevant risk are manageable to facilitate future developments which may lie within the regulated setback distance to the historic waste disposal site*"[4]. The following recommendations were made:

- Information in the preliminary quantitative risk assessment (PQRA) should be updated as new site information is obtained.
- A review of the RMP should be completed when the PQRA information is updated, if there are changes to the chemicals of potential concern (COPCs).
- The RMP should be reviewed and updated at five-year intervals.

The RMP[4] summarized the key results from the Phase II ESA[3] that were not included in the Phase II results. The results were the following:

- The soil materials underlying the MSW on site are native sand or clay till.
- In 2013, the average depth to groundwater was approximately 2.9 metres below grade (mbg), which is within the waste material on site. The average hydraulic horizontal gradient was approximately 0.04 m/m with an inferred east-northeast groundwater flow direction towards the northwest. Groundwater flow velocity was calculated to be 4.7 m/year using 30% porosity and 10^{-5} m/sec horizontal permeability.
- VOCs and other PHCs had detectable concentrations in 2013 at monitoring wells hydraulically down-gradient from the site. The concentrations consisted of parameters indicative of leachate. The leachate was characterized showing negative redox potentials and near anoxic conditions for dissolved oxygen.
- Several commercial businesses and residential developments are nearby the RDC site, as well as the College student residences.
- The historical landfill has a sandy soil cap of approximately 15 cm to 30 cm thick. Grass coverage is overlying the fill cap. Settlement has occurred in areas of waste disposal on the site. No activities located on adjacent lands were interpreted to be contributing environmental concerns.
- Volatile PHC compounds with a carbon chain length of up to 12 carbon atoms were detected at the vapour wells at RDC. Semi-volatile, oxygenated, and halogenated volatile hydrocarbons and ketones were also detected in the soil vapour samples.

2.1 2021 Monitoring Well Installation

On May 5, 2021, two new groundwater monitoring wells (MW-08 and MW-09) were installed using a tracked drill rig and solid stem auger along the east site boundary near Taylor Drive. The well locations were selected to assess subsurface conditions immediately east of the RDC site, in consideration of the extent of former operations that were visible on the 1973 aerial photograph in the 2013 Phase I ESA (Tiamat 2013).

While drilling MW-08, waste was encountered from 2.5 mbg to 5.0 mbg, and while drilling MW-09, waste was encountered from 3.5 mbg to 4.5 mbg. The groundwater wells were installed with 51 mm diameter polyvinyl chloride (PVC) pipe to a depth of 6.0 mbg and were screened with 51 mm slotted PVC pipe from 3.0 mbg to 6.0 mbg. The bottom of the screen for MW-08 and MW-09 were drilled to elevations of 867.08 m and 868.29 m.

Monitoring wells MW-08 and MW-09 were drilled less than 1 m behind the retaining wall along the walking path west of Taylor Drive. The available locations to install MW-08 and MW-09 outside of the waste footprint were limited due to powerlines being located in the ground along the boulevard right next to Taylor Drive. Installing the wells in the median on Taylor Drive would create complications for monitoring well installation as Taylor Drive has a high volume of traffic and traffic control methods would have to be implemented during monitoring well installation, groundwater monitoring, and groundwater sampling. Installing the wells on the east side of Taylor Drive above Waskasoo Creek was determined to not be a feasible location as there is less than 4 m between the edge of the road and the retaining wall along Waskasoo Creek. Additionally, there is a guard rail in between the road and retaining wall further limiting drill rig access.

3.0 SITE SETTING

The following section presents an overview of the regional and local setting for the site.

3.1 Geology

The following sections summarize the regional and local geology.

3.1.1 Geological Setting and Stratigraphy

The City of Red Deer (The City) and the site are located within the Red Deer River drainage basin with principal drainage via the Red Deer River located northwest of the site. The river has incised the uplands with gentle slopes to the either side of the river, Waskasoo Creek drains northward, eventually draining into the Red Deer River northeast of the site. The geology in the river valley is characterized by fluvial surficial sediments deposited by the Red Deer River, overlying shale and sandstone bedrock of the Paskapoo Formation. Key elements of the geological setting are presented below from Tiamat's 2013 Phase I ESA report[2]:

"The fertile black soil in the region (Penhold Loam) is of alluvial lacustrine origin. The Penhold Loam is a well-drained fine sandy loam classified as Chernozemic. It is generally stone free and in natural areas, is typically 1.5 m thick, more or less.

The Quaternary deposits consist of drift deposits of clay, silt, gravel and sand.

Surficial soils comprise largely of poorly to moderately sorted sand, silt and gravel with a varying amount of clay. The fluvial sediments generally have obscure bedding planes. Medium to coarse sized gravel with cross-bedded sand have been documented.

The Tertiary bedrock consists of sequences of alternating shales and sandstones of the Paskapoo Formation. The Paskapoo Formation underlies the gravel sediments. This non-marine bedrock is composed of mudstone, siltstone and sandstone. The formation of the Rocky Mountains subjected the Paskapoo Formation to a regional stress-induced fracture pattern."

3.1.2 Local Geology

Based on Tiamat's Phase II ESA[3], surficial soils at the site consist of gravel and sod overlying clay or sand fill material. Outside of the waste footprint, the fill was observed to approximately 3 mbg. A mound of soil and MSW is built up towards the southern end of the waste footprint. The mound is approximately 4.5 m higher than the surrounding land.

Within the waste footprint, sand fill typically overlays the MSW and in some locations the waste was encountered directly beneath the sod material (MW-03, MW-04, and MW-06). The waste materials were encountered at depths of up to 7.6 m.

The waste materials were overlying clay or sand fill in the central and west portion of the site and were overlying native sand or clay till elsewhere. No bedrock was encountered at any locations through the maximum depth of investigation of 10.7 m.

The Phase I ESA[2] indicated that the eastern portion of the landfill is near the west side of Taylor Drive and rerouting of Waskasoo Creek may have altered the geology in the area. There is deep fill in areas of the site that did not indicate waste disposal; therefore, possible fill may have been brought into the site during the creek rerouting process.

Cross-sections prepared for the Phase II ESA are included in Appendix D of this report. These sections show the significant topographical relief across the site, as well as the variable materials underlying the site.

3.2 Hydrogeology

The following sections summarize the regional and local hydrogeology.

3.2.1 Regional Hydrogeology

The regional hydrogeology is most influenced by the presence of the river sediments situated within the valley along the Red Deer River and a bedrock valley trending north-northeast in the vicinity of the site. Key elements of the hydrogeological setting are presented below from Tiamat's 2013 Phase I ESA report[2]:

"A significant buried valley and aquifer resource trending northeastward through the city has been partially mapped and lies in the SE 28-38-27 W4M (McKenzie Trail and Riverside). This buried valley extends to a depth of 21 m, more or less and may extend to the south into north portions of 21-28-27 W4M." Mapping by the Alberta Geological Survey[5] indicates that the valley could be beneath the site; however, the width of the valley is not defined.

"The dominant type of near-surface groundwater in the Paskapoo Formation in the area of assessment is sodium bicarbonate. Notable concentrations of sodium sulphate type groundwater have also been reported. The quality of groundwater for potable use is generally suitable to depths of 300 m on the west side of Red Deer and decreases to 90 m, more or less in the east.

Areas of recharge (downward flow) in unsaturated heterogeneous sediments include most areas above the river and creek valleys, whereas; the river valleys will generally exhibit discharge. The distribution of groundwater in the area can also be influenced by the local geology, topographic relief, areas of artesian flow, springs and reasonable yielding water source wells.

Numerous permanent surface water features within The City of Red Deer and vicinity include Red Deer River, Waskasoo Creek, Gaetz Lakes, Hazlett Lake, Bower Ponds (result of formerly mining gravel resources), various sloughs in the fringe areas of the city and an assortment of other smaller creeks and springs. The regional groundwater flow is expected to follow the bedrock topography and will be influenced by the varying distribution of sediments in the river valley, which will have been deposited in various historical channels since filled in under varying depositional environments."

[5] Andriashek, L. comp. 2018. Thalwegs of Bedrock Valleys, Alberta (GIS data, line features); Alberta Energy Regulator, AER/AGS Digital Data 2018-0001.

3.2.2 Local Hydrogeology

Waskasoo Creek is located to the south and east of the RDC campus. It flows south of the campus before crossing underneath Taylor Drive and flowing north along the east side of the road. Waskasoo Creek is located approximately 45 m east of the site and eventually flows into the Red Deer River located approximately 1.7 km north of the site. Based on information presented in a Phase I ESA[2] report for the site, rerouting of Waskasoo Creek may have altered the natural flow pattern of groundwater from the northeast to an easterly flow pattern. It was also stated that the past landfilling activities and "*variably transmissive shelves and/or gullies created by the previous location of Waskasoo Creek were redirecting the flow of the groundwater*."

The Phase II ESA[3] indicates the area of the site is within a zone of groundwater recharge with a downward flow component. The average groundwater level is approximately 3 mbg. Shallow groundwater is assumed to flow to the east-northeast, towards the creek.

3.3 Groundwater Resource Usage

A search of the Alberta Water Well Database for groundwater users was conducted in January 2020 within a 1 km radius of the RDC site identified 17 groundwater wells; seven of the wells are listed as domestic use, one is listed as domestic and stock use, five are listed as industrial use, two as "other", one as observation use, and one is listed as unknown use[6].

A water well was identified within 500 m of the site; but is believed to be plotted incorrectly based on the address on the water well report and is actually located further than 500 m from the site. No other wells were identified within 500 m of the site. The water wells within a 1 km radius of the site range in depth from 5.8 m to 122 m. The status and use of the surrounding groundwater wells were not confirmed and they were not field verified.

4.0 HAZARD QUOTIENTS

4.1 2019 Hazard Quotient Calculations

Estimated risks were calculated by dividing the soil vapour concentration by the corresponding soil vapour screening level for carcinogenic effects and multiplying the ratio by the target risk level of 1×10^{-5}. Similarly, the estimated hazard quotients (HQs) represent the soil vapour concentration divided by the corresponding soil vapour screening level for non-carcinogenic effects.

Risk estimates for non-carcinogenic COPCs are defined as HQs. HQs are calculated based on a ratio of the estimated exposure and the toxicity reference values (TRVs) identified as the tolerable daily intake (TDI) or tolerable concentration (TC) according to the following equation:

$$\text{Hazard Quotient} = \frac{\text{Estimated Daily Dose (mg/kg-day or mg/m}^3\text{)}}{\text{Tolerable Daily Intake (mg/kg-day) or Tolerable Concentration (mg/m}^3\text{)}}$$

Non-carcinogenic risk characterization in the assessment was completed for all COPCs.

[6] Alberta Environment and Parks. 2019. Water Well Database. http://www.telusgeomatics.com/tgpub/ag_water/.

When the HQ is greater than the target risk value, the scenario poses a potential concern and requires further evaluation or risk management. It is important to note that HQs greater than the target risk value do not necessarily indicate that adverse health effects will occur. This is because of the conservative assumptions used in estimating concentrations and in setting the target values. HQs that are less than the target risk value indicate that exposure is within acceptable levels and no further risk management is necessary. HQs greater than the target risk value suggest that further investigation or risk management (e.g., remediation) may be warranted.

For non-carcinogens, the individual target risk value used is 0.2 and the cumulative target risk value used is 1.0. This cumulative target risk value accounts for additional exposure to the chemicals of concern from sources other than the site. Therefore, the cumulative target risk value of 1.0 represents an allocation of 20% (the 0.2 target risk value from the individual compound) of a person's daily exposure from site sources and the remaining 80% would come from other sources. Other sources of exposure include ambient air, household products, and soil and water contact from locations other than the site.

For carcinogens, the risk of cancer is assumed to be proportional to dose with the assumption that any exposure results in a nonzero probability of risk. Carcinogenic risk probabilities were calculated by multiplying the estimated exposure level by the route-specific cancer slope factor (SF) or unit risk factor (URF) for each carcinogen:

$$R = E \times SF \text{ (or URF)}$$

Where:

R = Estimated individual excess lifetime cancer risk;

E = Exposure level for each COPC (mg/kg/day or mg/m^3); and

SF = Route- and chemical-specific SF $(mg/kg/day)^{-1}$ or URF $((mg/m^3)^{-1})$.

Risk probabilities determined for each carcinogen were also considered to be additive over all exposure pathways so that an overall risk of cancer was estimated for each group of potentially exposed receptors.

When assessing risks posed by exposure to carcinogenic substances, Health Canada and other regulatory agencies assume that any level of exposure is associated with some hypothetical cancer risk. As a result, it is necessary for regulatory agencies to specify an acceptable risk level. Per Health Canada guidance (2010a, 2010b), cancer risks are deemed essentially negligible where the estimated cumulative incremental lifetime cancer risk is less than or equal to 1 in 100,000 (1×10^{-5}).

4.2 Review of the 2014 Hazard Quotients from the Risk Management Plan

The following section is a review of the 2014 RMP[4] for the site that was completed by Tiamat. The review of the 2014 RMP was completed for the 2019 groundwater and soil vapour monitoring report[1].

The 2014 RMP presented a proposed site-specific environmental RMP as a tool to assist with the review of future subdivision applications on lands lying within the regulated setback distance from the site (300 m). The focus was on potential ingress of soil gas for COPCs with a HQ greater than 1.0. Residential land use was considered most sensitive, and exposure ratings for other land uses (e.g., school, public institutions, commercial complexes) were considered to not be greater than residential; however, unique exceptions would have to be reviewed and addressed on a site-specific basis[3]. Further, underground utility workers and subsurface utility infrastructure were considered relevant to potential exposure.

The RMP applied a 10x factor of safety to the HQs to address uncertainties. HQs from the RMP ranged up to 588,280 (including the 10x factor of safety). Based on these, the RMP then provided recommended generic mitigative measures based on the calculated HQs, ranging from passive to active measures, recognizing that the ultimate approach would require a design professional for the proposed development.

Following the 2014 RMP, Canadian Council of Ministers of the Environment (CCME) released the document "A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures Via Inhalation of Vapours"[7], designed to provide guidance for developing site-appropriate soil vapour quality guidelines. The guidelines developed using the methods outlined in the CCME document were used for this current study and are included with the vapour sampling results in Table 4. HQs were calculated using estimated dose (based on concentrations measured at the site) and divided by TDI. Soil vapour concentrations from the Phase II ESA conducted in 2013 were not compared to soil vapour quality guidelines; however, spot checks of five target compounds with the highest HQs in the 2013 work (benzene, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene) identified that none of the 2013 concentrations would have unacceptable HQs using the updated CCME methodology. It should be noted that only soil vapour wells VW-03 and VW-04 were sampled in 2013.

The 2014 RMP was prepared concurrent to RMPs at several other former City landfills, and a common set of mitigative measures was applied based on the HQs. Subsequent to the 2014 RMP and to the release of the CCME Protocol document, The City undertook additional assessment at another former City landfill (Montfort); as part of that work, their consultant XCG Consulting Limited (XCG) revised the 2014 RMP criteria ranges for each generic mitigative measure category to include a cancer risk range to allow comparison of the 2014 RMP ranges with the individual HQs and cancer risks calculated by XCG[8]. From that work, XCG identified the following generic mitigative measures for developments within a 300 m setback of these landfills (based on Tiamat 2014), and these have been adopted for this site:

Passive Measures

1. Passive Measures – Level A: for Cancer Risk of > $1E^{-5}$ and < $5E^{-5}$ and/or HQ >0.2 and <1.

   Compacted clay liner with a minimum thickness of 1 m and confirmed maximum hydraulic conductivity of 10^{-6} cm/sec.

2. Passive Measures – Level B: for Cancer Risk of > $5E^{-5}$ and < $5E^{-4}$ and/or HQ >1 and <5.

   Synthetic liner with type of material, thickness, and installation details dependent on the design professional.

3. Passive Measures – Level C: for Cancer Risk of > $5E^{-4}$ and < $1E^{-3}$ and/or HQ >5 and <50.

   Passive sub-slab depressurization (SSD) system with a minimum depressurization of 4 Pa to 10 Pa. In some instances (such as a pervious subgrade), the actual depressurization necessary may require an active SSD or alternative active ventilation system.

[7] Canadian Council of Ministers of the Environment. 2014. A Protocol for the Derivation of Soil Vapour Quality Guidelines for Exposure Protection of Human Exposures via Inhalation of Vapours. Available online: http://ceqg-rcqe.ccme.ca/en/index.html#void.

[8] XCG Consulting Limited. 2018. Vapour Intrusion Assessment and Environmental Monitoring Report, prepared for the City of Red Deer's Montfort Landfill.

Active Measures

Field verify the presence of the identified chemicals of concern and other potential chemicals in the soil gas state at the development site. If confirmed, determine the most appropriate manner to prevent soil vapour intrusion.

1. Active Measures – Level D: for Cancer Risk of > $1E^{-3}$ and < $2E^{-3}$ and/or HQ values >50 and <100.

   Active SSD must be configured to compensate for depressurization of the building and have adequate negative pressure gradients across the entire footprint of the foundation.

2. Active Measures – Level E: for Cancer Risk of >$2E^{-3}$ and/or HQ values >100.

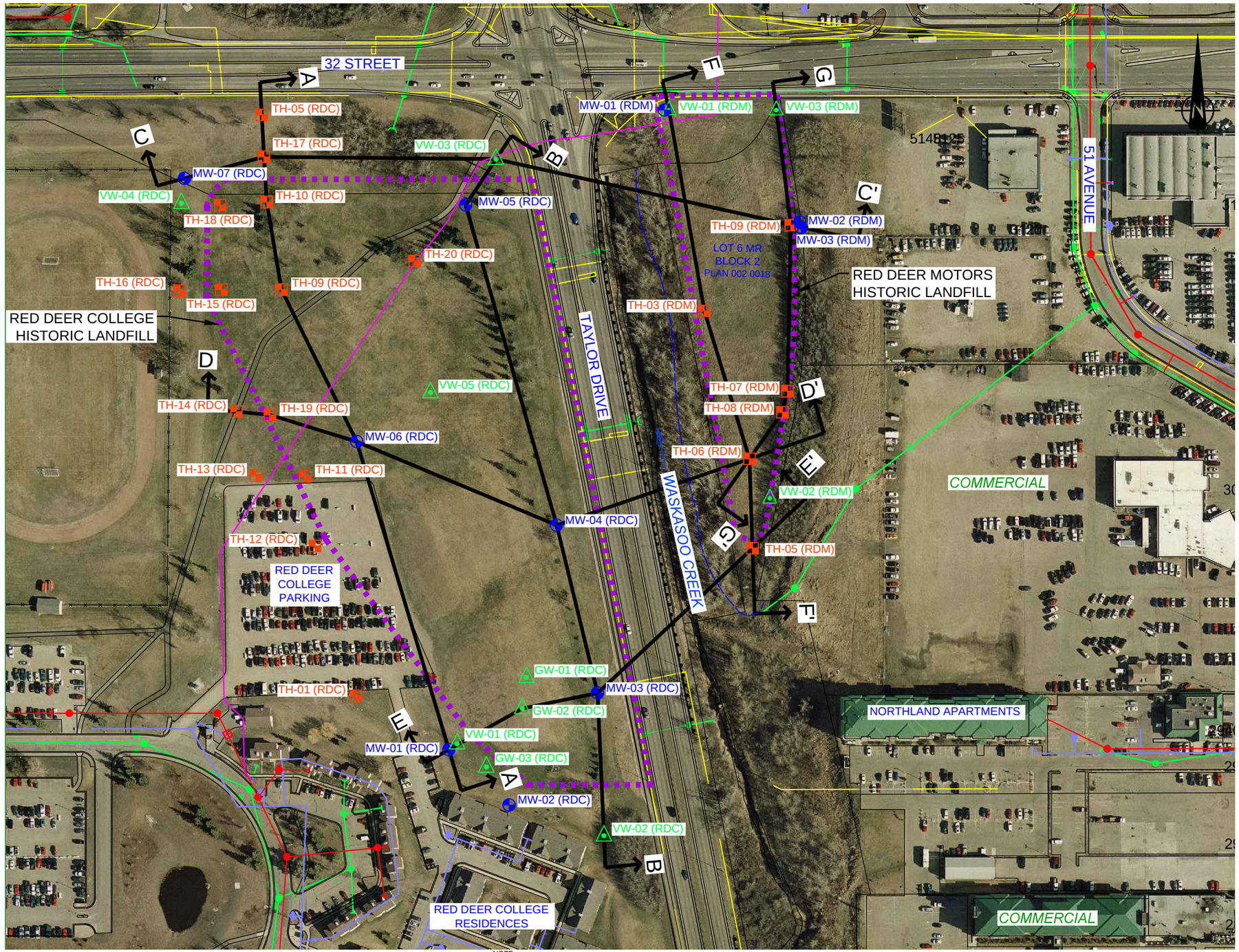
   Installation of geomembrane and active soil vapour extraction with system fault notification alarm.

For consistency with XCG's approach from 2017, we compared individual HQs with the individual target hazard level (0.2). Based on the 2023 program, the greatest individual HQ calculated for the site was 8.3 (vs target hazard level of 0.2), the greatest cumulative HQ was 9.3 (vs target hazard level of 1.0), and the greatest estimated cancer risk was 5.8×10^{-4} (vs target risk of 1.0×10^{-5}). While development at the site is not currently proposed, for illustrative purposes, based on these HQs and cancer risk levels calculated from the 2023 vapour data, passive Level C measures would be required for development within the setback area (the 2019 data indicated active Level E measures). We note that these HQs and risks are based on samples collected from VW-03 (immediately northeast of landfill footprint) and VW-05 (situated within the landfill footprint and an indicator of source concentrations).

Future applications for development within the setback are subject to review by The City. The developer's team would be responsible for reviewing and verifying the available data relative to their proposed development. The mitigative measures presented above are generic and can be used as a general guide for expectations by The City; ultimately, the developer's design engineer would be responsible for developing measures specific to the intended development based on the above or an appropriate equivalent. Protection of workers (e.g., construction and utility) should form part of any development plan.

APPENDIX C

CROSS-SECTIONS (TIAMAT 2014A)



SOURCE
2010 ORTHOGRAPHIC IMAGE © COPYRIGHT WITH PERMISSION FROM THE CITY OF RED DEER.

0 20 50 100m
Scale 1:2000

PHASE II TEST LOCATIONS
MW-## GROUNDWATER MONITORING WELL INSTALLED BY TIAMAT
TH-## TESTHOLE
VW-## SOIL VAPOUR MONITORING WELL
MW-## GROUNDWATER MONITORING WELL INSTALLED BY OTHERS
REFER TO TABLE 1 FOR TESTHOLE INFORMATION

LEGEND
HISTORIC WASTE DISPOSAL
LOT BOUNDARY
100 YEAR FLOOD LINE
CROSS SECTION LOCATION
ELECTRICAL
SANITARY
STORM
WATER
PRIVATE COMMUNICATIONS CABLE INSTALLED JULY 2011

NOTE:
LOCATION OF BURIED UTILITIES ARE APPROXIMATE, ACTUAL LOCATIONS OF THE SHALLOW UTILITIES AND ANY OTHER UTILITIES SHOULD BE VERIFIED PRIOR TO ANY GROUND DISTURBANCE ACTIVITY.

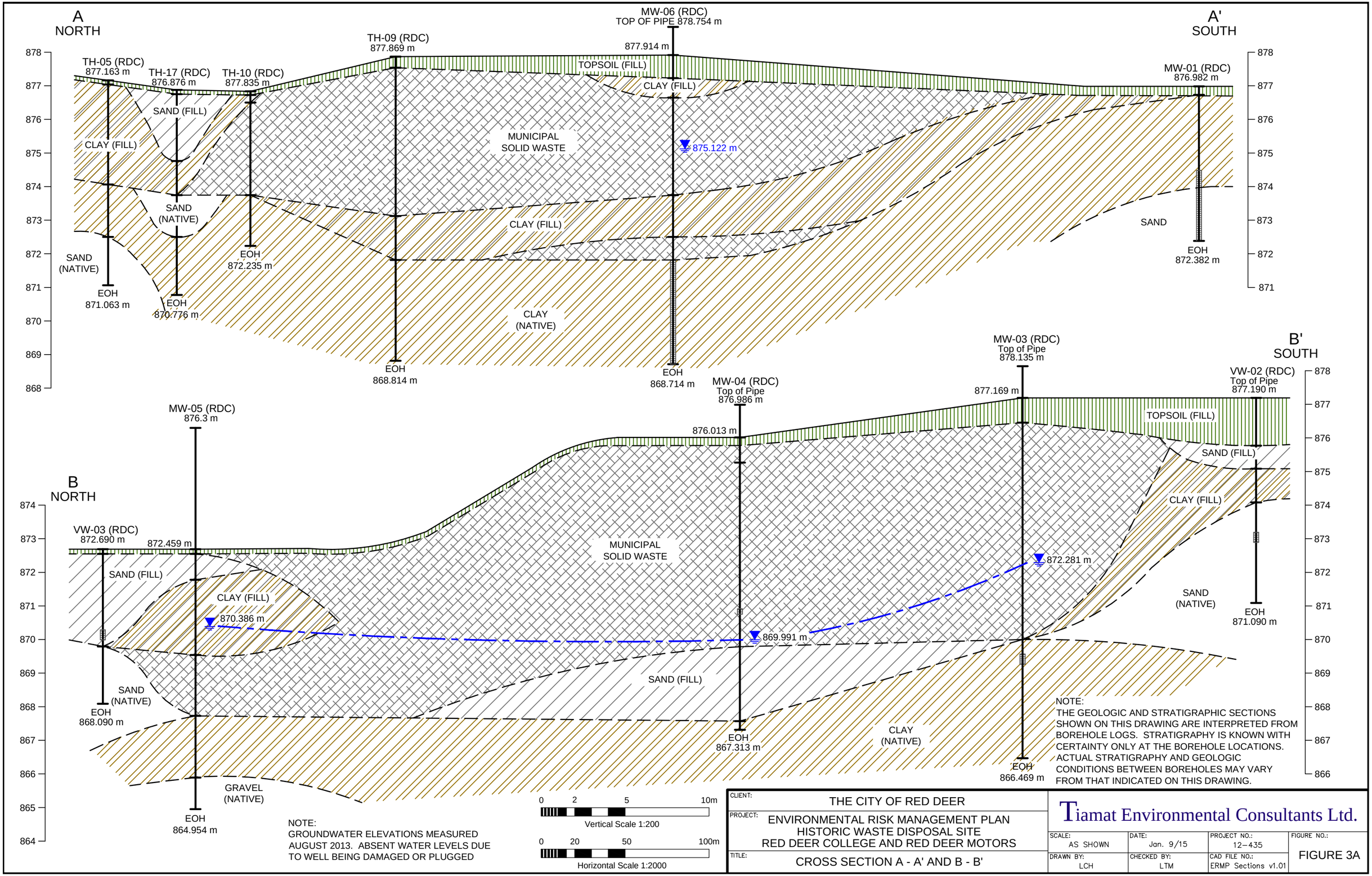
CLIENT: THE CITY OF RED DEER

PROJECT: ENVIRONMENTAL RISK MANAGEMENT PLAN
HISTORIC WASTE DISPOSAL SITE
RED DEER COLLEGE AND RED DEER MOTORS

TITLE: INTERPRETED EXTENT OF WASTE

Tiamat Environmental Consultants Ltd.

SCALE:	DATE:	PROJECT NO.:	FIGURE NO.:
1 : 2000	JAN. 18/15	12-435	FIGURE 2
DRAWN BY: LCH	CHECKED BY: LTM	CAD FILE NO.: ERMP v1.03	



NOTE:
GROUNDWATER ELEVATIONS MEASURED AUGUST 2013. ABSENT WATER LEVELS DUE TO WELL BEING DAMAGED OR PLUGGED

0 2 5 10m
Vertical Scale 1:200

0 20 50 100m
Horizontal Scale 1:2000

NOTE:
THE GEOLOGIC AND STRATIGRAPHIC SECTIONS SHOWN ON THIS DRAWING ARE INTERPRETED FROM BOREHOLE LOGS. STRATIGRAPHY IS KNOWN WITH CERTAINTY ONLY AT THE BOREHOLE LOCATIONS. ACTUAL STRATIGRAPHY AND GEOLOGIC CONDITIONS BETWEEN BOREHOLES MAY VARY FROM THAT INDICATED ON THIS DRAWING.

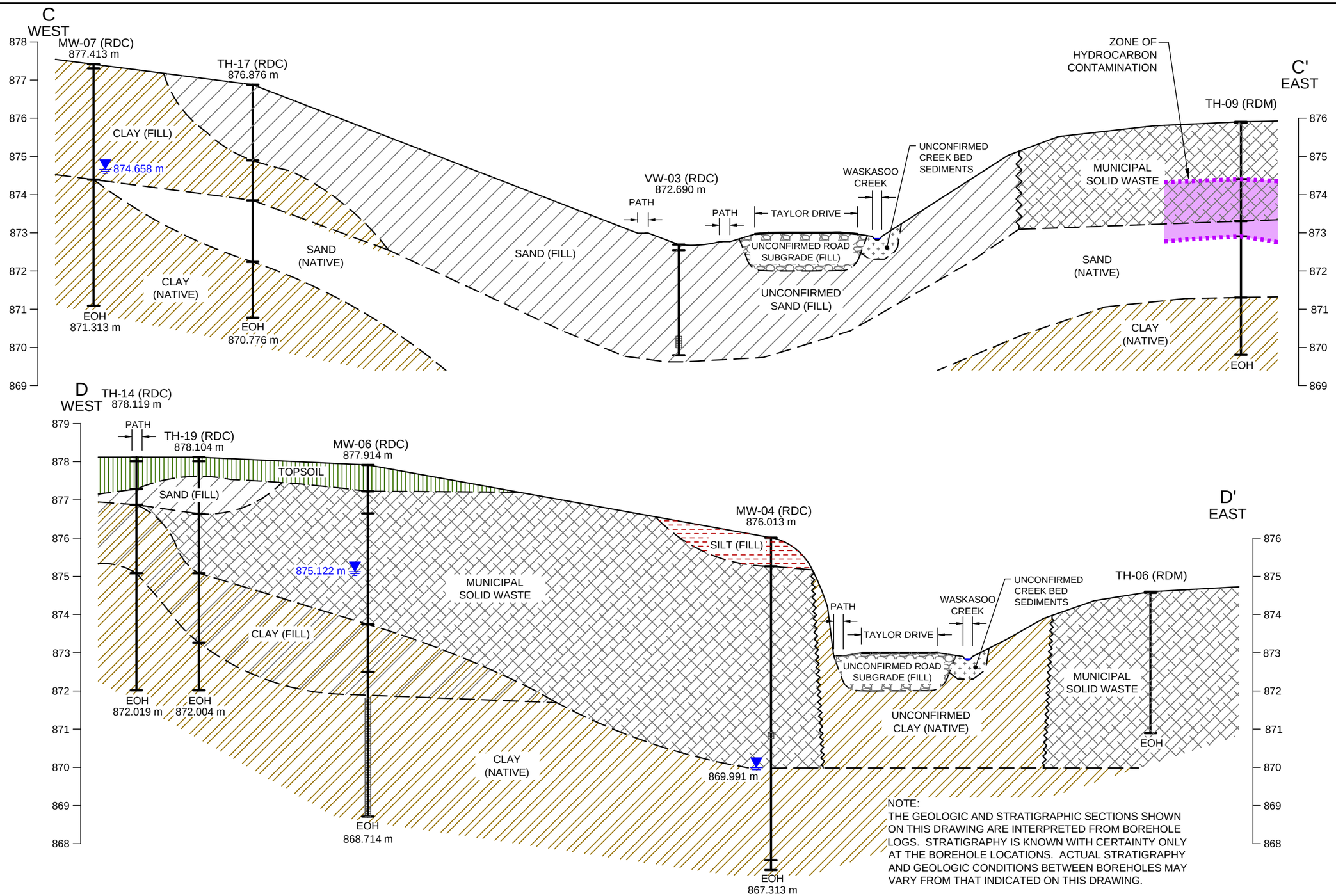
CLIENT: THE CITY OF RED DEER

PROJECT: ENVIRONMENTAL RISK MANAGEMENT PLAN
HISTORIC WASTE DISPOSAL SITE
RED DEER COLLEGE AND RED DEER MOTORS

TITLE: CROSS SECTION A - A' AND B - B'

Tiamat Environmental Consultants Ltd.

SCALE:	DATE:	PROJECT NO.:	FIGURE NO.:
AS SHOWN	Jan. 9/15	12-435	FIGURE 3A
DRAWN BY: LCH	CHECKED BY: LTM	CAD FILE NO.: ERMP Sections v1.01	



NOTE:
THE GEOLOGIC AND STRATIGRAPHIC SECTIONS SHOWN ON THIS DRAWING ARE INTERPRETED FROM BOREHOLE LOGS. STRATIGRAPHY IS KNOWN WITH CERTAINTY ONLY AT THE BOREHOLE LOCATIONS. ACTUAL STRATIGRAPHY AND GEOLOGIC CONDITIONS BETWEEN BOREHOLES MAY VARY FROM THAT INDICATED ON THIS DRAWING.

0 2 5 10m
Vertical Scale 1:200

0 20 50 100m
Horizontal Scale 1:2000

NOTE:
GROUNDWATER ELEVATIONS MEASURED AUGUST 2013. ABSENT WATER LEVELS DUE TO WELL BEING DAMAGED OR PLUGGED

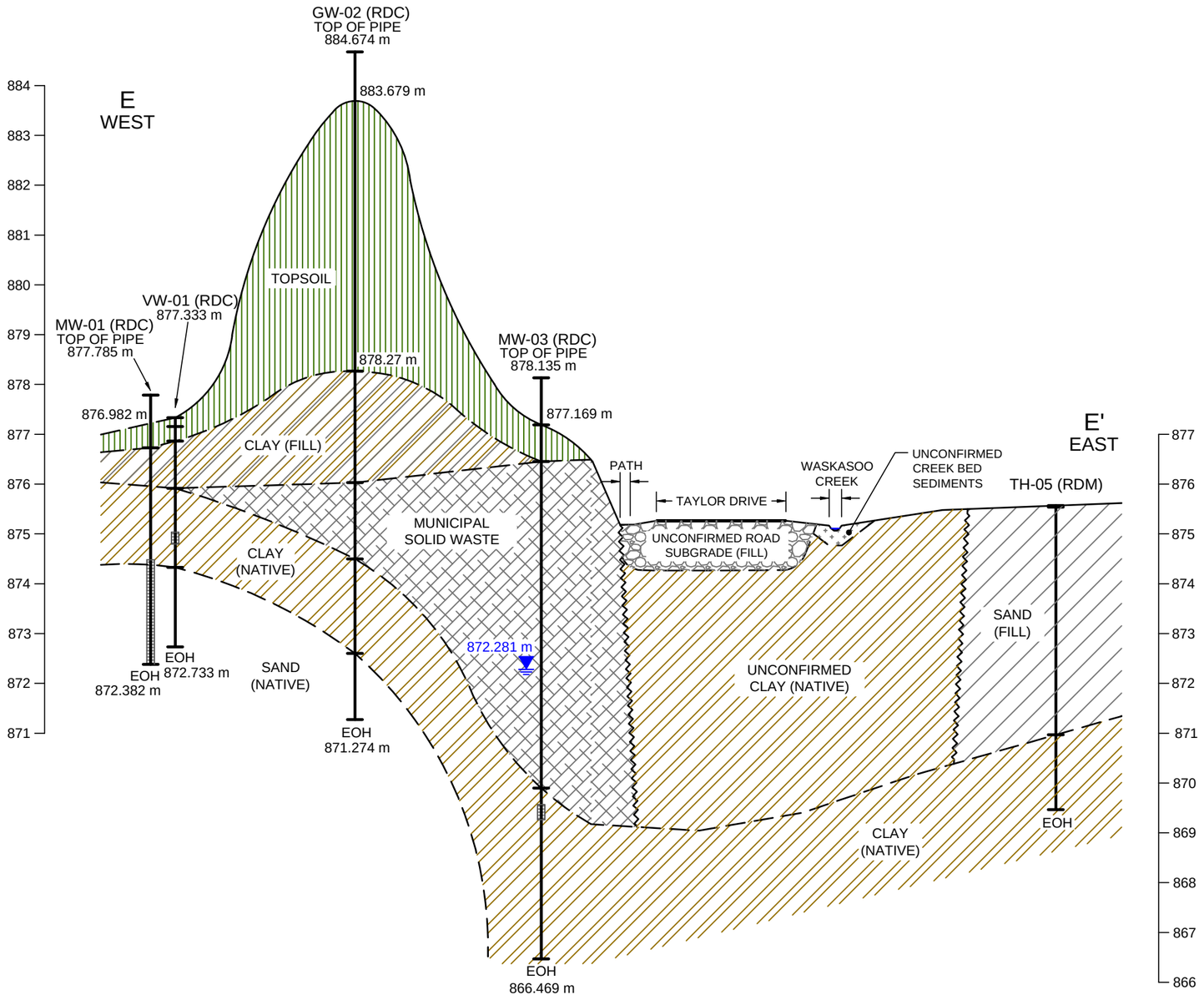
CLIENT: THE CITY OF RED DEER

PROJECT: ENVIRONMENTAL RISK MANAGEMENT PLAN
HISTORIC WASTE DISPOSAL SITE
RED DEER COLLEGE AND RED DEER MOTORS

TITLE: CROSS SECTION C - C' AND D - D'

Tiamat Environmental Consultants Ltd.

SCALE:	DATE:	PROJECT NO.:	FIGURE NO.:
AS SHOWN	June 27/14	12-435	FIGURE 3B
DRAWN BY: LCH	CHECKED BY: LTM	CAD FILE NO.: ERMP Sections v1.00	



NOTE:
THE GEOLOGIC AND STRATIGRAPHIC SECTIONS SHOWN ON THIS DRAWING ARE INTERPRETED FROM BOREHOLE LOGS. STRATIGRAPHY IS KNOWN WITH CERTAINTY ONLY AT THE BOREHOLE LOCATIONS. ACTUAL STRATIGRAPHY AND GEOLOGIC CONDITIONS BETWEEN BOREHOLES MAY VARY FROM THAT INDICATED ON THIS DRAWING.

0 2 5 10m
Vertical Scale 1:200

0 20 50 100m
Horizontal Scale 1:2000

NOTE:
GROUNDWATER ELEVATIONS MEASURED AUGUST 2013. ABSENT WATER LEVELS DUE TO WELL BEING DAMAGED OR PLUGGED

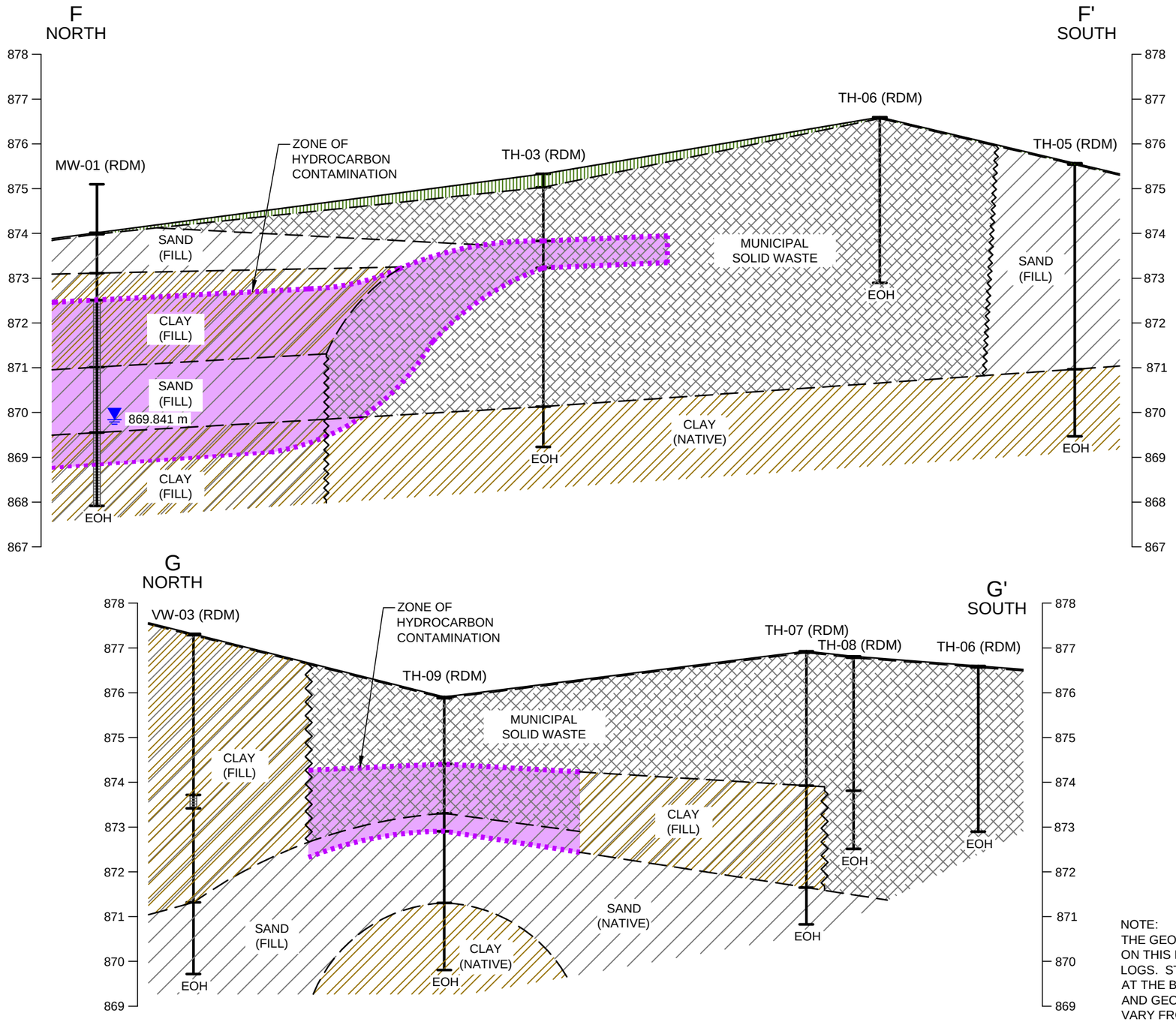
CLIENT: THE CITY OF RED DEER

PROJECT: ENVIRONMENTAL RISK MANAGEMENT PLAN
HISTORIC WASTE DISPOSAL SITE
RED DEER COLLEGE AND RED DEER MOTORS

TITLE: CROSS SECTION E - E'

Tiamat Environmental Consultants Ltd.

SCALE:	DATE:	PROJECT NO.:	FIGURE NO.:
AS SHOWN	June 27/14	12-435	FIGURE 3C
DRAWN BY: LCH	CHECKED BY: LTM	CAD FILE NO.: ERMP Sections v1.00	



NOTE:
THE GEOLOGIC AND STRATIGRAPHIC SECTIONS SHOWN ON THIS DRAWING ARE INTERPRETED FROM BOREHOLE LOGS. STRATIGRAPHY IS KNOWN WITH CERTAINTY ONLY AT THE BOREHOLE LOCATIONS. ACTUAL STRATIGRAPHY AND GEOLOGIC CONDITIONS BETWEEN BOREHOLES MAY VARY FROM THAT INDICATED ON THIS DRAWING.

0 2 5 10m
Vertical Scale 1:200

0 20 50 100m
Horizontal Scale 1:2000

NOTE:
GROUNDWATER ELEVATIONS MEASURED AUGUST 2013. ABSENT WATER LEVELS DUE TO WELL BEING DAMAGED OR PLUGGED

CLIENT: THE CITY OF RED DEER

PROJECT: ENVIRONMENTAL RISK MANAGEMENT PLAN
HISTORIC WASTE DISPOSAL SITE
RED DEER COLLEGE AND RED DEER MOTORS

TITLE: CROSS SECTION F - F' AND G - G'

Tiamat Environmental Consultants Ltd.

SCALE:	DATE:	PROJECT NO.:	FIGURE NO.:
AS SHOWN	June 27/14	12-435	FIGURE 3D
DRAWN BY:	CHECKED BY:	CAD FILE NO.:	
LCH	LTM	ERMP Sections v1.00	

APPENDIX D

BOREHOLE LOGS

Client: RED DEER COLLEGE	GEOTECHNICAL INVESTIGATION	TEST HOLE NO: MW1
	PROPOSED STUDENT RESIDENCES	PROJECT NO: 'X06424
BECK DRILLING – SOLID STEM AUGERS	GROUNDWATER MONITORING WELL	ELEVATION: 877.02 m

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test; Grab Sample; Split Pen; Core Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND

DEPTH(m)	PLASTIC — M.C. — LIQUID (20 40 60 80)	SOIL SYMBOL	Soil Description	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	OTHER TESTS COMMENTS	ELEVATION(m)
0.0			TOPSOIL: clay, silty, some fine sand, black, rootlets, organics, moist						877.0
1.0			CLAY: silty, low plastic, brown, coal fragments, moist						876.0
2.0 ▽			– grey mottling, rust staining						875.0 ▽
3.0			SAND TILL: some clay pieces, little fine gravel, brown, coal fragments, rust staining, wet						874.0
4.0									873.0
5.0			End of hole at 4.6 m. 50 mm PVC pipe installed to 4.6 m. Bottom 2.1 m slotted. Borehole backfilled with sand to 2.4 m, drill cuttings to 0.5 m and bentonite to surface grade. Aboveground steel well protector installed, locked and grouted in place. Well dry upon completion. Water level at 1.69 m on November 14/99. Water level at 1.89 m on November 15/99.						872.0
6.0									871.0
7.0									870.0
8.0									869.0
9.0									868.0
10.0									867.0
11.0									866.0
12.0									865.0
13.0									864.0
14.0									863.0
15.0									

Agra Earth & Environmental Limited
Red Deer, Alberta

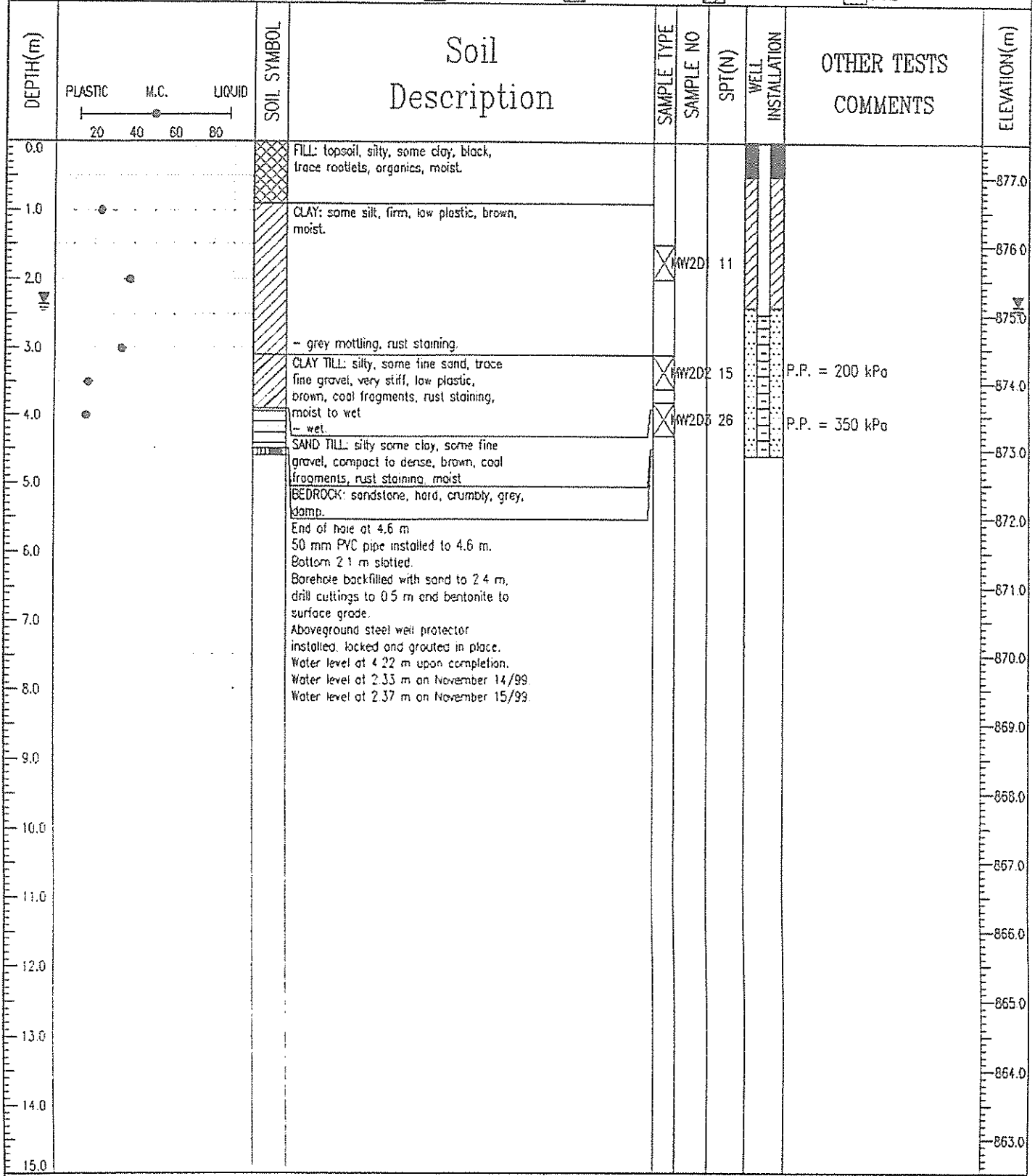
LOGGED BY: AR	COMPLETION DEPTH: 4.6 m
REVIEWED BY: MDB	COMPLETE: 11/08/99
Fig. No:	Page 1 of 1

99/11/23 12:04PM (AR-DEPTH)

Client: RED DEER COLLEGE	GEOTECHNICAL INVESTIGATION	TEST HOLE NO: MW2
	PROPOSED STUDENT RESIDENCES	PROJECT NO: RX06424
BECK DRILLING – SOLID STEM AUGERS	GROUNDWATER MONITORING WELL	ELEVATION: 877.5 m

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test; Grab Sample; Split Pen; Core Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND



Agra Earth & Environmental Limited Red Deer Alberta	LOGGED BY: AR	COMPLETION DEPTH: 4.6 m
	REVIEWED BY: MDB	COMPLETE: 11/08/99
	Fig. No:	Page 1 of 1

99/11/23 12:05PM (AWDEFIN)

Client: RED DEER COLLEGE	GEOTECHNICAL INVESTIGATION	TEST HOLE NO: MW3
	PROPOSED STUDENT RESIDENCES	PROJECT NO: RX06424
BECK DRILLING – SOLID STEM AUGERS	GROUNDWATER MONITORING WELL	ELEVATION: 877.31 m

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test; Grab Sample; Split Pen; Core Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND

DEPTH(m)	PLASTIC – M.C. – LIQUID (20 40 60 80)	SOIL SYMBOL	Soil Description	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	OTHER TESTS COMMENTS	ELEVATION(m)
0.0			FILL: topsoil mixed with clay and silt, some fine sand, black and brown, moist.						877.0
1.0			LANDFILL: domestic waste mixed with clay fill.					TRACETECHTOR: Full Gas = >10000 ppm No Methane = 90 ppm	876.0
2.0									875.0
3.0									874.0
4.0									873.0
5.0			– wet.						872.0
6.0									871.0
7.0									870.0
8.0			CLAY TILL: some fine sand, little fine gravel, grey, coal fragments, moist to wet.						869.0
9.0									868.0
10.0									867.0
11.0			End of hole at 10.7 m 50 mm PVC pipe installed to 10.7 m Bottom 3.1 m slotted Borehole backfilled with sand to 7.3 m, bentonite to 6.3 m, drill cuttings to 0.5 m and bentonite to surface grade Aboveground steel well protector installed, locked and grouted in place Water level at 10.12 m upon completion. Water level at 7.15 m on November 14/99 Water level at 5.75 m on November 15/99						866.0
12.0									865.0
13.0									864.0
14.0									863.0
15.0									

Agra Earth & Environmental Limited Red Deer Alberta	LOGGED BY: AR	COMPLETION DEPTH: 10.7 m
	REVIEWED BY: MDB	COMPLETE: 11/08/99
	Fig. No:	Page 1 of 1

99/11/23 12:05PM (ANYDEPTH)

Client: RED DEER COLLEGE	GEOTECHNICAL INVESTIGATION	TEST HOLE NO: MW4
	PROPOSED STUDENT RESIDENCES	PROJECT NO: RX06424
BECK DRILLING – SOLID STEM AUGERS	GROUNDWATER MONITORING WELL	ELEVATION: 876.16 m

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test; Grab Sample; Split Pen; Core Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND

DEPTH(m)	PLASTIC / M.C. / LIQUID (20 40 60 80)	SOIL SYMBOL	Soil Description	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	OTHER TESTS COMMENTS	ELEVATION(m)
0.0			TOPSOIL: silty, little fine sand, black, trace rootlets, organics, frost.						876.0
1.0			FILL: silt, some fine sand, some clay, loose, brown, moist.						875.0
2.0			LANDFILL: domestic waste mixed with clay fill, moist to wet.						874.0
3.0			– wet					TRACETECHTOR: Full Gas = >10000 ppm No Methane = 60 ppm	873.0
4.0									872.0
5.0									871.0
6.0			SAND: silt seams, little fine gravel, grey, wet.						870.0
7.0									869.0
8.0			– medium sized cobbles						868.0
9.0			CLAY: some silt, grey, wet.						867.0
10.0			End of hole at 9.0 m. 50 mm PVC pipe installed to 8.7 m. Bottom 2.1 m slotted. Borehole backfilled with sand to 8.6 m, bentonite to 4.6 m, cuttings to 0.5 m and bentonite to surface grade. Aboveground steel well protector installed, locked and grouted in place. Water level at 7.47 m upon completion. Water level at 8.93 m on November 14/99. Water level at 8.60 m on November 15/99.						866.0
11.0									865.0
12.0									864.0
13.0									863.0
14.0									862.0
15.0									

Agra Earth & Environmental Limited
Red Deer Alberta

LOGGED BY: AR
REVIEWED BY: MDB
Fig. No:

COMPLETION DEPTH: 9 m
COMPLETE: 11/09/99

99/11/23 12:05PM LANDDEPTH

Client: RED DEER COLLEGE	GEOTECHNICAL INVESTIGATION	TEST HOLE NO: MW5
	PROPOSED STUDENT RESIDENCES	PROJECT NO: RX06424
BECK DRILLING – SOLID STEM AUGERS	GROUNDWATER MONITORING WELL	ELEVATION: 872.5 m

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test; Grab Sample; Split Pen; Core Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND

DEPTH(m)	PLASTIC / M.C. / LIQUID (20 40 60 80)	SOIL SYMBOL	Soil Description	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	OTHER TESTS COMMENTS	ELEVATION(m)
0.0			TOPSOIL: silty, sandy, black, rootlets, organics, moist.						872.0
1.0			FILL: sand, silty, loose, brown, moist.						
			FILL: clay, silty, fine sand seams, brown, with grey mottling, moist to wet						871.0
2.0			– buried topsoil layer, (0.2 m thick), black, trace rootlets, organics, moist to wet.						
									870.0
3.0			LANDFILL: domestic waste mixed with clay fill, moist to wet						
4.0			– wet						869.0
5.0			CLAY: some silt, grey, rust staining, wet.					TRACETECHTOR: Full Gas = >10000 ppm No Methane = 64 ppm	868.0
6.0									867.0
7.0			GRAVEL, medium to coarse grained, some clay and silt layers, grey, cobbles, wet.						866.0
8.0			End of hole at 7.6 m 50 mm PVC pipe installed to 7.5 m Bottom 3.1 m slotted Borehole backfilled with sand to 4.2 m, bentonite to 3.2 m, drill cuttings to 0.5 m and bentonite to surface grade Aboveground steel well protector installed, bollard in place Water level at 2.75 m upon completion Water level at 2.1 m on November 14, 99 Water level at 2.1 m on November 15, 99						865.0
9.0									864.0
10.0									863.0
11.0									862.0
12.0									861.0
13.0									860.0
14.0									859.0
15.0									858.0

Agra Earth & Environmental Limited Red Deer, Alberta	LOGGED BY: AR REVIEWED BY: MDB Fig. No:	COMPLETION DEPTH: 7.6 m COMPLETE: 11/09/99 Page 1 of 1

99/11/23 12:05PM (ANYDEPTH)

Client: RED DEER COLLEGE	GEOTECHNICAL INVESTIGATION	TEST HOLE NO: MW6
	PROPOSED STUDENT RESIDENCES	PROJECT NO: RX06424
BECK DRILLING – SOLID STEM AUGERS	GROUNDWATER MONITORING WELL	ELEVATION: 877.99 m

SAMPLE TYPE: Shelby Tube; No Recovery; SPT Test; Grab Sample; Split Pen; Core Sample

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND

DEPTH(m)	PLASTIC – M.C. – LIQUID (20 40 60 80)	SOIL SYMBOL	Soil Description	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	OTHER TESTS COMMENTS	ELEVATION(m)
0.0			TOPSOIL: silty, some fine sand, black, rootlets, organics, moist.						877.0
1.0			FILL: clay and silt, brown with grey mottling, moist.						
2.0			LANDFILL: domestic waste mixed with clay fill, moist to wet. – wet.					TRACETECHTOR: Full Gas = 2000 ppm No Methane = 58 ppm	876.0
3.0									875.0
4.0			FILL: clay, silty, some fine gravel, brown with grey mottling, rust staining, wet.						874.0
5.0			LANDFILL: domestic waste mixed with clay fill, wet						873.0
6.0			CLAY TILL: some fine sand, little fine gravel, brown, coal fragments, rust staining, moist.					TRACETECHTOR: Full Gas = >10000 ppm No Methane = 71 ppm	872.0
7.0									871.0
8.0									870.0
9.0									869.0
10.0			End of hole at 9.2 m 50 mm PVC pipe installed to 9.2 m Bottom 3.1 m slotted Borehole backfilled with sand to 6.1 m bentonite to 5.1 m by cuttings to 0.5 m and bentonite to surface grade Aboveground steel well protector installed, locked and grouted in place Water level at 4.35 m upon completion Water level at 3.21 m on November 14/99 Water level at 2.91 m on November 15/99						868.0
11.0									867.0
12.0									866.0
13.0									865.0
14.0									864.0
15.0									863.0

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Red Deer Alberta

LOGGED BY: AR	COMPLETION DEPTH: 9.2 m
REVIEWED BY: MDB	COMPLETE: 11/09/99
Fig. No:	Page 1 of 1

99/11/23 10:20 M HARDCOPY

PROJECT: Phase II Environmental Site Assessment	**BOREHOLE No.:** MW-07
PROJECT No.: 12-435	**DRILL TYPE:** SS Auger
LOCATION: Red Deer College Site	**GROUND ELEVATION:** 877.413 m
CLIENT: The City of Red Deer	**COMPLETION DATE:** 06/28/2013

Sample Type: Shelby Tube | Split Spoon | Core | Disturbed | No Recovery

Backfill Type: Bentonite | Silica Sand | Grout | Pea Gravel | Drill Cuttings | Bentonite : Sand

Notes: Groundwater Monitoring Well is near the northeast corner of the fence for the running track, directly north of VW-04.

Depth (m)	Soil Description	Sample Type	Sample No.	SPT (N)	Combustible Soil Vapours (ppm)	Well Details
0.0	Sod (~ 3 cm thick).					
	Clay (fill) - soft, silty, trace sand, moist, light olive.					
1.0						
2.0						
	No obvious waste material.					
3.0	Clay till (native) - stiff, silty, trace sand, trace coal, trace oxides, wet, light olive.					
4.0						
5.0						
6.0	End of hole at 6.1 m. 51 mm diameter 4.6 m length 010 PVC screen. Aboveground lockable steel casing.					
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						

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Slough :	Completion Depth (m): 6.1
Depth to Groundwater :	Checked By: LTM
Logged By: JAL	Page: 1 of 1

Borehole No: **21MW-08**

Project: Red Deer Collect Well Installation	Project No: SWM.SWOP04071-02.008
Location: Red Deer College	
Red Deer, Alberta	UTM: 307536 E; 5792481 N; Z 12

Depth (m)	Method	Soil Description	Notes and Comments	MW08	Depth (ft)
0					0
	Solid stem auger	TOPSOIL - clay loam, organics, rootlets, black, (300 mm thick)			
		CLAY (FILL) - some sand, moist, grey to brown			
1					1
					2
2					3
					4
					5
					6
					7
					8
		WASTE - black, wood chips, plastic, strong odour			9
3					10
▼					▼11
					12
4					13
					14
					15
					16
5		CLAY - some silt, wet, firm, brown			17
					18
					19
6					20
		END OF BOREHOLE (6.0 metres) water - 3.4 metres Monitoring well installed to 6.0 metres			21
					22
7					23
7.5					24

TETRA TECH

Contractor: CP Drilling	Completion Depth: 6 m
Equipment Type: Truck mounted	Start Date: 2021 May 5
Logged By: MR	Completion Date: 2021 May 5
Reviewed By: FH	Page 1 of 1

Borehole No: **21MW-09**

Project: Red Deer Collect Well Installation	Project No: SWM.SWOP04071-02.008
Location: Red Deer College	
Red Deer, Alberta	UTM: 307541 E; 5792389 N; Z 12

Depth (m)	Method	Soil Description	Notes and Comments	MW09	Depth (ft)
0		TOPSOIL - organics, rootlets, black, (200 mm thick)			0
		CLAY (FILL) - sandy, trace gravel, dry, brown			
1					1
					2
					3
					4
2					5
					6
					7
					8
3	Solid stem auger				9
					10
					11
		WASTE AND CLAY (FILL) - sandy, damp to wet, grey, wood chips			12
4					13
					14
					15
		CLAY - sandy, trace gravel, moist, brown to grey			16
5					17
					18
▼					▼ 19
6		END OF BOREHOLE (6.0 metres) water - 5.9 metres Monitoring well installed to 6.0 metres			20
					21
					22
7					23
7.5					24

TETRA TECH

Contractor: CP Drilling	Completion Depth: 6 m
Equipment Type: Truck mounted	Start Date: 2021 May 5
Logged By: MR	Completion Date: 2021 May 5
Reviewed By: FH	Page 1 of 1

PROJECT: Phase II Environmental Site Assessment	**BOREHOLE No.:** VW-01
PROJECT No.: 12-435	**DRILL TYPE:** SS Auger
LOCATION: Red Deer College Site	**GROUND ELEVATION:** 877.333 m
CLIENT: The City of Red Deer	**COMPLETION DATE:** 06/28/2013

Sample Type: Shelby Tube | Split Spoon | Core | Disturbed | No Recovery

Backfill Type: Bentonite | Silica Sand | Grout | Pea Gravel | Drill Cuttings | Bentonite : Sand

Notes: Soil Vapour Well is ~ 1.5 m north of MW-01, northwest of the student housing.

Depth (m)	Soil Description	Sample Type	Sample No.	SPT (N)	Combustible Soil Vapours (ppm)	Well Details
0.0	Sod (~ 3 cm thick).					
	Loam (fill) - stiff, silty, clayey, some sand, trace rootlets, damp, dark olive.					
	Clay (fill) - stiff, silty, trace loam, damp, light olive.					
1.0	No obvious waste material.					
	Clay (native) - stiff to soft, silty, moist, light olive.					
2.0						
3.0	Sand (native) - loose to compact, silty, wet, light olive brown.					
4.0						
	End of hole at 4.6 m.					
	25 mm diameter 30 cm length 020 PVC screen.					
5.0	Aboveground lockable steel casing.					
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						

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Slough :	Completion Depth (m): 4.6
Depth to Groundwater :	Checked By: LTM
Logged By: JAL	Page: 1 of 1

PROJECT: Phase II Environmental Site Assessment	**BOREHOLE No.:** VW-02
PROJECT No.: 12-435	**DRILL TYPE:** SS Auger
LOCATION: Red Deer College Site	**GROUND ELEVATION:** 877.190 m
CLIENT: The City of Red Deer	**COMPLETION DATE:** 06/28/2013

Sample Type: Shelby Tube | Split Spoon | Core | Disturbed | No Recovery

Backfill Type: Bentonite | Silica Sand | Grout | Pea Gravel | Drill Cuttings | Bentonite : Sand

Notes: Soil Vapour Well is ~ 1 m west of tree island, near the northeast corner of the student housing facilities.

Depth (m)	Soil Description	Sample Type	Sample No.	SPT (N)	Combustible Soil Vapours (ppm)	Well Details
0.0	Sod (~ 3 cm thick). Top soil (fill) - loose, silty, damp, dark olive.					
1.0	Sand (fill) - compact, silty, some clay, moist, light olive brown.					
2.0	Clay (fill) - firm to soft, silty, trace sand, moist, light olive brown. No obvious waste material.					
3.0	Sand (native) - compact, silty, some clay, trace coal, trace oxides, moist, light olive brown.					
4.0						
5.0	becomes wet at 4.6 m.					
6.0	End of hole at 6.1 m. 25 mm diameter 30 cm length 020 PVC screen. Aboveground lockable steel casing.					
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						

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Slough : 0.9 m	Completion Depth (m): 6.2
Depth to Groundwater :	Checked By: LTM
Logged By: JAL	Page: 1 of 1

PROJECT: Phase II Environmental Site Assessment	**BOREHOLE No.:** VW-03
PROJECT No.: 12-435	**DRILL TYPE:** SS Auger
LOCATION: Red Deer College Site	**GROUND ELEVATION:** 872.690 m
CLIENT: The City of Red Deer	**COMPLETION DATE:** 06/28/2013

Sample Type: Shelby Tube | Split Spoon | Core | Disturbed | No Recovery

Backfill Type: Bentonite | Silica Sand | Grout | Pea Gravel | Drill Cuttings | Bentonite : Sand

Notes: Soil Vapour Well is in the vicinity of the Red Deer College sign at the intersection of 32 Street and Taylor Drive.

Depth (m)	Soil Description	Sample Type	Sample No.	SPT (N)	Combustible Soil Vapours (ppm)	Well Details
0.0	Sod (~ 3 cm thick).					
	Sand (fill) - loose, loamy, silty, some clay, damp, light olive.					
1.0	becomes compact, silty, clayey, trace loam, trace pebbles at 1.5 m.					
2.0	No obvious waste material.					
3.0	Sand (native) - dense, silty, some gravel, trace clay, trace coal, wet, olive.					
4.0	End of hole at 4.6 m. 25 mm diameter 30 cm length 020 PVC screen. Aboveground lockable steel casing.					
5.0						
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						

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Slough : 3.0 m	Completion Depth (m): 4.6
Depth to Groundwater :	Checked By: LTM
Logged By: JAL	Page: 1 of 1

PROJECT: Phase II Environmental Site Assessment	**BOREHOLE No.:** VW-04
PROJECT No.: 12-435	**DRILL TYPE:** SS Auger
LOCATION: Red Deer College Site	**GROUND ELEVATION:** 877.445 m
CLIENT: The City of Red Deer	**COMPLETION DATE:** 06/28/2013

Sample Type: Shelby Tube | Split Spoon | Core | Disturbed | No Recovery

Backfill Type: Bentonite | Silica Sand | Grout | Pea Gravel | Drill Cuttings | Bentonite : Sand

Notes: Soil Vapour Well is near the northeast corner of the fence for the running track.

Depth (m)	Soil Description	Sample Type	Sample No.	SPT (N)	Combustible Soil Vapours (ppm)	Well Details
0.0	Sod (~ 3 cm thick). Clay (fill) - soft, silty, wet to moist, light olive.					
1.0	becomes firm at 1.5 m.					
2.0	No obvious waste material.					
3.0	End of hole at 3 m. 25 mm diameter 30 cm length 020 PVC screen. Aboveground lockable steel casing.					
4.0						
5.0						
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						

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Slough :	Completion Depth (m): 3
Depth to Groundwater :	Checked By: LTM
Logged By: JAL	Page: 1 of 1

PROJECT: Phase II Environmental Site Assessment	**BOREHOLE No.:** VW-05
PROJECT No.: 12-435	**DRILL TYPE:** SS Auger
LOCATION: Red Deer College Site	**GROUND ELEVATION:** 877.724 m
CLIENT: The City of Red Deer	**COMPLETION DATE:** 06/28/2013

Sample Type: Shelby Tube | Split Spoon | Core | Disturbed | No Recovery

Backfill Type: Bentonite | Silica Sand | Grout | Pea Gravel | Drill Cuttings | Bentonite : Sand

Notes: Soil Vapour Well is in the middle of the open field, north and east of the campus parking lot.

Depth (m)	Soil Description	Sample Type	Sample No.	SPT (N)	Combustible Soil Vapours (ppm)	Well Details
0.0	Sod (~ 3 cm thick).					
	Clay (fill) mixed with MSW - wire, wood debris, glass, paper, plastic, strong bitter pungent odour, firm to soft, loamy, silty, some sand, damp, dark olive.					
1.0	becomes wet at 1.4 m.					
2.0						
3.0	Sand (fill) mixed with MSW - wood debris, nylon, plastic, tin can, plastic bag, newspaper, strong bitter pungent odour, dense, silty, trace clay, moist to wet, dark olive.					
4.0						
	Sand mix becomes compact, moderate bitter pungent odour at 4.6 m.					
5.0						
6.0						
7.0						
	Sand and MSW mix - loose, poor recovery.					
	Clay till (native) - stiff, silty, trace pebbles, trace coal, moist, olive grey.					
8.0						
9.0						
10.0						
	End of hole at 10.7 m.					
11.0	25 mm diameter 30 cm length 020 PVC screen.					
	Aboveground lockable steel casing.					
	Backfilled with bentonite to 7.6 m, ~ 50:50 bentonite and sand to 2.7 m, play sand to 2.4 m.					
12.0						

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Slough :	Completion Depth (m): 10.7
Depth to Groundwater :	Checked By: LTM
Logged By: JAL	Page: 1 of 1

Borehole No: **22VW-06**

Project: 2023 Pre-1972 Site Monitoring Program	Project No: SWM.SWOP04071-03.009
Location: NW 1/4, Sec. 21-38-27 W4M	
Red Deer, Alberta	

Depth (m)	Method	Soil Description	Notes and Comments	22VW-06	Depth (ft)
0	Solid stem auger	TOPSOIL - (200 mm thick)	Flush mount		0
		CLAY - silty, trace gravel, damp, low plastic, brown			
1		- moist, medium plastic			1 2 3 4 5 6 7 8 9
2		- iron inclusions			
3		END OF BOREHOLE (3.00 metres) slough - 2.40 metres at 0 hrs. Monitoring well installed to 2.40 metres			10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
4					
5					
6					
7					
7.5					

TETRA TECH

Contractor: CP Drilling	Completion Depth: 3 m
Equipment Type: Skid Steer	Start Date: 2022 December 5
Logged By: RM	Completion Date: 2022 December 5
Reviewed By:	Page 1 of 1

APPENDIX E

LABORATORY ANALYTICAL REPORTS

CERTIFICATE OF ANALYSIS

Work Order	:	**CG2515185**		
Client	:	**Tetra Tech Canada Inc.**	Laboratory	: ALS Environmental - Calgary
Contact	:	Kara Heckert	Account Manager	: Patryk Wojciak
Address	:	110, 140 Quarry Park Blvd SE Calgary Alberta Canada T2C 3G3	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	:	204 954 6832	E-mail	: patryk.wojciak@alsglobal.com
Project	:	SWM.SWOP04071-05.004	Telephone	: +1 403 407 1800
PO	:	SWM.SWOP04071-05.004	Date Samples Received	: 17-Oct-2025 13:40
C-O-C number	:	CORD RDM SWS	Date Analysis Commenced	: 17-Oct-2025
Sampler	:	WV	Issue Date	: 25-Oct-2025 09:49
Site	:	----		
Quote number	:	CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites		
No. of samples received	:	4		
No. of samples analysed	:	4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Forest Crocker		Metals, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Joshua Stessun	Laboratory Analyst	Organics, Calgary, Alberta
Jyotsnarani Devi	Laboratory Analyst	Organics, Calgary, Alberta
Katarzyna Glinka	Analyst	Inorganics, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Metals, Calgary, Alberta

General Comments

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

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

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

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

Unit	*Description*
-	no units
%	percent
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre

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

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	SW-01 ----	SW-02 ----	SW-03 ----	DUPLICATE ----	----
					Client sampling date / time	16-Oct-2025 15:00	16-Oct-2025 16:10	16-Oct-2025 15:45	16-Oct-2025 00:00	----
						CG2515185-001	CG2515185-002	CG2515185-003	CG2515185-004	----
						Result	Result	Result	Result	----
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/CG	0.50	mg/L		390	400	336	385	----
Conductivity	----	E100/CG	2.0	µS/cm		876	912	797	872	----
pH	----	E108/CG	0.10	pH units		8.49	8.51	8.46	8.46	----
Alkalinity, bicarbonate (as HCO3)	71-52-3	E290/CG	1.2	mg/L		334	351	310	337	----
Alkalinity, carbonate (as CO3)	3812-32-6	E290/CG	1.0	mg/L		14.3	16.4	13.6	14.3	----
Alkalinity, hydroxide (as OH)	14280-30-9	E290/CG	1.0	mg/L		<0.3	<0.3	<0.3	<0.3	----
Alkalinity, total (as CaCO3)	----	E290/CG	2.0	mg/L		298	315	276	300	----
Solids, total dissolved [TDS], calculated	----	EC103/CG	1.0	mg/L		500	520	454	499	----
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/CG	0.50	mg/L		90.0	90.6	80.2	90.0	----
Fluoride	16984-48-8	E235.F/CG	0.020	mg/L		0.168	0.155	0.170	0.158	----
Nitrate (as N)	14797-55-8	E235.NO3/CG	0.020	mg/L		0.612	0.716	0.655	0.611	----
Nitrite (as N)	14797-65-0	E235.NO2/CG	0.010	mg/L		0.024	0.064	0.025	0.023	----
Sulfate (as SO4)	14808-79-8	E235.SO4/CG	0.30	mg/L		36.6	38.3	36.2	36.6	----
Nitrate + Nitrite (as N)	----	EC235.N+N/CG	0.0500	mg/L		0.636	0.780	0.680	0.634	----
Ion Balance										
Anion sum	----	EC101/CG	0.10	meq/L		9.31	9.71	8.59	9.35	----
Cation sum	----	EC101/CG	0.10	meq/L		9.99	10.2	8.76	9.87	----
Ion balance (APHA)	----	EC101/CG	0.01	%		3.52	2.46	0.98	2.71	----
Ion balance (cations/anions)	----	EC101/CG	0.010	%		107	105	102	106	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	SW-01 ----	SW-02 ----	SW-03 ----	DUPLICATE ----	----
					Client sampling date / time	16-Oct-2025 15:00	16-Oct-2025 16:10	16-Oct-2025 15:45	16-Oct-2025 00:00	----
						CG2515185-001	CG2515185-002	CG2515185-003	CG2515185-004	----
						Result	Result	Result	Result	----
Total Metals										
Aluminum, total	7429-90-5	E420/CG	0.0030	mg/L		0.0419	0.0587	0.0606	0.0438	----
Antimony, total	7440-36-0	E420/CG	0.00010	mg/L		0.00046	0.00041	0.00049	0.00044	----
Arsenic, total	7440-38-2	E420/CG	0.00010	mg/L		0.00096	0.00161	0.00106	0.00099	----
Barium, total	7440-39-3	E420/CG	0.00010	mg/L		0.170	0.192	0.157	0.169	----
Boron, total	7440-42-8	E420/CG	0.010	mg/L		0.065	0.075	0.059	0.065	----
Cadmium, total	7440-43-9	E420/CG	0.0000050	mg/L		0.0000072	0.0000089	0.0000069	0.0000076	----
Calcium, total	7440-70-2	E420/CG	0.050	mg/L		81.0	83.3	72.7	79.7	----
Chromium, total	7440-47-3	E420/CG	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
Copper, total	7440-50-8	E420/CG	0.00050	mg/L		0.00169	0.00172	0.00189	0.00170	----
Iron, total	7439-89-6	E420/CG	0.010	mg/L		0.334	0.566	0.381	0.346	----
Lead, total	7439-92-1	E420/CG	0.000050	mg/L		0.000077	0.000101	0.000171	0.000081	----
Magnesium, total	7439-95-4	E420/CG	0.0050	mg/L		43.9	45.0	38.0	43.9	----
Manganese, total	7439-96-5	E420/CG	0.00010	mg/L		0.0792	0.383	0.0998	0.0792	----
Mercury, total	7439-97-6	E508/CG	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
Nickel, total	7440-02-0	E420/CG	0.00050	mg/L		0.00318	0.00379	0.00301	0.00323	----
Potassium, total	7440-09-7	E420/CG	0.050	mg/L		5.02	5.27	4.46	5.02	----
Selenium, total	7782-49-2	E420/CG	0.000050	mg/L		0.000166	0.000212	0.000167	0.000194	----
Silver, total	7440-22-4	E420/CG	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
Sodium, total	7440-23-5	E420/CG	0.050	mg/L		46.1	46.0	42.5	45.9	----
Uranium, total	7440-61-1	E420/CG	0.000010	mg/L		0.00433	0.00453	0.00376	0.00444	----
Zinc, total	7440-66-6	E420/CG	0.0030	mg/L		0.0257	0.122	0.0300	0.0255	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	SW-01 ----	SW-02 ----	SW-03 ----	DUPLICATE ----	----
					Client sampling date / time	16-Oct-2025 15:00	16-Oct-2025 16:10	16-Oct-2025 15:45	16-Oct-2025 00:00	----
						CG2515185-001	CG2515185-002	CG2515185-003	CG2515185-004	----
						Result	Result	Result	Result	----
Dissolved Metals										
Calcium, dissolved	7440-70-2	E421/CG	0.050	mg/L		80.9	82.2	70.9	79.8	----
Iron, dissolved	7439-89-6	E421/CG	0.010	mg/L		0.035	0.143	0.052	0.034	----
Magnesium, dissolved	7439-95-4	E421/CG	0.0050	mg/L		45.7	47.4	38.7	45.2	----
Manganese, dissolved	7439-96-5	E421/CG	0.00010	mg/L		0.0732	0.373	0.0918	0.0724	----
Potassium, dissolved	7440-09-7	E421/CG	0.050	mg/L		5.18	5.41	4.50	5.11	----
Sodium, dissolved	7440-23-5	E421/CG	0.050	mg/L		47.3	47.3	44.1	46.7	----
Dissolved metals filtration location	----	EP421/CG	-	-		Field	Field	Field	Field	----
Volatile Organic Compounds										
Benzene	71-43-2	E611A/CG	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Bromobenzene	108-86-1	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Bromochloromethane	74-97-5	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Bromodichloromethane	75-27-4	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Bromoform	75-25-2	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Bromomethane	74-83-9	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Butylbenzene, n-	104-51-8	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Butylbenzene, sec-	135-98-8	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Butylbenzene, tert-	98-06-6	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Carbon tetrachloride	56-23-5	E611E/CG	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Chlorobenzene	108-90-7	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Chloroethane	75-00-3	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Chloroform	67-66-3	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	SW-01 ----	SW-02 ----	SW-03 ----	DUPLICATE ----	----
					Client sampling date / time	16-Oct-2025 15:00	16-Oct-2025 16:10	16-Oct-2025 15:45	16-Oct-2025 00:00	----
						CG2515185-001	CG2515185-002	CG2515185-003	CG2515185-004	----
						Result	Result	Result	Result	----
Volatile Organic Compounds										
Chloromethane	74-87-3	E611E/CG	5.0	µg/L		<5.0	<5.0	<5.0	<5.0	----
Chlorotoluene, 2-	95-49-8	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Chlorotoluene, 4-	106-43-4	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Cymene, p-	99-87-6	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dibromo-3-chloropropane, 1,2-	96-12-8	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dibromochloromethane	124-48-1	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dibromoethane, 1,2-	106-93-4	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dibromomethane	74-95-3	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichlorobenzene, 1,2-	95-50-1	E611E/CG	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Dichlorobenzene, 1,3-	541-73-1	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichlorobenzene, 1,4-	106-46-7	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichlorodifluoromethane	75-71-8	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichloroethane, 1,1-	75-34-3	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichloroethane, 1,2-	107-06-2	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichloroethylene, 1,1-	75-35-4	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichloroethylene, cis-1,2-	156-59-2	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichloroethylene, trans-1,2-	156-60-5	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichloromethane	75-09-2	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichloropropane, 1,2-	78-87-5	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichloropropane, 1,3-	142-28-9	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichloropropane, 2,2-	594-20-7	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	SW-01 ----	SW-02 ----	SW-03 ----	DUPLICATE ----	----
					Client sampling date / time	16-Oct-2025 15:00	16-Oct-2025 16:10	16-Oct-2025 15:45	16-Oct-2025 00:00	----
						CG2515185-001	CG2515185-002	CG2515185-003	CG2515185-004	----
						Result	Result	Result	Result	----
Volatile Organic Compounds										
Dichloropropylene, 1,1-	563-58-6	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichloropropylene, cis-1,3-	10061-01-5	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dichloropropylene, cis+trans-1,3-	542-75-6	E611E/CG	1.5	µg/L		<1.5	<1.5	<1.5	<1.5	----
Dichloropropylene, trans-1,3-	10061-02-6	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Ethylbenzene	100-41-4	E611A/CG	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Hexachlorobutadiene	87-68-3	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Isopropylbenzene	98-82-8	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E/CG	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Propylbenzene, n-	103-65-1	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Styrene	100-42-5	E611E/CG	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Tetrachloroethylene	127-18-4	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Toluene	108-88-3	E611A/CG	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Trichlorobenzene, 1,2,3-	87-61-6	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Trichlorobenzene, 1,2,4-	120-82-1	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Trichloroethane, 1,1,1-	71-55-6	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Trichloroethane, 1,1,2-	79-00-5	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Trichloroethylene	79-01-6	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Trichlorofluoromethane	75-69-4	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Trichloropropane, 1,2,3-	96-18-4	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	SW-01 ----	SW-02 ----	SW-03 ----	DUPLICATE ----	----
					Client sampling date / time	16-Oct-2025 15:00	16-Oct-2025 16:10	16-Oct-2025 15:45	16-Oct-2025 00:00	----
						CG2515185-001	CG2515185-002	CG2515185-003	CG2515185-004	----
						Result	Result	Result	Result	----
Volatile Organic Compounds										
Trimethylbenzene, 1,2,4-	95-63-6	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Trimethylbenzene, 1,3,5-	108-67-8	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Vinyl chloride	75-01-4	E611E/CG	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Xylene, m+p-	179601-23-1	E611A/CG	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	----
Xylene, o-	95-47-6	E611A/CG	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	----
Xylenes, total	1330-20-7	E611A/CG	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Trihalomethanes [THMs], total	----	E611E/CG	2.0	µg/L		<2.0	<2.0	<2.0	<2.0	----
Hydrocarbons										
F1 (C6-C10)	----	E581.F1/CG	100	µg/L		<100	<100	<100	<100	----
F1-BTEX	----	EC580/CG	25	µg/L		<100	<100	<100	<100	----
F2 (C10-C16)	----	E601/CG	100	µg/L		<100	<100	<100	<100	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (F2-F4 surrogate)	392-83-6	E601/CG	1.0	%		83.2	83.7	86.1	87.8	----
Dichlorotoluene, 3,4-	95-75-0	E581.F1/CG	1.0	%		86.0	75.5	84.5	81.3	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611E/CG	1.0	%		92.4	93.1	87.4	88.8	----
Bromofluorobenzene, 4-	460-00-4	E611A/CG	1.0	%		92.4	93.1	87.4	88.8	----
Difluorobenzene, 1,4-	540-36-3	E611E/CG	1.0	%		101	98.3	96.8	99.3	----
Difluorobenzene, 1,4-	540-36-3	E611A/CG	1.0	%		101	98.3	96.8	99.3	----

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

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2515185**	Page	: 1 of 14
Client	: **Tetra Tech Canada Inc.**	Laboratory	: ALS Environmental - Calgary
Contact	: Kara Heckert	Account Manager	: Patryk Wojciak
Address	: 110, 140 Quarry Park Blvd SE Calgary AB Canada T2C 3G3	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: 204 954 6832	Telephone	: +1 403 407 1800
Project	: SWM.SWOP04071-05.004	Date Samples Received	: 17-Oct-2025 13:40
PO	: SWM.SWOP04071-05.004	Issue Date	: 25-Oct-2025 09:48
C-O-C number	: CORD RDM SWS		
Sampler	: WV		
Site	: ----		
Quote number	: CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE DUPLICATE	E235.Cl	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-01	E235.Cl	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-02	E235.Cl	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE SW-03	E235.Cl	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE DUPLICATE	E235.F	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-01	E235.F	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-02	E235.F	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓

Matrix: **Water**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE SW-03	E235.F	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE DUPLICATE	E235.NO3	16-Oct-2025	17-Oct-2025	3 days	1 days	✓	17-Oct-2025	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW-01	E235.NO3	16-Oct-2025	17-Oct-2025	3 days	1 days	✓	17-Oct-2025	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW-02	E235.NO3	16-Oct-2025	17-Oct-2025	3 days	1 days	✓	17-Oct-2025	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE SW-03	E235.NO3	16-Oct-2025	17-Oct-2025	3 days	1 days	✓	17-Oct-2025	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE DUPLICATE	E235.NO2	16-Oct-2025	17-Oct-2025	3 days	1 days	✓	17-Oct-2025	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW-01	E235.NO2	16-Oct-2025	17-Oct-2025	3 days	1 days	✓	17-Oct-2025	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW-02	E235.NO2	16-Oct-2025	17-Oct-2025	3 days	1 days	✓	17-Oct-2025	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE SW-03	E235.NO2	16-Oct-2025	17-Oct-2025	3 days	1 days	✓	17-Oct-2025	3 days	1 days	✓

Matrix: **Water**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE DUPLICATE	E235.SO4	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW-01	E235.SO4	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW-02	E235.SO4	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE SW-03	E235.SO4	16-Oct-2025	17-Oct-2025	28 days	1 days	✓	17-Oct-2025	28 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) DUPLICATE	E421	16-Oct-2025	21-Oct-2025	180 days	5 days	✓	21-Oct-2025	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SW-01	E421	16-Oct-2025	21-Oct-2025	180 days	5 days	✓	21-Oct-2025	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SW-02	E421	16-Oct-2025	21-Oct-2025	180 days	5 days	✓	21-Oct-2025	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SW-03	E421	16-Oct-2025	21-Oct-2025	180 days	5 days	✓	21-Oct-2025	180 days	5 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUPLICATE	E581.F1	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓

Matrix: **Water**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) SW-01	E581.F1	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) SW-02	E581.F1	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) SW-03	E581.F1	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUPLICATE	E601	16-Oct-2025	21-Oct-2025	14 days	5 days	✓	22-Oct-2025	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) SW-01	E601	16-Oct-2025	21-Oct-2025	14 days	5 days	✓	22-Oct-2025	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) SW-02	E601	16-Oct-2025	21-Oct-2025	14 days	5 days	✓	22-Oct-2025	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) SW-03	E601	16-Oct-2025	21-Oct-2025	14 days	5 days	✓	22-Oct-2025	40 days	0 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE DUPLICATE	E290	16-Oct-2025	18-Oct-2025	14 days	2 days	✓	18-Oct-2025	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW-01	E290	16-Oct-2025	18-Oct-2025	14 days	2 days	✓	18-Oct-2025	14 days	2 days	✓

Matrix: **Water**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE SW-02	E290	16-Oct-2025	18-Oct-2025	14 days	2 days	✓	18-Oct-2025	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE SW-03	E290	16-Oct-2025	18-Oct-2025	14 days	2 days	✓	18-Oct-2025	14 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE DUPLICATE	E100	16-Oct-2025	18-Oct-2025	28 days	2 days	✓	18-Oct-2025	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-01	E100	16-Oct-2025	18-Oct-2025	28 days	2 days	✓	18-Oct-2025	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-02	E100	16-Oct-2025	18-Oct-2025	28 days	2 days	✓	18-Oct-2025	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE SW-03	E100	16-Oct-2025	18-Oct-2025	28 days	2 days	✓	18-Oct-2025	28 days	2 days	✓
Physical Tests : pH by Meter										
HDPE SW-02	E108	16-Oct-2025	18-Oct-2025	0.25 hrs	42 hrs	× EHTR-FM	18-Oct-2025	0.25 hrs	42 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE DUPLICATE	E108	16-Oct-2025	18-Oct-2025	0.25 hrs	43 hrs	× EHTR-FM	18-Oct-2025	0.25 hrs	43 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE SW-01	E108	16-Oct-2025	18-Oct-2025	0.25 hrs	43 hrs	× EHTR-FM	18-Oct-2025	0.25 hrs	43 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE SW-03	E108	16-Oct-2025	18-Oct-2025	0.25 hrs	43 hrs	× EHTR-FM	18-Oct-2025	0.25 hrs	43 hrs	× EHTR-FM
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) DUPLICATE	E508	16-Oct-2025	21-Oct-2025	28 days	5 days	✓	21-Oct-2025	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-01	E508	16-Oct-2025	21-Oct-2025	28 days	5 days	✓	21-Oct-2025	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-02	E508	16-Oct-2025	21-Oct-2025	28 days	5 days	✓	21-Oct-2025	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) SW-03	E508	16-Oct-2025	21-Oct-2025	28 days	5 days	✓	21-Oct-2025	28 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) DUPLICATE	E420	16-Oct-2025	21-Oct-2025	180 days	5 days	✓	21-Oct-2025	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-01	E420	16-Oct-2025	21-Oct-2025	180 days	5 days	✓	21-Oct-2025	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-02	E420	16-Oct-2025	21-Oct-2025	180 days	5 days	✓	21-Oct-2025	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) SW-03	E420	16-Oct-2025	21-Oct-2025	180 days	5 days	✓	21-Oct-2025	180 days	5 days	✓

Matrix: **Water**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUPLICATE	E611A	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) SW-01	E611A	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) SW-02	E611A	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) SW-03	E611A	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓
Volatile Organic Compounds : VOCs (Prairies List) by Headspace GC-MS										
Glass vial (sodium bisulfate) DUPLICATE	E611E	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓
Volatile Organic Compounds : VOCs (Prairies List) by Headspace GC-MS										
Glass vial (sodium bisulfate) SW-01	E611E	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓
Volatile Organic Compounds : VOCs (Prairies List) by Headspace GC-MS										
Glass vial (sodium bisulfate) SW-02	E611E	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓
Volatile Organic Compounds : VOCs (Prairies List) by Headspace GC-MS										
Glass vial (sodium bisulfate) SW-03	E611E	16-Oct-2025	25-Oct-2025	14 days	9 days	✓	25-Oct-2025	14 days	9 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Conductivity in Water	E100	2284223	1	20	5.0	5.0	✓
pH by Meter	E108	2284222	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	2283644	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	2283643	1	12	8.3	5.0	✓
Nitrite in Water by IC	E235.NO2	2283645	1	13	7.6	5.0	✓
Nitrate in Water by IC	E235.NO3	2283641	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	2283642	1	14	7.1	5.0	✓
Alkalinity Species by Titration	E290	2284224	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2288302	1	10	10.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	2288305	1	6	16.6	5.0	✓
Total Mercury in Water by CVAAS	E508	2289237	1	5	20.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	2298661	1	9	11.1	5.0	✓
BTEX by Headspace GC-MS	E611A	2298660	1	10	10.0	5.0	✓
VOCs (Prairies List) by Headspace GC-MS	E611E	2298662	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Conductivity in Water	E100	2284223	1	20	5.0	5.0	✓
pH by Meter	E108	2284222	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	2283644	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	2283643	1	12	8.3	5.0	✓
Nitrite in Water by IC	E235.NO2	2283645	1	13	7.6	5.0	✓
Nitrate in Water by IC	E235.NO3	2283641	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	2283642	1	14	7.1	5.0	✓
Alkalinity Species by Titration	E290	2284224	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2288302	1	10	10.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	2288305	1	6	16.6	5.0	✓
Total Mercury in Water by CVAAS	E508	2289237	1	5	20.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	2298661	1	9	11.1	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	2287313	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	2298660	1	10	10.0	5.0	✓
VOCs (Prairies List) by Headspace GC-MS	E611E	2298662	1	12	8.3	5.0	✓
Method Blanks (MB)							
Conductivity in Water	E100	2284223	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	2283644	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	2283643	1	12	8.3	5.0	✓
Nitrite in Water by IC	E235.NO2	2283645	1	13	7.6	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Nitrate in Water by IC	E235.NO3	2283641	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	2283642	1	14	7.1	5.0	✓
Alkalinity Species by Titration	E290	2284224	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2288302	1	10	10.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	2288305	1	6	16.6	5.0	✓
Total Mercury in Water by CVAAS	E508	2289237	1	5	20.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	2298661	1	9	11.1	5.0	✓
CCME PHCs - F2-F4 by GC-FID	E601	2287313	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	2298660	1	10	10.0	5.0	✓
VOCs (Prairies List) by Headspace GC-MS	E611E	2298662	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	2283644	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	2283643	1	12	8.3	5.0	✓
Nitrite in Water by IC	E235.NO2	2283645	1	13	7.6	5.0	✓
Nitrate in Water by IC	E235.NO3	2283641	1	14	7.1	5.0	✓
Sulfate in Water by IC	E235.SO4	2283642	1	14	7.1	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2288302	1	10	10.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	2288305	1	6	16.6	5.0	✓
Total Mercury in Water by CVAAS	E508	2289237	1	5	20.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	2298661	1	9	11.1	5.0	✓
BTEX by Headspace GC-MS	E611A	2298660	1	10	10.0	5.0	✓
VOCs (Prairies List) by Headspace GC-MS	E611E	2298662	1	12	8.3	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 ALS Environmental - Calgary	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Calgary	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Chloride in Water by IC	E235.Cl ALS Environmental - Calgary	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Calgary	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC	E235.NO2 ALS Environmental - Calgary	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 ALS Environmental - Calgary	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Calgary	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Calgary	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Calgary	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Calgary	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 ALS Environmental - Calgary	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
CCME PHC - F1 by Headspace GC-FID	E581.F1 ALS Environmental - Calgary	Water	CCME PHC in Soil - Tier 1	CCME Fraction 1 (F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
CCME PHCs - F2-F4 by GC-FID	E601 ALS Environmental - Calgary	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4). Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BTEX by Headspace GC-MS	E611A ALS Environmental - Calgary	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VOCs (Prairies List) by Headspace GC-MS	E611E ALS Environmental - Calgary	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Calgary	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Calgary	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
TDS in Water (Calculation)	EC103 ALS Environmental - Calgary	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Calgary	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
F1-BTEX	EC580 ALS Environmental - Calgary	Water	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 ALS Environmental - Calgary	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Calgary	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into a GC-MS-FID.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Calgary	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **CG2515185**	Page	: 1 of 17
Client	: Tetra Tech Canada Inc.	Laboratory	: ALS Environmental - Calgary
Contact	: Kara Heckert	Account Manager	: Patryk Wojciak
Address	: 110, 140 Quarry Park Blvd SE Calgary AB Canada T2C 3G3	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: 204 954 6832	Telephone	: +1 403 407 1800
Project	: SWM.SWOP04071-05.004	Date Samples Received	: 17-Oct-2025 13:40
PO	: SWM.SWOP04071-05.004	Date Analysis Commenced	: 17-Oct-2025
C-O-C number	: CORD RDM SWS	Issue Date	: 25-Oct-2025 09:48
Sampler	: WV		
Site	: ----		
Quote number	: CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Forest Crocker		Calgary Metals, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Joshua Stessun	Laboratory Analyst	Calgary Organics, Calgary, Alberta
Jyotsnarani Devi	Laboratory Analyst	Calgary Organics, Calgary, Alberta
Katarzyna Glinka	Analyst	Calgary Inorganics, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 2284222)											
CG2515181-001	Anonymous	pH	----	E108	0.10	pH units	7.88	7.88	0.00%	4%	----
Physical Tests (QC Lot: 2284223)											
CG2515181-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	6210	6220	0.161%	10%	----
Physical Tests (QC Lot: 2284224)											
CG2515185-001	SW-01	Alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	298	303	1.57%	20%	----
Anions and Nutrients (QC Lot: 2283641)											
CG2515171-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2283642)											
CG2515171-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	394	393	0.0490%	20%	----
Anions and Nutrients (QC Lot: 2283643)											
CG2515171-001	Anonymous	Fluoride	16984-48-8	E235.F	0.100	mg/L	0.174	0.168	0.005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2283644)											
CG2515171-001	Anonymous	Chloride	16887-00-6	E235.Cl	2.50	mg/L	3.78	3.68	0.10	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2283645)											
CG2515171-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Total Metals (QC Lot: 2288302)											
CG2515161-007	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0050 µg/L	<0.0000050	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 2288302) - continued											
CG2515161-007	Anonymous	Potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	<0.050 µg/L	<0.000050	0	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Total Metals (QC Lot: 2289237)											
CG2515161-007	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 2288305)											
CG2515081-001	Anonymous	Calcium, dissolved	7440-70-2	E421	0.500	mg/L	176	179	1.53%	20%	----
		Iron, dissolved	7439-89-6	E421	0.100	mg/L	4.07	4.14	1.66%	20%	----
		Magnesium, dissolved	7439-95-4	E421	0.0500	mg/L	247	251	1.89%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00100	mg/L	0.347	0.355	2.20%	20%	----
		Potassium, dissolved	7440-09-7	E421	0.500	mg/L	188	188	0.204%	20%	----
		Sodium, dissolved	7440-23-5	E421	0.500	mg/L	673	685	1.75%	20%	----
Volatile Organic Compounds (QC Lot: 2298660)											
CG2515008-006	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 2298662)											
CG2515185-001	SW-01	Bromobenzene	108-86-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromochloromethane	74-97-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromodichloromethane	75-27-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromoform	75-25-2	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromomethane	74-83-9	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Butylbenzene, n-	104-51-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Butylbenzene, sec-	135-98-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Butylbenzene, tert-	98-06-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Carbon tetrachloride	56-23-5	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Chlorobenzene	108-90-7	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Chloroethane	75-00-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Chloroform	67-66-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 2298662) - continued											
CG2515185-001	SW-01	Chloromethane	74-87-3	E611E	5.0	µg/L	<5.0	<5.0	0	Diff <2x LOR	----
		Chlorotoluene, 2-	95-49-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Chlorotoluene, 4-	106-43-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Cymene, p-	99-87-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dibromochloromethane	124-48-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dibromoethane, 1,2-	106-93-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dibromomethane	74-95-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,3-	541-73-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichlorodifluoromethane	75-71-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethane, 1,1-	75-34-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethane, 1,2-	107-06-2	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethylene, 1,1-	75-35-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethylene, trans-1,2-	156-60-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropane, 1,2-	78-87-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropane, 1,3-	142-28-9	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropane, 2,2-	594-20-7	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropylene, 1,1-	563-58-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropylene, cis-1,3-	10061-01-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Hexachlorobutadiene	87-68-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isopropylbenzene	98-82-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Propylbenzene, n-	103-65-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Styrene	100-42-5	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichlorobenzene, 1,2,3-	87-61-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichlorobenzene, 1,2,4-	120-82-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 2298662) - continued											
CG2515185-001	SW-01	Trichloroethane, 1,1,1-	71-55-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichloroethane, 1,1,2-	79-00-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichlorofluoromethane	75-69-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichloropropane, 1,2,3-	96-18-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trimethylbenzene, 1,2,4-	95-63-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trimethylbenzene, 1,3,5-	108-67-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Vinyl chloride	75-01-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 2298661)											
CG2515185-001	SW-01	F1 (C6-C10)	----	E581.F1	100	µg/L	<100	<100	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 2284223)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 2284224)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 2283641)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2283642)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 2283643)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2283644)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 2283645)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Total Metals (QCLot: 2288302)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 2288302) - continued						
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 2289237)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 2288305)						
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Volatile Organic Compounds (QCLot: 2298660)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Volatile Organic Compounds (QCLot: 2298662)						
Bromobenzene	108-86-1	E611E	1	µg/L	<1.0	----
Bromochloromethane	74-97-5	E611E	1	µg/L	<1.0	----
Bromodichloromethane	75-27-4	E611E	1	µg/L	<1.0	----
Bromoform	75-25-2	E611E	1	µg/L	<1.0	----
Bromomethane	74-83-9	E611E	1	µg/L	<1.0	----
Butylbenzene, n-	104-51-8	E611E	1	µg/L	<1.0	----
Butylbenzene, sec-	135-98-8	E611E	1	µg/L	<1.0	----
Butylbenzene, tert-	98-06-6	E611E	1	µg/L	<1.0	----
Carbon tetrachloride	56-23-5	E611E	0.5	µg/L	<0.50	----
Chlorobenzene	108-90-7	E611E	1	µg/L	<1.0	----
Chloroethane	75-00-3	E611E	1	µg/L	<1.0	----
Chloroform	67-66-3	E611E	1	µg/L	<1.0	----
Chloromethane	74-87-3	E611E	5	µg/L	<5.0	----
Chlorotoluene, 2-	95-49-8	E611E	1	µg/L	<1.0	----
Chlorotoluene, 4-	106-43-4	E611E	1	µg/L	<1.0	----
Cymene, p-	99-87-6	E611E	1	µg/L	<1.0	----
Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	1	µg/L	<1.0	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 2298662) - continued						
Dibromochloromethane	124-48-1	E611E	1	µg/L	<1.0	----
Dibromoethane, 1,2-	106-93-4	E611E	1	µg/L	<1.0	----
Dibromomethane	74-95-3	E611E	1	µg/L	<1.0	----
Dichlorobenzene, 1,2-	95-50-1	E611E	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,3-	541-73-1	E611E	1	µg/L	<1.0	----
Dichlorobenzene, 1,4-	106-46-7	E611E	1	µg/L	<1.0	----
Dichlorodifluoromethane	75-71-8	E611E	1	µg/L	<1.0	----
Dichloroethane, 1,1-	75-34-3	E611E	1	µg/L	<1.0	----
Dichloroethane, 1,2-	107-06-2	E611E	1	µg/L	<1.0	----
Dichloroethylene, 1,1-	75-35-4	E611E	1	µg/L	<1.0	----
Dichloroethylene, cis-1,2-	156-59-2	E611E	1	µg/L	<1.0	----
Dichloroethylene, trans-1,2-	156-60-5	E611E	1	µg/L	<1.0	----
Dichloromethane	75-09-2	E611E	1	µg/L	<1.0	----
Dichloropropane, 1,2-	78-87-5	E611E	1	µg/L	<1.0	----
Dichloropropane, 1,3-	142-28-9	E611E	1	µg/L	<1.0	----
Dichloropropane, 2,2-	594-20-7	E611E	1	µg/L	<1.0	----
Dichloropropylene, 1,1-	563-58-6	E611E	1	µg/L	<1.0	----
Dichloropropylene, cis-1,3-	10061-01-5	E611E	1	µg/L	<1.0	----
Dichloropropylene, trans-1,3-	10061-02-6	E611E	1	µg/L	<1.0	----
Hexachlorobutadiene	87-68-3	E611E	1	µg/L	<1.0	----
Isopropylbenzene	98-82-8	E611E	1	µg/L	<1.0	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	0.5	µg/L	<0.50	----
Propylbenzene, n-	103-65-1	E611E	1	µg/L	<1.0	----
Styrene	100-42-5	E611E	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	1	µg/L	<1.0	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	1	µg/L	<1.0	----
Tetrachloroethylene	127-18-4	E611E	1	µg/L	<1.0	----
Trichlorobenzene, 1,2,3-	87-61-6	E611E	1	µg/L	<1.0	----
Trichlorobenzene, 1,2,4-	120-82-1	E611E	1	µg/L	<1.0	----
Trichloroethane, 1,1,1-	71-55-6	E611E	1	µg/L	<1.0	----
Trichloroethane, 1,1,2-	79-00-5	E611E	1	µg/L	<1.0	----
Trichloroethylene	79-01-6	E611E	1	µg/L	<1.0	----
Trichlorofluoromethane	75-69-4	E611E	1	µg/L	<1.0	----
Trichloropropane, 1,2,3-	96-18-4	E611E	1	µg/L	<1.0	----
Trimethylbenzene, 1,2,4-	95-63-6	E611E	1	µg/L	<1.0	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 2298662) - continued						
Trimethylbenzene, 1,3,5-	108-67-8	E611E	1	µg/L	<1.0	----
Vinyl chloride	75-01-4	E611E	1	µg/L	<1.0	----
Hydrocarbons (QCLot: 2287313)						
F2 (C10-C16)	----	E601	100	µg/L	<100	----
Hydrocarbons (QCLot: 2298661)						
F1 (C6-C10)	----	E581.F1	100	µg/L	<100	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 2284222)									
pH	----	E108	----	pH units	7 pH units	102	98.0	102	----
Physical Tests (QCLot: 2284223)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	103	90.0	110	----
Physical Tests (QCLot: 2284224)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	93.3	85.0	115	----
Anions and Nutrients (QCLot: 2283641)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 2283642)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 2283643)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	106	90.0	110	----
Anions and Nutrients (QCLot: 2283644)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 2283645)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	104	90.0	110	----
Total Metals (QCLot: 2288302)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	101	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	99.0	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	94.4	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.8	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.8	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	97.2	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	94.8	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	114	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.6	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	98.4	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.6	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Target Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 2288302) - continued									
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.3	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	93.2	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	99.1	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	96.4	80.0	120	----
Total Metals (QCLot: 2289237)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0 mg/L	94.1	80.0	120	----
Dissolved Metals (QCLot: 2288305)									
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.9	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	117	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	103	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	100.0	80.0	120	----
Volatile Organic Compounds (QCLot: 2298660)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	86.4	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	87.8	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	92.8	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	87.5	70.0	130	----
Volatile Organic Compounds (QCLot: 2298662)									
Bromobenzene	108-86-1	E611E	1	µg/L	100 µg/L	104	70.0	130	----
Bromochloromethane	74-97-5	E611E	1	µg/L	100 µg/L	113	70.0	130	----
Bromodichloromethane	75-27-4	E611E	1	µg/L	100 µg/L	113	70.0	130	----
Bromoform	75-25-2	E611E	1	µg/L	100 µg/L	99.4	70.0	130	----
Bromomethane	74-83-9	E611E	1	µg/L	100 µg/L	112	60.0	140	----
Butylbenzene, n-	104-51-8	E611E	1	µg/L	100 µg/L	92.6	70.0	130	----
Butylbenzene, sec-	135-98-8	E611E	1	µg/L	100 µg/L	105	70.0	130	----
Butylbenzene, tert-	98-06-6	E611E	1	µg/L	100 µg/L	97.5	70.0	130	----
Carbon tetrachloride	56-23-5	E611E	0.5	µg/L	100 µg/L	114	70.0	130	----
Chlorobenzene	108-90-7	E611E	1	µg/L	100 µg/L	101	70.0	130	----
Chloroethane	75-00-3	E611E	1	µg/L	100 µg/L	99.6	60.0	140	----
Chloroform	67-66-3	E611E	1	µg/L	100 µg/L	113	70.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 2298662) - continued									
Chloromethane	74-87-3	E611E	5	µg/L	100 µg/L	95.1	60.0	140	----
Chlorotoluene, 2-	95-49-8	E611E	1	µg/L	100 µg/L	98.4	70.0	130	----
Chlorotoluene, 4-	106-43-4	E611E	1	µg/L	100 µg/L	109	70.0	130	----
Cymene, p-	99-87-6	E611E	1	µg/L	100 µg/L	93.2	70.0	130	----
Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	1	µg/L	100 µg/L	100	70.0	130	----
Dibromochloromethane	124-48-1	E611E	1	µg/L	100 µg/L	107	70.0	130	----
Dibromoethane, 1,2-	106-93-4	E611E	1	µg/L	100 µg/L	102	70.0	130	----
Dibromomethane	74-95-3	E611E	1	µg/L	100 µg/L	115	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611E	0.5	µg/L	100 µg/L	102	70.0	130	----
Dichlorobenzene, 1,3-	541-73-1	E611E	1	µg/L	100 µg/L	104	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611E	1	µg/L	100 µg/L	103	70.0	130	----
Dichlorodifluoromethane	75-71-8	E611E	1	µg/L	100 µg/L	103	60.0	140	----
Dichloroethane, 1,1-	75-34-3	E611E	1	µg/L	100 µg/L	114	70.0	130	----
Dichloroethane, 1,2-	107-06-2	E611E	1	µg/L	100 µg/L	97.9	70.0	130	----
Dichloroethylene, 1,1-	75-35-4	E611E	1	µg/L	100 µg/L	107	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611E	1	µg/L	100 µg/L	108	70.0	130	----
Dichloroethylene, trans-1,2-	156-60-5	E611E	1	µg/L	100 µg/L	114	70.0	130	----
Dichloromethane	75-09-2	E611E	1	µg/L	100 µg/L	112	70.0	130	----
Dichloropropane, 1,2-	78-87-5	E611E	1	µg/L	100 µg/L	104	70.0	130	----
Dichloropropane, 1,3-	142-28-9	E611E	1	µg/L	100 µg/L	91.2	70.0	130	----
Dichloropropane, 2,2-	594-20-7	E611E	1	µg/L	100 µg/L	110	70.0	130	----
Dichloropropylene, 1,1-	563-58-6	E611E	1	µg/L	100 µg/L	103	70.0	130	----
Dichloropropylene, cis-1,3-	10061-01-5	E611E	1	µg/L	100 µg/L	90.6	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611E	1	µg/L	100 µg/L	88.8	70.0	130	----
Hexachlorobutadiene	87-68-3	E611E	1	µg/L	100 µg/L	103	70.0	130	----
Isopropylbenzene	98-82-8	E611E	1	µg/L	100 µg/L	89.7	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	0.5	µg/L	100 µg/L	104	70.0	130	----
Propylbenzene, n-	103-65-1	E611E	1	µg/L	100 µg/L	99.0	70.0	130	----
Styrene	100-42-5	E611E	0.5	µg/L	100 µg/L	92.6	70.0	130	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	1	µg/L	100 µg/L	110	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	1	µg/L	100 µg/L	93.4	70.0	130	----
Tetrachloroethylene	127-18-4	E611E	1	µg/L	100 µg/L	110	70.0	130	----
Trichlorobenzene, 1,2,3-	87-61-6	E611E	1	µg/L	100 µg/L	99.2	70.0	130	----
Trichlorobenzene, 1,2,4-	120-82-1	E611E	1	µg/L	100 µg/L	95.7	70.0	130	----
Trichloroethane, 1,1,1-	71-55-6	E611E	1	µg/L	100 µg/L	116	70.0	130	----
Trichloroethane, 1,1,2-	79-00-5	E611E	1	µg/L	100 µg/L	100	70.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 2298662) - continued									
Trichloroethylene	79-01-6	E611E	1	µg/L	100 µg/L	115	70.0	130	----
Trichlorofluoromethane	75-69-4	E611E	1	µg/L	100 µg/L	114	60.0	140	----
Trichloropropane, 1,2,3-	96-18-4	E611E	1	µg/L	100 µg/L	96.8	70.0	130	----
Trimethylbenzene, 1,2,4-	95-63-6	E611E	1	µg/L	100 µg/L	98.8	70.0	130	----
Trimethylbenzene, 1,3,5-	108-67-8	E611E	1	µg/L	100 µg/L	95.6	70.0	130	----
Vinyl chloride	75-01-4	E611E	1	µg/L	100 µg/L	97.8	60.0	140	----
Hydrocarbons (QCLot: 2287313)									
F2 (C10-C16)	----	E601	100	µg/L	3830 µg/L	95.5	70.0	130	----
Hydrocarbons (QCLot: 2298661)									
F1 (C6-C10)	----	E581.F1	100	µg/L	3090 µg/L	107	60.0	140	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 2283641)										
CG2515171-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	2.54 mg/L	2.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 2283642)										
CG2515171-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 2283643)										
CG2515171-001	Anonymous	Fluoride	16984-48-8	E235.F	0.990 mg/L	1 mg/L	99.0	75.0	125	----
Anions and Nutrients (QCLot: 2283644)										
CG2515171-001	Anonymous	Chloride	16887-00-6	E235.Cl	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 2283645)										
CG2515171-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.524 mg/L	0.5 mg/L	105	75.0	125	----
Total Metals (QCLot: 2288302)										
CG2515161-007	Anonymous	Aluminum, total	7429-90-5	E420	1.93 mg/L	2 mg/L	96.6	70.0	130	----
		Antimony, total	7440-36-0	E420	0.193 mg/L	0.2 mg/L	96.5	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.195 mg/L	0.2 mg/L	97.6	70.0	130	----
		Barium, total	7440-39-3	E420	0.196 mg/L	0.2 mg/L	98.2	70.0	130	----
		Boron, total	7440-42-8	E420	0.967 mg/L	1 mg/L	96.7	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.0386 mg/L	0.04 mg/L	96.5	70.0	130	----
		Calcium, total	7440-70-2	E420	39.0 mg/L	40 mg/L	97.6	70.0	130	----
		Chromium, total	7440-47-3	E420	0.382 mg/L	0.4 mg/L	95.5	70.0	130	----
		Copper, total	7440-50-8	E420	0.187 mg/L	0.2 mg/L	93.7	70.0	130	----
		Iron, total	7439-89-6	E420	19.0 mg/L	20 mg/L	95.2	70.0	130	----
		Lead, total	7439-92-1	E420	0.197 mg/L	0.2 mg/L	98.4	70.0	130	----
		Magnesium, total	7439-95-4	E420	9.63 mg/L	10 mg/L	96.3	70.0	130	----
		Manganese, total	7439-96-5	E420	0.192 mg/L	0.2 mg/L	95.9	70.0	130	----
		Nickel, total	7440-02-0	E420	0.378 mg/L	0.4 mg/L	94.6	70.0	130	----
		Potassium, total	7440-09-7	E420	38.7 mg/L	40 mg/L	96.7	70.0	130	----
		Selenium, total	7782-49-2	E420	0.388 mg/L	0.4 mg/L	97.1	70.0	130	----
		Silver, total	7440-22-4	E420	0.0406 mg/L	0.04 mg/L	101	70.0	130	----
		Sodium, total	7440-23-5	E420	19.2 mg/L	20 mg/L	96.2	70.0	130	----
		Uranium, total	7440-61-1	E420	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		Zinc, total	7440-66-6	E420	3.77 mg/L	4 mg/L	94.2	70.0	130	----
Total Metals (QCLot: 2289237)										
CG2515185-001	SW-01	Mercury, total	7439-97-6	E508	0.000116 mg/L	0 mg/L	116	70.0	130	----
Dissolved Metals (QCLot: 2288305)										
CG2515161-007	Anonymous	Calcium, dissolved	7440-70-2	E421	39.1 mg/L	40 mg/L	97.8	70.0	130	----
		Iron, dissolved	7439-89-6	E421	19.3 mg/L	20 mg/L	96.4	70.0	130	----

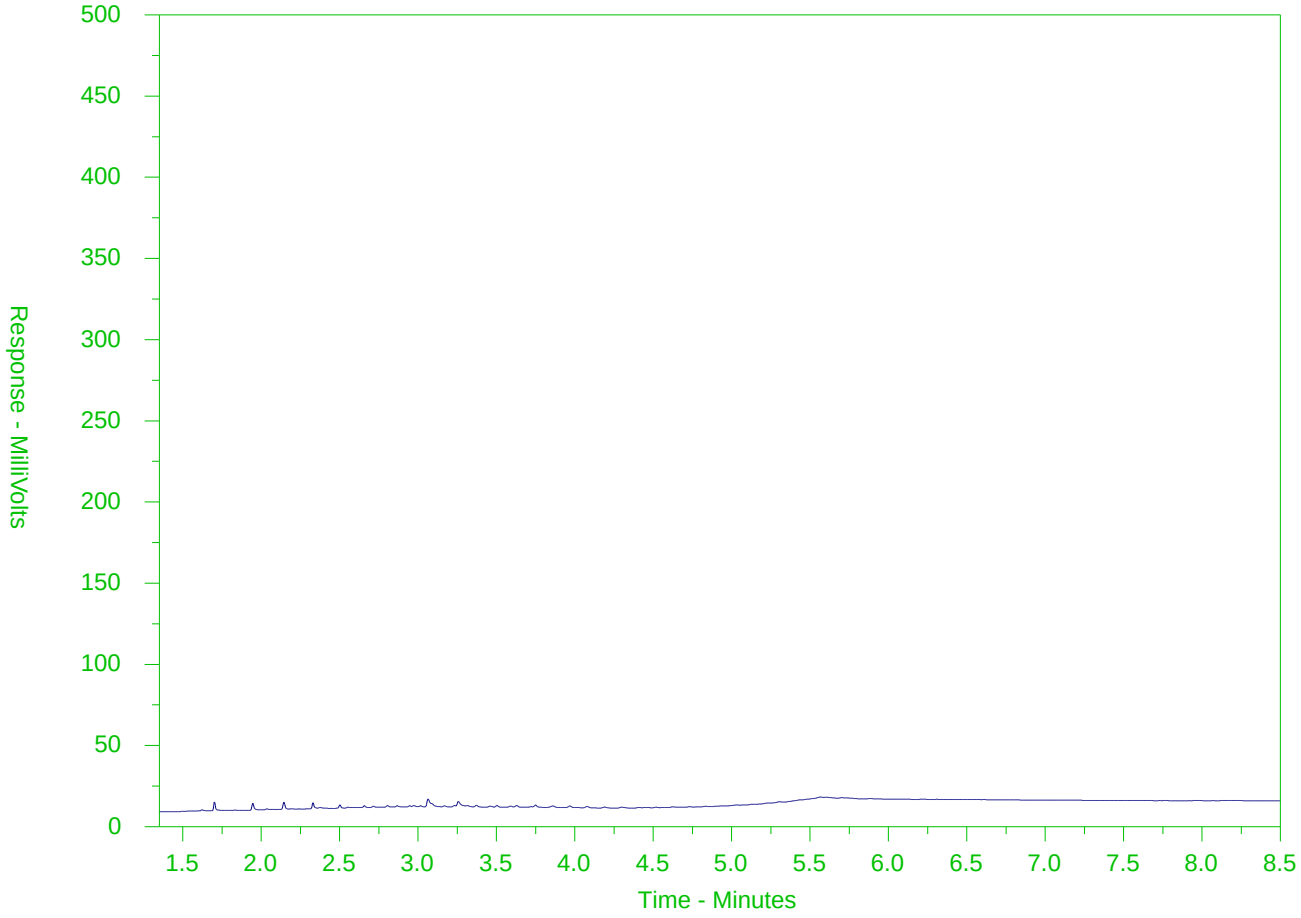
Sub-Matrix: **Water**

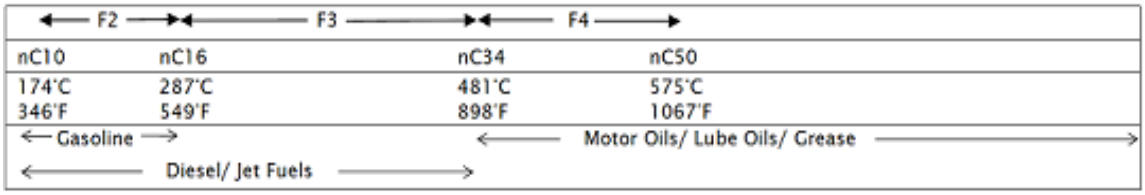
					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 2288305) - continued										
CG2515161-007	Anonymous	Magnesium, dissolved	7439-95-4	E421	9.97 mg/L	10 mg/L	99.7	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.191 mg/L	0.2 mg/L	95.7	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	39.5 mg/L	40 mg/L	98.7	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	19.6 mg/L	20 mg/L	98.0	70.0	130	----
Volatile Organic Compounds (QCLot: 2298660)										
CG2515008-006	Anonymous	Benzene	71-43-2	E611A	100 µg/L	100 µg/L	100	70.0	130	----
		Ethylbenzene	100-41-4	E611A	98.5 µg/L	100 µg/L	98.5	70.0	130	----
		Toluene	108-88-3	E611A	99.8 µg/L	100 µg/L	99.8	70.0	130	----
		Xylene, m+p-	179601-23-1	E611A	213 µg/L	200 µg/L	106	70.0	130	----
		Xylene, o-	95-47-6	E611A	100 µg/L	100 µg/L	100	70.0	130	----
Volatile Organic Compounds (QCLot: 2298662)										
CG2515185-001	SW-01	Bromobenzene	108-86-1	E611E	107 µg/L	100 µg/L	107	70.0	130	----
		Bromochloromethane	74-97-5	E611E	117 µg/L	100 µg/L	117	70.0	130	----
		Bromodichloromethane	75-27-4	E611E	106 µg/L	100 µg/L	106	70.0	130	----
		Bromoform	75-25-2	E611E	104 µg/L	100 µg/L	104	70.0	130	----
		Bromomethane	74-83-9	E611E	126 µg/L	100 µg/L	126	60.0	140	----
		Butylbenzene, n-	104-51-8	E611E	90.5 µg/L	100 µg/L	90.5	70.0	130	----
		Butylbenzene, sec-	135-98-8	E611E	106 µg/L	100 µg/L	106	70.0	130	----
		Butylbenzene, tert-	98-06-6	E611E	96.4 µg/L	100 µg/L	96.4	70.0	130	----
		Carbon tetrachloride	56-23-5	E611E	110 µg/L	100 µg/L	110	70.0	130	----
		Chlorobenzene	108-90-7	E611E	102 µg/L	100 µg/L	102	70.0	130	----
		Chloroethane	75-00-3	E611E	105 µg/L	100 µg/L	105	60.0	140	----
		Chloroform	67-66-3	E611E	106 µg/L	100 µg/L	106	70.0	130	----
		Chloromethane	74-87-3	E611E	100 µg/L	100 µg/L	100	60.0	140	----
		Chlorotoluene, 2-	95-49-8	E611E	99.7 µg/L	100 µg/L	99.7	70.0	130	----
		Chlorotoluene, 4-	106-43-4	E611E	107 µg/L	100 µg/L	107	70.0	130	----
		Cymene, p-	99-87-6	E611E	91.3 µg/L	100 µg/L	91.3	70.0	130	----
		Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	101 µg/L	100 µg/L	101	70.0	130	----
		Dibromochloromethane	124-48-1	E611E	108 µg/L	100 µg/L	108	70.0	130	----
		Dibromoethane, 1,2-	106-93-4	E611E	103 µg/L	100 µg/L	103	70.0	130	----
		Dibromomethane	74-95-3	E611E	111 µg/L	100 µg/L	111	70.0	130	----
		Dichlorobenzene, 1,2-	95-50-1	E611E	103 µg/L	100 µg/L	103	70.0	130	----
		Dichlorobenzene, 1,3-	541-73-1	E611E	105 µg/L	100 µg/L	105	70.0	130	----
		Dichlorobenzene, 1,4-	106-46-7	E611E	103 µg/L	100 µg/L	103	70.0	130	----
		Dichlorodifluoromethane	75-71-8	E611E	109 µg/L	100 µg/L	109	60.0	140	----
		Dichloroethane, 1,1-	75-34-3	E611E	109 µg/L	100 µg/L	109	70.0	130	----
		Dichloroethane, 1,2-	107-06-2	E611E	88.1 µg/L	100 µg/L	88.1	70.0	130	----
		Dichloroethylene, 1,1-	75-35-4	E611E	112 µg/L	100 µg/L	112	70.0	130	----
		Dichloroethylene, cis-1,2-	156-59-2	E611E	99.1 µg/L	100 µg/L	99.1	70.0	130	----
		Dichloroethylene, trans-1,2-	156-60-5	E611E	123 µg/L	100 µg/L	123	70.0	130	----
		Dichloromethane	75-09-2	E611E	126 µg/L	100 µg/L	126	70.0	130	----
		Dichloropropane, 1,2-	78-87-5	E611E	99.5 µg/L	100 µg/L	99.5	70.0	130	----
		Dichloropropane, 1,3-	142-28-9	E611E	91.0 µg/L	100 µg/L	91.0	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 2298662) - continued										
CG2515185-001	SW-01	Dichloropropane, 2,2-	594-20-7	E611E	93.9 µg/L	100 µg/L	93.9	70.0	130	----
		Dichloropropylene, 1,1-	563-58-6	E611E	94.8 µg/L	100 µg/L	94.8	70.0	130	----
		Dichloropropylene, cis-1,3-	10061-01-5	E611E	94.9 µg/L	100 µg/L	94.9	70.0	130	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611E	88.1 µg/L	100 µg/L	88.1	70.0	130	----
		Hexachlorobutadiene	87-68-3	E611E	105 µg/L	100 µg/L	105	70.0	130	----
		Isopropylbenzene	98-82-8	E611E	90.5 µg/L	100 µg/L	90.5	70.0	130	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	103 µg/L	100 µg/L	103	70.0	130	----
		Propylbenzene, n-	103-65-1	E611E	104 µg/L	100 µg/L	104	70.0	130	----
		Styrene	100-42-5	E611E	89.8 µg/L	100 µg/L	89.8	70.0	130	----
		Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	114 µg/L	100 µg/L	114	70.0	130	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	95.3 µg/L	100 µg/L	95.3	70.0	130	----
		Tetrachloroethylene	127-18-4	E611E	107 µg/L	100 µg/L	107	70.0	130	----
		Trichlorobenzene, 1,2,3-	87-61-6	E611E	99.3 µg/L	100 µg/L	99.3	70.0	130	----
		Trichlorobenzene, 1,2,4-	120-82-1	E611E	95.1 µg/L	100 µg/L	95.1	70.0	130	----
		Trichloroethane, 1,1,1-	71-55-6	E611E	110 µg/L	100 µg/L	110	70.0	130	----
		Trichloroethane, 1,1,2-	79-00-5	E611E	105 µg/L	100 µg/L	105	70.0	130	----
		Trichloroethylene	79-01-6	E611E	120 µg/L	100 µg/L	120	70.0	130	----
		Trichlorofluoromethane	75-69-4	E611E	124 µg/L	100 µg/L	124	60.0	140	----
		Trichloropropane, 1,2,3-	96-18-4	E611E	97.4 µg/L	100 µg/L	97.4	70.0	130	----
		Trimethylbenzene, 1,2,4-	95-63-6	E611E	97.6 µg/L	100 µg/L	97.6	70.0	130	----
		Trimethylbenzene, 1,3,5-	108-67-8	E611E	96.8 µg/L	100 µg/L	96.8	70.0	130	----
		Vinyl chloride	75-01-4	E611E	103 µg/L	100 µg/L	103	60.0	140	----
Hydrocarbons (QCLot: 2298661)										
CG2515185-001	SW-01	F1 (C6-C10)	----	E581.F1	2790 µg/L	3090 µg/L	90.4	60.0	140	----

ALS Sample ID: CG2515185-001-E601
Client Sample ID: SW-01





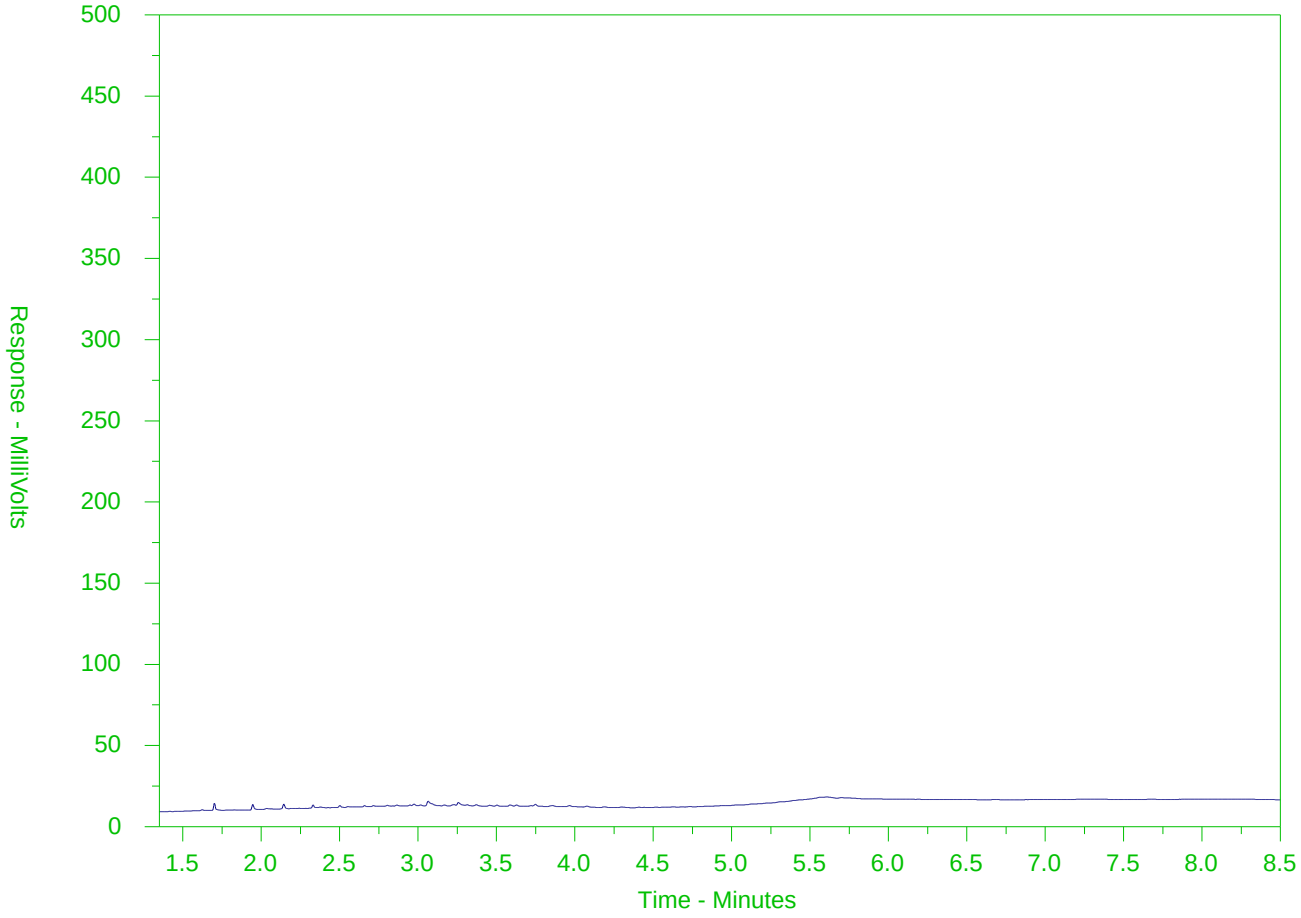
The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

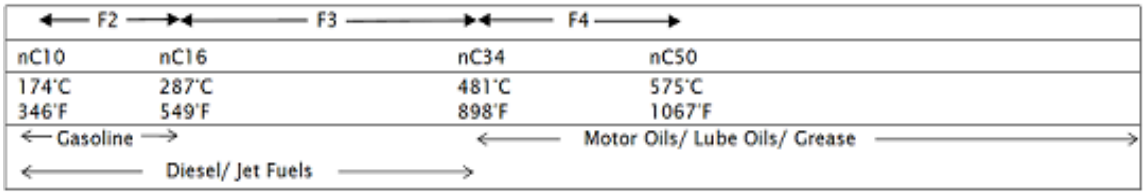
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

ALS Sample ID: CG2515185-002-E601
Client Sample ID: SW-02





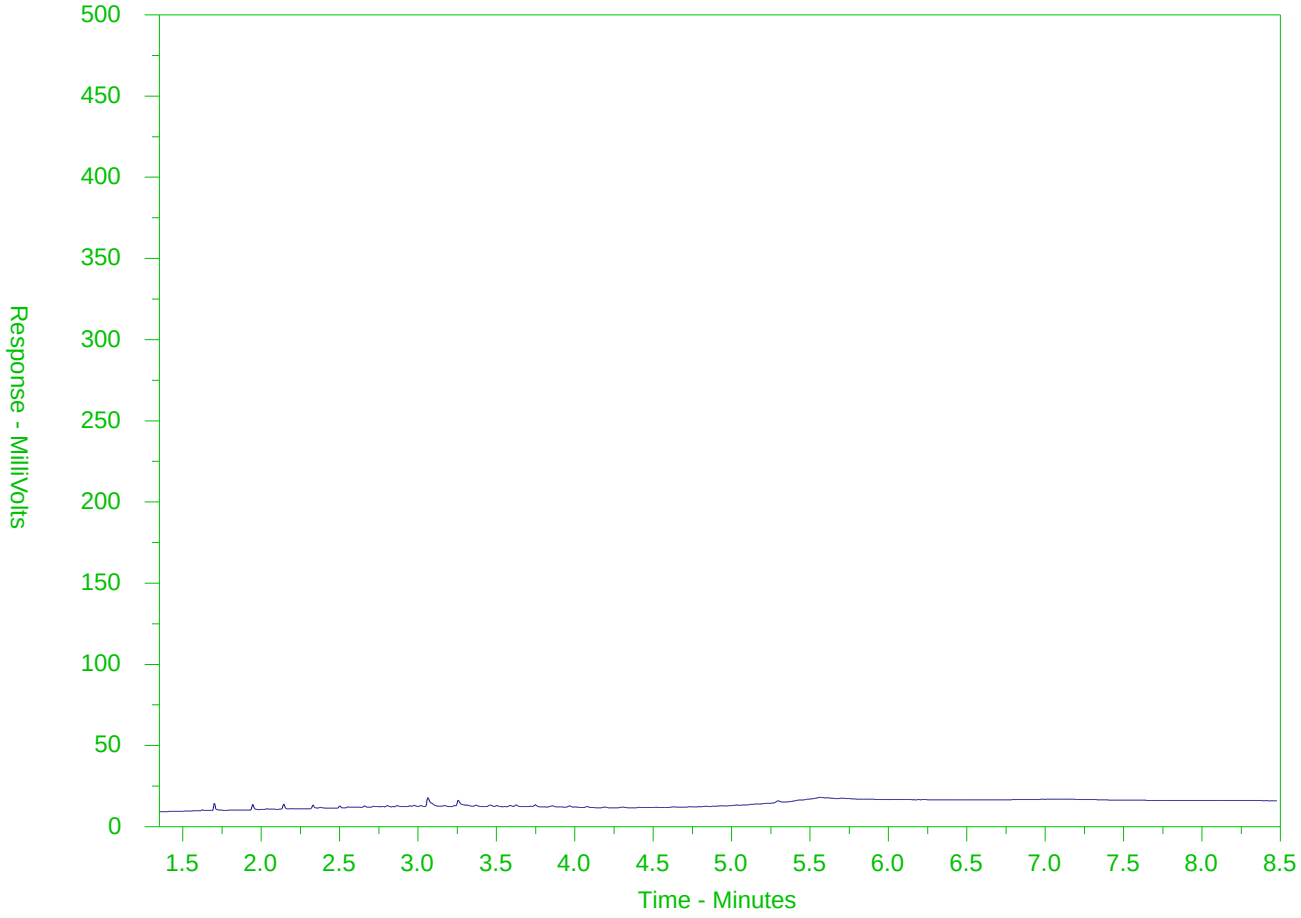
The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

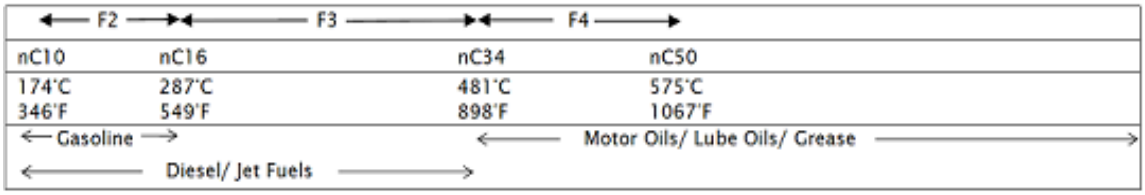
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

ALS Sample ID: CG2515185-003-E601
Client Sample ID: SW-03





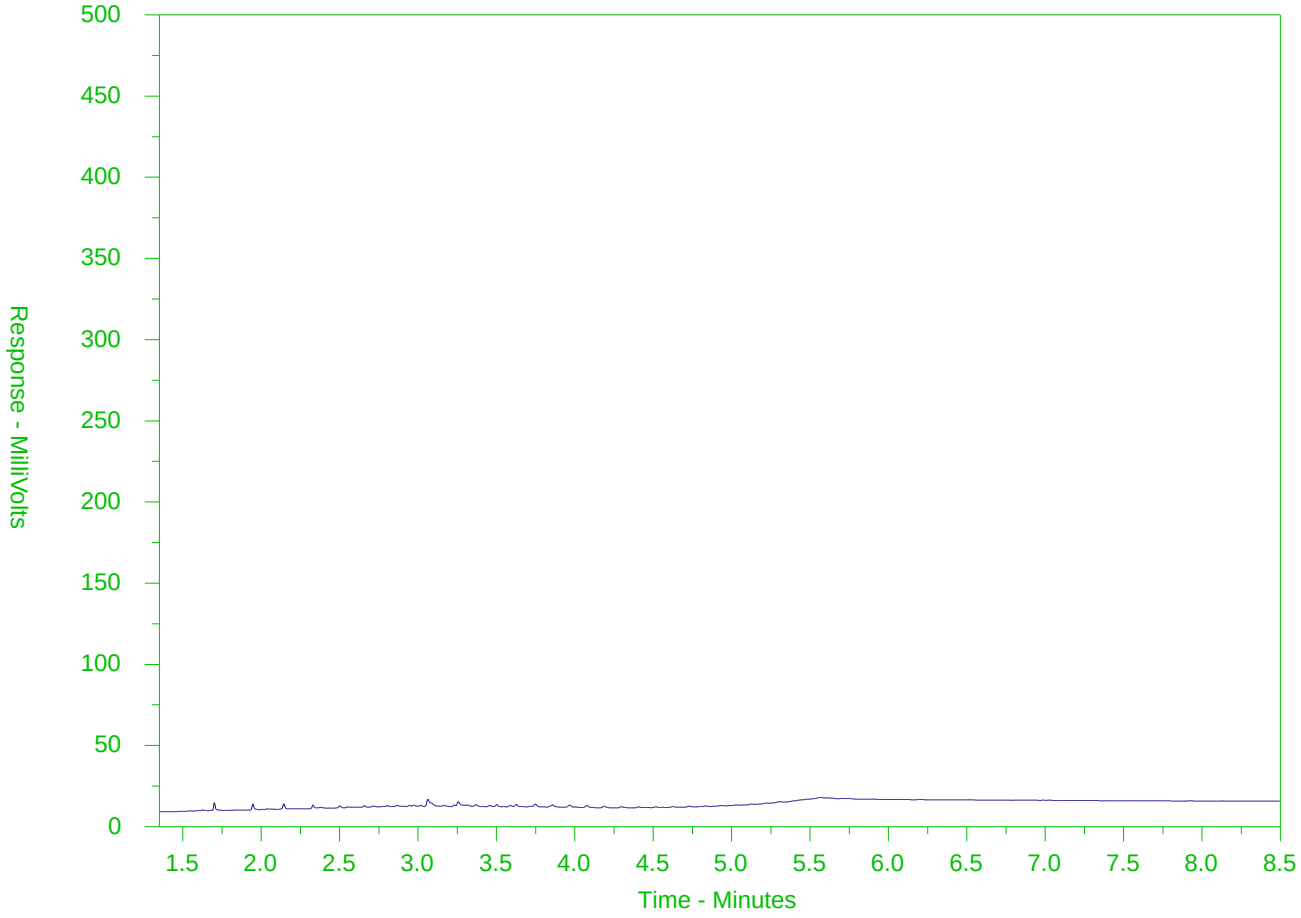
The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

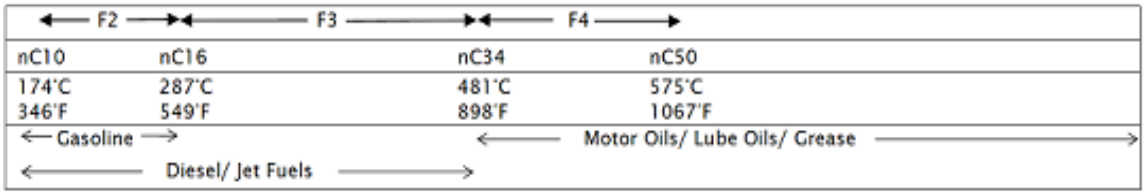
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

ALS Sample ID: CG2515185-004-E601
Client Sample ID: DUPLICATE





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # CORD RDM SWs

Page 1 of 1

Report to:		Report Format / Distribution		Service Requested:	
Company:	Tetra Tech Canada Inc.	☐ Standard ☐ Other		☑	Regular Service (Default)
Contact:	Kara Heckert	☑ PDF ☑ Excel ☐ Fax		☐	Rush Service (2-3 Days)
Address:	110, 140 Quarry Park Blvd SE, Calgary, AB T2C 3G3	Email 1:	kara.heckert@tetratech.com	☐	Priority Service (1 Day or ASAP)
		Email 2:	willem.verduyn@tetratech.com	☐	Emergency Service (<1 Day / Wkend) - Contact ALS
Phone:	431-554-1745 Fax: 403-203-3301	ALS Digital Crosstab results		Analysis Request	
Invoice To:	☑ Same as Report	Indicate Bottles: Filtered / Preserved (F/P) →			
Company:	SAME AS REPORT	Client / Project Information:			
Contact:		Job #:	SWM.SWOP04071-05.004		
Address:		PO/AFE:	SWM.SWOP04071-05.004		
Sample		Legal Site Description:			
Phone:	Fax:	Quote #:	CG22-EBAE100-0021		
Lab Work Order # (lab use only)		ALS Contact: Patryk Wojciak	Sampler (Initials): WV Willem Verduyn		

Sample #	Sample Identification (This description will appear on the report)	Date dd-mmm-yy	Time hh:mm	Sample Type (Select from drop-down list)	Routine	Total Metals	S665A-F (BTEX, F1 and F2)	E611E - VOCs	...ninated?	...ntainers
	SW-01	16-10-25	15:06	Water	X	X	X	X		
	SW-02	↓	16:10	Water	X	X	X	X		
	SW-03		15:45	Water	X	X	X	X		
	Duplicate			Water	X	X	X	X		

Environmental Division
Calgary
Work Order Reference
CG2515185

Telephone

Guidelines / Regulations	Special Instructions / Hazardous Details
	QUOTE CG2022EBAE1000021

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the adjacent worksheet.

								Sample Condition (lab use only)	
Relinquished By:	Willem	Date & Time:	Oct 17/25	Received By:		Date & Time:	10/17 13:40	Temperature	Samples Received in Good Condition? Y / N (if no provided details)
Relinquished By:	Verduyn	Date & Time:		Received By:		Date & Time:		2.0	

CERTIFICATE OF ANALYSIS

Work Order	:	**CG2516684**		
Client	:	**Tetra Tech Canada Inc.**	Laboratory	: ALS Environmental - Calgary
Contact	:	Kara Heckert	Account Manager	: Patryk Wojciak
Address	:	110, 140 Quarry Park Blvd SE Calgary Alberta Canada T2C 3G3	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	:	204 954 6832	E-mail	: patryk.wojciak@alsglobal.com
Project	:	SMW.SWOP04071-05.005	Telephone	: +1 403 407 1800
PO	:	SMW.SWOP04071-05.005	Date Samples Received	: 13-Nov-2025 15:25
C-O-C number	:	CORD RDC VWs	Date Analysis Commenced	: 18-Nov-2025
Sampler	:	WV	Issue Date	: 27-Nov-2025 09:31
Site	:	----		
Quote number	:	CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites		
No. of samples received	:	4		
No. of samples analysed	:	4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Andrea Armstrong	Department Manager - Air Quality and Volatiles	Air Quality, Waterloo, Ontario
David Tremblett	VOC Section Supervisor	Air Quality, Waterloo, Ontario

General Comments

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

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

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

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

Unit	*Description*
-	no units
%	percent
inches Hg	inches of mercury
ppbv	parts per billion (volume/volume)
µg/m³	micrograms per cubic metre

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

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Sample Comments

Sample	*Client Id*	*Comment*
CG2516684-001	VW-02	RRR - Detection Limit raised due to ALS-DQO failure.

Qualifiers

Qualifier	Description
AI	Analytical interferences may be present. Result may be biased high.
DLQ	Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.
RRR	Refer to report comments for issues regarding this analysis.

Analytical Results

Sub-Matrix: Canister
(Matrix: Air)

Analyte	CAS Number	Method/Lab	LOR	Unit	VW-02 ---- CG2516684-001 Result	VW-03 ---- CG2516684-002 Result	22VW-06 ---- CG2516684-003 Result	Duplicate ---- CG2516684-004 Result	---- ---- ----
Client sample ID					VW-02	VW-03	22VW-06	Duplicate	----
Client sampling date / time					11-Nov-2025 11:01	11-Nov-2025 10:35	11-Nov-2025 10:07	11-Nov-2025 00:00	----
Field Tests									
ID, batch proof	----	EF001/WT	-	-	250927.103	251028.110	251028.105	251023.108	----
ID, canister	----	EF001/WT	-	-	01400-0739	01400-0263	01400-0447	01400-0521	----
ID, regulator	----	EF001/WT	-	-	G14	G458	G468	G468	----
Pressure on receipt	----	EF001/WT	0.10	inches Hg	-2.05	-7.76	-6.95	-6.95	----
Permanent Gases									
Carbon dioxide	124-38-9	E629B-H/WT	0.050	%	0.325	16.3	5.16	4.83	----
Carbon monoxide	630-08-0	E629B-H/WT	0.050	%	<0.050	<0.050	<0.050	<0.050	----
Methane	74-82-8	E629B-H/WT	0.050	%	<0.050	2.49	0.051	<0.050	----
Nitrogen	7727-37-9	E629B-H/WT	1.0	%	72.8	69.4	71.0	70.3	----
Oxygen	7782-44-7	E629B-H/WT	0.10	%	23.1	4.22	19.4	19.6	----
Volatile Organic Compounds									
Acetone	67-64-1	E621B/WT	1.0	ppbv	4.0	1.1	11.9	12.2	----
Acetone	67-64-1	EC621B/WT	2.4	µg/m³	9.5	2.6	28.3	29.0	----
Allyl chloride	107-05-1	E621B/WT	0.20	ppbv	<0.20	0.31	<0.20	<0.20	----
Allyl chloride	107-05-1	EC621B/WT	0.63	µg/m³	<0.63	0.97	<0.63	<0.63	----
Benzene	71-43-2	E621B/WT	0.10	ppbv	0.36	4.06	0.30	0.16	----
Benzene	71-43-2	EC621B/WT	0.32	µg/m³	1.15	13.0	0.96	0.51	----
Benzyl chloride	100-44-7	E621B/WT	0.20	ppbv	<0.20	<0.20	<0.20	<0.20	----
Benzyl chloride	100-44-7	EC621B/WT	1.0	µg/m³	<1.0	<1.0	<1.0	<1.0	----
Bromodichloromethane	75-27-4	E621B/WT	0.20	ppbv	<0.20	<0.20	<0.20	<0.20	----
Bromodichloromethane	75-27-4	EC621B/WT	1.3	µg/m³	<1.3	<1.3	<1.3	<1.3	----

Analytical Results

Sub-Matrix: Canister
(Matrix: Air)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	VW-02 ----	VW-03 ----	22VW-06 ----	Duplicate ----	----
					Client sampling date / time	11-Nov-2025 11:01	11-Nov-2025 10:35	11-Nov-2025 10:07	11-Nov-2025 00:00	----
						CG2516684-001	CG2516684-002	CG2516684-003	CG2516684-004	----
						Result	Result	Result	Result	----
Volatile Organic Compounds										
Bromoform	75-25-2	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Bromoform	75-25-2	EC621B/WT	2.1	µg/m³		<2.1	<2.1	<2.1	<2.1	----
Bromomethane	74-83-9	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Bromomethane	74-83-9	EC621B/WT	0.78	µg/m³		<0.78	<0.78	<0.78	<0.78	----
Butadiene, 1,3-	106-99-0	E621B/WT	0.20	ppbv		<0.20	<1.70 DLQ	<0.20	<0.20	----
Butadiene, 1,3-	106-99-0	EC621B/WT	0.44	µg/m³		<0.44	<3.76	<0.44	<0.44	----
Carbon disulfide	75-15-0	E621B/WT	0.50	ppbv		<0.50	<0.51	<0.50	<0.50	----
Carbon disulfide	75-15-0	EC621B/WT	1.6	µg/m³		<1.6	<1.6	<1.6	<1.6	----
Carbon tetrachloride	56-23-5	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Carbon tetrachloride	56-23-5	EC621B/WT	1.30	µg/m³		<1.26	<1.26	<1.26	<1.26	----
Chlorobenzene	108-90-7	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Chlorobenzene	108-90-7	EC621B/WT	0.92	µg/m³		<0.92	<0.92	<0.92	<0.92	----
Chloroethane	75-00-3	E621B/WT	0.20	ppbv		<0.20	1.44	<0.20	<0.20	----
Chloroethane	75-00-3	EC621B/WT	0.53	µg/m³		<0.53	3.80	<0.53	<0.53	----
Chloroform	67-66-3	E621B/WT	0.20	ppbv		<0.20	<0.20	2.63	2.36	----
Chloroform	67-66-3	EC621B/WT	0.98	µg/m³		<0.98	<0.98	12.8	11.5	----
Chloromethane	74-87-3	E621B/WT	0.20	ppbv		0.68	<0.20	<0.20	<0.20	----
Chloromethane	74-87-3	EC621B/WT	0.41	µg/m³		1.40	<0.41	<0.41	<0.41	----
Cyclohexane	110-82-7	E621B/WT	0.20	ppbv		<0.20	20.8	<0.20	<0.20	----
Cyclohexane	110-82-7	EC621B/WT	0.69	µg/m³		<0.69	71.6	<0.69	<0.69	----
Dibromochloromethane	124-48-1	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----

Analytical Results

Sub-Matrix: Canister
(Matrix: Air)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	VW-02 ----	VW-03 ----	22VW-06 ----	Duplicate ----	----
					Client sampling date / time	11-Nov-2025 11:01	11-Nov-2025 10:35	11-Nov-2025 10:07	11-Nov-2025 00:00	----
						CG2516684-001	CG2516684-002	CG2516684-003	CG2516684-004	----
						Result	Result	Result	Result	----
Volatile Organic Compounds										
Dibromochloromethane	124-48-1	EC621B/WT	1.7	µg/m³		<1.7	<1.7	<1.7	<1.7	----
Dibromoethane, 1,2-	106-93-4	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Dibromoethane, 1,2-	106-93-4	EC621B/WT	1.5	µg/m³		<1.5	<1.5	<1.5	<1.5	----
Dichlorobenzene, 1,2-	95-50-1	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Dichlorobenzene, 1,2-	95-50-1	EC621B/WT	1.2	µg/m³		<1.2	<1.2	<1.2	<1.2	----
Dichlorobenzene, 1,3-	541-73-1	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Dichlorobenzene, 1,3-	541-73-1	EC621B/WT	1.2	µg/m³		<1.2	<1.2	<1.2	<1.2	----
Dichlorobenzene, 1,4-	106-46-7	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Dichlorobenzene, 1,4-	106-46-7	EC621B/WT	1.2	µg/m³		<1.2	<1.2	<1.2	<1.2	----
Dichlorodifluoromethane	75-71-8	E621B/WT	0.20	ppbv		0.52	2.26	0.47	0.49	----
Dichlorodifluoromethane	75-71-8	EC621B/WT	1.0	µg/m³		2.6	11.2	2.3	2.4	----
Dichloroethane, 1,1-	75-34-3	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Dichloroethane, 1,1-	75-34-3	EC621B/WT	0.81	µg/m³		<0.81	<0.81	<0.81	<0.81	----
Dichloroethane, 1,2-	107-06-2	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Dichloroethane, 1,2-	107-06-2	EC621B/WT	0.81	µg/m³		<0.81	<0.81	<0.81	<0.81	----
Dichloroethylene, 1,1-	75-35-4	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Dichloroethylene, 1,1-	75-35-4	EC621B/WT	0.79	µg/m³		<0.79	<0.79	<0.79	<0.79	----
Dichloroethylene, cis-1,2-	156-59-2	E621B/WT	0.20	ppbv		<0.20	650	<0.20	<0.20	----
Dichloroethylene, cis-1,2-	156-59-2	EC621B/WT	0.79	µg/m³		<0.79	2580	<0.79	<0.79	----
Dichloroethylene, trans-1,2-	156-60-5	E621B/WT	0.20	ppbv		<0.20	56.3	<0.20	<0.20	----
Dichloroethylene, trans-1,2-	156-60-5	EC621B/WT	0.79	µg/m³		<0.79	223	<0.79	<0.79	----

Analytical Results

Sub-Matrix: Canister
(Matrix: Air)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	VW-02 ----	VW-03 ----	22VW-06 ----	Duplicate ----	----
					Client sampling date / time	11-Nov-2025 11:01	11-Nov-2025 10:35	11-Nov-2025 10:07	11-Nov-2025 00:00	----
						CG2516684-001	CG2516684-002	CG2516684-003	CG2516684-004	----
						Result	Result	Result	Result	----
Volatile Organic Compounds										
Dichloromethane	75-09-2	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	0.26	----
Dichloromethane	75-09-2	EC621B/WT	0.69	µg/m³		<0.69	<0.69	<0.69	0.90	----
Dichloropropane, 1,2-	78-87-5	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Dichloropropane, 1,2-	78-87-5	EC621B/WT	0.9	µg/m³		<0.9	<0.9	<0.9	<0.9	----
Dichloropropylene, cis-1,3-	10061-01-5	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Dichloropropylene, cis-1,3-	10061-01-5	EC621B/WT	0.9	µg/m³		<0.9	<0.9	<0.9	<0.9	----
Dichloropropylene, cis+trans-1,3-	542-75-6	E621B/WT	0.30	ppbv		<0.30	<0.30	<0.30	<0.30	----
Dichloropropylene, cis+trans-1,3-	542-75-6	EC621B/WT	1.3	µg/m³		<1.8	<1.8	<1.8	<1.8	----
Dichloropropylene, trans-1,3-	10061-02-6	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Dichloropropylene, trans-1,3-	10061-02-6	EC621B/WT	0.9	µg/m³		<0.9	<0.9	<0.9	<0.9	----
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B/WT	0.20	ppbv		<0.20	1.49	<0.20	<0.20	----
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	EC621B/WT	1.4	µg/m³		<1.4	10.4	<1.4	<1.4	----
Dioxane, 1,4-	123-91-1	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Dioxane, 1,4-	123-91-1	EC621B/WT	0.72	µg/m³		<0.72	<0.72	<0.72	<0.72	----
Ethyl acetate	141-78-6	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	0.33	----
Ethyl acetate	141-78-6	EC621B/WT	0.72	µg/m³		<0.72	<0.72	<0.72	1.19	----
Ethylbenzene	100-41-4	E621B/WT	0.10	ppbv		<0.10	0.17	<0.10	<0.10	----
Ethylbenzene	100-41-4	EC621B/WT	0.43	µg/m³		<0.43	0.74	<0.43	<0.43	----
Ethyltoluene, 4-	622-96-8	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Ethyltoluene, 4-	622-96-8	EC621B/WT	1.0	µg/m³		<1.0	<1.0	<1.0	<1.0	----
Heptane, n-	142-82-5	E621B/WT	0.20	ppbv		<0.20	1.11	<0.20	0.46	----

Analytical Results

Sub-Matrix: Canister
(Matrix: Air)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	VW-02 ----	VW-03 ----	22VW-06 ----	Duplicate ----	----
					Client sampling date / time	11-Nov-2025 11:01	11-Nov-2025 10:35	11-Nov-2025 10:07	11-Nov-2025 00:00	----
						CG2516684-001	CG2516684-002	CG2516684-003	CG2516684-004	----
						Result	Result	Result	Result	----
Volatile Organic Compounds										
Heptane, n-	142-82-5	EC621B/WT	0.82	µg/m³		<0.82	4.55	<0.82	1.89	----
Hexachlorobutadiene	87-68-3	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Hexachlorobutadiene	87-68-3	EC621B/WT	2.1	µg/m³		<2.1	<2.1	<2.1	<2.1	----
Hexane, n-	110-54-3	E621B/WT	0.20	ppbv		0.25	5.45	<0.20	<0.20	----
Hexane, n-	110-54-3	EC621B/WT	0.70	µg/m³		0.88	19.2	<0.70	<0.70	----
Hexanone, 2-	591-78-6	E621B/WT	1.0	ppbv		<1.0	<1.0	<1.0	<1.0	----
Hexanone, 2-	591-78-6	EC621B/WT	4.10	µg/m³		<4.10	<4.10	<4.10	<4.10	----
Isopropylbenzene	98-82-8	E621B/WT	0.20	ppbv		<0.20	<0.20	0.38	0.36	----
Isopropylbenzene	98-82-8	EC621B/WT	1.0	µg/m³		<1.0	<1.0	1.9	1.8	----
Methyl ethyl ketone [MEK]	78-93-3	E621B/WT	0.20	ppbv		<0.20	<0.24 RRR	<0.50 RRR	<0.36 RRR	----
Methyl ethyl ketone [MEK]	78-93-3	EC621B/WT	0.59	µg/m³		<0.59	<0.71	<1.47	<1.06	----
Methyl isobutyl ketone [MIBK]	108-10-1	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Methyl isobutyl ketone [MIBK]	108-10-1	EC621B/WT	0.82	µg/m³		<0.82	<0.82	<0.82	<0.82	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	EC621B/WT	0.72	µg/m³		<0.72	<0.72	<0.72	<0.72	----
Naphthalene	91-20-3	E621B/WT	0.10	ppbv		<0.10	<0.10	<0.10	<0.10	----
Naphthalene	91-20-3	EC621B/WT	0.52	µg/m³		<0.52	<0.52	<0.52	<0.52	----
Propylene	115-07-1	E621B/WT	0.20	ppbv		<1.54 DLQ	56.2 AI	<0.22 DLQ	<0.24 DLQ	----
Propylene	115-07-1	EC621B/WT	0.34	µg/m³		<2.65	96.7	<0.38	<0.41	----
Styrene	100-42-5	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Styrene	100-42-5	EC621B/WT	0.85	µg/m³		<0.85	<0.85	<0.85	<0.85	----

Analytical Results

Sub-Matrix: Canister
(Matrix: Air)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	VW-02 ----	VW-03 ----	22VW-06 ----	Duplicate ----	----
					Client sampling date / time	11-Nov-2025 11:01	11-Nov-2025 10:35	11-Nov-2025 10:07	11-Nov-2025 00:00	----
						CG2516684-001	CG2516684-002	CG2516684-003	CG2516684-004	----
						Result	Result	Result	Result	----
Volatile Organic Compounds										
Tetrachloroethane, 1,1,2,2-	79-34-5	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Tetrachloroethane, 1,1,2,2-	79-34-5	EC621B/WT	1.4	µg/m³		<1.4	<1.4	<1.4	<1.4	----
Tetrachloroethylene	127-18-4	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Tetrachloroethylene	127-18-4	EC621B/WT	1.4	µg/m³		<1.4	<1.4	<1.4	<1.4	----
Tetrahydrofuran	109-99-9	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Tetrahydrofuran	109-99-9	EC621B/WT	0.59	µg/m³		<0.59	<0.59	<0.59	<0.59	----
Toluene	108-88-3	E621B/WT	0.10	ppbv		0.40	0.94	0.12	0.22	----
Toluene	108-88-3	EC621B/WT	0.38	µg/m³		1.51	3.54	0.45	0.83	----
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	EC621B/WT	1.5	µg/m³		<1.5	<1.5	<1.5	<1.5	----
Trichlorobenzene, 1,2,4-	120-82-1	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Trichlorobenzene, 1,2,4-	120-82-1	EC621B/WT	1.5	µg/m³		<1.5	<1.5	<1.5	<1.5	----
Trichloroethane, 1,1,1-	71-55-6	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Trichloroethane, 1,1,1-	71-55-6	EC621B/WT	1.1	µg/m³		<1.1	<1.1	<1.1	<1.1	----
Trichloroethane, 1,1,2-	79-00-5	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Trichloroethane, 1,1,2-	79-00-5	EC621B/WT	1.1	µg/m³		<1.1	<1.1	<1.1	<1.1	----
Trichloroethylene	79-01-6	E621B/WT	0.20	ppbv		2.14	0.85	0.30	0.78	----
Trichloroethylene	79-01-6	EC621B/WT	1.1	µg/m³		11.5	4.6	1.6	4.2	----
Trichlorofluoromethane	75-69-4	E621B/WT	0.20	ppbv		0.23	<0.20	<0.20	<0.20	----
Trichlorofluoromethane	75-69-4	EC621B/WT	1.1	µg/m³		1.3	<1.1	<1.1	<1.1	----
Trimethylbenzene, 1,2,4-	95-63-6	E621B/WT	0.20	ppbv		<0.20	0.44	<0.20	<0.20	----

Analytical Results

Sub-Matrix: Canister
(Matrix: Air)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	VW-02 ----	VW-03 ----	22VW-06 ----	Duplicate ----	----
					Client sampling date / time	11-Nov-2025 11:01	11-Nov-2025 10:35	11-Nov-2025 10:07	11-Nov-2025 00:00	----
						CG2516684-001	CG2516684-002	CG2516684-003	CG2516684-004	----
						Result	Result	Result	Result	----
Volatile Organic Compounds										
Trimethylbenzene, 1,2,4-	95-63-6	EC621B/WT	1.0	µg/m³		<1.0	2.2	<1.0	<1.0	----
Trimethylbenzene, 1,3,5-	108-67-8	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Trimethylbenzene, 1,3,5-	108-67-8	EC621B/WT	1.0	µg/m³		<1.0	<1.0	<1.0	<1.0	----
Trimethylpentane, 2,2,4-	540-84-1	E621B/WT	0.20	ppbv		<0.20	6.41	<0.20	<0.20	----
Trimethylpentane, 2,2,4-	540-84-1	EC621B/WT	0.9	µg/m³		<0.9	29.9	<0.9	<0.9	----
Vinyl acetate	108-05-4	E621B/WT	0.50	ppbv		<0.50	<2.60 DLQ	<0.50	<0.50	----
Vinyl acetate	108-05-4	EC621B/WT	1.8	µg/m³		<1.8	<9.2	<1.8	<1.8	----
Vinyl bromide	593-60-2	E621B/WT	0.20	ppbv		<0.20	<0.20	<0.20	<0.20	----
Vinyl bromide	593-60-2	EC621B/WT	0.9	µg/m³		<0.9	<0.9	<0.9	<0.9	----
Vinyl chloride	75-01-4	E621B/WT	0.20	ppbv		<0.20	611	<0.20	<0.20	----
Vinyl chloride	75-01-4	EC621B/WT	0.51	µg/m³		<0.51	1560	<0.51	<0.51	----
Xylene, m+p-	179601-23-1	E621B/WT	0.20	ppbv		0.32	0.61	<0.20	<0.20	----
Xylene, m+p-	179601-23-1	EC621B/WT	0.87	µg/m³		1.39	2.65	<0.87	<0.87	----
Xylene, o-	95-47-6	E621B/WT	0.10	ppbv		0.11	0.27	<0.10	<0.10	----
Xylene, o-	95-47-6	EC621B/WT	0.43	µg/m³		0.48	1.17	<0.43	<0.43	----
Xylenes, total	1330-20-7	E621B/WT	0.30	ppbv		0.43	0.88	<0.30	<0.30	----
Xylenes, total	1330-20-7	EC621B/WT	1.3	µg/m³		1.9	3.8	<1.3	<1.3	----
BTEX, total	----	E621B/WT	0.30	ppbv		1.19	6.05	0.42	0.38	----
BTEX, total	----	EC621B/WT	1.2	µg/m³		4.5	21.1	<2.4	<2.4	----
Hydrocarbons										
Aliphatic (C10-C12)	----	E593C/WT	15	µg/m³		<15	180	<15	<15	----

Analytical Results

Sub-Matrix: Canister
(Matrix: Air)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	VW-02 ----	VW-03 ----	22VW-06 ----	Duplicate ----	----
					Client sampling date / time	11-Nov-2025 11:01	11-Nov-2025 10:35	11-Nov-2025 10:07	11-Nov-2025 00:00	----
						CG2516684-001	CG2516684-002	CG2516684-003	CG2516684-004	----
						Result	Result	Result	Result	----
Hydrocarbons										
Aliphatic (C12-C16)	----	E593C/WT	30	µg/m³		<30	<30	<30	<30	----
Aliphatic (C6-C8)	----	E593C/WT	15	µg/m³		18	614	<15	<15	----
Aliphatic (C8-C10)	----	E593C/WT	15	µg/m³		58	300	<15	<15	----
Aromatic (C10-C12)	----	E593C/WT	15	µg/m³		<15	<15	<15	<15	----
Aromatic (C12-C16)	----	E593C/WT	30	µg/m³		<30	<30	<30	<30	----
Aromatic (C6-C8)	----	E593C/WT	15	µg/m³		<15	<15	<15	<15	----
Aromatic (C8-C10)	----	E593C/WT	15	µg/m³		<15	<15	<15	<15	----
F1 (C6-C10)	----	E593A/WT	15	µg/m³		76	808	15	<15	----
F1-BTEX	----	EC592A/WT	15	µg/m³		72	787	15	<15	----
F2 (C10-C16)	----	E593A/WT	15	µg/m³		<15	218	<15	<15	----
F2-Naphthalene	----	EC593D/WT	15	µg/m³		<15	218	<15	<15	----
TVOC (C10-C12)	----	E593C/WT	15	µg/m³		<15	180	<15	<15	----
TVOC (C12-C16)	----	E593C/WT	30	µg/m³		<30	<30	<30	<30	----
TVOC (C6-C8)	----	E593C/WT	15	µg/m³		18	614	<15	<15	----
TVOC (C8-C10)	----	E593C/WT	15	µg/m³		58	300	<15	<15	----
Hydrocarbons Surrogates										
Bromofluorobenzene, 4-	460-00-4	E593C/WT	1	%		97.2	95.5	96.5	96.0	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E621B/WT	0.20	%		110	110	106	109	----

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2516684**	Page	: 1 of 7
Client	: **Tetra Tech Canada Inc.**	Laboratory	: ALS Environmental - Calgary
Contact	: Kara Heckert	Account Manager	: Patryk Wojciak
Address	: 110, 140 Quarry Park Blvd SE Calgary AB Canada T2C 3G3	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: 204 954 6832	Telephone	: +1 403 407 1800
Project	: SMW.SWOP04071-05.005	Date Samples Received	: 13-Nov-2025 15:25
PO	: SMW.SWOP04071-05.005	Issue Date	: 27-Nov-2025 09:31
C-O-C number	: CORD RDC VWs		
Sampler	: WV		
Site	: ----		
Quote number	: CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Air**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Field Tests : Air Canister Information										
Air Canister 22VW-06	EF001	11-Nov-2025	----	----	----		20-Nov-2025	----	----	
Field Tests : Air Canister Information										
Air Canister Duplicate	EF001	11-Nov-2025	----	----	----		20-Nov-2025	----	----	
Field Tests : Air Canister Information										
Air Canister VW-02	EF001	11-Nov-2025	----	----	----		20-Nov-2025	----	----	
Field Tests : Air Canister Information										
Air Canister VW-03	EF001	11-Nov-2025	----	----	----		20-Nov-2025	----	----	
Hydrocarbons : TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)										
Air Canister 22VW-06	E593C	11-Nov-2025	----	----	----		21-Nov-2025	30 days	10 days	✓
Hydrocarbons : TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)										
Air Canister VW-02	E593C	11-Nov-2025	----	----	----		21-Nov-2025	30 days	10 days	✓
Hydrocarbons : TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)										
Air Canister VW-03	E593C	11-Nov-2025	----	----	----		21-Nov-2025	30 days	10 days	✓

Matrix: **Air**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)										
Air Canister Duplicate	E593C	11-Nov-2025	----	----	----		21-Nov-2025	30 days	11 days	✓
Hydrocarbons : TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)										
Air Canister 22VW-06	E593A	11-Nov-2025	----	----	----		21-Nov-2025	30 days	10 days	✓
Hydrocarbons : TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)										
Air Canister VW-02	E593A	11-Nov-2025	----	----	----		21-Nov-2025	30 days	10 days	✓
Hydrocarbons : TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)										
Air Canister VW-03	E593A	11-Nov-2025	----	----	----		21-Nov-2025	30 days	10 days	✓
Hydrocarbons : TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)										
Air Canister Duplicate	E593A	11-Nov-2025	----	----	----		21-Nov-2025	30 days	11 days	✓
Permanent Gases : Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)										
Air Canister 22VW-06	E629B-H	11-Nov-2025	----	----	----		18-Nov-2025	30 days	7 days	✓
Permanent Gases : Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)										
Air Canister Duplicate	E629B-H	11-Nov-2025	----	----	----		18-Nov-2025	30 days	7 days	✓
Permanent Gases : Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)										
Air Canister VW-02	E629B-H	11-Nov-2025	----	----	----		18-Nov-2025	30 days	7 days	✓
Permanent Gases : Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)										
Air Canister VW-03	E629B-H	11-Nov-2025	----	----	----		18-Nov-2025	30 days	7 days	✓

Matrix: **Air**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds : VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)										
Air Canister 22VW-06	E621B	11-Nov-2025	----	----	----		21-Nov-2025	30 days	10 days	✓
Volatile Organic Compounds : VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)										
Air Canister VW-02	E621B	11-Nov-2025	----	----	----		21-Nov-2025	30 days	10 days	✓
Volatile Organic Compounds : VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)										
Air Canister VW-03	E621B	11-Nov-2025	----	----	----		21-Nov-2025	30 days	10 days	✓
Volatile Organic Compounds : VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)										
Air Canister Duplicate	E621B	11-Nov-2025	----	----	----		21-Nov-2025	30 days	11 days	✓

Legend & Qualifier Definitions

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Air**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A	2349658	1	14	7.1	5.0	✓
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C	2349659	1	14	7.1	5.0	✓
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B	2349629	1	14	7.1	5.0	✓
Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)	E629B-H	2342050	1	15	6.6	5.0	✓
Laboratory Control Samples (LCS)							
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A	2349658	1	14	7.1	5.0	✓
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C	2349659	1	14	7.1	5.0	✓
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B	2349629	1	14	7.1	5.0	✓
Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)	E629B-H	2342050	1	15	6.6	5.0	✓
Method Blanks (MB)							
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A	2349658	1	14	7.1	5.0	✓
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C	2349659	1	14	7.1	5.0	✓
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B	2349629	1	14	7.1	5.0	✓
Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)	E629B-H	2342050	1	15	6.6	5.0	✓
Air Canister Information	EF001	2346469	1	14	7.1	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A ALS Environmental - Waterloo	Air	EPA TO-15 (mod)	Total Volatile Organic Compounds (TVOC) in canisters (or bags) are transferred to a preconcentrator system and then thermally desorbed prior to injection into a GC-MS system for analysis.
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C ALS Environmental - Waterloo	Air	EPA TO-15 (mod)	Total Volatile Organic Compounds (TVOC) in canisters (or bags) are transferred to a preconcentrator system and then thermally desorbed prior to injection into a GC-MS system for analysis.
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B ALS Environmental - Waterloo	Air	EPA TO-15 (mod)	Volatile Organic Compounds (VOC) in canisters (or bags) are transferred to a preconcentrator system and then thermally desorbed prior to injection into a GC-MS system for analysis.
Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)	E629B-H ALS Environmental - Waterloo	Air	EPA Method 3C & ASTM D1946	This analysis is performed using procedures adapted from EPA Method 3C & ASTM D1946. Air samples are collected into cleaned evacuated canisters. A volume of air is removed from the canister and injected by means of a gas-sampling/backflush valve onto a series of packed GC columns and measured using a thermal conductivity detector (TCD). Oxygen is not separated from Argon. Canister samples will be retained for 7 calendar days after final report. If you require a longer canister storage time, please contact your account manager.
F1-BTEX in Canisters or Bags GC-MS (µg/m3)	EC592A ALS Environmental - Waterloo	Air	unit conversion	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
F2-Naphthalene in Canisters by GC-MS (ug/m3)	EC593D ALS Environmental - Waterloo	Air	CCME PHC	F2-PAH = CCME Fraction 2 (C10-C16) minus Naphthalene
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ug/m3)	EC621B ALS Environmental - Waterloo	Air	unit conversion	Convert ppbV to ug/m3
Air Canister Information	EF001 ALS Environmental - Waterloo	Air	In-house	Air canister information provided by client and recorded on ALS report may affect the validity of results.

QUALITY CONTROL REPORT

Work Order	: **CG2516684**	Page	: 1 of 11
Client	: Tetra Tech Canada Inc.	Laboratory	: ALS Environmental - Calgary
Contact	: Kara Heckert	Account Manager	: Patryk Wojciak
Address	: 110, 140 Quarry Park Blvd SE Calgary AB Canada T2C 3G3	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: 204 954 6832	Telephone	: +1 403 407 1800
Project	: SMW.SWOP04071-05.005	Date Samples Received	: 13-Nov-2025 15:25
PO	: SMW.SWOP04071-05.005	Date Analysis Commenced	: 18-Nov-2025
C-O-C number	: CORD RDC VWs	Issue Date	: 27-Nov-2025 09:31
Sampler	: WV		
Site	: ----		
Quote number	: CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Andrea Armstrong	Department Manager - Air Quality and Volatiles	Waterloo Air Quality, Waterloo, Ontario
David Tremblett	VOC Section Supervisor	Waterloo Air Quality, Waterloo, Ontario

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Air**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Permanent Gases (QC Lot: 2342050)											
CG2516680-001	Anonymous	Carbon dioxide	124-38-9	E629B-H	0.050	%	1.86	1.93	3.52%	20%	----
		Carbon monoxide	630-08-0	E629B-H	0.050	%	<0.050	<0.050	0	Diff <2x LOR	----
		Methane	74-82-8	E629B-H	0.050	%	<0.050	<0.050	0	Diff <2x LOR	----
		Nitrogen	7727-37-9	E629B-H	1.0	%	73.4	69.4	5.60%	20%	----
		Oxygen	7782-44-7	E629B-H	0.10	%	21.5	20.1	6.90%	20%	----
Volatile Organic Compounds (QC Lot: 2349629)											
CG2516680-001	Anonymous	Acetone	67-64-1	E621B	1.1	ppbv	3.5	3.4	0.1	Diff <2x LOR	----
		Allyl chloride	107-05-1	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Benzene	71-43-2	E621B	0.11	ppbv	0.11	0.12	0.12	Diff <2x LOR	----
		Benzyl chloride	100-44-7	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Bromodichloromethane	75-27-4	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Bromoform	75-25-2	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Bromomethane	74-83-9	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Butadiene, 1,3-	106-99-0	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Carbon disulfide	75-15-0	E621B	0.54	ppbv	<0.54	<0.54	0	Diff <2x LOR	----
		Carbon tetrachloride	56-23-5	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Chlorobenzene	108-90-7	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Chloroethane	75-00-3	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Chloroform	67-66-3	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Chloromethane	74-87-3	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Cyclohexane	110-82-7	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dibromochloromethane	124-48-1	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dibromoethane, 1,2-	106-93-4	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dichlorobenzene, 1,3-	541-73-1	E621B	0.22	ppbv	0.22	<0.22	0.22	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dichlorodifluoromethane	75-71-8	E621B	1.00	ppbv	7.33	7.25	1.19%	30%	----
		Dichloroethane, 1,1-	75-34-3	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dichloroethane, 1,2-	107-06-2	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dichloroethylene, 1,1-	75-35-4	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----

Sub-Matrix: **Air**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 2349629) - continued											
CG2516680-001	Anonymous	Dichloroethylene, cis-1,2-	156-59-2	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dichloroethylene, trans-1,2-	156-60-5	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E621B	0.22	ppbv	0.41	0.38	0.02	Diff <2x LOR	----
		Dichloropropane, 1,2-	78-87-5	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dichloropropylene, cis+trans-1,3-	542-75-6	E621B	0.31	ppbv	<0.31	<0.31	0	Diff <2x LOR	----
		Dichloropropylene, cis-1,3-	10061-01-5	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B	1.00	ppbv	4.73	4.38	0.35	Diff <2x LOR	----
		Dioxane, 1,4-	123-91-1	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Ethyl acetate	141-78-6	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E621B	0.11	ppbv	0.51	0.51	0.004	Diff <2x LOR	----
		Ethyltoluene, 4-	622-96-8	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Heptane, n-	142-82-5	E621B	0.22	ppbv	0.23	0.29	0.06	Diff <2x LOR	----
		Hexachlorobutadiene	87-68-3	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Hexane, n-	110-54-3	E621B	0.22	ppbv	1.87	2.10	11.3%	30%	----
		Hexanone, 2-	591-78-6	E621B	1.1	ppbv	<1.1	<1.1	0	Diff <2x LOR	----
		Isopropylbenzene	98-82-8	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Methyl ethyl ketone [MEK]	78-93-3	E621B	0.28	ppbv	<0.24	<0.28	0.04	Diff <2x LOR	----
		Methyl isobutyl ketone [MIBK]	108-10-1	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Naphthalene	91-20-3	E621B	0.11	ppbv	<0.11	<0.11	0	Diff <2x LOR	----
		Propylene	115-07-1	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Styrene	100-42-5	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E621B	0.22	ppbv	1.52	1.54	1.35%	30%	----
		Tetrahydrofuran	109-99-9	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Toluene	108-88-3	E621B	0.11	ppbv	1.24	1.15	7.17%	30%	----
		Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Trichlorobenzene, 1,2,4-	120-82-1	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Trichloroethane, 1,1,1-	71-55-6	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Trichloroethane, 1,1,2-	79-00-5	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E621B	1.00	ppbv	7.75	7.55	2.55%	30%	----
		Trichlorofluoromethane	75-69-4	E621B	0.22	ppbv	0.26	0.23	0.03	Diff <2x LOR	----

Sub-Matrix: **Air**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 2349629) - continued											
CG2516680-001	Anonymous	Trimethylbenzene, 1,2,4-	95-63-6	E621B	0.22	ppbv	0.82	0.80	0.02	Diff <2x LOR	----
		Trimethylbenzene, 1,3,5-	108-67-8	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Trimethylpentane, 2,2,4-	540-84-1	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Vinyl acetate	108-05-4	E621B	0.54	ppbv	<0.54	<0.54	0	Diff <2x LOR	----
		Vinyl bromide	593-60-2	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Vinyl chloride	75-01-4	E621B	0.22	ppbv	<0.22	<0.22	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E621B	0.22	ppbv	1.95	1.93	1.16%	30%	----
		Xylene, o-	95-47-6	E621B	0.11	ppbv	0.73	0.73	0.009	Diff <2x LOR	----
Hydrocarbons (QC Lot: 2349658)											
CG2516680-001	Anonymous	F1 (C6-C10)	----	E593A	15	µg/m³	312	250	22.2%	30%	----
		F2 (C10-C16)	----	E593A	15	µg/m³	68	53	15	Diff <2x LOR	----
Hydrocarbons (QC Lot: 2349659)											
CG2516680-001	Anonymous	Aromatic (C10-C12)	----	E593C	15	µg/m³	<15	<15	0	Diff <2x LOR	----
		Aromatic (C12-C16)	----	E593C	30	µg/m³	<30	<30	0	Diff <2x LOR	----
		Aromatic (C6-C8)	----	E593C	15	µg/m³	<15	<15	0	Diff <2x LOR	----
		Aromatic (C8-C10)	----	E593C	15	µg/m³	26	21	5	Diff <2x LOR	----
		TVOC (C10-C12)	----	E593C	15	µg/m³	62	52	10	Diff <2x LOR	----
		TVOC (C12-C16)	----	E593C	30	µg/m³	<30	<30	0	Diff <2x LOR	----
		TVOC (C6-C8)	----	E593C	15	µg/m³	56	61	5	Diff <2x LOR	----
		TVOC (C8-C10)	----	E593C	15	µg/m³	257	188	30.8%	50%	----

Method Blank (MB) Report

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

Sub-Matrix: **Air**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Field Tests (QCLot: 2346469)						
Pressure on receipt	----	EF001	0.1	Inches Hg	-30.0	----
Permanent Gases (QCLot: 2342050)						
Carbon dioxide	124-38-9	E629B-H	0.05	%	<0.050	----
Carbon monoxide	630-08-0	E629B-H	0.05	%	<0.050	----
Methane	74-82-8	E629B-H	0.05	%	<0.050	----
Nitrogen	7727-37-9	E629B-H	1	%	<1.0	----
Oxygen	7782-44-7	E629B-H	0.1	%	<0.10	----
Volatile Organic Compounds (QCLot: 2349629)						
Acetone	67-64-1	E621B	1	ppbv	<1.0	----
Allyl chloride	107-05-1	E621B	0.2	ppbv	<0.20	----
Benzene	71-43-2	E621B	0.1	ppbv	<0.10	----
Benzyl chloride	100-44-7	E621B	0.2	ppbv	<0.20	----
Bromodichloromethane	75-27-4	E621B	0.2	ppbv	<0.20	----
Bromoform	75-25-2	E621B	0.2	ppbv	<0.20	----
Bromomethane	74-83-9	E621B	0.2	ppbv	<0.20	----
Butadiene, 1,3-	106-99-0	E621B	0.2	ppbv	<0.20	----
Carbon disulfide	75-15-0	E621B	0.5	ppbv	<0.50	----
Carbon tetrachloride	56-23-5	E621B	0.2	ppbv	<0.20	----
Chlorobenzene	108-90-7	E621B	0.2	ppbv	<0.20	----
Chloroethane	75-00-3	E621B	0.2	ppbv	<0.20	----
Chloroform	67-66-3	E621B	0.2	ppbv	<0.20	----
Chloromethane	74-87-3	E621B	0.2	ppbv	<0.20	----
Cyclohexane	110-82-7	E621B	0.2	ppbv	<0.20	----
Dibromochloromethane	124-48-1	E621B	0.2	ppbv	<0.20	----
Dibromoethane, 1,2-	106-93-4	E621B	0.2	ppbv	<0.20	----
Dichlorobenzene, 1,2-	95-50-1	E621B	0.2	ppbv	<0.20	----
Dichlorobenzene, 1,3-	541-73-1	E621B	0.2	ppbv	<0.20	----
Dichlorobenzene, 1,4-	106-46-7	E621B	0.2	ppbv	<0.20	----
Dichlorodifluoromethane	75-71-8	E621B	0.2	ppbv	<0.20	----
Dichloroethane, 1,1-	75-34-3	E621B	0.2	ppbv	<0.20	----
Dichloroethane, 1,2-	107-06-2	E621B	0.2	ppbv	<0.20	----
Dichloroethylene, 1,1-	75-35-4	E621B	0.2	ppbv	<0.20	----

Sub-Matrix: **Air**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 2349629) - continued						
Dichloroethylene, cis-1,2-	156-59-2	E621B	0.2	ppbv	<0.20	----
Dichloroethylene, trans-1,2-	156-60-5	E621B	0.2	ppbv	<0.20	----
Dichloromethane	75-09-2	E621B	0.2	ppbv	<0.20	----
Dichloropropane, 1,2-	78-87-5	E621B	0.2	ppbv	<0.20	----
Dichloropropylene, cis-1,3-	10061-01-5	E621B	0.2	ppbv	<0.20	----
Dichloropropylene, trans-1,3-	10061-02-6	E621B	0.2	ppbv	<0.20	----
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B	0.2	ppbv	<0.20	----
Dioxane, 1,4-	123-91-1	E621B	0.2	ppbv	<0.20	----
Ethyl acetate	141-78-6	E621B	0.2	ppbv	<0.20	----
Ethylbenzene	100-41-4	E621B	0.1	ppbv	<0.10	----
Ethyltoluene, 4-	622-96-8	E621B	0.2	ppbv	<0.20	----
Heptane, n-	142-82-5	E621B	0.2	ppbv	<0.20	----
Hexachlorobutadiene	87-68-3	E621B	0.2	ppbv	<0.20	----
Hexane, n-	110-54-3	E621B	0.2	ppbv	<0.20	----
Hexanone, 2-	591-78-6	E621B	1	ppbv	<1.0	----
Isopropylbenzene	98-82-8	E621B	0.2	ppbv	<0.20	----
Methyl ethyl ketone [MEK]	78-93-3	E621B	0.2	ppbv	<0.20	----
Methyl isobutyl ketone [MIBK]	108-10-1	E621B	0.2	ppbv	<0.20	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B	0.2	ppbv	<0.20	----
Naphthalene	91-20-3	E621B	0.1	ppbv	<0.10	----
Propylene	115-07-1	E621B	0.2	ppbv	<0.20	----
Styrene	100-42-5	E621B	0.2	ppbv	<0.20	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E621B	0.2	ppbv	<0.20	----
Tetrachloroethylene	127-18-4	E621B	0.2	ppbv	<0.20	----
Tetrahydrofuran	109-99-9	E621B	0.2	ppbv	<0.20	----
Toluene	108-88-3	E621B	0.1	ppbv	<0.10	----
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B	0.2	ppbv	<0.20	----
Trichlorobenzene, 1,2,4-	120-82-1	E621B	0.2	ppbv	<0.20	----
Trichloroethane, 1,1,1-	71-55-6	E621B	0.2	ppbv	<0.20	----
Trichloroethane, 1,1,2-	79-00-5	E621B	0.2	ppbv	<0.20	----
Trichloroethylene	79-01-6	E621B	0.2	ppbv	<0.20	----
Trichlorofluoromethane	75-69-4	E621B	0.2	ppbv	<0.20	----
Trimethylbenzene, 1,2,4-	95-63-6	E621B	0.2	ppbv	<0.20	----
Trimethylbenzene, 1,3,5-	108-67-8	E621B	0.2	ppbv	<0.20	----
Trimethylpentane, 2,2,4-	540-84-1	E621B	0.2	ppbv	<0.20	----

Sub-Matrix: **Air**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 2349629) - continued						
Vinyl acetate	108-05-4	E621B	0.5	ppbv	<0.50	----
Vinyl bromide	593-60-2	E621B	0.2	ppbv	<0.20	----
Vinyl chloride	75-01-4	E621B	0.2	ppbv	<0.20	----
Xylene, m+p-	179601-23-1	E621B	0.2	ppbv	<0.20	----
Xylene, o-	95-47-6	E621B	0.1	ppbv	<0.10	----
Hydrocarbons (QCLot: 2349658)						
F1 (C6-C10)	----	E593A	15	µg/m³	<15	----
F2 (C10-C16)	----	E593A	15	µg/m³	<15	----
Hydrocarbons (QCLot: 2349659)						
Aromatic (C10-C12)	----	E593C	15	µg/m³	<15	----
Aromatic (C12-C16)	----	E593C	30	µg/m³	<30	----
Aromatic (C6-C8)	----	E593C	15	µg/m³	<15	----
Aromatic (C8-C10)	----	E593C	15	µg/m³	<15	----
TVOC (C10-C12)	----	E593C	15	µg/m³	<15	----
TVOC (C12-C16)	----	E593C	30	µg/m³	<30	----
TVOC (C6-C8)	----	E593C	15	µg/m³	<15	----
TVOC (C8-C10)	----	E593C	15	µg/m³	<15	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Air**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Permanent Gases (QCLot: 2342050)									
Carbon dioxide	124-38-9	E629B-H	0.05	%	4.98 %	98.7	70.0	130	----
Carbon monoxide	630-08-0	E629B-H	0.05	%	0.747 %	112	70.0	130	----
Methane	74-82-8	E629B-H	0.05	%	15 %	104	70.0	130	----
Nitrogen	7727-37-9	E629B-H	1	%	50.4 %	98.7	70.0	130	----
Oxygen	7782-44-7	E629B-H	0.1	%	7.41 %	111	70.0	130	----
Volatile Organic Compounds (QCLot: 2349629)									
Acetone	67-64-1	E621B	1	ppbv	1.03 ppbv	106	70.0	130	----
Allyl chloride	107-05-1	E621B	0.2	ppbv	1.04 ppbv	92.2	70.0	130	----
Benzene	71-43-2	E621B	0.1	ppbv	1.04 ppbv	102	70.0	130	----
Benzyl chloride	100-44-7	E621B	0.2	ppbv	0.99 ppbv	101	70.0	130	----
Bromodichloromethane	75-27-4	E621B	0.2	ppbv	1.07 ppbv	85.0	70.0	130	----
Bromoform	75-25-2	E621B	0.2	ppbv	1.03 ppbv	103	70.0	130	----
Bromomethane	74-83-9	E621B	0.2	ppbv	1.01 ppbv	96.4	70.0	130	----
Butadiene, 1,3-	106-99-0	E621B	0.2	ppbv	1.05 ppbv	91.7	70.0	130	----
Carbon disulfide	75-15-0	E621B	0.5	ppbv	0.99 ppbv	90.9	70.0	130	----
Carbon tetrachloride	56-23-5	E621B	0.2	ppbv	1.05 ppbv	100	70.0	130	----
Chlorobenzene	108-90-7	E621B	0.2	ppbv	1.03 ppbv	101	70.0	130	----
Chloroethane	75-00-3	E621B	0.2	ppbv	1.04 ppbv	90.7	70.0	130	----
Chloroform	67-66-3	E621B	0.2	ppbv	1.04 ppbv	108	70.0	130	----
Chloromethane	74-87-3	E621B	0.2	ppbv	1.03 ppbv	91.8	70.0	130	----
Cyclohexane	110-82-7	E621B	0.2	ppbv	1.06 ppbv	88.8	70.0	130	----
Dibromochloromethane	124-48-1	E621B	0.2	ppbv	1.05 ppbv	101	70.0	130	----
Dibromoethane, 1,2-	106-93-4	E621B	0.2	ppbv	1.04 ppbv	96.8	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E621B	0.2	ppbv	0.97 ppbv	103	70.0	130	----
Dichlorobenzene, 1,3-	541-73-1	E621B	0.2	ppbv	0.99 ppbv	104	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E621B	0.2	ppbv	0.98 ppbv	101	70.0	130	----
Dichlorodifluoromethane	75-71-8	E621B	0.2	ppbv	1.05 ppbv	94.1	70.0	130	----
Dichloroethane, 1,1-	75-34-3	E621B	0.2	ppbv	1.01 ppbv	92.7	70.0	130	----
Dichloroethane, 1,2-	107-06-2	E621B	0.2	ppbv	1.04 ppbv	100	70.0	130	----
Dichloroethylene, 1,1-	75-35-4	E621B	0.2	ppbv	1.01 ppbv	96.6	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E621B	0.2	ppbv	1.04 ppbv	99.7	70.0	130	----
Dichloroethylene, trans-1,2-	156-60-5	E621B	0.2	ppbv	1.06 ppbv	94.7	70.0	130	----

Sub-Matrix: **Air**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 2349629) - continued									
Dichloromethane	75-09-2	E621B	0.2	ppbv	1.02 ppbv	97.0	70.0	130	----
Dichloropropane, 1,2-	78-87-5	E621B	0.2	ppbv	1.05 ppbv	82.2	70.0	130	----
Dichloropropylene, cis-1,3-	10061-01-5	E621B	0.2	ppbv	1.04 ppbv	86.3	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E621B	0.2	ppbv	1.05 ppbv	76.4	70.0	130	----
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B	0.2	ppbv	0.96 ppbv	95.0	70.0	130	----
Dioxane, 1,4-	123-91-1	E621B	0.2	ppbv	1.05 ppbv	84.2	70.0	130	----
Ethyl acetate	141-78-6	E621B	0.2	ppbv	1.04 ppbv	103	70.0	130	----
Ethylbenzene	100-41-4	E621B	0.1	ppbv	1.04 ppbv	100	70.0	130	----
Ethyltoluene, 4-	622-96-8	E621B	0.2	ppbv	1.01 ppbv	99.4	70.0	130	----
Heptane, n-	142-82-5	E621B	0.2	ppbv	1.06 ppbv	82.5	70.0	130	----
Hexachlorobutadiene	87-68-3	E621B	0.2	ppbv	1.02 ppbv	108	70.0	130	----
Hexane, n-	110-54-3	E621B	0.2	ppbv	1.06 ppbv	100	70.0	130	----
Hexanone, 2-	591-78-6	E621B	1	ppbv	1.04 ppbv	94.3	70.0	130	----
Isopropylbenzene	98-82-8	E621B	0.2	ppbv	1 ppbv	104	70.0	130	----
Methyl ethyl ketone [MEK]	78-93-3	E621B	0.2	ppbv	1.05 ppbv	92.5	70.0	130	----
Methyl isobutyl ketone [MIBK]	108-10-1	E621B	0.2	ppbv	0.99 ppbv	75.1	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B	0.2	ppbv	1.06 ppbv	94.5	70.0	130	----
Naphthalene	91-20-3	E621B	0.1	ppbv	0.98 ppbv	91.4	70.0	130	----
Propylene	115-07-1	E621B	0.2	ppbv	1.02 ppbv	93.8	70.0	130	----
Styrene	100-42-5	E621B	0.2	ppbv	1.04 ppbv	100	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E621B	0.2	ppbv	0.99 ppbv	102	70.0	130	----
Tetrachloroethylene	127-18-4	E621B	0.2	ppbv	1.04 ppbv	103	70.0	130	----
Tetrahydrofuran	109-99-9	E621B	0.2	ppbv	1.04 ppbv	100	70.0	130	----
Toluene	108-88-3	E621B	0.1	ppbv	1.04 ppbv	94.1	70.0	130	----
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B	0.2	ppbv	1.05 ppbv	98.3	70.0	130	----
Trichlorobenzene, 1,2,4-	120-82-1	E621B	0.2	ppbv	0.99 ppbv	98.0	70.0	130	----
Trichloroethane, 1,1,1-	71-55-6	E621B	0.2	ppbv	1.05 ppbv	107	70.0	130	----
Trichloroethane, 1,1,2-	79-00-5	E621B	0.2	ppbv	1.03 ppbv	92.8	70.0	130	----
Trichloroethylene	79-01-6	E621B	0.2	ppbv	1.01 ppbv	90.4	70.0	130	----
Trichlorofluoromethane	75-69-4	E621B	0.2	ppbv	1.04 ppbv	98.1	70.0	130	----
Trimethylbenzene, 1,2,4-	95-63-6	E621B	0.2	ppbv	1.05 ppbv	96.1	70.0	130	----
Trimethylbenzene, 1,3,5-	108-67-8	E621B	0.2	ppbv	1 ppbv	102	70.0	130	----
Trimethylpentane, 2,2,4-	540-84-1	E621B	0.2	ppbv	1.04 ppbv	75.9	70.0	130	----
Vinyl acetate	108-05-4	E621B	0.5	ppbv	1.05 ppbv	93.0	70.0	130	----
Vinyl bromide	593-60-2	E621B	0.2	ppbv	0.99 ppbv	88.2	70.0	130	----
Vinyl chloride	75-01-4	E621B	0.2	ppbv	1.04 ppbv	93.6	70.0	130	----

Sub-Matrix: **Air**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 2349629) - continued									
Xylene, m+p-	179601-23-1	E621B	0.2	ppbv	2.06 ppbv	101	70.0	130	----
Xylene, o-	95-47-6	E621B	0.1	ppbv	1.03 ppbv	101	70.0	130	----
Hydrocarbons (QCLot: 2349658)									
F1 (C6-C10)	----	E593A	15	µg/m³	815 µg/m³	93.3	50.0	150	----
Hydrocarbons (QCLot: 2349659)									
Aromatic (C10-C12)	----	E593C	15	µg/m³	60.8 µg/m³	86.9	50.0	150	----
Aromatic (C12-C16)	----	E593C	30	µg/m³	60.1 µg/m³	110	50.0	150	----
Aromatic (C6-C8)	----	E593C	15	µg/m³	60.1 µg/m³	95.7	50.0	150	----
Aromatic (C8-C10)	----	E593C	15	µg/m³	59.6 µg/m³	100	50.0	150	----
TVOC (C10-C12)	----	E593C	15	µg/m³	121 µg/m³	94.6	50.0	150	----
TVOC (C12-C16)	----	E593C	30	µg/m³	120 µg/m³	91.2	50.0	150	----
TVOC (C6-C8)	----	E593C	15	µg/m³	120 µg/m³	107	50.0	150	----
TVOC (C8-C10)	----	E593C	15	µg/m³	119 µg/m³	100.0	50.0	150	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

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COC # CORD RDC VWs

Page 1 of 1

Report to:	Report Format / Distribution	Service Requested:
Company: Tetra Tech Canada Inc.	☐ Standard ☐ Other	☑ Regular Service (Default)
Contact: Kara Heckert	☑ PDF ☑ Excel ☐ Fax	☐ Rush Service (2-3 Days)
Address: 110, 140 Quarry Park Blvd SE, Calgary, AB T2C 3G3	Email 1: kara.heckert@tetratech.com	☐ Priority Service (1 Day or ASAP)
	Email 2: willem.verduyn@tetratech.com	☐ Emergency Service (<1 Day / Wkend) - Contact ALS
Phone: 431-554-1745 Fax:	ALS Digital Crosstab results	**Analysis Request**
Invoice To: ☑ Same as Report	Indicate Bottles: Filtered / Preserved (F/P) →	
Company: SAME AS REPORT	**Client / Project Information:**	
Contact:	Job #: SWM.SWOP04071-05.005	
Address:	PO/AFE: SWM.SWOP04071-05.005	
Sample	Legal Site Description:	
Phone: Fax:	Quote #: CG22-EBAE100-0021	
Lab Work Order # (lab use only)	**ALS Contact:** Patryk Wojciak	**Sampler** (Initials): Willem Verduyn

Sample #	Sample Identification (This description will appear on the report)	Date dd-mmm-yy	Time hh:mm	Sample Type (Select from drop-down list)	EP592	S621E - Aliphatic and Aromat	S629B - Methane, CO2, CO
	VW-02	11-NOV-25	11:01	Air	X	X	X
	VW-03		10:35	Air	X	X	X
	22VW-06		10:07	Air	X	X	X
	Duplicate	↓		Air	X	X	X

Environmental Division
Calgary
Work Order Reference
CG2516684

Telephone : +1 403 407 1800

Guidelines / Regulations	Special Instructions / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the adjacent worksheet.

								Sample Condition (lab use only)	
Relinquished By:	Willem V.	Date & Time:		Received By:		Date & Time:	13/11 15:25	Temperature	Samples Received in Good Condition? Y / N (if no provided details)
Relinquished By:		Date & Time:		Received By:		Date & Time:		18.3	

APPENDIX F

HISTORICAL DATA

Table 1
Groundwater Monitoring and Soil Vapour Well Elevations

Test Location	Well Depth (m)	Elevations				Screen Length (m)
		Ground (m)	Top of Pipe (m)	Screen Interval		
				Bottom	Top	
GW-01	5.6	883.693	884.788	878.093	883.193	5.1
GW-02	12.0	883.679	884.674	871.679	883.279	11.6
GW-03	6.1	877.577	878.182	871.477	876.977	5.5
MW-01	4.6	876.982	877.785	872.382	874.482	2.1
MW-02	4.6	877.851	878.281	873.251	875.351	2.1
MW-03	10.7	877.169	878.135	866.469	869.569	3.1
MW-04	8.7	876.013	876.986	867.313	870.413	3.1
MW-05	7.5	872.454	873.306	864.954	868.054	3.1
MW-06	9.2	877.914	878.754	868.714	871.814	3.1
MW-07	6.1	877.413	878.174	871.313	875.913	4.6
VW-01	2.6	877.333	- -	874.733	875.033	0.3
VW-02	4.3	877.190	- -	872.890	873.190	0.3
VW-03	2.7	872.690	- -	869.990	870.290	0.3
VW-04	2.4	877.445	- -	875.045	875.345	0.3
VW-05	2.4	877.724	- -	875.324	875.624	0.3
TH-01	NA	877.319	- -	- -	- -	- -
TH-05	NA	877.163	- -	- -	- -	- -
TH-09	NA	877.869	- -	- -	- -	- -
TH-10	NA	876.835	- -	- -	- -	- -
TH-11	NA	878.046	- -	- -	- -	- -
TH-12	NA	877.927	- -	- -	- -	- -
TH-13	NA	877.941	- -	- -	- -	- -
TH-14	NA	878.119	- -	- -	- -	- -
TH-15	NA	878.554	- -	- -	- -	- -
TH-16	NA	877.755	- -	- -	- -	- -
TH-17	NA	876.876	- -	- -	- -	- -
TH-18	NA	877.253	- -	- -	- -	- -
TH-19	NA	878.104	- -	- -	- -	- -
TH-20	NA	876.195	- -	- -	- -	- -

Notes:

1) Geodetic elevations are determined from multiple datums, ASCM Nos. 269191, 376673 and 384792. Refer to ASCM Information in Appendix A.
2) GW - soil vapour well installed by others.
3) MW - groundwater monitoring well. MW-01 to MW-06 installed Dec. 1999 by others. MW-07 installed Jun. 2013.
4) VW - soil vapour well installed Jun 2013.
3) TH - testhole, no instrumentation installed .
4) - - no applicable elevation.

Table 2
Site Monitoring Results

Test Location	Elevation		Groundwater Elevation (m)		Headspace Vapour				Notes
	Ground (m)	Top of Pipe (m)	08/13-14/2013		08/13-14/2013				
					Combustible	Volatile	Combustile	Volatile	
GW-01	883.693	884.788	damaged		410	ND			Unable to remove slip cap
GW-02	883.679	884.674	ND		- -	- -			
GW-03	877.577	878.182	875.913		80	ND			cap missing, aerated
MW-01	876.982	877.785	damaged		- -	- -			blockage
MW-02	877.851	878.281	damaged		- -	- -			unable to remove slip cap
MW-03	877.169	878.135	872.281		2,450	89			
MW-04	876.013	876.986	869.991		45	4			
MW-05	872.454	873.306	870.386		230	ND			
MW-06	877.914	878.754	875.122		ND	ND			
MW-07	877.413	878.174	874.658		ND	ND			
VW-01	877.333	NA	NA		- -	- -			Screen submerged in water
VW-02	877.190	NA	NA		- -	- -			Screen submerged in water
VW-03	872.690	NA	NA		480	1			instrument alarm <19% O_2
VW-04	877.445	NA	NA		50	1			instrument alarm <19% O_2
VW-05	877.724	NA	NA		- -	- -			Screen submerged in water

Notes:

1) Measurement of combustible and volatile vapours by RKI Eagle 2. Combustbile vapour sensor calibrated to hexane and photoionization detector calibrated to isobutylene.
2) ND - Not Detected, less than the limit of instrument detection.
3) - - No value.
4) NA - Not Applicable.

Table 3A
Analytical Results - Soil - Drill Cuttings (Soil Bag)

Parameter	Detection Limit	Soil Bag			Class II Landfill Acceptance Criteria
		1 of 3	2 of 3	3 of 3	
pH	0.10	8.56	8.14	8.28	2-12.5
Flash Point (°C)	30.0	>75	>75	>75	>61
Paint Filter Test	-	PASS	PASS	PASS	PASS
Total Organic Carbon	0.10	NT	NT	1.04	- -
TCLP Hydrocarbons					
Benzene	0.0050	ND	ND	ND	0.5
Toluene	0.0050	ND	ND	ND	0.5
Ethylbenzene	0.0050	ND	ND	ND	0.5
Xylenes	0.0050	ND	0.0194	ND	0.5
TCLP Metals					
Antimony (Sb)	5.0	ND	ND	ND	500
Arsenic (As)	0.20	ND	ND	ND	5
Barium (Ba)	5.0	ND	ND	ND	100
Beryllium (Be)	0.50	ND	ND	ND	5
Boron (B)	5.0	ND	ND	ND	500
Cadmium (Cd)	0.050	ND	ND	ND	1
Chromium (Cr)	0.50	ND	ND	ND	5
Cobalt (Co)	5.0	ND	ND	ND	100
Copper (Cu)	5.0	ND	ND	ND	100
Iron (Fe)	5.0	ND	ND	ND	1,000
Lead (Pb)	0.50	ND	ND	ND	5
Mercury (Hg)	0.010	ND	ND	ND	0.2
Nickel (Ni)	0.50	ND	ND	ND	5
Selenium (Se)	0.20	ND	ND	ND	1
Silver (Ag)	0.50	ND	ND	ND	5
Thallium (Tl)	0.50	ND	ND	ND	5
Uranium (U)	1.0	ND	ND	ND	2
Vanadium (V)	5.0	ND	ND	ND	100
Zinc (Zn)	5.0	ND	ND	ND	500
Zirconium (Zr)	5.0	ND	ND	ND	500

Notes:

1) Class II Landfill Acceptance Criteria - per Table 2, Part 4 Schedule to the Alberta User Guide for Waste Managers 3/95. Applicable waste screening for The City of Red Deer Class II Waste Managment Facility.
2) Units in mg/L, unless otherwise stated.
3) ND - Not Detected, less than the limit of method detection.
4) NT - Not Tested.
5) Soil bags were sampled on Monday, June 24, 2013 and Saturday, June 29, 2013.
6) For further laboratory information, refer to the specific laboratory report in Appendix A.

Table 3B
Analytical Results - Soil - General Indices and Heavy Metals

Parameter	Unit	Detection Limit	TH-10 @ 3.0 m	TH-19 @ 4.9 m	TH-20 @ 8.8 m	Tier 1 Guideline
			06/29/2013	07/10/2013		
Chloride (Cl)	mg/kg	41958	146	38	47	- -
Nitrate-N	mg/kg	0.53 - 0.73	ND	ND	ND	- -
Nitrite-N	mg/kg	0.53 - 0.73	ND	ND	ND	- -
Total Metals						
Antimony (Sb)	mg/kg	0.20	0.55	0.44	0.63	20
Arsenic (As)	mg/kg	0.20	7.40	6.55	8.38	17
Barium (Ba)	mg/kg	5.0	273	164	295	500
Beryllium (Be)	mg/kg	1.0	ND	ND	ND	5
Cadmium (Cd)	mg/kg	0.50	ND	ND	ND	10
Chromium (Cr)	mg/kg	0.50	26.6	18.3	26.9	64
Cobalt (Co)	mg/kg	1.0	11.5	7.9	8.5	20
Copper (Cu)	mg/kg	2.0	28.3	16.0	21.1	63
Lead (Pb)	mg/kg	5.0	20.1	9.0	12.8	140
Mercury (Hg)	mg/kg	0.050	0.059	ND	0.054	6.6
Molybdenum (Mo)	mg/kg	1.0	1.0	ND	1.4	4
Nickel (Ni)	mg/kg	2.0	33.0	22.6	27.9	50
Selenium (Se)	mg/kg	0.50	ND	0.74	ND	1.0
Silver (Ag)	mg/kg	1.0	ND	ND	ND	20
Thallium (Tl)	mg/kg	0.50	ND	ND	ND	1.0
Tin (Sn)	mg/kg	2.0	ND	ND	ND	5
Uranium (U)	mg/kg	2.0	ND	ND	ND	23
Vanadium (V)	mg/kg	1.0	42.5	32.0	45.8	130
Zinc (Zn)	mg/kg	10	82	60	78	200
Hexavalent Chromium	mg/kg	0.10	ND	ND	ND	0.4
Boron (B), Hot Water Ext.	mg/kg	0.10	0.49	0.26	0.51	2

Notes:

1) Tier 1 Guideline - Alberta Tier 1 Soil and Groundwater Remediation Guidelines, December 2010 and amendments. Coarse-grained criteria for residential/parkland land use.
2) ND - Not Detected, less than the limit of method detection.
3) - - No value established in the referenced criteria.
4) Bold & Shaded - Exceeds the referenced Alberta Tier 1 Guidelines.
5) For further laboratory information, refer to the specific laboratory report in Appendix A.

Table 3C
Analytical Results - Soil - VOCs

Parameter	Detection Limit	TH-10 @ 3.0 m	TH-19 @ 4.9 m	TH-20 @ 8.8 m	Tier 1 Guideline
		06/29/2013	07/10/2013		
Hydrocarbons					
F1 (C_6-C_{10})	10	**47**	ND	ND	24
F2 (C_{10}-C_{16})	25	ND	ND	ND	130
F3 (C_{16}-C_{34})	50	159	ND	ND	300
F4 (C_{34}-C_{50})	50	ND	ND	ND	2,800
Total Hydrocarbons (C_6-C_{50})	50	206	ND	ND	--
Volatile Organic Compounds					
Benzene	0.0050	0.0058	ND	ND	0.073
Bromobenzene	0.010	ND	ND	ND	--
Bromochloromethane	0.010	ND	ND	ND	--
Bromodichloromethane	0.010	ND	ND	ND	--
Bromoform	0.010	ND	ND	ND	--
Bromomethane	0.10	ND	ND	ND	--
n-Butylbenzene	0.010 - 0.05	ND	ND	ND	--
sec-Butylbenzene	0.010 - 0.20	ND	ND	ND	--
tert-Butylbenzene	0.010	ND	ND	ND	--
Carbon tetrachloride	0.010	ND	ND	ND	0.00056
Chlorobenzene	0.010	ND	ND	ND	0.018
Dibromochloromethane	0.010	ND	ND	ND	0.27
Chloroethane	0.10	ND	ND	ND	--
Chloroform	0.010	**0.062**	ND	ND	0.001
Chloromethane	0.10	ND	ND	ND	--
2-Chlorotoluene	0.010 - 0.75	ND	ND	ND	--
4-Chlorotoluene	0.010	ND	ND	ND	--
1,2-Dibromo-3-chloropropane	0.010	ND	ND	ND	--
1,2-Dibromoethane	0.010	ND	ND	ND	--
Dibromomethane	0.010	ND	ND	ND	--
1,2-Dichlorobenzene	0.010	ND	ND	ND	0.18
1,3-Dichlorobenzene	0.010	ND	ND	ND	--
1,4-Dichlorobenzene	0.010	ND	ND	ND	0.098
Dichlorodifluoromethane	0.010	ND	ND	ND	--
1,1-Dichloroethane	0.010	ND	ND	ND	--
1,2-Dichloroethane	0.010	ND	0.087	ND	--
1,1-Dichloroethene	0.010	ND	ND	ND	0.021
cis-1,2-Dichloroethene	0.010	0.231	0.207	1.04	--
trans-1,2-Dichloroethene	0.010	ND	ND	0.048	--
Methylene chloride	0.010	**0.101**	0.012	0.015	0.095
1,2-Dichloropropane	0.010	ND	ND	ND	--
1,3-Dichloropropane	0.010	ND	ND	ND	--
2,2-Dichloropropane	0.010	ND	ND	ND	--
1,1-Dichloropropene	0.010	ND	ND	ND	--
cis-1,3-Dichloropropene	0.010	ND	ND	ND	--
trans-1,3-Dichloropropene	0.010	ND	ND	ND	--
Ethylbenzene	0.015	**1.04**	ND	ND	0.21
Hexachlorobutadiene	0.010	ND	ND	ND	0.0067
Isopropylbenzene	0.010	0.214	ND	ND	--
p-Isopropyltoluene	0.010	0.813	ND	ND	--
n-Propylbenzene	0.010	0.858	ND	ND	--
Styrene	0.010 - 0.050	ND	ND	ND	0.80
1,1,1,2-Tetrachloroethane	0.010	ND	ND	ND	--
1,1,2,2-Tetrachloroethane	0.050 - 0.50	ND	ND	ND	--
Tetrachloroethene	0.010	ND	ND	ND	0.16
Toluene	0.050	0.048	ND	ND	0.49
1,2,3-Trichlorobenzene	0.010	ND	ND	ND	0.26
1,2,4-Trichlorobenzene	0.010	ND	ND	ND	0.23
1,1,1-Trichloroethane	0.010	ND	ND	ND	--
1,1,2-Trichloroethane	0.010	ND	ND	ND	--
Trichloroethene	0.010	ND	ND	ND	0.012
Trichlorofluoromethane	0.010	ND	ND	ND	--
1,2,3-Trichloropropane	0.020 - 0.10	ND	ND	ND	--
1,2,4-Trimethylbenzene	0.010	7.72	ND	0.015	--
1,3,5-Trimethylbenzene	0.010	2.01	ND	ND	--
Vinyl chloride	0.20	ND	ND	ND	0.00034
Xylenes	0.10	7.28	ND	ND	12

Notes:

1) Tier 1 Guideline - Alberta Tier 1 Soil and Groundwater Remediation Guidelines, December 2010 and amendments. Coarse-grained criteria for residential/parkland land use.
2) ND - Not Detected, less than the limit of method detection.
3) -- No value established in the referenced criteria.
4) Bold & Shaded - Exceeds the referenced Alberta Tier 1 Guidelines.
5) Units are in mg/kg unless otherwise noted.
6) For further laboratory information, refer to the specific laboratory report in Appendix A.

Table 4A
Groundwater Indices at Time of Sampling

Monitoring Well	pH	Electrical Conductivity (µS/cm)	Temperature (°C)	Dissolved Oxygen (mg/L)	Total Dissolved Solid (mg/L)	Redox Potential (±mV)
GW-01	- -	- -	- -	- -	- -	- -
GW-02	- -	-	- -	- -	- -	- -
GW-03	7.81	868	9	1.69	812.50	+9.1
MW-01	- -	- -	- -	- -	- -	- -
MW-02	- -	- -	- -	- -	- -	- -
MW-03	7.58	2,103	8.6	2.08	2,002.00	-104.0
MW-04	7.46	3,209	8.8	2.23	3,016.00	-100.6
MW-05	7.67	1,786	8.2	1.3	1,657.50	-98.6
MW-06	- -	- -	- -	- -	- -	- -
MW-07	7.49	841	8.3	4.69	799.50	+39.9

Notes:

1) Groundwater indices measured by YSI Pro Plus multi-meter.
2) GW-03, MW-04 and MW-05 sampled on Wednesday, August 14, 2013
3) MW-03 sampled on Wednesday, August 14 and Friday, August 16, 2013
4) MW-07 sampled on Tuesday, August 13, 2013
5) - - Not Monitored, well not selected for sampling groundwater.

Table 4B
Analytical Results - Groundwater - General Water Quality

Parameter	Unit	Detection Limit	GW-03	MW-03	MW-04	MW-05	MW-07	Tier 1 Guideline
			08/14/2013	08/16/2013	08/14/2013		08/13/2013	
General Water Quality								
Biochemical Oxygen Demand	mg/L	2.0 - 10	ND	14	35	41	ND	- -
Total Chemical Oxygen Demand	mg/L	5.0	35	110	240	220	25	- -
Conductivity	µS/cm	1.0	1,300	1,000	4,900	2,600	1,300	- -
pH	Unitless	0.1	7.48	7.76	7.11	6.92	7.54	6.5 - 8.5
Total Organic Carbon (C)	mg/L	0.50 - 10	9.4	21	68	58	10	- -
Dissolved Cadmium (Cd)	µg/L	0.0050 - 0.025	0.048	ND	ND	ND	0.032	- -
Total Cadmium (Cd)	µg/L	0.0050 - 0.013	**0.37**	**11**	**0.10**	**0.59**	**1.7**	0.060*
Alkalinity ($CaCO_3$)	mg/L	0.50	620	530	1,700	1,100	610	- -
Bicarbonate (HCO_3)	mg/L	0.50	750	650	2,000	1,400	750	- -
Carbonate (CO_3)	mg/L	0.50	ND	ND	ND	ND	ND	- -
Hydroxide (OH)	mg/L	0.50	ND	ND	ND	ND	ND	- -
Sulphate (SO_4)	mg/L	1.0	66	ND	ND	ND	170	- -
Chloride (Cl)	mg/L	1.0 - 5.0	45	19	770	200	16	- -
Total Ammonia (N)	mg/L	0.050 - 2.5	ND	1.3	**22**	**77**	ND	1.37*
Total Phosphorus (P)	mg/L	0.015 - 0.30	0.74	24	0.65	0.6	1.3	- -
Total Nitrogen (N)	mg/L	0.050	5.2	15	23	73	1.3	- -
Total Kjeldahl Nitrogen	mg/L	0.050 - 2.5	1.2	15	23	73	1.2	- -
Nitrite (N)	mg/L	0.0030 - 0.015	0.025	0.0086	ND	ND	ND	- -
Nitrate (N)	mg/L	0.0030 - 0.015	3.9	0.036	0.065	0.055	0.072	- -
Nitrate plus Nitrite (N)	mg/L	0.0030 - 0.015	3.9	0.044	0.065	0.055	0.072	- -
Trace Organics								
Acetic Acid	mg/L	50	ND	NT	ND	ND	ND	- -
Formic Acid	mg/L	50	ND	NT	ND	ND	ND	- -
Propionic Acid	mg/L	50	ND	NT	ND	ND	ND	- -
Adsorbable Organic Halogens	mg/L	0.004 - 0.01	0.083	NT	1.22	2.41	0.012	- -

Notes:

1) Tier 1 Guideline - Alberta Tier 1 Soil and Groundwater Remediation Guidelines, December 2010 and amendments. Coarse-grained criteria for residential/parkland land use.
2) * Surface Water Quality Guidelines for Use in Alberta (AENV, 1999) on aquatic life pathway. Canadian Council of Ministers of the Environment (CCME) guidelines are referenced
3) ND - Not Detected, less than the limit of method detection.
4) NT - Not Tested.
5) - - No value established in the reference criteria.
6) Bold & Shaded - Exceeds thereferenced Alberta Tier 1 Guidelines.
7) For further laboratory information, refer to the specific laboratory report in Appendix A.

Table 4C
Analytical Results - Groundwater - Metals

Parameter	Detection Limit	GW-03	MW-03	MW-04	MW-05	MW-07	Tier 1 Guideline
		08/14/2013	08/16/2013	08/14/2013		08/13/2013	
Total Metals							
Aluminum (Al)	0.0030 - 0.0075	**3.8**	**120**	**0.20**	**2.0**	**25**	0.1*
Antimony (Sb)	0.00060 - 0.0015	0.00081	ND	ND	ND	0.0015	0.006
Arsenic (As)	0.00020 - 0.00050	**0.0057**	**0.37**	**0.048**	**0.0077**	**0.074**	0.005
Barium (Ba)	0.010 - 0.10	0.32	**11**	**1.7**	0.87	**1.4**	1
Beryllium (Be)	0.0010 - 0.0025	ND	0.015	ND	ND	0.0036	--
Boron (B)	0.020	0.19	0.11	0.37	0.40	0.041	1.5
Calcium (Ca)	0.30 - 3.0	180	1,200	210	160	250	--
Chromium (Cr)	0.0010 - 0.0025	**0.0087**	**0.47**	**0.0027**	**0.0069**	**0.071**	0.001*
Cobalt (Co)	0.00030 - 0.00075	0.0086	0.23	0.0052	0.011	0.065	--
Copper (Cu)	0.00020 - 0.0010	**0.012**	**0.68**	0.0023	**0.0077**	**0.12**	0.003*
Iron (Fe)	0.060 - 0.60	**15**	**740**	**54**	**68**	**12**	0.3
Lead (Pb)	0.00020 - 0.0010	**0.0048**	**0.34**	0.0016	**0.092**	**0.081**	0.004*
Lithium (Li)	0.020	0.17	0.33	0.057	0.033	0.085	--
Magnesium (Mg)	0.20	92	320	280	130	120	--
Manganese (Mn)	0.0040	**2.2**	**13**	**0.34**	**0.56**	**2.5**	0.05
Molybdenum (Mo)	0.00020 - 0.0010	0.0019	0.027	0.0016	0.0020	0.0042	--
Nickel (Ni)	0.00050 - 0.0025	0.027	**0.66**	0.046	0.028	**0.15**	0.11*
Phosphorus (P)	0.10	0.50	15	0.72	0.78	0.71	--
Potassium (K)	0.30	3.7	34	10	35	11	--
Selenium (Se)	0.00020 - 0.0010	0.00047	**0.0049**	ND	ND	**0.0022**	0.001
Silicon (Si)	0.10 - 1.0	16	200	24	21	25	--
Silver (Ag)	0.00010 - 0.00050	ND	**0.0042**	ND	ND	**0.00075**	0.0001*
Sodium (Na)	0.50	72	54	470	120	27	--
Strontium (Sr)	0.020	1.3	2.2	3.0	1.7	1.1	--
Sulphur (S)	0.20	21	22	3.5	2.2	53	--
Thallium (Tl)	0.00020 - 0.0010	0.00025	0.0019	ND	ND	0.00052	--
Tin (Sn)	0.0010 - 0.0050	0.0010	0.0043	ND	0.031	0.0014	--
Titanium (Ti)	0.0010 - 0.0050	0.23	1.1	0.0076	0.053	0.44	--
Uranium (U)	0.00010 - 0.00050	**0.094**	**0.022**	ND	0.0017	0.017	0.02
Vanadium (V)	0.0010 - 0.0050	0.015	0.57	0.0033	0.0071	0.13	--
Zinc (Zn)	0.0030 - 0.015	0.027	**1.7**	0.017	**0.081**	**0.48**	0.03
Dissolved Metals							
Aluminum (Al)	0.0030 - 0.015	ND	ND	ND	ND	ND	--
Antimony (Sb)	0.00060 - 0.0030	ND	ND	ND	ND	ND	--
Arsenic (As)	0.00020 - 0.0010	0.00037	0.014	0.044	0.0043	0.00031	--
Barium (Ba)	0.010	0.13	1.5	1.4	0.78	0.29	--
Beryllium (Be)	0.0010 - 0.0050	ND	ND	ND	ND	ND	--
Boron (B)	0.020	0.094	0.048	0.38	0.39	0.030	--
Calcium (Ca)	0.30	120	120	200	150	160	--
Chromium (Cr)	0.0010 - 0.0050	ND	ND	ND	ND	ND	--
Cobalt (Co)	0.00030 - 0.0015	ND	0.0031	0.0042	0.0085	ND	--
Copper (Cu)	0.00020 - 0.0010	0.0044	0.0024	ND	ND	0.0023	--
Iron (Fe)	0.060	ND	1.9	40	56	0.17	--
Lead (Pb)	0.00020 - 0.0010	ND	ND	ND	ND	ND	--
Lithium (Li)	0.020	0.13	ND	0.058	0.031	0.059	--
Magnesium (Mg)	0.20	63	45	260	120	90	--
Manganese (Mn)	0.0040	0.0041	1.0	0.30	0.36	0.0084	--
Molybdenum (Mo)	0.00020 - 0.0010	0.00089	0.0055	0.0016	ND	0.00088	--
Nickel (Ni)	0.00050 - 0.0025	0.0017	0.0044	0.044	0.020	0.0015	--
Phosphorus (P)	0.10	ND	ND	0.35	0.45	ND	--
Potassium (K)	0.30	2.1	6.8	9.5	31	8.5	--
Selenium (Se)	0.00020 - 0.0010	0.00032	ND	ND	ND	0.00061	--
Silicon (Si)	0.10	7.2	7.8	21	16	8.1	--
Silver (Ag)	0.00010 - 0.00050	ND	ND	ND	ND	ND	--
Sodium (Na)	0.50	56	51	450	110	25	--
Strontium (Sr)	0.020	1.1	0.74	2.9	1.7	0.88	--
Sulphur (S)	0.20	17	0.78	2.9	1.6	49	--
Thallium (Tl)	0.00020 - 0.0010	ND	ND	ND	ND	ND	--
Tin (Sn)	0.0010 - 0.0050	ND	ND	ND	0.0078	ND	--
Titanium (Ti)	0.0010 - 0.0050	ND	ND	ND	ND	ND	--
Uranium (U)	0.00010 - 0.00050	0.086	0.00092	ND	ND	0.014	--
Vanadium (V)	0.0010 - 0.0050	ND	ND	ND	ND	ND	--
Zinc (Zn)	0.0030 - 0.015	0.0035	ND	ND	ND	0.0054	--

Notes:

1) Tier 1 Guideline - Alberta Tier 1 Soil and Groundwater Remediation Guidelines, December 2010 and amendments. Coarse-grained criteria for residential/parkland land use.
2) * Surface Water Quality Guidelines for Use in Alberta (AENV, 1999) on aquatic life pathway. Canadian Council of Ministers of the Environment (CCME) Guidelines as referenced in the Tier 1 Guidelines.
3) ND - Not Detected, less than the limit of method detection.
4) Unless specified all units are mg/L.
5) -- No value established in the reference criteria.
6) Bold & Shaded - Exceeds the referenced Alberta Tier 1 Guideline.
7) For further laboratory information, refer to the specific laboratory report in Appendix B.

Table 4D
Analytical Results - Groundwater - VOCs

Parameters	Detection Limit	GW-03	MW-03	MW-04	MW-05	MW-07	Tier 1 Guideline
		08/14/2013	08/16/2013	08/14/2013		08/13/2013	
Volatile Organic Compounds							
Benzene	0.00040	ND	ND	**0.011**	**0.037**	ND	0.005
Toluene	0.00040	ND	ND	0.0033	**0.040**	ND	0.024
Ethylbenzene	0.00040	ND	ND	0.0015	**0.046**	ND	0.0024
Xylenes (Total)	0.00080	ND	ND	0.0062	0.260	ND	0.3
F1 (C_6-C_{10})	0.10	ND	ND	0.12	**1.4**	ND	0.81
F2 (C_{10}-C_{16})	0.10	ND	0.15	ND	**2.3**	ND	1.1
Total Trihalomethanes	0.0020	ND	ND	ND	ND	ND	0.1
Bromodichloromethane	0.00050	ND	ND	ND	ND	ND	- -
Bromoform	0.00050	ND	ND	ND	ND	ND	- -
Bromomethane	0.0020	ND	ND	ND	ND	ND	- -
Carbon tetrachloride	0.00050	ND	ND	ND	ND	ND	0.00056
Chlorobenzene	0.00050	ND	ND	ND	0.00097	ND	0.0013
Chlorodibromomethane	0.0010	ND	ND	ND	ND	ND	- -
Chloroethane	0.0010	ND	ND	0.045	0.0055	ND	- -
Chloroform	0.00050	ND	ND	ND	ND	ND	0.0018
Chloromethane	0.0020	ND	ND	ND	ND	ND	- -
1,2-dibromoethane	0.00050	ND	ND	ND	ND	ND	- -
1,2-dichlorobenzene	0.00050	ND	ND	**0.0025**	**0.0067**	ND	0.0007
1,3-dichlorobenzene	0.00050	ND	ND	ND	ND	ND	- -
1,4-dichlorobenzene	0.00050 - 0.00055	ND	ND	ND	**0.002**	ND	0.001
1,1-dichloroethane	0.00050	ND	ND	ND	ND	ND	- -
1,2-dichloroethane	0.00050	ND	ND	**0.0094**	ND	ND	0.005
1,1-dichloroethene	0.00050	ND	ND	ND	ND	ND	0.014
cis-1,2-dichloroethene	0.00050 - 0.010	ND	0.0017	1.7	3.0	ND	- -
trans-1,2-dichloroethene	0.00050	ND	ND	ND	ND	ND	- -
Dichloromethane	0.0020	ND	ND	0.0078	ND	ND	0.05
1,2-dichloropropane	0.00050 - 0.0010	ND	ND	ND	ND	ND	- -
cis-1,3-dichloropropene	0.00050	ND	ND	ND	ND	ND	- -
trans-1,3-dichloropropene	0.00050	ND	ND	ND	ND	ND	- -
Methyl methacrylate	0.00050	ND	ND	ND	ND	ND	0.47
Methyl-tert-butylether (MTBE)	0.00050	ND	ND	ND	ND	ND	0.015
Styrene	0.00050	ND	ND	ND	ND	ND	0.072
1,1,1,2-tetrachloroethane	0.0020	ND	ND	ND	ND	ND	- -
1,1,2,2-tetrachloroethane	0.0020	ND	ND	ND	ND	ND	- -
Tetrachloroethene	0.00050	ND	ND	ND	ND	ND	0.03
1,2,3-trichlorobenzene	0.0010	ND	ND	ND	ND	ND	0.008
1,2,4-trichlorobenzene	0.0010	ND	ND	ND	ND	ND	0.015
1,3,5-trichlorobenzene	0.00050	ND	ND	ND	ND	ND	0.014
1,1,1-trichloroethane	0.00050	ND	ND	ND	ND	ND	- -
1,1,2-trichloroethane	0.00050	ND	ND	ND	ND	ND	- -
Trichloroethene	0.00050	ND	ND	0.00077	0.00062	ND	0.005
Trichlorofluoromethane	0.00050	ND	ND	ND	ND	ND	- -
1,2,4-trimethylbenzene	0.00050	ND	ND	0.00059	0.089	ND	- -
1,3,5-trimethylbenzene	0.00050	ND	ND	ND	0.017	ND	- -
Vinyl chloride	0.00050	ND	ND	**0.011**	**0.47**	ND	0.0011

Notes:

1) Tier 1 Guideline - Alberta Tier 1 Soil and Groundwater Remediation Guidelines, December 2010 and amendments. Coarse-grained criteria for residential/parkland land use.
2) ND - Not Detected, less than the limit of method detection.
3) Unless specified all units are mg/L (ppm).
4) - - No value established in the reference criteria.
5) Bold & Shaded - Exceeds the referenced Alberta Tier 1 Guidelines.
6) For further laboratory information, refer to the specific laboratory report in Appendix A.

Table 5A
Summary of Field Parameters Measured During Sampling of Soil Vapour

Parameter	Well Diameter (mm)	Screen Length (cm)	Well Depth (m)	Headspace Volume (cm^3)	Purge Rate (cm^3/min)	Purge Time (min)	Pressure	
							Ambient (psi)	Vapour Well (psi)
VW-01	25	30	2.6	1,317	943.3	- -	- -	- -
VW-02	25	30	4.3	2,164	943.3	- -	- -	- -
VW-03	25	30	2.7	1,388	943.3	6	15.04	15.03
VW-04	25	30	2.4	1,317	943.3	6	15.05	15.04
VW-05	25	30	2.4	1,231	943.3	- -	- -	- -

Notes:

1) Measurement of pressure by digital Cole-Parmer absolute pressure gauge.
2) Purge time is minimum elapsed time prior to the collection of a soil vapour sample.
3) Screen set at base of well.
4) Soil vapour sampling was performed on Tuesday, August 13, 2013.
5) VW-01, VW-02 and VW-05 not sampled due to submerged screen.

Table 5B
Analytical Results - Soil Vapour - General Indices

Parameters	Units	Detection Limit	VW-01	VW-02	VW-03	VW-04	VW-05
Gauge Pressure							
Following sampling	psi	- -	NT	NT	-5.0	-5.0	NT
Reported by laboratory	psi	- -	NT	NT	-4.0	-3.0	NT
Fixed Gases							
Oxygen	% v/v	0.2	NT	NT	8.0	20.7	NT
Nitrogen	% v/v	0.2	NT	NT	71.8	77	NT
Carbon Monoxide	% v/v	0.2	NT	NT	ND	ND	NT
Methane	% v/v	0.2	NT	NT	5.2	ND	NT
Carbon Dioxide	% v/v	0.2	NT	NT	15.1	2.3	NT

Notes:

1) Soil vapour sample collected on Thursday, August 13, 2013.
2) ND - Not Detected, less than the limit of method detection.
3) NT - Not Tested.
4) - - No value established in the detection limit.
5) VW-01, VW-02 and VW-05 not sampled due to submerged screen.
6) For further information, the reader should refer to the laboratory report in Appendix A.

Table 5C
Analytical Results - Soil Vapour - VOCs

Parameters	Units	Detection Limit	VW-03	VW-04
			08/13/2013	
Hydrocarbon Fractions				
Aliphatic >C_5-C_6	µg/m^3	5.0	176	15.7
Aliphatic >C_6-C_8	µg/m^3	5.0	231	59.7
Aliphatic >C_8-C_{10}	µg/m^3	5.0	68.4	36.6
Aliphatic >C_{10}-C_{12}	µg/m^3	5.0	226	95.0
Aliphatic >C_{12}-C_{16}	µg/m^3	5.0	58.6	25.3
Aromatic >C_7–C_8 (TEX Excluded)	µg/m^3	5.0	ND	ND
Aromatic >C_8-C_{10}	µg/m^3	5.0	50.7	23.9
Aromatic >C_{10}-C_{12}	µg/m^3	5.0	62.5	22.7
Aromatic >C_{12}-C_{16}	µg/m^3	5.0	ND	ND
Select Volatile Gases				
Acetylene	ppm	0.19 - 0.22	ND	ND
Ethane	ppm	0.19 - 0.22	0.38	ND
Ethylene	ppm	0.19 - 0.22	ND	ND
Methane	ppm	4.4	- -	58
n-Butane	ppm	0.38 - 0.44	ND	ND
n-Pentane	ppm	0.19 - 0.22	ND	ND
Propane	ppm	0.19 - 0.22	0.19	ND
Propene	ppm	0.19 - 0.22	ND	ND
Propyne	ppm	0.38 - 0.44	ND	ND
Volatile Organic Compounds				
Benzene	ppbv	0.18	0.69	0.65
Toluene	ppbv	0.20	2.81	2.91
Ethylbenzene	ppbv	0.20	1.31	0.96
Xylene (Total)	ppbv	0.60	8.12	4.63
Dichlorodifluoromethane (FREON 12)	ppbv	0.20	2.82	1.15
1,2-Dichlorotetrafluoroethane	ppbv	0.17	11.0	ND
Chloromethane	ppbv	0.30	3.09	1.50
Vinyl Chloride	ppbv	0.18	3.01	0.83
Chloroethane	ppbv	0.30	0.52	ND
1,3-Butadiene	ppbv	0.50	ND	ND
Trichlorofluoromethane (FREON 11)	ppbv	0.20	ND	0.59
Ethanol (ethyl alcohol)	ppbv	2.3 - 4.6	143	101
Trichlorotrifluoroethane	ppbv	0.15	ND	ND
2-propanol	ppbv	3.0	3.5	ND
2-Propanone	ppbv	0.80	25.8	21.1
Methyl Ethyl Ketone (2-Butanone)	ppbv	3.0	ND	3.5
Methyl Isobutyl Ketone	ppbv	3.2	ND	ND
Methyl Butyl Ketone (2-Hexanone)	ppbv	2.0	ND	ND
Methyl t-butyl ether (MTBE)	ppbv	0.20	ND	ND
Ethyl Acetate	ppbv	2.2	ND	ND
1,1-Dichloroethylene	ppbv	0.25	ND	ND
cis-1,2-Dichloroethylene	ppbv	0.19	1.37	0.59
trans-1,2-Dichloroethylene	ppbv	0.20	ND	ND
Methylene Chloride(Dichloromethane)	ppbv	0.80	0.97	ND
Chloroform	ppbv	0.15	ND	ND
Carbon Tetrachloride	ppbv	0.30	ND	ND
1,1-Dichloroethane	ppbv	0.20	ND	ND
1,2-Dichloroethane	ppbv	0.20	ND	ND
Ethylene Dibromide	ppbv	0.17	ND	ND
1,1,1-Trichloroethane	ppbv	0.30	ND	ND
1,1,2-Trichloroethane	ppbv	0.15	ND	ND
1,1,2,2-Tetrachloroethane	ppbv	0.20	ND	ND
cis-1,3-Dichloropropene	ppbv	0.18	ND	ND
trans-1,3-Dichloropropene	ppbv	0.17	ND	1.91
1,2-Dichloropropane	ppbv	0.40	ND	ND
Bromomethane	ppbv	0.18	ND	ND
Bromoform	ppbv	0.20	ND	ND
Bromodichloromethane	ppbv	0.20	ND	ND
Dibromochloromethane	ppbv	0.20	ND	ND
Trichloroethylene	ppbv	0.30	ND	ND
Tetrachloroethylene	ppbv	0.20	ND	ND
Styrene	ppbv	0.20	0.20	ND
4-ethyltoluene	ppbv	2.2	ND	ND
1,3,5-Trimethylbenzene	ppbv	0.50	1.38	0.54
1,2,4-Trimethylbenzene	ppbv	0.50	2.29	1.08
Chlorobenzene	ppbv	0.20	ND	ND
Benzyl chloride	ppbv	1.0	ND	ND
1,3-Dichlorobenzene	ppbv	0.40	ND	ND
1,4-Dichlorobenzene	ppbv	0.40	ND	ND
1,2-Dichlorobenzene	ppbv	0.40	ND	ND
1,2,4-Trichlorobenzene	ppbv	2.0	ND	ND
Hexachlorobutadiene	ppbv	3.0	ND	ND
Hexane	ppbv	0.30	13.8	1.83
Heptane	ppbv	0.30	2.78	1.31
Cyclohexane	ppbv	0.20	11.9	2.21
Tetrahydrofuran	ppbv	0.40	ND	ND
1,4-Dioxane	ppbv	2.0	ND	ND
Vinyl Bromide	ppbv	0.20	ND	ND
Propene	ppbv	0.30	ND	11.6
2,2,4-Trimethylpentane	ppbv	0.20	5.11	1.00
Carbon Disulfide	ppbv	0.50	1.79	37.0
Vinyl Acetate	ppbv	0.20	ND	ND

Notes:
1) Results are from sampling performed on Thursday, August 13, 2013.
2) ND - Not Detected, less than the limit of method detection.
3) For further information, the reader should refer to the laboratory report in Appendix A.

Table 5D
Analytical Results - Soil Vapour - Siloxanes

Parameter	Detection Limit		VW-03		VW-04	
			08/13/2013			
	mg/m³	ppm	mg/m³	ppm	mg/m³	ppm
Trimethylsilyl Fluoride	- -		ND	ND	ND	ND
Tetramethylsilane	0.0001	0.0001	ND	ND	ND	ND
Methoxytrimethylsilane	0.0029 - 0.0030	0.0007	ND	ND	ND	ND
Ethoxytrimethylsilane	0.0028 - 0.0029	0.0006	ND	ND	ND	ND
Trimethylsilanol	- -	- -	0.0142	0.0038	0.0102	0.0028
Isopropoxytrimethylsilane	0.0012	0.0002	ND	ND	ND	ND
Trimethoxymethyl Silane #	- -	- -	ND	ND	ND	ND
Hexamethyl Disiloxane - L2	0.0001	0.0001	ND	ND	ND	ND
Propoxytrimethylsilane	0.0032 - 0.0033	0.0006	ND	ND	ND	ND
1-Methylbutoxytrimethylsilane *	- -	- -	ND	ND	ND	ND
Butoxytrimethylsilane *	- -	- -	ND	ND	ND	ND
Trimethoxyvinyl Silane #	- -	- -	ND	ND	ND	ND
Hexamethyl Cyclotrisiloxane - D3	- -	- -	0.0317	0.0035	0.0135	0.0015
Octamethyl Trisiloxane - L3	0.0002	0.0001	ND	ND	ND	ND
Triethoxyvinyl Silane #	- -	- -	ND	ND	ND	ND
Triethoxyethyl Silane #	- -	- -	ND	ND	ND	ND
Octamethyl Cyclotetrasiloxane - D4	- -	- -	0.0276	0.0023	0.0172	0.0014
Decamethyl Tetrasiloxane - L4	0.0003	0.0001	ND	ND	ND	ND
Tetraethylsilicate #	- -	- -	ND	ND	ND	ND
Decamethyl Cyclopentasiloxane - D5	- -	- -	0.0357	0.0024	0.0246	0.0016
Dodecamethyl Pentasiloxane - L5	0.0028	0.0002	ND	ND	ND	ND
Dodecamethyl Cyclohexasiloxane - D6	- -	- -	0.2163	0.0119	0.1685	0.0093
Sum			0.3396	0.0263	0.2476	0.0189

Notes:

1) Soil vapour samples collected on Thursday, August 13, 2013.
2) ND - Not Detected, less than the limit of method detection.
3) - - No value established in the detection limit.
4) V=200 mL, where V is volume of air/gas sampled.
5) * - Semiquanititative (response factor set at 5).
6) # - Unstable, poor detectability, commercial standards tested.
7) For further information, the reader should refer to the laboratory report in Appendix A.

Table 1
General Site Attributes for Exposure to Soil Vapour Inhalation

Site Information and Environmental Setting	
Site Description:	The historic waste material lies in two distinct areas within the boundaries of the Red Deer College and the South Hill neighbourhood. Each landfill is separated by Taylor Drive and Waskasoo Creek. Presently, the site on the college campus is an open landscaped area with an asphalt paved pedestrian path. The Red Deer Motors site is currently a vacant grassed area. There are currently no buildings located within the boundaries of the two historic landfills.
Legal Description:	Red Deer College - Lot J Plan 012 0303 within SE 08-38-27 W4M Red Deer Motors - Lot 3MR Block 2 Plan 842 2279 within SE 08-38-27 W4M
Surrounding Land Use:	Urban Setting (City of Red Deer) The sites are bounded on the north by 32 Street followed by various commercial and residential developments. The community of West Park is located to the northwest. Commercial developments are to the east and southeast. On campus housing borders the Red Deer College Landfill. Other campus facilities are southwest of the landfill. Red Deer Motors Landfill is a green space with no direct assess from Taylor Drive or 32 Street and considered to be semi-isolated from the public.
Groundwater Usage:	No usage on either landfill site presently nor likely in the future.
Surface Water:	No noted direction of principal overland flow or drainage control measures. There are no obvious environmental concerns for surface water run-off or run-on throughout this area.
Underground Structures:	A private communication line (installed July 2011) traverses the waste area at the college campus. Buried electrical cable is along the south side of 32 Street. A storm sewer traverses south of the Red Deer Motors Landfill with an outfall into Waskasoo Creek.
Special Environmental Conditions:	The landfills have been closed for approximately 43 years, circa 1972.

Receptor	Potential Exposure Routes	Soil Gas		
		Oxygenated	Ketone	Chlorinated
<u>On-Site:</u>				
Recreational Visitors	Inhalation of vapours from soil	×	×	✓
Maintenance Workers	Inhalation of vapours from groundwater	×	×	×
Students	Ingestion of groundwater	✓	✓	✓
Student Housing (with basement)	Inhalation of vapours from soil	×	×	×
<u>Off-Site:</u>				
Red Deer College Buildings	Inhalation of vapours from soil	×	×	✓
in proximity to the landfill	Inhalation of vapours from groundwater	×	×	✓
	Ingestion of groundwater	✓	✓	✓
Single and Multi-Family Houses (with	Inhalation of vapours from soil	✓	✓	✓
basement/underground garage)	Inhalation of vapours from groundwater	×	×	×
	Ingestion of groundwater	✓	✓	✓
Commercial Developments	Inhalation of vapours from soil	✓	✓	✓
	Inhalation of vapours from groundwater	×	×	×
	Ingestion of groundwater	✓	✓	✓
West Park Middle School	Inhalation of vapours from soil	✓	✓	✓
	Inhalation of vapours from groundwater	✓	✓	✓
	Ingestion of groundwater	✓	✓	✓
<u>Underground Utilities:</u>				
Communication Line	Impact of vapours from groundwater	×	×	×
Electrical Cable	Impact of vapours from soil	×	×	×
Storm Sewer	Ingestion of groundwater	×	×	×

× - Potential Exposure Hazard
✓ - "Negligible" Potential Exposure Hazard

Table 2A
Identified Chemicals of Concern - Physical Attributes

Chemical	Media			Physical Attributes											
	Soil	Groundwater	Soil Vapour	Molecular Weight	Vapour Pressure	Specific Gravity		Solubility in Water	Henry's Law Constant	Coefficients			Half-life		Odour Threshold
										Octanol Water	Org. C. Water	Soil/Sediment	Air	Soil	
	mg/kg	ppb	ppbv	g/mol	mmHg	Water	Air	mg/L	Pa m^3/mol	log K_{ow}	log K_{oc}	kd	Time	Time	ppm
Ethane	- -	- -	190 - 1100	30.07	31,500 *	0.546	1.1	60.2	5.07E+04	1.81	230	- -	50 - 70 days	- -	899
Ethylene	- -	- -	190 - 670	28.05	52,100*	0.569	1	131	2.31E+04	1.13	98	- -	1.9 days	- -	270 - 600
Methane	- -	- -	44,000 - 260 x 10^6	16.04	47,000 *	0.422	0.55	Insoluble	6.69E+04	1.09	90	- -	7 - 10 years	- -	- -
n-Pentane	- -	- -	190 - 14,000	72.15	420	0.63	2.5	38.0	1.27E+05	3.39	80	- -	4 days	- -	10
n-Butane	- -	- -	358 - 2400	58.12	1,820	0.60	2.1	Insoluble	9.63E+04	2.89	900	- -	6.3 days	- -	1,200
Propane	- -	- -	190 - 340	44.09	9,823	0.59	1.5	100	7.16E+04	2.36	460	- -	14 days	- -	20,000
Propene	- -	- -	190 - 220	42.08	760 @ -47°C	0.609	1.46	2.44 *	1.99E+04	1.77	220	- -	15 - 23 hours	- -	- -
Dichlorodifluoromethane (FREON 12)	0.010	- -	0.2 - 348	120.9	4,332	1.50	4.20	Insoluble	3.48E+04	2.16	356	- -	105 - 169 years	- -	- -
1,2-Dichlorotetrafluoroethane	- -	- -	0.17 - 34.4	170.93	1,444	1.44	5.93	130 *	1.27E+05	2.82	815	- -	126 - 310 years	- -	- -
Chloromethane	0.10	2.00	0.3 - 29	50.5	3,800	0.92	1.80	5,000	8.94E+02	0.91	14	- -	1 year	- -	10
Vinyl Chloride	0.20	3.0 - 470	0.18 - 519	62.5	2,508	0.969	2.2	2,760	8.82E+01	1.5	57	- -	55 hours	0.2 - 0.5 days	3,000
Chloroethane	0.10	1.0 - 45	0.30 - 29	64.5	1,000	0.92	2.22	6,000	1.11E+03	1.43	24	- -	39 days	- -	4.2
Trichlorofluoromethane (FREON 11)	0.01	5.0	0.20 - 50.6	137.4	690	1.49	4.70	Insoluble	9.83E+03	2.53	97	- -	52 - 207 years	- -	- -
Ethanol (Ethyl Alcohol)	- -	- -	101 - 648	46.1	44	0.80	1.60	Miscible	5.07E-01	-0.31	1	- -	5 days	- -	0.35
2-Propanol	- -	- -	3.0 - 290	60.1	33	2.07	0.785	Miscible	8.21E-01	0.05	1.5	- -	3.2 days	- -	- -
2-Propanone	- -	- -	0.80 - 76	58.1	180	0.80	2.00	Miscible	1.61E+02	-0.24	0.73	- -	22 - 23 days	1 - 7 days	20
p-Isopropyltoluene	0.010 - 0.813	- -	- -	134.2	1.5 *	0.857	4.62	23.4	1.11E+03	4.1	4,050	- -	1 - 34 days	- -	- -
Methyl Ethyl Ketone (2-Butanone)	- -	- -	3.0 - 290	72.1	71	0.80	2.41	Soluble	5.77E+00	0.63	0.56	- -	14 days	- -	5.4
1,1-Dichloroethylene	0.01	0.50	0.25 - 24	96.94	500	1.21	3.25	400	2.64E+03	2.13	64 & 65	- -	5 - 12 days	- -	190
cis-1,2-Dicholoroethylene	0.010 - 1.04	330 - 3,000	0.42 - 123	96.95	180	1.28	3.34	4,000	4.13E+02	1.86	250	- -	6.1 days	0.14 - 9.9 years	0.085
trans-1,2-Dichloroethene	0.01 - 0.048	0.5 - 3.4	0.20 - 30	96.95	265	1.27	3.34	6,300	6.81E+02	2.09	1.56	- -	3.79 days	- -	0.26
Methylene Chloride	0.010 - 0.101	2.0 - 7.8	0.80 - 120	84.9	350	1.30	2.90	20,000	3.29E+02	1.25	24	- -	119 days	- -	250
Chloroform	0.010 - 0.062	0.50	0.15 - 18.2	119.4	160	1.48	4.12	5,000 *	3.72E+02	1.97	34 - 196	- -	150 days	0.3 - 1.4 days	85
1,2-Dichloroethane	0.010 - 0.087	0.5 - 9.4	0.20 - 19	98.96	64	1.24	3.40	8,690	1.11E+01	1.48	1.28 - 1.62	- -	73 days	- -	12 - 100
1,1,1-Trichloroethane	0.01	0.50	0.30 - 29	133.4	100	1.31	4.6	4,000	7.30E+03	2.48	120 - 151	1.8, 2.592 & 1.338	4.7 years	>97 & >485 days	0.971
trans-1,3-Dichloropropene	0.01	0.50	0.17 - 16	110.98	34 *	1.220 *	1.40	2,800 *	3.60E+02	2.03	28	- -	76 days	6 - 17 days	1
Trichloroethylene	0.01	0.5 - 0.77	0.30 - 81.9	131.4	58	1.46	4.50	1,280 *	9.98E+02	2.61	101	0.093	7 & 114 days	- -	28
Tetrachloroethylene	0.01	0.50	0.20 - 221	165.8	14	1.62	5.80	206 *	1.79E+03	3.40	200 - 237	- -	96 days	1.2 - 5.4 hours	1
Benzene	0.0050 - 0.0058	1.5 - 37	0.18 - 5.17	78.1	75	0.88	2.70	700	5.63E+02	2.13	85	- -	13 days	- -	1.5
Toluene	0.048 - 0.050	0.4 - 40	0.20 - 4.80	92.1	21	0.87	3.10	700 @ 23.3°C	6.73E+02	2.73	37 - 178	- -	3 days	3 hours - 71 days	2.9
Ethylbenzene	0.015 - 1.04	0.4 - 46	0.20 - 27	106.2	7	0.87	3.70	100	7.98E+02	3.15	520	- -	55 hours	- -	2.3
o-Xylene	- -	- -	0.20 - 19	106.2	7	0.88	3.70	200	5.25E+02	3.12	24 - 251	- -	1.2 days	- -	- -
m-Xylene	- -	- -	0.37 - 99	106.2	9	0.86	3.70	Slight	7.28E+02	3.20	166 - 182	- -	16.3 hours	- -	1.1
p-Xylene	- -	- -	0.37 - 99	106.2	9	0.86	3.70	200	6.99E+02	3.15	246 - 540	- -	27 hours	- -	- -
Total Xylene	0.1 - 7.28	1.8 - 260	0.60 - 190	106.2	0.896 @ 21°C	0.86	3.70	130	6.23E+02	- -	- -	- -	8 - 14 hours	- -	0.05 - 0.27
Styrene	0.010 - 0.050	0.50	0.20 - 42	104.2	5	0.91	3.60	300	2.81E+04	2.95	960	- -	3.5 - 9 hours	4 months	0.008
1,2,4-Trimethylbenzene	0.013 - 7.72	4.0 - 89	0.50 - 48	120.2	1 @ 13.33°C	0.88	4.10	60	5.25E+02	3.78	3.5	- -	6 hours	- -	0.4
1,3,5-Trimethylbenzene	0.010 - 2.01	1.8 - 17	0.50 - 48	120.2	2	0.86	4.15	20	8.89E+02	3.42	500 - 1,445	- -	11 hours	- -	0.03661
Chlorobenzene	0.01	0.5 - 0.97	0.20 - 19	112.56	8.8	1.11	3.88	498 *	3.15E+02	2.84	4.8 - 313	166.34	21 days	7 days	0.217 - 1.738
1,2-Dicholorobenzene	0.01	0.5 - 6.7	0.40 - 38	147	1.47 *	1.30	5.10	140.000	1.93E+02	3.38	2.5 - 3.76	- -	<50 days	- -	50
1,4-Dicholorobenzene	0.01	0.5 - 2.0	0.40 - 38	147	0.6	1.458	5.08	73.8	2.74E+02	3.42	273 & 390	- -	50 days	- -	0.121
Hexane	- -	- -	0.30 - 17,800	86.2	124	0.66	3.00	20	1.85E+05	3.90	150	- -	3 days	- -	130
Heptane	- -	- -	0.58 - 1,970	100.2	40 @ 22.2°C	0.68	4.60	3	2.03E+05	4.66	8,200	- -	54 hours	- -	220
Cyclohexane	- -	- -	0.35 - 4,900	84.2	78	0.78	2.90	Insoluble	1.52E+04	3.44	160	- -	45 hours	- -	0.41
Tetrahydrofuran	- -	- -	0.40 - 38	72.1	132	0.89	2.50	Miscible	7.14E+00	0.46	18	- -	21 - 24 hours	- -	30
2,2,4-Trimethylpentane	- -	- -	0.20 - 19	114.22	49.3 *	0.69	3.93	Insoluble	3.05E+05	4.08	4.35	- -	4.4 days	- -	- -
Carbon Disulfide	- -	- -	0.50 - 48	76.1	297	1.26	2.63	3,000	1.46E+03	1.94	270	- -	5.5 days	- -	0.016

Notes:
1) Above identified chemicals of concern are derived from the results of a 2014 Phase II ESA. Additional chemicals may be added pending future investigation and testing events.
2) HQ values are calculated by the use of the highest concentration measured or the detection limit established by the analytical method.
3) Solubility in water, Vapour pressure, Specific Gravity is at 20°C unless otherwise stated.
4) Henry's Law Constant and any value with * Temperature at 25°C.
5) - -/N/E - Not Tested, No Value Established or Not Evaluated.
6) ND - Not Detected, below the limit of method detection.

Table 2B
Identified Chemicals of Concern - Guidelines and Toxicological Values

Chemical	Carcinogen	Media			Toxicological Attributes						
		Soil	Groundwater	Soil Vapour	Bioconcentration Factor	8-hour Occupational Exposure Limit		Acceptable Daily Intake	Tolerable Daily Intake	TRV	
										TC	UR
		mg/kg	ppb	ppbv	gm/kg or gm/l	ppm	mg/m^3	mg/kg/day	ppm bw/day	mg/m^3	$(mg/m^3)^{-1}$
Ethane	N/E	--	--	190 - 1100	5	1,000	1,230	--	--	--	--
Ethylene	N/E	--	--	190 - 670	4	200	229	--	--	--	--
Methane	Non-Carcinogen	--	--	44,000 - 260 x 10^6	1	1,000	706	--	--	--	--
n-Pentane	N/E	--	--	190 - 14,000	80	600	1,770	--	--	--	--
n-Butane	N/E	--	--	358 - 2400	33	1,000	--	--	--	--	--
Propane	Non-Carcinogen	--	--	190 - 340	13.1	100	180		--		
Propene	N/E	--	--	190 - 220	5	50	147		--		
Dichlorodifluoromethane (FREON 12)	Non-Carcinogen	0.010	--	0.2 - 348	25	1,000	4,950	--	--	--	--
1,2-Dichlorotetrafluoroethane	N/E	--	--	0.17 - 34.4	82	1,000	6,991		--		
Chloromethane	Carcinogen	0.10	2.00	0.3 - 29	3	50	105	--	0.003	0.1	0.4
Vinyl Chloride	Carcinogen	0.20	3.0 - 470	0.18 - 519	<10	1	2.6		0.009	0.1	0.0088
Chloroethane	Carcinogen	0.10	1.0 - 45	0.30 - 29	2.5	100	264	--	--	--	--
Trichlorofluoromethane (FREON 11)	Non-Carcinogen	0.01	5.0	0.20 - 50.6	49	1,000 [2]	5,600 [2]	--	--	--	--
Ethanol (Ethyl Alcohol)	Carcinogen	--	--	101 - 648	3	1,000	1,880	--	--	--	--
2-Propanol	N/E	--	--	3.0 - 290	3	200	492		--		
2-Propanone	N/E	--	--	0.80 - 76	3.2	250 [2]	590 [2]	--	--	--	--
p-Isopropyltoluene	N/E	0.010 - 0.813	--	--	286	10	49		--	--	--
Methyl Ethyl Ketone (2-Butanone)	N/E	--	--	3.0 - 290	1.2 - 27.5	200	590	--	0.6	5	--
1,1-Dichloroethylene	N/E	0.01	0.50	0.25 - 24	<13	5	20		0.05	0.2	
cis-1,2,-Dicholoroethylene	N/E	0.010 - 1.04	330 - 3,000	0.42 - 123	5	200	793	--	0.002	--	0.15
trans-1,2-Dichlorоethylene	N/E	0.01 - 0.048	0.5 - 3.4	0.20 - 30	5	200	790	0.0003	--	--	--
Methylene Chloride	Possible Carcinogen	0.010 - 0.101	2.0 - 7.8	0.80 - 120	2	50	174	--	0.05	3	0.000023
Chloroform	Possible Carcinogen	0.010 - 0.062	0.50	0.15 - 18.2	2.9 - 10.35	10	49	--	0.01	0.04475	0.023
1,2-Dichloroethane	Possible Carcinogen	0.010 - 0.087	0.5 - 9.4	0.20 - 19	2	10	40	--	1.2	--	--
1,1,1-Trichloroethane	N/E	0.01	0.50	0.30 - 29	0.7 - 4.9	350	1,910		0.6		
trans-1,3-Dichloropropene	Carcinogen	0.01	0.50	0.17 - 16	5	1	4.5	0.0003	--	--	--
Trichloroethylene	Carcinogen	0.01	0.5 - 0.77	0.30 - 81.9	4 - 39	50	269	--	0.00146	0.04	0.00061
Tetrachloroethylene	Carcinogen	0.01	0.50	0.20 - 221	26 - 115	25	170	--	0.014	0.36	--
Benzene	Carcinogen	0.0050 - 0.0058	1.5 - 37	0.18 - 5.17	1.1 - 20	0.5	1.6	--	0.004	--	0.0033
Toluene	Non-Carcinogen	0.048 - 0.050	0.4 - 40	0.20 - 4.80	13 - 90	50	188	--	0.22	3.8	5
Ethylbenzene	Possible Carcinogen	0.015 - 1.04	0.4 - 46	0.20 - 27	0.67 - 15	100	434	1.6	0.1	1	1
o-Xylene	Non-Carcinogen	--	--	0.20 - 19	6.2 - 21	100	434	--	1.5	0.18	--
m-Xylene	Non-Carcinogen	--	--	0.37 - 99	6 - 23.4	100	434	--	1.5	0.18	--
p-Xylene	Non-Carcinogen	--	--	0.37 - 99	15	100	434	--	1.5	0.18	--
Total Xylene	Non-Carcinogen	0.1 - 7.28	1.8 - 260	0.60 - 190	1 - 24	100	434	--	1.5	0.18	0.7
Styrene	Non-Carcinogen	0.010 - 0.050	0.50	0.20 - 42	13.5	85	0.133	0.12	0.092	0.26	
1,2,4-Trimethylbenzene	Non-Carcinogen	0.013 - 7.72	4.0 - 89	0.50 - 48	439	25	123	--	0.0016	0.007	--
1,3,5-Trimethylbenzene	Non-Carcinogen	0.010 - 2.01	1.8 - 17	0.50 - 48	23 - 342	25	123		0.0015	0.0036	
Chlorobenzene	Non-Carcinogen	0.01	0.5 - 0.97	0.20 - 19	3.9 - 40	75	350		0.01		
1,2-Dicholorobenzene	Non-Carcinogen	0.01	0.5 - 6.7	0.40 - 38	90 - 28,840	25	150		0.43		
1,4-Dicholorobenzene	Possible Carcinogen	0.01	0.5 - 2.0	0.40 - 38	33 - 720	10	60		0.11	0.095	--
Hexane	Non-Carcinogen	--	--	0.30 - 17,800	200	500	1,760	--	0.7	--	--
Heptane	N/E	--	--	0.58 - 1,970	2,000	400	1,640	--	--	--	--
Cyclohexane	N/E	--	--	0.35 - 4,900	89	300	1,010	--	--	--	--
Tetrahydrofuran	Possible Carcinogen	--	--	0.40 - 38	3	50	147	--	0.9	--	--
2,2,4-Trimethylpentane	N/E	--	--	0.20 - 19	2.57	300	1,400	--	--	--	--
Carbon Disulfide	Non-Carcinogen	--	--	0.50 - 48	<6.1 & <60	1	3.1	--	0.1	0.1	--

Notes:
1) Above identified chemicals of concern are derived from the results of a 2014 Phase II ESA. Additional chemicals may be added pending future investigation and testing events.
2) HQ values are calculated by the use of the highest concentration measured or the detection limit established by the analytical method.
3) Solubility in water, Vapour pressure, Specific Gravity is at 20°C unless otherwise stated.
4) Henry's Law Constant and any value with * Temperature at 25°C.
5) - -/N/E - Not Tested, No Value Established or Not Evaluated.
6) ND - Not Detected, below the limit of method detection.

Table 2 Notes

1. Eight (8) Hour occupational Exposure Limit is referenced from Alberta Occupational Health & Safety Code 2009 unless no value available in which Time Weighted Average is referenced from NIOSH standards.
2. Alberta Environment Sustainable Resource & Development.
3. Environment Canada, Health Canada.
4. Ontario Ministry of the Environment, Standards Development Branch.
5. United States of America Department of Labor, Occupational Safety & Health Administration.
6. Alberta Tier 1 Soil and Groundwater Remediation Guidelines December 2010 and May 2014.
7. National Institute for Occupational Safety and Health (NIOSH) Education and Information Division.
8. Federal Contaminated Site Risk Assessment in Canada.
9. US National Library of Medicine, National Institutes of Health, Department of Health & Human Services, Hazardous Substance Database.
10. The Merck Index, 12th Edition, 1996.
11. EPA United States Environmental Protection Agency, Technology Transfer Network – Air Toxics Web Site.
12. EPA United States Environmental Protection Agency, Integrated Risk Information System (IRIS).
13. EPA United States Environmental Protection Agency, Chemical Summary Fact Sheets.
14. NOAA National Oceanic and Atmospheric Administration - Cameo Chemicals Web Site.
15. World Health Organization - International Agency For Research on Cancer.
16. UNEP - United Nations Environment Programme.

Table 3A Residential Land Use
Calculated Hazard Quotients for Identified Chemicals of Concern

Chemical	Estimate Dosage ppm bw/day	Carcinogen	Hazard Quotient	
			Calculated	Adjusted
Chloromethane	0.2	Carcinogen	**57**	**570**
Vinyl Chloride	4	Carcinogen	**470.9**	**4,709**
Chloroethane	5	Carcinogen	- -	- -
trans-1,3-Dichloropropene	0.02	Carcinogen	**63.6**	**636**
Trichloroethylene	0.2	Carcinogen	**120.7**	**1,207**
Tetrachloroethylene	0.4	Carcinogen	**31.2**	**312**
Benzene	2	Carcinogen	**494.9**	**4,949**
Ethanol (Ethyl Alcohol)	0.3	Carcinogen	- -	- -
Chloroform	0.04	Possible Carcinogen	**3.8**	**38**
Methylene Chloride	0.2	Possible Carcinogen	**4.9**	**49**
1,2-Dichloroethane	0.03	Possible Carcinogen	0.02	0.2
Ethylbenzene	3	Possible Carcinogen	**34.8**	**348**
1,4-Dichlorobenzene	0.1	Possible Carcinogen	1	**10**
Tetrahydrofuran	0.004	Possible Carcinogen	0.004	0.04
Propane	0.1	Non Carcinogen	- -	- -
Dichlorodifluoromethane (FREON 12)	0.4	Non Carcinogen	- -	- -
Trichlorofluoromethane (FREON 11)	0.5	Non Carcinogen	- -	- -
Toluene	3	Non Carcinogen	**11.6**	**116**
o-Xylene	0.002	Non Carcinogen	0.001	0.01
m Xylene	0.004	Non Carcinogen	0.002	0.02
p-Xylene	0.004	Non Carcinogen	0.002	0.02
Total Xylene	15	Non Carcinogen	**10.2**	**102**
Styrene	1	Non Carcinogen	**14.9**	**149**
1,2,4-Trimethylbenzene	4	Non Carcinogen	**2,769**	**27,690**
1,3,5-Trimethylbenzene	1	Non Carcinogen	**957.6**	**9,576**
Chlorobenzene	0.05	Non Carcinogen	**5**	**50**
1,2-Dicholorobenzene	0.1	Non Carcinogen	0.3	**3**
Hexane	15	Non Carcinogen	**21**	**210**
Carbon Disulfide	0.03	Non Carcinogen	0.3	**3**
Ethane	0.3	N/E	- -	- -
Ethylene	0.2	N/E	- -	- -
n-Pentane	10	N/E	- -	- -
n-Butane	1	N/E	- -	- -
Propene	0.1	N/E	- -	- -
1,2-Dichlorotetrafluoroethane	0.06	N/E	- -	- -
2-Propanol	0.003	N/E	- -	- -
2-Propanone	0.02	N/E	- -	- -
Methyl Ethyl Ketone (2-Butanone)	0.004	N/E	0.007	0.07
1,1-Dichloroethylene	0.1	N/E	**2.5**	**25**
cis-1,2,-Dicholoroethylene	118	N/E	**58,828**	**588,280**
trans-1,2-Dichloroethene	0.2	N/E	**824.5**	**8,245**
1,1,1-Trichloroethane	0.4	N/E	0.6	**6**
Heptane	2	N/E	- -	- -
Cyclohexane	4	N/E	- -	- -
2,2,4-Trimethylpentane	0.01	N/E	- -	- -
Methane	40,049	Asphyxiant	- -	- -

Notes:
1) HQ values are calculated solely on Health Canada exposure parameters published in the PQRA, ver 2.0 September 2010.
2) Landfill soil gas is the gaseous constituents present in the pores between soil particles.
   Once the soil gas enters into a structure, the soil gas is referred to as soil vapour.
3) Vapour inhalation for a coarse-grained soil in a basement.
4) - -/N/E - Not Tested, No Value Established or Not Evaluated.
5) Adjusted HQ - Calculated HQ with a Factor of Safety (10) applied to address uncertainties with single data point.
6) Bold and shaded reflect a calculated HQ greater than 1 signifying a level of concern to hazard exposure.

Table 3B Food Establishment Land Use
Calculated Hazard Quotients for Identified Chemicals of Concern

Chemical	Estimate Dosage	Carcinogen	Hazard Quotient	
	ppm bw/day		Calculated	Adjusted
Chloromethane	0.02	Carcinogen	**5.9**	**59**
Vinyl Chloride	0.4	Carcinogen	**49.1**	**491**
Chloroethane	0.5	Carcinogen	- -	- -
trans-1,3-Dichloropropene	0.002	Carcinogen	**6.6**	**66**
Trichloroethylene	0.02	Carcinogen	**12.6**	**126**
Tetrachloroethylene	0.05	Carcinogen	**3.3**	**33**
Benzene	0.2	Carcinogen	**51.5**	**515**
Ethanol (Ethyl Alcohol)	0.03	Carcinogen	- -	- -
Chloroform	0.004	Possible Carcinogen	0.4	**4**
Methylene Chloride	0.03	Possible Carcinogen	0.5	**5**
1,2-Dichloroethane	0.003	Possible Carcinogen	0.002	0.02
Ethylbenzene	0.4	Possible Carcinogen	**3.6**	**36**
1,4-Dichlorobenzene	0.01	Possible Carcinogen	0.1	1
Tetrahydrofuran	0.0004	Possible Carcinogen	0.0004	0.004
Propane	0.03	Non Carcinogen	- -	- -
Dichlorodifluoromethane (FREON 12)	0.1	Non Carcinogen	- -	- -
Trichlorofluoromethane (FREON 11)	0.1	Non Carcinogen	- -	- -
Toluene	0.6	Non Carcinogen	**2.8**	**28**
o-Xylene	0.0004	Non Carcinogen	0.0003	0.003
m-Xylene	0.0009	Non Carcinogen	0.0006	0.006
p-Xylene	0.0009	Non Carcinogen	0.0006	0.006
Total Xylene	4	Non Carcinogen	**2.4**	**24**
Styrene	0.3	Non Carcinogen	**3.6**	**36**
1,2,4-Trimethylbenzene	1	Non Carcinogen	**659.3**	**6,593**
1,3,5-Trimethylbenzene	0.3	Non Carcinogen	**228**	**2,280**
Chlorobenzene	0.01	Non Carcinogen	**1.2**	**12**
1,2-Dicholorobenzene	0.03	Non Carcinogen	0.08	0.8
Hexane	4	Non Carcinogen	**5**	**50**
Carbon Disulfide	0.007	Non Carcinogen	0.07	0.7
Ethane	0.08	N/E	- -	- -
Ethylene	0.04	N/E	- -	- -
n-Pentane	2	N/E	- -	- -
n-Butane	0.3	N/E	- -	- -
Propene	0.04	N/E	- -	- -
1,2-Dichlorotetrafluoroethane	0.01	N/E	- -	- -
2-Propanol	0.0007	N/E	- -	- -
2-Propanone	0.005	N/E	- -	- -
Methyl Ethyl Ketone (2-Butanone)	0.001	N/E	0.002	0.02
1,1-Dichloroethylene	0.03	N/E	0.6	**6**
cis-1,2,-Dicholoroethylene	28	N/E	**14,006.7**	**140,067**
trans-1,2-Dichloroethene	0.06	N/E	**196.3**	**1,963**
1,1,1-Trichloroethane	0.08	N/E	0.1	1
Heptane	0.5	N/E	- -	- -
Cyclohexane	0.9	N/E	- -	- -
2,2,4-Trimethylpentane	0.001	N/E	- -	- -
Methane	9,535	Asphyxiant	- -	- -

Notes:
1) HQ values are calculated solely on Health Canada exposure parameters published in the PQRA, ver 2.0 September 2010.
2) Landfill soil gas is the gaseous constituents present in the pores between soil particles.
   Once the soil gas enters into a structure, the soil gas is referred to as soil vapour.
3) Vapour inhalation for a coarse-grained soil in a basement.
4) - -/N/E - Not Tested, No Value Established or Not Evaluated.
5) Adjusted HQ - Calculated HQ with a Factor of Safety (10) applied to address uncertainties with single data point.
6) Bold and shaded reflect a calculated HQ greater than 1 signifying a level of concern to hazard exposure.

Table 3C School & Hospital Developments Land Use
Calculated Hazard Quotients for Identified Chemicals of Concern

Chemical	Estimate Dosage ppm bw/day	Carcinogen	Hazard Quotient	
			Calculated	Adjusted
Chloromethane	0.02	Carcinogen	**5.9**	**59**
Vinyl Chloride	0.4	Carcinogen	**49.1**	**491**
Chloroethane	0.5	Carcinogen	- -	- -
trans-1,3-Dichloropropene	0.002	Carcinogen	**6.6**	**66**
Trichloroethylene	0.02	Carcinogen	**12.6**	**126**
Tetrachloroethylene	0.05	Carcinogen	**3.3**	**33**
Benzene	0.2	Carcinogen	**51.5**	**515**
Ethanol (Ethyl Alcohol)	0.03	Carcinogen	- -	- -
Chloroform	0.004	Possible Carcinogen	0.4	**4**
Methylene Chloride	0.03	Possible Carcinogen	0.5	**5**
1,2-Dichloroethane	0.003	Possible Carcinogen	0.002	0.02
Ethylbenzene	0.4	Possible Carcinogen	**3.6**	**36.3**
1,4-Dichlorobenzene	0.01	Possible Carcinogen	0.1	1
Tetrahydrofuran	0.0004	Possible Carcinogen	0.0004	0.004
Propane	0.03	Non Carcinogen	- -	- -
Dichlorodifluoromethane (FREON 12)	0.10	Non Carcinogen	- -	- -
Trichlorofluoromethane (FREON 11)	0.1	Non Carcinogen	- -	- -
Toluene	0.6	Non Carcinogen	**2.8**	**28**
o-Xylene	0.0004	Non Carcinogen	0.0003	0.003
m-Xylene	0.0009	Non Carcinogen	0.0006	0.006
p-Xylene	0.0009	Non Carcinogen	0.0006	0.006
Total Xylene	4	Non Carcinogen	**2.4**	**24**
Styrene	0.3	Non Carcinogen	**3.6**	**36**
1,2,4-Trimethylbenzene	1	Non Carcinogen	**659.3**	**6,593**
1,3,5-Trimethylbenzene	0.3	Non Carcinogen	**228**	**2,280**
Chlorobenzene	0.01	Non Carcinogen	**1.2**	**12**
1,2-Dicholorobenzene	0.03	Non Carcinogen	0.08	0.8
Hexane	4	Non Carcinogen	**5**	**50**
Carbon Disulfide	0.007	Non Carcinogen	0.07	0.7
Ethane	0.08	N/E	- -	- -
Ethylene	0.04	N/E	- -	- -
n-Pentane	2	N/E	- -	- -
n-Butane	0.3	N/E	- -	- -
Propene	0.04	N/E	- -	- -
1,2-Dichlorotetrafluoroethane	0.01	N/E	- -	- -
2-Propanol	0.0007	N/E	- -	- -
2-Propanone	0.005	N/E	- -	- -
Methyl Ethyl Ketone (2-Butanone)	0.001	N/E	0.002	0.02
1,1-Dichloroethylene	0.6	N/E	0.6	**6**
cis-1,2,-Dicholoroethylene	28	N/E	**14,006.7**	**140,067**
trans-1,2-Dichloroethene	0.06	N/E	**196.3**	**1,963**
1,1,1-Trichloroethane	0.08	N/E	0.1	1
Heptane	0.5	N/E	- -	- -
Cyclohexane	0.9	N/E	- -	- -
2,2,4-Trimethylpentane	0.001	N/E	- -	- -
Methane	9,535	Asphyxiant	- -	- -

Notes:
1) HQ values are calculated solely on Health Canada exposure parameters published in the PQRA, ver 2.0 September 2010.
2) Landfill soil gas is the gaseous constituents present in the pores between soil particles.
   Once the soil gas enters into a structure, the soil gas is referred to as soil vapour.
3) Vapour inhalation for a coarse-grained soil in a basement.
4) - -/N/E - Not Tested, No Value Established or Not Evaluated.
5) Adjusted HQ - Calculated HQ with a Factor of Safety (10) applied to address uncertainties with single data point.
6) Bold and shaded reflect a calculated HQ greater than 1 signifying a level of concern to hazard exposure.

Table 3D General Retail Developments Excluding Food Establishments Land Use
Calculated Hazard Quotients for Identified Chemicals of Concern

Chemical	Estimate Dosage	Carcinogen	Hazard Quotient	
	ppm bw/day		Calculated	Adjusted
Chloromethane	0.02	Carcinogen	**5.9**	**59**
Vinyl Chloride	0.4	Carcinogen	**49.1**	**491**
Chloroethane	0.5	Carcinogen	- -	- -
trans-1,3-Dichloropropene	0.002	Carcinogen	**6.6**	**66**
Trichloroethylene	0.02	Carcinogen	**12.6**	**126**
Tetrachloroethylene	0.05	Carcinogen	**3.3**	**33**
Benzene	0.2	Carcinogen	**51.5**	**515**
Ethanol (Ethyl Alcohol)	0.03	Carcinogen	- -	- -
Chloroform	0.004	Possible Carcinogen	0.4	**4**
Methylene Chloride	0.03	Possible Carcinogen	0.5	**5**
1,2-Dichloroethane	0.003	Possible Carcinogen	0.002	0.02
Ethylbenzene	0.4	Possible Carcinogen	**3.6**	**36**
1,4-Dichlorobenzene	0.01	Possible Carcinogen	0.1	1
Tetrahydrofuran	0.0004	Possible Carcinogen	0.0004	0.004
Propane	0.03	Non Carcinogen	- -	- -
Dichlorodifluoromethane (FREON 12)	0.1	Non Carcinogen	- -	- -
Trichlorofluoromethane (FREON 11)	0.1	Non Carcinogen	- -	- -
Toluene	0.6	Non Carcinogen	**2.8**	**28**
o-Xylene	0.0004	Non Carcinogen	0.0003	0.003
m-Xylene	0.0009	Non Carcinogen	0.0006	0.006
p-Xylene	0.0009	Non Carcinogen	0.0006	0.006
Total Xylene	4	Non Carcinogen	**2.4**	**24**
Styrene	0.3	Non Carcinogen	**3.6**	**36**
1,2,4-Trimethylbenzene	1	Non Carcinogen	**659.3**	**6,593**
1,3,5-Trimethylbenzene	0.3	Non Carcinogen	**228**	**2,280**
Chlorobenzene	0.01	Non Carcinogen	**1.2**	**12**
1,2-Dicholorobenzene	0.03	Non Carcinogen	0.08	0.8
Hexane	4	Non Carcinogen	**5**	**50**
Carbon Disulfide	0.007	Non Carcinogen	0.07	0.7
Ethane	0.08	N/E	- -	- -
Ethylene	0.04	N/E	- -	- -
n-Pentane	2	N/E	- -	- -
n-Butane	0.3	N/E	- -	- -
Propene	0.04	N/E	- -	- -
1,2-Dichlorotetrafluoroethane	0.01	N/E	- -	- -
2-Propanol	0.0007	N/E	- -	- -
2-Propanone	0.005	N/E	- -	- -
Methyl Ethyl Ketone (2-Butanone)	0.001	N/E	0.002	0.02
1,1-Dichloroethylene	0.03	N/E	0.6	**6**
cis-1,2,-Dicholoroethylene	28	N/E	**14,006.7**	**140,067**
trans-1,2-Dichloroethene	0.06	N/E	**196.3**	**1,963**
1,1,1-Trichloroethane	0.08	N/E	0.1	1
Heptane	0.5	N/E	- -	- -
Cyclohexane	0.9	N/E	- -	- -
2,2,4-Trimethylpentane	0.001	N/E	- -	- -
Methane	9,535	Asphyxiant	- -	- -

Notes:
1) HQ values are calculated solely on Health Canada exposure parameters published in the PQRA, ver 2.0 September 2010.
2) Landfill soil gas is the gaseous constituents present in the pores between soil particles.
   Once the soil gas enters into a structure, the soil gas is referred to as soil vapour.
3) Vapour inhalation for a coarse-grained soil in a basement.
4) - -/N/E - Not Tested, No Value Established or Not Evaluated.
5) Adjusted HQ - Calculated HQ with a Factor of Safety (10) applied to address uncertainties with single data point.
6) Bold and shaded reflect a calculated HQ greater than 1 signifying a level of concern to hazard exposure.

Table 3E Utility Infrastructure Activities Land Use
Calculated Hazard Quotients for Identified Chemicals of Concern

Chemical	Estimate Dosage	Carcinogen	Hazard Quotient	
	ppm bw/day		Calculated	Adjusted
Chloromethane	0.02	Carcinogen	**5.8**	**58**
Vinyl Chloride	0.4	Carcinogen	**47.7**	**477**
Chloroethane	0.5	Carcinogen	- -	- -
trans-1,3-Dichloropropene	0.002	Carcinogen	**6.4**	**64**
Trichloroethylene	0.02	Carcinogen	**12.2**	**122**
Tetrachloroethylene	0.04	Carcinogen	**3.2**	**32**
Benzene	0.2	Carcinogen	**50.2**	**502**
Ethanol (Ethyl Alcohol)	0.03	Carcinogen	- -	- -
Chloroform	0.004	Possible Carcinogen	0.4	**4**
Methylene chloride	0.02	Possible Carcinogen	0.5	**5**
1,2-Dichloroethane	0.003	Possible Carcinogen	0.002	0.02
Ethylbenzene	0.4	Possible Carcinogen	**3.5**	**35**
1,4-Dichlorobenzene	0.01	Possible Carcinogen	0.1	1
Tetrahydrofuran	0.0004	Possible Carcinogen	0.0004	0.004
Propane	0.03	Non Carcinogen	- -	- -
Dichlorodifluoromethane (FREON 12)	0.09	Non Carcinogen	- -	- -
Trichlorofluoromethane (FREON 11)	0.1	Non Carcinogen	- -	- -
Toluene	0.6	Non Carcinogen	**2.7**	**27**
o-Xylene	0.0004	Non Carcinogen	0.0003	0.003
m-Xylene	0.0009	Non Carcinogen	0.0006	0.006
p-Xylene	0.0009	Non Carcinogen	0.0006	0.006
Total Xylene	4	Non Carcinogen	**2.4**	**24**
Styrene	0.3	Non Carcinogen	**3.5**	**35**
1,2,4-Trimethylbenzene	1	Non Carcinogen	**641.6**	**6,416**
1,3,5-Trimethylbenzene	0.3	Non Carcinogen	**221.9**	**2,219**
Chlorobenzene	0.01	Non Carcinogen	**1.1**	**11**
1,2-Dicholorobenzene	0.03	Non Carcinogen	0.08	0.8
Hexane	3	Non Carcinogen	**4.9**	**49**
Carbon Disulfide	0.007	Non Carcinogen	0.07	0.7
Ethane	0.07	N/E	- -	- -
Ethylene	0.04	N/E	- -	- -
n-Pentane	2	N/E	- -	- -
n-Butane	0.3	N/E	- -	- -
Propene	0.03	N/E	- -	- -
1,2-Dichlorotetrafluoroethane	0.01	N/E	- -	- -
2-Propanol	0.0007	N/E	- -	- -
2-Propanone	0.005	N/E	- -	- -
Methyl Ethyl Ketone (2-Butanone)	0.0009	N/E	0.002	0.02
1,1-Dichloroethylene	0.03	N/E	0.6	**6**
cis-1,2,-Dicholoroethylene	27	N/E	**13,630.2**	**136,302**
trans-1,2-Dichloroethene	0.06	N/E	**191**	**1,910**
1,1,1-Trichloroethane	0.08	N/E	0.1	1
Heptane	0.4	N/E	- -	- -
Cyclohexane	0.9	N/E	- -	- -
2,2,4-Trimethylpentane	0.001	N/E	- -	- -
Methane	9,279	Asphyxiant	- -	- -

Notes:
1) HQ values are calculated solely on Health Canada exposure parameters published in the PQRA, ver 2.0 September 2010.
2) Landfill soil gas is the gaseous constituents present in the pores between soil particles.
   Once the soil gas enters into a structure, the soil gas is referred to as soil vapour.
3) Vapour inhalation for a coarse-grained soil in a basement.
4) - -/N/E - Not Tested, No Value Established or Not Evaluated.
5) Adjusted HQ - Calculated HQ with a Factor of Safety (10) applied to address uncertainties with single data point.
6) Bold and shaded reflect a calculated HQ greater than 1 signifying a level of concern to hazard exposure.

Table 3F - Wildlife Receptors within the Vicinity of Waskasoo Creek Flowing Between the Red Deer College and Red Deer Motors Landfills
Calculated Hazard Quotients for Identified Chemicals of Concern

Chemical	Estimate Dosage (ppm bw/day)							Carcinogen	Hazard Quotient Selected Animals						
	White-Tailed Deer	Snowshoe Hare	Muskrat	Meadow Vole	Red Fox	Deer Mouse	Mallard		White-Tailed Deer	Snowshoe Hare	Muskrat	Meadow Vole	Red Fox	Deer Mouse	Mallard
Chloromethane	0.0001	0.0002	0.0002	0.0004	0.0002	0.0004	0.0001	Carcinogen	0.04	0.07	0.07	0.1	0.06	0.1	0.04
Vinyl Chloride	0.03	0.05	0.05	0.1	0.04	0.09	0.03	Carcinogen	**3**	**5**	**5**	**11**	**5**	**10**	**3**
Chloroethane	0.003	0.005	0.005	0.009	0.004	0.009	0.003	Carcinogen	- -	- -	- -	- -	- -	- -	- -
trans-1,3-Dichloropropene	0.00003	0.00005	0.00005	0.0001	0.00005	0.0001	0.00003	Carcinogen	0.1	0.2	0.2	0.4	0.2	0.3	0.1
Trichloroethylene	0.00005	0.00008	0.00008	0.0002	0.00007	0.0001	0.00005	Carcinogen	0.03	0.05	0.05	0.1	0.05	0.1	0.03
Tetrachloroethylene	0.00003	0.00005	0.00005	0.0001	0.00005	0.0001	0.00003	Carcinogen	0.002	0.004	0.004	0.008	0.003	0.007	0.002
Benzene	0.002	0.004	0.004	0.008	0.003	0.007	0.002	Carcinogen	0.6	0.9	0.9	**2**	0.8	**2**	0.6
Chloroform	0.00003	0.00005	0.00005	0.0001	0.00005	0.0001	0.00003	Possible Carcinogen	0.003	0.005	0.005	0.01	0.005	0.010	0.003
Methylene Chloride	0.0005	0.0008	0.0008	0.002	0.0007	0.001	0.0005	Possible Carcinogen	0.009	0.02	0.02	0.03	0.01	0.03	0.009
1,2-Dichloroethane	0.0006	0.0009	0.0009	0.002	0.0008	0.002	0.0006	Possible Carcinogen	0.0005	0.0008	0.0008	0.002	0.0007	0.001	0.0005
Ethylbenzene	0.003	0.005	0.005	0.01	0.004	0.009	0.003	Possible Carcinogen	0.03	0.05	0.05	0.10	0.04	0.09	0.03
1,4-Dichlorobenzene	0.0001	0.0002	0.0002	0.0004	0.0002	0.0004	0.0001	Possible Carcinogen	0.001	0.002	0.002	0.004	0.002	0.003	0.001
Toluene	0.002	0.004	0.004	0.008	0.004	0.008	0.002	Non Carcinogen	0.01	0.02	0.02	0.04	0.02	0.03	0.01
Total Xylene	0.02	0.03	0.03	0.05	0.02	0.05	0.02	Non Carcinogen	0.01	0.02	0.02	0.04	0.02	0.03	0.01
Styrene	0.00003	0.00005	0.00005	0.0001	0.00005	0.0001	0.00003	Non Carcinogen	0.0003	0.0005	0.0005	0.001	0.0005	0.001	0.0003
1,2,4-Trimethylbenzene	0.005	0.009	0.009	0.02	0.008	0.02	0.005	Non Carcinogen	**3**	**6**	**6**	**12**	**5**	**11**	**3**
1,3,5-Trimethylbenzene	0.001	0.002	0.002	0.004	0.002	0.003	0.001	Non Carcinogen	0.7	1	1	**2**	1	**2**	0.7
Chlorobenzene	0.00006	0.0001	0.0001	0.0002	0.00009	0.0002	0.00006	Non Carcinogen	0.006	0.01	0.01	0.02	0.009	0.02	0.006
1,2-Dicholorobenzene	0.0004	0.0007	0.0007	0.001	0.0006	0.001	0.0004	Non Carcinogen	0.0009	0.002	0.002	0.003	0.001	0.003	0.0009
1,1-Dichloroethylene	0.00003	0.00005	0.00005	0.0001	0.00005	0.0001	0.00003	N/E	0.0006	0.001	0.001	0.002	0.0009	0.002	0.0006
cis-1,2,-Dichloroethylene	0.2	0.3	0.3	0.6	0.3	0.6	0.2	N/E	**90**	**150**	**150**	**315**	**135**	**285**	**90**
trans-1,2-Dichloroethene	0.0002	0.0003	0.0003	0.0007	0.0003	0.0006	0.0002	N/E	0.7	1	1	**2**	1	**2**	0.7
1,1,1-Trichloroethane	0.00003	0.00005	0.00005	0.0001	0.00005	0.0001	0.00003	N/E	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0001

Notes:
1) Hazard Quotients are calculated on the basis of site-specific values. Federal Contaminated Sites Action Plan (FCSAP) Ecological Risk Assessment Guideline, March 2012.
2) Factors for select animal species are applied to illustrate the relative risk for exposure on the basis of ingestion.
3) HQ Values based on drinking water ingestion rate in Wildlife Receptor Characteristics in the Ecological Risk Assessment Guidance
4) - -/N/E - Not Tested, No Value Established or Not Evaluated.
5) Bold and shaded represents HQ values greater than 1 signifying a level of concern to hazard exposure.