

Waste and Excess Materials Management Plan

Highway 400 – Highway 404 Link (Bradford Bypass)
County Road 4 Early Work (GWP 2008-21-00)

Town of Bradford West Gwillimbury, Ontario

Ministry of Transportation, Central Region

60636190

January 2022

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1. Introduction

The Ontario Ministry of Transportation (MTO) has retained AECOM Canada Ltd. (AECOM) to undertake the Early Works study for the grade separated bridge crossing at County Road 4 for the future Bradford Bypass (Highway 400 – Highway 404 Link) Project, in accordance with the provisions of the Ontario Regulation (O.Reg.) 697/21. The Project limits of construction work (herein referred to as the “Project Area”) is located along County Road 4 from north of 8th Line to north of the intersection with 9th Line within the Town of Bradford West Gwillimbury and that area is referred to as the Study Area. The Study Area map is presented in key plan below and location is presented in **Appendix A**. This study will advance as an early works project for the Bradford Bypass Project. The new bridge will be designed to include the widening and underpass of County Road 4 approved by Simcoe County. Refer to Section 2 for specific project component details.

This Waste and Excess Materials Management Plan (WEMMP) was prepared for the MTO in support of the County Road 4 (also referred to as Yonge Street) Early Works Project (the Project). This WEMMP has been developed based on current understanding of applicable legislation, existing conditions, current land use, and planned future construction activities for the Project. For construction-based activities to be undertaken responsibly and in a manner that is protective of both human health and the environment, basic foundation principles and industry standard practices for management of contaminated and/or excess material were considered in the development of the WEMMP. Further, it should be noted that the WEMMP itself is a dynamic document that is anticipated to evolve and be updated based on changing legislation and/or specific requirements of the Project.

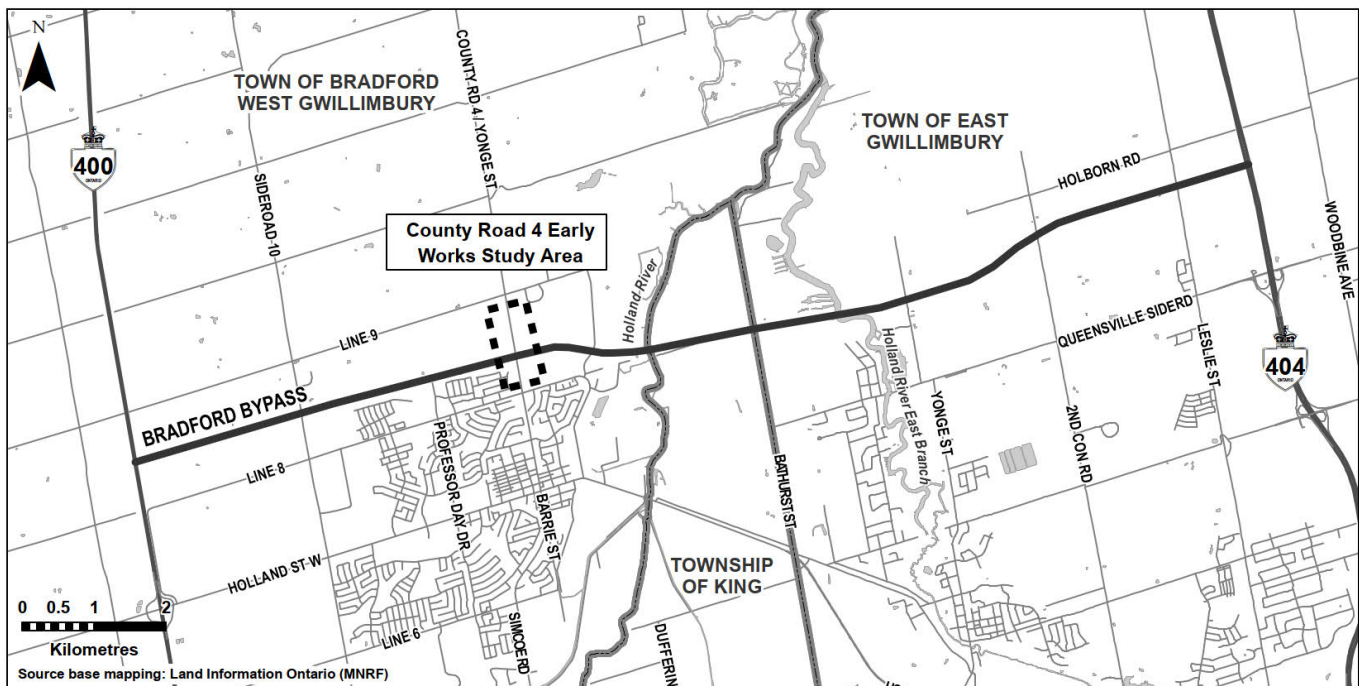


Figure 1: Study Area

2. Project Scope

The scope of work for the County Road 4 Early Works project (GWP 2008-21-00) undertaken in accordance with O. Reg.697/21, generally includes the following roadway and structure works:

Roadway/Grading

- ◆ Shoulder strengthening (west side) and temporary roadway widening (east side) for construction staging as required.
- ◆ Temporary detour road around the west side of the future bridge structure for construction staging as required.
- ◆ Temporary aerial traffic signal spans, traffic island removals, and lane shifts at 8th Line intersection for construction staging as required.
- ◆ Reprofiling and realigning County Road 4 to meet MTO’s future interchange for the Bradford Bypass and intersection standards within the property constraints.
- ◆ Widening County Road 4 from two to four lanes on behalf of the County of Simcoe.
- ◆ Temporary road protection system will be used for construction staging to maintain the two existing lanes of traffic as required.
- ◆ Pavement markings, signage, traffic safety and control devices, barriers, and attenuators as required.
- ◆ Driveway and entrance access modifications, realignment, and reconstruction as required.
- ◆ Stormwater management, drainage improvements and culvert works.

Structures

This Project includes a new structure for the grade separated crossing of County Road 4 and the future Bradford Bypass as follows:

Structure Site No.	Structure Name	Work Required
30X-0866/B0	Highway 400 – Highway 401 Link (Bradford Bypass) County Road 4 Underpass	New Construction

Construction Staging

To accommodate traffic safety and efficient construction, construction staging is required to facilitate the proposed works. The following impacts to traffic are anticipated:

- Two lanes north of 8th Line to south of 9th Line are anticipated to be maintained throughout construction.
- At 8th Line intersection, the Southbound through and right-turn lanes are to be combined during construction reducing the total available lanes from 6 to 5 lanes during Stages 4, 5, and 6 to tie-in the works in the south limits.
- At 8th Line intersection during night-time lane closures for construction, a Southbound left-turn lane will be removed reducing the total available lanes from 5 to 4 lanes in Stages 4, 5, and 6 to tie-in the works in the south limits.

3. Waste and Excess Materials Management Plan Purpose

3.1 Purpose

There are minimum Soil Management Requirements that every Project must adhere to in accordance with O. Reg. 406/19. These requirements are listed in Part I, Section C of The Soil Rules. The purpose of the Soil Management Requirements is to prevent any cross-contamination between soils of different quality and to prevent contaminants from being released into the environment.

In addition, every project that will generate Excess Soil must have an excavation procedure that outlines what is required when observations of contaminated soil are made in the field. The requirements for these procedures are listed in Section 23 of O. Reg 406/19.

The purpose of this WEMMP is to provide guidance for the contractor during the construction of the County Road 4 Early Works. The WEMMP describes appropriate procedures for the management of soil and waste on site including, if necessary, evaluating and managing potentially contaminated and/or excess soils. This WEMMP will serve to support Soil Management Planning (SMP) before initiating any construction or development activities and will support verification that conditions of Project approval documents, applicable relevant environmental legislation, policies, permitting requirements, protocols and procedures are implemented accordingly.

The intent of this WEMMP is to provide relevant and applicable guidance as it pertains to the following key elements:

- Applicable regulatory and permitting requirements;
- Key construction personnel;
- Protocols and procedures to be employed for excavation and management of on-site soils including those that are potentially contaminated or in excess, including:
 - Retention and preservation of suitable soil for on-site use in Project reclamation/rehabilitation; and
 - Identification and management of soil impacted by existing or historical anthropogenic activities that require removal to allow development of the Project;
- Applicable environmental protection measures to be employed;
- Applicable soil transportation and reuse or disposal requirements; and
- Prevention of admixing or comingling, compaction, rutting during hauling and soil loss.

This WEMMP applies to the Project Area that will undergo changes through construction to accommodate the advancement of the Project. AECOM's understanding is that no excess soil will be excavated and transported for off-site disposal unless the excavated soil is geotechnically unsuitable and with approval from the Qualified Professional, Project Leader, and MTO's Environmental Monitor, as defined in Section 4 below. This WEMMP applies to all individuals working for or on behalf of MTO, including employees and contractors, who have a role and/or accountability for the development, implementation, and maintenance of this WEMMP.

However, material identified as contaminated or soil that cannot be reused on site may require off-site reuse or disposal. It is important to note that the regulatory regime for off-site soil transportation and reuse or disposal differs from the regulatory regime applicable to on-site soil management. These important differences are addressed further in **Section 4.2** below. Should the need for off-site reuse or disposal arise in the exceptional case, this WEMMP provides procedures and protocols for the handling and off-site transportation and reuse or disposal of potentially contaminated and excess soil.

3.2 Performance Objectives

This WEMMP also describes the objectives and targets to be established to drive continuous improvement in environmental performance. Objectives are measurable (where practical), monitored, communicated, and updated as appropriate. MTO will establish the following performance objectives for the WEMMP that considers key Project interactions and compliance obligations:

- to utilize on-site material for the creation of berms or other usages;
- to preserve adequate volumes of topsoil for rehabilitation; and
- meet the applicable regulations and guidelines when handling, managing and disposing of contaminated soil or sediment.

4. Planning

4.1 Organizational Roles, Responsibilities and Authorities

Table 4-1 provides the roles and responsibilities of the key construction personnel with respect to this WEMMP.

Table 4-1: Conceptual Roles and Responsibilities

Role	Definition	Responsibility
Qualified Person (QP)	The person holds a license, limited license or temporary license under the <i>Professional Engineers Act</i> ; or the person holds a certificate of registration under the <i>Professional Geoscientists Act, 2000</i> and is a practicing member, temporary member or limited member of the Association of Professional Geoscientists of Ontario per Section 5 of O. Reg. 153/04. The QP will be assigned by the Contractor.	The QP will be assigned by the Contractor and is responsible for: <ul style="list-style-type: none"> ■ Ensuring this SMP is followed. ■ Assessment of soil and its appropriate use with respect to all Phase 1 activities. ■ Regular communication with MTO on the management and use of soil within Phase 1 Project Area.
MTO Environmental Monitor	The Environmental Monitor has the authority to direct the Construction Manager or Contractor to satisfy or meet the standards outlined in the Environmental Protection Plan ¹ .	Independent of the Contractor and staff structure and is ultimately responsible to MTO.
Contractor	Any person, who is not directly employed by MTO, conducting work or other activities in relation to the Project on behalf of or at the request of MTO.	Is responsible for construction of the Project in accordance with detailed design plans and implementation of associated mitigation measures, as outlined in the Environmental Protection Plan and associated tender packages(s).
Project Leader	The Project Leader of MTO or the duly authorized agents.	Is ultimately responsible for making decisions relating to the planning and implementation of the Project.

4.2 Compliance Obligations

This plan has been developed with the assumption that no soil will be transported off the Project Area. The following applicable regulations, permits, approvals, certifications, and notifications should be examined for relevance. It is the responsibility of the Contractor to understand their obligations and relevant regulations with respect to soils movement within and outside the Project Area. The following is provided for reference purposes.

4.2.1 Regulatory and Permitting Requirements

This plan has been developed with the assumption that no soil will be transported off the Project Area. The following applicable regulations, permits, approvals, certifications, and notifications should be examined for relevance. It is the responsibility of the Contractor to understand their obligations and relevant regulations with respect to soils movement within and outside the Project Area.

4.2.2 Applicable Regulations

The Project Area is located in the Province of Ontario within the Town of Bradford West Gwillimbury and the County of Simcoe. The two tiers of government responsible for these jurisdictions (i.e., the Provincial Government of Ontario, and the Town of Bradford West Gwillimbury and County of Simcoe) develop, implement and enforce laws, ordinances and applicable regulations that govern activities and the standards applied thereto for construction projects in the Town of Bradford West Gwillimbury. Applicable regulations that may be relevant to construction-based activities undertaken as part of the Project are outlined in the following sections.

1. The Environmental Protection Plan is an attachment provided in the overall Tender Package.

4.2.3 Provincial Government of Ontario

Provincial environmental legislature and associated regulations that apply to future site development and construction-based activities include but are not limited to, the following.

Table 4-2: Provincial Legislation Applicable Future Site Development Activities

Media	Regulatory Body	Legislation	Regulations/Standards/Guidelines
All	MECP	<i>Environmental Protection Act, R.S.O. 1990, c. E.19</i>	<ul style="list-style-type: none"> ■ Management of Excess Soil – A Guide for Best Management Practices (January 2014) MECP ■ Management of Excess Materials In Road Construction and Maintenance (1994), Ministry of the Environment and Energy (MOEE) ■ On-Site and Excess Soil Management, R.R.O. 1990, O. Reg. 406/19. ■ Classification and Exemption of Spills and Reporting of Discharges, O. Reg. 675/98 ■ General - Waste Management, R.R.O. 1990, Reg. 347 ■ Records of Site Condition - Part XV.1 of the Act, O. Reg. 153/04 as amended ■ Spill Prevention and Contingency Plans, O. Reg. 224/07 ■ Spills, R.R.O. 1990, Reg. 360 ■ Waste Audits and Waste Reduction Work Plans, O. Reg. 102/94 ■ Ontario Regulation 103/94: Industrial, Commercial and Institutional Source Separation Programs ■ Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011 ■ Ambient Air Quality Criteria (point of impingement, 24-hour AAQC) ■ Ontario Provincial Standard Specification (OPSS) 180: General Specification for the Management of Excess Materials (Nov. 2011)
		NA	<ul style="list-style-type: none"> ■ Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario, May 1996 (MOE 1996 Guidance Manual)
		NA	<ul style="list-style-type: none"> ■ Ontario Provincial Standards for Roads and Public Works
Materials Handling	NA	<i>Technical Standards and Safety Act (TSSA)</i>	<ul style="list-style-type: none"> ■ Fuel Oil Regulation, O. Reg. 213/01 ■ Liquid Fuels Regulation, O. Reg. 217/01 ■ Gaseous Fuels Regulation, O. Reg. 212/01 ■ Compressed Gas Regulation, O. Reg. 214/01 ■ Propane Storage and Handling Regulation, O. Reg. 211/01
Groundwater and Soil (Specific)	Ontario Ministry of the Environment	<i>Ontario Water Resources Act R.S.O. 1990, c. O.40</i>	<ul style="list-style-type: none"> ■ Wells, R.R.O. 1990, O. Reg. 903

4.2.4 Regulatory Requirements for Off-Site Soil Management Activities

No off-site soil transportation or reuse or disposal is planned in relation to the Project. The Contractor is expected to make all reasonable efforts to find suitable locations within the Project Area (see **Appendix B**) to reuse or place excess soil. However, in the event that excess soils cannot be re-used or placed on site and/or if contaminated soils are encountered that cannot be re-used or placed on site, off-site transportation and reuse or disposal may be considered. Any off-site transportation and reuse or disposal of soils from within the Construction Limits must be approved by the QP, Project Leader, and MTO’s Environmental Monitor prior to commencing any off-site soil management activity.

Soil management activities that may occur outside of the Construction Limits, such as the off-site transportation and reuse or disposal of contaminated or excess soils in the unplanned event such activity is required, would be subject to provincial and local legislation. Compliance with applicable legislation and regulation, including obtaining all

necessary permits, approvals, certificates, or other authorizations, including payment of any associated fees, will be the responsibility of the Contractor for any and all off-site soil management activity outside the Construction Limits.

Provincial and local legislation that may be applicable to off-site soil management activities are summarized in Table 5-3. Note this is not an exhaustive list. It will be the responsibility of the Contractor to confirm and comply with all applicable legislation and regulation.

Table 4-3: Provincial and Local Legislation Potentially Applicable to Future Off-Site Activities

Media	Regulatory Body	Legislation	Regulations/Standards/Guidelines
For Soils Transported outside Construction Limits²	Ministry of the Environment, Conservation and Parks	<i>Environmental Protection Act, R.S.O. 1990, c. E.19</i>	<ul style="list-style-type: none"> ■ Management of Excess Soil – A Guide for Best Management Practices (January 2014) MECP ■ Management of Excess Materials in Road Construction and Maintenance (1994), Ministry of the Environment and Energy (MOEE). ■ On-Site and Excess Soil Management, R.R.O. 1990, O. Reg. 406/19. ■ Rules for Soil Management and Excess Soil Quality Standards (The Soil Rules). ■ General – Waste Management, R.R.O. 1990, Reg. 347 ■ Valid operating licenses and permits for each proposed disposal/receiving facility prior to commencing transportation of materials from the site. ■ Valid operating licenses, certifications and permits from each carrier for all proposed transport vehicles/containers prior to entry to the site. ■ Supporting information, payment of associated fees, and implementing and managing document control procedures and protocols for the appropriate disposal of waste materials generated as part of construction-based activities.
	Receiving Landfill	<i>Varies</i>	<ul style="list-style-type: none"> ■ Licensed landfill sites can implement their own requirements beyond those outlined in this WEMMP or O. Reg. 406/19 in order to accept Excess Soil that is designated as waste. These requirements are developed on a landfill-by-landfill basis. As such, supplemental sampling beyond what is outlined in the SMP (e.g., additional leachate analysis), may be required to dispose of Excess Soil that is designated as waste.

As of January 2021, certain requirements of O. Reg 406/19 for excess soil management came into force. Excess soil as defined by this regulation means “Soil, crushed rock, or soil mixed with rock or crushed rock, that has been excavated as part of a project and removed from the Project area for the project”. Project Area as defined by this regulation means “in respect of a project, a single property or adjoining properties on which the project is carried out”. Based on these definitions soil that is excavated within the Project Area and reused in the Project Area is not considered excess soil under this regulation.

In addition to compliance with any provincial or local legislation or regulation that may apply to off-site transportation and reuse or disposal of soils, the Contractor must comply with the practices and procedures outlined in **Section 6.3** regarding beneficial reuse and **Section 6.4** regarding off-site transportation and reuse or disposal.

2. Soil shall not be transported off-site without the approval of the QP, Engineer, and MTO’s Environmental Monitor.

5. Support

5.1 Identification / Inventory of Resources

5.1.1 Historical Soil Quality Data

A Contamination Overview Study (COS) was completed by AECOM in advance of the Preliminary Design study for the Bradford Bypass. The study area consisted of the 16.2 km proposed route for Bradford Bypass (Highway 404 to Highway 400 Link) starting from Highway 400 easterly to Highway 404 and includes the lands within a 500 m buffer on either side of the proposed Bradford Bypass Right-of-Way (ROW). The COS covered the Early Works Study Area. The COS report was completed based on a desktop review of available historical records and documented.

The Ministry of Environment, Conservation and Parks (MECP) has also prepared a list of processes and operations that historically posed a higher risk of environmental impact, referred to as “potentially contaminating activity” (PCAs) as listed in Table 2 of Schedule D of O. Reg. 153/04. These PCAs must be identified and evaluated when preparing Phase I ESAs for filing Record of Site Conditions. In general, these PCAs are considered to represent “high” potential for contamination, unless other information supports assigning a lower risk.

Based on the COS findings, the following two properties were identified with a high potential for contamination based on the past and current “potentially contaminating activity” (PCAs) within the Early Work Study Area. The Early Works Study Area and Contamination Potential Ratings are presented in **Figure A**.

Parcel Identifier (PID)	Address	Occupant/Site Description	Risk Rating Rationale	PCA Description
172	3001 Yonge Street	GFL Environmental/ Charter Construction/ Hulst Town Contracting	Waste management services	Waste Disposal and Waste Management, including thermal treatment, landfilling and transfer of waste, other than use of biosoils as soil conditioners
1350	305 Barrie Street	Commercial Plaza	Based on 1994 City Directories, Panda Cleaners (possible dry cleaners) was listed as a shop in the commercial plaza.	Operation of Dry Cleaning Equipment (where chemicals are used)

5.1.2 Characterization of Soils in Project Area

The following summarizes the results of a geo-environmental program undertaken by AECOM in June 2021-October 2021, which provides a description of soils quality within the Project Area. The environmental program was undertaken in conjunction with the Foundation Investigation and Design Report investigation undertaken by Golder Associates Ltd. (Golder). A total of twenty two (22) boreholes (CR4-01 to CR4-13, HF-01 to HF-05 and CV1-01 to CV1-04) were advanced, the borehole locations and borehole logs can be found in **Appendix B** and **Appendix C** of this report and also within the separate geotechnical report, on file with the MTO. The soils sampling program was completed according to O. Reg. 406/19. Locations of the boreholes for soil sampling were chosen where the properties identified high or medium risk of contamination based on the Contaminated Overview Study (conducted by AECOM).

5.1.2.1 Soil Sampling Program and Procedures

The borehole drilling program was supervised by Golder and environmental soil samples were collected by AECOM staff during the drilling program. AECOM collected twenty-nine (29) soil samples from eleven (11) boreholes out of twenty two (22), which were selected due to their proximity to the PCA’s. The samples were taken within the depth range 0.7 to 2.0 m bgs and submitted for laboratory analyses as shown below in **Table 5-1**.

Table 5-1: Analytical Parameters Tested on Samples

Sample ID	Analytical Parameters
HF-04-SS-2, CV1-03-SS-2, CR4-04, HF-02, CR4-11, CR4-02, CR4-09-SS2	Selected Inorganic Parameters and Metals and Inorganic (M&I)
HF-04-SS-2, CR4-04, CR4-07, CV1-04, CR4-06-SS2, CR4-09-SS2	Polycyclic Aromatic Hydrocarbons (PAHs)
HF-04-SS-2, CR4-07, CR4-11	Petroleum Hydrocarbons in Fractions F1 to F4 (PHCs)
HF-04-SS-2, CR4-07	Volatile Organic Compounds (VOCs)
HF-04-SS-2, HF-02, CR4-06-SS2	Polychlorinated Biphenyls (PCBs)
HF-02, CR4-02	Synthetic Precipitate Leaching Procedure (SPLP) Metals
CR4-07	SPLP VOCs
CR4-06-SS2	Organophosphorus Pesticide
CR4-06-SS2	Organochlorine Pesticides
CR4-07	SPLP PAHs
HF-02	SPLP PCBs
CR-07-COM	O. Reg. 558 - Benzo(a) pyrene

Soil samples were screened for combustible organic vapours using a RKI GX-6000 photoionization detector (PID), which was calibrated using isobutylene. Soil vapours readings ranged from 0 to less than 50 ppm in all soil samples across the site. In addition, field staff looked for potential visual indicators of soil contamination including staining or soil odours during the collection of samples; however, none were observed in the samples. Therefore, representative samples were submitted for laboratory analysis for PAHs, PHCs F1-F4, PCBs, VOCs, metals and inorganics, and mandatory testing of SPLP to support the requirements under O. Reg 406/19.

5.1.2.2 Regulatory Framework for Evaluation of Soil Quality

The soil chemical analysis results were evaluated with respect to the MTO requirements for soil management as follows:

- O.Reg. 406/19, Appendix 1, TABLE 2.1: Full Depth Excess Soil Quality Standards in a Potable Groundwater Condition for Industrial/ Commercial/ Community Property Use uses with coarse type of soil condition (Table 2.1 standards).
- O.Reg. 406/19, Appendix 2, TABLE 2.1: Leachate Screening Levels for Full Depth Excess Soil in a Potable Groundwater Condition for Industrial/ Commercial/ Community Property Use uses with coarse type of soil condition.

5.1.2.3 Soil Analytical Results

Based on results of analysis, the concentration of several PAHs exceeded the applicable MECP Table 2.1 Standards in shallow soil samples mainly in fill material collected from HF-04-SS-2, CR4-04, and CR4-07 from the depth interval 0.7-2.0 m bgs. In addition, Sodium Adsorption Ratio (SAR) exceeded MECP Table 2.1 Standards in shallow soil samples collected from HF-02 from depth interval 0.7-1.5 m bgs. **Table 5-2** Shows soil samples exceedances in comparison to MECP Table 2.1 Standards.

Table 5-2: Summary of Soil Samples Exceedances

Borehole	Exceedance	Criteria	Result
HF-04	Anthracene	0.16	0.53
	Benzo(a)pyrene	0.31	0.38
CR4-04	Naphthalene	0.2	0.79
	Acenaphthylene	0.093	0.41
	Anthracene	0.16	3.00
	Fluoranthene	2.8	6.84
	Benz(a)anthracene	0.92	4.62
	Benzo(b)fluoranthene	3.2	5.22
	Benzo(a)pyrene	0.31	4.07
	Indeno(1,2,3-cd)pyrene	0.76	1.42
	Methylnaphthalene 2-(1-)	0.59	1.21
	CR4-07	Naphthalene	0.2
Acenaphthylene		0.093	0.13
Anthracene		0.16	1.19
Benz(a)anthracene		0.92	1.58
Benzo(a)pyrene		0.31	1.36
Dibenzo(a,h)anthracene		0.7	0.72
Methylnaphthalene 2-(1-)		0.59	1.05
HF-02	SAR*	12.0	12.2

Notes: * Results with salt related exceedances
 Criteria = MECP Table 2.1 standards, referenced in O. Reg. 406/19
 All units in micrograms per gram (ug/g), unless otherwise specified.

No other contaminants analyzed exceeded the MECP Table 2.1 standards from the soil samples collected from the eight drilled boreholes at the investigated Site. The concentrations of PHCs, VOCs, PCBs, and M&I (except SAR) were non-detect and/or below applicable criteria in soil samples collected from all boreholes. Also, all SPLP soil sample’s analytical results were below the Table 2.1 screening level criteria.

For off-site waste management considerations, one composite soil sample was prepared from CR4-07 and HF-04 and submitted to the laboratory for PAH Toxicity Characteristic Leaching Procedure (TCLP) testing. Based on the results of laboratory analyses, the soil sample is classified as non-hazardous solid waste in accordance with O. Reg. 347, Schedule 4 Leachate Quality Criteria for non-hazardous material.

Appendix B – Borehole Location Plan; **Appendix D** – The Certificate of Analysis on the collected soil samples.

5.1.3 Waste and Excess Materials Identification and Classification

Based on the age and materials used for buildings on properties and two culverts within the Project Area, there is potential for designated substances to be present. Should buildings be identified for demolition by MTO, a Designated Substance Survey (DSS) should be completed to ensure proper handling and disposal of materials.

The asphalt levelling course on County Road 4 may contain asbestos and prior to construction, asphalt core samples should be collected and tested for asbestos. If asbestos containing materials are found, an asbestos abatement plan should be implemented according to MTO standard special provision 101 F21 ‘Occupational Health and Safety Compliance - List of Designated Substances’, that is included in the MTO construction tender documents in accordance with the Occupational Health and Safety Act of the presence of designated substances.

5.2 Competence, Training and Awareness

Prior to construction, the Contractor and any sub-contractors shall attend an Environmental Orientation, to be developed by the Project Leader and the MTO Environmental Monitor. The Contractor will be responsible for ensuring all personnel on the Site are informed on the contents of the Plans and the Environmental Orientation Program. The Contractor must ensure that all new employees and/ or subcontractors receive the Environmental Orientation training prior to them conducting any activity on site.

Competence of a person means they hold a license, limited license or temporary license under the Professional Engineers Act, 1990 or the QP holds a certificate of registration under the Professional Geoscientists Act, 2000 or is a practicing member, temporary member or limited member of the Association of Professional Geoscientists of Ontario per Section 5 of Ontario Regulation 153/04.

5.3 Internal and External Communication

A communication protocol shall be developed by the Engineer and provided to the Contractor. The Contractor will be required to follow the Communication Protocol, including any notification requirements. The Protocol will include but not be limited to the following:

1. Schedule of the construction activities, including construction activities that generate noise, light trespass or dust;
2. Process for notification in the event of any accidents and malfunctions;
3. Process for notifying the public of any night-time construction activities;
4. Details for receiving complaints related to noise, light, dust, fumes or any other complaint; and
5. Process for how a member of the public can record a complaint.

6. Implementation of Mitigation Measures

6.1 General Approach

The following provides the relevant protocols and procedures for Project Area soil management. Given the results of the Soils Chemical Analysis as described in **Section 5.1** above, additional soil sampling programs may be required to investigate the extent of the soil impact based on the proposed locations of the excavation. It is anticipated that most of the excavated soils can be re-used on Project. This will need to be confirmed by the Contractor and QP.

If contaminated soils are encountered during construction, the Contractor must notify the MTO Environmental Monitor and the Project Leader. The suitability of re-using that soil must be determined before re-using it in accordance with O. Reg 406/19.

If excavated soil is deemed unsuitable for backfill operations due to environmental conditions, the Contractor shall proceed to stockpile the material in the appropriate location assigned for unsuitable material on site (refer to **Appendix A**). The Project Leader, and MTO's Environmental Monitor can direct the contractor, whether the soil is required to leave the site or can remain on site with the additional approval of the QP. No soil may be transported off-site without authorization from a designated QP, the Project Leader and MTO's Environmental Monitor during construction work. Refer to **7.3** for more detail.

6.2 Soil Excavation and Salvage

6.2.1 Cut/ Fill Locations

The major areas that require cut/fill include the grading for the road winding, as well as the areas designated County Road 4 Underpass. The estimated volume of excess material for the entire Project throughout each stage is estimated to be 21,000 m³. The estimated quantity of material that could be reused or placed within the Project Area is unknown at the time of this report.

6.2.2 Topsoil

For the purposes of this WEMMP, topsoil includes those horizons in a soil profile containing organic material typically comprised of deposits of partially decomposed organic matter. Subsoil consists of the soils which occur below the topsoil.

Topsoil stripping will be based on, but not limited to, the following considerations and constraints.

- Topsoil will be stripped and stockpiled in accordance with the Grading Plan for all permanent and temporary construction areas after areas have been cleared of vegetation.
- Topsoil stripped during the site preparation program is not considered suitable for reuse in any application other than general landscaping on the site. The topsoil can be used for landscaping within diversion channel and swales, and the construction of landscaped berms.
- Any topsoil to be salvaged will be stripped during dry periods to the greatest extent practical. Topsoil will be stored in accordance with the sediment and erosion control measures described in the Environmental Protection Plan (EPP) and contract specifications, until it is required for site reclamation.

- Topsoil piles shall be marked with appropriate signage to prevent accidental admixing. Topsoil shall not be imported to or exported from the site unless it satisfies the requirements of the Aggregate Resources Act.
- Topsoil from the natural areas will be separated from other topsoil stockpiles so that it may be used for restoration of the areas from which it was removed, to the extent possible.
- Replace topsoil as evenly as possible over areas of the construction area to be reclaimed where topsoil salvage was conducted. Postpone replacing topsoil during wet weather or high winds to prevent damaging soil structure or erosion of topsoil.
- Subsoil will be stored separately from topsoil with a minimum of 1 m separation of the piles
- Blade ruttled topsoil flat prior to topsoil replacement.
- To prepare restoration areas for seeding, spread, loosen and fine grade topsoil. Topsoil shall be prepared for planting at a depth of 0.3 m unless otherwise specified.

6.3 Handling and Storage of On-Site Soil

The following outlines the requirements for handling, transporting, and storing on-site soil.

6.3.1 General Handling and Storage of Soil

6.3.1.1 Laydown Areas

It is the responsibility of the Contractor and MTO to determine the best strategy for the movement of soil across the Project Area. Double handling of soil is to be minimized to the extent possible.

Soil shall not be placed in locations where there is direct drainage to that location. The drainage at the laydown located need to be managed appropriately to avoid localized flooding and/ or erosion of these storage areas.

6.3.1.2 Site Access and Movement

Site access and movement will be based on, but not limited to, the following considerations and constraints:

- The Contractor must keep within the designated construction limits and not travel from different areas of the Project Area using the public road network for movement of soil.
- The Contractor should limit the crossing of any watercourse to pre-determined locations to aid movement within the Project Area. Should other temporary crossings be required for any other fish-bearing watercourse, the Contractor shall develop a plan and submit to the MTO Environmental Monitor for approval. Approval must be received before implementation. These temporary crossings of any watercourse will not be accessible once the realignment and restoration of the watercourse is complete. Work shall be undertaken in compliance with the *Fisheries Act* and any permits or approvals. The Contractor shall move the soil within Construction Limits. The off-site soil storage and movement is described in the **Section 6.4**.

6.3.1.3 Stockpiles

Stockpiles within the Project Area will either be re-used for engineered or for other purposes (e.g., topsoil/slope flattening). Some stockpiles may be required for a short period of time, but in some instances, it may be necessary to stockpile earth material for an extended period. Stockpile locations are to be limited to the Laydown Areas outlined in **Section 7.3.1.1**.

Stockpile locations within the Laydown Areas will be based on, but not limited to, the following considerations and constraints.

- Excavated earth that is not to be utilized immediately will be temporarily stockpiled in a manner that does not cause an adverse environmental effect or impair water quality.
- There will be minimal stockpiles of earth and granular material on-site in order to limit/ avoid double handling of material.
- A stockpiling location will generally be in proximity to where the material will be ultimately used.
- Earth will not be placed in locations where there is direct drainage to that location.
- Stockpiled materials near any watercourse will be stored and stabilized at least 30 m away from the watercourse.
- Soil must not be stored within 10 m of the construction limits unless any of the following apply:
 - 500 m³ or less will be stored
 - Soil storage will be less than 1 week
 - There is a physical barrier between the excess soil and the Construction Limits; or
- Stockpile management will be based on, but not limited to, the following considerations and constraints.
- Implement measures, during construction, to avoid the introduction or spread of invasive vegetation with the Project Area, including from equipment brought on-site from other worksites and from imported fill. In doing so, take into account Ontario Invasive Plant Council's *Clean Equipment Protocol for Industry*.
- Stockpiles with invasive species may be tarped to facilitate the invasive species deterioration.
- Stockpiles shall be temporarily seeded to reduce erosion if left exposed or inactive for more than 30 days.
- Measures to prevent the mobilization of stockpiles will be employed using silt fences and other erosion control methods in accordance with the Erosion and Sediment Control Plans and approved by MTO's Environmental Monitor.
- For stockpiles left on-site long-term (more than one month) and where erosion and sediment control measures are required to manage on-site runoff water, the Contractor shall maintain such measures to ensure their effectiveness. Silt fencing installed around soil stockpiles must maintain a minimum 1 m distance from the toe of the stockpile.
- Additional erosion and sediment control measures will be inspected on a weekly basis and after a major precipitation event. The Contractor is responsible to correct any identified deficiencies in a timely manner.
- The stockpiles should be monitored to ensure that stockpiles remain intact and that there are no environmental adverse effects, erosion issues, or other concerns.
- Soil stockpiles of any type must be stored with slopes 70 degrees or less from April 15 until July 15 (MNRF, 2017) to prevent Bank Swallows (*Riparia riparia*), a bird Species at Risk, from nesting in the stockpiles. If not permissible, the contractor shall implement exclusion techniques such as tarping of slopes.
- Soils shall be handled and stored during construction in a manner that protects soil quality for re-use.

6.3.1.4 On-site Reuse of Soil

Decisions on re-using stockpiled soil to backfill the excavations or for grading within the Project Area will be determined in accordance with the project specifications and will be based strictly on the suitability of soil for use in backfilling construction excavations or as structural fill. The Contractor is responsible for the reuse of soil within the Project Area to the extent possible.

6.3.2 Environmental Protection Measures

The following provides the relevant environmental protection measures with respect to the management of soil within the Project Area. These recommendations should be read in conjunction with other Project reports including the Erosion and Sediment Control Plan, the Final Design-Build Ready Reference Design, Early Works Report and applicable drawings provide additional measures for the management of soil to reduce potential environmental effects during construction.

6.3.2.1 Dust Suppression

During all phases of the Project, the following measures to mitigate fugitive dust emissions must be implemented:

- Use of dust suppressants with the least potential for adverse environmental effects when conducting any project activity that may generate dust.
- Not handling non-enclosed granular materials during sustained high wind conditions.
- Covering or enclosing sources of granular materials stored in open containers within the Project Area.
- Building and managing temporary and permanent roads and parking lots located within the Project Area to reduce fugitive dust emissions from dirt surfaces, including through paving and the removal of loose materials on road surfaces.
- Establishing speed limits of no more than 30 km/hour on temporary and permanent roads located within the Project Area and requiring that all persons abide by these speed limits.

Such activities should be co-ordinated with the Contractor's Air Quality Best Management Practices, including the monitoring of dust during construction through the use of mobile detectors to inform on the location and timing of construction activities that may result in adverse effects and corresponding implementation of targeted dust suppression measures.

6.3.2.2 Erosion and Sediment Control

During all phases of the Project, the following measures to mitigate sedimentation and erosion must be implemented with respect to soil management:

- Follow the Erosion and Sediment Control Plan for Construction and corresponding Erosion and Sediment Control Plan for the stream realignment work.
- No work will be permitted on site until all such erosion and sediment control devices are properly installed.
- Maintain all erosion and sediment control devices to the satisfaction of MTO's Environmental Monitor.
- Trapped sediments and controls are to be removed only after the soils of the construction area have been stabilized and adequately re-vegetated, unless sediments have accumulated to a depth of 1/3 the height of the sediment control device.
- The Contractor shall remove accumulated sediment to the level of existing grade, in a manner that avoids sediment release to the downstream side of the sediment control device. The disposal location

and method of disposal of removed sediment must be approved by MTO's Environmental Monitor. All sediment control devices shall remain in place until after the surrounding ground has been permanently stabilized according to the Contract Drawings.

- Any stockpiled material must be deposited, stored, and contained in a manner to ensure sediment does not enter a water body and will be appropriately stored, as approved by MTO's Environmental Monitor. Areas containing exposed soil or stockpiled material will be isolated using appropriated sediment control devices to prevent the entry of sediment into the watercourse.
- All activities, including maintenance procedures, will be controlled to prevent the entry of petroleum products, debris, rubble, concrete, or other deleterious substance into the water. Vehicular refuelling and maintenance will be conducted a minimum of 30 m away from any aquatic areas to avoid potential impacts, in the event that an accidental spill occurs.
- Periodically inspect all erosion and siltation control devices in accordance with requirements.
- Remove temporary erosion control devices upon completion of work.

6.3.2.3 Restoration

The Project will be restored in phases (i.e., progressive restoration), such that restoration of disturbed areas is completed as soon as possible following the completion of contraction activities in the corresponding areas. To achieve this outcome, the following measures will be taken during restoration activities with respect to soil management:

- Regrade areas with vehicle ruts, erosion gullies or where there has been subsidence. Regrade streambanks, and approaches to a maximum of 1:3 (rise over run), unless otherwise directed by a QP or as specified in Project-specific regulatory authorizations.
- Blade rutted subsoils flat prior to topsoil replacement
- Damaged Soil: Disc, till or cultivate ripped subsoils to break up lumps and to smooth the surface. To reduce further compaction, limit discing to what is necessary to break up clods. Till or cultivate soil and any severely compacted or rutted areas to loosen compacted soil.
- The contractor shall remove any felled trees, debris, or soil inadvertently deposited below the high watermark of a watercourse within one working day.
- In restoration areas, topsoil shall be prepared in accordance with the Natural Channel Design.
- To prepare restoration areas for seeding, spread, loosen and fine grade topsoil. Topsoil shall be prepared for planting at a depth of 0.3 m unless otherwise specified.

6.4 Handling and Storage of Excess Soils (Off-Site)

The Contractor shall reuse excess soil within the Project Area to the extent possible. Remaining excess soil shall be re-used or placed in the creation of berms at locations to be determined by the QP, Project Leader and MTO's Environmental Monitor. In some instances, on-site reuse of soil may not be possible. In these instances, with the consultation and approval of the QP, Project Leader and MTO's Environmental Monitor the soil may be reused off-site or if that is not possible, disposed off-site.

Stockpiles of excess soil deemed unsuitable for use in any application after all construction excavations have been backfilled and grading completed within the Project Area and as approved by the QP, Project Leader and MTO's Environmental Monitor, must be transported to an off-site disposal facility or approved off-site reuse receiver in accordance with the applicable regulations, including O. Reg. 406/19. Transportation and reuse or disposal of excess soil should follow an Excess Soil Management Plan (ESMP) developed by the Contractor and approved by

MTO prior to transport of reuse or disposal of the soil. All documentation (bills of lading, waste manifests, waste characterization, etc.) are to be maintained on-site, and copies shall be provided to MTO and the QP. When required, off-site reuse or disposal details should be included in the ESMP by the contractor outlining specific procedures and protocols for soil sampling. No soil removed from the site may be disposed of off-site or re-used at any location other than the Project Area and/or off-site location permitted to accept the soil. Approval by the QP is required prior to the removal of any soil from the site. Preference will be given to reusing soil instead of disposing of soil at a landfill, if the geotechnical quality of the soil is deemed appropriate for reuse. Large debris and solid waste material such as foundations, concrete, field stones, cobble stones, wood or metal shall be separated from the soil by mechanical means and salvaged for on-site/off-site reuse or disposed off-site separately as solid waste at a facility permitted to receive construction/ demolition debris.

Any excess soil should be sampled according to a Sampling and Analysis Plan that is prepared by the QP based on O.Reg. 406/19 and at a minimum, soil samples must be analyzed for the following parameters: PHCs, and metals (including lead), salinity (if there are any intended agricultural receiving sites), inorganics, pH and grain size. Additional analysis may also be required for leachate if any substances with published Leachate Screening Levels in the Soil Rules are identified as COCs within the Project Area.

Assuming excess soil is stockpiled, appropriate bulk soil sample frequencies should comply with “Records of Site Condition - Part XV.1 of the Act, O. Reg. 153/04 as amended, Table 2 Minimum Stockpile Sampling Frequency”. This is a requirement of O. Reg. 406/19.

All sampling and decontamination procedures, laboratory analytical methods, and protocols and procedures will be consistent with those established by the MECP, as documented in “*Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario, May 1996*” (MOE 1996 Guidance Manual). Representative samples should be collected in containers supplied by a Canadian Association for Laboratory Accreditation (CALA) - accredited laboratory.

Based on the results of the analytical testing of soils within the Project Area, excess materials should not be re-used off-site at a residential, commercial, or industrial property without further verification sampling or acceptance of that material according to the ESMP for the receiver site that is completed by the Contractor and approved by MTO. It should be noted that the private receiver site may require additional testing to satisfy the Excess Soil Quality Standards published in the Soil Rules; which may require the collection and analysis of soil for select Synthetic Precipitation Leaching Procedure (SPLP) parameters to meet O.Reg. 406/19 before soil are exported and accepted. The Contractor will follow the proper screening for excess soil if any is deemed to require off-site reuse or disposal. When soil suspected of being potentially contaminated are observed during construction, the contractor should inform the QP. Additional testing should be conducted to further characterize the contamination based on the QP’s recommendation to determine suitability for reuse on-site or disposal.

6.4.1 Off-site receiving Sites for Beneficial Reuse

Should on-site reuse not be possible, the Contractor shall make all reasonable attempts to locate a suitable off-site beneficial reuse receiver. Only as a last resort shall disposal of excess soil at landfill will be undertaken. Reuse at off-site beneficial reuse receivers shall be communicated to MTO and the Contractor shall verify and document that the receiver is operating under appropriate by-laws, permits and regulations and that the quality of material being reused is suitable for their operation. Copies of all agreements, hauling record, bills of lading, weigh bills, analytical results shall be forwarded to MTO and/or Contract Administrator. A copy of the hauling record must be retained on behalf of the MTO and confirmation of receipt of the excess soil at the destination site must be obtained by the hauler a copy of the final record must be retained by all parties for two years.

Receiving sites identified for beneficial reuse of excess material will be screened in advance and will require approval by the QP. As part of the screening process, the QP will ensure that receiving site criteria, and legislative and regulatory requirements are withheld. If excess soil is to be transported off MTO property for beneficial reuse at a receiving site, each load should be accompanied by documentation from the QP that summarized or provides (as a minimum):

- The sampling and segregating work done,
- The excess soil data pertaining to the suitability for the excess soil for reuse,
- The receiving site soil data pertaining to the suitability of the excess soil for reuse at the receiving site,
- A statement from the QP that the soil should be used for beneficial reuse and is not likely to cause a negative effect on human health or the environment; and a statement from the QP confirming the land use of the receiving site matches the intended use/ suitability of the excess soil

Before the soil has been shipped and received at the receiving site, MTO requires written documentation from the owner of the receiving site confirming acceptance of the soil and the owner's understanding of the soil quality and quantity. The following must be kept on file for future reference as outlined in OPSS.MUNI 100:

- A record of the exact location where the soil is deposited on the Receiving site;
- Landowner/ facility names and civic addresses;
- Date of disposition;
- Quantity (bill of lading);
- Soil sampling results; and,
- QPs confirmation of appropriateness of excess soil for Receiving Site.

6.4.2 Handling and Storage of Contaminated Soil

If potentially contaminated soil is encountered based on organic vapour monitor, odours, soil discolouration, buried containers or other materials contributing to a potential release, etc., the Contractor must inform MTO and the QP. The following provides guidance with respect to contaminated soil management within the Project Area.

6.4.2.1 Soil Testing

A thorough understanding of the contaminants that may be encountered and appropriate means and measures for handling and managing excavated materials should be contemplated in advance of undertaking excavation activities of suspected contaminated soils. Contaminated soil is soil that exceeds the applicable MECP Table 2 Site Condition Standard (MECP, 2011).

A procedure for soil testing, if soil that is observed to be potentially contaminated is encountered during excavation shall be developed by the QP, in accordance with the project specification. If potentially contaminated soil is encountered during excavation, the contractor shall notify MTO and the QP and the above noted procedure shall be implemented by the Contractor.

6.4.2.2 Temporary Soil Storage Site

The Contractor shall stockpile all suspected contaminated soil in a designated Temporary Soil Storage Site (TSSS) in such a manner as to protect existing surface, materials and structures from contamination, runoff surface water and, as result, erosion. Intermediate staging of contaminated soils elsewhere within the Project Area is strictly prohibited. If the designated TSSS cannot be used for any reason, the Contractor must consult with the QP to determine an alternative, if possible. The QP should notify MTO of any changes.

The TSSS should be designed by the QP and constructed by the Contractor. Once designated, the surface soils (up to 1.5 m depth) of the TSSS will be sampled to establish a baseline of environmental conditions. Depending on

the size of the TSSS, between three and eight samples will be collected and submitted for chemical analysis of PHCs in F1-F4, VOCs, PAHs, metals and inorganic parameters, including pH. Samples will be collected using either hand auger or by excavation of shallow test pits.

The design of the TSSS will include: a minimum of 10-mil (10 thousandth of an inch) nylon reinforced polyethylene sheeting serving as an impermeable/low permeable barrier to contain stockpiled potentially contaminated excess soils; a 0.5 to 1 m high berm of baled hay or clean fill with the 10-mil nylon reinforced polyethylene sheeting extended over the berm, reaching the exterior ground surface; and consider how the potentially contaminated soils will be transported and stockpiled without compromising the berms (controlling runoff/run-on) or causing potential cross contamination (e.g., migration of contaminants outside the TSSS). If more than one sheet of polyethylene is needed to line the ground beneath the TSSS, each section of sheeting must overlap by at least 1 m. As necessary, the TSSS will be designed with a sump pump to remove any accumulated water from the TSSS and temporary store it for proper discharge. In addition, should contaminated soil be encountered that the QP or MTO consider a potential source of groundwater contamination, then these soils will either be:

- Placed in a separate cell in the TSSS, or;
- Placed directly into a lined roll-off and properly disposed of at a licensed landfill facility.

Following the use of the TSSS, confirmatory surface soil samples (up to 1.5 m depth) will be collected and submitted for chemical analysis of PHCs, VOCs, PAHs, pH, metals and inorganic parameters to verify the quality of soil in this area. These sample results will be compared to the baseline samples to verify the area was not contaminated through the use of the TSSS. If needed, shallow remedial excavations can be completed to return the TSSS area back to original condition.

6.4.2.3 Excavation and Management

If necessary, the excavation of contaminated soil, segregation and processing will be overseen by the QP or a designate of the QP, and any additional excavations/removal of impacted soil will require approvals from MTO, as well as a management plan and document for the additional work.

When excavation and/or trenching are required at a suspected contaminated location, appropriate management of the contaminated solid or semi-solid material (such as soil or sludge) is required. Concerns for excavation and management of impacted soil relate to the potential for transfer of contaminants during materials handling and transportation activities. Transfer of contaminants may occur due to:

- Excavation, storage, sizing etc. and the potential for dust and volatile emissions from the contaminated media;
- High potential for fugitive dust emissions due to movement of equipment at the site;
- Leaching contaminants from contaminated soil to surface and groundwater water can occur from unlined and uncovered stockpiles and excavated pits;
- Migration of contaminants to uncontaminated areas may occur during transportation;
- Improper handling and reuse or disposal of contaminated soil may allow contaminants to migrate into and pollute uncontaminated areas.

Excavation and trenching primarily involves equipment that is widely used in the construction or non-hazardous solid waste disposal industries, such as excavators, earth movers or backhoes, dump trucks, and containers of various shapes, sizes, and materials.

General guidance and best practice measures to prevent potential transfer of contaminants during excavation, material handling and transport of contaminated material include the following:

- Entry to the active work area should be limited to avoid unnecessary exposure and related transfer of contaminants.
- Traffic should be minimized on contaminated soil.
- Surface drainage and subsurface utility systems should be identified.
- Any runoff should be prevented from entering and mixing with on-site contaminated media by building earthen berms or adopting similar other measures on the TSSS and on the site, where needed.
- Provisions should generally be made to capture surface water runoff by diverting it to a controlled depression-area or lined pit on the TSSS and on-site, where needed.
- Fugitive dust emissions should be controlled during excavation both on the TSSS and on-site, where needed, by spraying water or other materials to keep the ground moist or covered. During wet weather or rainfall no water spraying would be needed. Materials for dust control must be approved by the QP prior to use on the site.
- Appropriate personnel and equipment and decontamination procedures should be employed as required to keep the site-related contaminants within the TSSS and the Project Area.
- Covers and liners should be used at all times when contaminated materials are being stored at the TSSS. Covers should be used on trucks that are moving materials around and from the site.
- Any equipment that is involved in earthwork activities or that may have come into contact with waste or any potentially contaminated material must be decontaminated prior to being removed from the Site or TSSS.

General guidance and best practice measures for the storage of contaminated soil include the following:

- For contaminated suspected soil, soil must be stored in a manner that prevents potential contaminants from leaching into the groundwater.
- Potentially contaminated soil will be protected to prevent the infiltration of precipitation and/or generation of runoff.
- If determined necessary by a QP, soil from the Project Area that require sampling needs to be kept segregated from soil that has already been sampled.

6.4.2.4 Reuse of Contaminated Soil

In the event that contaminated soil are encountered during construction, the suitability of reusing the soil should be determined before it's re-use. The contractor must consult with the QP and the MTO Environmental Monitor prior to re-using contaminated soil on-site. In general, contaminated soil may be re-used on-site for backfilling construction excavations/or as structural fill, as deemed appropriate by the QP subject to approval from MTO the Project Leader and MTO's Environmental Monitor.

Contaminated soil must be stockpiled as close as possible to the location from where it was excavated or placed in a separate cell in the TSSS to ensure it is isolated from stockpiled clean material and is clearly identifiable. Contaminated soil may only be re-used in areas that will be advised by the QP with approval from the Project Leader and MTO's Environmental Monitor according to the provincial and local authority standards. The contractor shall maintain a log to document the final disposition of contaminated soil re-used on-site, if any.

Contaminated soil will not be replaced beneath the groundwater table under any circumstance. In addition, if contaminated soil is encountered that the QP, notify MTO immediately and then - consider a potential long-term source to groundwater contamination, then these contaminated soils may not be re-used in the Project Area in their

current state. In the event contaminated soil is found below the water table, the contractor should contact MTO first for potential remedial actions. This soil should be either:

- Placed in a separate cell in the TSSS; and
- Placed directly into a lined roll-off container.

In the event that off-site disposal is required, with prior approval from the QP, Project Leader and MTO, the Contractor shall dispose of soil not suitable for reuse according to proper disposal requirements, taking into account Ontario's *Management of Excess Soil- A Guide for Best Management Practices* (MECP, 2014) and O. Reg. 406/19, including the *Soil Rules*.

6.4.3 Transportation of Soils

It is important that transportation of contaminated soil/excess soil is carefully considered prior to the commencement of the Project. Transportation of Dangerous Goods, General Waste Management, and other environmental regulations apply to the off-site transportation and of materials.

Contaminated soil not suitable for reuse within the Project Area shall be managed and reuse or disposed of in accordance with all applicable laws, industry standards and best management practices, this may include but not limited to:

- The Environmental Protection Act;
- O. Reg. 406/19, as amended;
- OPSS.PROV 180 General Specification for the Management of Excess Materials;
- Management of Excess Soil – A Guide for Best Management Practices (Ministry of Environment, Conservation and Parks [MECP], Updated: April 4, 2019, Published: April 5, 2016, as updated).

During all phases of the Project, the following measures must be implemented with respect to transportation and reuse or disposal requirements for soil management:

- The contractor will ensure that all shipments comply with applicable regulatory requirements, including O. Reg. 406/19, and all necessary documentation is provided to MTO in a timely manner.
- Only approved disposal facilities for contaminated soil (either non-hazardous or hazardous) will be permitted for use.
- Acceptance criteria must be met, including but not limited to provision of adequate soil quality data for bulk chemical analysis and Schedule 4 leachate criteria. The origin and volume of contaminated material being transferred to a reuse or disposal site and its final destination shall be tracked.
- The Contractor shall arrange for and pay for any additional testing required by the receiver site as a condition of acceptance of the material. The Contractor shall submit to MTO a copy of the forms provided under OPSS.PROV. 180, signed by the receiver site.
- Mitigation measures will be developed in consultation with the QP and MTO Environmental Monitor to mitigate the mobilization and transport of potential residual agricultural contaminants within the Project Area towards waterbodies during all phases of the Project, including measures to allow time for increased die-off of pathogenic organisms and volatilization of agricultural contaminants prior to soil disturbance and removal of nutrient compounds through plant harvesting.
- Prior to disposing of a subject waste (i.e., liquid industrial waste and hazardous waste, including hazardous soil), the contractor shall ensure that the subject waste be properly classified as per O. Reg. 347 and registered in the MECP Hazardous Waste Information Network (HWIN), and a valid waste

subject waste generator registration number is obtained. The generator shall ensure that waste manifests are completed correctly for each subject waste transferred and all waste transfers are properly identified and tracked through the HWIN system.

- A waste tracking system governing all hazardous waste transfers in accordance with the federal *Transportation of Dangerous Goods Regulation* and provincial regulations should be implemented by the contractor.
- Soil/fill materials imported to the Project Area, including quantity, quality and the source of the imported materials, should also be tracked and documented during the construction activities in accordance with O. Reg. 406/19.
- For the purpose of any record-keeping mentioned in this document, it is recommended that records be retained for a minimum of 7 years after the completion of all excess soil management activities or the removal of all excess soil from a TSSS, as required by O. Reg. 406/19.

7. Monitoring, Evaluation and Reporting

The following sections describe the protocols and practices to monitor progress, quality and daily activities.

7.1 Monitoring, Measurement, Analysis and Evaluation

Field monitoring for excavated materials is required during and post-construction. Construction monitoring for excavated materials during construction will be focused on the mitigation measures and management strategies described in this SMP. QPs will conduct daily visual inspections of active construction work zones to monitor stockpiles, potential excess soil or work in potentially contaminated areas.

The Contractor will be responsible for tracking and managing the quality and quantity of material excavated from or imported to the site using existing information and new information, as needed. Tracking will include quantifying and documenting locations for the beneficial on-site reuse of excavated materials. Management will include:

- Minimizing adverse effects to workers and sensitive receptors through Best Management Practices (BMPs), worker health and safety provisions and ensuring that remedial/risk management options are considered during the construction planning process and appropriately incorporated into final designs.
- Minimizing soil disturbance and retaining vegetation, including wildlife trees, within and around the Project Area in accordance with the setbacks / buffers identified on applicable design drawings, and in other areas to the extent that it is technically feasible or unless required to meet engineering requirements for safe and facility operation. The construction vehicle traffic will be minimized on contaminated soils.
- Manage soil in such a way as to prevent any adverse effects associated with receiving, processing, storage and movement of soil with respect to noise, dust, mud, tracking, leaching, runoff, erosion, outdoor air quality and odour. Monitoring will be completed in accordance with the Contractor's Air Quality Best Management Practices Plan to reduce the potential generation of dust (specifically PM10) and other fugitive air emissions during construction, including daily visual observations and on-site dust monitoring to inform the implementation of mitigation measures.
- Handle and store soil during construction in a manner that protects soil quality for re-use. In the event that contaminated soil are encountered during construction, the Contractor, QP, with approval from MTO, shall determine the suitability of reusing the soil before reusing it. The Contractor shall (with Project Leader and MTO's Environmental Monitor's permission) dispose of any soil not suitable for reuse according to proper screening and disposal requirements, taking into account *Ontario's Management of Excess Soil- a Guide for Best Management Practices* (MECP, 2014) and O. Reg. 406/19, including the *Soil Rules*.
- Encouraging reuse of soil where appropriate, balancing cut and fill, minimizing grading, and minimizing the need to transport additional soil to the Project Area where possible.

8. References

AECOM February 2020:

Contamination Overview Study – FINAL Highway 400 – Highway 404 Link (Bradford Bypass W.O. #19-2001, Prepared for MTO.

Government of Ontario:

General - Waste Management, R.R.O. 1990, Reg. 347

Government of Ontario:

R.R.O. 1990, Reg. 697: EXEMPTION(S) - FOR CERTAIN CONVEYANCES OF FAMILY FARMS OR FAMILY BUSINESSES On-Site and Excess Soil Management, R.S.O. 1990, O. Reg. 406/19

Government of Ontario:

Waste Audits and Waste Reduction Work Plans, O. Reg. 102/94

Ministry of the Environment and Energy (MOEE), 1994:

Management of Excess Materials In Road Construction and Maintenance

Ministry of the Environment, 1996:

Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario, May 1996 (MOE 1996 Guidance Manual)

Ministry of the Environment, Conservation and Parks (MECP), 2011:

Environmental Protection Act – Ontario Regulation 153/04 (as amended) – Record of Site Condition regulation - Part XV.1 of the Environmental Protection Act

Ministry of the Environment, Conservation and Parks (MECP), 2011:

Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011

Ministry of the Environment, Conservation and Parks (MECP), 2014:

Management of Excess Soil – A Guide for Best Management Practices (January 2014) MECP

Ministry of the Environment, Conservation and Parks (MECP), 2019:

Ontario Regulation 407/19 - Records of Site Condition – Part XV.1 of the Environmental Protection Act

Ministry of the Environment, Conservation and Parks (MECP), 2020:

Rules for Soil Management and Excess Soil Quality Standards (The Soil Rules)

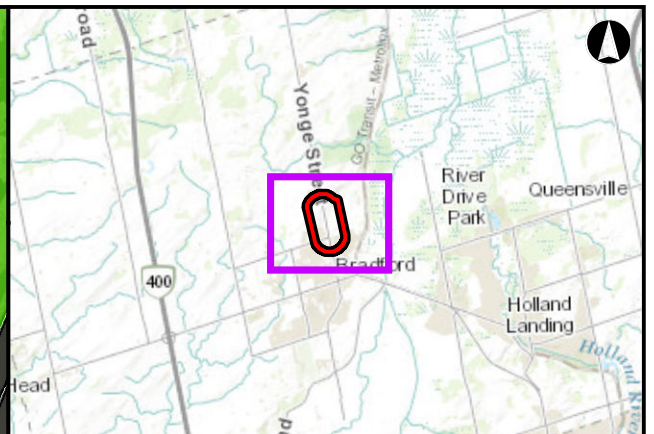
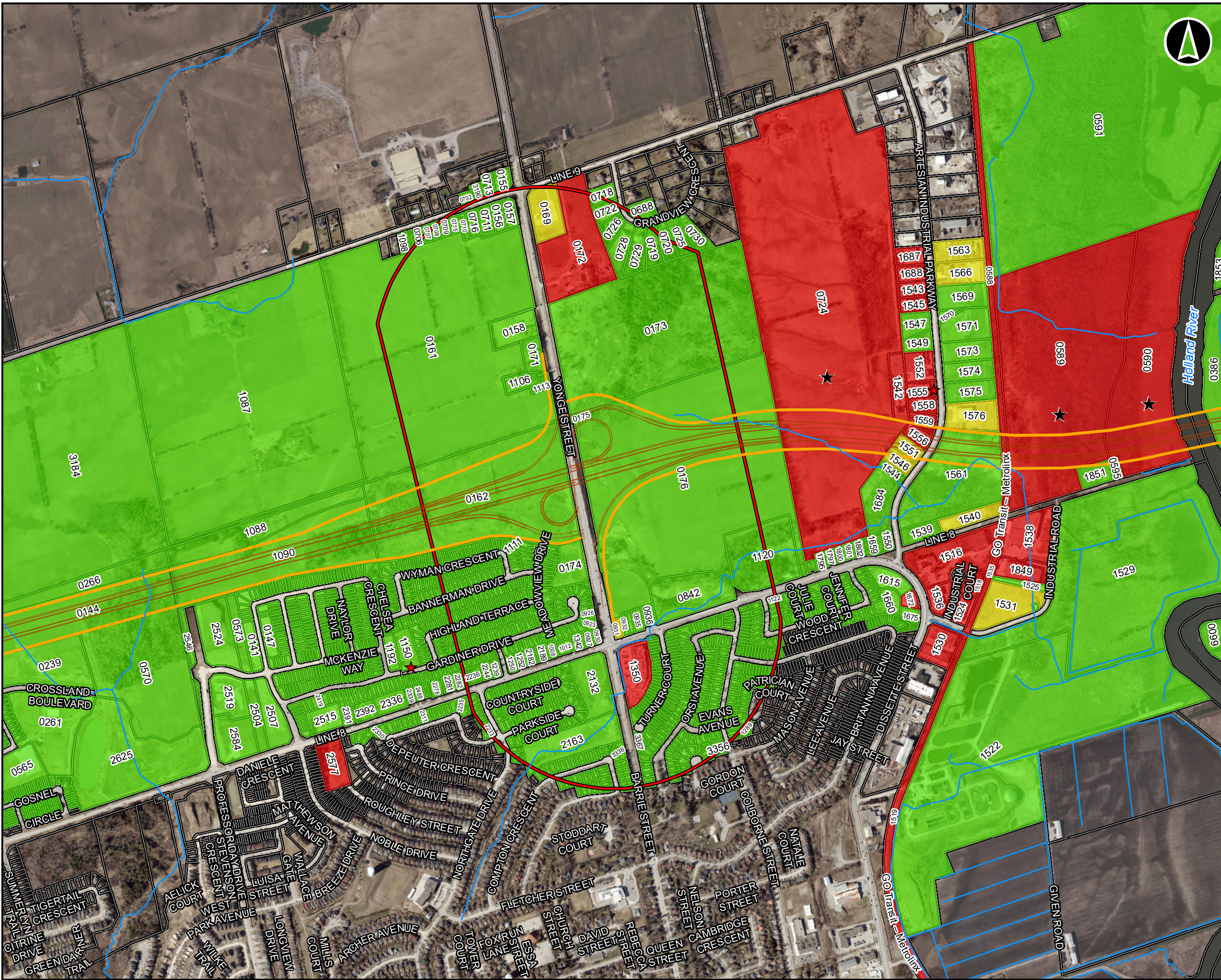
Kesh Appadurai, P.Eng., QPESA
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Appendix **A**

Early Works Study Area and Contamination Potential Ratings



Legend

- Watercourse
- Highway 400 - Highway 404 Link (Bradford Bypass) Alignment
- Highway 400 - Highway 404 Link (Bradford Bypass) Right of Way
- Study Area
- Parcel Boundary
- ★ Spill Location
- ★ Closed Landfill

Contamination Potential Rating

- High
- Medium
- Low

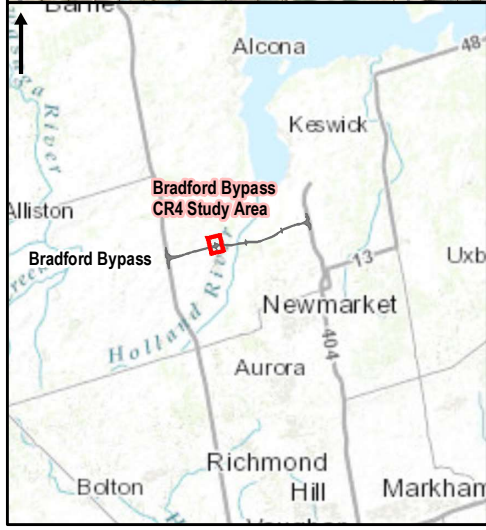
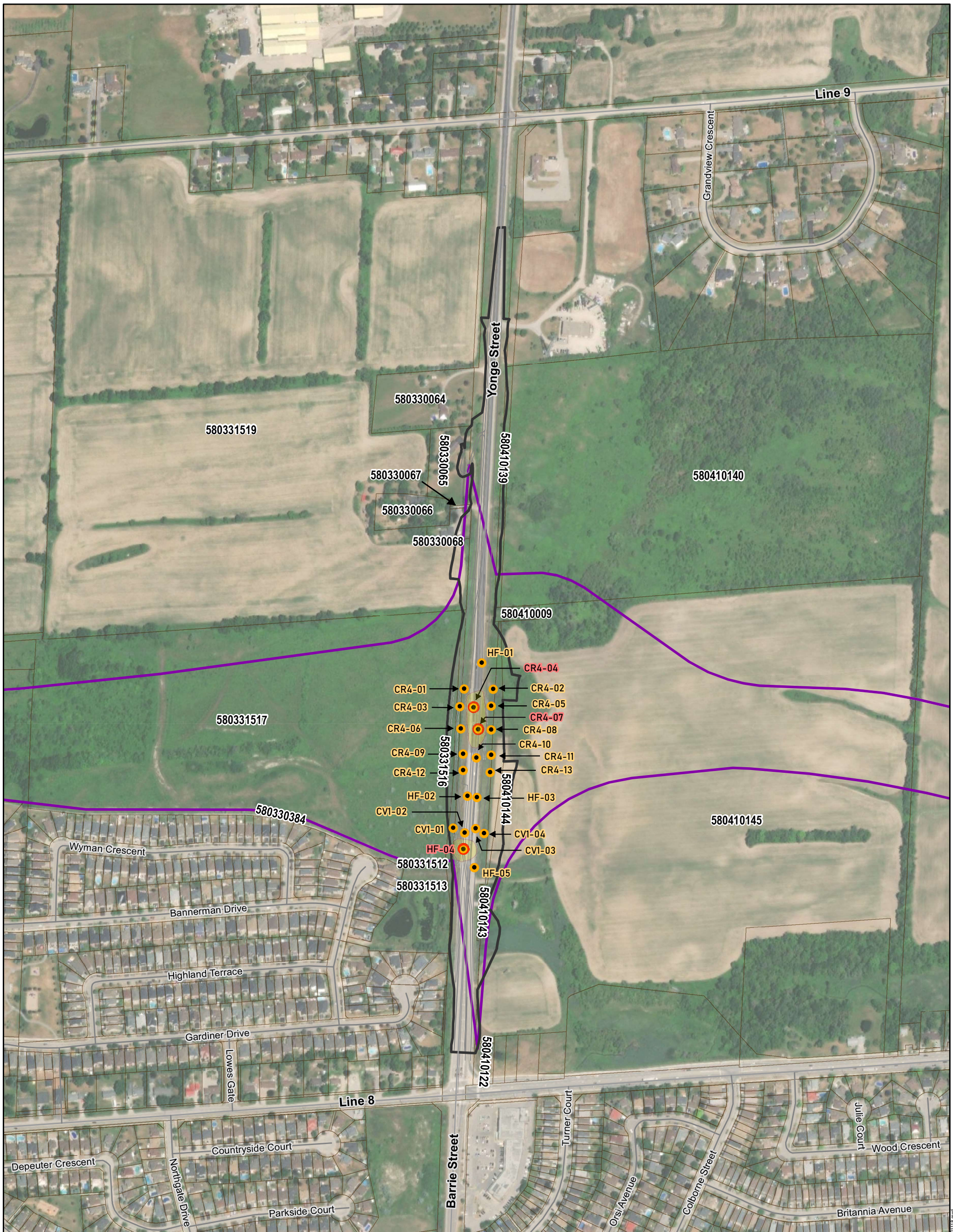
0 50 100 200 300 400 500 600 700
Metres

Highway 400 - Highway 404 Link (Bradford Bypass)		
Early Works Study Area and Contamination Potential Ratings		
Dec, 2021	1:10,980 <small>* when printed 11"x17"</small>	Datum: NAD 1983 UTM Zone 17N Source: MNR, NRC, MTO, Region of York
P#: 60601761		APPENDIX A
AECOM		
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Appendix **B**

Borehole Locations and Soil Exceedances





- Legend**
- Borehole Locations
 - Soil at BH/MW Exceeded PAHs Table 2.1 SCS
 - Extent Area of PAHs
 - Roads
 - County Road 4 (CR4) Design
 - CR4 Limit of Work
 - Bradford Bypass Right of Way (ROW)
 - Parcel Fabric



**Highway 400 - Highway 404 Link
(Bradford Bypass) County Road 4 Advance Works (GWP 2008-21-00)**

Borehole Locations and Soil Exceedances

December 2021	1:5,000	NAD 83 Zone 17 GeoHub, MTO, LSRCA
P#:	V#:	
AECOM		Figure 2
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Map Location: G:\Projects\400-404 Link (Bradford Bypass)\Design\01 - Reports\CR4 - Memo\CR4 - Limit\CR4 - Limit\118.dwg Date Saved: 12/29/2021 8:05:54 PM

Appendix **C**

Borehole Logs



RECORD OF BOREHOLE: BH CR4-01

Sheet 1 of 2

CLIENT: AECOM	DATE: September 30, 2021	ELEVATION: 262.80 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131693° Long: -79.569600°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)			
0.00			Gravelly CLAYEY SAND (SC), trace rootlets Firm Brown Moist	SC		0.00	1	SS	38	2-3-6-30	9				MIS_202 110280	
262.11			SILTY CLAY (CI) trace sand to SILTY CLAY (CI) and sand Stiff to very stiff Brown to grey Moist	CI		0.69	2	SS	100	6-7-5-6	12					
							3	SS	62	4-6-9-13	15				MIS_202 110282	
							4	SS	66	8-10-16-19	26					
							5	SS	100	8-12-16-22	28				MIS_202 110283	
			- grey below a depth of 3.7 m				6	SS	62	8-12-13-15	25					
							7	SS	100	6-8-13-17	21				MIS_202 110284	
256.86			SILTY SAND (SM), trace gravel Compact to very dense Grey Moist - auger grinding between depths of 5.9 m and 6.1 m	SM		5.94	8	SS	100	7-7-11-14	18				MIS_202 110285	
							9	SS	100	11-25-50-73	75				MIS_202 110286	
254.11			SILT (ML) of slight plasticity, trace sand Very Dense Grey Moist	ML		8.69	10	SS	100	33-39-51-60	90					

Continued on Next Page

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



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DATE: Sep 30, 2021
DATE:

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RECORD OF BOREHOLE: BH CR4-01

CLIENT: AECOM	DATE: September 30, 2021	ELEVATION: 262.80 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131693° Long: -79.569600°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				□
11	D 90	210mm O.D. Hollow Stem Auger	SILT (ML) of slight plasticity, trace sand Very Dense Grey Moist	ML		251.52	11	SS	100	15-25-51-95	76	0						MIS_202 110281			
			End of hole at 11.28 m.																		
			End of Borehole																		

PRELIMINARY

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



GOLDER
MEMBER OF WSP

LOGGED: Dipendra Paudel

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REV:

Pre-draft

DATE: Sep 30, 2021

DATE:

RECORD OF BOREHOLE: BH CR4-02

CLIENT: AECOM	DATE: September 21, 2021	ELEVATION: 259.72 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131759° Long: -79.569053°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	NP Water Content (%)	NP Nonplastic	○	●	⊗			
0.00			SILT (ML) of slight plasticity, trace gravel, trace to some sand, trace rootlets (FILL) Loose to compact Brown to grey Moist	ML	[Cross-hatched pattern]	0.00	1	SS	88	2-4-37	7									
258.27			Sandy SILT (ML) of slight plasticity Compact Grey Moist	ML	[Vertical lines pattern]	1.45	2	SS	50	4-5-8-14	13									
257.43			SILTY SAND (SM), trace gravel Compact Brown to grey Moist to wet	SM	[Dotted pattern]	2.29	3	SS	75	4-9-10-4	19									
							4	SS	38	5-5-6-9	11									
							5	SS	100	6-9-12-17	21									
							6	SS	100	7-12-17-20	29									
							7	SS	100	4-9-14-20	23									
							8	SS	100	8-12-18-26	30									
252.10			CLAYEY SILT-SILT (CL-ML), trace to some sand Very stiff to hard Grey Moist	CL-ML	[Diagonal lines pattern]	7.62	9	SS	100	9-9-12-15	21									
							10	SS	100	15-25-22-26	47									
249.97			End of hole at 9.75 m.																	
			End of Borehole																	

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



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DATE: Sep 21, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-03

CLIENT: AECOM	DATE: September 23, 2021	ELEVATION: 261.18 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131484° Long: -79.569594°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS	
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)					NP Nonplastic
0.00			SILTY SAND (SM), trace gravel, trace rootlets (FILL) Loose Brown Moist	SM	[Pattern]	0.00	1	SS	50	2-3-32	6							MIS_202 110287
260.50			SILTY CLAY (CI) Firm to very stiff Brown Moist	CI	[Pattern]	0.68	2	SS	100	2-2-34	5							MIS_202 1102814
257.45			SILTY SAND (SM) Very dense Grey Moist - clayey silt pockets between depths of 3.7 m and 4.4 m	SM	[Pattern]	3.73	4	SS	100	5-6-9-11	15							MIS_202 1102818
3.73							5	SS	100	5-8-8-13	16							MIS_202 1102818
3.73							6	SS	88	9-26-38-48	64							MIS_202 1102819
3.73							7	SS	88	13-24-33-45	57							MIS_202 1102819
3.73							8	SS	100	18-29-40-51	69							MIS_202 1102819
3.73							9	SS	89	28-43-60-81	103							MIS_202 1102819
252.51			CLAYEY SILT-SILT (CL-ML) to SILT (ML) of slight plasticity Hard Grey Moist	CL-ML	[Pattern]	8.67	10	SS	100	8-12-20-24	32							MIS_202 110288

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DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



GOLDER
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DATE: Sep 23, 2021

DATE:

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RECORD OF BOREHOLE: BH CR4-03

CLIENT: AECOM	DATE: September 23, 2021	ELEVATION: 261.18 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131484° Long: -79.569594°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS					
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)					NP Nonplastic	Nat Vane	Rem Vane	Pocket Pen	
11	D 90 210 mm O.D. Hollow Stem Auger		CLAYEY SILT-SILT (CL-ML) to SILT (ML) of slight plasticity Hard Grey Moist	CL-ML	[Strata Plot]	243.35	11	SS		14-15-20-44	35							MIS_202 110289				
12						12	SS	100	8-16-29-65	45											MIS_202 1102810	
13						13	SS	100	23-17-25-32	42												MIS_202 1102811
14						14	SS	100	15-23-37-47	60												MIS_202 1102812
15						15	SS	100	17-18-24-31	42												
16						16	SS	100	21-27-55-87	82												
17																						
18			CLAYEY SILT (CL) to SILTY CLAY (CI) Hard Grey Moist to wet	CI	[Strata Plot]	17.83																
19																						
20																						

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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



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DATE: Sep 23, 2021
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Pre-draft

RECORD OF BOREHOLE: BH CR4-03

CLIENT: AECOM	DATE: September 23, 2021	ELEVATION: 261.18 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131484° Long: -79.569594°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS			
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)					NP Nonplastic	Nat Vane	Rem Vane
21			CLAYEY SILT (CL) to SILTY CLAY (CI) Hard Grey Moist to wet	CI	17	SS	100	19-18-21-26	39	○				MIS_202 1102813						
22					18	SS	100	16-22-37-67	59											
23																				
24																				
25	D 90	210 mm O.D. Hollow Stem Auger			19	SS	100	10-12-18-62	30											
26																				
27																				
28																				
29																				
30																				

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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

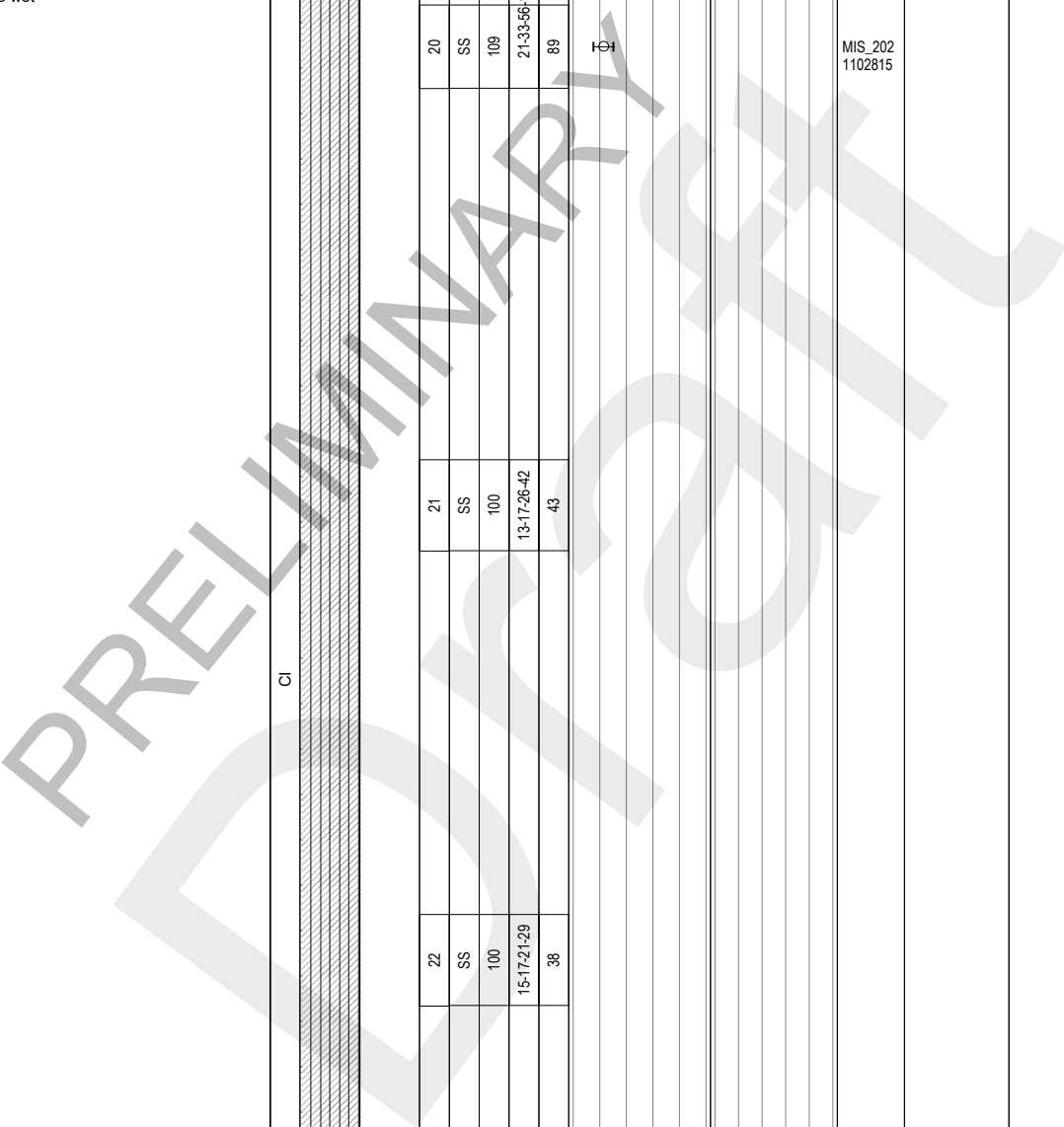
DATE: Sep 23, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-03

CLIENT: AECOM	DATE: September 23, 2021	ELEVATION: 261.18 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131484° Long: -79.569594°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS			
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)					NP Nonplastic	●	○
31			CLAYEY SILT (CL) to SILTY CLAY (CI) Hard Grey Moist to wet	CI																
						20	SS	109	21-33-56-100/108mm	89										MIS 202 1102815
						21	SS	100	13-17-26-42	43										
						22	SS	100	15-17-21-29	38										
40																		MIS 202 1102816		



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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel	DATE: Sep 23, 2021
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REV: Pre-draft

RECORD OF BOREHOLE: BH CR4-03

CLIENT: AECOM	DATE: September 23, 2021	ELEVATION: 261.18 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131484° Long: -79.569594°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				
41			CLAYEY SILT (CL) to SILTY CLAY (CI) Hard Grey Moist to wet	CI																	
42																					
43									24	SS	100	12-17-20-34	37								
44																					
45																					
46						25	SS		20-49-100/133mm												
47																					
48																					
49						26	SS	104	15-20-68-100/135mm	88	H-CI							MIS 202 1102817			
50			End of hole at 49.38 m.																		
			End of Borehole																		

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

DATE: Sep 23, 2021
DATE:

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Pre-draft

RECORD OF BOREHOLE: BH CR4-04

CLIENT: AECOM	DATE: July 14, 2021	ELEVATION: 262.75 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131580° Long: -79.569143°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR:	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H	Plastic & Liquid Limits (%)	Water Content (%)	NP	Nonplastic	●			
0.00			ASPHALT (180mm)			0.00														
262.57			SAND (SP), some gravel (FILL) Dense Brown Dry	SP	[Pattern]	262.57	1	SS	58	15-17-16-14										
261.96			CLAYEY SAND (SC), trace gravel (FILL) Very stiff Grey Moist	SC	[Pattern]	261.96	2	SS	42	7-5-12-16										
261.30			SAND (SP), trace gravel, trace fines, containing silt pockets (FILL) Compact Brown Moist	SP	[Pattern]	261.30	3	SS	50	7-12-7-9										
260.54			CLAYEY SAND (SC) to Sandy CLAYEY SILT (CL), trace gravel (FILL) Very stiff Brown Moist	SC	[Pattern]	260.54	4	SS	67	4-9-10-14										
258.48			Sandy CLAYEY SILT (CL) to CLAYEY SILT (CL), trace organics Loose Brown Moist	CL	[Pattern]	258.48	6A	SS	67	9-12-9-12										
256.96			SILTY SAND (SM), trace gravel Compact Grey Wet	SM	[Pattern]	256.96	7	SS	67	2-2-1-2										
5.79						5.79	8	SS	0											
							9	SS	83	25-6-7-8										
							10	SS	100	8-12-16-16										

Continued on Next Page

DEPTH SCALE: 1:51
HAMMER TYPE:



REV: Pre-draft
LOGGED: DP
CHECKED: ACK
DATE: Jul 14, 2021
DATE: Jul 27, 2021

RECORD OF BOREHOLE: BH CR4-04

CLIENT: AECOM	DATE: July 14, 2021	ELEVATION: 262.75 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131580° Long: -79.569143°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR:	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×			
11			SILTY SAND (SM), trace gravel Compact Grey Wet	SM	[Strata Plot]	252.54 10.21	11	SS	75	8-12-16-16	28									
12			CLAYEY SILT (CL), trace sand Very stiff to hard Grey Wet	CL	[Strata Plot]		12	SS	83	10-12-14-22	26									
13																				
14							13	SS	88	10-18-21-23	39									
15																				
16							14	SS	79	10-12-18-23	30									
17							15	SS	100	8-12-15-16	27									
18																				
19			End of hole at 18.90 m. End of Borehole			243.85	16	SS	100	10-14-15-19	29									
20																				

DEPTH SCALE: 1:51
HAMMER TYPE:



LOGGED: DP
CHECKED: ACK

DATE: Jul 14, 2021
DATE: Jul 27, 2021

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-05

CLIENT: AECOM DATE: September 15, 2021 ELEVATION: 258.01 m (CGVD28)
 PROJECT: Bradford Bypass COORDINATES: Lat: 44.131601° Long: -79.568978°
 PROJECT NO: 19136074 INCLINATION: 90.0° COORD SYS: Geographical Coordinates
 LOCATION: Bradford, Ontario CONTRACTOR: Walker HORZ DATUM: NAD83 VERT DATUM: CGVD28
 HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H	P	NP	○	●	⊗			
0.00			CLAYEY SILT (CL), some sand, trace gravel, trace organics (FILL) Soft Brown to black Moist	CL		0.00	1	SS	50	2.2-1.1										
257.10			Sandy Silt (ML) of slight plasticity Loose to compact Grey Wet	ML		0.91	2A	SS	89	1.3-5.8										
255.80			CLAYEY SILT (CL), some sand, trace gravel Stiff to very stiff Grey Moist	CL		2.21	3	SS	75	9.9-5.3										
253.67			SILTY SAND (SM), trace gravel Compact Brown Wet	SM		4.34	4	SS	50	2.5-5.8										
252.37			CLAYEY SILT-SILT (CL-ML), trace sand Very stiff to hard Grey Wet	CL-ML		5.64	5	SS	88	4.8-14.18										
							6	SS	62	9.8-10.12										
							7	SS	62	17-12-13-13										
							8	SS	88	6.6-9.12										
							9	SS	75	9-12-19-22										
							10	SS	100	18-27-32-46										

Continued on Next Page

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



GOLDER
MEMBER OF WSP

LOGGED: Dipendra Paudel

CHECKED: ACK

DATE: Sep 15, 2021

DATE:

REV:

Pre-draft

RECORD OF BOREHOLE: BH CR4-05

CLIENT: AECOM	DATE: September 15, 2021	ELEVATION: 258.01 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131601° Long: -79.568978°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS			
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H	O	NP	Plastic & Liquid Limits (%)	Water Content (%)	Nonplastic				●	○	×
11			CLAYEY SILT-SILT (CL-ML), trace sand Very stiff to hard Grey Wet	CL-ML		243.23	11	SS	100	13-16-18-16	34												
12						12	SS	100	10-10-14-15	24													
13										13	SS	100	14-14-17-23	31									
14																							
15									14.78	14	SS	100	19-21-26-27	47									
16																							
17			CLAYEY SILT (CL) Very stiff to hard Grey Moist	CL			15	SS	100	11-12-15-22	27												
18																							
19										16	SS	100	13-14-19-25	33									

Continued on Next Page

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

REV: Pre-draft
DATE: Sep 15, 2021
DATE:

RECORD OF BOREHOLE: BH CR4-05

CLIENT: AECOM	DATE: September 15, 2021	ELEVATION: 258.01 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131601° Long: -79.568978°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS			
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				□		
21 22 23 24 25 26 27 28 29 30	D 90 Mid Rotary		CLAYEY SILT (CL) Very stiff to hard Grey Moist	CL		17	SS		10-11-17-31	28													
18						SS	100	13-15-45-80	60														
19						SS	100	12-16-28-59	44														

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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



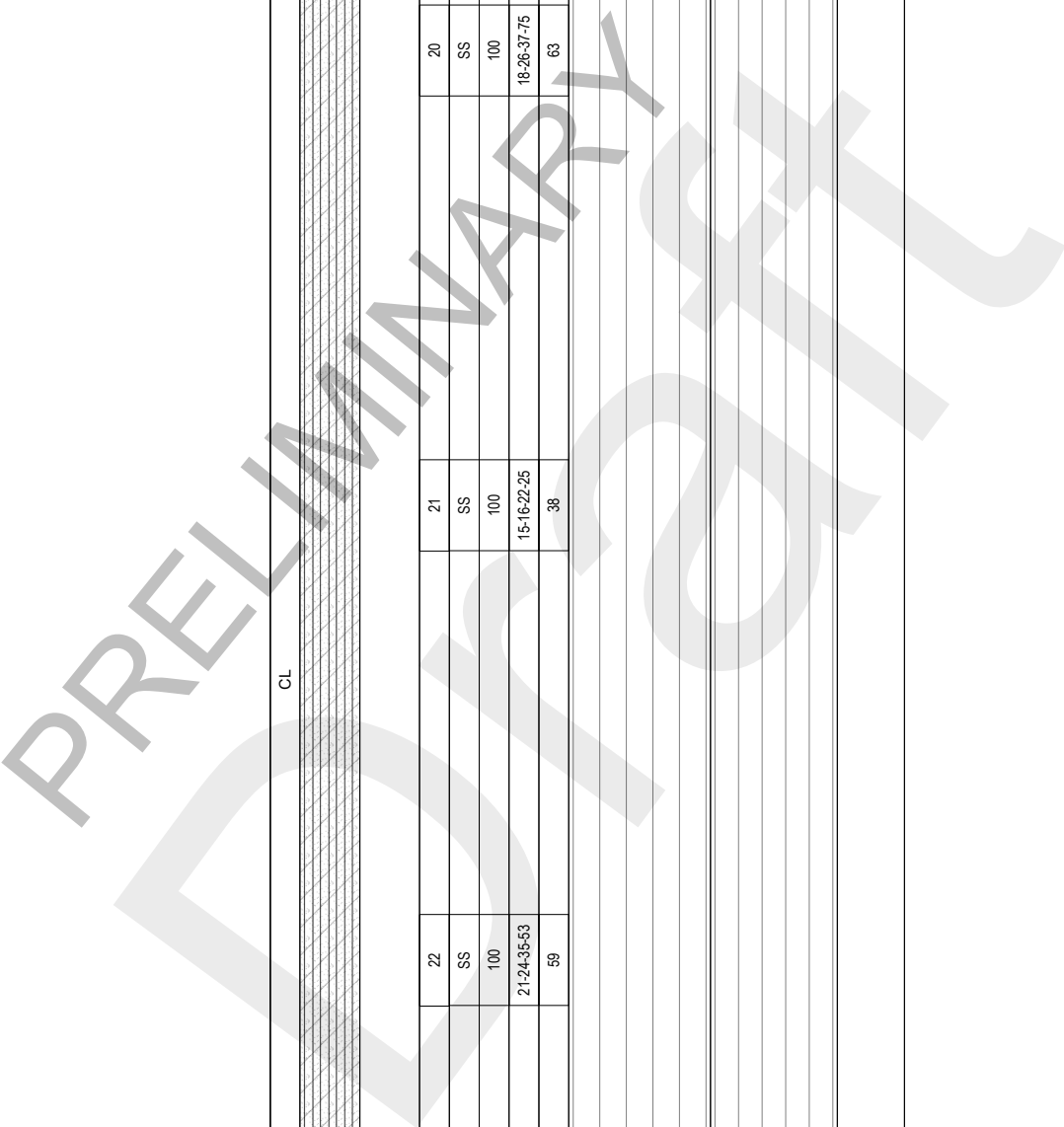
LOGGED: Dipendra Paudel
CHECKED: ACK

REV: Pre-draft
DATE: Sep 15, 2021
DATE:

RECORD OF BOREHOLE: BH CR4-05

CLIENT: AECOM	DATE: September 15, 2021	ELEVATION: 258.01 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131601° Long: -79.568978°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS				
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				Nat Vane	Rem Vane	Pocket Pen	
31	D 90	Mud Rotary	CLAYEY SILT (CL) Very stiff to hard Grey Moist	CL			20	SS	100	18-26-37-75	63													
34							21	SS	100	15-16-22-25	38													
37							22	SS	100	21-24-35-53	59													
40							23	SS	100	12-17-23-34	40													



Continued on Next Page

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

REV: Pre-draft
DATE: Sep 15, 2021
DATE:

RECORD OF BOREHOLE: BH CR4-05

CLIENT: AECOM	DATE: September 15, 2021	ELEVATION: 258.01 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131601° Long: -79.568978°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES					WATER CONTENT					SHEAR STRENGTH					ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS						
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×	Nat Vane	Rem Vane	Pocket Pen									
41	D 90	Mud Rotary	CLAYEY SILT (CL) Very stiff to hard Grey Moist	CL			24	SS	100	27-19-29-50	48																		
42																													
43																													
44																													
45																													
46							25	SS	114	28-35-66-100/83mm	101																		
47																													
48																													
49							26	SS	100	17-21-27-34	48																		
50			End of hole at 49.38 m.				208.63																						
			End of Borehole																										

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

DATE: Sep 15, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-06

CLIENT: AECOM	START DATE: October 01, 2021	ELEVATION: 258.20 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: October 06, 2021	COORDINATES: Lat: 44.131114° Long: -79.569432°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×			
0.00			SILTY SAND (SM), trace sand, trace rootlets, trace gravel Loose to compact Dark brown to brown Moist to wet	SM		0.00	1	SS	88	1-2-3-3	5									
1							2	SS	100	4-7-6-16	13									
2			CLAYEY SILT (CL), trace sand to sandy, trace gravel, (TILL) Stiff to Very Stiff Brownish Grey Moist	CL		256.22 1.98	3A	SS	100	8-7-5-6	12									
3							4	SS	62	5-7-10-14	17									
4			SILTY SAND (SM), trace gravel Compact Grey Moist to Wet	SM		254.47 3.73	5	SS	62	6-8-16-19	24									
5							6	SS	75	6-9-11-15	20									
6			CLAYEY SILT (CL), trace sand, trace gravel Hard Grey Moist	CL		252.56 5.64	7	SS	62	7-9-13-18	22									
7							8	SS	88	9-11-13-19	24									
8							9	SS	100	23-24-25-27	49									
9							10	SS	88	17-20-22-18	42									

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DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



GOLDER
MEMBER OF WSP

LOGGED: Dipendra Paudel

CHECKED: ACK

DATE: Oct 01, 2021

DATE:

REV:

Pre-draft

RECORD OF BOREHOLE: BH CR4-06

CLIENT: AECOM	START DATE: October 01, 2021	ELEVATION: 258.20 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: October 06, 2021	COORDINATES: Lat: 44.131114° Long: -79.569432°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				□
11			CLAYEY SILT (CL), trace sand, trace gravel Hard Grey Moist	CL																	
						11	SS	88	20-23-30-11	53											
12						12	SS	100	20-27-29-29	50											
13																					
14						13	SS		13-19-32-57	51											
15	D 90 Mid Rotary					14	SS	100	17-26-44-59	70											
16																					
17			15	SS	100	18-27-31-27	58														
18																					
19			16	SS	100	14-17-34-50	51														
20																					

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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

REV: Pre-draft
DATE: Oct 01, 2021
DATE:

RECORD OF BOREHOLE: BH CR4-06

CLIENT: AECOM	START DATE: October 01, 2021	ELEVATION: 258.20 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: October 06, 2021	COORDINATES: Lat: 44.131114° Long: -79.569432°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				□
21			CLAYEY SILT (CL), trace sand, trace gravel Hard Grey Moist	CL	[Strata Plot]																
22						17	SS	100	11-14-33-50	47											
23																					
24																					
25	D 90	Mid Rotary				18	SS	100	16-24-50-40	74											
26																					
27																					
28						19	SS	100	29-28-30-36	58											
29																					
30																					

Continued on Next Page

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel

CHECKED: ACK

DATE: Oct 01, 2021

DATE:

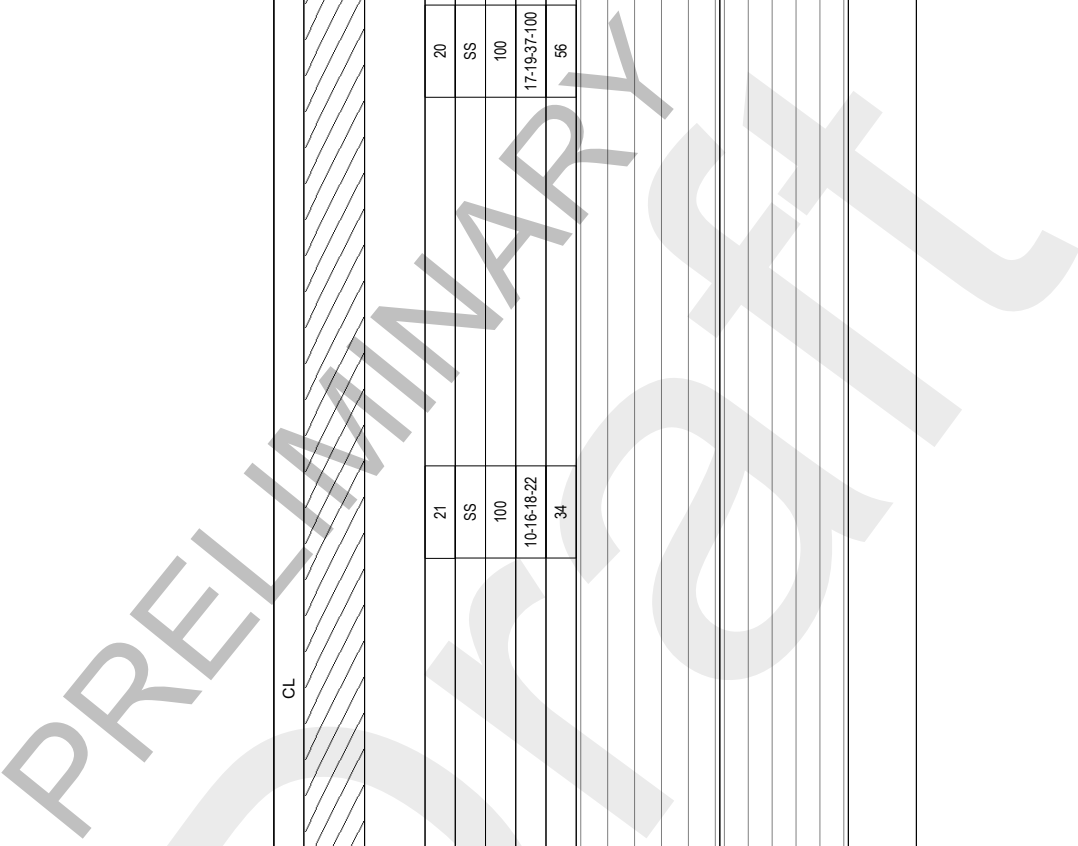
REV:

Pre-draft

RECORD OF BOREHOLE: BH CR4-06

CLIENT: AECOM	START DATE: October 01, 2021	ELEVATION: 258.20 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: October 06, 2021	COORDINATES: Lat: 44.131114° Long: -79.569432°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS		
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				□	
31	D 90	Mud Rotary	CLAYEY SILT (CL), trace sand, trace gravel Hard Grey Moist	CL		20	SS	100	17-19-37-100	56												
34						21	SS	100	10-16-18-22	34												
37						22	SS	100	12-15-20-31	35												
40						23	SS	100	12-14-18-27	32												



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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

REV: Pre-draft
DATE: Oct 01, 2021
DATE:

RECORD OF BOREHOLE: BH CR4-06

CLIENT: AECOM	START DATE: October 01, 2021	ELEVATION: 258.20 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: October 06, 2021	COORDINATES: Lat: 44.131114° Long: -79.569432°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				Nat Vane
41			CLAYEY SILT (CL), trace sand, trace gravel Hard Grey Moist	CL																	
42																					
43									24	SS	100	21-25-27-58	52								
44	D 90	Mud Rotary																			
45																					
46						25	SS	100	14-28-39-58	67											
47																					
48																					
49						26	SS	100	12-14-17-22	31											
50			End of hole at 49.38 m. End of Borehole																		

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



GOLDER
MEMBER OF WSP

LOGGED: Dipendra Paudel

CHECKED: ACK

DATE: Oct 01, 2021

DATE:

REV:

Pre-draft

RECORD OF BOREHOLE: BH CR4-07

CLIENT: AECOM	START DATE: July 13, 2021	ELEVATION: 261.21 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: July 15, 2021	COORDINATES: Lat: 44.131232° Long: -79.569039°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT					SHEAR STRENGTH			ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS	
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H	P	W	NP	○	●				□	×
0.00			ASPHALT (100 mm)			0.00														0.00 - 0.10 m bgs: Concrete		
261.11			SAND (SP), trace fines, trace gravel (FILL) Compact Brown Moist	SP		261.11	1	SS	83	8-11-12-14	23											
0.10							2a	SS	83	5-5-7-7	12											
260.21			CLAYEY SILT (CL), some sand, trace gravel (FILL) Stiff Grey Moist	CL		260.21	2b	SS	83	8-11-12-14	12											
1.00																						
259.74																						
1.47			SILTY SAND (SM) of slight plasticity, trace gravel (FILL) Compact to Dense Brown to grey Moist	SM			3	SS	100	9-11-12-14	23											
							4	SS	50	8-19-15-16	34											
							5	SS	100	10-10-8-10	18											
							6	SS	67	7-8-11-11	19											
							7a	SS														
256.31			SANDY SILT (ML) of slight plasticity, trace sand, trace gravel, trace organics Firm to very stiff Dark brown to grey Moist	ML		256.31	7b	SS	62	9-15-10-8	25											
4.90							8a	SS	100	4-3-4-7	7											
254.81			CLAYEY SILT (CL), trace to some sand, trace gravel (TILL) Firm to Very Stiff Grey Moist	CL		254.81	8b	SS	100	5-9-10-12	19											
6.40							9	SS	100	11-17-23-11	40											
							10	SS	92													
252.51			CLAYEY SILT (CL), trace to some sand Very Stiff to Hard Grey Moist	CL		252.51																
8.70																						

Continued on Next Page

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



GOLDER
MEMBER OF WSP

LOGGED: Matthew Montesano

CHECKED: ACK

DATE: Jul 13, 2021

DATE:

REV:

Pre-draft

RECORD OF BOREHOLE: BH CR4-07

CLIENT: AECOM	START DATE: July 13, 2021	ELEVATION: 261.21 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: July 15, 2021	COORDINATES: Lat: 44.131232° Long: -79.569039°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS			
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	NP Water Content (%)					○ Nat Vane	● Rem Vane	□ Pocket Pen
11			CLAYEY SILT (CL), trace to some sand Very Stiff to Hard Grey Moist	CL			11	SS	17	10-12-10-12	22									
12						12	SS	100	17-19-21-25	40										
13						13	SS	100	19-24-28-32	52										
14						14	SS	100	17-24-34-36	58										
15						15	SS	100	18-30-41-58	71										
16						16	SS	100	18-23-34-47	57										
17																				
18																				
19			End of hole at 18.90 m. End of Borehole			242.31														
20																				

11.28 - 18.90 m bgs:
Bentonite

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic Historic,
Automatic



LOGGED: Matthew Montesano
CHECKED: ACK

DATE: Jul 13, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-08

CLIENT: AECOM	DATE: September 09, 2021	ELEVATION: 253.27 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131227° Long: -79.568623°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	W Water Content (%)	NP Nonplastic	●	○	×			
0.00			CLAYEY SILT (CL), some sand, trace rootlets (FILL) Soft to firm Brown Moist			0.00	1	SS	100	2-2-2-3	4									
252.58			CLAYEY SILT (CL), trace sand, trace gravel Soft to stiff Brown Moist			0.69	2	SS	75	1-1-2-3	3									
251.06			CLAYEY SILT (CL), trace sand, trace gravel (TILL) Stiff to Hard Grey Moist			2.21	3	SS	50	4-4-7-9	11									
							4	SS	75	4-5-9-13	14									
							5	SS	100	7-8-9-14	17									
							6	SS	62	16-22-24-26	46									
							7	SS	79	14-14-20-27	34									
							8	SS	88	13-16-17-21	33									
							9A	SS												
							9B	SS	88	10-23-50-75	73									
							10	SS	100	21-24-27-28	51									

Continued on Next Page

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

DATE: Sep 09, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-08

CLIENT: AECOM	DATE: September 09, 2021	ELEVATION: 253.27 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131227° Long: -79.568623°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS				
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H	O	NP	Plastic & Liquid Limits (%)	Water Content (%)	Nonplastic				●	○	×	□
11			CLAYEY SILT (CL), trace sand, trace gravel (TILL) Stiff to Hard Grey Moist	CL		240.01	11	SS	100	22-28-34-41	62													
12						13.26	12	SS	100	22-28-34-27	62													
13			CLAYEY SILT (CL), trace sand Hard Grey Moist	CL			13	SS	100	16-19-22-22	41													
14							14	SS	100	13-17-21-29	38													
15	D 90 Mid Rotary						15	SS	100	11-19-20-32	39													
16																								
17																								
18																								
19							16	SS	100	12-16-18-21	34													
20																								

Continued on Next Page

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



GOLDER
MEMBER OF WSP

LOGGED: Dipendra Paudel

CHECKED: ACK

REV:

Pre-draft

DATE: Sep 09, 2021

DATE:

RECORD OF BOREHOLE: BH CR4-08

CLIENT: AECOM	DATE: September 09, 2021	ELEVATION: 253.27 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131227° Long: -79.568623°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				□
21			CLAYEY SILT (CL), trace sand Hard Grey Moist	CL																	
22									17	SS	100	24-17-21-30	38								
23																					
24																					
25	D 90 Mid Rotary								18	SS	100	16-16-26-34	42								
26																					
27																					
28						19	SS	100	14-16-20-23	36											
29																					
30																					

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DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel

CHECKED: ACK

DATE: Sep 09, 2021

DATE:

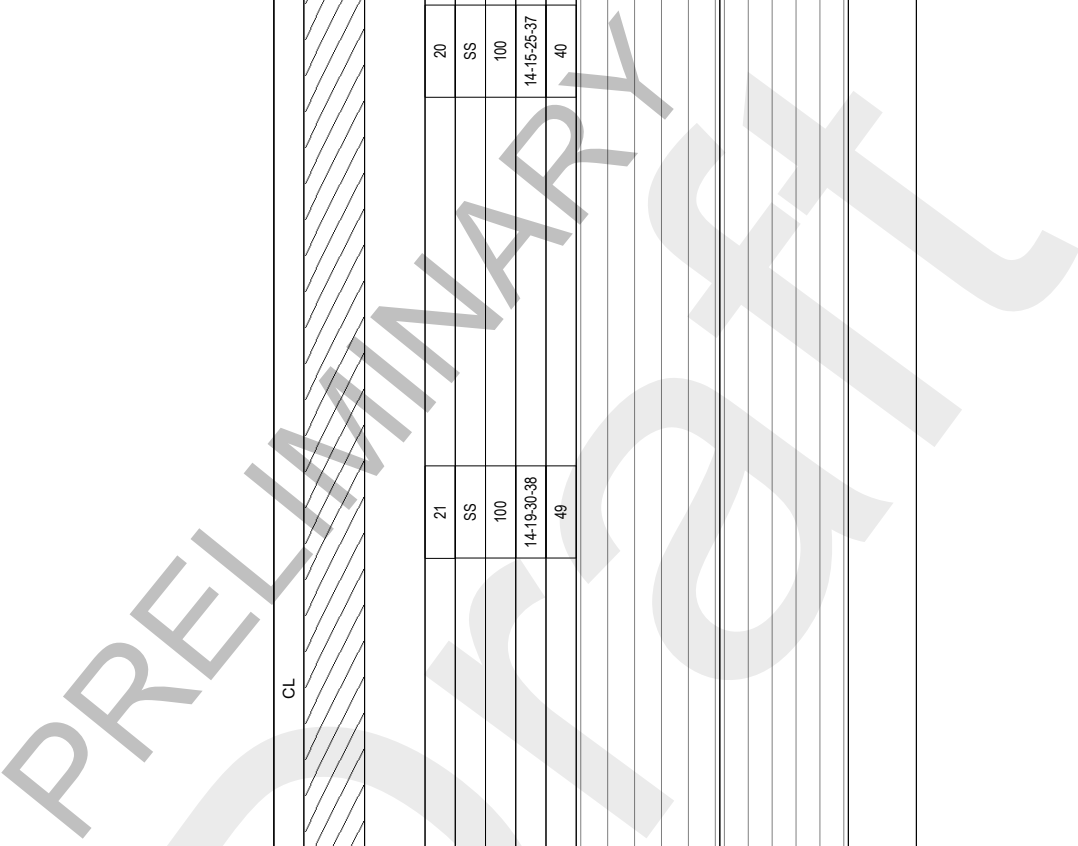
REV:

Pre-draft

RECORD OF BOREHOLE: BH CR4-08

CLIENT: AECOM	DATE: September 09, 2021	ELEVATION: 253.27 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131227° Long: -79.568623°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS			
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				Nat Vane	Rem Vane	Pocket Pen
31	D 90	Mud Rotary	CLAYEY SILT (CL), trace sand Hard Grey Moist	CL		20	SS	100	14-15-25-37	40													
34						21	SS	100	14-19-30-38	49													
37						22	SS	100	15-17-21-29	38													
40						23	SS		25-45-100/63/1mm	70													



Continued on Next Page

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

REV: Pre-draft
DATE: Sep 09, 2021
DATE:

RECORD OF BOREHOLE: BH CR4-08

CLIENT: AECOM	DATE: September 09, 2021	ELEVATION: 253.27 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.131227° Long: -79.568623°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×			
41			CLAYEY SILT (CL), trace sand Hard Grey Moist	CL	[Strata Plot]	206.03	24	SS	100	13-46-22-24	68									
42						47.24														
43																				
44																				
45	D 90 Mud Rotary																			
46							25	SS	100	16-17-27-34	44									
47																				
48			CLAYEY SILT (CL), trace sand, trace gravel Hard Grey Moist			203.91	26	SS		29-44-53-89	97									
49																				
50			End of hole at 49.38 m. End of Borehole																	

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



GOLDER
MEMBER OF WSP

LOGGED: Dipendra Paudel

CHECKED: ACK

REV:

Pre-draft

DATE: Sep 09, 2021

DATE:

RECORD OF BOREHOLE: BH CR4-09

CLIENT: AECOM	START DATE: October 06, 2021	ELEVATION: 256.46 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: October 12, 2021	COORDINATES: Lat: 44.130758° Long: -79.569369°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)			
0.00			CLAYEY SILT (CL), some sand, trace rootlets Soft Brown Moist	CL		0.00	1	SS	38	1-1-22	3					
255.77			SILTY SAND (SM) Loose Brown Moist	SM		0.69	2	SS	50	1-1-45	5					
255.01			CLAYEY SILT (CL), some sand, trace gravel, Very Stiff Brown Moist	CL		1.45	3	SS	62	4-6-12-17	18					
254.25			SILTY SAND (SM) Compact Grey Moist to Wet	SM		2.21	4	SS	100	5-7-7-9	14					
252.73			Sandy CLAYEY SILT (CL), trace gravel Firm to very stiff Grey Moist	CL		3.73	6	SS	29	3-7-11-10	18					
							7	SS	75	6-3-4-3	7					
							8	SS	88	8-11-14-15	25					
							9	SS	62	7-11-10-11	21					
							10	SS	75	11-17-20-21	37					

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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

DATE: Oct 06, 2021
DATE: Oct 21, 2021

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-09

CLIENT: AECOM	START DATE: October 06, 2021	ELEVATION: 256.46 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: October 12, 2021	COORDINATES: Lat: 44.130758° Long: -79.569369°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×			
10.21			Sandy CLAYEY SILT (CL), trace gravel Firm to very stiff Grey Moist			246.25														
11			CLAYEY SILT (CL) Hard Grey Moist	CL		10.21	11	SS	75	12-14-16-19										
12							12	SS	88	13-16-22-19										
13																				
14							13	SS	100	24-29-31-44										
15																				
16							14	SS	88	24-41-36-71										
17																				
18																				
19																				
20							16	SS	100	14-15-22-35										

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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

DATE: Oct 06, 2021
DATE: Oct 21, 2021

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-09

CLIENT: AECOM	START DATE: October 06, 2021	ELEVATION: 256.46 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: October 12, 2021	COORDINATES: Lat: 44.130758° Long: -79.569369°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				□
21			CLAYEY SILT (CL) Hard Grey Moist	CL	[Hatched Pattern]																
22						17	SS	100	14-19-34-65	53											
23																					
24																					
25	D 90	Mud Rotary - 102-mm Hole Dia.				18	SS	100	35-23-27-68	50											
26																					
27																					
28						19	SS	100	16-23-42-100	65											
29																					
30																					

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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

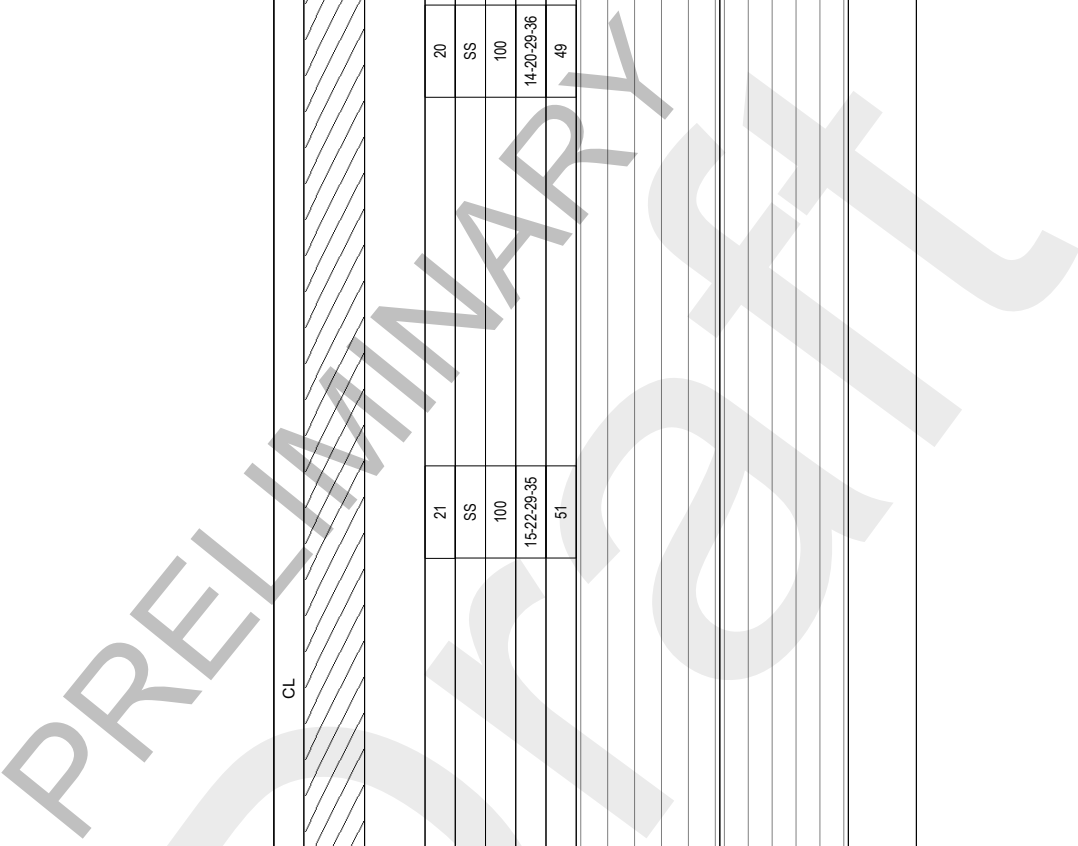
DATE: Oct 06, 2021
DATE: Oct 21, 2021

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-09

CLIENT: AECOM	START DATE: October 06, 2021	ELEVATION: 256.46 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: October 12, 2021	COORDINATES: Lat: 44.130758° Long: -79.569369°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×			
31			CLAYEY SILT (CL) Hard Grey Moist	CL	[Hatched Pattern]															
						20	SS	100		14-20-29-36	49									
						21	SS	100		15-22-29-35	51									
						22	SS	100		14-21-25-24	46									
40						23	SS	100												



Continued on Next Page

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

REV: Pre-draft
DATE: Oct 06, 2021
DATE: Oct 21, 2021

RECORD OF BOREHOLE: BH CR4-09

CLIENT: AECOM	START DATE: October 06, 2021	ELEVATION: 256.46 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: October 12, 2021	COORDINATES: Lat: 44.130758° Long: -79.569369°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×			
41			CLAYEY SILT (CL) Hard Grey Moist	CL		207.08	24	SS	114	19-28-56-100/83mm										
42																				
43																				
44																				
45																				
46							25	SS	100	14-16-24-32										
47																				
48																				
49							26	SS	100	18-24-33-37										
50			End of hole at 49.38 m. End of Borehole																	

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
CHECKED: ACK

DATE: Oct 06, 2021
DATE: Oct 21, 2021

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-10

Sheet 1 of 2

CLIENT: AECOM
 PROJECT: Bradford Bypass
 PROJECT NO: 19136074
 LOCATION: Bradford, Ontario

DATE: July 13, 2021
 CONTRACTOR:

ELEVATION: 259.94 m (CGVD28)
 COORDINATES: Lat: 44.130808° Long: -79.568956°
 COORD SYS: Geographical Coordinates
 HORZ DATUM: NAD83 VERT DATUM: CGVD28
 HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H	NP			
			ASPHALT (200 mm)			0.00										
1			SAND (SP), trace gravel, trace fines (FILL) Compact Brown Dry to moist	SP		259.74	1	SS	62	10-15-16-15						
						258.64	2A	SS		12-10-5-5						
2			Sandy CLAYEY SILT (CL), trace gravel (FILL) Stiff to very stiff Brown to grey Moist	CL		1.30	2B	SS	103	7-8-7-9						
							3	SS		7-13-14-13						
							4	SS		5-4-5-4						
							5	SS		7-12-14-12						
							6	SS		8-10-7-8						
							7	SS								
						254.30										
6			SILT (ML), trace sand Compact to dense Grey Wet	ML		5.64	8	SS		4-10-10-8						
8			- 7.62 to 8.23 m: no sample recovered				9	SS		14-16-15-16						
9			CLAYEY SILT (CL), trace sand, trace gravel (TILL) Very stiff to hard Brown to brownish grey Moist	CL		251.25										
						8.69	10	SS		12-17-18-20						
10																

Continued on Next Page

DEPTH SCALE: 1:51
 HAMMER TYPE:



LOGGED: DP
 CHECKED: ACK

REV: Pre-draft
 DATE: Jul 13, 2021
 DATE:

RECORD OF BOREHOLE: BH CR4-10

CLIENT: AECOM	DATE: July 13, 2021	ELEVATION: 259.94 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.130808° Long: -79.568956°
PROJECT NO: 19136074		COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR:	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H	O	NP	●	○	×			
11			CLAYEY SILT (CL), trace sand, trace gravel (TILL) Very stiff to hard Brown to brownish grey Moist	CL		248.21	11	SS	6-9-11-17	20										
12			SANDY CLAYEY SILT (CL), trace gravel (TILL) Hard Grey Moist			248.21	12	SS	17-30-48-50	78										
13								14	SS	11-100										
14								13	SS	17-25-35-22	60									
15																				
16						243.63	15	SS	25-28-42-47	70										
17			SILT (ML), trace sand Dense to very dense Grey Wet	ML		16.31	16	SS	12-23-26-26	49										
18								241.04												
19			End of hole at 18.90 m. End of Borehole																	
20																				

DEPTH SCALE: 1:51
HAMMER TYPE:



LOGGED: DP
CHECKED: ACK

REV: Pre-draft
DATE: Jul 13, 2021
DATE:

RECORD OF BOREHOLE: BH CR4-11

CLIENT: AECOM	DATE: August 30, 2021	ELEVATION: 253.34 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.130896° Long: -79.568730°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)				
0.00			SILTY SAND (SM), trace organics (FILL) Loose Brown Moist	SM	[Pattern]	0.00	1	SS	58	3-3-5.6		8					
252.65			CLAYEY SILT (CL), trace sand, trace gravel Firm to stiff Grey to Brown Moist -Grey below a depth of 2.3m (Elev. 251.0 m)	CL	[Pattern]	0.69	2	SS	100	2-2-3.4		5					
							3	SS	80	3-3-6.8		9					
							4	SS	100	4-6-7.12		13					
							5A	SS	100	9-9-13-18		22					
249.91			SAND (SP), trace gravel Compact Grey Wet	SP	[Pattern]	3.43	9B										
249.61			CLAYEY SILT (CL), trace sand, trace gravel to CLAYEY SAND (SC), some gravel (TILL) Dense Grey Moist to wet	CL	[Pattern]	3.73	6	SS	49	100							
							7	SS	88	12-21-22-28		43					
			-Sandy SILT (ML) of slight plasticity interlayer				8	SS	34	36-30-33-28		63					
							9A										
							9B	SS	80	19-18-25-28		43					
							10	SS	100	32-31-35-66		66					

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DEPTH SCALE: 1:51
HAMMER TYPE:



LOGGED: Dipendra Paudel
CHECKED: ACK

DATE: Aug 30, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-11

CLIENT: AECOM	DATE: August 30, 2021	ELEVATION: 253.34 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.130896° Long: -79.568730°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS		
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)					NP Nonplastic	●
11			CLAYEY SILT (CL), trace sand, trace gravel to CLAYEY SAND (SC), some gravel (TILL) Dense Grey Moist to wet	CL		237.03	11	SS	100	21-22-31-38	53								
			-Sandy SILT (ML) of slight plasticity interlayer					12	SS	88	14-16-27-29	43							
13								13	SS	100	9-8-19-23	27							
14								14	SS		10-17-17-19	34							
15	D 90	Mud Rotary				16													
16			SILT (ML) of slight plasticity, trace sand Hard Grey Moist	ML		16.31	15	SS	75	22-33-43-71	76								
17								18											
18			CLAYEY SILT-SILT (CL-ML) to CLAYEY SILT (CL) Hard Grey Moist	CL-ML		235.51	16	SS		9-15-18-21	33								
19								17											
20																			

Continued on Next Page

DEPTH SCALE: 1:51
HAMMER TYPE:



LOGGED: Dipendra Paudel
CHECKED: ACK

DATE: Aug 30, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-11

CLIENT: AECOM	DATE: August 30, 2021	ELEVATION: 253.34 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.130896° Long: -79.568730°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS		
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×					Nat Vane	Rem Vane
21	D 90 Mud Rotary		CLAYEY SILT-SILT (CL-ML) to CLAYEY SILT (CL) Hard Grey Moist	CL-ML		17	SS		11-17-18-23	35													
22						18	SS	100	13-15-22-40	37													
23						19	SS	100	18-30-48-100	78													
24																							
25						20	SS	100	15-18-27-39	45													
26						21	SS	100	18-25-39-63	64													
27																							
28						22	SS	100	14-17-20-26	37													
29																							
30																							
30																							

Continued on Next Page

DEPTH SCALE: 1:51
HAMMER TYPE:



LOGGED: Dipendra Paudel
CHECKED: ACK

DATE: Aug 30, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-11

CLIENT: AECOM	DATE: August 30, 2021	ELEVATION: 253.34 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.130896° Long: -79.568730°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS					
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)					NP Nonplastic	●	○		
31	D 90 Mid Rotary		CLAYEY SILT-SILT (CL-ML) to CLAYEY SILT (CL) Hard Grey Moist	CL-ML																		
						24	SS	100	14-26-34-34	60												
						25	SS	100	17-22-29-40	51												
						26	SS	100	18-36-50-68	86												
						27	SS	100	15-21-27-48	48												
						28	SS	100	20-23-25-50	48												
						29	SS	100	19-23-30-99	53												
						30	SS	114	19-40-400/63/mm	59												

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DEPTH SCALE: 1:51
HAMMER TYPE:



LOGGED: Dipendra Paudel
CHECKED: ACK

DATE: Aug 30, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-11

CLIENT: AECOM	DATE: August 30, 2021	ELEVATION: 253.34 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.130896° Long: -79.568730°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS		
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H	O	NP	●	○	×					□	
41	D 90 Mud Rotary		CLAYEY SILT-SILT (CL-ML) to CLAYEY SILT (CL) Hard Grey Moist	CL-ML		207.32	31	SS	100	16-22-28-28	60												
42																							
43																							
44																							
45																							
46			SILTY SAND (SM) Very dense Grey Moist	SM		207.32 46.02																	
47																							
48																							
49			CLAYEY SILT (CL), trace sand, trace gravel (TILL) Hard Grey Moist	CL		204.27 49.07																	
50																							

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DEPTH SCALE: 1:51
HAMMER TYPE:



LOGGED: Dipendra Paudel
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DATE: Aug 30, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-11

CLIENT: AECOM

DATE: August 30, 2021

ELEVATION: 253.34 m (CGVD28)

PROJECT: Bradford Bypass

COORDINATES: Lat: 44.130896° Long: -79.568730°

PROJECT NO: 19136074

INCLINATION: 90.0°


COORD SYS: Geographical Coordinates

LOCATION: Bradford, Ontario

CONTRACTOR: Walker

HORZ DATUM: NAD83 VERT DATUM: CGVD28

HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE				SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS					
			DESCRIPTION	USCS	STRATA PLOT	ELEV.	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H	O	NP	●	○	×	□									
51	D 90 MUD Rotary		CLAYEY SILT (CL), trace sand, trace gravel (TILL) Hard Grey Moist	CL		202.44	35	SS	100	32-44-62,84	106															Pipe Stickup: 0.00 m	
51	End of hole at 50.90 m. End of Borehole																										
52																											
53																											
54																											
55																											
56																											
57																											
58																											
59																											
60																											

PRELIMINARY

DEPTH SCALE: 1:51

HAMMER TYPE:



GOLDER
MEMBER OF WSP

LOGGED: Dipendra Paudel

CHECKED: ACK

REV:
Pre-draft

DATE: Aug 30, 2021

DATE:

RECORD OF BOREHOLE: BH CR4-12

CLIENT: AECOM	DATE: October 13, 2021	ELEVATION: 255.23 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.130596° Long: -79.569281°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV.	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H	O	NP	Water Content (%)	Plastic & Liquid Limits (%)	Nat Vane			
0.00			SILTY SAND (SM), trace rootlets, trace gravel, Loose Brown Moist	SM		0.00	1	SS	62	1-1-23	3									
253.78			CLAYEY SILT (CL), trace to some sand, trace gravel, (TILL) Stiff to Hard Grey Moist	CL		253.78	2	SS	62	2-2-5-7	7									
1.45						1.45	3	SS	100	2-4-4-9	8									
							4	SS	75	4-4-8-10	12									
							5	SS	100	4-4-5-9	9									
							6	SS	100	8-13-17-23	30									
							7	SS	100	20-35-34-45	69									
							8	SS	75	25-45-51-40	96									
							9	SS	100	8-14-17-23	31									
246.54						246.54														
8.69			CLAYEY SILT (CL) Hard Grey Moist to Wet			8.69	10	SS	75	17-30-38-33	68									

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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
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DATE: Oct 13, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH CR4-12

CLIENT: AECOM	DATE: October 13, 2021	ELEVATION: 255.23 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.130596° Long: -79.569281°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×			
11	D 90 240 mm C.D. Hollow Stem Auger		CLAYEY SILT (CL) Hard Grey Moist to Wet	CL		243.95	11	SS	100	21-27-29-23	56									
			End of hole at 11.28 m. End of Borehole																	
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Dipendra Paudel
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REV: Pre-draft
DATE: Oct 13, 2021
DATE:

RECORD OF BOREHOLE: BH CR4-13

CLIENT: AECOM	DATE: August 27, 2021	ELEVATION: 252.46 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.130667° Long: -79.568660°
PROJECT NO: 19136074		COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR:	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H	Plastic & Liquid Limits (%)	Water Content (%)	NP	Nonplastic	○			
0.00			SILTY SAND (SM), trace organics, trace rootlets (FILL) Compact Brown Moist	SM	[Pattern]	0.00	1	SS		3-6-11-8	17									
251.77			CLAYEY SILT (CL), trace sand, trace gravel Firm Brown Moist		[Pattern]	0.69	2	SS		1-2-2-5	4									
250.25			CLAYEY SILT (CL), trace to some sand, trace gravel Very stiff to hard Brown to grey Moist		[Pattern]	2.21	3	SS		2-3-5-8	8									
			-Grey below a depth of 3.8m below ground surface (Elev. 248.7m)		[Pattern]		4	SS		4-6-11-13	17									
					[Pattern]		5	SS		11-17-23-28	40									
					[Pattern]		6	SS		12-17-16-18	33									
					[Pattern]		7	SS		6-13-14-18	27									
					[Pattern]		8	SS		10-12-18-24	30									
					[Pattern]		9	SS		14-21-26-24	47									
					[Pattern]		10	SS		14-16-17-24	33									
242.71			End of hole at 9.75 m.		[Pattern]															
242.71			End of Borehole		[Pattern]															

DEPTH SCALE: 1:51
HAMMER TYPE:



LOGGED: DP
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DATE: Aug 27, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH HF-01

CLIENT: AECOM	START DATE: July 19, 2021	ELEVATION: 264.43 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: July 20, 2021	COORDINATES: Lat: 44.131934° Long: -79.569230°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS
			DESCRIPTION	USCS	STRATA PLOT	ELEV.	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)				
0.00			ASPHALT (100 mm)			0.00											
0.10			SAND (SP) some gravel to gravelly, trace fines (FILL) Compact Brown Moist	SP		264.33	1a	SS	75	9-10-15-9	25			MIS_202 109103			0.00 - 0.10 m bgs:
0.73			SILT (ML) of slight plasticity, some sand to SILTY SAND (ML), of slight plasticity, trace gravel (FILL) Loose to compact Brown to Grey Moist			263.70	2	SS	54	6-17-12-5	29			MIS_202 109105			
							3	SS	83	9-9-8-15	17						
				CL			4	SS	100	4-2-3-2	5			MIS_202 109101			0.10 - 4.27 m bgs: Bentonite
							5a	SS	75	2-4-6-16	10						
							5b	SS	75	2-4-6-16	10						
			SILTY CLAY (CI), trace sand Firm to very stiff Brown Moist	CI		260.70	6	SS	100	2-2-3-5	5			MIS_202 109131			
			- 4.60 m: Wet sands noted at approximately 4.6 m, difficult advancement with augers. Borehole moved 1.0 m south, obstruction encountered at a depth of 0.3 m. Borehole moved approximately 2.7 m south of original location, sampling resumed at a depth of 10.7 m.				7	SS	67	5-9-15-19	24						
							8	SS	100	13-18-24-29	42			MIS_202 109104			4.27 - 7.62 m bgs: Sand
			SILTY SAND (SM) Loose to very dense Brown to Grey Wet	SM		258.79	9	SS	100	19-48-52/81mm							
							10	SS	100	2-4-4-7	8			MIS_202 109106			7.62 - 10.67 m bgs:

Continued on Next Page

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



GOLDER
MEMBER OF WSP

LOGGED: Matthew Montesano

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DATE: Jul 19, 2021

DATE:

REV:

Pre-draft

RECORD OF BOREHOLE: BH HF-01

CLIENT: AECOM	START DATE: July 19, 2021	ELEVATION: 264.43 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: July 20, 2021	COORDINATES: Lat: 44.131934° Long: -79.569230°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS	
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)					NP Nonplastic
11	Diedrich D-50 Track 210 mm O.D. Hollow Stem Auger - 210-mm Hole Dia.		SILTY SAND (SM) Loose to very dense Brown to Grey Wet - 10.21 m: - grey below a depth of 10.2 m	SM	[Strata Plot]	252.70	11	SS	100	9-18-31-46	49							
12			SILT (ML) of slight plasticity, trace sand Hard Grey Wet	ML	[Strata Plot]	11.73	12	SS	100	17-23-30-62	53							
14					ML	[Strata Plot]		13	SS	100	26-42-58/133mm							
15						ML	[Strata Plot]		14	SS	100	20-23-26-53	49					
16			End of hole at 15.85 m.			248.58												
17			End of Borehole Note: 1. Borehole moved 1 m south due to flowing sands in hollow stem augers at a depth of 4.6 m.															
18																		
19																		
20																		

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Matthew Montesano
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DATE: Jul 19, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH HF-02

CLIENT: AECOM	START DATE: July 06, 2021	ELEVATION: 258.07 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: July 09, 2021	COORDINATES: Lat: 44.130378° Long: -79.568995°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)			
0.00			ASPHALT (200 mm)			0.00										
0.20			Gravelly SAND (SP-SW), trace fines (FILL) Loose to compact Brown Moist	SP-SM		257.87	1	SS	75	11-12-11-9						
1.04			SILTY SAND (SM) of slight plasticity, some gravel (FILL) Loose to dense Brown Moist - trace organics, trace rootlets between a depth of 1.0 m and 2.2 m	SP		257.03	2a	SS	83	4-3-2-3						MIS_202 1072713 1
1.04						1.04	2b	SS	83	4-3-2-3						
2.2							3	SS	86	2-2-2-3						
3.2							4	SS	33	3-2-2-3						MIS_202 1072713 4
4.5							5	SS	67	39-17-12-16						
4.5							6a	SS	83	12-18-13-11						MIS_202 1072713 5
4.5							6c	SS	83	12-18-13-11						
4.50			SILT (ML) of slight plasticity and sand trace gravel, trace organics Compact Brown Moist	ML		253.57	7	SS	83	2-12-11-8						MIS_202 1072713 6
6.27			SILTY CLAY (CI) to sandy CLAYEY SILT-SILT (CL-ML), trace gravel (TILL) Stiff to hard Brown to grey Moist	CL		251.80	8a	SS	100	3-4-11-15						
6.27							8b	SS	100	3-4-11-15						
8.7							9	SS	96	9-10-13-12						MIS_202 1072713 7
8.7							10	SS	100	2-4-4-7						
8.7			- grey below a depth of 8.7 m				8									

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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Matthew Montesano
CHECKED: ACK

REV: Pre-draft
DATE: Jul 06, 2021
DATE:

RECORD OF BOREHOLE: BH HF-02

CLIENT: AECOM	START DATE: July 06, 2021	ELEVATION: 258.07 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: July 09, 2021	COORDINATES: Lat: 44.130378° Long: -79.568995°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS				
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				Nat Vane	Rem Vane	Pocket Pen	
11	Diedrich D-50 Track 210 mm O.D. Hollow Stem Auger - 210-mm Hole Dia.		SILTY CLAY (CI) to sandy CLAYEY SILT-SILT (CL-ML), trace gravel (TILL) Stiff to hard Brown to grey Moist	CL		242.22	11	SS	92	7-6-9-17	15													
12						12	SS	75	22-20-38-50	58														
13						13	SS	100	31-49-51/133mm															
14						14	SS	100	21-23-17-27	40														
15			End of hole at 15.85 m.																					
16			End of Borehole																					
17																								
18																								
19																								
20																								

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Matthew Montesano	DATE: Jul 06, 2021
CHECKED: ACK	DATE:

REV: Pre-draft

RECORD OF BOREHOLE: BH HF-03

CLIENT: AECOM	START DATE: July 12, 2021	ELEVATION: 258.04 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: July 13, 2021	COORDINATES: Lat: 44.130388° Long: -79.568829°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)			
0.00			ASPHALT (200 mm)			0.00										
0.20			SAND (SP), some gravel, trace fines (FILL) Compact to dense Brown Moist	SP		257.84	1	SS	75	19-18-16-15						
0.20							2	SS	83	8-9-8-6				MIS_202 1072714 1		
1.47			Sandy CLAYEY SILT-SILT (CL-ML), trace to some gravel (FILL) Firm to stiff Grey Moist	CL-ML		256.57	3	SS	92	6-4-4-9						
1.47							4	SS	100	10-8-8-14				MIS_202 1072714 2		
2.97			SILT (ML) of slight plasticity, some sand, trace gravel Firm to very stiff Brown Moist	ML		255.07	5	SS	100	8-8-12-16						
2.97							6	SS	100	9-12-13-15				MIS_202 1072714 3		
2.97							7	SS	62	9-15-10-8				MIS_202 1072714 4		
2.97							8	SS	100	2-3-6-9				MIS_202 1072714 5		
7.16			CLAYEY SILT-SILT (CL-ML) to SILTY CLAY (CI), trace sand Hard Moist Grey	CI		250.88	9	SS	92	9-10-14-16						
7.16							10	SS	100	8-9-14-11				MIS_202 1072713 8		

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DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Matthew Montesano
CHECKED: ACK

DATE: Jul 12, 2021
DATE:

REV:
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RECORD OF BOREHOLE: BH HF-03

CLIENT: AECOM	START DATE: July 12, 2021	ELEVATION: 258.04 m (CGVD28)
PROJECT: Bradford Bypass	END DATE: July 13, 2021	COORDINATES: Lat: 44.130388° Long: -79.568829°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS		
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				□	
11		Diedrich D-50 Track 210 mm O.D. Hollow Stem Auger - 210-mm Hole Dia.	CLAYEY SILT-SILT (CL-ML) to SILTY CLAY (Cl), trace sand Hard Moist Grey	CI		11	SS	100	6-7-9-9	16												
12						12	SS		30-38-43-47	81												
13						13	SS		15-15-22-40	37												
14						14	SS		19-31-38-38	69												
15						15	SS		16-21-16-19	37												
16						16	SS		15-88-42/105mm													
17			CLAYEY SILT (CL) trace sand, trace gravel (TILL) Hard Grey Moist	CL		241.69																
18			CLAYEY SILT (CL) Hard Grey Moist			240.24																
19			End of hole at 18.69 m. End of Borehole			239.35																

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Matthew Montesano
CHECKED: ACK

REV: Pre-draft
DATE: Jul 12, 2021
DATE:

RECORD OF BOREHOLE: BH HF-04

CLIENT: AECOM	DATE: June 29, 2021	ELEVATION: 255.52 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.129614° Long: -79.568812°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	Water Content (%)			
0.00			ASPHALT (180 mm)			0.00										
0.18			SILTY SAND (SM), some gravel (FILL) Compact Brown Moist	SM		255.34	1	SS	50	10-11-11-13	22					
0.18							2	SS	38	11-8-6-8	14				MIS_202 1091014	
1.46			SILT (ML), some sand to SILTY SAND (SM) some gravel (FILL) Compact to Dense Brown Moist	ML		254.06	3	SS	21	7-6-6-6	12					
1.46							4	SS	100	2-11-18-25	29					
3.74			CLAYEY SILT (CL), trace sand, trace gravel, trace organics Firm Dark brown Moist			251.78	5a	SS	67	18-29-13-10	42		NP		MIS_202 109132	
3.74							5b	SS	67	18-29-13-10	42					
5.80			SANDY CLAYEY SILT (CL), trace gravel to gravelly (TILL) Stiff to hard Brown to grey Moist	CL		249.72	6	SS	100	4-4-4-3	8				MIS_202 1091011	
5.80							7	SS	100	9-8-12-12	20				MIS_202 1091010	
							8	SS	100	12-19-24-28	43					
							9	SS	83	14-17-17-18	34				MIS_202 1091012	

Continued on Next Page

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



GOLDER
MEMBER OF WSP

LOGGED: Matthew Montesano

CHECKED: ACK

DATE: Jun 29, 2021

DATE:

REV:

Pre-draft

RECORD OF BOREHOLE: BH HF-04

CLIENT: AECOM	DATE: June 29, 2021	ELEVATION: 255.52 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.129614° Long: -79.568812°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT				SHEAR STRENGTH				ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)	NP Nonplastic	●	○	×				□
11		Diedrich D-90 Track 210 mm O.D. Hollow Stem Auger - 210-mm Hole Dia.	Sandy CLAYEY SILT (CL), trace gravel to gravelly (TILL) Stiff to hard Brown to grey Moist	CL		240.73	10	SS	100	8-10-11-14	21										
12						11	SS	83	8-10-12-18	22											
13						12	SS	46	9-15-20-25	35	O										MIS_202 1091013
14			CLAYEY SILT-SILT (CL-ML) Hard grey Moist	CL-ML		14.79	13	SS	100	22-21-34-41	55	CH							MIS_202 109109		
15		239.67																			
16			End of hole at 15.85 m. End of Borehole																		
17																					
18																					
19																					
20																					

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Matthew Montesano
CHECKED: ACK

DATE: Jun 29, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH HF-05

CLIENT: AECOM	DATE: June 24, 2021	ELEVATION: 254.70 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.129434° Long: -79.568551°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS	
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)				NP Nonplastic	○ Nat Vane
0.00			ASPHALT (100 mm)			0.00												
0.10			SAND (SP) and Gravel, trace fines (FILL) Dense Brown Moist	SP		254.60	1	SS	50	19-17-15-16					MIS_202 1072714 6			0.00 - 0.10 m bgs:
253.70			SILTY SAND (SM) of slight plasticity, some gravel (FILL) Loose to dense Brown Moist	SM		1.00	2a	SS	58	6-13-26-27								
							2b	SS	50	8-7-9-11					MIS_202 1072714 9			0.10 - 3.96 m bgs: Bentonite
							3	SS	50	6-10-11-9								
							4	SS	100	8-4-5-7					MIS_202 1072715 0			
							5	SS	67	8-4-6-6								
250.65			CLAYEY SILT (CL), trace sand, trace organics Firm Dark brown Moist			4.05	6a	SS	100	3-5-5-4					MIS_202 1072715 1			
							6b	SS	100	5-7-13-18								
							7	SS	83	27-40-45-58/135mm					MIS_202 1072715 2			
249.00			CLAYEY SILT (CL), some sand, trace gravel to Sandy CLAYEY SILT-SILT (CL-ML), trace gravel (TILL) Very stiff to hard Brown to grey Moist			5.70	8	SS	100	20-27-38-42					MIS_202 1072715 3			3.96 - 7.62 m bgs: Sand
			Grey below a depth of 9.1m	CL			9	SS	100									
							10	SS	100						MIS_202 1072714 7			9.10 - 9.10 m: Grey below a depth of 9.1 m

Continued on Next Page

DEPTH SCALE: 1:51
HAMMER TYPE: Automatic



LOGGED: Matthew Montesano
CHECKED: ACK

DATE: Jun 24, 2021
DATE:

REV:
Pre-draft

RECORD OF BOREHOLE: BH HF-05

CLIENT: AECOM	DATE: June 24, 2021	ELEVATION: 254.70 m (CGVD28)
PROJECT: Bradford Bypass		COORDINATES: Lat: 44.129434° Long: -79.568551°
PROJECT NO: 19136074	INCLINATION: 90.0°	COORD SYS: Geographical Coordinates
LOCATION: Bradford, Ontario	CONTRACTOR: Walker Drilling Ltd.	HORZ DATUM: NAD83 VERT DATUM: CGVD28
		HOLE LOC: Bradford Bypass - County Road 4

DEPTH (m)	DRILL RIG	DRILL METHOD	MATERIAL PROFILE			SAMPLES				WATER CONTENT		SHEAR STRENGTH		ADDITIONAL LAB TESTING	ADDITIONAL OBSERVATIONS	GROUNDWATER OBSERVATIONS	CONSTRUCTION AND INSTALLATION DETAILS				
			DESCRIPTION	USCS	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	REC %	BLOWS	N-VALUE	H Plastic & Liquid Limits (%)	O Water Content (%)					NP Nonplastic	Nat Vane	Rem Vane	Pocket Pen
11	Diedrich D-50 Track 210 mm O.D. Hollow Stem Auger - 203-mm Hole Dia.		CLAYEY SILT (CL), some sand, trace gravel to Sandy CLAYEY SILT-SILT (CL-ML), trace gravel (TILL) Very stiff to hard Brown to grey Moist	CL	[Strata Plot]	242.30	11	SS		21-25-33-41	58										
12			Grey below a depth of 9.1m			12a	SS	100													
13			CLAYEY SILT (CL) Hard Grey Moist			12b	SS	100	20-48-60	108											
14						13	SS	100	34-43-57	100											MIS_202 1072714 8
15						14	SS	100	28-52-48/105mm												
16			End of hole at 15.65 m.			239.05															
16			End of Borehole																		
17																					
18																					
19																					
20																					

DEPTH SCALE: 1:51

HAMMER TYPE: Automatic



GOLDER
MEMBER OF WSP

LOGGED: Matthew Montesano

CHECKED: ACK

DATE: Jun 24, 2021

DATE:

REV:

Pre-draft

Appendix **D**

Laboratory Analysis Results





CLIENT NAME: AECOM CANADA LTD
105 COMMERCE VALLEY DR.W 7TH FLOOR
MARKHAM, ON L3T7W3
(905) 886-7022

ATTENTION TO: Kesh Appadurai
PROJECT: 60636190 - CR-4

AGAT WORK ORDER: 21T768662

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer
TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Jul 09, 2021

PAGES (INCLUDING COVER): 17

VERSION*: 1

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

*Notes

Disclaimer:

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



Certificate of Analysis

AGAT WORK ORDER: 21T768662

PROJECT: 60636190 - CR-4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY: Kesh A

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-06-30

DATE REPORTED: 2021-07-09

Parameter	Unit	SAMPLE DESCRIPTION:		HF-04-SS-2	CV1-03-SS-2
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2021-06-29	2021-06-25
		G / S	RDL	2682272	2682274
Antimony	µg/g	40	0.8	<0.8	<0.8
Arsenic	µg/g	18	1	1	2
Barium	µg/g	670	2.0	37.6	40.8
Beryllium	µg/g	8	0.4	<0.4	<0.4
Boron	µg/g	120	5	<5	<5
Boron (Hot Water Soluble)	µg/g	2	0.10	0.12	0.15
Cadmium	µg/g	1.9	0.5	<0.5	<0.5
Chromium	µg/g	160	5	29	23
Cobalt	µg/g	80	0.5	3.7	3.8
Copper	µg/g	230	1.0	7.1	8.0
Lead	µg/g	120	1	7	13
Molybdenum	µg/g	40	0.5	<0.5	<0.5
Nickel	µg/g	270	1	6	6
Selenium	µg/g	5.5	0.8	<0.8	<0.8
Silver	µg/g	40	0.5	<0.5	<0.5
Thallium	µg/g	3.3	0.5	<0.5	<0.5
Uranium	µg/g	33	0.50	<0.50	<0.50
Vanadium	µg/g	86	0.4	24.4	23.5
Zinc	µg/g	340	5	23	32
Chromium, Hexavalent	µg/g	8	0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	1.4	0.005	0.811	0.366
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	12	N/A	9.54	4.48
pH, 2:1 CaCl ₂ Extraction	pH Units		NA	7.89	7.97

Certified By:



N. Basu



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T768662

PROJECT: 60636190 - CR-4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY: Kesh A

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-06-30

DATE REPORTED: 2021-07-09

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.
2682272-2682274 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:





Certificate of Analysis

AGAT WORK ORDER: 21T768662

PROJECT: 60636190 - CR-4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY: Kesh A

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2021-06-30

DATE REPORTED: 2021-07-09

		SAMPLE DESCRIPTION: HF-04-SS-2		
		SAMPLE TYPE: Soil		
		DATE SAMPLED: 2021-06-29		
Parameter	Unit	G / S	RDL	2682272
Naphthalene	µg/g	0.2	0.05	<0.05
Acenaphthylene	µg/g	0.093	0.05	0.06
Acenaphthene	µg/g	2.5	0.05	0.19
Fluorene	µg/g	6.8	0.05	0.33
Phenanthrene	µg/g	12	0.05	1.21
Anthracene	µg/g	0.16	0.05	0.53
Fluoranthene	µg/g	2.8	0.05	1.41
Pyrene	µg/g	28	0.05	1.16
Benz(a)anthracene	µg/g	0.92	0.05	0.46
Chrysene	µg/g	9.4	0.05	0.59
Benzo(b)fluoranthene	µg/g	3.2	0.05	0.62
Benzo(k)fluoranthene	µg/g	3.1	0.05	0.26
Benzo(a)pyrene	µg/g	0.31	0.05	0.38
Indeno(1,2,3-cd)pyrene	µg/g	0.76	0.05	0.15
Dibenz(a,h)anthracene	µg/g	0.7	0.05	<0.05
Benzo(g,h,i)perylene	µg/g	13	0.05	0.17
1 and 2 Methyl naphthalene	µg/g	0.59	0.05	<0.05
Moisture Content	%		0.1	7.8
Surrogate	Unit	Acceptable Limits		
Naphthalene-d8	%	50-140		77
Acridine-d9	%	50-140		77
Terphenyl-d14	%	50-140		85

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2682272 Results are based on the dry weight of the soil.

Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T768662

PROJECT: 60636190 - CR-4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY: Kesh A

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Soil)

DATE RECEIVED: 2021-06-30

DATE REPORTED: 2021-07-09

Parameter		Unit	G / S	RDL	2682272
SAMPLE DESCRIPTION: HF-04-SS-2					
SAMPLE TYPE: Soil					
DATE SAMPLED: 2021-06-29					
F1 (C6 - C10)	µg/g			5	<5
F1 (C6 to C10) minus BTEX	µg/g		25	5	<5
F2 (C10 to C16)	µg/g		26	10	<10
F2 (C10 to C16) minus Naphthalene	µg/g			10	<10
F3 (C16 to C34)	µg/g		240	50	97
F3 (C16 to C34) minus PAHs	µg/g		240	50	91
F4 (C34 to C50)	µg/g		3300	50	87
Gravimetric Heavy Hydrocarbons	µg/g			50	NA
Moisture Content	%			0.1	7.8
Surrogate	Unit	Acceptable Limits			
Toluene-d8	% Recovery		50-140		98
Terphenyl	%		60-140		95

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2682272 Results are based on sample dry weight.
The C6-C10 fraction is calculated using toluene response factor.
C6-C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present. The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX and PAH contributions.
C>10 - C16 (F2- Naphthalene) is a calculated parameter. The calculated value is F2 - Naphthalene.
C>16 - C34 (F3-PAH) is a calculated parameter. The calculated value is F3-PAH (PAH: sum of Phenanthrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-c,d)pyrene and Pyrene).
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T768662

PROJECT: 60636190 - CR-4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY: Kesh A

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2021-06-30

DATE REPORTED: 2021-07-09

Parameter	Unit	SAMPLE DESCRIPTION: HF-04-SS-2		
		G / S	RDL	2682272
Dichlorodifluoromethane	µg/g	1.5	0.05	<0.05
Vinyl Chloride	ug/g	0.02	0.02	<0.02
Bromomethane	ug/g	0.05	0.05	<0.05
Trichlorofluoromethane	ug/g	0.25	0.05	<0.05
Acetone	ug/g	0.5	0.50	<0.50
1,1-Dichloroethylene	ug/g	0.05	0.05	<0.05
Methylene Chloride	ug/g	0.05	0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g	0.05	0.05	<0.05
Methyl tert-butyl Ether	ug/g	0.05	0.05	<0.05
1,1-Dichloroethane	ug/g	0.05	0.02	<0.02
Methyl Ethyl Ketone	ug/g	0.5	0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g	0.05	0.02	<0.02
Chloroform	ug/g	0.05	0.04	<0.04
1,2-Dichloroethane	ug/g	0.05	0.03	<0.03
1,1,1-Trichloroethane	ug/g	0.12	0.05	<0.05
Carbon Tetrachloride	ug/g	0.05	0.05	<0.05
Benzene	ug/g	0.02	0.02	<0.02
1,2-Dichloropropane	ug/g	0.05	0.03	<0.03
Trichloroethylene	ug/g	0.05	0.03	<0.03
Bromodichloromethane	ug/g	0.05	0.05	<0.05
Methyl Isobutyl Ketone	ug/g	0.5	0.50	<0.50
1,1,2-Trichloroethane	ug/g	0.05	0.04	<0.04
Toluene	ug/g	0.2	0.05	<0.05
Dibromochloromethane	ug/g	0.05	0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04	<0.04
Tetrachloroethylene	ug/g	0.05	0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g	0.05	0.04	<0.04
Chlorobenzene	ug/g	0.083	0.05	<0.05
Ethylbenzene	ug/g	0.05	0.05	<0.05
m & p-Xylene	ug/g		0.05	<0.05

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T768662

PROJECT: 60636190 - CR-4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY: Kesh A

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2021-06-30

DATE REPORTED: 2021-07-09

SAMPLE DESCRIPTION:		HF-04-SS-2		
SAMPLE TYPE:		Soil		
DATE SAMPLED:		2021-06-29		
Parameter	Unit	G / S	RDL	2682272
Bromoform	ug/g	0.05	0.05	<0.05
Styrene	ug/g	0.05	0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.05
o-Xylene	ug/g		0.05	<0.05
1,3-Dichlorobenzene	ug/g	0.26	0.05	<0.05
1,4-Dichlorobenzene	ug/g	0.05	0.05	<0.05
1,2-Dichlorobenzene	ug/g	6.8	0.05	<0.05
Xylenes (Total)	ug/g	0.091	0.05	<0.05
1,3-Dichloropropene (Cis + Trans)	µg/g	0.05	0.04	<0.04
n-Hexane	µg/g	2.5	0.05	<0.05
Moisture Content	%		0.1	7.8
Surrogate	Unit	Acceptable Limits		
Toluene-d8	% Recovery	50-140		81
4-Bromofluorobenzene	% Recovery	50-140		84

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2682272 The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T768662

PROJECT: 60636190 - CR-4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY: Kesh A

Total PCBs (soil)

DATE RECEIVED: 2021-06-30

DATE REPORTED: 2021-07-09

		SAMPLE DESCRIPTION: HF-04-SS-2		
		SAMPLE TYPE: Soil		
		DATE SAMPLED: 2021-06-29		
Parameter	Unit	G / S	RDL	2682272
Polychlorinated Biphenyls	µg/g	0.78	0.1	<0.1
Moisture Content	%		0.1	7.8
Surrogate	Unit	Acceptable Limits		
Decachlorobiphenyl	%	60-130		88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
 Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2682272 Results are based on the dry weight of soil extracted.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Exceedance Summary

AGAT WORK ORDER: 21T768662

PROJECT: 60636190 - CR-4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
2682272	HF-04-SS-2	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Anthracene	µg/g	0.16	0.53
2682272	HF-04-SS-2	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Benzo(a)pyrene	µg/g	0.31	0.38
2682272	HF-04-SS-2	ON 406/19 T2.1 IC	O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Soil)	Benzo(a)pyrene	µg/g	0.31	0.38

Quality Assurance

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190 - CR-4
 SAMPLING SITE:

AGAT WORK ORDER: 21T768662
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY: Kesh A

Soil Analysis															
RPT Date: Jul 09, 2021			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - Metals & Inorganics (Soil)

Antimony	2649400		<0.8	<0.8	NA	< 0.8	124%	70%	130%	98%	80%	120%	87%	70%	130%
Arsenic	2649400		2	2	NA	< 1	93%	70%	130%	106%	80%	120%	103%	70%	130%
Barium	2649400		27.4	27.8	1.4%	< 2.0	108%	70%	130%	99%	80%	120%	97%	70%	130%
Beryllium	2649400		0.7	0.7	NA	< 0.4	109%	70%	130%	102%	80%	120%	107%	70%	130%
Boron	2649400		<5	<5	NA	< 5	105%	70%	130%	101%	80%	120%	84%	70%	130%
Boron (Hot Water Soluble)	2686242		0.22	0.22	NA	< 0.10	93%	60%	140%	96%	70%	130%	106%	60%	140%
Cadmium	2649400		<0.5	<0.5	NA	< 0.5	110%	70%	130%	100%	80%	120%	104%	70%	130%
Chromium	2649400		21	20	NA	< 5	104%	70%	130%	98%	80%	120%	105%	70%	130%
Cobalt	2649400		8.9	8.9	0.0%	< 0.5	99%	70%	130%	110%	80%	120%	107%	70%	130%
Copper	2649400		7.0	6.7	4.8%	< 1.0	95%	70%	130%	104%	80%	120%	104%	70%	130%
Lead	2649400		6	6	0.1%	< 1	93%	70%	130%	98%	80%	120%	95%	70%	130%
Molybdenum	2649400		<0.5	<0.5	NA	< 0.5	98%	70%	130%	107%	80%	120%	110%	70%	130%
Nickel	2649400		18	17	1.4%	< 1	98%	70%	130%	109%	80%	120%	105%	70%	130%
Selenium	2649400		<0.8	<0.8	NA	< 0.8	98%	70%	130%	98%	80%	120%	105%	70%	130%
Silver	2649400		<0.5	<0.5	NA	< 0.5	95%	70%	130%	109%	80%	120%	105%	70%	130%
Thallium	2649400		<0.5	<0.5	NA	< 0.5	99%	70%	130%	108%	80%	120%	111%	70%	130%
Uranium	2649400		0.69	0.71	NA	< 0.50	98%	70%	130%	106%	80%	120%	106%	70%	130%
Vanadium	2649400		28.6	26.9	6.2%	< 0.4	99%	70%	130%	108%	80%	120%	104%	70%	130%
Zinc	2649400		37	37	0.8%	< 5	100%	70%	130%	104%	80%	120%	110%	70%	130%
Chromium, Hexavalent	2679664		<0.2	<0.2	NA	< 0.2	96%	70%	130%	95%	80%	120%	74%	70%	130%
Cyanide, Free	2703258		<0.040	<0.040	NA	< 0.040	103%	70%	130%	82%	80%	120%	94%	70%	130%
Mercury	2649400		<0.10	<0.10	NA	< 0.10	102%	70%	130%	97%	80%	120%	82%	70%	130%
Electrical Conductivity (2:1)	2682271		0.230	0.229	0.4%	< 0.005	109%	80%	120%						
Sodium Adsorption Ratio (2:1) (Calc.)	2690406		0.085	0.079	7.6%	NA									
pH, 2:1 CaCl2 Extraction	2703258		7.76	7.78	0.3%	NA	101%	80%	120%						

Comments: NA signifies Not Applicable.

pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

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

Certified By:



Nivine Basily

Quality Assurance

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190 - CR-4
 SAMPLING SITE:

AGAT WORK ORDER: 21T768662
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY: Kesh A

Trace Organics Analysis															
RPT Date: Jul 09, 2021			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE	
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Soil)															
F1 (C6 - C10)	2682282		<5	<5	NA	< 5	101%	60%	140%	94%	60%	140%	111%	60%	140%
F2 (C10 to C16)	2682272	2682272	< 10	< 10	NA	< 10	103%	60%	140%	110%	60%	140%	100%	60%	140%
F3 (C16 to C34)	2682272	2682272	97	110	NA	< 50	104%	60%	140%	117%	60%	140%	105%	60%	140%
F4 (C34 to C50)	2682272	2682272	87	83	NA	< 50	105%	60%	140%	105%	60%	140%	100%	60%	140%

O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	2662097		< 0.05	< 0.05	0.0%	< 0.05	89%	50%	140%	99%	50%	140%	96%	50%	140%
Acenaphthylene	2662097		< 0.05	< 0.05	0.0%	< 0.05	96%	50%	140%	95%	50%	140%	95%	50%	140%
Acenaphthene	2662097		< 0.05	< 0.05	0.0%	< 0.05	95%	50%	140%	96%	50%	140%	99%	50%	140%
Fluorene	2662097		< 0.05	< 0.05	0.0%	< 0.05	96%	50%	140%	86%	50%	140%	96%	50%	140%
Phenanthrene	2662097		< 0.05	< 0.05	0.0%	< 0.05	101%	50%	140%	96%	50%	140%	96%	50%	140%
Anthracene	2662097		< 0.05	< 0.05	0.0%	< 0.05	96%	50%	140%	95%	50%	140%	101%	50%	140%
Fluoranthene	2662097		< 0.05	< 0.05	0.0%	< 0.05	99%	50%	140%	96%	50%	140%	96%	50%	140%
Pyrene	2662097		< 0.05	< 0.05	0.0%	< 0.05	95%	50%	140%	95%	50%	140%	98%	50%	140%
Benz(a)anthracene	2662097		< 0.05	< 0.05	0.0%	< 0.05	96%	50%	140%	85%	50%	140%	99%	50%	140%
Chrysene	2662097		< 0.05	< 0.05	0.0%	< 0.05	96%	50%	140%	96%	50%	140%	96%	50%	140%
Benzo(b)fluoranthene	2662097		< 0.05	< 0.05	0.0%	< 0.05	101%	50%	140%	99%	50%	140%	98%	50%	140%
Benzo(k)fluoranthene	2662097		< 0.05	< 0.05	0.0%	< 0.05	96%	50%	140%	96%	50%	140%	101%	50%	140%
Benzo(a)pyrene	2662097		< 0.05	< 0.05	0.0%	< 0.05	98%	50%	140%	95%	50%	140%	96%	50%	140%
Indeno(1,2,3-cd)pyrene	2662097		< 0.05	< 0.05	0.0%	< 0.05	86%	50%	140%	99%	50%	140%	98%	50%	140%
Dibenz(a,h)anthracene	2662097		< 0.05	< 0.05	0.0%	< 0.05	94%	50%	140%	86%	50%	140%	101%	50%	140%
Benzo(g,h,i)perylene	2662097		< 0.05	< 0.05	0.0%	< 0.05	95%	50%	140%	96%	50%	140%	96%	50%	140%

O. Reg. 153(511) - VOCs (Soil)															
Dichlorodifluoromethane	2686285		<0.05	<0.05	NA	< 0.05	105%	50%	140%	87%	50%	140%	73%	50%	140%
Vinyl Chloride	2686285		<0.02	<0.02	NA	< 0.02	104%	50%	140%	98%	50%	140%	114%	50%	140%
Bromomethane	2686285		<0.05	<0.05	NA	< 0.05	105%	50%	140%	100%	50%	140%	95%	50%	140%
Trichlorofluoromethane	2686285		<0.05	<0.05	NA	< 0.05	107%	50%	140%	109%	50%	140%	92%	50%	140%
Acetone	2686285		<0.50	<0.50	NA	< 0.50	82%	50%	140%	85%	50%	140%	95%	50%	140%
1,1-Dichloroethylene	2686285		<0.05	<0.05	NA	< 0.05	95%	50%	140%	79%	60%	130%	72%	50%	140%
Methylene Chloride	2686285		<0.05	<0.05	NA	< 0.05	96%	50%	140%	100%	60%	130%	107%	50%	140%
Trans- 1,2-Dichloroethylene	2686285		<0.05	<0.05	NA	< 0.05	82%	50%	140%	113%	60%	130%	110%	50%	140%
Methyl tert-butyl Ether	2686285		<0.05	<0.05	NA	< 0.05	95%	50%	140%	107%	60%	130%	102%	50%	140%
1,1-Dichloroethane	2686285		<0.02	<0.02	NA	< 0.02	81%	50%	140%	115%	60%	130%	89%	50%	140%
Methyl Ethyl Ketone	2686285		<0.50	<0.50	NA	< 0.50	89%	50%	140%	88%	50%	140%	99%	50%	140%
Cis- 1,2-Dichloroethylene	2686285		<0.02	<0.02	NA	< 0.02	102%	50%	140%	91%	60%	130%	100%	50%	140%
Chloroform	2686285		<0.04	<0.04	NA	< 0.04	104%	50%	140%	114%	60%	130%	111%	50%	140%
1,2-Dichloroethane	2686285		<0.03	<0.03	NA	< 0.03	99%	50%	140%	107%	60%	130%	110%	50%	140%
1,1,1-Trichloroethane	2686285		<0.05	<0.05	NA	< 0.05	87%	50%	140%	87%	60%	130%	83%	50%	140%
Carbon Tetrachloride	2686285		<0.05	<0.05	NA	< 0.05	103%	50%	140%	81%	60%	130%	99%	50%	140%

Quality Assurance

 CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190 - CR-4
 SAMPLING SITE:

 AGAT WORK ORDER: 21T768662
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY: Kesh A

Trace Organics Analysis (Continued)

RPT Date: Jul 09, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Benzene	2686285		<0.02	<0.02	NA	< 0.02	96%	50%	140%	82%	60%	130%	100%	50%	140%
1,2-Dichloropropane	2686285		<0.03	<0.03	NA	< 0.03	107%	50%	140%	86%	60%	130%	91%	50%	140%
Trichloroethylene	2686285		<0.03	<0.03	NA	< 0.03	104%	50%	140%	103%	60%	130%	91%	50%	140%
Bromodichloromethane	2686285		<0.05	<0.05	NA	< 0.05	83%	50%	140%	88%	60%	130%	94%	50%	140%
Methyl Isobutyl Ketone	2686285		<0.50	<0.50	NA	< 0.50	74%	50%	140%	94%	50%	140%	98%	50%	140%
1,1,2-Trichloroethane	2686285		<0.04	<0.04	NA	< 0.04	86%	50%	140%	98%	60%	130%	103%	50%	140%
Toluene	2686285		<0.05	<0.05	NA	< 0.05	106%	50%	140%	111%	60%	130%	117%	50%	140%
Dibromochloromethane	2686285		<0.05	<0.05	NA	< 0.05	94%	50%	140%	103%	60%	130%	106%	50%	140%
Ethylene Dibromide	2686285		<0.04	<0.04	NA	< 0.04	89%	50%	140%	84%	60%	130%	76%	50%	140%
Tetrachloroethylene	2686285		<0.05	<0.05	NA	< 0.05	98%	50%	140%	101%	60%	130%	108%	50%	140%
1,1,1,2-Tetrachloroethane	2686285		<0.04	<0.04	NA	< 0.04	90%	50%	140%	107%	60%	130%	100%	50%	140%
Chlorobenzene	2686285		<0.05	<0.05	NA	< 0.05	91%	50%	140%	97%	60%	130%	97%	50%	140%
Ethylbenzene	2686285		<0.05	<0.05	NA	< 0.05	106%	50%	140%	95%	60%	130%	95%	50%	140%
m & p-Xylene	2686285		<0.05	<0.05	NA	< 0.05	102%	50%	140%	106%	60%	130%	102%	50%	140%
Bromoform	2686285		<0.05	<0.05	NA	< 0.05	98%	50%	140%	116%	60%	130%	74%	50%	140%
Styrene	2686285		<0.05	<0.05	NA	< 0.05	92%	50%	140%	82%	60%	130%	97%	50%	140%
1,1,2,2-Tetrachloroethane	2686285		<0.05	<0.05	NA	< 0.05	86%	50%	140%	89%	60%	130%	95%	50%	140%
o-Xylene	2686285		<0.05	<0.05	NA	< 0.05	96%	50%	140%	84%	60%	130%	100%	50%	140%
1,3-Dichlorobenzene	2686285		<0.05	<0.05	NA	< 0.05	99%	50%	140%	94%	60%	130%	73%	50%	140%
1,4-Dichlorobenzene	2686285		<0.05	<0.05	NA	< 0.05	94%	50%	140%	103%	60%	130%	89%	50%	140%
1,2-Dichlorobenzene	2686285		<0.05	<0.05	NA	< 0.05	92%	50%	140%	103%	60%	130%	105%	50%	140%
n-Hexane	2686285		<0.05	<0.05	NA	< 0.05	101%	50%	140%	89%	60%	130%	107%	50%	140%
Total PCBs (soil)															
Polychlorinated Biphenyls	2679423		< 0.1	< 0.1	NA	< 0.1	102%	60%	140%	92%	60%	140%	105%	60%	140%

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

Certified By:





Method Summary

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190 - CR-4
 SAMPLING SITE:

AGAT WORK ORDER: 21T768662
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY: Kesh A

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl ₂ Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T768662

PROJECT: 60636190 - CR-4

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY: Kesh A

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluorene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benz(a)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
1 and 2 Methlynaphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Moisture Content	ORG-91-5009	CCME Tier 1 Method	BALANCE
F1 (C6 - C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34) minus PAHs	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS



Method Summary

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190 - CR-4
 SAMPLING SITE:

AGAT WORK ORDER: 21T768662
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY: Kesh A

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Vinyl Chloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS



Method Summary

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190 - CR-4
 SAMPLING SITE:

AGAT WORK ORDER: 21T768662
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY: Kesh A

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
m & p-Xylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromoform	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5002	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Polychlorinated Biphenyls	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD



AGAT Laboratories

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Mississauga, Ontario L4Z 1Y2
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webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

Report Information:

Company: AECOM Canada - Markham

Contact: kesh.appadurai@AECOM.com

Address: _____

Phone: _____ Fax: _____

Reports to be sent to: kesh.appadurai@AECOM.com

1. Email: _____

2. Email: _____

Project Information:

Project: 60636190 - Bradford Bypass PF CR-4

Site Location: _____

Sampled By: Kesh.A

AGAT Quote #: _____ PO: _____

Please note: if quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes No

Company: _____

Contact: _____

Address: _____

Email: _____

Regulatory Requirements: No Regulatory Requirement
(Please check all applicable boxes)

Regulation 153/04
Table 1 Indicate One
 Ind/Com
 Res/Park
 Agriculture

Sewer Use
 Sanitary
 Storm

Regulation 558
 CCME
 Prov. Water Quality Objectives (PWQO)
 Other

Soil Texture (Check One) Coarse Fine

Region: _____ Indicate One

Is this submission for a Record of Site Condition? Yes No

Report Guideline on Certificate of Analysis Yes No

Sample Matrix Legend

B Biota
GW Ground Water
O Oil
P Paint
S Soil
SD Sediment
SW Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N	Field Filtered - Metals, Hg, CVI (Please Circle)	(Check Applicable)																
								Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> Cu <input type="checkbox"/> Cr <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO ₃ /NO ₂ <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH ₃ <input type="checkbox"/> TKN <input type="checkbox"/> NO ₃ <input type="checkbox"/> NO ₂ <input type="checkbox"/> NO _x /NO _y	Volatiles: <input checked="" type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM	CCME Fractions 1 to 4	ABNS	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use		
HF-04-SS-2	June 29/21		4	Soil				X						X				X						
CVI-03-SS-2	June 25/21		1	Soil				X																

Sample Released By (Print Name and Sign): _____ Date: _____ Time: _____

Sample Received By (Print Name and Sign): _____ Date: 6-30-21 Time: 3:04

Sample Released By (Print Name and Sign): _____ Date: _____ Time: _____

Sample Received By (Print Name and Sign): _____ Date: _____ Time: _____

Page 1 of 1

Laboratory Use Only

Work Order #: 21T768662

Cooler Quantity: Muel

Arrival Temperatures: 37.3539
14.29127125

Custody Seal Intact: Yes No N/A

Notes: _____

Turnaround Time (TAT) Required:

Regular TAT: 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply):
 3 Business Days 2 Business Days 1 Business Day

OR Date Required (Rush Surcharges May Apply): _____

Please provide prior notification for rush TAT
*TAT is exclusive of weekends and statutory holidays



CLIENT NAME: AECOM CANADA LTD
105 COMMERCE VALLEY DR.W 7TH FLOOR
MARKHAM, ON L3T7W3
(905) 886-7022

ATTENTION TO: Kesh Appadurai

PROJECT: 60636190-CR4

AGAT WORK ORDER: 21T775122

SOIL ANALYSIS REVIEWED BY: Jacky Zhu, Spectroscopy Technician

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Jul 26, 2021

PAGES (INCLUDING COVER): 25

VERSION*: 1

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

*Notes

Disclaimer:

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



Certificate of Analysis

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-07-15

DATE REPORTED: 2021-07-26

Parameter	Unit	SAMPLE DESCRIPTION:		CR4-04	HF-02
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2021-07-14	2021-07-15
		G / S	RDL	2744970	2744976
Antimony	µg/g	40	0.8	<0.8	<0.8
Arsenic	µg/g	18	1	1	1
Barium	µg/g	670	2.0	44.8	45.1
Beryllium	µg/g	8	0.4	<0.4	<0.4
Boron	µg/g	120	5	<5	<5
Boron (Hot Water Soluble)	µg/g	2	0.10	0.20	0.17
Cadmium	µg/g	1.9	0.5	<0.5	<0.5
Chromium	µg/g	160	5	17	28
Cobalt	µg/g	80	0.5	4.0	3.9
Copper	µg/g	230	1.0	10.6	8.7
Lead	µg/g	120	1	10	19
Molybdenum	µg/g	40	0.5	1.1	<0.5
Nickel	µg/g	270	1	6	6
Selenium	µg/g	5.5	0.8	<0.8	<0.8
Silver	µg/g	40	0.5	<0.5	<0.5
Thallium	µg/g	3.3	0.5	<0.5	<0.5
Uranium	µg/g	33	0.50	<0.50	<0.50
Vanadium	µg/g	86	0.4	26.0	24.6
Zinc	µg/g	340	5	37	30
Chromium, Hexavalent	µg/g	8	0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	1.4	0.005	1.00	1.23
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	12	N/A	9.34	12.2
pH, 2:1 CaCl ₂ Extraction	pH Units		NA	7.93	7.82

Certified By:





AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-07-15

DATE REPORTED: 2021-07-26

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.
2744970-2744976 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:





Certificate of Analysis

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 406/19 SPLP Metals

DATE RECEIVED: 2021-07-15

DATE REPORTED: 2021-07-26

Parameter	Unit	SAMPLE DESCRIPTION: HF-02		
		G / S	RDL	2744976
Antimony Leachate	µg/L	6	0.6	<0.6
Arsenic Leachate	µg/L	-	5	<5
Barium Leachate	µg/L	1000	100	<100
Beryllium Leachate	µg/L	4	0.8	<0.8
Boron Leachate	µg/L	5000	500	<500
Cadmium Leachate	µg/L	0.5	0.20	<0.20
Chromium Leachate	µg/L	50	10	<10
Cobalt Leachate	µg/L	3.8	0.3	<0.3
Copper Leachate	µg/L	14	7.0	<7.0
Lead Leachate	µg/L	-	1.0	1.6
Molybdenum Leachate	µg/L	23	1.5	1.8
Nickel Leachate	µg/L	78	10	<10
Selenium Leachate	µg/L	10	5.0	<5.0
Silver Leachate	µg/L	0.3	0.10	<0.10
Thallium Leachate	µg/L	2	0.5	<0.5
Uranium Leachate	µg/L	20	2	<2
Vanadium Leachate	µg/L	-	0.6	15.7
Zinc Leachate	µg/L	180	20	<20

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.
2744976 Leachate for metal testing was prepared in accordance with Ontario MECP Method E9003, which has been modified from SW846-1312 by Ontario MECP. MECP has recommended that Method E9003 be used for leachate testing of soil samples under O'Reg 406/19 by MECP. This is a validated, unaccredited procedure.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:





Certificate of Analysis

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
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FAX (905)712-5122
<http://www.agatlabs.com>

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2021-07-15

DATE REPORTED: 2021-07-26

Parameter	Unit	SAMPLE DESCRIPTION:		CR4-04	CR4-07
		G / S	RDL	2744970	2744974
Naphthalene	µg/g	0.2	0.05	0.79	0.62
Acenaphthylene	µg/g	0.093	0.05	0.41	0.13
Acenaphthene	µg/g	2.5	0.05	1.83	0.98
Fluorene	µg/g	6.8	0.05	3.50	1.30
Phenanthrene	µg/g	12	0.05	11.4	4.95
Anthracene	µg/g	0.16	0.05	3.00	1.19
Fluoranthene	µg/g	2.8	0.05	6.84	2.50
Pyrene	µg/g	28	0.05	6.55	2.34
Benz(a)anthracene	µg/g	0.92	0.05	4.62	1.58
Chrysene	µg/g	9.4	0.05	5.01	1.83
Benzo(b)fluoranthene	µg/g	3.2	0.05	5.22	1.76
Benzo(k)fluoranthene	µg/g	3.1	0.05	1.57	0.82
Benzo(a)pyrene	µg/g	0.31	0.05	4.07	1.36
Indeno(1,2,3-cd)pyrene	µg/g	0.76	0.05	1.42	0.19
Dibenz(a,h)anthracene	µg/g	0.7	0.05	0.42	0.72
Benzo(g,h,i)perylene	µg/g	13	0.05	1.55	0.72
1 and 2 Methylnaphthalene	µg/g	0.59	0.05	1.21	1.05
Moisture Content	%		0.1	8.3	14.2
Surrogate	Unit	Acceptable Limits			
Naphthalene-d8	%	50-140		82	89
Acridine-d9	%	50-140		86	91
Terphenyl-d14	%	50-140		92	99

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2744970-2744974 Results are based on the dry weight of the soil.

Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Soil)

DATE RECEIVED: 2021-07-15

DATE REPORTED: 2021-07-26

Parameter		Unit	G / S	RDL	2744974
SAMPLE DESCRIPTION: CR4-07					
SAMPLE TYPE: Soil					
DATE SAMPLED: 2021-07-14					
F1 (C6 - C10)	µg/g		5	<5	
F1 (C6 to C10) minus BTEX	µg/g	25	5	<5	
F2 (C10 to C16)	µg/g	26	10	<10	
F2 (C10 to C16) minus Naphthalene	µg/g		10	<10	
F3 (C16 to C34)	µg/g	240	50	99	
F3 (C16 to C34) minus PAHs	µg/g	240	50	83	
F4 (C34 to C50)	µg/g	3300	50	<50	
Gravimetric Heavy Hydrocarbons	µg/g		50	NA	
Moisture Content	%		0.1	14.2	
Surrogate	Unit	Acceptable Limits			
Toluene-d8	% Recovery	50-140		74	
Terphenyl	%	60-140		99	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2744974 Results are based on sample dry weight.
The C6-C10 fraction is calculated using toluene response factor.
C6-C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present. The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX and PAH contributions.
C>10 - C16 (F2- Naphthalene) is a calculated parameter. The calculated value is F2 - Naphthalene.
C>16 - C34 (F3-PAH) is a calculated parameter. The calculated value is F3-PAH (PAH: sum of Phenanthrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-c,d)pyrene and Pyrene).
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2021-07-15

DATE REPORTED: 2021-07-26

Parameter	Unit	SAMPLE DESCRIPTION: CR4-07		
		G / S	RDL	2744974
Dichlorodifluoromethane	µg/g	1.5	0.05	<0.05
Vinyl Chloride	ug/g	0.02	0.02	<0.02
Bromomethane	ug/g	0.05	0.05	<0.05
Trichlorofluoromethane	ug/g	0.25	0.05	<0.05
Acetone	ug/g	0.5	0.50	<0.50
1,1-Dichloroethylene	ug/g	0.05	0.05	<0.05
Methylene Chloride	ug/g	0.05	0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g	0.05	0.05	<0.05
Methyl tert-butyl Ether	ug/g	0.05	0.05	<0.05
1,1-Dichloroethane	ug/g	0.05	0.02	<0.02
Methyl Ethyl Ketone	ug/g	0.5	0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g	0.05	0.02	<0.02
Chloroform	ug/g	0.05	0.04	<0.04
1,2-Dichloroethane	ug/g	0.05	0.03	<0.03
1,1,1-Trichloroethane	ug/g	0.12	0.05	<0.05
Carbon Tetrachloride	ug/g	0.05	0.05	<0.05
Benzene	ug/g	0.02	0.02	<0.02
1,2-Dichloropropane	ug/g	0.05	0.03	<0.03
Trichloroethylene	ug/g	0.05	0.03	<0.03
Bromodichloromethane	ug/g	0.05	0.05	<0.05
Methyl Isobutyl Ketone	ug/g	0.5	0.50	<0.50
1,1,2-Trichloroethane	ug/g	0.05	0.04	<0.04
Toluene	ug/g	0.2	0.05	<0.05
Dibromochloromethane	ug/g	0.05	0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04	<0.04
Tetrachloroethylene	ug/g	0.05	0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g	0.05	0.04	<0.04
Chlorobenzene	ug/g	0.083	0.05	<0.05
Ethylbenzene	ug/g	0.05	0.05	<0.05
m & p-Xylene	ug/g		0.05	<0.05

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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - VOCs (Soil)

DATE RECEIVED: 2021-07-15

DATE REPORTED: 2021-07-26

Parameter		Unit	G / S	RDL	2744974
SAMPLE DESCRIPTION: CR4-07					
SAMPLE TYPE: Soil					
DATE SAMPLED: 2021-07-14					
Bromoform	ug/g	0.05	0.05	<0.05	
Styrene	ug/g	0.05	0.05	<0.05	
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.05	
o-Xylene	ug/g		0.05	<0.05	
1,3-Dichlorobenzene	ug/g	0.26	0.05	<0.05	
1,4-Dichlorobenzene	ug/g	0.05	0.05	<0.05	
1,2-Dichlorobenzene	ug/g	6.8	0.05	<0.05	
Xylenes (Total)	ug/g	0.091	0.05	<0.05	
1,3-Dichloropropene (Cis + Trans)	µg/g	0.05	0.04	<0.04	
n-Hexane	µg/g	2.5	0.05	<0.05	
Moisture Content	%		0.1	14.2	
Surrogate	Unit	Acceptable Limits			
Toluene-d8	% Recovery	50-140		94	
4-Bromofluorobenzene	% Recovery	50-140		110	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2744974 The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 406/19 - SPLP VOCs

DATE RECEIVED: 2021-07-15

DATE REPORTED: 2021-07-26

SAMPLE DESCRIPTION:		CR4-07		
SAMPLE TYPE:		Soil		
DATE SAMPLED:		2021-07-14		
Parameter	Unit	G / S	RDL	2744974
Bromomethane Leachate	µg/L	0.5	0.20	<0.20
1,1-Dichloroethylene Leachate	µg/L	0.5	0.30	<0.30
Trans 1,2-Dichloroethylene Leachate	µg/L	0.5	0.20	<0.20
1,1-Dichloroethane Leachate	µg/L	-	0.30	<0.30
Cis 1,2-Dichloroethylene Leachate	µg/L	0.5	0.20	<0.20
Chloroform Leachate	µg/L	-	0.20	<0.20
1,2-Dichloroethane Leachate	µg/L	0.5	0.20	<0.20
Carbon Tetrachloride Leachate	µg/L	0.2	0.20	<0.20
1,2-Dichloropropane Leachate	µg/L	0.55	0.20	<0.20
Trichloroethylene Leachate	µg/L	0.5	0.20	<0.20
1,1,2-Trichloroethane Leachate	µg/L	-	0.20	<0.20
Ethylene Dibromide Leachate	µg/L	0.2	0.10	<0.10
Tetrachloroethylene Leachate	µg/L	0.5	0.20	<0.20
1,1,1,2-Tetrachloroethane Leachate	µg/L	-	0.10	<0.10
1,1,1,2,2-Tetrachloroethane Leachate	µg/L	0.5	0.10	<0.10
1,4-Dichlorobenzene Leachate	µg/L	0.5	0.10	<0.10
1,2-Dichlorobenzene Leachate	µg/L	0.55	0.10	<0.10
1,3-Dichloropropene Total Leachate	µg/L	-	0.30	<0.30
Surrogate	Unit	Acceptable Limits		
Toluene-d8	% Recovery	50-140	94	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2744974 Leachate was prepared in accordance with Ontario MECP Method E9003, which has been modified from SW846-1312 by Ontario MECP. MECP has recommended that Method E9003 be used for leachate testing of soil samples under O'Reg 406/19 by MECP. This is a validated, unaccredited procedure.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

SPLP PCBs

DATE RECEIVED: 2021-07-15

DATE REPORTED: 2021-07-26

		SAMPLE DESCRIPTION: HF-02	
		SAMPLE TYPE: Soil	
		DATE SAMPLED: 2021-07-15	
Parameter	Unit	G / S	RDL
PCBs	µg/L	0.1	<0.1
Surrogate	Unit	Acceptable Limits	
Decachlorobiphenyl	%	50-140	72

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

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

Total PCBs (soil)

DATE RECEIVED: 2021-07-15

DATE REPORTED: 2021-07-26

		SAMPLE DESCRIPTION: HF-02		
		SAMPLE TYPE: Soil		
		DATE SAMPLED: 2021-07-15		
Parameter	Unit	G / S	RDL	2744976
Polychlorinated Biphenyls	µg/g	0.78	0.1	<0.1
Moisture Content	%		0.1	11.9
Surrogate	Unit	Acceptable Limits		
Decachlorobiphenyl	%	60-130		76

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2744976 Results are based on the dry weight of soil extracted.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Exceedance Summary

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

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SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
2744970	CR4-04	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	1 and 2 Methylnaphthalene	µg/g	0.59	1.21
2744970	CR4-04	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	1-Methylnaphthalene	µg/g	0.59	0.80
2744970	CR4-04	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Acenaphthylene	µg/g	0.093	0.41
2744970	CR4-04	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Anthracene	µg/g	0.16	3.00
2744970	CR4-04	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Benz(a)anthracene	µg/g	0.92	4.62
2744970	CR4-04	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Benzo(a)pyrene	µg/g	0.31	4.07
2744970	CR4-04	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Benzo(b)fluoranthene	µg/g	3.2	5.22
2744970	CR4-04	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Fluoranthene	µg/g	2.8	6.84
2744970	CR4-04	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Indeno(1,2,3-cd)pyrene	µg/g	0.76	1.42
2744970	CR4-04	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Naphthalene	µg/g	0.2	0.79
2744974	CR4-07	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	1 and 2 Methylnaphthalene	µg/g	0.59	1.05
2744974	CR4-07	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	2-Methylnaphthalene	µg/g	0.59	0.70
2744974	CR4-07	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Acenaphthylene	µg/g	0.093	0.13
2744974	CR4-07	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Anthracene	µg/g	0.16	1.19
2744974	CR4-07	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Benz(a)anthracene	µg/g	0.92	1.58
2744974	CR4-07	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Benzo(a)pyrene	µg/g	0.31	1.36
2744974	CR4-07	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Dibenz(a,h)anthracene	µg/g	0.7	0.72
2744974	CR4-07	ON 406/19 T2.1 IC	O. Reg. 153(511) - PAHs (Soil)	Naphthalene	µg/g	0.2	0.62
2744974	CR4-07	ON 406/19 T2.1 IC	O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Soil)	Benzo(a)anthracene	µg/g	0.92	1.58
2744974	CR4-07	ON 406/19 T2.1 IC	O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Soil)	Benzo(a)pyrene	µg/g	0.31	1.36
2744974	CR4-07	ON 406/19 T2.1 IC	O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Soil)	Naphthalene	µg/g	0.2	0.62
2744976	HF-02	ON 406/19 T2.1 IC	O. Reg. 153(511) - Metals & Inorganics (Soil)	Sodium Adsorption Ratio (2:1) (Calc.	N/A	12	12.2

Quality Assurance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

Soil Analysis															
RPT Date: Jul 26, 2021			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	2733119		<0.8	<0.8	NA	< 0.8	128%	70%	130%	101%	80%	120%	103%	70%	130%
Arsenic	2733119		5	5	0.0%	< 1	120%	70%	130%	110%	80%	120%	111%	70%	130%
Barium	2733119		144	143	0.7%	< 2.0	110%	70%	130%	99%	80%	120%	113%	70%	130%
Beryllium	2733119		1.1	1.2	NA	< 0.4	109%	70%	130%	96%	80%	120%	104%	70%	130%
Boron	2733119		13	12	NA	< 5	92%	70%	130%	97%	80%	120%	87%	70%	130%
Boron (Hot Water Soluble)	2739776		<0.10	<0.10	NA	< 0.10	93%	60%	140%	101%	70%	130%	101%	60%	140%
Cadmium	2733119		<0.5	<0.5	NA	< 0.5	95%	70%	130%	99%	80%	120%	110%	70%	130%
Chromium	2733119		38	37	2.7%	< 5	106%	70%	130%	106%	80%	120%	99%	70%	130%
Cobalt	2733119		14.5	14.4	0.7%	< 0.5	103%	70%	130%	103%	80%	120%	104%	70%	130%
Copper	2733119		27.6	27.3	1.1%	< 1.0	94%	70%	130%	111%	80%	120%	102%	70%	130%
Lead	2733119		28	26	7.4%	< 1	102%	70%	130%	112%	80%	120%	104%	70%	130%
Molybdenum	2733119		<0.5	<0.5	NA	< 0.5	118%	70%	130%	112%	80%	120%	117%	70%	130%
Nickel	2733119		35	34	2.9%	< 1	105%	70%	130%	107%	80%	120%	109%	70%	130%
Selenium	2733119		<0.8	<0.8	NA	< 0.8	131%	70%	130%	104%	80%	120%	106%	70%	130%
Silver	2733119		<0.5	<0.5	NA	< 0.5	104%	70%	130%	111%	80%	120%	106%	70%	130%
Thallium	2733119		<0.5	<0.5	NA	< 0.5	114%	70%	130%	106%	80%	120%	104%	70%	130%
Uranium	2733119		0.64	0.62	NA	< 0.50	115%	70%	130%	100%	80%	120%	102%	70%	130%
Vanadium	2733119		48.7	48.2	1.0%	< 0.4	112%	70%	130%	102%	80%	120%	106%	70%	130%
Zinc	2733119		91	94	3.2%	< 5	100%	70%	130%	107%	80%	120%	108%	70%	130%
Chromium, Hexavalent	2746463		<0.2	<0.2	NA	< 0.2	101%	70%	130%	87%	80%	120%	87%	70%	130%
Cyanide, Free	2739776		<0.040	<0.040	NA	< 0.040	94%	70%	130%	96%	80%	120%	109%	70%	130%
Mercury	2733119		0.12	0.11	NA	< 0.10	106%	70%	130%	99%	80%	120%	100%	70%	130%
Electrical Conductivity (2:1)	2739776		0.145	0.147	1.4%	< 0.005	109%	80%	120%						
Sodium Adsorption Ratio (2:1) (Calc.)	2740616		10.4	10.2	1.9%	NA									
pH, 2:1 CaCl2 Extraction	2736682		7.78	7.76	0.3%	NA	101%	80%	120%						

Comments: For a multi-element scan for lab control standards and matrix spikes, up to 10% of analytes may exceed the quoted limits by up to 10% absolute and it is considered acceptable.

O. Reg. 406/19 SPLP Metals

Antimony Leachate	2734598		<0.6	<0.6	NA	< 0.6	106%	70%	130%	102%	80%	120%	111%	70%	130%
Arsenic Leachate	2734598		<5	<5	NA	< 5	100%	70%	130%	99%	80%	120%	107%	70%	130%
Barium Leachate	2734598		<100	<100	NA	< 100	100%	70%	130%	101%	80%	120%	105%	70%	130%
Beryllium Leachate	2734598		<0.8	<0.8	NA	< 0.8	92%	70%	130%	89%	80%	120%	102%	70%	130%
Boron Leachate	2734598		<500	<500	NA	< 500	97%	70%	130%	95%	80%	120%	105%	70%	130%
Cadmium Leachate	2734598		<0.20	<0.20	NA	< 0.20	101%	70%	130%	101%	80%	120%	110%	70%	130%
Chromium Leachate	2734598		<10	<10	NA	< 10	104%	70%	130%	109%	80%	120%	115%	70%	130%
Cobalt Leachate	2734598		<0.3	<0.3	NA	< 0.3	96%	70%	130%	99%	80%	120%	104%	70%	130%
Copper Leachate	2734598		<7.0	<7.0	NA	< 7.0	100%	70%	130%	104%	80%	120%	109%	70%	130%
Lead Leachate	2734598		3.2	<1.0	NA	< 1.0	99%	70%	130%	102%	80%	120%	107%	70%	130%

Quality Assurance

 CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR4
 SAMPLING SITE:

 AGAT WORK ORDER: 21T775122
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Jul 26, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Molybdenum Leachate	2734598		2.5	2.4	NA	< 1.5	108%	70%	130%	108%	80%	120%	117%	70%	130%
Nickel Leachate	2734598		<10	<10	NA	< 10	101%	70%	130%	103%	80%	120%	108%	70%	130%
Selenium Leachate	2734598		<5.0	<5.0	NA	< 5.0	95%	70%	130%	94%	80%	120%	101%	70%	130%
Silver Leachate	2734598		<0.10	<0.10	NA	< 0.10	104%	70%	130%	105%	80%	120%	110%	70%	130%
Thallium Leachate	2734598		<0.5	<0.5	NA	< 0.5	99%	70%	130%	98%	80%	120%	103%	70%	130%
Uranium Leachate	2734598		<2	<2	NA	< 2	96%	70%	130%	93%	80%	120%	98%	70%	130%
Vanadium Leachate	2734598		2.3	2.2	NA	< 0.6	101%	70%	130%	106%	80%	120%	112%	70%	130%
Zinc Leachate	2734598		<20	<20	NA	< 20	100%	70%	130%	101%	80%	120%	108%	70%	130%

Comments: NA signifies Not Applicable.
 pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
 Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:



Quality Assurance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis														
RPT Date: Jul 26, 2021			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE	
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits
							Lower	Upper	Lower		Upper	Lower		Upper

O. Reg. 153(511) - PAHs (Soil)

Naphthalene	2687085		< 0.05	< 0.05	NA	< 0.05	89%	50%	140%	99%	50%	140%	96%	50%	140%
Acenaphthylene	2687085		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	95%	50%	140%	95%	50%	140%
Acenaphthene	2687085		< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	96%	50%	140%	99%	50%	140%
Fluorene	2687085		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	86%	50%	140%	96%	50%	140%
Phenanthrene	2687085		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	96%	50%	140%	96%	50%	140%
Anthracene	2687085		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	95%	50%	140%	101%	50%	140%
Fluoranthene	2687085		< 0.05	< 0.05	NA	< 0.05	99%	50%	140%	96%	50%	140%	96%	50%	140%
Pyrene	2687085		< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	95%	50%	140%	98%	50%	140%
Benz(a)anthracene	2687085		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	85%	50%	140%	99%	50%	140%
Chrysene	2687085		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	96%	50%	140%	96%	50%	140%
Benzo(b)fluoranthene	2687085		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	99%	50%	140%	98%	50%	140%
Benzo(k)fluoranthene	2687085		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	96%	50%	140%	101%	50%	140%
Benzo(a)pyrene	2687085		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	95%	50%	140%	96%	50%	140%
Indeno(1,2,3-cd)pyrene	2687085		< 0.05	< 0.05	NA	< 0.05	86%	50%	140%	99%	50%	140%	98%	50%	140%
Dibenz(a,h)anthracene	2687085		< 0.05	< 0.05	NA	< 0.05	94%	50%	140%	86%	50%	140%	101%	50%	140%
Benzo(g,h,i)perylene	2687085		< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	96%	50%	140%	96%	50%	140%

O. Reg. 153(511) - VOCs (Soil)

Dichlorodifluoromethane	2742794	2744974	<0.05	<0.05	NA	< 0.05	111%	50%	140%	78%	50%	140%	71%	50%	140%
Vinyl Chloride	2742794	2744974	<0.02	<0.02	NA	< 0.02	92%	50%	140%	108%	50%	140%	83%	50%	140%
Bromomethane	2742794	2744974	<0.05	<0.05	NA	< 0.05	86%	50%	140%	89%	50%	140%	84%	50%	140%
Trichlorofluoromethane	2742794	2744974	<0.05	<0.05	NA	< 0.05	91%	50%	140%	104%	50%	140%	79%	50%	140%
Acetone	2742794	2744974	<0.50	<0.50	NA	< 0.50	99%	50%	140%	88%	50%	140%	92%	50%	140%
1,1-Dichloroethylene	2744974	2744974	<0.05	<0.05	NA	< 0.05	117%	50%	140%	82%	60%	130%	85%	50%	140%
Methylene Chloride	2742794	2744974	<0.05	<0.05	NA	< 0.05	73%	50%	140%	111%	60%	130%	79%	50%	140%
Trans- 1,2-Dichloroethylene	2742794	2744974	<0.05	<0.05	NA	< 0.05	79%	50%	140%	86%	60%	130%	88%	50%	140%
Methyl tert-butyl Ether	2742794	2744974	<0.05	<0.05	NA	< 0.05	77%	50%	140%	75%	60%	130%	70%	50%	140%
1,1-Dichloroethane	2742794	2744974	<0.02	<0.02	NA	< 0.02	102%	50%	140%	93%	60%	130%	93%	50%	140%
Methyl Ethyl Ketone	2742794	2744974	<0.50	<0.50	NA	< 0.50	87%	50%	140%	84%	50%	140%	83%	50%	140%
Cis- 1,2-Dichloroethylene	2742794	2744974	<0.02	<0.02	NA	< 0.02	117%	50%	140%	80%	60%	130%	86%	50%	140%
Chloroform	2742794	2744974	<0.04	<0.04	NA	< 0.04	110%	50%	140%	94%	60%	130%	74%	50%	140%
1,2-Dichloroethane	2742794	2744974	<0.03	<0.03	NA	< 0.03	93%	50%	140%	113%	60%	130%	112%	50%	140%
1,1,1-Trichloroethane	2742794	2744974	<0.05	<0.05	NA	< 0.05	91%	50%	140%	103%	60%	130%	98%	50%	140%
Carbon Tetrachloride	2742794	2744974	<0.05	<0.05	NA	< 0.05	80%	50%	140%	88%	60%	130%	84%	50%	140%
Benzene	2742794	2744974	<0.02	<0.02	NA	< 0.02	91%	50%	140%	95%	60%	130%	85%	50%	140%
1,2-Dichloropropane	2742794	2744974	<0.03	<0.03	NA	< 0.03	89%	50%	140%	110%	60%	130%	103%	50%	140%
Trichloroethylene	2742794	2744974	<0.03	<0.03	NA	< 0.03	82%	50%	140%	99%	60%	130%	97%	50%	140%
Bromodichloromethane	2742794	2744974	<0.05	<0.05	NA	< 0.05	74%	50%	140%	95%	60%	130%	76%	50%	140%
Methyl Isobutyl Ketone	2742794	2744974	<0.50	<0.50	NA	< 0.50	102%	50%	140%	81%	50%	140%	81%	50%	140%

Quality Assurance

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jul 26, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,1,2-Trichloroethane	2742794	2744974	<0.04	<0.04	NA	< 0.04	85%	50%	140%	100%	60%	130%	93%	50%	140%
Toluene	2742794	2744974	<0.05	<0.05	NA	< 0.05	97%	50%	140%	80%	60%	130%	98%	50%	140%
Dibromochloromethane	2742794	2744974	<0.05	<0.05	NA	< 0.05	92%	50%	140%	78%	60%	130%	81%	50%	140%
Ethylene Dibromide	2742794	2744974	<0.04	<0.04	NA	< 0.04	76%	50%	140%	101%	60%	130%	115%	50%	140%
Tetrachloroethylene	2742794		< 0.05	< 0.05	NA	< 0.05	92%	50%	140%	108%	60%	130%	91%	50%	140%
1,1,1,2-Tetrachloroethane	2742794	2744974	<0.04	<0.04	NA	< 0.04	105%	50%	140%	83%	60%	130%	95%	50%	140%
Chlorobenzene	2742794	2744974	<0.05	<0.05	NA	< 0.05	79%	50%	140%	117%	60%	130%	96%	50%	140%
Ethylbenzene	2742794	2744974	<0.05	<0.05	NA	< 0.05	106%	50%	140%	112%	60%	130%	111%	50%	140%
m & p-Xylene	2742794	2744974	<0.05	<0.05	NA	< 0.05	106%	50%	140%	109%	60%	130%	97%	50%	140%
Bromoform	2742794	2744974	<0.05	<0.05	NA	< 0.05	76%	50%	140%	118%	60%	130%	71%	50%	140%
Styrene	2742794	2744974	<0.05	<0.05	NA	< 0.05	85%	50%	140%	95%	60%	130%	79%	50%	140%
1,1,2,2-Tetrachloroethane	2742794	2744974	<0.05	<0.05	NA	< 0.05	93%	50%	140%	113%	60%	130%	88%	50%	140%
o-Xylene	2742794	2744974	<0.05	<0.05	NA	< 0.05	117%	50%	140%	114%	60%	130%	98%	50%	140%
1,3-Dichlorobenzene	2742794	2744974	<0.05	<0.05	NA	< 0.05	87%	50%	140%	112%	60%	130%	88%	50%	140%
1,4-Dichlorobenzene	2742794	2744974	<0.05	<0.05	NA	< 0.05	93%	50%	140%	108%	60%	130%	76%	50%	140%
1,2-Dichlorobenzene	2742794	2744974	<0.05	<0.05	NA	< 0.05	99%	50%	140%	99%	60%	130%	73%	50%	140%
n-Hexane	2742794	2744974	<0.05	<0.05	NA	< 0.05	86%	50%	140%	72%	60%	130%	111%	50%	140%
4-Bromofluorobenzene	2742794		98	94	3.7%	< 1	NA			NA			79%		
O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Soil)															
F1 (C6 - C10)	2747856		<5	<5	NA	< 5	98%	60%	140%	102%	60%	140%	105%	60%	140%
F2 (C10 to C16)	2736706		< 10	< 10	NA	< 10	103%	60%	140%	110%	60%	140%	82%	60%	140%
F3 (C16 to C34)	2736706		< 50	< 50	NA	< 50	97%	60%	140%	101%	60%	140%	79%	60%	140%
F4 (C34 to C50)	2736706		< 50	< 50	NA	< 50	96%	60%	140%	76%	60%	140%	91%	60%	140%
O. Reg. 406/19 - SPLP VOCs															
Bromomethane Leachate	2744974	2744974	<0.20	<0.20	NA	< 0.20	97%	50%	140%	95%	50%	140%	97%	50%	140%
1,1-Dichloroethylene Leachate	2744974	2744974	<0.30	<0.30	NA	< 0.30	117%	50%	140%	82%	60%	130%	85%	50%	140%
Trans 1,2-Dichloroethylene Leachate	2744974	2744974	<0.20	<0.20	NA	< 0.20	83%	50%	140%	88%	60%	130%	86%	50%	140%
1,1-Dichloroethane Leachate	2744974	2744974	<0.30	<0.30	NA	< 0.30	91%	50%	140%	100%	60%	130%	97%	50%	140%
Cis 1,2-Dichloroethylene Leachate	2744974	2744974	<0.20	<0.20	NA	< 0.20	101%	50%	140%	92%	60%	130%	106%	50%	140%
Chloroform Leachate	2744974	2744974	<0.20	<0.20	NA	< 0.20	88%	50%	140%	98%	60%	130%	96%	50%	130%
1,2-Dichloroethane Leachate	2744974	2744974	<0.20	<0.20	NA	< 0.20	106%	50%	140%	108%	60%	130%	85%	50%	140%
Carbon Tetrachloride Leachate	2744974	2744974	<0.20	<0.20	NA	< 0.20	102%	50%	140%	100%	60%	130%	84%	50%	140%
1,2-Dichloropropane Leachate	2744974	2744974	<0.20	<0.20	NA	< 0.20	86%	50%	140%	96%	60%	130%	98%	50%	140%
Trichloroethylene Leachate	2744974	2744974	<0.20	<0.20	NA	< 0.20	91%	50%	140%	112%	60%	130%	113%	50%	140%
1,1,2-Trichloroethane Leachate	2744974	2744974	<0.20	<0.20	NA	< 0.20	89%	50%	140%	110%	60%	130%	99%	50%	140%
Ethylene Dibromide Leachate	2744974	2744974	<0.10	<0.10	NA	< 0.10	90%	50%	140%	87%	60%	130%	90%	50%	140%
Tetrachloroethylene Leachate	2744974	2744974	<0.20	<0.20	NA	< 0.20	107%	50%	140%	108%	60%	130%	87%	50%	140%
1,1,1,2-Tetrachloroethane Leachate	2744974	2744974	<0.10	<0.10	NA	< 0.10	111%	50%	140%	91%	60%	130%	85%	50%	140%

Quality Assurance

 CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR4
 SAMPLING SITE:

 AGAT WORK ORDER: 21T775122
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jul 26, 2021			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	
1,1,2,2-Tetrachloroethane Leachate	2744974	2744974	<0.10	<0.10	NA	< 0.10	112%	50%	140%	101%	60%	130%	100%	50%	140%	
1,4-Dichlorobenzene Leachate	2744974	2744974	<0.10	<0.10	NA	< 0.10	98%	50%	140%	94%	60%	130%	81%	50%	140%	
1,2-Dichlorobenzene Leachate	2744974	2744974	<0.10	<0.10	NA	< 0.10	116%	50%	140%	99%	60%	130%	101%	50%	140%	

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

SPLP PCBs

PCBs	2744976	2744976	< 0.1	< 0.1	NA	< 0.1	103%	50%	140%	105%	50%	140%	91%	50%	140%
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Total PCBs (soil)

Polychlorinated Biphenyls	2748412		< 0.1	< 0.1	NA	< 0.1	99%	60%	140%	102%	60%	140%	88%	60%	140%
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Certified By:



QA Violation

 CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR4

 AGAT WORK ORDER: 21T775122
 ATTENTION TO: Kesh Appadurai

RPT Date: Jul 26, 2021			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Sample Id	Sample Description	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
				Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)											
Selenium		CR4-04	131%	70%	130%	104%	80%	120%	106%	70%	130%

Comments: For a multi-element scan for lab control standards and matrix spikes, up to 10% of analytes may exceed the quoted limits by up to 10% absolute and it is considered acceptable.



Method Summary

CLIENT NAME: AECOM CANADA LTD
PROJECT: 60636190-CR4
SAMPLING SITE:

AGAT WORK ORDER: 21T775122
ATTENTION TO: Kesh Appadurai
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl ₂ Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER
Antimony Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP/MS
Arsenic Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP/MS
Barium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Beryllium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Boron Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS



Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Cadmium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Chromium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Cobalt Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Copper Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Lead Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Molybdenum Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Nickel Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Selenium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Silver Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Thallium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Uranium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Vanadium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	
Zinc Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B ICP-MS	

Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluorene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benz(a)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
1 and 2 Methylnaphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
F1 (C6 - C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34) minus PAHs	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS



Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Vinyl Chloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS

Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T775122

PROJECT: 60636190-CR4

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
m & p-Xylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Bromoform	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5002	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Moisture Content	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Bromomethane Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,1-Dichloroethylene Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
Trans 1,2-Dichloroethylene Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,1-Dichloroethane Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
Cis 1,2-Dichloroethylene Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
Chloroform Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,2-Dichloroethane Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
Carbon Tetrachloride Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,2-Dichloropropane Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
Trichloroethylene Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,1,2-Trichloroethane Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
Ethylene Dibromide Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
Tetrachloroethylene Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS



Method Summary

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR4
 SAMPLING SITE:

AGAT WORK ORDER: 21T775122
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,1,2,2-Tetrachloroethane Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,4-Dichlorobenzene Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,2-Dichlorobenzene Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
1,3-Dichloropropene Total Leachate	VOL-91-5001	modified from EPA 1312, EPA SW-846 5030C & 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
PCBs	ORG-91-5112	EPA SW-846 3510 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5112	EPA SW-846 3510 & 8082	GC/ECD
Polychlorinated Biphenyls	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Moisture Content	ORG-91-5009	CCME Tier 1 Method	BALANCE



CLIENT NAME: AECOM CANADA LTD
105 COMMERCE VALLEY DR.W 7TH FLOOR
MARKHAM, ON L3T7W3
(905) 886-7022

ATTENTION TO: Kesh Appadurai
PROJECT: 60636190-CR 4 (Waste)

AGAT WORK ORDER: 21T796739

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer
TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Sep 13, 2021

PAGES (INCLUDING COVER): 16

VERSION*: 1

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

*Notes

Disclaimer:

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



Certificate of Analysis

AGAT WORK ORDER: 21T796739

PROJECT: 60636190-CR 4 (Waste)

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

CLIENT NAME: AECOM CANADA LTD

SAMPLING SITE: CR4

ATTENTION TO: Kesh Appadurai

SAMPLED BY: Kesh with Golder

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-09-02

DATE REPORTED: 2021-09-13

Parameter	Unit	SAMPLE DESCRIPTION:		CR4-11	CR4-02
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2021-08-30	2021-08-26
		G / S	RDL	2923111	2923113
Antimony	µg/g	40	0.8	<0.8	<0.8
Arsenic	µg/g	18	1	3	4
Barium	µg/g	670	2.0	154	26.2
Beryllium	µg/g	8	0.4	0.6	<0.4
Boron	µg/g	120	5	15	<5
Boron (Hot Water Soluble)	µg/g	2	0.10	<0.10	<0.10
Cadmium	µg/g	1.9	0.5	<0.5	<0.5
Chromium	µg/g	160	5	25	10
Cobalt	µg/g	80	0.5	8.6	2.9
Copper	µg/g	230	1.0	15.4	4.9
Lead	µg/g	120	1	7	2
Molybdenum	µg/g	40	0.5	<0.5	<0.5
Nickel	µg/g	270	1	16	4
Selenium	µg/g	5.5	0.8	<0.8	<0.8
Silver	µg/g	40	0.5	<0.5	<0.5
Thallium	µg/g	3.3	0.5	<0.5	<0.5
Uranium	µg/g	33	0.50	<0.50	<0.50
Vanadium	µg/g	86	0.4	36.4	26.9
Zinc	µg/g	340	5	45	16
Chromium, Hexavalent	µg/g	8	0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	1.4	0.005	0.666	0.434
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	12	N/A	8.52	6.96
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.63	7.66

Certified By:



Nvine Dasly



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T796739

PROJECT: 60636190-CR 4 (Waste)

5835 COOPERS AVENUE
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CLIENT NAME: AECOM CANADA LTD

SAMPLING SITE: CR4

ATTENTION TO: Kesh Appadurai

SAMPLED BY: Kesh with Golder

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-09-02

DATE REPORTED: 2021-09-13

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.
2923111-2923113 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Nivine Dasly



Certificate of Analysis

AGAT WORK ORDER: 21T796739

PROJECT: 60636190-CR 4 (Waste)

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CLIENT NAME: AECOM CANADA LTD

SAMPLING SITE: CR4

ATTENTION TO: Kesh Appadurai

SAMPLED BY: Kesh with Golder

O. Reg. 406/19 SPLP Metals

DATE RECEIVED: 2021-09-02

DATE REPORTED: 2021-09-13

		SAMPLE DESCRIPTION: CR4-02		
		SAMPLE TYPE: Soil		
		DATE SAMPLED: 2021-08-26		
Parameter	Unit	G / S	RDL	2923113
Antimony Leachate	µg/L	6	0.6	<0.6
Arsenic Leachate	µg/L	-	5	<5
Barium Leachate	µg/L	1000	100	<100
Beryllium Leachate	µg/L	4	0.8	<0.8
Boron Leachate	µg/L	5000	500	<500
Cadmium Leachate	µg/L	0.5	0.20	<0.20
Chromium Leachate	µg/L	50	10	<10
Cobalt Leachate	µg/L	3.8	0.3	<0.3
Copper Leachate	µg/L	14	7.0	<7.0
Lead Leachate	µg/L	-	1.0	<1.0
Molybdenum Leachate	µg/L	23	1.5	<1.5
Nickel Leachate	µg/L	78	10	<10
Selenium Leachate	µg/L	10	5.0	<5.0
Silver Leachate	µg/L	0.3	0.10	<0.10
Thallium Leachate	µg/L	2	0.5	<0.5
Uranium Leachate	µg/L	20	2	<2
Vanadium Leachate	µg/L	-	0.6	2.6
Zinc Leachate	µg/L	180	20	<20

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.
2923113 Leachate for metal testing was prepared in accordance with Ontario MECP Method E9003, which has been modified from SW846-1312 by Ontario MECP. MECP has recommended that Method E9003 be used for leachate testing of soil samples under O'Reg 406/19 by MECP. This is a validated, unaccredited procedure.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Manish Basak



Certificate of Analysis

AGAT WORK ORDER: 21T796739

PROJECT: 60636190-CR 4 (Waste)

5835 COOPERS AVENUE
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CLIENT NAME: AECOM CANADA LTD

SAMPLING SITE: CR4

ATTENTION TO: Kesh Appadurai

SAMPLED BY: Kesh with Golder

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2021-09-02

DATE REPORTED: 2021-09-13

SAMPLE DESCRIPTION:		CU-1-04		
SAMPLE TYPE:		Soil		
DATE SAMPLED:		2021-08-26		
Parameter	Unit	G / S	RDL	2923109
Naphthalene	µg/g	0.2	0.05	<0.05
Acenaphthylene	µg/g	0.093	0.05	<0.05
Acenaphthene	µg/g	2.5	0.05	<0.05
Fluorene	µg/g	6.8	0.05	<0.05
Phenanthrene	µg/g	12	0.05	<0.05
Anthracene	µg/g	0.16	0.05	<0.05
Fluoranthene	µg/g	2.8	0.05	<0.05
Pyrene	µg/g	28	0.05	<0.05
Benz(a)anthracene	µg/g	0.92	0.05	<0.05
Chrysene	µg/g	9.4	0.05	<0.05
Benzo(b)fluoranthene	µg/g	3.2	0.05	<0.05
Benzo(k)fluoranthene	µg/g	3.1	0.05	<0.05
Benzo(a)pyrene	µg/g	0.31	0.05	<0.05
Indeno(1,2,3-cd)pyrene	µg/g	0.76	0.05	<0.05
Dibenz(a,h)anthracene	µg/g	0.7	0.05	<0.05
Benzo(g,h,i)perylene	µg/g	13	0.05	<0.05
1 and 2 Methyl naphthalene	µg/g	0.59	0.05	<0.05
Moisture Content	%		0.1	17.3
Surrogate	Unit	Acceptable Limits		
Naphthalene-d8	%	50-140		89
Acridine-d9	%	50-140		85
Terphenyl-d14	%	50-140		96

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2923109 Results are based on the dry weight of the soil.

Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Analysis performed at AGAT Toronto (unless marked by *)

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Certificate of Analysis

AGAT WORK ORDER: 21T796739
PROJECT: 60636190-CR 4 (Waste)

5835 COOPERS AVENUE
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CLIENT NAME: AECOM CANADA LTD
SAMPLING SITE: CR4

ATTENTION TO: Kesh Appadurai
SAMPLED BY: Kesh with Golder

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2021-09-02

DATE REPORTED: 2021-09-13

		SAMPLE DESCRIPTION: CR4-11		
		SAMPLE TYPE: Soil		
		DATE SAMPLED: 2021-08-30		
Parameter	Unit	G / S	RDL	2923111
Benzene	µg/g	0.02	0.02	<0.02
Toluene	µg/g	0.2	0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05
m & p-Xylene	µg/g		0.05	<0.05
o-Xylene	µg/g		0.05	<0.05
Xylenes (Total)	µg/g	0.091	0.05	<0.05
F1 (C6 - C10)	µg/g		5	<5
F1 (C6 to C10) minus BTEX	µg/g	25	5	<5
F2 (C10 to C16)	µg/g	26	10	<10
F3 (C16 to C34)	µg/g	240	50	<50
F4 (C34 to C50)	µg/g	3300	50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA
Moisture Content	%		0.1	20.2
Surrogate	Unit	Acceptable Limits		
Toluene-d8	% Recovery	60-140		
Terphenyl	%	60-140		

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T796739

PROJECT: 60636190-CR 4 (Waste)

5835 COOPERS AVENUE
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CLIENT NAME: AECOM CANADA LTD

SAMPLING SITE: CR4

ATTENTION TO: Kesh Appadurai

SAMPLED BY: Kesh with Golder

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2021-09-02

DATE REPORTED: 2021-09-13

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Com/Ind
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2923111 Results are based on sample dry weight.
The C6-C10 fraction is calculated using Toluene response factor.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.
C6-C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.
Quality Control Data is available upon request.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Quality Assurance

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR 4 (Waste)
 SAMPLING SITE: CR4

AGAT WORK ORDER: 21T796739
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY: Kesh with Golder

Soil Analysis															
RPT Date: Sep 13, 2021			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	2927188		<0.8	<0.8	NA	< 0.8	123%	70%	130%	100%	80%	120%	106%	70%	130%
Arsenic	2927188		<1	<1	NA	< 1	119%	70%	130%	100%	80%	120%	105%	70%	130%
Barium	2927188		12.3	13.0	5.5%	< 2.0	107%	70%	130%	99%	80%	120%	98%	70%	130%
Beryllium	2927188		<0.4	<0.4	NA	< 0.4	106%	70%	130%	95%	80%	120%	113%	70%	130%
Boron	2927188		<5	<5	NA	< 5	89%	70%	130%	100%	80%	120%	114%	70%	130%
Boron (Hot Water Soluble)	2946202		0.11	0.11	NA	< 0.10	85%	60%	140%	98%	70%	130%	101%	60%	140%
Cadmium	2927188		<0.5	<0.5	NA	< 0.5	116%	70%	130%	100%	80%	120%	107%	70%	130%
Chromium	2927188		<5	<5	NA	< 5	97%	70%	130%	100%	80%	120%	91%	70%	130%
Cobalt	2927188		1.6	1.6	NA	< 0.5	98%	70%	130%	93%	80%	120%	93%	70%	130%
Copper	2927188		2.9	3.1	NA	< 1.0	97%	70%	130%	98%	80%	120%	96%	70%	130%
Lead	2927188		2	2	NA	< 1	103%	70%	130%	94%	80%	120%	94%	70%	130%
Molybdenum	2927188		<0.5	<0.5	NA	< 0.5	99%	70%	130%	96%	80%	120%	95%	70%	130%
Nickel	2927188		2	2	NA	< 1	100%	70%	130%	96%	80%	120%	96%	70%	130%
Selenium	2927188		<0.8	<0.8	NA	< 0.8	135%	70%	130%	93%	80%	120%	98%	70%	130%
Silver	2927188		<0.5	<0.5	NA	< 0.5	114%	70%	130%	107%	80%	120%	113%	70%	130%
Thallium	2927188		<0.5	<0.5	NA	< 0.5	100%	70%	130%	96%	80%	120%	97%	70%	130%
Uranium	2927188		<0.50	<0.50	NA	< 0.50	102%	70%	130%	99%	80%	120%	98%	70%	130%
Vanadium	2927188		8.0	8.2	2.5%	< 0.4	100%	70%	130%	89%	80%	120%	90%	70%	130%
Zinc	2927188		11	11	NA	< 5	102%	70%	130%	98%	80%	120%	112%	70%	130%
Chromium, Hexavalent	2930980		<0.2	<0.2	NA	< 0.2	97%	70%	130%	95%	80%	120%	101%	70%	130%
Cyanide, Free	2920645		<0.040	<0.040	NA	< 0.040	101%	70%	130%	98%	80%	120%	83%	70%	130%
Mercury	2927188		<0.10	<0.10	NA	< 0.10	115%	70%	130%	107%	80%	120%	108%	70%	130%
Electrical Conductivity (2:1)	2946202		0.099	0.102	3.0%	< 0.005	109%	80%	120%						
Sodium Adsorption Ratio (2:1) (Calc.)	2946202		0.073	0.080	9.2%	NA									
pH, 2:1 CaCl2 Extraction	2930980		7.50	7.45	0.7%	NA	100%	80%	120%						

Comments: NA signifies Not Applicable.
 pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
 Duplicate NA: results are under 5X the RDL and will not be calculated.

More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

O. Reg. 406/19 SPLP Metals

Antimony Leachate	2916559		<0.6	<0.6	NA	< 0.6	103%	70%	130%	100%	80%	120%	101%	70%	130%
Arsenic Leachate	2916559		<5	<5	NA	< 5	99%	70%	130%	97%	80%	120%	102%	70%	130%
Barium Leachate	2916559		<100	<100	NA	< 100	101%	70%	130%	100%	80%	120%	104%	70%	130%
Beryllium Leachate	2916559		<0.8	<0.8	NA	< 0.8	92%	70%	130%	92%	80%	120%	90%	70%	130%
Boron Leachate	2916559		<500	<500	NA	< 500	98%	70%	130%	99%	80%	120%	102%	70%	130%
Cadmium Leachate	2916559		<0.20	<0.20	NA	< 0.20	101%	70%	130%	99%	80%	120%	101%	70%	130%
Chromium Leachate	2916559		<10	<10	NA	< 10	101%	70%	130%	102%	80%	120%	104%	70%	130%
Cobalt Leachate	2916559		<0.3	<0.3	NA	< 0.3	100%	70%	130%	100%	80%	120%	101%	70%	130%

Quality Assurance

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR 4 (Waste)
 SAMPLING SITE: CR4

AGAT WORK ORDER: 21T796739
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY: Kesh with Golder

Soil Analysis (Continued)

RPT Date: Sep 13, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Copper Leachate	2916559		<7.0	<7.0	NA	< 7.0	97%	70%	130%	105%	80%	120%	106%	70%	130%
Lead Leachate	2916559		<1.0	<1.0	NA	< 1.0	100%	70%	130%	99%	80%	120%	102%	70%	130%
Molybdenum Leachate	2916559		2.2	2.2	NA	< 1.5	104%	70%	130%	108%	80%	120%	109%	70%	130%
Nickel Leachate	2916559		<10	<10	NA	< 10	102%	70%	130%	101%	80%	120%	103%	70%	130%
Selenium Leachate	2916559		<5.0	<5.0	NA	< 5.0	102%	70%	130%	94%	80%	120%	98%	70%	130%
Silver Leachate	2916559		<0.10	<0.10	NA	< 0.10	103%	70%	130%	101%	80%	120%	101%	70%	130%
Thallium Leachate	2916559		<0.5	<0.5	NA	< 0.5	100%	70%	130%	98%	80%	120%	101%	70%	130%
Uranium Leachate	2916559		<2	<2	NA	< 2	100%	70%	130%	100%	80%	120%	105%	70%	130%
Vanadium Leachate	2916559		1.3	1.4	NA	< 0.6	103%	70%	130%	101%	80%	120%	103%	70%	130%
Zinc Leachate	2916559		<20	<20	NA	< 20	97%	70%	130%	115%	80%	120%	119%	70%	130%

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

Certified By:



Nivine Basily

Quality Assurance

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR 4 (Waste)
 SAMPLING SITE: CR4

AGAT WORK ORDER: 21T796739
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY: Kesh with Golder

Trace Organics Analysis

RPT Date: Sep 13, 2021			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	

O. Reg. 153(511) - PAHs (Soil)

Naphthalene	2930870	< 0.05	< 0.05	NA	< 0.05	89%	50%	140%	102%	50%	140%	84%	50%	140%
Acenaphthylene	2930870	< 0.05	< 0.05	NA	< 0.05	85%	50%	140%	96%	50%	140%	109%	50%	140%
Acenaphthene	2930870	< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	84%	50%	140%	109%	50%	140%
Fluorene	2930870	< 0.05	< 0.05	NA	< 0.05	85%	50%	140%	85%	50%	140%	96%	50%	140%
Phenanthrene	2930870	< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	96%	50%	140%	96%	50%	140%
Anthracene	2930870	< 0.05	< 0.05	NA	< 0.05	85%	50%	140%	85%	50%	140%	91%	50%	140%
Fluoranthene	2930870	< 0.05	< 0.05	NA	< 0.05	87%	50%	140%	85%	50%	140%	94%	50%	140%
Pyrene	2930870	< 0.05	< 0.05	NA	< 0.05	85%	50%	140%	85%	50%	140%	93%	50%	140%
Benz(a)anthracene	2930870	< 0.05	< 0.05	NA	< 0.05	89%	50%	140%	96%	50%	140%	92%	50%	140%
Chrysene	2930870	< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	85%	50%	140%	83%	50%	140%
Benzo(b)fluoranthene	2930870	< 0.05	< 0.05	NA	< 0.05	85%	50%	140%	81%	50%	140%	100%	50%	140%
Benzo(k)fluoranthene	2930870	< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	85%	50%	140%	92%	50%	140%
Benzo(a)pyrene	2930870	< 0.05	< 0.05	NA	< 0.05	85%	50%	140%	84%	50%	140%	93%	50%	140%
Indeno(1,2,3-cd)pyrene	2930870	< 0.05	< 0.05	NA	< 0.05	89%	50%	140%	85%	50%	140%	94%	50%	140%
Dibenz(a,h)anthracene	2930870	< 0.05	< 0.05	NA	< 0.05	85%	50%	140%	96%	50%	140%	104%	50%	140%
Benzo(g,h,i)perylene	2930870	< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	85%	50%	140%	99%	50%	140%

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

Benzene	2920651	<0.02	<0.02	NA	< 0.02	81%	60%	140%	111%	60%	140%	92%	60%	140%
Toluene	2920651	<0.05	<0.05	NA	< 0.05	107%	60%	140%	113%	60%	140%	110%	60%	140%
Ethylbenzene	2920651	<0.05	<0.05	NA	< 0.05	85%	60%	140%	116%	60%	140%	89%	60%	140%
m & p-Xylene	2920651	<0.05	<0.05	NA	< 0.05	109%	60%	140%	90%	60%	140%	107%	60%	140%
o-Xylene	2920651	<0.05	<0.05	NA	< 0.05	87%	60%	140%	109%	60%	140%	85%	60%	140%
F1 (C6 - C10)	2920651	<5	<5	NA	< 5	97%	60%	140%	99%	60%	140%	116%	60%	140%
F2 (C10 to C16)	2939919	< 10	< 10	NA	< 10	115%	60%	140%	90%	60%	140%	76%	60%	140%
F3 (C16 to C34)	2939919	< 50	< 50	NA	< 50	110%	60%	140%	88%	60%	140%	62%	60%	140%
F4 (C34 to C50)	2939919	< 50	< 50	NA	< 50	92%	60%	140%	87%	60%	140%	94%	60%	140%

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

Certified By: 

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

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

QA Violation

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T796739

PROJECT: 60636190-CR 4 (Waste)

ATTENTION TO: Kesh Appadurai

RPT Date: Sep 13, 2021			REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Sample Id	Sample Description	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
				Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)											
Selenium		CR4-11	135%	70%	130%	93%	80%	120%	98%	70%	130%

Comments: NA signifies Not Applicable.

pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

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

More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.



Method Summary

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR 4 (Waste)
 SAMPLING SITE:CR4

AGAT WORK ORDER: 21T796739
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY:Kesh with Golder

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER
Antimony Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP/MS
Arsenic Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP/MS
Barium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Beryllium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Boron Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS



Method Summary

CLIENT NAME: AECOM CANADA LTD
PROJECT: 60636190-CR 4 (Waste)
SAMPLING SITE:CR4

AGAT WORK ORDER: 21T796739
ATTENTION TO: Kesh Appadurai
SAMPLED BY:Kesh with Golder

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Cadmium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Chromium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Cobalt Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Copper Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Lead Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Molybdenum Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Nickel Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Selenium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Silver Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Thallium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Uranium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Vanadium Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS
Zinc Leachate	MET-93-6103	modified from EPA 1312 & EPA 6020B	ICP-MS



Method Summary

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR 4 (Waste)
 SAMPLING SITE:CR4

AGAT WORK ORDER: 21T796739
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY:Kesh with Golder

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluorene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benz(a)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
1 and 2 Methlynaphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Benzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Toluene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Ethylbenzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
m & p-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
o-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Xylenes (Total)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
F1 (C6 - C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID

Method Summary

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR 4 (Waste)
 SAMPLING SITE:CR4

AGAT WORK ORDER: 21T796739
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY:Kesh with Golder

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID



AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Laboratory Use Only

Work Order #: 21T796739

Cooler Quantity: Need

Arrival Temperatures: 39.37 | 38
34.32 | 3

Custody Seal Intact: Yes No N/A

Notes:

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

Report Information:

Company: AECOM Canada - Markham

Contact: kesh.appadurai@AECOM.com

Address: _____

Phone: _____ Fax: _____

Reports to be sent to: kesh.appadurai@AECOM.com

1. Email: _____

2. Email: _____

Regulatory Requirements: No Regulatory Requirement

(Please check all applicable boxes)

Regulation 153/04
Table 1 Indicate One

Ind/Com
 Res/Park
 Agriculture

Soil Texture (Check One)
 Coarse
 Fine

Sewer Use
 Sanitary
 Storm

Regulation 558
 CCME
 Prov. Water Quality Objectives (PWQO)
 Other

Region: _____ Indicate One

Project Information:

Project: 60636190 - CR 4 (waste)

Site Location: CR 4

Sampled By: Kesh with Golder

AGAT Quote #: _____ PO: _____

Please note: If quotation number is not provided, client will be billed full price for analysis.

Is this submission for a Record of Site Condition?

Yes No

Report Guideline on Certificate of Analysis

Yes No

Sample Matrix Legend

- B** Biota
- GW** Ground Water
- O** Oil
- P** Paint
- S** Soil
- SD** Sediment
- SW** Surface Water

Invoice Information:

Bill To Same: Yes No

Company: _____

Contact: _____

Address: _____

Email: _____

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N	Field Filtered - Metals, Hg, CuVI (Please Circle)	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> CN <input type="checkbox"/> Cr+ <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO ₂ /NO ₃ <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH ₃ <input type="checkbox"/> TKN <input type="checkbox"/> NO ₂ <input type="checkbox"/> NO ₃ <input type="checkbox"/> NO ₂ /NO ₃	Volatiles: <input type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM <input type="checkbox"/> Semivolatiles to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	
<u>CV-1-04</u>	<u>Aug 26</u>		<u>1</u>	<u>Soil</u>																		
<u>CR4-11</u>	<u>Aug 30</u>		<u>3</u>	<u>II</u>				<u>X</u>						<u>X</u>								
<u>CR4-02</u>	<u>Aug 26</u>		<u>1</u>	<u>II</u>				<u>X</u>														<u>X</u>

Samples Relinquished By (Print Name and Sign): <u>[Signature]</u>	Date: <u>9/16/21</u>	Time: <u>2:11</u>	Samples Received By (Print Name and Sign): <u>[Signature]</u>	Date: <u>9/12/21</u>	Time: <u>12:46</u>
Samples Relinquished By (Print Name and Sign): _____	Date: _____	Time: _____	Samples Received By (Print Name and Sign): _____	Date: _____	Time: _____
Samples Relinquished By (Print Name and Sign): _____	Date: _____	Time: _____	Samples Received By (Print Name and Sign): _____	Date: _____	Time: _____



CLIENT NAME: AECOM CANADA LTD
105 COMMERCE VALLEY DR.W 7TH FLOOR
MARKHAM, ON L3T7W3
(905) 886-7022

ATTENTION TO: Kesh Appadurai

PROJECT: 60636190-CR4

AGAT WORK ORDER: 21T813708

SOIL ANALYSIS REVIEWED BY: Jacky Zhu, Spectroscopy Technician

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Nov 10, 2021

PAGES (INCLUDING COVER): 17

VERSION*: 1

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

*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
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- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.



Certificate of Analysis

AGAT WORK ORDER: 21T813708

PROJECT: 60636190-CR4

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

CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-10-08

DATE REPORTED: 2021-11-10

SAMPLE DESCRIPTION: CR4-09-SS2

SAMPLE TYPE: Soil

DATE SAMPLED: 2021-10-06

3073358

Parameter	Unit	G / S	RDL	3073358
Antimony	µg/g	7.5	0.8	<0.8
Arsenic	µg/g	11	1	4
Barium	µg/g	390	2.0	53.3
Beryllium	µg/g	4	0.4	<0.4
Boron	µg/g	120	5	5
Boron (Hot Water Soluble)	µg/g	1.5	0.10	0.13
Cadmium	µg/g	1	0.5	<0.5
Chromium	µg/g	160	5	16
Cobalt	µg/g	22	0.5	4.0
Copper	µg/g	140	1.0	11.9
Lead	µg/g	45	1	6
Molybdenum	µg/g	6.9	0.5	<0.5
Nickel	µg/g	100	1	7
Selenium	µg/g	2.4	0.8	<0.8
Silver	µg/g	20	0.5	<0.5
Thallium	µg/g	1	0.5	<0.5
Uranium	µg/g	23	0.50	0.54
Vanadium	µg/g	86	0.4	24.5
Zinc	µg/g	340	5	33
Chromium, Hexavalent	µg/g	8	0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040
Mercury	µg/g	0.24	0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	0.7	0.005	0.144
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	4	N/A	0.192
pH, 2:1 CaCl ₂ Extraction	pH Units		NA	7.49

Certified By:





AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 21T813708

PROJECT: 60636190-CR4

5835 COOPERS AVENUE
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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-10-08

DATE REPORTED: 2021-11-10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Ag
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.
3073358 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

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Certificate of Analysis

AGAT WORK ORDER: 21T813708

PROJECT: 60636190-CR4

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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - OC Pesticides (Soil)

DATE RECEIVED: 2021-10-08

DATE REPORTED: 2021-11-10

SAMPLE DESCRIPTION: CR4-06-SS2

SAMPLE TYPE: Soil

DATE SAMPLED: 2021-10-04

3073364

Parameter	Unit	G / S	RDL	3073364
Hexachloroethane	µg/g	0.01	0.01	<0.01
Gamma-Hexachlorocyclohexane	µg/g	0.01	0.005	<0.005
Heptachlor	µg/g	0.05	0.005	<0.005
Aldrin	µg/g	0.05	0.005	<0.005
Heptachlor Epoxide	µg/g	0.05	0.005	<0.005
Endosulfan I	µg/g		0.005	<0.005
Endosulfan II	µg/g		0.005	<0.005
Endosulfan	µg/g	0.04	0.005	<0.005
Alpha-Chlordane	µg/g		0.005	<0.005
gamma-Chlordane	µg/g		0.005	<0.005
Chlordane	µg/g	0.05	0.007	<0.007
op'-DDE	ug/g		0.005	<0.005
pp'-DDE	µg/g		0.005	<0.005
DDE	µg/g	0.05	0.007	<0.007
op'-DDD	µg/g		0.005	<0.005
pp'-DDD	µg/g		0.005	<0.005
DDD	µg/g	0.05	0.007	<0.007
op'-DDT	µg/g		0.005	<0.005
pp'-DDT	µg/g		0.005	<0.005
DDT (Total)	µg/g	0.078	0.007	<0.007
Dieldrin	µg/g	0.05	0.005	<0.005
Endrin	µg/g	0.04	0.005	<0.005
Methoxychlor	µg/g	0.05	0.005	<0.005
Hexachlorobenzene	µg/g	0.01	0.005	<0.005
Hexachlorobutadiene	µg/g	0.01	0.01	<0.01
Moisture Content	%		0.1	15.0
wet weight OC	g		0.01	10.53
Surrogate	Unit	Acceptable Limits		
TCMX	%	50-140		78
Decachlorobiphenyl	%	50-140		94

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AGAT WORK ORDER: 21T813708

PROJECT: 60636190-CR4

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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - OC Pesticides (Soil)

DATE RECEIVED: 2021-10-08

DATE REPORTED: 2021-11-10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Agricultural or Other Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3073364 Results are based on the dry weight of the soil.
DDT total is a calculated parameter. The calculated value is the sum of op'DDT and pp'DDT.
DDD total is a calculated parameter. The calculated value is the sum of op'DDD and pp'DDD.
DDE total is a calculated parameter. The calculated value is the sum of op'DDE and pp'DDE.
Endosulfan total is a calculated parameter. The calculated value is the sum of Endosulfan I and Endosulfan II.
Chlordane total is a calculated parameter. The calculated value is the sum of Alpha-Chlordane and Gamma-Chlordane.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

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AGAT WORK ORDER: 21T813708

PROJECT: 60636190-CR4

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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2021-10-08

DATE REPORTED: 2021-11-10

Parameter	Unit	SAMPLE DESCRIPTION:		CR4-09-SS2	CR4-06-SS2
		G / S	RDL	3073358	3073364
Naphthalene	µg/g	0.2	0.05	<0.05	<0.05
Acenaphthylene	µg/g	0.093	0.05	<0.05	<0.05
Acenaphthene	µg/g	2.5	0.05	<0.05	<0.05
Fluorene	µg/g	6.8	0.05	<0.05	<0.05
Phenanthrene	µg/g	6.2	0.05	<0.05	<0.05
Anthracene	µg/g	0.058	0.05	<0.05	<0.05
Fluoranthene	µg/g	0.69	0.05	<0.05	<0.05
Pyrene	µg/g	28	0.05	<0.05	<0.05
Benz(a)anthracene	µg/g	0.5	0.05	<0.05	<0.05
Chrysene	µg/g	7	0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g	3.2	0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/g	3.1	0.05	<0.05	<0.05
Benzo(a)pyrene	µg/g	0.31	0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	µg/g	0.38	0.05	<0.05	<0.05
Dibenz(a,h)anthracene	µg/g	0.57	0.05	<0.05	<0.05
Benzo(g,h,i)perylene	µg/g	6.6	0.05	<0.05	<0.05
1 and 2 Methylnaphthalene	µg/g	0.096	0.05	<0.05	<0.05
Moisture Content	%		0.1	26.0	15.0
Surrogate	Unit	Acceptable Limits			
Naphthalene-d8	%	50-140		61	71
Acridine-d9	%	50-140		114	96
Terphenyl-d14	%	50-140		103	90

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Ag
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3073358-3073364 Results are based on the dry weight of the soil.

Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T813708

PROJECT: 60636190-CR4

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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

O. Reg. 558 - Benzo(a) pyrene

DATE RECEIVED: 2021-10-08

DATE REPORTED: 2021-11-10

SAMPLE DESCRIPTION: CR-07-COM

SAMPLE TYPE: Soil

DATE SAMPLED: 2021-10-08

Parameter	Unit	G / S	RDL	3073365
Benzo(a)pyrene Leachate	mg/L	0.001	0.001	<0.001
Surrogate	Unit	Acceptable Limits		
Acridine-d9	%	50-140		78
Naphthalene-d8	%	50-140		84
Terphenyl-d14	%	50-140		88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3073365 The sample was leached according to Regulation 558 protocol. Analysis was performed on the leachate.

Analysis performed at AGAT Toronto (unless marked by *)

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AGAT WORK ORDER: 21T813708

PROJECT: 60636190-CR4

5835 COOPERS AVENUE
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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

OP Pesticides (Soil)

DATE RECEIVED: 2021-10-08

DATE REPORTED: 2021-11-10

SAMPLE DESCRIPTION: CR4-06-SS2

SAMPLE TYPE: Soil

DATE SAMPLED: 2021-10-04

3073364

Parameter	Unit	G / S	RDL	3073364
Phorate	µg/g		0.1	<0.1
Dimethoate	µg/g		0.5	<0.5
Terbufos	µg/g		0.14	<0.14
Diazinon	µg/g		0.2	<0.2
Malathion	µg/g		0.5	<0.5
Chlorpyrifos	µg/g		0.2	<0.2
Parathion	µg/g		0.2	<0.2
Azinphos-methyl	µg/g		0.4	<0.4
Moisture Content	%		0.1	15.0
Surrogate	Unit	Acceptable Limits		
Triphenyl phosphate (surr)	%	50-140		105

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

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 21T813708

PROJECT: 60636190-CR4

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CLIENT NAME: AECOM CANADA LTD

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

Total PCBs (soil)

DATE RECEIVED: 2021-10-08

DATE REPORTED: 2021-11-10

SAMPLE DESCRIPTION: CR4-06-SS2

SAMPLE TYPE: Soil

DATE SAMPLED: 2021-10-04

Parameter	Unit	G / S	RDL	3073364
Polychlorinated Biphenyls	µg/g	0.35	0.1	<0.1
Moisture Content	%		0.1	15.0
Surrogate	Unit	Acceptable Limits		
Decachlorobiphenyl	%	60-130		84

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 2.1: Full Depth Potable Ground Water Condition Volume Independent - Ag
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3073364 Results are based on the dry weight of soil extracted.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Quality Assurance

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR4
 SAMPLING SITE:

AGAT WORK ORDER: 21T813708
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY:

Soil Analysis															
RPT Date: Nov 10, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - Metals & Inorganics (Soil)

Antimony	3100848		<0.8	<0.8	NA	< 0.8	96%	70%	130%	109%	80%	120%	99%	70%	130%
Arsenic	3100848		3	3	NA	< 1	128%	70%	130%	114%	80%	120%	117%	70%	130%
Barium	3100848		42.2	45.2	6.9%	< 2.0	105%	70%	130%	104%	80%	120%	104%	70%	130%
Beryllium	3100848		<0.4	<0.4	NA	< 0.4	99%	70%	130%	106%	80%	120%	105%	70%	130%
Boron	3100848		5	6	NA	< 5	98%	70%	130%	114%	80%	120%	108%	70%	130%
Boron (Hot Water Soluble)	3095704		0.28	0.29	NA	< 0.10	84%	60%	140%	96%	70%	130%	106%	60%	140%
Cadmium	3100848		<0.5	<0.5	NA	< 0.5	110%	70%	130%	107%	80%	120%	109%	70%	130%
Chromium	3100848		14	15	NA	< 5	109%	70%	130%	112%	80%	120%	110%	70%	130%
Cobalt	3100848		3.5	3.6	2.8%	< 0.5	108%	70%	130%	108%	80%	120%	107%	70%	130%
Copper	3100848		10.0	10.2	2.0%	< 1.0	100%	70%	130%	112%	80%	120%	106%	70%	130%
Lead	3100848		19	20	5.1%	< 1	109%	70%	130%	106%	80%	120%	103%	70%	130%
Molybdenum	3100848		<0.5	<0.5	NA	< 0.5	116%	70%	130%	115%	80%	120%	121%	70%	130%
Nickel	3100848		7	7	0.0%	< 1	114%	70%	130%	114%	80%	120%	111%	70%	130%
Selenium	3100848		<0.8	<0.8	NA	< 0.8	73%	70%	130%	109%	80%	120%	114%	70%	130%
Silver	3100848		<0.5	<0.5	NA	< 0.5	104%	70%	130%	111%	80%	120%	104%	70%	130%
Thallium	3100848		<0.5	<0.5	NA	< 0.5	115%	70%	130%	109%	80%	120%	109%	70%	130%
Uranium	3100848		<0.50	<0.50	NA	< 0.50	120%	70%	130%	110%	80%	120%	112%	70%	130%
Vanadium	3100848		23.2	23.4	0.9%	< 0.4	116%	70%	130%	106%	80%	120%	109%	70%	130%
Zinc	3100848		52	53	1.9%	< 5	109%	70%	130%	111%	80%	120%	111%	70%	130%
Chromium, Hexavalent	3086422		<0.2	<0.2	NA	< 0.2	94%	70%	130%	96%	80%	120%	80%	70%	130%
Cyanide, Free	3096487		<0.040	<0.040	NA	< 0.040	99%	70%	130%	107%	80%	120%	96%	70%	130%
Mercury	3100848		<0.10	<0.10	NA	< 0.10	109%	70%	130%	105%	80%	120%	106%	70%	130%
Electrical Conductivity (2:1)	3095704		0.590	0.641	8.3%	< 0.005	108%	80%	120%						
Sodium Adsorption Ratio (2:1) (Calc.)	3096484		39.0	38.7	0.8%	NA									
pH, 2:1 CaCl2 Extraction	3096487		7.39	7.40	0.1%	NA	100%	80%	120%						

Comments: NA signifies Not Applicable.

pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

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

Certified By: _____



Quality Assurance

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR4
 SAMPLING SITE:

AGAT WORK ORDER: 21T813708
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY:

Trace Organics Analysis														
RPT Date: Nov 10, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE	
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits
						Lower		Upper	Lower		Upper	Lower		Upper

O. Reg. 153(511) - PAHs (Soil)

Naphthalene	2970884		< 0.05	< 0.05	NA	< 0.05	99%	50%	140%	99%	50%	140%	111%	50%	140%
Acenaphthylene	2970884		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	98%	50%	140%	98%	50%	140%
Acenaphthene	2970884		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	96%	50%	140%	96%	50%	140%
Fluorene	2970884		0.07	< 0.05	NA	< 0.05	85%	50%	140%	95%	50%	140%	85%	50%	140%
Phenanthrene	2970884		0.24	0.16	NA	< 0.05	96%	50%	140%	85%	50%	140%	96%	50%	140%
Anthracene	2970884		0.05	< 0.05	NA	< 0.05	85%	50%	140%	96%	50%	140%	85%	50%	140%
Fluoranthene	2970884		0.14	0.14	NA	< 0.05	81%	50%	140%	85%	50%	140%	96%	50%	140%
Pyrene	2970884		0.31	0.23	NA	< 0.05	86%	50%	140%	96%	50%	140%	98%	50%	140%
Benz(a)anthracene	2970884		0.10	0.07	NA	< 0.05	92%	50%	140%	82%	50%	140%	98%	50%	140%
Chrysene	2970884		0.12	0.08	NA	< 0.05	81%	50%	140%	92%	50%	140%	85%	50%	140%
Benzo(b)fluoranthene	2970884		0.05	< 0.05	NA	< 0.05	98%	50%	140%	81%	50%	140%	96%	50%	140%
Benzo(k)fluoranthene	2970884		0.05	0.07	NA	< 0.05	96%	50%	140%	82%	50%	140%	85%	50%	140%
Benzo(a)pyrene	2970884		0.05	< 0.05	NA	< 0.05	105%	50%	140%	93%	50%	140%	96%	50%	140%
Indeno(1,2,3-cd)pyrene	2970884		< 0.05	< 0.05	NA	< 0.05	109%	50%	140%	105%	50%	140%	85%	50%	140%
Dibenz(a,h)anthracene	2970884		< 0.05	< 0.05	NA	< 0.05	108%	50%	140%	118%	50%	140%	96%	50%	140%
Benzo(g,h,i)perylene	2970884		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	98%	50%	140%	85%	50%	140%
Total PCBs (soil)															
Polychlorinated Biphenyls	3072766		< 0.1	< 0.1	NA	< 0.1	97%	60%	140%	94%	60%	140%	84%	60%	140%

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

O. Reg. 558 - Benzo(a) pyrene

Benzo(a)pyrene Leachate	3073365	3073365	< 0.001	< 0.001	NA	< 0.001	72%	50%	140%	91%	50%	140%	75%	50%	140%
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O. Reg. 153(511) - OC Pesticides (Soil)

Hexachloroethane	3159799		< 0.01	< 0.01	NA	< 0.01	87%	50%	140%	103%	50%	140%	87%	50%	140%
Gamma-Hexachlorocyclohexane	3159799		< 0.005	< 0.005	NA	< 0.005	85%	50%	140%	100%	50%	140%	101%	50%	140%
Heptachlor	3159799		< 0.005	< 0.005	NA	< 0.005	90%	50%	140%	104%	50%	140%	100%	50%	140%
Aldrin	3159799		< 0.005	< 0.005	NA	< 0.005	93%	50%	140%	99%	50%	140%	80%	50%	140%
Heptachlor Epoxide	3159799		< 0.005	< 0.005	NA	< 0.005	93%	50%	140%	104%	50%	140%	88%	50%	140%
Endosulfan I	3159799		< 0.005	< 0.005	NA	< 0.005	92%	50%	140%	102%	50%	140%	82%	50%	140%
Endosulfan II	3159799		< 0.005	< 0.005	NA	< 0.005	98%	50%	140%	101%	50%	140%	90%	50%	140%
Alpha-Chlordane	3159799		< 0.005	< 0.005	NA	< 0.005	91%	50%	140%	100%	50%	140%	85%	50%	140%
gamma-Chlordane	3159799		< 0.005	< 0.005	NA	< 0.005	90%	50%	140%	99%	50%	140%	86%	50%	140%
op'-DDE	3159799		< 0.005	< 0.005	NA	< 0.005	85%	50%	140%	110%	50%	140%	89%	50%	140%
pp'-DDE	3159799		< 0.005	< 0.005	NA	< 0.005	87%	50%	140%	110%	50%	140%	100%	50%	140%
op'-DDD	3159799		< 0.005	< 0.005	NA	< 0.005	99%	50%	140%	106%	50%	140%	96%	50%	140%
pp'-DDD	3159799		< 0.005	< 0.005	NA	< 0.005	89%	50%	140%	105%	50%	140%	96%	50%	140%
op'-DDT	3159799		< 0.005	< 0.005	NA	< 0.005	94%	50%	140%	115%	50%	140%	106%	50%	140%
pp'-DDT	3159799		< 0.005	< 0.005	NA	< 0.005	83%	50%	140%	106%	50%	140%	108%	50%	140%

Quality Assurance

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR4
 SAMPLING SITE:

AGAT WORK ORDER: 21T813708
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Nov 10, 2021			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	
Dieldrin	3159799		< 0.005	< 0.005	NA	< 0.005	92%	50%	140%	106%	50%	140%	91%	50%	140%	
Endrin	3159799		< 0.005	< 0.005	NA	< 0.005	84%	50%	140%	105%	50%	140%	82%	50%	140%	
Methoxychlor	3159799		< 0.005	< 0.005	NA	< 0.005	89%	50%	140%		50%	140%	104%	50%	140%	
Hexachlorobenzene	3159799		< 0.005	< 0.005	NA	< 0.005	103%	50%	140%	98%	50%	140%	82%	50%	140%	
Hexachlorobutadiene	3159799		< 0.01	< 0.01	NA	< 0.01	83%	50%	140%	101%	50%	140%	86%	50%	140%	
OP Pesticides (Soil)																
Phorate	3073364	3073364	< 0.1	< 0.1	NA	< 0.1	105%	50%	140%	78%	50%	140%	104%	50%	140%	
Dimethoate	3073364	3073364	< 0.5	< 0.5	NA	< 0.5	98%	50%	140%	98%	50%	140%	77%	50%	140%	
Terbufos	3073364	3073364	< 0.14	< 0.14	NA	< 0.14	85%	50%	140%	96%	50%	140%	85%	60%	140%	
Diazinon	3073364	3073364	< 0.2	< 0.2	NA	< 0.2	93%	50%	140%	93%	50%	140%	96%	50%	140%	
Malathion	3073364	3073364	< 0.5	< 0.5	NA	< 0.5	92%	50%	140%	105%	50%	140%	93%	50%	140%	
Chlorpyrifos	3073364	3073364	< 0.2	< 0.2	NA	< 0.2	105%	50%	140%	98%	50%	140%	93%	50%	140%	
Parathion	3073364	3073364	< 0.2	< 0.2	NA	< 0.2	77%	50%	140%	78%	50%	140%	91%	50%	140%	
Azinphos-methyl	3073364	3073364	< 0.4	< 0.4	NA	< 0.4	74%	50%	140%	88%	50%	140%	98%	50%	140%	

Certified By: _____





Method Summary

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR4
 SAMPLING SITE:

AGAT WORK ORDER: 21T813708
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl ₂ Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

Method Summary

CLIENT NAME: AECOM CANADA LTD

AGAT WORK ORDER: 21T813708

PROJECT: 60636190-CR4

ATTENTION TO: Kesh Appadurai

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Hexachloroethane	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Gamma-Hexachlorocyclohexane	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Heptachlor	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Aldrin	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Heptachlor Epoxide	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Endosulfan I	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Endosulfan II	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Endosulfan	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	CALCULATION
Alpha-Chlordane	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
gamma-Chlordane	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Chlordane	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	CALCULATION
op'-DDE	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
pp'-DDE	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
DDE	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
op'-DDD	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
pp'-DDD	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
DDD	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	CALCULATION
op'-DDT	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
pp'-DDT	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
DDT (Total)	ORG-91-5113	modified from EPA 3570, 3620C & 8081B	CALCULATION
Dieldrin	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Endrin	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Methoxychlor	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Hexachlorobenzene	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Hexachlorobutadiene	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
TCMX	ORG-91-5112	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE



Method Summary

CLIENT NAME: AECOM CANADA LTD
 PROJECT: 60636190-CR4
 SAMPLING SITE:

AGAT WORK ORDER: 21T813708
 ATTENTION TO: Kesh Appadurai
 SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
wet weight OC	ORG-91-5113		BALANCE
Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluorene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benz(a)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
1 and 2 Methlynaphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene Leachate	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Phorate	ORG-91-5103	modified from EPA 3570, 8141B & 8270E	GC/MS
Dimethoate	ORG-91-5103	modified from EPA 3570, 8141B & 8270E	GC/MS
Terbufos	ORG-91-5103	modified from EPA 3570, 8141B & 8270E	GC/MS



Method Summary

CLIENT NAME: AECOM CANADA LTD
PROJECT: 60636190-CR4
SAMPLING SITE:

AGAT WORK ORDER: 21T813708
ATTENTION TO: Kesh Appadurai
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Diazinon	ORG-91-5103	modified from EPA 3570, 8141B & 8270E	GC/MS
Malathion	ORG-91-5103	modified from EPA 3570, 8141B & 8270E	GC/MS
Chlorpyrifos	ORG-91-5103	modified from EPA 3570, 8141B & 8270E	GC/MS
Parathion	ORG-91-5103	modified from EPA 3570, 8141B & 8270E	GC/MS
Azinphos-methyl	ORG-91-5103	modified from EPA 3570, 8141B & 8270E	GC/MS
Triphenyl phosphate (surr)	ORG-91-5103	modified from EPA 3570, 8141B & 8270E	GC/MS
Moisture Content	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Polychlorinated Biphenyls	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA SW-846 3541 & 8082	GC/ECD
Moisture Content	ORG-91-5009	CCME Tier 1 Method	BALANCE



AGAT Laboratories

5835 Cooper's Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
web:earth.agatlabs.com

Laboratory Use Only

Work Order #: 21T813708

Cooler Quantity: _____
Arrival Temperatures: 87 99 94

Custody Seal Intact: Yes No N/A

Notes: see

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

Report Information:

Company: AECOM Canada - Markham
Contact: kesh.appadurai@AECOM.com
Address: _____
Phone: _____ Fax: _____
Reports to be sent to: _____
1. Email: kesh.appadurai@AECOM.com
2. Email: _____

Regulatory Requirements: No Regulatory Requirement

(Please check all applicable boxes)

Regulation 153/04 Sewer Use Regulation 558
Table 1 Sanitary CCME
 Ind/Com Storm Prov. Water Quality Objectives (PWQO)
 Res/Park Agriculture Other
Soil Texture: 106/19 2.1 Region: _____
 Coarse Fine _____

Is this submission for a Record of Site Condition?

Yes No

Report Guideline on Certificate of Analysis

Yes No

Turnaround Time (TAT) Required:

Regular TAT 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

3 Business Days 2 Business Days 1 Business Day

OR Date Required (Rush Surcharges May Apply): _____

Please provide prior notification for rush TAT
*TAT is exclusive of weekends and statutory holidays

Project Information:

Project: 60636190 - CR04
Site Location: CR-04 kesh.
Sampled By: _____
AGAT Quote #: _____ PO: _____

Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes No

Company: _____
Contact: _____
Address: _____
Email: _____

Sample Matrix Legend

B Biota
GW Ground Water
O Oil
P Paint
S Soil
SD Sediment
SW Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N	Field Filtered - Metals, Hg, CrVI (Please Circle)	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> CN Ct: <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO ₂ /NO ₃ <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH ₃ <input type="checkbox"/> TKN <input type="checkbox"/> NO ₂ <input type="checkbox"/> NO ₃ <input type="checkbox"/> NO ₂ /NO ₃	Volatiles: <input type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM	CCME Fractions 1 to 4	ABNS	PAHS	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals <u>PAH</u>	Sewer Use	
<u>CR4-09-SS2</u>	<u>Oct 6</u>	<u>04:06</u>	<u>1</u>																				
<u>CR4-06-SS2</u>	<u>Oct 4</u>	<u>04:04</u>	<u>1</u>																				
<u>CR4-07-Com</u>	<u>Oct 8</u>	<u>04:08</u>	<u>1</u>																				

Samples Relinquished By (Print Name and Sign): <u>[Signature]</u>	Date: <u>3:55</u>	Time: _____	Samples Received By (Print Name and Sign): <u>[Signature]</u>	Date: _____	Time: <u>3:57</u>
Samples Relinquished By (Print Name and Sign): _____	Date: _____	Time: _____	Samples Received By (Print Name and Sign): _____	Date: _____	Time: _____
Samples Relinquished By (Print Name and Sign): _____	Date: _____	Time: _____	Samples Received By (Print Name and Sign): _____	Date: _____	Time: _____

Page 1 of 1