



Public Works and Government Services Canada

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Specifications for

AEC 32 Remediation and Landfill Treatment Facility Operation

Watson Lake Airport, Watson Lake, Yukon

Project No. R.084240.002 July 2017

APPROVED BY:

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[Signature] 2017-07-27
 Construction Safety Coordinator Date

TENDER:

[Signature] 25 July 2017
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1. PART 1 - GENERAL

1.1. Measurement Procedures

- 1.1.1. Pre-mobilization Submittals will be paid in accordance with lump sum price established for all Preconstruction Meetings, final design, planning, health and safety, and other Submittals in accordance with the Contract or required and accepted by the Departmental Representative as in accordance with the Contract prior to mobilization to Site.
- 1.1.2. Mobilization will be paid in accordance with lump sum price established for mobilizing all necessary equipment, materials, supplies, facilities, and personnel associated with the Works to the Site. Includes initial insurance, bonding, and permits. Additional insurance, bonding, and permits due to changes in scope, cost, and schedule as accepted by the Departmental Representative will be included in Contract amendments.
- 1.1.3. Site and Ground Surface Preparation will be paid in accordance with lump sum price established to prepare the Site for planned construction works. Includes clearing and grubbing, demolition, temporary removal of existing infrastructure, utility location, rerouting, and protection, and construction of temporary onsite access roads. Also includes removal of any incidental or generated material. Also includes Preconstruction Precondition Survey and Preconstruction As-Built Documents.
- 1.1.4. Traffic Control will be paid in accordance with lump sum price established to provide traffic control in accordance with the current version of BC Ministry of Transportation and Infrastructure Traffic Control Manual for Work on Roadways and the *Yukon Highways Act*, or equivalent.
- 1.1.5. Test Pitting will be paid in accordance with unit rate established for time to complete excavation and backfill of test pits, including for equipment time and associated delays, as directed by Departmental Representative.
- 1.1.6. Monitoring Well Decommissioning – will be paid in accordance with lump sum price established to decommission monitoring wells indicated on Drawings in accordance with Provincial or Territorial regulations.
- 1.1.7. Site Facilities - Provision will be paid in accordance with lump sum price established to design, temporarily provide for duration of Work, and erect all infrastructure in accordance with the Contract. Includes temporary structures and facilities, environmental protection, stockpile areas, laydown areas, groundwater monitoring well protection, access, onsite roadways, temporary hoarding, federal signage, office facilities, sanitary facilities, water management infrastructure, lighting and utilities.
- 1.1.8. Site Facilities - Operation will be paid in accordance with lump sum price established to operate and maintain all infrastructure between mobilization and demobilization. Includes temporary structures and facilities, stockpile areas, laydown areas, groundwater monitoring well protection, access, onsite roadways, temporary hoarding, federal signage, office facilities, sanitary facilities, water management infrastructure, lighting, and utilities. Also includes ongoing services including project management, security, surveying, noise



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monitoring, vibration monitoring, road cleaning and dust control, utilities, project meetings, inspections, progress Submittals, traffic control, health and safety, Environmental Protection, cleaning and operation during inclement weather. Also, includes living out allowances, travel and room and board. Rate must not vary even if hours of work and/or days of work vary. Time will only be paid for duration in accordance with the Contract and changes in schedule as accepted by the Departmental Representative and included in Extension of Time on Contracts.

- 1.1.9. Temporary Site Fencing will be paid in accordance with a unit rate established for a lineal measurement for temporary security fencing at the entrance to the Site and around the perimeter of any on-Site open excavation including a minimum 10 m setback from the edge of the excavation. Rate includes fence provision, erection, dismantling and removal from Site. Measurement of length of fencing to be confirmed by Departmental Representative.
- 1.1.10. Survey – Survey will be paid in accordance with a lump sum established for measurement of quantities in the event of a dispute between the Contractor and the Contract. The Contractor can, at their own cost, retain a land surveyor.
- 1.1.11. Standby Time will be paid in accordance with unit rate price established, for time when construction Work is unable to proceed, and that is directly attributable to any neglect or delay that occurs after the date of the Contract on the part of the Departmental Representative in providing any information or in doing any act that the Contract expressly requires the Departmental Representative. Measurement as recorded time by Departmental Representative. Includes machinery and labour standby costs. Does not include items covered by Site Facilities Operation. Standby Time may be pro-rated based on hours of work. Make all efforts to minimize impacts due to delays caused by the Departmental Representative, including re-sequencing Work. Provide documentation of a sufficient description of the facts and circumstances of the occurrence to enable the Departmental Representative to determine whether or not the Standby Time is justified. Reviews, sampling, or other work conducted by the Departmental Representative with time allowances in accordance with the Contract will result in no increase to the Contract Amount nor Extension of Time for completion of the Work.
- 1.1.12. Waste Oversize Debris Removal will be paid in accordance with unit rate price established for volume including Transport and Disposal. Measurement as recorded by Departmental Representative. Includes loading, hauling, interim storage, and handling for all material transported from Site. Debris may include concrete, metal and asbestos containing pipe.
- 1.1.13. Access Road Maintenance will be paid in accordance with the lump sum price established to design and provide access road maintenance acceptable to a Qualified Professional and Departmental Representative for the duration of the Contract.
- 1.1.14. Water Management – Equipment will be paid in accordance with the lump sum price to provide all personnel labour, pumps, hoses, lines and minimum 5,000 L



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- tank to dewater the excavation and store water for disposal. Cost includes removal of equipment and tank upon completion of work.
- 1.1.15. Water Management – Disposal will be paid in accordance with the unit rate price established for disposal of liquid collected in a minimum 5,000 L tank on-Site at an approved or disposal at a permitted facility as accepted by the Departmental Representative.
- 1.1.16. Contaminated Material - Excavation, Transportation and Placement will be paid in accordance with unit rate price established for volume of material removed to excavate to Contaminated Material Extents according to Drawings, transported to the on-Site Land Treatment Facility, and placement within the Land Treatment Facility using methods and locations approved by the Departmental Representative. Measurement as recorded insitu Excavation volume of final Contaminated Material Extents as Surveyed by Departmental Representative. Insitu volume will be calculated based on simple dimensions of excavation (bank volume) and will not account for exsitu bulking (expansion or swell) and insitu compaction (densifying) factors. Includes all handling, loading, hauling, unloading, interim storage, and final placement.
- 1.1.17. Non-Contaminated Material - Excavation, Transportation and Stockpile will be paid in accordance with unit rate price established for volume of material removed to excavate to Overburden and Topsoil and Inert Debris. Measurement as recorded insitu Excavation volume of Overburden and Topsoil as Surveyed by Departmental Representative. Insitu volume will be calculated based on simple dimensions of excavation (bank volume) and will not account for exsitu bulking (expansion or swell) and insitu compaction (densifying) factors. Includes transportation on-Site within 200 m. Includes all handling, loading, hauling, unloading, and stockpiling.
- 1.1.18. Hazardous/Special Waste Soil - Excavation and Transportation will be paid in accordance with unit rate price established for volume of material removed to excavate Hazardous/Special Waste Soil. Measurement as recorded insitu Excavation volume of Hazardous/Special Waste Soil as Surveyed by Departmental Representative. Insitu volume will be calculated based on simple dimensions of excavation (bank volume) and will not account for exsitu bulking (expansion or swell) and insitu compaction (densifying) factors. Includes transportation to an off-Site Facility as approved by the Departmental Representative. Includes all handling, loading, hauling, and unloading.
- 1.1.19. Metals Impacted Soil - Excavation and Transportation will be paid in accordance with unit rate price established for volume of material removed to excavate Metals Impacted Soil. Measurement as recorded insitu Excavation volume of Metals Impacted Soil as Surveyed by Departmental Representative. Insitu volume will be calculated based on simple dimensions of excavation (bank volume) and will not account for exsitu bulking (expansion or swell) and insitu compaction (densifying) factors. Includes transportation to an off-Site Facility as approved by the Departmental Representative. Includes all handling, loading, hauling, and unloading.

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- 1.1.20. Purchase and Install Recontamination Prevention Liner (Geomembrane) will be paid in accordance with the unit rate price established for area of material purchased and installed at the base of the excavation(s). Measurement in accordance with the Drawings, the Contract and as directed by the Departmental Representative. Includes purchase, transportation to Site, onsite transport, all handling, loading, hauling, unloading, placing, testing, and inspections to demonstrate compliance with Contract.
- 1.1.21. Purchase and Install Geotextile will be paid in accordance with the unit rate price established for area of material purchased and installed at the depth specified in the Drawings. Measurement in accordance with the Drawings, the Contract and as directed by the Departmental Representative. Includes purchase, transportation to Site, onsite transport, all handling, loading, hauling, unloading, placing, testing, and inspections to demonstrate compliance with Contract.
- 1.1.22. Backfill – Imported from the storage area in or near the Land Treatment Facility will be paid in accordance with unit rate price established per volume of material for use as Backfill for Excavation. Measurement as recorded insitu Imported Backfill volume of final Contaminated Material Extents and overlying incidental material as Surveyed by Departmental Representative. Insitu volume will be calculated based on simple dimensions of excavation (bank volume) and will not account for exsitu bulking (expansion or swell) and insitu compaction (densifying) factors. Includes analytical testing and inspections to demonstrate compliance with Contract, provision, transport to Site, onsite transport, all handling, loading, hauling, unloading, placing, grading and compacting.
- 1.1.23. Backfill – Imported from off-Site will be paid in accordance with unit rate price established per volume of material imported from an off-Site Facility for use as Backfill for Excavation. Measurement as recorded insitu Imported Backfill volume of final Contaminated Material Extents and overlying incidental material as Surveyed by Departmental Representative. Insitu volume will be calculated based on simple dimensions of excavation (bank volume) and will not account for exsitu bulking (expansion or swell) and insitu compaction (densifying) factors. Includes analytical testing and inspections to demonstrate compliance with Contract, provision, transport to Site, onsite transport, all handling, loading, hauling, unloading, placing, grading and compacting. Material to be 100% passing the 75mm sieve and less than 5% passing the 0.075 mm sieve.
- 1.1.24. Backfill – Overburden and Topsoil will be paid in accordance with unit rate price established for volume of Overburden and Topsoil material suitable for reuse as Backfill for Excavation. Measurement as recorded insitu Overburden and Topsoil Backfill volume of final Contaminated Material Extents and overlying and adjacent incidental material as Surveyed by Departmental Representative. Insitu volume will be calculated based on simple dimensions of excavation (bank volume) and will not account for exsitu bulking (expansion or swell) and insitu compaction (densifying) factors. Includes analytical testing and inspections to demonstrate compliance with Contract, onsite transport, all handling, loading, hauling, unloading, placing, grading and compacting.



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- 1.1.25. Disposal – Hazardous/Special Waste will be paid in accordance with unit rate price established for weight of Hazardous/Special Waste material disposed. Measurement as recorded on Disposal Facility weigh scale certified by Measurement Canada and results provided to Departmental Representative on Certificates of Disposal. Contaminated Material Disposal includes Contaminated Material Treatment Offsite, as required by Disposal Facility.
- 1.1.26. Disposal – Metals Impacted Soil will be paid in accordance with unit rate price established for weight of Metals Impacted Soil disposed. Measurement as recorded on Disposal Facility weigh scale certified by Measurement Canada and results provided to Departmental Representative on Certificates of Disposal. Contaminated Material Disposal includes Contaminated Material Treatment Offsite, as required by Disposal Facility.
- 1.1.27. Site Restoration will be paid in accordance with the lump sum price established to restore the Site to make suitable for post-Work use as shown on Drawings. Includes re-establishment of pre-existing infrastructure, re-installing groundwater monitoring wells, final grading, topsoil reuse, revegetation, and deconstructing and removal from Site all temporary facilities and removal of any incidental or generated material. Also includes repair and maintenance of access road, restoration of equipment staging areas, onsite roadways, stockpile areas, access pad areas, as required.
- 1.1.28. Demobilization will be paid in accordance with lump sum price established for demobilizing all equipment and personnel associated with the Works from the Site. Includes decontaminating all equipment prior to removal from Site.
- 1.1.29. Closeout Submittals will be paid in accordance with lump sum price established for Final Site Inspection (for Certificate of Completion purposes), Closeout Meetings, provision of final as-built documents and completion documents as instructed by the Departmental Representative.
- 1.1.30. Land Treatment Facility Preparation will be paid in accordance with lump sum price established to prepare and the Land Treatment Facility and area around the LTF for bioremediation in accordance with the Treatment Facility Operations Plan and Permitting.
- 1.1.31. Fertilizer Supply and Application will be paid in accordance with unit rate price established for weight of fertilizer supplied and applied to the LTF. Includes all associated costs to provide, store and apply the high nitrogen water soluble fertilizer (30-10-10) at the location specified by the Departmental Representative.
- 1.1.32. Water Supply and Application will be paid in accordance with unit rate price established for volume of water supplied and applied to the LTF to assist with bioremediation. Include all costs associated with dispersing the sump water during treatment of contaminated soil.
- 1.1.33. Tractor Operation will be paid in accordance with unit rate price established using a four wheel drive tractor or track mounted bulldozer with a minimum of 84 horsepower, with cultivator (recommended width should be less than 14 feet).
- 1.1.34. Soil flipping with an excavator will be paid in accordance with unit rate price established using a excavator to access the cell and flip the soil as directed by

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Department Representative. It is important to note that the bucket of the excavator must be marked and it must not come in contact with the geotextile separator marker layer.

- 1.1.35. Soil sampling with backhoe/excavator will be paid in accordance with unit rate price established using a backhoe or excavator to access the cell and to excavate soil sampling locations as directed by Department Representative.
- 1.1.36. Soil Relocation from Cell to Storage Area will be paid in accordance with unit rate price established for volume of soil from the LTF that is to be relocated to a storage area in or near the LTF (within 300 m). The unit rate will include excavation, loading and placement of the soil into the storage area. The unit rate should also include stockpiling.
- 1.1.37. Construct Access to Highway will be paid as a lump sum to construct access from the Robert Campbell Highway to the Site access road in accordance with permit conditions.

In the event the contractor does not agree on the quantities documented for material in the trucks the Departmental Representative can direct loaded trucks to a weigh scale for measurement, at the Contractor's cost. For the purpose of estimation soil will be assumed to have a bulk density of 2,000 kg/m³ and concrete will be 2,400 kg/m³.

1.2. Definitions

- 1.2.1. Certificate of Completion: see General Conditions.
- 1.2.2. Change Order: PSPC form issued by the Departmental Representative to the Contractor as per the relevant Contemplated Change Notice.
- 1.2.3. Confirmation Samples: soil and sediment samples collected from the base and walls of the excavation by the Departmental Representative to confirm that the remedial objectives for the Work have been met.
- 1.2.4. Contaminated Material: soil, sediment and other solid material where substances occur at concentrations that: (i) are above background levels and pose, or are likely to pose, an immediate or long-term hazard to human health or the environment, or (ii) exceed the levels specified in policies and regulations. Includes Hazardous Waste and Waste Quality; does not include Non-Contaminated Material or Waste. Relevant regulations, unless otherwise in accordance with the Contract or as instructed by the Departmental Representative, include:
 - 1.2.4.1. For sites in Yukon, may include risk-based site-specific target levels for remediation objectives: Yukon Special Waste Regulation, Yukon Contaminated Sites Regulation.
- 1.2.5. Contaminated Material Extents: lateral and vertical excavation extents of Contaminated Material to be remediated to meet remediation objectives. Extents on Drawings are approximate and may vary based on field observations or Confirmation Samples. Does not include Topsoil or Overburden.
- 1.2.6. Contaminated Water: liquid material where substances occur at concentrations that: (i) are above background levels and pose, or are likely to pose, an immediate or long-term hazard to human health or the environment, or (ii) meet



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or exceed the levels specified in policies and regulations. Includes Hazardous Waste and water that is not suitable for aquatic life, irrigation, livestock or drinking water or any other water use specified in the BC Contaminated Sites Regulation, as applicable. Includes Non-Aqueous Phase Liquids (NAPL). Does not include Non-Contaminated Water or Sewage Wastewater. Relevant regulations, unless otherwise in accordance with the Contract or as directed by the Departmental Representative, include:

- 1.2.6.1. For sites in Yukon, may include risk-based site-specific target levels for remediation objectives : Yukon Special Waste Regulation, Yukon Contaminated Sites Regulation.
- 1.2.7. Contaminated Water Treatment Plant: a temporary onsite or existing offsite facility located in Canada that is designed, constructed and operated for the handling or processing of Contaminated Water in such a manner as to change the physical, chemical or biological character or composition of the water to lower than the site-specific remedial objective, Discharge Approval, and in compliance with all regulations.
- 1.2.8. Contemplated Change Notice: PSPC form issued by the Departmental Representative to the Contractor requesting Contractor to provide a quote, which may result in a Change Order.
- 1.2.9. Contract: see General Conditions.
- 1.2.10. Contract Amount: see General Conditions.
- 1.2.11. Contractor: see General Conditions.
- 1.2.12. Departmental Representative: see General Conditions.
- 1.2.13. Discharge Approval: permit, certificate, approval, or any other form of authorization issued by appropriate federal agency, province, territory, or municipality having jurisdiction and authorizing discharge.
- 1.2.14. Disposal Facility: a facility specifically used to introduce waste into the environment for the purpose of final burial.
- 1.2.15. Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- 1.2.16. Environmental Protection: prevention, control, mitigation, and restoration of pollution and habitat or environmental disruption during construction. Control of Environmental Pollution and Damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; vibrations; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.
- 1.2.17. Environmental Protection Plan: plan developed by the Contractor to ensure Environmental Protection and prevent Environmental Pollution and Damage identifying all environmental risks and mitigation measures, including: personnel requirements, emergency contacts, Environmental Protection methods, procedures, and equipment, and emergency response including a Spill Control Plan.

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- 1.2.18. Extension of Time: see General Conditions.
- 1.2.19. Extension of Time on Contracts: PSPC form requesting an Extension of Time.
- 1.2.20. Final Completion: see General Conditions.
- 1.2.21. Hazardous Waste: Contaminated Material which meets the regulatory definition of Hazardous Waste.
- 1.2.22. Land Surveyor: a person working for the Contractor who is a qualified, registered land surveyor licensed to practice in relevant jurisdiction.
- 1.2.23. Land Treatment Facility: equivalent of Soil Treatment Facility.
- 1.2.24. Landfill Facility: an existing offsite facility located in Canada that is designed, constructed and operated to prevent any pollution from being caused by the facility outside the area of the facility from waste placed in or on land within the facility.
- 1.2.25. Materials Source Separation Program: consists of a series of ongoing activities to separate reusable and recyclable waste into categories from other types of waste at point of generation.
- 1.2.26. Non-Contaminated Material: soil, sediment and other solid material, including debris, excavated incidentally which meets:
 - 1.2.26.1. For sites in Yukon: the Yukon Contaminated Sites Regulation most stringent of Schedule 1 and 2.
- 1.2.27. Non-Contaminated Water: liquids which are suitable for direct discharge to the environment after removal of sediment, and which is not Contaminated Water or Sewage Wastewater. Includes surface runoff, stormwater, and groundwater which has not come into contact with Contaminated Material.
- 1.2.28. On Site Instruction: instructions or other communications issued by the Departmental Representative to the Contractor.
- 1.2.29. On Site Notice: notice or other communication issued by the Contractor to the Departmental Representative.
- 1.2.30. Overburden: Non-Contaminated Material excavated incidentally above Contaminated Material Extents that is suitable as Backfill or material removal required to facilitate access to the Contaminated Material. Includes material excavated as part of Temporary Sloping.
- 1.2.31. Progress Payment: see General Conditions.
- 1.2.32. PSPC: Public Services and Procurement Canada. Representative of Canada with control of the Site.
- 1.2.33. Qualified Professional: a person working for the Contractor who is registered in relevant jurisdiction with his or her appropriate professional association, acts under that professional association's code of ethics, and is subject to disciplinary action by that professional association, and through suitable education, experience, accreditation and knowledge can be reasonably relied on to provide advice within his or her area of expertise. Includes Geotechnical Engineers, Environmental Consultants, and Land Surveyors.
- 1.2.34. Quote: Contractor's cost estimate issued to the Departmental Representative as per the relevant Contemplated Change Notice via an On Site Notice.
- 1.2.35. Remediation by Excavation: excavation of Contaminated Material and incidental Non-Contaminated Material to the Extents determined by a Qualified

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- Professional for the purpose of remediating the Site to meet numerical standards. Includes full treatment and disposal. Does not include risk assessment or risk management of material onsite. Does not include encapsulation or solidification in place.
- 1.2.36. Sewage Wastewater: liquid waste which is not suitable for direct discharge to the environment, and which must be either treated offsite or discharged to a sanitary sewer. Includes water from hand basin, shower, personal hygiene facilities, or other liquid waste from sanitary facilities.
 - 1.2.37. Site: work area available to Contractor according to Drawings. Does not include shared or public areas, including common roads.
 - 1.2.38. Special Waste: Yukon equivalent of Hazardous Waste.
 - 1.2.39. Subcontractor: see General Conditions.
 - 1.2.40. Submit/Submittals: documents from the Contractor to the Departmental Representative as: required by Contract; stipulated in permit, certificate, approval, license or any other form of authorization; by convention or industry practice. Submittals are final only after review and accepted in writing by Departmental Representative.
 - 1.2.41. Substantial Performance: see General Conditions.
 - 1.2.42. Superintendent: see General Conditions
 - 1.2.43. Supplier: see General Conditions.
 - 1.2.44. Survey by Departmental Representative: survey conducted by Departmental Representative, or by Departmental Representative's consultant or by Land Surveyor retained by Departmental Representative. Survey may be performed by physical measurement (e.g. tape measurer) or by survey equipment (e.g. Global Positioning System, total station). Contractor may perform independent survey using a Qualified Professional to confirm Survey by Departmental Representative.
 - 1.2.45. Topsoil: Organic Containing, Non-Contaminated Material excavated incidentally above Contaminated Material Extents that is a surface organic layer to facilitate vegetation growth. Does not include Overburden.
 - 1.2.46. Transfer/Interim Storage Facility: a facility specifically used to transfer or store on a short-term basis Contaminated Material during offsite transport.
 - 1.2.47. Treatment Facility: a facility specifically used to treat Contaminated Material. May be Owner's (PSPC provided) or Offsite (Contractor provided). Owner's Soil Treatment Facility is located on property under PSPC control, but may be located at a different location than where construction work occurs. Offsite Treatment Facility may treat soil, sediment, or water.
 - 1.2.48. Waste: Non-Contaminated Material that is not soil. Includes cleared and grubbed vegetation, litter, rubbish, debris, cobbles, boulders, excess construction material, lumber, steel, plastic, concrete, and asphalt. Includes Topsoil and Overburden that is not re-used.
 - 1.2.49. Waste Oversize Debris: Waste that is required to be excavated and is: larger than 1 cubic metre or larger than 2 metres in one dimension, cannot be removed with a typical excavator with bucket, and requires the use of special equipment (e.g., saws, hydraulic cutters, excavator hammers, vibratory pile extractors). Includes

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bedrock, boulders, pilings, building structures, concrete foundations, pipe supports, and tank bases.

- 1.2.50. Waste Quality: soil or other material that is not suitable for industrial, commercial, urban park, residential, agricultural, wildlands or any other land use specified in the BC Contaminated Sites Regulation or Yukon Contaminated Sites Regulation, as applicable.
- 1.2.51. Waste Reduction Plan: a written report which addresses opportunities for reduction, reuse or recycling of materials.
- 1.2.52. Work: see General Conditions.
- 1.2.53. Working Day: see General Conditions.

1.3. Action and Informational Submittals

- 1.3.1. After hours work: at least 5 Working Days prior to commencing after hours work Submit a schedule showing requested dates, times, and reasons for after hours work. Approval will only be granted for reasons valid in the opinion of the Departmental Representative and if request can be reasonably accommodated by other contracts.

1.4. Work Covered by Contract

- 1.4.1. Contractor must provide personnel with appropriate experience in remediating contaminated materials. Contractor to provide specialized material handling, health and safety, and environmental protection procedures.
- 1.4.2. Work to be performed under the Contract includes, but is not limited to, the following items, including all ancillary Work, covered further in the Contract:
 - 1.4.2.1. Pre-mobilization Submittals
 - 1.4.2.2. Mobilization
 - 1.4.2.3. Site and Ground Surface Preparation
 - 1.4.2.4. Traffic Control
 - 1.4.2.5. Test Pitting
 - 1.4.2.6. Monitoring Well Decommissioning
 - 1.4.2.7. Site Facilities Provision
 - 1.4.2.8. Site Facilities Operation
 - 1.4.2.9. Temporary Site Fencing
 - 1.4.2.10. Survey
 - 1.4.2.11. Standby Time
 - 1.4.2.12. Waste Oversize Debris Removal and Disposal. Includes concrete, metal, asbestos containing pipe
 - 1.4.2.13. Access Road Maintenance
 - 1.4.2.14. Water Management – Equipment
 - 1.4.2.15. Water Management – Disposal
 - 1.4.2.16. Contaminated Material (Waste Quality) – Excavate, Transport (to LTF), Place
 - 1.4.2.17. Non-Contaminated Material (including Overburden, Topsoil, Inert Debris) – Excavate, Transport (200 m), Stockpile
 - 1.4.2.18. Hazardous/Special Waste Soil -- Excavate, Transport (off-Site)



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- 1.4.2.19. Metals Impacted Soil -- Excavate, Transport (off-Site)
- 1.4.2.20. Purchase and Install Recontamination Prevention Liner
- 1.4.2.21. Purchase and Install Geotextile
- 1.4.2.22. Backfill – Imported from Land Treatment Facility
- 1.4.2.23. Backfill – Imported from Off-Site
- 1.4.2.24. Backfill – Overburden and Topsoil
- 1.4.2.25. Disposal – Special Waste
- 1.4.2.26. Disposal – Metals Impacted Soil
- 1.4.2.27. Site Restoration
- 1.4.2.28. Demobilization
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- 1.4.2.30. Land Treatment Facility Preparation
- 1.4.2.31. Fertilizer Supply and Application (LTF)
- 1.4.2.32. Water Supply and Application (LTF)
- 1.4.2.33. Tractor Operation (LTF)
- 1.4.2.34. Soil Flipping with Excavator (LTF)
- 1.4.2.35. Soil Relocation from Cell to Storage Area (LTF)
- 1.4.2.36. Soil Sampling with backhoe/excavator (LTF)
- 1.4.2.37. Construct Access to highway in accordance with permit conditions
- 1.4.3. Green Requirements:
 - 1.4.3.1. Use only environmentally responsible green materials/products with no Volatile Organic Compounds (VOC) emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality – subject of acceptance of Submittal of Materials Safety Data Sheet (MSDS) Product Data.
 - 1.4.3.2. Use materials/products containing highest percentage of recycled and recovered materials practicable – consistent with maintaining cost effective satisfactory levels of competition.
 - 1.4.3.3. Adhere to waste reduction requirement for reuse or recycling of waste materials, thus diverting materials from Landfill Facility.
- 1.4.4. Work not included in the Contract comprises such work and services specifically listed as:
 - 1.4.4.1. Not Used.

1.5. Location

- 1.5.1. The Site location is shown on Drawings.
- 1.5.2. There is no civic street address or PIN for the Site.

1.6. Project/Site Conditions

- 1.6.1. Work at Site will involve contact with contaminated materials, requiring appropriate health and safety and environmental protection procedures.
- 1.6.2. Complete list of anticipated contaminants and concentration levels on the Site available separately in assessment reports and/or Drawings.
- 1.6.3. Existing condition on the Site identified according to Drawings.
- 1.6.4. Utilities/services availability on Site:



SUMMARY OF WORK

- 1.6.4.1. Electrical power is not available on Site.
- 1.6.4.2. Water is not available on Site.
- 1.6.4.3. Sanitary sewer is not available on Site.
- 1.6.4.4. Storm sewer is not available on Site.

1.7. Other Contracts

- 1.7.1. Other contracts are currently in progress at Site.
- 1.7.2. Other contracts are:
 - 1.7.2.1. Environmental and other consultants.
 - 1.7.2.2. Site users as identified in Contract Documents.
- 1.7.3. Further contracts may be awarded while the Contract is in progress.
- 1.7.4. Cooperate with other contractors in carrying out their respective works and carry out instructions from Departmental Representative.
- 1.7.5. Coordinate Work with that of other contractors. Allow access for other contractors to Land Treatment Facility. If any part of Work under the Contract depends for its proper execution or result upon Work of another contractor, report promptly to Departmental Representative, in writing, any defects which can interfere with proper execution of this Work.

1.8. Products Supplied by the Departmental Representative

- 1.8.1. Not Used.

1.9. Contractor's Use of Site

- 1.9.1. Use of Site:
 - 1.9.1.1. For the sole benefit of Canada.
 - 1.9.1.2. Exclusive and only for completion of the execution of Work.
 - 1.9.1.3. Assume responsibility for assigned premises for performance of this Work.
 - 1.9.1.4. Be responsible for coordination of all Work activities onsite, including the Work of other contractors engaged by the Departmental Representative.
- 1.9.2. There are no pre-existing arrangements for encroachment on the neighbouring properties. Shoring designs accommodating no offsite encroachment, or arrangements for offsite encroachment, are the responsibility of the Contractor.
- 1.9.3. Perform Work in accordance with Contract. Ensure Work is carried out in accordance with schedule accepted by Departmental Representative.
- 1.9.4. Do not unreasonably encumber Site with material or equipment.
- 1.9.5. Accommodate common areas with other Site users, including roadways.
- 1.9.6. Segregate Contractor's work area from common areas to prevent unintentional multiple employer worksite, as required.

1.10. Existing Permits

- 1.10.1. Existing permits are:
 - 1.10.1.1. Attached in Appendix C.

1.11. Schedule Requirements

- 1.11.1. Work to be initiated: within 5 Working Days of Contract Award.

SUMMARY OF WORK

- 1.11.2. Pre-Mobilization Submittals: within 10 Working Days of Contract Award.
- 1.11.3. Mobilization: within 10 Working Days of Contract Award.
 - 1.11.3.1. Site Works: Final Completion no later than 2017 October 31.
 - 1.11.3.2. Offsite Treatment and Disposal Works: Final Completion no later than 2017 October 31.
- 1.11.4. Completion of the Work: no later than 2017 December 31. Includes all final Submittals including as-built documents, the Certificate of Completion, and the Statutory Declaration at Final Completion.

1.12. Hours of Work

- 1.12.1. Restrictive as follows:
 - 1.12.1.1. Working Day work hours are unrestricted.
 - 1.12.1.2. Contractor to define Working Day prior to start of work.
- 1.12.2. Obtain consent from Departmental Representative for all after hours Work, including weekends and holidays.
 - 1.12.2.1. Proceed only as instructed by the Departmental Representative.

1.13. Security Clearances

- 1.13.1. Not Used.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

- 1.3.1. Utility Locations: at least 5 Working Days prior to commencing any subsurface disturbance, Submit drawings identifying all utilities on the Site. Update drawings as instructed by the Departmental Representative.
- 1.3.2. Breakdown of Lump Sum Prices: at least 5 Working Days prior to submitting the first Progress Payment, Submit a breakdown of the Contract lump sum prices including labour, material and time, in detail as instructed by the Departmental Representative and aggregating Contract Amount.
- 1.3.3. Daily Work Records: at the end of each shift Submit daily Work records, during onsite Work. Include:
 - 1.3.3.1. Quantities for each Description of Work identified in the Unit Price Table and Change Orders.
 - 1.3.3.2. Description of Work performed.
 - 1.3.3.3. Current Site conditions.
 - 1.3.3.4. General information including: date, time shift started and ended, Subcontractor(s) onsite, Health and Safety items, and Environmental Protection items.
 - 1.3.3.5. Signature of Superintendent and Departmental Representative.
- 1.3.4. Cash Flow: with each Progress Payment, Submit a cash flow forecast. Include:
 - 1.3.4.1. Calculation of planned cost versus actual cost and schedule forecasting and cash flow projections on a monthly basis, indicating anticipated value of future Progress Payments, for each Description of Work identified in the Unit Price Table.
 - 1.3.4.2. Progress Payments will not be processed until cash flow has been accepted by the Departmental Representative.
- 1.3.5. Coordination Meeting Minutes and Drawings: at least 5 Working Days prior to relevant Work commencing, Submit final meeting minutes and drawings from coordination with Subcontractors. Quality Management Plan: within 10 Working Days after Contract award, Submit a quality management plan. Include:
 - 1.3.5.1. Details on planned review, inspection and testing to provide Quality Assurance and Quality Control for the Work.
 - 1.3.5.2. Subcontractors responsible for review, inspection and testing.
 - 1.3.5.3. Schedule of submittals of review, inspection and testing results.

- 1.3.6. Review, Inspection, and Testing Results: within 5 Working Days of receipt, Submit all results of reviews, inspection, and testing performed as part of the Work, including laboratory reports.

1.4. Division of Specifications

- 1.4.1. This specification is subdivided into Divisions and Sections in accordance with the six digit National Master Specifications System.
- 1.4.2. A Division or Section may consist of the Work of more than one Subcontractor. Responsibility for determining which Subcontractor provides the labour, material, equipment and services required to complete the Work rests solely with the Contractor.

1.5. Documents Required

- 1.5.1. Maintain 1 copy each of the following posted at the job Site:
- 1.5.1.1. General Conditions.
 - 1.5.1.2. Drawings.
 - 1.5.1.3. Specifications.
 - 1.5.1.4. Addenda or other modifications to Contract.
 - 1.5.1.5. Change orders.
 - 1.5.1.6. Copy of current Work schedule.
 - 1.5.1.7. Reviewed and final shop drawings Submittals.
 - 1.5.1.8. One set of record drawings and Specifications for “as-built” purposes.
 - 1.5.1.9. Field and laboratory test reports.
 - 1.5.1.10. Reviewed and accepted Submittals.
 - 1.5.1.11. Manufacturers’ installation and application instructions (as appropriate).
 - 1.5.1.12. National Building Code of Canada (as appropriate).
 - 1.5.1.13. Current construction standards of workmanship listed in technical Sections (as appropriate).
 - 1.5.1.14. Health and Safety documents, including all daily toolbox meetings, Notice of Project, and utility clearances.
 - 1.5.1.15. Environmental Protection Plan.
 - 1.5.1.16. Quality Management Plan.
 - 1.5.1.17. Final Meeting Minutes, Agendas and associated attachments.
 - 1.5.1.18. Permits and other approvals.

1.6. Setting out of Work

- 1.6.1. Assume full responsibility for and execute complete layout of Work to locations, lines and elevations in accordance with the Drawings.
- 1.6.2. Provide devices needed to layout and construct Work.
- 1.6.3. Supply such services and devices in accordance with the Contract to facilitate Departmental Representative’s inspection of Work.

1.7. Acceptance of Substrates

GENERAL INSTRUCTIONS

- 1.7.1. Each trade must examine surfaces prepared by others and job conditions which can affect his work, and must report defects to the Departmental Representative. Commencement of Work will imply acceptance of prepared Work or substrate surfaces.

1.8. Works Coordination

- 1.8.1. Coordinate Work of Subcontractors.
 - 1.8.1.1. Designate one person to be responsible for review of Contract and shop drawings and managing coordination of Work.
 - 1.8.2. Convene meetings between Subcontractors whose Work interfaces and ensure awareness of areas and extent of interface required.
 - 1.8.2.1. Provide each Subcontractor with complete Drawings and Specifications for Contract, to assist them in planning and carrying out their respective work.
 - 1.8.2.2. Develop coordination drawings when required, illustrating potential interference between Work of various trades and distribute to affected parties.
 - 1.8.2.3. Facilitate meeting and review coordination drawings. Ensure Subcontractors agree and sign off on coordination drawings.
 - 1.8.2.4. Publish minutes of each meeting.
 - 1.8.2.5. Submit a copy of coordination drawings and meeting minutes as instructed by the Departmental Representative.
 - 1.8.3. Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
 - 1.8.4. Work coordination:
 - 1.8.4.1. Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
 - 1.8.4.2. Ensure that each trade provides all other trades reasonable opportunity for Final Completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed Work.
 - 1.8.4.3. Ensure disputes between Subcontractors are resolved.
 - 1.8.5. Failure to coordinate Work is responsibility of Contractor.

1.9. Approvals of Shop Drawings, Product Data and Samples

- 1.9.1. The term "shop drawings" means drawings, figures, diagrams, illustrations, schedules, performance charts, brochures and other data which are Submittals by Contractor to illustrate details of a portion of Work.
- 1.9.2. Submit as instructed by the Departmental Representative the requested Shop Drawings, product data, MSDS sheets and samples in accordance with the Contract.
- 1.9.3. Allow sufficient time for the following:
 - 1.9.3.1. Review of product data.
 - 1.9.3.2. Acceptance of shop drawings.
 - 1.9.3.3. Review of re-submission.
 - 1.9.3.4. Ordering of accepted material and/or products.

1.10. Relics and Antiquities

- 1.10.1. See General Conditions.

1.11. Additional Drawings

- 1.11.1. The Departmental Representative may furnish additional Drawings for clarification. These additional Drawings have the same meaning and intent as if they were included with Drawings referred to in the Contract.
- 1.11.2. Upon request, Departmental Representative may furnish up to a maximum of 2 sets of Drawings for use by the Contractor at no additional cost. Should more than 2 sets of documents be required the Departmental Representative will provide them at additional cost.

1.12. Record Keeping

- 1.12.1. On Site Instructions: Contractual correspondence from the Departmental Representative to the Contractor. Does not include Contemplated Change Notices, Change Orders, and Extension of Time on Contracts. Sequentially numbered On Site Instructions. Include cross references to applicable On Site Notifications. The status of the Contractor, including the function of Prime Contractor, must not change by reason of any On Site Instructions.
- 1.12.2. On Site Notifications: Contractual correspondence from Contractor to the Departmental Representative. Includes Submittals. Does not include Quotes and Extension Of Time on Contracts. Must be as a sequentially numbered On Site Notifications. Include cross references to applicable On Site Instructions. The status of the Contractor, including the function of Prime Contractor, must not change by reason of any On Site Notifications.
- 1.12.3. Maintain adequate records to support information provided to Departmental Representative.
- 1.12.4. Maintain asbestos waste shipment records or other Hazardous Waste Manifests for minimum of 3 years from date of shipment or longer period required by applicable law or regulation.
- 1.12.5. Maintain bills of lading for minimum of 300 Working Days from date of shipment or longer period required by applicable law or regulation.

1.13. Change Documents

- 1.13.1. Change Documents do not relieve Contractor of any obligation.
- 1.13.2. Change Documents do not change the Contractor's responsibility for sequencing, methods and means.
- 1.13.3. Change Documents do not change by any reason the status of the Contractor, including the function of Prime Contractor or as supervisor.
- 1.13.4. Change Documents include:
 - 1.13.4.1. Change Order: There may be an increase to the Contract Amount by reason of any Change Order. No Extension of Time for completion of the Work by reason of any Change Order.

- 1.13.4.2. Contemplated Change Notice: No increase to the Contract Amount by reason of any Contemplated Change Notice. No Extension of Time for completion of the Work by reason of any Contemplated Change Notice.
- 1.13.4.3. Extension of Time on Contracts: No increase to the Contract Amount by reason of any Extension of Time on Contracts. There may be an Extension of Time for completion of the Work by reason of an Extension of Time on Contracts.
- 1.13.4.4. Quote: No increase to the Contract Amount by reason of any Quote. No Extension of Time for completion of the Work by reason of any Quote. The status of the Contractor, including the function of Prime Contractor, must not change by reason of any Quote.

1.14. System of Measurement

- 1.14.1. The metric system of measurement (SI) will be employed on the Contract.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Preconstruction Meeting Minutes: within 2 Working Days of the Preconstruction Meeting, Submit meeting minutes.

1.3.2. Progress Meeting Minutes: within 2 Working Days of a Progress Meeting, Submit meeting minutes. Submit revised minutes within 2 Working Days of receiving comments by Departmental Representative.

1.3.3. Information for Progress Meetings: at least 2 Working Days prior to scheduled Progress Meetings, Submit all information in accordance with the Contract for Progress Meetings. Include:

1.3.3.1. Agenda for the proposed Progress Meeting.

1.3.3.2. Updated Project Schedule.

1.3.3.3. Copies of transport manifests and disposal receipts for all materials removed from Site.

1.3.3.4. Other information as instructed by the Departmental Representative or relevant to agenda for upcoming progress meeting.

1.3.4. Final Site Inspection: within 2 Working Days of the Final Site Inspection, Submit meeting minutes.

1.3.5. Closeout Meeting Minutes: within 2 Working Days of the Closeout Meeting, Submit meeting minutes.

1.4. Administrative

1.4.1. Schedule and administer project meetings throughout the progress of the Work weekly and at the call of the Departmental Representative.

1.4.2. Prepare agenda for meetings.

1.4.3. Submit written notice with agenda of each meeting 2 Working Days in advance of meeting date as instructed by the Departmental Representative.

1.4.4. Provide physical space and make arrangements for meetings, or arrange for teleconference meetings, as instructed by Departmental Representative.

1.4.5. Preside at meetings.

1.4.6. Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

1.4.7. Maintain records of meeting minutes for a minimum of 2 years after Work is completed.

PROJECT MEETINGS

- 1.4.8. Representative of Contractor, Subcontractor(s) and Supplier(s) attending meetings must be qualified and authorized to act on behalf of party each represents.

1.5. Preconstruction Meeting

- 1.5.1. Within 5 Working Days after award of Contract, request a meeting of parties in Contract to discuss and resolve administrative procedures and responsibilities.
- 1.5.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.
- 1.5.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
- 1.5.4. Agenda to include:
- 1.5.4.1. Appointment of official representative of participants in the Work, including Contractor's Superintendent and Departmental Representative.
- 1.5.4.2. Schedule of Work.
- 1.5.4.3. Schedule of Submittals.
- 1.5.4.4. Requirements for temporary facilities.
- 1.5.4.5. Site security.
- 1.5.4.6. Change orders, procedures, approvals required, administrative requirements.
- 1.5.4.7. Monthly Progress Payments, administrative procedures, hold backs.
- 1.5.4.8. Appointment of inspection and testing agencies or firms.
- 1.5.4.9. List of Subcontractor(s).

1.6. Progress Meetings

- 1.6.1. During course of Work schedule progress meetings weekly subject to approval by Departmental Representative.
- 1.6.2. Contractor, Superintendent, major Subcontractor(s) involved in Work, and Departmental Representative are to be in attendance.
- 1.6.3. Agenda to include:
- 1.6.3.1. Review and acceptance of minutes of previous meeting.
- 1.6.3.2. Review health and safety, including incidents, near misses, and corrective measures.
- 1.6.3.3. Review Environmental Protection, including incidents, near misses, and corrective measures.
- 1.6.3.4. Review contractual compliance.
- 1.6.3.5. Review regulatory compliance.
- 1.6.3.6. Review communications, problems or concerns with community.
- 1.6.3.7. Review of Work progress since previous meeting.
- 1.6.3.8. Field observations, problems, conflicts.
- 1.6.3.9. Quantity results.
- 1.6.3.10. Updated progress schedule detailing activities planned over next 2 week period. Include review of progress with respect to previously established dates for starting and stopping various stages of Work.

PROJECT MEETINGS

- 1.6.3.11. Problems which impede construction schedule.
- 1.6.3.12. Corrective measures and procedures to regain projected schedule.
- 1.6.3.13. Revision to construction schedule.
- 1.6.3.14. Progress schedule, during succeeding Work period.
- 1.6.3.15. Review submittal schedules: expedite as required.
- 1.6.3.16. Maintenance of quality standards.
- 1.6.3.17. Quantities of material transported, treated, and disposed.
- 1.6.3.18. Review proposed changes for effect on construction schedule and on Final Completion date.
- 1.6.3.19. Other business.
- 1.6.4. Submit draft Progress Meeting Minutes for review and comment by Departmental Representative. Incorporate comments into final Progress Meeting Minutes.

1.7. Toolbox Meetings

- 1.7.1. During the course of the Work, schedule daily toolbox meetings at the start of each Work shift. Multiple meetings are required if the Contractor works multiple shifts within a 24-hour period.
- 1.7.2. All on Site workers to attend, including Contractor, Superintendent, major Subcontractor(s), and environmental consultants. Departmental Representative may attend.
- 1.7.3. Agenda to include:
 - 1.7.3.1. Planned Work activities and environmental considerations for that shift.
 - 1.7.3.2. Coordination activities required between Contractor, Subcontractor(s), Departmental Representative, and other contractor(s) including environmental consultant.
 - 1.7.3.3. Health and Safety items.
 - 1.7.3.4. Environmental Protection items.

1.8. Final Site Inspection

- 1.8.1. Within 5 Working Days of completion of Site Works but prior to Demobilization, request a meeting on Site to review the Site.
- 1.8.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.
- 1.8.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
- 1.8.4. Agenda to include:
 - 1.8.4.1. Inspect removal of all temporary equipment, materials, supplies, and facilities.
 - 1.8.4.2. Inspect final surface grades.
 - 1.8.4.3. Inspect final vegetation.
 - 1.8.4.4. Inspect permanent facilities for performance and damage.
 - 1.8.4.5. Document all damage, deficiencies, missing items, and non-conformance.

PROJECT MEETINGS

- 1.8.5. If required, and in the opinion of the Departmental Representative, perform another Final Site Inspection after resolving all documented damage, deficiencies, missing items, and non-conformance.

1.9. Closeout Meeting

- 1.9.1. Within 10 Working Days of completion of the Work, request a meeting to review the project.
- 1.9.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.
- 1.9.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
- 1.9.4. Agenda to include:
 - 1.9.4.1. Review Certificate of Completion.
 - 1.9.4.2. Review final payment.
 - 1.9.4.3. Identify lessons learned.
 - 1.9.4.4. Perform Contractor Performance Evaluation Report Form.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

- 1.3.1. Master Plan: within 10 Working Days after Contract award, Submit a Master Plan (baseline schedule).
- 1.3.2. Schedule of Interruption of Services: at least 5 Working Days prior to any shutdown or closure of active utilities or facilities Submit a schedule identifying type of service and dates of shutdown or closure.
- 1.3.3. Project Schedule and Updates: with Progress Payment, Submit a Project Schedule updated as appropriate. Progress Payment submission is incomplete without an updated Project Schedule acceptable to Departmental Representative.

1.4. Requirements

- 1.4.1. Ensure Master Plan and detail Project Schedules are practical and remain within specified Contract duration.
- 1.4.2. Plan to complete Work in accordance with prescribed milestones and time frame.
- 1.4.3. Limit activity durations to maximum of approximately 10 Working Days, to allow for progress reporting.
- 1.4.4. Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.
- 1.4.5. Include Work sequencing description and schedule:
 - 1.4.5.1. Work Sequencing description must describe sequence, methods and means to perform each major task.
 - 1.4.5.2. Work Sequencing schedule must show on a Gantt chart, start, end and dependencies of each major task and also indicates Work to be performed in sequence and in parallel.
 - 1.4.5.3. Major tasks includes all items identified on Unit Price Table.

1.5. Master Plan

- 1.5.1. Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- 1.5.2. Departmental Representative will review and return revised schedules within 5 Working Days.
- 1.5.3. Revise impractical schedule and resubmit within 5 Working Days.

- 1.5.4. Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6. Project Schedule

- 1.6.1. Develop detailed Project Schedule derived from Master Plan.
- 1.6.2. Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - 1.6.2.1. Dates of commencement and completion of Work for each Description of Work identified on the Unit Price Table.
 - 1.6.2.2. Dates of Submittals including shop drawings, product data, MSDS sheets and samples.
 - 1.6.2.3. Dates of inspection and testing.
 - 1.6.2.4. Final Completion date within the time period in accordance with the Contract, including Amendments.

1.7. Project Schedule Reporting

- 1.7.1. Update Project Schedule on monthly basis reflecting activity changes and completions, as well as activities in progress.
- 1.7.2. Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8. Project Meetings

- 1.8.1. Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- 1.8.2. Weather related delays with their remedial measures will be discussed and schedule, not cost, will be negotiated.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Project Submittal List – Pre-Project Submittals

#	Contractor's Submission	Submitted to PSPC	Submitted when
1	Health & Safety Plan and related Health & Safety Submittals (including Yukon Workers Compensation Board Notice of Project, Proof of Good Standing with Yukon Workers Compensation Board) (Section 01 35 29.14)	Departmental Representative	Within 10 working days of Contract Award
2	Preconstruction Condition Survey (Section 01 71 00)	Departmental Representative	within 10 Working Days prior to mobilization to Site
3	Preconstruction As-Built Documents (Section 01 71 00)	Departmental Representative	at least 5 Working Days prior to mobilization to Site
4	Preconstruction Meeting Minutes (Section 01 31 19)	Departmental Representative	within 2 Working Days of the Preconstruction Meeting
5	Coordination Meeting Minutes and Drawings (Section 01 11 55)	Departmental Representative	At least 5 Working Days prior to relevant Work commencing
6	Permits (Section 01 41 00)	Departmental Representative	at least 10 Working Days prior to mobilization to Site
7	Master Plan (Section 01 32 16.07)	Departmental Representative	Within 10 working days after Contract Award
8	Project Schedule and Updates (Section 01 32 16.07)	Departmental Representative	With Progress Payment
9	Shop Drawings (Section 01 33 00)	Departmental Representative	at least 5 Working Days prior to commencing applicable Work
10	Site Layout (Section 01 52 00)	Departmental Representative	within 10 Working Days after Contract award and prior to mobilization to Site
11	Signs (Section 01 52 00)	Departmental Representative	at least 5 Working Days prior to posting
12	List of Signs and Devices (Section 01 35 00.06)	Departmental Representative	within 10 Working Days after Contract award and prior to mobilization to Site
13	Contaminated Material and Non-Contaminated Material Management Plan. Includes Proposed Disposal Facilities and Licensing for transport of contaminated materials (including	Departmental Representative	within 10 Working Days after Contract award and prior to mobilization to Site

#	Contractor's Submission	Submitted to PSPC	Submitted when
	Hazardous/Special Waste) and waste (Section 01 35 13.43)		
14	Environmental Protection Plan (Section 01 35 43)	Departmental Representative	within 10 Working Days after Contract award and prior to mobilization to Site
15	Pollution Control Procedures Modification (Section 01 35 43)	Departmental Representative	Immediately when pollution control procedures are inadequate
16	Pollution Control Remediation Procedures Modification (Section 01 35 43)	Departmental Representative	immediately when soil, sediment or water contaminated by Contractor's activities are inadequate as instructed by the Departmental Representative
17	Dust and Particulate Control Procedures Modification (Section 01 35 43)	Departmental Representative	immediately when dust and particulate control measures are inadequate as instructed by the Departmental Representative
18	Quality Management Plan (Section 01 11 55)	Departmental Representative	Within 10 Working Days after Contract award
19	Waste Reduction Plan (Section 01 74 19)	Departmental Representative	within 10 Working Days after Contract award and prior to mobilization to Site
20	Import Backfill Material Quality (Section 02 61 00.02)	Departmental Representative	at least 5 Working Days prior to bringing material onsite
21	Import Backfill Material Samples (Section 02 61 00.02)	Departmental Representative	at least 5 Working Days prior to bringing material to Site
22	Seed and Fertilizer (Section 02 61 00.02)	Departmental Representative	prior to ordering
23	Temporary Hoarding and Fencing (Section 31 23 33.01)	Departmental Representative	at least 5 Working Days prior to installation
24	Sloping, Shoring, Excavation and Backfilling Plan (Section 31 23 33.01)	Departmental Representative	within 10 Working Days after Contract award and prior to mobilization to Site

1.3.2. Project Submittal List – During Project

#	Contractor's Submission	Submitted to PSPC	Submitted when
1	Information for Progress Meetings (Section 01 31 19)	Departmental Representative	at least 2 Working Days prior to scheduled Progress Meetings
2	Progress Meeting Minutes (Section 01 31 19)	Departmental Representative	within 2 Working Days of a Progress Meeting
3	Product Data (Section 01 61 10)	Departmental Representative	at least 5 Working Days prior to use
4	Substitution (Section 01 61 10)	Departmental Representative	at least 5 Working Days prior to use and after Contract award

**01 33 00
SUBMITTAL PROCEDURES**

#	Contractor's Submission	Submitted to PSPC	Submitted when
5	Quality of Work (Section 01 61 10)	Departmental Representative	at least 5 Working Days prior to Work
6	Transport Manifests (Section 01 35 13.43)	Departmental Representative	within 5 Working Days of offsite transport
7	Drawings identifying all utilities within and immediately surrounding the work area (Section 01 11 55)	Departmental Representative	5 working days prior to commencing any subsurface disturbance
8	After Hours Work (Section 01 11 00)	Departmental Representative	at least 5 Working Days prior to commencing after hours work
9	Breakdown of Lump Sum Prices (Section 01 11 55)	Departmental Representative	At least 5 working days prior to submitting first Progress Payment
10	Daily Work Records (Section 01 11 55)	Departmental Representative	At the end of each shift
11	Cash Flow (Section 01 11 55)	Departmental Representative	With each Progress Payment
12	Schedule of Interruption of Services (Section 01 32 16.07)	Departmental Representative	at least 5 Working Days prior to any shutdown or closure of active utilities or facilities
13	Landfill Receipts (Section 01 74 19)	Departmental Representative	within 5 Working Days of transport offsite
14	Recycling Receipts (Section 01 74 19)	Departmental Representative	within 5 Working Days of transport offsite
15	Inspection and Test Reports (Section 01 45 00)	Departmental Representative	within 5 Working Days of receipt
16	Monitoring and Testing Results (Section 31 23 33.01)	Departmental Representative	within 5 Working Days of sampling, Submit all monitoring and testing results. Include procedures, frequency of sampling
17	Weigh Scale Certification (Section 31 23 33.01)	Departmental Representative	at least 5 Working Days prior to use
18	Weigh Scale Slips (Section 31 23 33.01)	Departmental Representative	within 10 days of measurement
19	Final Site Inspection Meeting Minutes (Section 01 31 19)	Departmental Representative	within 2 Working Days of the Final Site Inspection

1.3.3. Project Submittal List – Closeout Submittals

#	Contractor’s Submission	Submitted to PSPC	Submitted when
1	Closeout Documents: includes As-Built Documents (Section 01 78 00)	Departmental Representative	within 20 Working Days of Final Completion of Site Restoration
2	Certificate of Treatment (Section 01 35 13.43)	Departmental Representative	within 30 Working Days of treatment at Treatment Facility
3	Product Instructions (Section 01 78 00)	Departmental Representative	at least 10 Working Days before Substantial Performance of the Work is completed
4	Certificate of Disposal (Section 01 35 13.43)	Departmental Representative	within 30 Working Days of disposal at Disposal Facility
5	Closeout Meeting Minutes (Section 01 31 19)	Departmental Representative	within 2 Working Days of the Closeout Meeting

1.3.4. Shop Drawings: at least 5 Working Days prior to commencing applicable Work, Submit Shop Drawings signed by a Qualified Professional.

1.4. General

- 1.4.1. Submission details to be commensurate for type of Work and Site conditions. Details depend on Work performed and Contractor’s sequence, methods and means.
- 1.4.2. This section specifies general requirements and procedures for the Contractor’s Submittals of Shop Drawings, product data, samples and other submittals in accordance with the Contract to Departmental Representative. Additional specific requirements for Submittals are identified in individual technical sections.
- 1.4.3. Present Shop Drawings, product data and samples in SI Metric units.
- 1.4.4. Where items or information is not produced in SI Metric units, converted values are acceptable.
- 1.4.5. Contractor’s responsibility for errors and omissions in Submittals is not relieved by the Departmental Representative’s review of Submittals.
- 1.4.6. Notify Departmental Representative in writing at time of Submittals, identifying deviations from requirements of Contract and stating reasons for deviations.
- 1.4.7. Contractor’s responsibility for deviations in Submittals from requirements of Contract is not relieved by the Departmental Representative’s review of Submittals unless Departmental Representative gives written acceptance of specific deviations.

- 1.4.8. Make any changes in Submittals which Departmental Representative requires to be in accordance with the Contract and resubmit as instructed by the Departmental Representative.
- 1.4.9. Notify Departmental Representative in writing, when resubmitting, of any revisions other than those instructed by the Departmental Representative.
- 1.4.10. Do not proceed with Work until relevant Submittals are finalized and have been accepted.
- 1.4.11. Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to Submit in ample time is responsibility of Contractor.
- 1.4.12. Review Submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each Submittal has been checked and coordinated with requirements of Work and Contract. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- 1.4.13. Verify field measurements and affected adjacent Work are coordinated.
- 1.4.14. Adjustments made on Submittals by the Departmental Representative will not result in an increase to the Contract Amount nor an Extension of Time for completion of the Work. If adjustments result in an increase to the Contract Amount or an Extension of Time for completion of the Work, notify Departmental Representative and receive approval prior to proceeding with Work.
- 1.4.15. Keep one final copy of each Submittal onsite.

1.5. Submission Requirements

- 1.5.1. Coordinate each Submittal with the requirements of the Work and the Contract. Individual Submittals will not be reviewed until:
 - 1.5.1.1. Submittals are complete.
 - 1.5.1.2. All related information is available.
- 1.5.2. Allow 10 Working Days for Departmental Representative's review of each Submittal, unless otherwise specified.
- 1.5.3. All Submittals are to be sent to Departmental Representative in duplicate as a hardcopy and in electronic format compatible with Departmental Representative's software.
- 1.5.4. Accompany Submittals with On Site Notification:
 - 1.5.4.1. Date.
 - 1.5.4.2. Project title and number.
 - 1.5.4.3. Contractor's name and address.
 - 1.5.4.4. Identification and quantity of each Shop Drawing, product data and sample.
 - 1.5.4.5. Other pertinent data.
- 1.5.5. Submittals must include:
 - 1.5.5.1. Date and revision dates.
 - 1.5.5.2. Project title and number.

- 1.5.5.3. Name and address of:
 - 1.5.5.3.1. Subcontractor.
 - 1.5.5.3.2. Supplier.
 - 1.5.5.3.3. Manufacturer.
- 1.5.5.4. Signature of Superintendent, certifying approval of Submittals, verification of field measurements and in accordance with the Contract.
- 1.5.5.5. Qualified Professional to sign and seal Submittals in accordance with the Contract. Submittals to include at a minimum 1 hard copy of original ink sealed document.
- 1.5.5.6. Details of appropriate portions of Work as applicable.

1.6. Shop Drawings

- 1.6.1. Shop Drawings are designs, drawings, figures, diagrams, illustrations, schedules, performance charts, brochures and other data intended to illustrate details of a portion of the Work which are provided by the Qualified Professional of record.
- 1.6.2. Maximum sheet size: ANSI E (864 x 1118 mm).
- 1.6.3. Submit, as instructed by the Departmental Representative, electronic and 2 hard copies of Shop Drawings for each requirement requested in the specification sections and/or as instructed by the Departmental Representative.
- 1.6.4. Cross-reference Shop Drawing information to applicable portions of the Contract.
- 1.6.5. Qualified Professional to sign and seal each individual Shop Drawing.
- 1.6.6. Qualified Professional to sign and seal final Shop Drawings and submit as instructed by the Departmental Representative upon Final Completion of the construction project. Final Shop Drawings are prepared by a Qualified Professional to reflect design changes made during the construction of the Remediation by Excavation project. Final Shop Drawings are intended to incorporate addenda, change orders and other significant design changes, but not necessarily Site instructions.
- 1.6.7. Shop Drawings must include:
 - 1.6.7.1. The original date of issue.
 - 1.6.7.2. The dates of all applicable revisions.
 - 1.6.7.3. The project title.
 - 1.6.7.4. The project address.
 - 1.6.7.5. The project number.
 - 1.6.7.6. Wherever applicable, the name(s) of the: Contractor, Subcontractor(s), Supplier(s), manufacturers, and separate detailers.
 - 1.6.7.7. The sequence number for each Shop Drawing.
 - 1.6.7.8. Identifications of all products and materials.
 - 1.6.7.9. Relation to adjacent structures or materials.
 - 1.6.7.10. Clearly identified field dimensions.
 - 1.6.7.11. Applicable standards.

1.7. Shop Drawings Review

- 1.7.1. Departmental Representative's review of Shop Drawings is only to determine if Shop Drawings are consistent with the general intent of the Contract and are in accordance with the Contract.
- 1.7.2. This review will not mean that Departmental Representative approves the detail design inherent in the Shop Drawings, responsibility for which will remain with Contractor submitting same.
- 1.7.3. This review will not relieve the Contractor of responsibility for errors or omissions in the Shop Drawings or of responsibility for meeting all requirements of the Contract.
- 1.7.4. Without restricting the generality of the foregoing, be responsible for:
 - 1.7.4.1. Dimensions to be confirmed and correlated at the Site.
 - 1.7.4.2. Information that pertains solely to fabrication processes or to techniques of construction and installation.
 - 1.7.4.3. Coordination of the Work of all sub-trades.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

SPECIAL PROCEDURES FOR TRAFFIC CONTROL

4. PART 1 - GENERAL

4.1. Measurement Procedures

4.1.1. See 01 11 00.

4.2. Definitions

4.2.1. See 01 11 00.

4.3. Action and Informational Submittals

4.3.1. List of Signs and Devices: within 10 Working Days after Contract award and prior to mobilization to Site Submit a list of signs and other devices required for the project.

4.4. Protection of Public Traffic

4.4.1. Comply with requirements of acts, regulations and bylaws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.

4.4.2. Comply with current version of BC Ministry of Transportation and Infrastructure Traffic Control Manual for Work on Roadways, the *Yukon Highways Act*, or equivalent.

4.4.3. Provide and maintain road access and egress to property fronting Site and in other areas in accordance with the Contract, except where other means of road access exist that are accepted.

4.5. Informational and Warning Devices

4.5.1. Provide and maintain signs, flashing warning lights, and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Work which requires road user response.

4.5.2. Supply and erect signs, delineators, barricades and miscellaneous warning devices to comply with current version of BC Ministry of Transportation and Infrastructure Traffic Control Manual for Work on Roadways, the *Yukon Highways Act*, or equivalent..

4.5.3. Place signs and other devices in locations recommended in current version of BC Ministry of Transportation and Infrastructure Traffic Control Manual for Work on Roadways, the *Yukon Highways Act*, or equivalent..

4.5.4. Meet with Departmental Representative prior to commencement of Work to prepare list of signs and other devices required for project. If situation onsite changes, revise list for approval.

4.5.5. Continually maintain traffic control devices in use:

4.5.5.1. Check signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

4.5.5.2. Remove or cover signs which do not apply to conditions existing from day to day.

SPECIAL PROCEDURES FOR TRAFFIC CONTROL

4.6. Control of Public Traffic

- 4.6.1. Provide competent flag personnel, trained in accordance with, and properly equipped to, current version of BC Ministry of Transportation and Infrastructure Traffic Control Manual for Work on Roadways, the *Yukon Highways Act*, or equivalent for situations as follows:
 - 4.6.1.1. When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.
 - 4.6.1.2. In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

4.7. Operational Requirements

- 4.7.1. Maintain existing conditions for traffic throughout period of Contract except that, when required for construction in accordance with the Contract and when measures have been taken in accordance with the Contract and accepted by Departmental Representative to protect and control public traffic, existing conditions for traffic to be restricted as follows:
 - 4.7.1.1. Maintain existing conditions for traffic crossing right-of-way.
 - 4.7.1.2. Maintain access for medivac purposes at all times.

5. PART 2 - PRODUCTS

5.1. Not Used

- 5.1.1. Not Used.

6. PART 3 - EXECUTION

6.1. Not Used

- 6.1.1. Not Used.

END OF SECTION

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Contaminated Material and Non-Contaminated Material Management Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit plan detailing management of Contaminated Material and Non-Contaminated Material. Include:

1.3.1.1. Sequence, methods and means to ensure different categories of waste are segregated.

1.3.1.2. Sequence, methods and means to handle, transport, and store Contaminated Material and Non-Contaminated Material onsite.

1.3.1.3. Sequence, methods and means to transport Contaminated Material and Non-Contaminated Material offsite. Include name, vehicle type, and licenses of transporters. Include name, location, provincial or territorial authorizations, and evidence of compliance with municipal zoning and bylaws of all transfer stations and interim storage facilities.

1.3.1.4. Sequence, methods and means to transport Hazardous/Special Waste offsite. Include name, vehicle type, and licenses of transporters. Include name, location, provincial or territorial authorizations, and evidence of compliance with municipal zoning and bylaws of all transfer stations and interim storage facilities

1.3.1.5. Sequence, methods and means to dispose Hazardous/Special Waste offsite. Include details on treatment process, disposition of contaminants, and written confirmation from facility owner acknowledging suitability of facility for material to be treated. For all offsite Treatment Facilities, include name of facility, location of facility, copy of valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the facility, and evidence of compliance with municipal zoning and bylaws of facility.

1.3.1.6. Sequence, methods and means to treat Contaminated Material at Owner's Land Treatment Facility. Sequence, methods and means to dispose Non-Contaminated Material offsite. Include details on disposal process and written confirmation from facility owner acknowledging suitability of facility for material to be disposed. For all Disposal Facilities include name of facility; location of facility; copy of valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

for the facility; and evidence of compliance with municipal zoning and bylaws of facility.

- 1.3.2. Transport Manifests: within 5 Working Days of offsite transport, Submit documentation verifying that material has been transported appropriately. Include:
 - 1.3.2.1. Method of transport.
 - 1.3.2.2. Name of transport company.
 - 1.3.2.3. Weigh scale receipt including location, date, and weight of loading.
 - 1.3.2.4. Weigh scale receipt including location, date, and weight of unloading.
- 1.3.3. Certificate of Treatment: within 30 Working Days of treatment at Treatment Facility, Submit documentation verifying that materials have been treated by Contractor. Include:
 - 1.3.3.1. Issued by the Treatment Facility.
 - 1.3.3.2. On company letterhead.
 - 1.3.3.3. Name and location of facility where the material is being treated.
 - 1.3.3.4. Date and weight for each shipment received and total weight received at the offsite facility.
 - 1.3.3.5. Date and weight for each treatment event and total weight treated at the offsite facility.
 - 1.3.3.6. Treatment methodology.
 - 1.3.3.7. Laboratory certificates demonstrating treatment objectives were met.
 - 1.3.3.8. Disposition of treated material.
 - 1.3.3.9. Signed by identified authorized treatment company representative.
- 1.3.4. Certificate of Disposal: within 30 Working Days of disposal at Disposal Facility, Submit documentation verifying that materials have been disposed by Contractor. Include:
 - 1.3.4.1. Issued by the Disposal Facility.
 - 1.3.4.2. On company letterhead.
 - 1.3.4.3. Name and location of facility where the material is being disposed.
 - 1.3.4.4. Date and weight for each shipment received and total weight received at the Disposal Facility.
 - 1.3.4.5. Identification of final ownership of material.
 - 1.3.4.6. Signed by identified authorized disposal company representative.

1.4. Sequencing and Scheduling

- 1.4.1. Commence Work involving contact with Contaminated or potentially Contaminated Material or Wastewater after all applicable Environmental Protection procedures (including those identified in Contaminated Material and Non-Contaminated Material Management Plan and Environmental Protection Plan) and facilities (including those identified in Site Layout) are operational and accepted by Departmental Representative.
- 1.4.2. Plan work sequencing and traffic patterns to prevent contamination of clean areas due to traffic or debris.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

1.5. Equipment Decontamination Facility

- 1.5.1. Prior to commencing Work involving equipment contact with potentially Contaminated Material, construct equipment decontamination facilities to accommodate the largest potentially contaminated equipment onsite.
- 1.5.2. Collect and contain equipment decontamination wastewater and sediment. Transfer collected wastewater and sediment to treatment facilities accepted by Departmental Representative.

1.6. Personnel Decontamination Facility

- 1.6.1. Provide an area or areas close to the workers' changing facilities to enable workers and other personnel leaving areas such as exclusion area to remove deleterious and contaminated materials from boots, clothing and skin surfaces.
- 1.6.2. Be responsible for ensuring that all materials, chemicals, protective clothing, wash water and deleterious materials are collected, treated and disposed of in accordance with applicable environmental standards and regulations.
- 1.6.3. Personnel Decontamination Facility to be available for use by persons other than the Contractor's workers and Subcontractors, including federal employees, other contractor(s), and environmental agencies. Provide use of facilities to other persons.

1.7. Drum Staging Pad

- 1.7.1. Provide, maintain, and operate drum staging pad as required.
- 1.7.2. Construct drum staging pad with sump capable of collecting leachate and rain runoff. Place impermeable liner that contours over top of berm, and collects leachate and runoff from staging pad which is conducted solely to sump on staging pad. Leachate is Contaminated Water.

1.8. Soil Stockpiling

- 1.8.1. Provide, maintain, and operate temporary storage/stockpiling facilities as per Contractor's Site Layout.
- 1.8.2. Segregate Contaminated Material from Non-Contaminated Material into separate stockpiles to prevent cross-contamination.
- 1.8.3. Prevent precipitation from infiltrating or from directly running off stockpiled materials. Cover stockpiled materials with an impermeable cover during periods of Work stoppage including at end of each Working Day and as directed by the Departmental Representative.
- 1.8.4. Securely fasten covers over stockpiled material until material is loaded for offsite transport.
- 1.8.5. Store excavated Non-Contaminated Material only on non-contaminated surface areas. Ensure no contact between excavated Non-Contaminated Material and drainage of Contaminated Water or Contaminated Material.
- 1.8.6. Store excavated Contaminated Material in temporary stockpiles.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.8.6.1. Install impermeable liner (eg asphalt or minimum 20 mil (0.5mm) polyethylene) below proposed stockpile locations to prevent contact between stockpile material and ground.
- 1.8.6.2. Cover stockpiled material when not being worked or sampled to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material.
- 1.8.6.3. Prevent Non-Contaminated Water, such as surface water, from coming into contact with Contaminated Material stockpiles.
- 1.8.7. Segregate Contaminated Material into different treatment/disposal streams, including at a minimum:
 - 1.8.7.1. Hazardous Waste/Special Waste
 - 1.8.7.2. Waste Quality
- 1.8.8. Segregate different suspect material in discrete stockpiles to facilitate ex-situ characterization as instructed by the Departmental Representative.
- 1.8.9. Assist Departmental Representative in collection of stockpile samples for exsitu characterization. Ex-situ characterization may take up to 5 Working Days, not counting the day the sample is collected. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work can be incurred for Confirmation Sample results provided within 5 Working Days, not counting the day the sample is collected.
- 1.8.10. Do not remove Contaminated Material from stockpiles until exsitu characterization completed and as instructed by Departmental Representative.

1.9. Equipment Decontamination

- 1.9.1. At minimum, perform the following steps during equipment decontamination: mechanically remove packed dirt, grit, and debris by scraping and brushing without using steam or high-pressure water to reduce amount of water needed and to reduce amount of contaminated rinsate generated.
- 1.9.2. If required, as instructed by the Departmental Representative, use high-pressure, low-volume, hot water or steam supplemented by detergents or solvents as appropriate. Pay particular attention to tire treads, equipment tracks, springs, joints, sprockets, and undercarriages. Scrub surfaces with long handle scrub brushes and cleaning agent. Rinse off and collect cleaning agent. Air dry equipment in clean area before removing from Site or travelling on clean areas. Perform assessment as instructed by the Departmental Representative to determine effectiveness of decontamination.
 - 1.9.2.1. Take appropriate measures necessary to minimize drift of mist and spray during decontamination including provision of wind screens.
 - 1.9.2.2. Collect decontamination wastewater and sediment which accumulate in decontamination location. Treat collected wastewater as Contaminated Water. Manage decontamination sediment as Hazardous Waste/Special Waste or characterize the material appropriately and dispose in accordance with the characterized class.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.9.3. In the opinion of the Departmental Representative, each piece of equipment must be inspected by the Departmental Representative after decontamination and prior to travel on clean areas or demobilization from Site. Perform additional decontamination as required in the opinion of the Departmental Representative.
- 1.9.4. Furnish and equip personnel engaged in equipment decontamination with protective equipment including suitable disposable clothing, respiratory protection, and face shields.

1.10. Progress Decontamination

- 1.10.1. Decontaminate equipment after working in potentially contaminated Work areas and prior to subsequent Work or travel on clean areas.

1.11. Final Decontamination

- 1.11.1. Perform final decontamination of construction facilities, equipment, and materials which may have come in contact with potentially Contaminated Material prior to demobilization from Site.

1.12. Drums

- 1.12.1. Storage of liquid waste: 200 L steel drums meeting the *Transportation and Dangerous Goods Act*, closable lids, complete with labels for marking contents and date filled.
- 1.12.2. Storage of solid waste: 200 L steel drums meeting the *Transportation and Dangerous Goods Act*, closable lids, complete with labels for marking contents and date filled.

1.13. Contaminated Water Management

- 1.13.1. Collect Contaminated Water that has, or potentially has, come into contact with Contaminated Material including excavation and stockpile areas, or is otherwise potentially contaminated from Work activities.
- 1.13.2. Transport and treat collected Contaminated Water at treatment facilities accepted by Departmental Representative.

1.14. Contaminated Water Transport

- 1.14.1. Assume ownership of, and be responsible for Contaminated Water once it is loaded on a vehicle, barge, or other vessel for transport offsite.

1.15. Offsite Contaminated Water Treatment Plant

- 1.15.1. Offsite Contaminated Water Treatment: at Contractor's discretion, treat at Treatment Facility offsite provided by Contractor and accepted by the Departmental Representative.
- 1.15.2. Offsite Treatment Facility must:
 - 1.15.2.1. Be an existing offsite facility located in Canada or the United States.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.15.2.2. Be designed, constructed and operated for the handling or processing of waste in such a manner as to change the physical, chemical or biological character or composition of Contaminated Water. Treatment includes bioremediation and filtering. Treatment does not include blending, mixing, or dilution
- 1.15.2.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the treatment of relevant Contaminated Material.
- 1.15.2.4. Comply with applicable municipal zoning, bylaws, and other applicable requirements.
- 1.15.3. Facility Authority:
 - 1.15.3.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.
 - 1.15.3.2. For facilities on First Nations reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.
 - 1.15.3.3. For facilities on First Nations reserve land in Canada subject to the First Nation Land Management regime: the relevant First Nation Council. In addition, a Qualified Professional must certify that the facility is appropriate for the relevant Contaminated Material.
 - 1.15.3.4. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.
- 1.15.4. Treat material as soon as practical and within 100 Working Days of leaving Site or as required by Contract unless otherwise accepted by Departmental Representative.

1.16. Contaminated Material Management

- 1.16.1. Remove all Contaminated Material within Work areas in accordance with the Contract and as directed by the Departmental Representative.
- 1.16.2. Minimize generation of Contaminated Material to greatest extent practicable. Take necessary precautions to avoid mixing during excavation, handling, loading, stockpiling, and transport of Non-Contaminated Material with Contaminated Material, and Waste Quality with Hazardous Waste.
- 1.16.3. Segregate, excavate, handle, stockpile, load, unload, haul, interim storage, treat, and dispose Contaminated Material separately into the following classifications in accordance with the Contract or as instructed by the Departmental Representative based on insitu results, field observations, field measurements, and/or ex-situ characterization:
 - 1.16.3.1. Hazardous Waste/Special Waste
 - 1.16.3.2. Waste Quality
- 1.16.4. Handle, stockpile, load, unload, haul, and interim store Contaminated Material from the Site separately from material from other sites.
- 1.16.5. Treat and dispose Contaminated Material from the Site separately from material from other sites to the extent practicable as acceptable to the Departmental Representative.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.16.6. Material characterization additional to information provided in Contract required by transport, Treatment Facility or Disposal Facility responsibility of Contractor.

1.17. Offsite Contaminated Material Disposition

- 1.17.1. Treat Contaminated Material offsite as follows, otherwise in accordance with the Contract, or as instructed by the Departmental Representative:
- 1.17.1.1. Hazardous Waste/Special Waste: May be treated at a Treatment Facility prior to disposal at a Disposal Facility. Whether Treatment is required is dependent on Contractor's methods and means to meet Transport, Disposal, Regulatory or other requirements, and is not a project requirement.
- 1.17.1.2. Waste Quality: May be treated at a Treatment Facility prior to disposal at a Disposal Facility. Whether Treatment is required is dependent on Contractor's methods and means to meet Transport, Disposal, Regulatory or other requirements, and is not a project requirement.
- 1.17.2. Dispose of Contaminated Material offsite as follows, otherwise in accordance with the Contract, or as directed by the Departmental Representative:
- 1.17.2.1. Hazardous Waste/Special Waste: Must be disposed at a Disposal Facility regardless of Treatment.
- 1.17.2.2. Waste Quality: Must be disposed at a Disposal Facility regardless of Treatment.

1.18. Contaminated Material Transport-Offsite

- 1.18.1. Assume ownership of, and be responsible for, Contaminated Material once it is loaded on a vehicle, barge, or other vessel for transport.
- 1.18.2. Transport material as soon as practical. Do not unreasonably stockpile material onsite.
- 1.18.3. Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material.
- 1.18.4. Excess water in soil or sediment must not be allowed to flow out of vehicle or vessel during transport.
- 1.18.5. Stabilize soil and sediment as necessary.
- 1.18.6. All vehicles, vessels and operators must be appropriately licensed and equipped to transport Contaminated Material.
- 1.18.7. Manifest and correlate weights and/or volume of all material transported from Site documenting weight and/or volume at removal from Site, movement, transfer stations, interim storage and treatment, and weight and/or volume of material at final Disposal Facility. Submit all manifests, as instructed by the Departmental Representative. Selected method of measurement must be consistent.
- 1.18.8. Material transported with discrepancies in manifests must be resolved as required by regulations and as acceptable to the Departmental Representative. Discrepancies include:
- 1.18.8.1. No manifest or an incomplete manifest.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.18.8.2. The material transported does not match the description in the manifest.
- 1.18.8.3. The amount transported differs by more than 5% in the manifest.
- 1.18.8.4. The material transported is in a hazardous condition.
- 1.18.9. Transfer/Interim Storage Facility must:
 - 1.18.9.1. Be an existing offsite facility located in Canada or the United States.
 - 1.18.9.2. Be designed, constructed and operated for the transfer or interim storage of Contaminated Material.
 - 1.18.9.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the transfer or interim storage of relevant Contaminated Material.
 - 1.18.9.4. Comply with applicable municipal zoning, bylaws, and other applicable requirements.
- 1.18.10. Facility Authority:
 - 1.18.10.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.
 - 1.18.10.2. For facilities on First Nations reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.
 - 1.18.10.3. For facilities on First Nations reserve land in Canada subject to the First Nation Land Management regime: the relevant First Nation Council. In addition, a Qualified Professional must certify that the facility is appropriate for the relevant Contaminated Material.
- 1.18.11. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.

1.19. Contaminated Material Treatment-Offsite

- 1.19.1. Assume ownership of, and be responsible for, Contaminated Material treated offsite.
- 1.19.2. Contaminated Material Treatment-Offsite: treat at Treatment Facility provided by Contractor and accepted by the Departmental Representative.
- 1.19.3. Treatment Facility must:
 - 1.19.3.1. Be an existing offsite facility located in Canada or the United States.
- 1.19.4. Be designed, constructed and operated for the handling or processing of waste in such a manner as to change the physical, chemical or biological character or composition of Contaminated Material. Treatment includes bioremediation, thermal desorption, and incineration. Treatment does not include blending, mixing, or dilution.
 - 1.19.4.1. Hold a valid and subsisting permit, certificate, approval, license or other required form of authorization issued by a Facility Authority for the treatment of relevant Contaminated Material.
 - 1.19.4.2. Comply with applicable municipal zoning, bylaws, and other applicable requirements.
- 1.19.5. Facility Authority:
 - 1.19.5.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.19.5.2. For facilities on First Nations reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.
- 1.19.5.3. For facilities on First Nations reserve land in Canada subject to the First Nation Land Management regime: the relevant First Nation Council. In addition, a Qualified Professional must certify that the facility is appropriate for the relevant Contaminated Material.
- 1.19.5.4. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.
- 1.19.6. Treat material as soon as practical and within 100 Working Days of leaving Site or as required by Contract unless otherwise accepted by Departmental Representative.
- 1.19.7. Material sent to an offsite Treatment Facility must subsequently be disposed of at a Disposal Facility after treatment.
- 1.19.8. If proposed Treatment Facility is not acceptable to Departmental Representative, identify an alternate Treatment Facility that is acceptable.
- 1.19.9. Submit Certificates of Treatment for all Contaminated Material treated offsite.

1.20. Contaminated Material Disposal

- 1.20.1. Assume ownership of, and be responsible for, Contaminated Material disposed.
- 1.20.2. Contaminated Material Disposal: dispose Contaminated Material, including offsite treated Contaminated Material that may no longer be contaminated, at Disposal Facility provided by Contractor and accepted by the Departmental Representative.
- 1.20.3. Disposal Facility must:
 - 1.20.3.1. Be an existing offsite facility located in Canada or the United States.
 - 1.20.3.2. Be designed, constructed and operated to prevent any pollution from being caused by the facility outside the area of the facility from waste placed in or on land within the facility.
 - 1.20.3.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the disposal of relevant Contaminated Material.
 - 1.20.3.4. Comply with applicable municipal zoning, bylaws, and other applicable requirements.
- 1.20.4. Facility Authority:
 - 1.20.4.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.
 - 1.20.4.2. For facilities on First Nations reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.
 - 1.20.4.3. For facilities on First Nations reserve land in Canada subject to the First Nation Land Management regime: the relevant First Nation Council. In addition, a Qualified Professional must certify that the facility is appropriate for the relevant Contaminated Material.
 - 1.20.4.4. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.20.5. Dispose material as soon as practical and within 100 Working Days of leaving Site or as required by Contract unless otherwise accepted by Departmental Representative.
- 1.20.6. Material sent to a Disposal Facility must be permanently stored at that facility.
- 1.20.7. If proposed Disposal Facility is not acceptable to Departmental Representative, provide an alternate Disposal Facility that is acceptable.
- 1.20.8. Submit Certificates of Disposal for all Contaminated Material disposed offsite.

1.21. Contaminated Material Transport – Owner’s Land Treatment Facility

- 1.21.1. Assume ownership of, and be responsible for, Contaminated Material once it is loaded on a vehicle.
- 1.21.2. Transport material as soon as practical. Do not unreasonably stockpile material onsite.
- 1.21.3. Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material.
- 1.21.4. Excess water in soil or sediment must not be allowed to flow out of vehicle or vessel during transport.
- 1.21.5. Stabilize soil and sediment as necessary.
- 1.21.6. All vehicles, vessels and operators must be appropriately licensed and equipped to transport Contaminated Material.
- 1.21.7. Manifest and correlate weights and/or volume of all material transported from Site documenting weight and/or volume at removal from Site, movement, transfer stations, interim storage and treatment, and weight and/or volume of material at Owner’s Land Treatment Facility. Submit all manifests, as instructed by the Departmental Representative. Selected method of measurement must be consistent.
- 1.21.8. Material transported with discrepancies in manifests must be resolved as required by regulations and as acceptable to the Departmental Representative. Discrepancies include:
 - 1.21.8.1. No manifest or an incomplete manifest.
 - 1.21.8.2. The material transported does not match the description in the manifest.
 - 1.21.8.3. The amount transported differs by more than 5% in the manifest.
 - 1.21.8.4. The material transported is in a hazardous condition.

1.22. Contaminated Material Treatment – Owner’s Land Treatment Facility

- 1.22.1. Treat material as soon as practical and within 100 Working Days of leaving Site or as required by Contract unless otherwise accepted by Departmental Representative.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

HEALTH AND SAFETY FOR CONTAMINATED SITES

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Submit to Departmental Representative Submittals listed for review.

1.3.2. Work affected by Submittal must not proceed until review is complete.

1.3.3. Submit the following within 10 Working Days of Contract award:

1.3.3.1. Health and Safety Plan.

1.3.3.2. Copies of reports or directions issued by federal and provincial health and safety inspectors.

1.3.3.3. Copies of incident and accident reports.

1.3.3.4. Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by the 2015 Workplace Hazardous Materials Information System (WHMIS 2015) requirements.

1.3.3.5. Emergency Procedures.

1.3.3.6. Notice of Project.

1.3.3.7. Proof of Good Standing with Yukon Workers' Compensation Board

1.3.4. The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 Working Days after receipt of the plan.

1.3.5. If changes are required, revise the plan as appropriate and resubmit to Departmental Representative within 5 Working Days.

1.3.6. Submittal of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It will not:

1.3.6.1. Be construed to imply approval by the Departmental Representative.

1.3.6.2. Be interpreted as a warranty of being complete, accurate and legislatively compliant.

1.3.6.3. Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.4. References

1.4.1. Government of Canada:

1.4.1.1. Canada Labour Code - Part II.

1.4.1.2. Canada Occupational Health and Safety Regulations.

1.4.2. National Building Code of Canada (NBC):

1.4.2.1. Part 8, Safety Measures at Construction and Demolition Sites.

1.4.3. Canadian Standards Association (CSA) as amended:

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- 1.4.3.1. CSA Z797-2009 Code of Practice for Access Scaffold.
- 1.4.3.2. CSA S269.1-1975 (R2003) Falsework for Construction Purposes.
- 1.4.3.3. CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
- 1.4.4. National Fire Code of Canada 2010 (as amended):
 - 1.4.4.1. Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
 - 1.4.4.2. FCC No. 302, Standard for Welding and Cutting.
- 1.4.5. American National Standards Institute (ANSI):
 - 1.4.5.1. ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
- 1.4.6. Province of British Columbia:
 - 1.4.6.1. *Workers Compensation Act* Part 3-Occupational Health and Safety.
 - 1.4.6.2. Occupational Health and Safety Regulation.
- 1.4.7. Yukon Territory (as appropriate):
 - 1.4.7.1. *Occupational Health and Safety Act*.
 - 1.4.7.2. *Workers' Compensation Act*.
 - 1.4.7.3. Occupational Health and Safety Regulation

1.5. Regulatory Requirements

- 1.5.1. Comply with codes, acts, bylaws, standards and regulations applicable to the performance of the Work in accordance with the Contract to ensure safe operations at Site.
- 1.5.2. In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will instruct on the course of action to be followed.

1.6. Worker's Compensation Board Coverage

- 1.6.1. Comply fully with the *Workers' Compensation Act*, regulations and orders made pursuant thereto, and any amendments up to the Final Completion of the Work.
- 1.6.2. Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.7. Compliance with Regulations

- 1.7.1. PSPC may terminate the Contract without liability to PSPC where the Contractor, in the opinion of PSPC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- 1.7.2. It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the Work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

HEALTH AND SAFETY FOR CONTAMINATED SITES

1.8. Responsibility

- 1.8.1. Assume responsibility as the Prime Contractor for Work under this Contract.
- 1.8.1.1. Be responsible for health and safety of persons onsite, safety of property onsite and for protection of persons adjacent to Site and environment to extent that they may be affected by conduct of Work.
- 1.8.1.2. Comply with and enforce compliance by employees with safety requirements of Contract, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.9. Health and Safety Coordinator

- 1.9.1. The Health and Safety Coordinator must:
 - 1.9.1.1. Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the Site to perform Work.
 - 1.9.1.2. Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.
 - 1.9.1.3. Be on Site during execution of Work.

1.10. General Conditions

- 1.10.1. Provide safety barricades and lights around Site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- 1.10.2. Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the Site:
 - 1.10.2.1. Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

1.11. Project/Site Conditions

- 1.11.1. Work at Site will involve contact with contaminants identified in Specifications and environmental reports.

1.12. Work Permits

- 1.12.1. Obtain specialty permits related to project before start of Work.

1.13. Filing of Notice

- 1.13.1. The Prime Contractor must complete and submit a Notice of Project as required by Provincial or Territorial authorities.
- 1.13.2. Provide copies of all notices to the Departmental Representative.

1.14. Health and Safety Plan

- 1.14.1. Conduct a site-specific hazard assessment based on review of Contract, required Work, and project Site. Identify any known and potential health risks and safety hazards.

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.14.2. Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
 - 1.14.2.1. Primary requirements:
 - 1.14.2.1.1. Contractor's safety policy.
 - 1.14.2.1.2. Identification of applicable compliance obligations.
 - 1.14.2.1.3. Definition of responsibilities for project safety/organization chart for project.
 - 1.14.2.1.4. General safety rules for project.
 - 1.14.2.1.5. Job-specific safe work, procedures.
 - 1.14.2.1.6. Inspection policy and procedures.
 - 1.14.2.1.7. Incident reporting and investigation policy and procedures.
 - 1.14.2.1.8. Occupational Health and Safety Committee/Representative procedures.
 - 1.14.2.1.9. Occupational Health and Safety meetings.
 - 1.14.2.1.10. Occupational Health and Safety communications and record keeping procedures.
 - 1.14.2.2. Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the Work.
 - 1.14.2.3. List hazardous materials to be brought onsite as required by Work.
 - 1.14.2.4. Indicate engineering and administrative control measures to be implemented at the Site for managing identified risks and hazards.
 - 1.14.2.5. Identify personal protective equipment (PPE) to be used by workers.
 - 1.14.2.6. Identify personnel and alternates responsible for site safety and health.
 - 1.14.2.7. Identify personnel training requirements and training plan, including site orientation for new workers.
- 1.14.3. Develop the plan in collaboration with all Subcontractors. Ensure that work/activities of Subcontractors are included in the hazard assessment and are reflected in the plan.
- 1.14.4. Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
- 1.14.5. Departmental Representative's review: the review of Health and Safety Plan by Public Service and Procurement Canada (PSPC) will not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract.

1.15. Emergency Procedures

- 1.15.1. List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (ie names/telephone numbers) of:
 - 1.15.1.1. Designated personnel from own company.
 - 1.15.1.2. Regulatory agencies applicable to Work and as per legislated regulations.
 - 1.15.1.3. Local emergency resources.
 - 1.15.1.4. Departmental Representative and site staff.
- 1.15.2. Include the following provisions in the emergency procedures:

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.15.2.1. Notify workers and the first-aid attendant, of the nature and location of the emergency.
- 1.15.2.2. Evacuate all workers safely.
- 1.15.2.3. Check and confirm the safe evacuation of all workers.
- 1.15.2.4. Notify the fire department or other emergency responders.
- 1.15.2.5. Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
- 1.15.2.6. Notify Departmental Representative and Site staff.
- 1.15.3. Provide written rescue/evacuation procedures as required for, but not limited to:
 - 1.15.3.1. Work at high angles.
 - 1.15.3.2. Work in confined spaces or where there is a risk of entrapment.
 - 1.15.3.3. Work with hazardous substances.
 - 1.15.3.4. Underground work.
 - 1.15.3.5. Work on, over, under and adjacent to water.
 - 1.15.3.6. Workplaces where there are persons who require physical assistance to be moved.
- 1.15.4. Design and mark emergency exit routes to provide quick and unimpeded exit.
- 1.15.5. Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

1.16. Hazardous Products

- 1.16.1. Comply with requirements of Workplace Hazardous Materials Information System 2015 (WHMIS 2015) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
- 1.16.2. Where use of hazardous and toxic products cannot be avoided:
 - 1.16.2.1. Notify Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS 2015 documents as required.
 - 1.16.2.2. Provide adequate means of ventilation as required.

1.17. Unforeseen Hazards

- 1.17.1. Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the Work, immediately stop Work and notify the Departmental Representative verbally and in writing.

1.18. Posted Documents

- 1.18.1. Post legible versions of the following documents onsite:
 - 1.18.1.1. Health and Safety Plan.
 - 1.18.1.2. Sequence of Work.
 - 1.18.1.3. Emergency procedures.
 - 1.18.1.4. Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.

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- 1.18.1.5. Notice of Project.
- 1.18.1.6. Floor plans or Site plans.
- 1.18.1.7. Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the Site for review by employees and workers.
- 1.18.1.8. Workplace Hazardous Materials Information System 2015 (WHMIS 2015) documents.
- 1.18.1.9. Material Safety Data Sheets (MSDS).
- 1.18.1.10. List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
- 1.18.2. Post all Material Safety Data Sheets (MSDS) onsite, in a common area, visible to all workers and in locations accessible to tenants when Work of this Contract includes construction activities adjacent to occupied areas.
- 1.18.3. Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as accepted by the Departmental Representative.

1.19. Meetings

- 1.19.1. Attend health and safety preconstruction meeting and all subsequent meetings called by the Departmental Representative.
- 1.19.2. Ensure all site personnel attend a health and safety toolbox meeting at the beginning of each shift, which must include:
 - 1.19.2.1. Sign-in of all attendees.
 - 1.19.2.2. Planned Work activities and environmental considerations for that shift.
 - 1.19.2.3. Hazards associated with these Work activities, including environmental hazards (eg potential for hypothermia, heat exhaustion, heat stroke).
 - 1.19.2.4. Appropriate job-specific safe work procedures.
 - 1.19.2.5. Required personal protective equipment (PPE).
 - 1.19.2.6. Appropriate emergency procedures.
 - 1.19.2.7. Review recent accidents on Site, including near misses.
- 1.19.3. Retain records of all health and safety meetings onsite during Work, and retain as corporate records for a minimum of 7 years after Work is completed.

1.20. Correction of Non-Compliance

- 1.20.1. Immediately address health and safety non-compliance issues identified by the Departmental Representative.
- 1.20.2. Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.
- 1.20.3. The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time.
- 1.20.4. Correct non-compliance.

1.21. Hazardous Occurrence Investigation and Reporting

- 1.21.1. Hazard includes:

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.21.1.1. Any source of potential damage, harm or adverse effects on life, health, property or environment at work. It refers to any biological, chemical, ergonomic, physical, psychosocial and safety factor that is reasonably likely to cause harm or damage to humans, other organisms, or the environment in the absence of its control. Sometimes a hazard is referred to as being the actual harm or the health effect it caused rather than the hazard. For example the disease tuberculosis might be called a hazard by some but in general the tuberculosis-causing bacteria would be considered the “hazard” or “hazardous biological agent”. Exposure to tuberculosis would be the hazardous incident. For types of Hazards refer to Annex 3 of the Standard on Hazard Prevention Program.
- 1.21.2. Hazardous Occurrence includes:
 - 1.21.2.1. An event occurring at a PSPC managed building or worksite, or through the course of an employee's work that results in, or has the potential to result in, a fatality, injury, illness, exposure to a hazardous substance or property damage or an escapement of a hazardous material. For the purpose of investigating, recording and reporting hazardous occurrences, the following are included under this term: disabling injuries, minor injuries and near-misses.
 - 1.21.3. Hazardous Occurrence Investigation and Reporting Procedures:
 - 1.21.3.1. Includes information regarding the person involved and the basic circumstances surrounding the hazardous occurrence.
 - 1.21.3.2. Provides a detailed and thorough description of the hazardous occurrence and the sequence of events.
 - 1.21.3.3. Indicates corrective measures that have been taken since the occurrence.
 - 1.21.3.4. Requires the appointment of a qualified investigator.
 - 1.21.3.5. Provides recommendations for additional corrective measures, if required.
 - 1.21.4. Fatal or Serious Accidents Procedures:
 - 1.21.4.1. Call 911 to advise the police organization having jurisdiction to secure the scene and investigate the matter.
 - 1.21.4.2. Advise the Departmental Representative of the fatality or serious accident within 1 hour.
 - 1.21.4.3. No investigation will be conducted at the scene until the police service having jurisdiction has released the scene.
 - 1.21.4.4. No person shall, unless authorized to do so, remove or in any way interfere with or disturb any wreckage, article or thing related to the incident except to the extent necessary to: save a life, prevent injury or relieve human suffering in the vicinity; maintain an essential public service; or prevent unnecessary damage to or loss of property.

1.22. Utility Clearance

- 1.22.1. The Contractor is solely responsible for utility clearance.
- 1.22.2. The Contractor will not rely upon Drawings or other information provided with utility locations.

HEALTH AND SAFETY FOR CONTAMINATED SITES

1.23. Personal Protective Equipment Program

- 1.23.1. Submit Personal Protective Equipment (PPE) program to the Departmental Representative addressing:
- 1.23.1.1. Donning and doffing procedures.
 - 1.23.1.2. PPE selection based upon Site hazards.
 - 1.23.1.3. PPE use and limitations of equipment.
 - 1.23.1.4. Work mission duration, PPE maintenance and storage.
 - 1.23.1.5. PPE decontamination and disposal.
 - 1.23.1.6. PPE inspection procedures prior to, during, and after use.
 - 1.23.1.7. Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.
 - 1.23.1.8. Medical surveillance requirements for personnel assigned to work at Site.
 - 1.23.1.9. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.
 - 1.23.1.10. Site control measures employed at Site including site map, site work zones, use of 'buddy system', site communications including site security, alerting means for emergencies, standard operating procedures or safe work practices, and identification of nearest medical assistance.
 - 1.23.1.11. Decontamination procedures for both personnel and equipment.
 - 1.23.1.12. Emergency response requirements addressing: pre-emergency planning, personnel roles, lines of authority and communication, emergency recognition and prevention, safe distances and places of refuge, site security and control, evacuation routes and procedures, decontamination procedures not covered under decontamination section, emergency medical treatment and first aid, emergency alerting and response procedures, critique of response and follow-up, PPE and emergency equipment, site topography, layout, prevailing weather conditions, and procedures for reporting incidents to local, provincial, or federal agencies.
 - 1.23.1.13. Written respiratory protection program for project activities.
 - 1.23.1.14. Procedures dealing with heat and/or cold stress.
 - 1.23.1.15. Spill containment program if waste material is generated, excavated, stored, or managed onsite.

1.24. Offsite Contingency and Emergency Response Plan

- 1.24.1. Prior to commencing Work involving handling of hazardous materials, develop offsite Contingency and Emergency Response Plan.
- 1.24.2. Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from Site.

HEALTH AND SAFETY FOR CONTAMINATED SITES

1.25. Personnel Health, Safety, and Hygiene

- 1.25.1. Training: ensure personnel entering Site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.
- 1.25.2. Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity.
- 1.25.3. Personal Protective Equipment:
 - 1.25.3.1. Ensure all site personnel are furnished with appropriate PPE..
 - 1.25.3.2. Unless identified otherwise in site-specific health and safety plan, minimum PPE to include: industrial protective headwear, high-visibility safety apparel, and protective footwear.
 - 1.25.3.3. Ensure that safety equipment and protective clothing is kept clean and maintained.
- 1.25.4. Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:
 - 1.25.4.1. Ensure industrial protective headwear is of appropriate CSA Standard and meets other appropriate standards.
 - 1.25.4.2. Ensure high-visibility safety apparel is of appropriate CSA Standard and meets other appropriate standards.
 - 1.25.4.3. Ensure protective footwear is of appropriate CSA Standard and meets other appropriate standards.
 - 1.25.4.4. Dispose of or decontaminate PPE worn onsite at end of each workday.
 - 1.25.4.5. Decontaminate reusable PPE before reissuing.
 - 1.25.4.6. Ensure site personnel have passed respirator fit test prior to entering potentially contaminated work areas.
 - 1.25.4.7. Ensure facial hair does not interfere with proper respirator fit.
- 1.25.5. Respiratory Protection:
 - 1.25.5.1. Provide site personnel with extensive training in usage and limitations of, and qualitative fit testing for, air purifying and supplied-air respirators in accordance with specified regulations.
 - 1.25.5.2. Develop, implement, and maintain respirator program.
 - 1.25.5.3. Monitor, evaluate, and provide respiratory protection for site personnel.
 - 1.25.5.4. Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified onsite.
 - 1.25.5.5. In absence of additional air monitoring information or substance identification, retain an industrial hygiene specialist to determine minimum levels of respiratory protection required.
 - 1.25.5.6. Immediately notify Departmental Representative when level of respiratory protection required increases.

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.25.5.7. Ensure appropriate respiratory protection during Work activities. As minimum requirement, ensure that persons entering potentially contaminated work areas are supplied with and use appropriate respiratory protection.
- 1.25.6. Heat Stress/Cold Stress: implement heat stress or cold stress monitoring program as applicable and include in site-specific Health and Safety Plan.
- 1.25.7. Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:
 - 1.25.7.1. Suitable containers for storage and disposal of used disposable PPE.
 - 1.25.7.2. Potable water and suitable sanitation facility.
- 1.25.8. Emergency and First-Aid Equipment:
 - 1.25.8.1. Locate and maintain emergency and first-aid equipment in appropriate location onsite including first-aid kit to accommodate number of site personnel; portable emergency eye wash; two 9 kg ABC type dry chemical fire extinguishers.
- 1.25.9. Site Communications:
 - 1.25.9.1. Identify, supply and implement appropriate dedicated communication devices for Site and post emergency numbers near dedicated devices.
 - 1.25.9.2. Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities.
 - 1.25.9.3. Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.
 - 1.25.9.4. Furnish selected personnel with 2-way radios.
 - 1.25.9.5. Safety Meetings: conduct mandatory daily safety meetings for personnel, and additionally as required by special or Work-related conditions; include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new site conditions as encountered. Hold additional safety meetings on as-needed basis.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

HEALTH AND SAFETY FOR CONTAMINATED SITES

ENVIRONMENTAL PROCEDURES

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Environmental Protection Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit a plan detailing protection of the environment. Include:

- 1.3.1.1. Comprehensive overview of known or potential environmental issues to be addressed during Work.
- 1.3.1.2. Identify requirements that plan complies with. Includes: permits, certificates, approvals, or any other form of authorizations; other federal, territorial or provincial, or municipal requirements; and in accordance with the Contract.
- 1.3.1.3. Names and qualifications of persons responsible for ensuring adherence to Environmental Protection Plan.
- 1.3.1.4. Names and qualifications of persons responsible for manifesting material to be removed from Site.
- 1.3.1.5. Names and qualifications of persons responsible for training Site personnel.
- 1.3.1.6. Description of Environmental Protection personnel training program.
- 1.3.1.7. Work Area Plan showing proposed activity in each portion of areas, such as exclusion zone(s), decontamination zone(s) and clean zone(s), and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized Work areas.
- 1.3.1.8. Drawings showing locations of proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials onsite.
- 1.3.1.9. Historical, Archaeological, Cultural Resources, Biological Resources and Wetlands Plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands. Include procedures if previously unknown historical, archaeological, cultural, and biological resources are discovered during Work.
- 1.3.1.10. Noise Control Plan identifying methods and procedures for preventing, monitoring, and controlling noise for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, territorial or provincial, or municipal requirements; and in accordance with the Contract. Include thresholds and procedures if: noise does not comply

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- with appropriate levels, or if there are public complaints. Plan to be for type of Work and Site conditions.
- 1.3.1.11. Vibration Control Plan identifying methods and procedures for preventing, monitoring, and controlling vibration for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, territorial or provincial, or municipal requirements; and in accordance with the Contract. Include thresholds and procedures if: vibration does not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs
 - 1.3.1.12. Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Ensure plans include measures to prevent mud transported onto public roads by vehicles or runoff, and mitigation measures if mud is transported onto public roads by vehicles or runoff. This includes roads from the Site to the Land Treatment Facility. Vehicles and vehicle traffic must comply with all federal, provincial, and municipal laws and regulations.
 - 1.3.1.13. Contamination Prevention Plan identifying hazardous, deleterious or regulated substances to be used onsite; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with federal, territorial or provincial, and municipal laws and regulations for storage and handling of these materials.
 - 1.3.1.14. Spill Control Plan including procedures, instructions, and reports to be used in event of spill of hazardous, deleterious or regulated substances. Identify locations and contents of spill kits.
 - 1.3.1.15. Communications Plan identifying emergency contact list and conditions for implementing emergency contact. Emergency contact to include: Contractor emergency response team including Superintendent; Departmental Representative and alternate, and other contractor(s) and individuals as instructed by the Departmental Representative; and federal, territorial or provincial, and municipal emergency contacts.
 - 1.3.1.16. Air Pollution Control Plan detailing provisions to assure that contaminants, dust, debris, materials, and trash, are contained onsite. Include procedures, in accordance with the Contract, if air pollution does not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs.
 - 1.3.1.17. Non-Contaminated Material Disposal Plan identifying methods and locations for solid waste disposal including clearing waste. Include name, location, provincial or territorial authorizations, and evidence of compliance with municipal zoning and bylaws of Landfill.
 - 1.3.1.18. Wastewater Management Plan identifying methods and procedures for management and discharge of Contaminated and Non-Contaminated Water including surface waters and wastewater which are directly derived from construction activities, such as concrete curing water, clean-up water,

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- dewatering of groundwater, disinfection water, hydrostatic test water, and water used in flushing of lines. Include method of treatment and disposal.
- 1.3.1.19. Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, federal, territorial or provincial, and municipal laws and regulations.
 - 1.3.2. Pollution Control Procedures Modification: immediately when pollution control procedures are inadequate, as instructed by the Departmental Representative, Submit modified procedures to resolve problem.
 - 1.3.3. Pollution Control Remediation Procedures Modification: immediately when soil, sediment or water contaminated by Contractor's activities are inadequate as instructed by the Departmental Representative, Submit remediation procedures.
 - 1.3.4. Dust and Particulate Control Procedures Modification: immediately when dust and particulate control measures are inadequate as instructed by the Departmental Representative, Submit modified procedures to resolve problem.

1.4. Fires

- 1.4.1. Fires and burning of rubbish onsite not permitted.

1.5. Cleaning

- 1.5.1. Maintain cleanliness of Work and surrounding Site to comply with federal, provincial, territorial, and municipal fire and safety laws, ordinances, codes, and regulations applicable to the performance of the Work.
- 1.5.2. Coordinate cleaning operations with disposal operations to prevent accumulation of dust, dirt, debris, rubbish, and waste materials.
- 1.5.3. Ensure cleanup of the Work areas each day and after Final Completion of Work.

1.6. Site Clearing and Plant Protection

- 1.6.1. Minimize stripping of Topsoil and vegetation.
- 1.6.2. Restrict tree and plant removal to areas in accordance with the Contract or as instructed by the Departmental Representative. Protect all other trees and plants onsite and offsite.
- 1.6.3. Salvage all trees and plants to be removed in accordance with the Contract or as instructed by the Departmental Representative.
- 1.6.4. Wrap in burlap, trees and shrubs adjacent to construction Work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.
- 1.6.5. Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

1.7. Vibration

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- 1.7.1. Maintain acceptable vibration levels not injurious to public health or safety, to the environment, to onsite or offsite property, or to any part of Work completed or under construction.

1.8. Noise

- 1.8.1. Maintain acceptable noise levels not injurious to public health or safety or to the environment.

1.9. Maintenance of Public Roads

- 1.9.1. Prevent tracking or spilling of debris or material onto public roads including roads to on-Site Land Treatment Facility.
- 1.9.2. Immediately sweep or scrape up debris or material on public roads including roads to on-Site Land Treatment Facility.
- 1.9.3. Clean public roads within a 200 m radius of the Site entrance at least once per shift.

1.10. Pollution Control

- 1.10.1. Pollution includes spills or other releases from Contractor's activities that could potentially contaminate soil, sediment, water, and atmosphere from discharge of hazardous, deleterious or regulated substances, including from equipment and material handling.
- 1.10.2. Provide sequence, methods and means, and facilities to prevent spills or releases.
 - 1.10.2.1. Maintain temporary erosion and pollution control features.
 - 1.10.2.2. Do not store fuel onsite other than tanks forming part of the equipment.
 - 1.10.2.3. Control emissions from equipment and plant to meet applicable authorities' emission requirements.
 - 1.10.2.4. Contractor to regularly inspect all machinery on the Site to ensure it is in good repair and free of leaks.
- 1.10.3. Inadequate procedures:
 - 1.10.3.1. Stop relevant Work if procedures are inadequate to prevent spills or other releases, or when monitoring indicates that release equals or exceeds regulated or levels in accordance with the Contract.
 - 1.10.3.2. Submit procedures proposed to resolve problem.
 - 1.10.3.3. Make necessary changes to operations prior to resuming excavation, handling, processing, or other Work that can cause spills or other releases.
 - 1.10.3.4. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate to prevent spills or other releases, or when monitoring indicates that release equals or exceeds regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.
- 1.10.4. Be prepared to intercept, cleanup, and dispose of spills or other releases that can occur whether on land or water.
- 1.10.5. Spill kits and containment are to be maintained onsite and ready for deployment in the event of spills or other releases.

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- 1.10.5.1. Spill kits are to include sufficient quantities of absorbent material, containers, booms, shovels and other tools, and personal protective equipment.
- 1.10.5.2. Spill response materials must be compatible with type of equipment being used or type of material being handled.
- 1.10.5.3. Spill kits are to be in close proximity to machinery.
- 1.10.5.4. During the Work there are to be trained and qualified personnel available that are ready to deploy spill kits when necessary.
- 1.10.6. Take immediate action using available resources to contain and mitigate effects on environment and persons from spill or release.
- 1.10.7. Promptly report spills and releases potentially causing damage to environment to:
 - 1.10.7.1. Authority having jurisdiction or interest in spill or other release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.
 - 1.10.7.2. Contractor emergency response team including Superintendent
 - 1.10.7.3. Departmental Representative and other contractor(s) and individuals as instructed by the Departmental Representative.
- 1.10.8. Departmental Representative can collect samples for chemical analyses prior to, during, and upon Final Completion of Work to monitor potential pollution caused by Contractor's activities. Assist Departmental Representative in collection of samples.
- 1.10.9. Remediation of soil, sediment or water contaminated by Contractor's activities.
 - 1.10.9.1. Remediate all soil, sediment or water contaminated by Contractor's activities associated with the Work onsite and offsite.
 - 1.10.9.2. Remediation includes excavation, pumping, testing, transport, treatment and disposal as appropriate for the type of contamination incurred, and at a minimum in accordance with the Contract.
 - 1.10.9.3. Submit procedures for remediating soil, sediment or water contaminated by Contractor's activities.
 - 1.10.9.4. Remediate as directed by the Departmental Representative.
 - 1.10.9.5. Contractor is responsible for any additional investigation, testing, and assessments required as acceptable to the Departmental Representative.

1.11. Dust and Particulate Control

- 1.11.1. Execute Work by methods to minimize raising dust from construction operations.
- 1.11.2. Prevent fugitive dust from the Site from interfering with onsite and offsite uses.
- 1.11.3. Prevent dust from spreading to neighbouring properties.
- 1.11.4. Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads, excavations, and stockpiles.
- 1.11.5. Implement and maintain dust and particulate control measures immediately as instructed by the Departmental Representative during Work and in accordance with regulations and in accordance with the Contract.

ENVIRONMENTAL PROCEDURES

- 1.11.6. Provide positive means to prevent airborne dust from dispersing into atmosphere. Use fresh (non-saline) water for dust and particulate control.
- 1.11.7. As minimum, use appropriate covers on vehicles, including trucks, barges, and trains, hauling fine or dusty material. Use watertight vehicles to haul wet materials.
- 1.11.8. Inadequate procedures:
 - 1.11.8.1. Stop relevant Work if dust and particulate control is not sufficient for controlling dusts and particulates into atmosphere, or when monitoring indicates that dust or particulate levels equal or exceed regulated or levels in accordance with the Contract.
 - 1.11.8.2. Submit procedures proposed to resolve problem.
 - 1.11.8.3. Make necessary changes to operations prior to resuming excavation, handling, processing, or other Work that can cause release of dusts or particulates.
 - 1.11.8.4. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate to prevent release of dusts or particulates, or when monitoring indicates that dust or particulate levels equal or exceed regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.

1.12. Non-Contaminated Material Removal

- 1.12.1. Remove all Non-Contaminated Material within Work areas in accordance with the Contract and as instructed by the Departmental Representative.
- 1.12.2. Remove surplus materials and temporary facilities from Site.
- 1.12.3. Dispose waste offsite.
- 1.12.4. Do not burn or bury any waste onsite.
- 1.12.5. Do not discharge wastes into streams or waterways.
- 1.12.6. Do not dispose of volatile or hazardous materials such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

1.13. Sewage Wastewater

- 1.13.1. Store Sewage Wastewater from toilet facilities with wastewater from handbasins, and/or showers, for ultimate disposal.
- 1.13.2. Provide, operate, and maintain Sewage Wastewater storage tanks to store Sewage Wastewater.
- 1.13.3. Transport and dispose of Sewage Wastewater at a Disposal Facility, or discharge to municipal sanitary sewer system in compliance with Municipal requirements, as accepted by Departmental Representative.
- 1.13.4. Discharges: comply with applicable discharge limitations and requirements; do not discharge Sewage Wastewater to Site sewer systems that do not conform to or are in violation of such limitations or requirements; and obtain approval prior to discharge of Sewage Wastewater.

ENVIRONMENTAL PROCEDURES

1.14. Wastewater Control

- 1.14.1. Dewater various parts of Work including, without limitation, excavations, structures, foundations, and Work areas.
- 1.14.2. Employ construction methods, plant procedures, and precautions that ensure Work, including excavations, are stable, free from disturbance, and dry.
- 1.14.3. Direct surface waters that have not contacted potentially Contaminated Materials to surface drainage systems.
- 1.14.4. Control surface drainage including ensuring that gutters are kept open, wastewater is not allowed across or over pavements or sidewalks except through accepted pipes or properly constructed troughs, and runoff from unstabilized areas is intercepted and diverted to suitable outlet.

1.15. Non-Contaminated Water Disposal

- 1.15.1. Dispose of Non-Contaminated Water in manner not injurious to public health or safety, to property, or to any part of Work completed or under construction.
- 1.15.2. Control disposal or runoff of Non-Contaminated Water containing suspended materials or other harmful substances in accordance with local authority requirements.
- 1.15.3. Ensure pumped Non-Contaminated Water into waterways, sewer or drainage systems is free of suspended materials. Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.
- 1.15.4. Obtain permits to discharge Non-Contaminated Water to environment or Municipal sewers.
- 1.15.5. Do not discharge water which may have come in contact with potentially Contaminated Material or otherwise be Contaminated directly offsite to the environment or to municipal sewers.

1.16. Erosion and Sediment Control

- 1.16.1. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas, from stockpiles, staging areas, and other Work areas. Prevent erosion and sedimentation.
- 1.16.2. Minimize amount of bare soil or sediment exposed at one time. Stabilize disturbed soil or sediment as quickly as practical. Strip vegetation, regrade, or otherwise develop to minimize erosion. Remove accumulated sediment resulting from construction activity from adjoining surfaces, drainage systems, and water courses, and repair damage caused by soil erosion and sedimentation as instructed by the Departmental Representative.
- 1.16.3. Provide and maintain temporary erosion and sediment control measures.
 - 1.16.3.1. Temporary erosion and sediment control measures are required to prevent erosion and migration of silt, mud, sediment, and other debris offsite or to other areas of Site where damage might result, or that might otherwise be required by laws and regulations.

ENVIRONMENTAL PROCEDURES

- 1.16.3.2. Temporary erosion and sediment control measures include: silt fences, hay or straw bales, ditches, geotextiles, drains, berms, terracing, riprap, temporary drainage piping, vegetative cover, dikes, mulching, sediment traps, detention and retention basins, grading, planting, retaining walls, culverts, pipes, guardrails, temporary roads, and other measures appropriate to specific condition.
- 1.16.3.3. Temporary improvements must remain in place and in operation as necessary or until otherwise instructed by the Departmental Representative
- 1.16.3.4. Place silt fences and/or hay or straw bales in ditches to prevent sediment from escaping from ditch terminations.
- 1.16.3.5. Do not construct bale barriers and silt fence in flowing streams or in swales.
- 1.16.3.6. Check erosion and sediment control measures weekly after each rainfall; during prolonged rainfall check daily.
- 1.16.3.7. Bales and/or silt fence can be removed at beginning of Working Day, replace at end of Working Day.
- 1.16.3.8. Repair damaged bales, end runs, and undercutting beneath bales.
- 1.16.3.9. Unless instructed by the Departmental Representative, remove temporary erosion and sediment control devices upon Final Completion of Work. Temporary erosion and sediment control devices once removed become property of Contractor.
- 1.16.4. Whenever sedimentation is caused by stripping vegetation, regrading, or other development, remove it from adjoining surfaces, drainage systems, and watercourses, and repair damage as quickly as possible.
- 1.16.5. Construct fill areas to prevent erosion.
- 1.16.6. Do not disturb existing embankments or embankment protection in accordance with the Contract.
- 1.16.7. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- 1.16.8. If soil, sediment and debris from Site accumulate in low areas, storm sewers, roadways, gutters, ditches, or other areas where it is undesirable, remove accumulation and restore area to original condition, as instructed by the Departmental Representative.

1.17. Noncompliance

- 1.17.1. Departmental Representative will inform Contractor in writing of observed noncompliance with federal, provincial, territorial or municipal environmental laws, regulations, permits, or other environmental procedure violations.
- 1.17.2. After receipt of notice, inform the Departmental Representative of the proposed corrective action. Corrective action will be subject to acceptance of Departmental Representative.
 - 1.17.2.1. Do not take action until after receipt of written acceptance.
- 1.17.3. Departmental Representative will issue stop order of Work until satisfactory corrective action has been taken.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION



1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Permits: at least 10 Working Days prior to mobilization to Site, Submit copies of all permits, certificates, approvals, or any other form of authorizations and all reporting required.

1.4. Laws, Regulations, Permits

1.4.1. Generally, provincial, territorial and municipal laws, regulations, bylaws and other requirements do not apply on federal lands, activities or undertakings. Soil and other materials that are removed from federal lands may become subject to provincial, territorial or municipal laws and regulations.

1.4.2. Provincial, territorial or municipal standards may be used in relation to federal lands only as guidelines for the purpose of establishing remediation goals and objectives. The term "standards" is used in this part in order to maintain consistency in terminology throughout this document, and does not imply that standards contained in provincial, territorial or municipal laws and regulations apply on Federal lands, activities or undertakings.

1.4.3. Comply with certificates, licenses and other permits enforced at the location concerned required by regulatory federal, provincial, territorial, or municipal authorities to complete the Work that have already been obtained.

1.4.4. Obtain and pay for certificates, licenses and other permits enforced at the location concerned required by regulatory federal, provincial, territorial or municipal authorities to complete the Work that have not already been obtained or that are required to be amended.

1.4.5. Provide applicable authorities with plans and information required for issue of acceptance certificates.

1.4.6. Furnish inspection certificates in evidence that the Work installed conforms with the requirements of the authority having jurisdiction.

1.5. Codes, Bylaws, Standards

1.5.1. Meet or exceed requirements of Contract, standards, and codes applicable to the performance of the Work and referenced documents.

1.5.2. In any case of conflict or discrepancy, the most stringent requirements will apply.

1.5.3. Perform Work in accordance with the National Building Code of Canada (NBC), and other requirements or codes in accordance with the Contract, construction

standards and/or any other code or bylaw applicable to the performance of the Work.

- 1.5.4. Certificates, licenses and other permits enforced at the location concerned required by regulatory federal, provincial or municipal authorities to complete the Work: see 01 11 00.
- 1.5.5. Comply with all attachments, references, and reports relevant to Work, including environmental protection.

1.6. Smoking Environment

- 1.6.1. Smoking on the Site is not permitted.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Inspection and Test Reports: within 5 Working Days of receipt, Submit 2 copies of inspection and test reports to Departmental Representative.

1.4. Quality of Work

1.4.1. Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman, or Qualified Professional.

1.4.2. Meet or exceed standards set out in the National Building Code of Canada as applicable for workmanship, erection methods and procedures.

1.4.3. In cases of dispute, perform Work to standard or quality in accordance with any decisions by the Departmental Representative.

1.4.4. Follow Departmental Representative's directions to meet the Quality of Work in accordance with the Contract at no increase to the Contract Amount and no increase to Extension of Time for completion of the Work. Quality of Work includes addressing comments on Submittals, modifying environmental procedures, and preventing or remediating contaminated material spills.

1.5. Quality Management

1.5.1. Be responsible for all Quality Assurance and Quality Control during the performance of the Work.

1.5.2. Quality Assurance and Quality Control includes monitoring, inspecting, testing, documenting and reporting the means, methods, materials, workmanship, processes, and products of all aspects of the Work, including design, construction, and management as necessary to ensure conformance with the Contract.

1.5.3. Assist Departmental Representative in quality audit inspections and submit all indicated information within 5 Working Days of collection or as directed.

1.6. Inspection

1.6.1. Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Site, allow access to such Work whenever it is in progress. Work at locations other than Site includes offsite Transportation (eg transfer stations), Treatment, and Disposal Facilities.

QUALITY CONTROL

- 1.6.2. Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Site.
- 1.6.3. If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- 1.6.4. Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.7. Independent Inspection Agencies

- 1.7.1. Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- 1.7.2. Provide equipment required for executing inspection and testing by appointed agencies.
- 1.7.3. Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- 1.7.4. If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

1.8. Access to Work

- 1.8.1. Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- 1.8.2. Co-operate to provide reasonable facilities for such access.

1.9. Procedures

- 1.9.1. Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- 1.9.2. Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- 1.9.3. Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.10. Rejected Work

- 1.10.1. Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

QUALITY CONTROL

- 1.10.2. Make good other Contractor's work damaged by such removals or replacements promptly.
- 1.10.3. If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, PSPC will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.11. Reports

- 1.11.1. Provide copies of inspection and test reports to subcontractor of work being inspected or tested and Departmental Representative.

1.12. Tests and Mix Designs

- 1.12.1. Furnish test results and mix designs as requested.
- 1.12.2. Test results must be signed by Qualified Professional.
- 1.12.3. The Departmental Representative may require, and pay for, additional inspection and testing services not included above.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

- 1.3.1. Site Layout: within 10 Working Days after Contract award and prior to mobilization to Site, Submit Site Layout drawings showing existing conditions and facilities, construction facilities and temporary controls provided by Contractor. Include:
- 1.3.1.1. Equipment and personnel decontamination areas.
 - 1.3.1.2. Means of ingress, egress and temporary traffic control.
 - 1.3.1.3. Equipment and material staging areas.
 - 1.3.1.4. Stockpile areas and construction details, including base preparation and water control features.
 - 1.3.1.5. Exclusion areas, contaminant handling areas, and other areas identified in Contractor's site-specific Health and Safety Plan and Environmental Protection Plan.
 - 1.3.1.6. Grading, including contours, required to construct temporary facilities.
 - 1.3.1.7. Location of all temporary facilities including: wash and decontamination units, parking, storage, environmental monitoring stations, above ground and underground utilities, and temporary facilities and roads.
- 1.3.2. Signs: at least 5 Working Days prior to posting, Submit any signs viewable by public.

1.4. Utilities

- 1.4.1. Utilities not identified as being available on Site must be supplied at the Contractor's expense. Provide supplied utilities for entire work force, including Subcontractors and Departmental Representative and their consultants.

1.5. Fire Protection

- 1.5.1. Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

1.6. Access and Delivery

- 1.6.1. Only the designated entrance in accordance with the Contract can be used for access to Site.
- 1.6.1.1. Maintain for duration of Contract.
 - 1.6.1.2. Make good damage resulting from Contractor's use.

- 1.6.2. Use of the Site will be granted to the Contractor through the Departmental Representative.

1.7. Installation and Removal

- 1.7.1. Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- 1.7.2. Identify areas which have to be graveled or otherwise treated to prevent tracking of mud.
- 1.7.3. Indicate use of supplemental or other staging area.
- 1.7.4. Provide construction facilities in order to execute work expeditiously.
- 1.7.5. Provide temporary utilities in order to execute Work expeditiously.
- 1.7.6. Remove from Site all such Work after use.

1.8. Site Storage/Loading

- 1.8.1. Confine work and operations of employees in accordance with the Contract. Do not unreasonably encumber premises with products.
- 1.8.2. Storage space must be limited to the Site.
- 1.8.3. Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.9. Construction Parking

- 1.9.1. Parking of private vehicles will not be permitted on Site.
- 1.9.2. Provide and maintain adequate access to project site.

1.10. Security

- 1.10.1. Be responsible security of site and contents of site after working hours and during holidays.
- 1.10.2. Control access to Site and maintain a log of all personnel onsite. No non-Work visitors allowed without prior written consent of Departmental Representative

1.11. Departmental Representative, Consultant(s) and Contractor Offices

- 1.11.1. Provide office facilities for the exclusive use of the Departmental Representative and their consultant(s), and the Contractor, with the following intent:
- 1.11.1.1. Two work stations within the factory fabricated modular units.
- 1.11.1.2. Work stations must include; 1 desk for the exclusive use of the Departmental Representative and their Consultant(s) (minimum size 120 cm x 50 cm, minimum height 70 cm), 1 swivel desk chair for the exclusive use of the Departmental Representative and their Consultant(s) (minimum load requirement 100 kg), 1 garbage can, and 1 recycling bin.
- 1.11.1.3. Building envelope: watertight construction.
- 1.11.1.4. Completed building: exterior to interior minimum sound attenuation of STC 30.

- 1.11.1.5. Building interior environment: heated and cooled to maintain temperature of 20 degrees C minimum to 25 degrees C maximum with relative humidity of 35% to 60%.
- 1.11.1.6. Provide ventilation and outdoor air as per ASHRAE 62.1 – 2010 Standard.
- 1.11.1.7. Building lighting: maintain measured lighting level of 200 lx at 1500 mm above finished floor, after building finishes and painting complete.
- 1.11.1.8. Thermal performance of window units: Maximum heat transfer rate (U-value) not to exceed 2.0 W/m²K.
- 1.11.1.9. Regularly collect refuse and recyclables and keep the office clean and properly maintained with heat and light.
- 1.11.1.10. Provide private washroom facilities in offices in accordance with the Contract, complete with flush or chemical type toilet, lavatory and mirror and maintain supply of soap, paper towels and toilet tissue.
- 1.11.1.11. Furnish offices in accordance with the Contract.
- 1.11.1.12. The work stations and contents designated for the Departmental Representative and their Consultant(s) must be for the sole use of the Departmental Representative and their Consultant(s) for the duration of the Work and may, if necessary, be used concurrently with other inspection agencies.
- 1.11.2. Installation:
 - 1.11.2.1. Install level and plumb.
 - 1.11.2.2. Install stairs.
 - 1.11.2.3. Adjust doors and windows for smooth operation.
- 1.11.3. Provide a minimum of 2 parking spaces for Departmental Representative and their Consultant(s) adjacent to offices.

1.12. Sanitary Facilities

- 1.12.1. Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- 1.12.2. Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.13. Protection and Maintenance of Traffic

- 1.13.1. Provide access and temporary relocated roads as necessary to maintain traffic.
- 1.13.2. Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- 1.13.3. Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
- 1.13.4. Protect travelling public from damage to person and property.
- 1.13.5. Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

- 1.13.6. Verify adequacy of existing roads and allowable load limit on these roads.
Contractor: responsible for repair of damage to roads caused by construction operations.
- 1.13.7. Construct access and haul roads necessary.
- 1.13.8. Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
- 1.13.9. Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- 1.13.10. Dust control: adequate to ensure safe operation at all times.
- 1.13.11. Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.
- 1.13.12. Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- 1.13.13. Provide snow removal during period of Work.
- 1.13.14. Remove, upon completion of work, haul roads designated by Departmental Representative.

1.14. Truck Wash and Decontamination Units

- 1.14.1. Supply, install and operate the truck wash, including the installation of a water supply.
 - 1.14.1.1. No vehicles which have come in contact with Contaminated Material must leave the Site without passing through the truck wash.
 - 1.14.1.2. The truck wash must provide, at a minimum, the ability to wash truck tires and load boxes to a minimum height of 1.7 m.
 - 1.14.1.3. Truck wash must have a solid separation tank and all solids collected must be classified as Contaminated Material and disposed of at a Disposal Facility.
 - 1.14.1.4. Recycle or treated as Contaminated Water water used in the truck wash.
- 1.14.2. Supply personnel decontamination units (minimum of 2) for use by hazardous material, testing and inspection personnel working in areas of hazardous materials and for general clean-up of personal protective equipment to remove Contaminated Material. Provide decontamination units for work force.
 - 1.14.2.1. At least one personnel decontamination unit must have overhead shower capability.
 - 1.14.2.2. The personnel decontamination units to be available to Departmental Representative and their consultants.
 - 1.14.2.3. The personnel decontamination units are subject to acceptance of Departmental Representative.
- 1.14.3. The truck wash and personnel decontamination units must be maintained in good working order during onsite Work.
- 1.14.4. The truck wash and personnel decontamination units must be removed from the Site during Site Decommissioning.

1.15. Clean-Up

- 1.15.1. Remove construction debris, waste materials, packaging material from work site daily.
- 1.15.2. Clean dirt or mud tracked onto paved or surfaced roadways.
- 1.15.3. Store materials resulting from demolition activities that are salvageable.
- 1.15.4. Stack stored new or salvaged material not in construction facilities.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Product Data: at least 5 Working Days prior to use, Submit data on products to be used in Work. Include:

1.3.1.1. Manufacturers' catalogue sheets, MSDS sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products or any other information in accordance with the Contract.

1.3.1.2. Delete information not applicable to project.

1.3.1.3. Supplement standard information to provide details applicable to project.

1.3.1.4. Cross-reference product data information to applicable portions of Contract.

1.3.2. Substitution: at least 5 Working Days prior to use and after Contract award, Submit proposals for substituting products, if required. Include statements of respective costs of items originally in accordance with the Contract and the proposed substitution.

1.3.3. Quality of Work: at least 5 Working Days prior to Work, Submit alternate means to meet or correct quality of work, if required.

1.4. Products, Material and Equipment

1.4.1. Use new products, material and equipment in accordance with the Contract. The term "products" is referred to throughout the specifications.

1.4.2. Use products of one manufacturer for material and equipment of the same type or classification in accordance with the Contract.

1.4.3. Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation method in accordance with the Contract.

1.4.4. Notify Departmental Representative in writing of any conflict between Contract and manufacturer's instructions. Departmental Representative will direct which document is to be followed.

1.4.5. Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.

1.4.6. Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from Site.

1.4.7. Store products in accordance with Suppliers' instructions.

PRODUCT REQUIREMENTS

1.5. Quality of Products

- 1.5.1. Products, materials and equipment (referred to as products) incorporated into Work must be new, not damaged or defective, and of the best quality (compatible with the specifications) for the purpose intended. As instructed by the Departmental Representative, furnish evidence as to type, source, and quality of the products provided.
- 1.5.2. Defective products will be rejected regardless of previous inspections.
 - 1.5.2.1. Inspection does not relieve responsibility, but is precaution against oversight or error.
 - 1.5.2.2. Remove and replace defective products.
- 1.5.3. Retain purchase orders, invoices and other documents to prove that all products utilized in the Work meet the requirements of the Contract. Produce documents as instructed by the Departmental Representative.
- 1.5.4. Should any dispute arise as to quality or fitness of products, the decision rests strictly with the Departmental Representative in accordance with the Contract.
- 1.5.5. Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.6. Availability of Products

- 1.6.1. Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for any items.
- 1.6.2. If delays in supply of products are foreseeable, Notify Departmental Representative of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the Work.
- 1.6.3. In event of failure to Notify Departmental Representative at the start of Work and should it subsequently appear that the Work may be delayed for such reason, the Departmental Representative reserves the right to substitute more readily available products of similar character.

1.7. Manufacturer's Instructions

- 1.7.1. Install or erect products in accordance with the manufacturer's instructions in accordance with the Contract.
 - 1.7.1.1. Do not rely on labels or enclosures provided with products.
 - 1.7.1.2. Obtain written instructions directly from the manufacturer.
- 1.7.2. Notify Departmental Representative in writing of any conflict between Contract and manufacturer's instructions. Departmental Representative will instruct which document must be followed.
- 1.7.3. Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Departmental Representative to instruct the removal and re-installation.

1.8. Contractor's Options for Selection of Products for Tendering

PRODUCT REQUIREMENTS

- 1.8.1. Products specified by “Prescriptive” specifications: select any product meeting or exceeding requirements in accordance with the Contract.
- 1.8.2. Products specified by performance and referenced standard: select any product meeting or exceeding the referenced standard.
- 1.8.3. Products specified to meet particular design requirements or to match existing materials: use only material in accordance with the Contract.
- 1.8.4. When products are specified by a referenced standard or by performance specifications, as directed by the Departmental Representative, obtain from manufacturer and independent laboratory a report showing that the product meets or exceeds the requirements in accordance with the Contract.

1.9. Storage, Handling and Protection

- 1.9.1. Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions.
- 1.9.2. Store packaged or bundled products in original and undamaged condition with manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in Work.
- 1.9.3. Store products subject to damage from weather in weatherproof enclosures.
- 1.9.4. Remove and replace damaged products as instructed by the Departmental Representative.

1.10. Transportation

- 1.10.1. Pay costs of transportation of products required in performance of Work.
- 1.10.2. Transport products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- 1.10.3. Transport products subject to damage from weather in weatherproof enclosures.
- 1.10.4. Transport in an efficient manner that does not cause delays to the Work schedule.

1.11. Quality of Work

- 1.11.1. Ensure quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately Notify Departmental Representative if required Work is such as to make it impractical to produce results in accordance with the Contract. Provide alternate means to meet or correct quality of work, as accepted by the Departmental Representative.
- 1.11.2. Do not employ anyone unskilled in their required duties.
- 1.11.3. Perform Work to standard of fitness of Quality of Work in accordance with any decision by the Departmental Representative.

1.12. Coordination

- 1.12.1. Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

1.13. Remedial Work

- 1.13.1. Perform remedial Work required to repair or replace parts or portions of Work as instructed by the Departmental Representative as defective or unacceptable. Coordinate adjacent affected Work as required.
- 1.13.2. Perform remedial Work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

2. PART 2 - PRODUCTS

2.1. Asbestos Containing Materials Prohibition

- 2.1.1. Any material containing any degree of asbestos is banned from use in any and all sites, designs and projects.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

EXAMINATION AND PREPARATION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

- 1.3.1. Preconstruction Condition Survey: within 10 Working Days prior to mobilization to Site, Submit Preconstruction Condition Survey of existing structures, utilities and surface features.
- 1.3.2. Preconstruction As-Built Documents: at least 5 Working Days prior to mobilization to Site, Submit preconstruction as-built documents prepared by a Land Surveyor.

1.4. Survey Reference Points

- 1.4.1. Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- 1.4.2. Make no changes or relocations without prior written notice to Departmental Representative.
- 1.4.3. Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- 1.4.4. Require surveyor to replace control points in accordance with original survey control.

1.5. Survey Requirements

- 1.5.1. Establish permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- 1.5.2. Establish lines and levels, locate and lay out, by instrumentation planned excavation limits.
- 1.5.3. Stake for grading, fill.

1.6. Existing Services

- 1.6.1. Size, depth and location of existing utilities and structures as specified are for guidance only. Completeness and accuracy are not guaranteed.
- 1.6.2. Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative. All utilities entering Site must be confirmed prior to subsurface disturbance (i.e. do not rely on as-built documents). As appropriate, confirm locations of buried utilities by independent utility locator and using hand test excavations or hydrovac methods.

EXAMINATION AND PREPARATION

- 1.6.3. Maintain and protect from damage all utilities and structures encountered, unless Work involves temporarily breaking, rerouting, or connecting into existing utilities.
- 1.6.4. Where Work involves temporarily breaking, rerouting, or connecting into existing utilities, obtain permission from utility companies of intended interruption of services, and carry out Work at times determined by the authorities having jurisdiction.
- 1.6.5. Submit schedule to and obtain approval for any shutdown or closure of active service. Adhere to schedule accepted by Departmental Representative and provide notice to affected parties.
- 1.6.6. Where unknown utilities are encountered, immediately verbally notify Departmental Representative and confirm findings in writing.

1.7. Examination

- 1.7.1. Examine Site and Contract and be familiar and conversant with existing conditions likely to affect Work, including Contaminated Material.

1.8. Records

- 1.8.1. Land Surveyor to prepare preconstruction as-built Shop Drawings of all utilities.
- 1.8.2. Land Surveyor to prepare postconstruction as-built Shop Drawings of all utilities, including existing, reinstated, rerouted, and abandoned.
- 1.8.3. Maintain a complete, accurate log of control and survey work as it progresses.
- 1.8.4. Preconstruction Condition Survey:
 - 1.8.4.1. Conduct Preconstruction Condition Survey of existing structures and other features which can be affected by Work, both onsite and offsite. Includes: buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, roads, survey bench marks, monuments and other features.
 - 1.8.4.2. Survey to include detailed photographic documentation of any preconstruction damage, and measurements where appropriate, including crack width and length, angles out of true. Record written notices to owners of features that have existing damage.
 - 1.8.4.3. Record written notices of offsite owners which refused entry to conduct Preconstruction Condition Survey.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION



WASTE MANAGEMENT AND DISPOSAL

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Waste Reduction Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit a plan detailing material separation. Include:

1.3.1.1. List of materials to be reused or recycled.

1.3.1.2. Sequence, methods and means to dispose Waste offsite. For all Landfill Facilities include name of facility; location of facility; copy of valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the facility; and evidence of compliance with municipal zoning and bylaws of facility.

1.3.2. Landfill Receipts: within 5 Working Days of transport offsite, Submit receiving facility receipts indicating quantity and type of material delivered to Landfill Facility. Include:

1.3.2.1. Issued by the Landfill Facility.

1.3.2.2. On company letterhead.

1.3.2.3. Name and location of facility where the material is being disposed.

1.3.2.4. Date and weight for each shipment received and total weight received at the Landfill Facility.

1.3.3. Recycling Receipts: within 5 Working Days of transport offsite, Submit receiving facility receipts indicating quantity and type of materials sent for recycling.

1.4. Waste Disposition

1.4.1. Waste and Non-Contaminated Material Disposal:

1.4.1.1. Dispose all soil and sediment in Landfill Facility.

1.4.1.2. Divert materials other than soil or sediment which can be practically reused or recycled from Landfill as approved by Departmental Representative.

1.4.1.3. All Waste not reused or recycled must be disposed in Landfill Facility.

1.5. Waste Transport

1.5.1. Assume ownership of, and be responsible for, Waste once it is loaded on a vehicle, barge, or other vessel for transport.

1.5.2. Transport material as soon as practical. Do not unreasonably stockpile material onsite.

WASTE MANAGEMENT AND DISPOSAL

- 1.5.3. Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material.
- 1.5.4. Excess water in material must not be allowed to flow out of vehicle or vessel during transport.
- 1.5.5. Stabilize material as necessary.
- 1.5.6. All vehicles, vessels and operators must be appropriately licensed and equipped to transport Waste.
- 1.5.7. Manifest and correlate quantities of all material transported from Site documenting quantity removed from Site, movement, transfer stations, interim storage and treatment, and weight of material at final Disposal Facility. Submit all manifests, as directed by the Departmental Representative.
- 1.5.8. Material transported with discrepancies in manifests must be resolved as required by regulations and as acceptable to the Departmental Representative. Discrepancies include:
 - 1.5.8.1. No manifest or an incomplete manifest.
 - 1.5.8.2. The material transported does not match the description in the manifest.
 - 1.5.8.3. The amount transported differs by more than 5% in the manifest.
 - 1.5.8.4. The material transported is in a hazardous condition.
- 1.5.9. Transfer/Interim Storage Facility must:
 - 1.5.9.1. Be an existing offsite facility located in Canada or the United States.
 - 1.5.9.2. Be designed, constructed and operated for the transfer or interim storage of Contaminated Material.
 - 1.5.9.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the transfer or interim storage of relevant Contaminated Material.
 - 1.5.9.4. Comply with applicable municipal zoning, bylaws, and other applicable requirements.
- 1.5.10. Facility Authority:
 - 1.5.10.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.
 - 1.5.10.2. For facilities on First Nations reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.
 - 1.5.10.3. For facilities on First Nations reserve land in Canada subject to the First Nation Land Management regime: the relevant First Nation Council. In addition, a Qualified Professional must certify that the facility is appropriate for the relevant Contaminated Material.
 - 1.5.10.4. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.

1.6. Waste Disposal

- 1.6.1. Assume ownership of, and be responsible for, Waste disposed.
- 1.6.2. Waste Disposal: dispose Waste at Landfill Facility provided by Contractor and accepted by the Departmental Representative.

WASTE MANAGEMENT AND DISPOSAL

- 1.6.3. Disposal Facility must:
 - 1.6.3.1. Be an existing offsite facility located in Canada or the United States.
 - 1.6.3.2. Be designed, constructed and operated to prevent any pollution from being caused by the facility outside the area of the facility from waste placed in or on land within the facility. Must conform with the BC Landfill Criteria For Municipal Solid Waste or equivalent requirements of authorities having jurisdiction.
 - 1.6.3.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the disposal of relevant Contaminated Material.
 - 1.6.3.4. Comply with applicable municipal zoning, bylaws, and other applicable requirements.
- 1.6.4. Facility Authority:
 - 1.6.4.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.
 - 1.6.4.2. For facilities on First Nations reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.
 - 1.6.4.3. For facilities on First Nations reserve land in Canada subject to the First Nation Land Management regime: the relevant First Nation Council. In addition, a Qualified Professional must certify that the facility is appropriate for the relevant Contaminated Material.
 - 1.6.4.4. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.
- 1.6.5. Dispose material as soon as practical and within 100 Working Days of leaving Site or as required by Contract unless otherwise accepted by Departmental Representative.
- 1.6.6. Material sent to a Landfill Facility must be permanently stored at that facility.
- 1.6.7. If proposed Landfill Facility is not acceptable to Departmental Representative, provide an alternate Landfill Facility that is acceptable.
- 1.6.8. Submit Landfill Receipts for all Waste material disposed offsite.

1.7. Materials Source Separation

- 1.7.1. Provide separate containers for reusable and/or recyclable materials of the following:
 - 1.7.1.1. Metals.
 - 1.7.1.2. Wood.
 - 1.7.1.3. Plastics.
 - 1.7.1.4. Paper.
 - 1.7.1.5. Glass.
 - 1.7.1.6. Concrete
 - 1.7.1.7. Other materials in accordance with the Contract.
- 1.7.2. Implement Materials Source Separation Program for waste generated on project in compliance with methods accepted by the Departmental Representative.

WASTE MANAGEMENT AND DISPOSAL

- 1.7.3. Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
- 1.7.4. Locate separated materials in areas which minimize material damage.

1.8. Diversion of Materials

- 1.8.1. Create a list of materials to be separated from the general waste stream and stockpiled in separate containers, as accepted by the Departmental Representative and consistent with applicable fire regulations.
 - 1.8.1.1. Mark containers.
 - 1.8.1.2. Provide instruction on disposal practices.

1.9. Storage, Handling and Application

- 1.9.1. Do Work in compliance with Waste Reduction Plan.
- 1.9.2. Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes, and dispose at Landfill weekly.
- 1.9.3. Materials in separated condition: collect, handle, store onsite, and transport offsite to an authorized recycling facility accepted by the Departmental Representative, and remove from Site weekly.
- 1.9.4. Materials must be immediately separated into specified categories for reuse or recycling.
- 1.9.5. Unless otherwise in accordance with the Contract, materials for removal become the Contractor's property.
- 1.9.6. Onsite sale of salvaged/recyclable material is not permitted.
- 1.9.7. Submit receiving facility weigh scale receipts indicating quantity and type of materials sent for recycling as directed by the Departmental Representative.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Product Instructions: at least 10 Working Days before Substantial Performance of the Work is completed, Submit instructions and data by personnel experienced in maintenance and operation of products and equipment constructed and remaining onsite, if required.

1.3.2. Closeout Documents: within 20 Working Days of Final Completion of Site Restoration, Submit completion documents and as-built documents.

1.4. As-Built Documents

1.4.1. The Departmental Representative will provide 2 sets of Drawings, 2 sets of Specifications, and 2 copies of the original AutoCAD files for “as-built” purposes.

1.4.2. As Work progresses, maintain accurate records to show all deviations from the Contract. Note changes as they occur on as-built Specifications, Drawings and Shop Drawings.

1.4.3. Drawings and Shop Drawings: legibly mark each item to record actual construction, including:

1.4.3.1. Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

1.4.3.2. Field changes of dimension and detail.

1.4.3.3. Changes made by change orders.

1.4.3.4. Details not on original Drawings.

1.4.3.5. References to related Shop Drawings and modifications.

1.4.4. Contract Specifications: legibly mark each item to record actual workmanship of construction, including:

1.4.4.1. Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

1.4.4.2. Changes made by addenda and change orders.

1.4.5. As-built information:

1.4.5.1. Record changes in red ink.

1.4.5.2. Mark on 1 set of Drawings, Specifications and Shop Drawings at Final Completion of project and, before final inspection, neatly transfer notations to second set.

1.4.5.3. Submit 1 set in editable AutoCAD 14 file format with all as-built information.

- 1.4.5.4. Submit all sets as instructed by the Departmental Representative.
- 1.4.6. As required, surveying to be completed by a Land Surveyor for as-built documents.

1.5. Completion Documents

- 1.5.1. Submit as instructed by the Departmental Representative, a written certificate that the following have been performed:
 - 1.5.1.1. Work has been completed and inspected by the Departmental Representative in accordance with the Contract.
 - 1.5.1.2. Treatment and disposal of treatable soils have been completed and disposal of all other soils has been completed.
 - 1.5.1.3. Damage has been repaired, deficiencies have been completed, missing items have been provided, and non-conformance has been corrected, in the opinion of the Departmental Representative.
 - 1.5.1.4. Equipment and systems have been tested, adjusted and balanced, and are fully operational, as applicable.
 - 1.5.1.5. Certificates required by the Fire Commissioner of Canada, and utility companies have been submitted, as applicable.
 - 1.5.1.6. Operation of systems has been demonstrated to the personnel as instructed by the Departmental Representative, as applicable.
 - 1.5.1.7. Qualified Professional report documenting backfilling has met all requirements of the Contract.
 - 1.5.1.8. Work is complete and ready for Final Site Inspection.
- 1.5.2. Defective products will be rejected, regardless of previous inspections. Replace defective products.
- 1.5.3. Prepare all documentation required as part of any permits or other authorizations obtained or otherwise the responsibility of the Contractor.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

SOIL REMEDIATION GENERAL CONSTRUCTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

- 1.1.1. See 01 11 00.

1.2. Definitions

- 1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

- 1.3.1. Permits: at least 10 Working Days prior to mobilization to Site, Submit copies of all permits, certificates, approvals, or any other form of authorizations and all reporting required.
- 1.3.2. Import Backfill Material Quality: at least 5 Working Days prior to bringing material onsite, Submit documentation signed and sealed by a Qualified Professional verifying that material is acceptable for import and intended use. Include:
- 1.3.2.1. Grain-size distribution information, as applicable.
- 1.3.2.2. Chemical analyses for Potential Contaminants of Concern, including metals.
- 1.3.2.3. Testing to be performed by a Qualified Professional at sufficient frequency to characterize all material imported to Site. Test using appropriate guidelines and practices.
- 1.3.3. Import Backfill Material Samples: at least 5 Working Days prior to bringing material to Site, Submit samples of imported backfill.
- 1.3.3.1. Submit samples representative of all material to be imported. Sample frequency subject to acceptance by Departmental Representative.
- 1.3.3.2. Submit sufficient sample size to allow geotechnical and environmental quality testing as directed by Departmental Representative.
- 1.3.4. Seed and Fertilizer: prior to ordering, submit specifications of proposed native plant seed mix and fertilizer, including supplier information, to the Departmental Representative for approval. The native seed mix shall be free of invasive species.

1.4. Sequencing for Free Phase Products

- 1.4.1. When floating free phase substance (Non-Aqueous Phase Liquids) is present, remove free phase from saturated soil or sediment without further contaminating soil, sediment or groundwater prior to commencing other construction Work.
- 1.4.2. Collect free phase product (NAPL), load, transport and unload to a Treatment Facility.

1.5. Onsite Access Roads

- 1.5.1. Maintain onsite access roads as follows:
- 1.5.1.1. Obtain permission to use existing onsite access roads.
- 1.5.1.2. Maintain and clean roads for duration of Work.

SOIL REMEDIATION GENERAL CONSTRUCTION

- 1.5.1.3. Control mud and dust from road.
- 1.5.1.4. Repair damage incurred from use of roads.
- 1.5.1.5. Provide photographic documentation of roads used by construction vehicles before, during and after Work.
- 1.5.1.6. The Departmental Representative can instruct cleaning of the onsite access roads.

2. PART 2 - PRODUCTS

2.1. Materials

- 2.1.1. Erosion and sediment control materials to meet the following minimum requirements:
 - 2.1.1.1. Hay or Straw Bale: wire bound or string tied; securely anchored by at least 2 stakes or rebars driven through bale 300 mm to 450 mm into ground; chinked (filled by wedging) with hay or straw to prevent water from escaping between bales; and entrenched minimum of 100 mm into ground.
 - 2.1.1.2. Silt Fence: assembled, ready to install unit consisting of geotextile attached to driveable posts. Geotextile: uniform in texture and appearance, having no defects, flaws, or tears that would affect its physical properties; and contain sufficient ultraviolet ray inhibitor and stabilizers to provide minimum 2-year service life from outdoor exposure.
 - 2.1.1.3. Net Backing: industrial polypropylene mesh joined to geotextile at both top and bottom with double stitching of heavy-duty cord, with minimum width of 750 mm.
 - 2.1.1.4. Posts: sharpened wood, approximately 50 mm square, protruding below bottom of geotextile to allow minimum 450 mm embedment; post spacing 2.4 m maximum. Securely fasten each post to geotextile and net backing using suitable staples.
- 2.1.2. Gradations to be within limits specified when tested to ASTM C117-13 (Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing) and ASTM C136-06 (Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates). Sieve sizes to SCC CAN/CGSB-8.1-88 (Sieves, Testing, Woven Wire, Inch Series) and CAN/CGSB-8.2-M88 (Sieves, Testing, Woven Wire, Metric Series).
- 2.1.3. Import fill materials to meet the following minimum requirements
 - 2.1.3.1. Import fill materials must be granular aggregate must be composed of inert, clean, tough, durable particles of crushed rock, gravel and sand capable of withstanding the deleterious effects of exposure to water, freeze-thaw, handling, spreading and compacting. The aggregate particles must be uniform in quality and free from cinders, ashes, refuse, organics (e.g. sod, roots, wood), other deleterious materials, and free from an excess of flat or elongated pieces. Import fill materials must be compatible with existing insitu materials on Site.

SOIL REMEDIATION GENERAL CONSTRUCTION

- 2.1.3.2. Import fill materials must be approved by the Departmental Representative and originate from a clean source, and be below the standards in the Yukon Contaminated Sites Regulation applicable at the proposed receiving site. The analytical testing program to verify compliance with the above regulatory requirements should be determined by the Contractor's Qualified Professional.
- 2.1.3.3. Import fill material that is cobble sized or larger (> 64mm) brought onsite must be tested by the Contractor for Acid Rock Drainage (ARD) and Metals Leaching (ML) potential using acid base accounting (ABA) for assessment of ARD potential and more specifically using the Modified Sobek Test Method. The potential for metals leaching must use Shake Flask Extraction (SFE) Method for analysis of metals leaching. See guidance document Price 2009, Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials MEND Report 1.20.1, Natural Resources Canada.
- 2.1.3.4. Any import fill material which has a discrete sample exceeding the standards or guidelines specified must be removed from the Site and replaced, including relevant placed material, as instructed by the Departmental Representative, and an alternate source of fill must be provided, with no increases to Contract Amount or Extension of Time for completion of the Work.
- 2.1.4. Import fill material additional testing:
 - 2.1.4.1. Perform additional testing as instructed by the Departmental Representative.
 - 2.1.4.2. Facilitate testing by the Departmental Representative.
- 2.1.5. Asphalt, as required, must, at minimum, meet the specifications for: Upper Course #1 mix-type as specified in Section 32 12 16, Hot Mix Asphalt Concrete Paving; of the BC Master Municipal Construction Document (2009) Platinum Edition.

3. PART 3 - EXECUTION

3.1. Examination

- 3.1.1. Site Verification of Conditions:
 - 3.1.1.1. Contractor to determine condition of existing Site and requirements to make the Site suitable for Work.

3.2. Mobilization Requirements

- 3.2.1. Do not mobilize until instructed by Departmental Representative.
- 3.2.2. Mobilize all necessary equipment, materials and personnel to the Site in an orderly and efficient manner.

3.3. Site Preparation and Operation

- 3.3.1. Site Preparation and operation includes construction, operation and maintenance for the duration of the Work,

SOIL REMEDIATION GENERAL CONSTRUCTION

- 3.3.2. Remove and dispose all surficial Non-Contaminated Material at a Landfill to allow access for Work.
- 3.3.3. Clearing and grubbing of the Site to allow access for Work.
 - 3.3.3.1. Clearing consists of removing Non-Contaminated Material vegetation above existing ground surface to facilitate Work. Includes: cutting off trees and brush vegetative growth, felled trees, previously uprooted trees and stumps. Trees may be chipped and used on Site as part of Site Restoration. Dispose of Non-Contaminated Material at a Landfill.
 - 3.3.3.2. Grubbing consists of excavation of Non-Contaminated Material below existing ground surface to facilitate Work. Includes: stumps, roots, boulders and rock fragments. Dispose of Non-Contaminated Material at a Landfill.
- 3.3.4. Remove obstructions, ice and snow, from surfaces to be worked.
- 3.3.5. Stripping of Topsoil (organic containing soil)
 - 3.3.5.1. Commence Topsoil stripping of areas according to Drawings after clearing and grubbing.
 - 3.3.5.2. Strip Topsoil to depths according to Drawings. Do not mix Topsoil with other soils.
 - 3.3.5.3. Stockpile Topsoil as directed by Departmental Representative.
 - 3.3.5.4. Reuse Topsoil as Owner Supplied Backfill as directed by Departmental Representative. Dispose of unused Topsoil as Non-Contaminated Material as directed by Departmental Representative.
- 3.3.6. Stripping of Overburden
 - 3.3.6.1. Commence Overburden stripping of areas according to Drawings after stripping of Topsoil.
 - 3.3.6.2. Strip Overburden to depths according to Drawings. Do not mix Overburden with other soils.
 - 3.3.6.3. Stockpile Overburden as directed by Departmental Representative.
 - 3.3.6.4. Testing of Overburden may be required if suspected of being contaminated. Contaminated Overburden will be considered Contaminated Material.
 - 3.3.6.5. Reuse Overburden as Owner Supplied Backfill as directed by Departmental Representative and agreed to by Qualified Professional. Dispose of unused Overburden as Non-Contaminated Material as directed by Departmental Representative.
- 3.3.7. Decommission monitoring wells encountered incidentally within final Contaminated Material Extents.
 - 3.3.7.1. Decommission monitoring wells extending below the Contaminated Material Extents in accordance with methods in BC Groundwater Protection Regulation or the Yukon Environment Protocol 7: Groundwater Monitoring Well Installation, Sampling and Decommissioning, as appropriate.
 - 3.3.7.2. Protect monitoring wells outside Contaminated Material Extents. Replace damaged monitoring wells as directed by the Departmental Representative at Contractor's expense.
- 3.3.8. Protection:

SOIL REMEDIATION GENERAL CONSTRUCTION

- 3.3.8.1. Protect existing features with temporary barriers and enclosures as required by applicable local regulations.
- 3.3.8.2. Keep excavations clean, free of standing water, and loose soil or sediment.
- 3.3.8.3. Protect natural and man-made features required to remain undisturbed. Unless otherwise required or located in an area to be occupied by new construction, protect existing trees from damage.
- 3.3.8.4. Protect buried utilities that are required to remain undisturbed.
- 3.3.8.5. Provide temporary structures to divert flow of surface water from excavation.
- 3.3.9. Security and Safety:
 - 3.3.9.1. Provide safety measures to ensure worker and public safety.
 - 3.3.9.2. Ensure Site is secure during onsite Work, provide, install, and remove fencing, temporary hoarding, and other security measures as required and specified.
- 3.3.10. Site including all restoration and excavation areas should be secured with locked fencing, temporary hoarding and security personnel.

3.4. Import Fill Material

- 3.4.1. Do not import fill material until Departmental Representative has completed and analysed testing. Testing and analysis will depend on parameters. Testing will be performed at industry regular (standard) turnaround times (i.e. not priority, emergency, same day or other rush turnaround times).
- 3.4.2. Departmental Representative will inspect import fill material, and will not allow import of fill material that varies from Submittal samples.

3.5. Site Restoration

- 3.5.1. Final site grades must be within 5 cm of pre-existing grades before Work commenced, unless otherwise specified.
- 3.5.2. Clean permanent access roads of contamination resulting from project activity as required or as instructed of Departmental Representative, with no increases to Contract Amount or Extension of Time for completion of the Work.
- 3.5.3. Decontaminate equipment used in construction processes and remove from Site at end of construction activities.
- 3.5.4. Remove all temporary structures including subsurface structures for shoring support.
- 3.5.5. Revegetate disturbed areas, including excavated area and stockpile area, with fertilizer and seed mixture appropriate for location. Broadcast seed in the disturbed areas with a native plant seed mix. Seek Departmental Representative approval of the proposed native plant seed mix and supplier prior to ordering. The native seed mix must be free of invasive species. Apply seed in accordance with supplier's recommendations. No overspray is to occur onto equipment, roadways, utilities, structures, waterbodies, or environmentally sensitive areas.
- 3.5.6.

SOIL REMEDIATION GENERAL CONSTRUCTION

- 3.5.7. Upon Final Completion of Work, remove Non-Contaminated Material materials and debris, trim slopes, and correct defects as instructed by the Departmental Representative.
- 3.5.8. Protect newly graded areas from traffic and erosion and maintain free of trash or debris until demobilization is completed and accepted by the Departmental Representative.
- 3.5.9. Reinstate pre-existing utilities, existing site access roads impacted by excavations and other infrastructure to original location and condition, meeting current standards, codes, and other requirements, unless otherwise indicated or as instructed by the Departmental Representative.
- 3.5.10. Reinstate surface to pre-existing conditions, including surface material (e.g. vegetation, gravel, pavement), unless otherwise indicated or as directed by the Departmental Representative.

3.6. Demobilization

- 3.6.1. Do not demobilize until instructed by Departmental Representative.
- 3.6.2. Demobilize all necessary equipment, materials, and personnel from Site in an orderly and efficient manner.

END OF SECTION

SOIL REMEDIATION - BIOREMEDIATION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1.1. Not Used.

1.4. Maintenance

1.4.1. Maintain Land Treatment Facility as follows:

1.4.1.1. Maintain berms, ditches, and filters.

1.4.1.2. Repair damage incurred from use of Land Treatment Facility.

2. PART 2 - PRODUCTS

2.1. Materials

2.1.1. Fertilizer: N:P:K ratio of 30:10:10 or higher for Nitrogen.

2.2. Equipment

2.2.1. Tractor 1 must be a four wheel drive tractor or track mounted bulldozer with a minimum of 84 horsepower, with cultivator (recommended width should be less than 14 feet).

3. PART 3 - EXECUTION

3.1. Site Preparation

3.1.1. Pump out water, to location determined by Departmental Representative, contained within the sumps for LTF to reduce the total volume in the sump to half its capacity, prior to regrading, repairing, or commencing soil treatment. This should be done after confirmation sample requirements are met, and approval has been given for disposal.

3.1.2. Regrade contaminated soil within Land Treatment Facility to facilitate Work.

3.1.3. Repair Land Treatment Facility to facilitate Work.

3.2. Soil Treatment

SOIL REMEDIATION - BIOREMEDIATION

- 3.2.1. Remove debris from the Land Treatment Facility. Debris is Non-Contaminated Waste that will interfere with tilling of soil within the Land Treatment Facility at a Landfill. Debris includes: rocks, concrete, brick, metal, wood.
- 3.2.2. Till the upper 400 mm of the contaminated soil within Land Treatment Facility with Tractor #1 as required based on field observations by Departmental Representative. It is anticipated that the tractor will be operated approximately 4 hours per day. This process will be repeated for additional lifts as the upper layer is deemed compliant and moved to the bioremediated soil stockpile area.
- 3.2.3. Flip soil in the LTF cell using an excavator as directed by Departmental Representative. It is important to note that the bucket of the excavator must be marked and it must not come in contact with the geotextile separator marker layer. The anticipated depth of the soil in each cell from the surface to the geotextile separator is less than 2 m.
- 3.2.4. Supply and apply fertilizer to soils in LTF as directed by Departmental Representative. This includes all associated costs to transport and store the nitrate fertilizer at the location specified by the Departmental Representative. The fertilizer will be a high nitrogen water soluble fertilizer (such as 30-10-10) and will be applied as directed by Departmental Representative.
- 3.2.5. Apply water (as needed) to assist with bioremediation as required based on field observations at application rates and methodology as accepted by Departmental Representative.
- 3.2.6. Facilitate soil confirmation sampling using a backhoe or excavator as directed by Departmental Representative. Departmental Representative responsible for confirmation sampling, analysis and assessment.
- 3.2.7. Once confirmation sampling has been completed by the Departmental Representative it may take up to 5 Working Days to complete analysis and assessment. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work can be incurred for Confirmation Sampling results provided within 5 Working Days, not including day of sample collection.
- 3.2.8. Once the 400mm lift is bio-remediated and meets the confirmation sample requirements, relocate the 400 mm lift of bioremediated soil from Land Treatment Facility to a storage area within 300 m, determined by the Departmental Representative. The bio-remediated soil in the storage area will be required to be stockpiled.
- 3.2.9. Cease all Work activities during inclement weather.
- 3.2.10. Trucks are only to operate on LTF when there is a minimum of 1m of soil present.
- 3.2.11. Tracked equipment is only to operate on LTF when there is a minimum of 0.5m of soil present.
- 3.2.12. During the course of the project, other contractors, consultants and Departmental Representatives will require access along the LTF access road as well as the LTF and contaminated soil will be transported and placed into LTF. Communication and coordination of other contractors, consultants, and Departmental Representatives will be required during this time.

SOIL REMEDIATION - BIOREMEDIATION

3.3. Restoration and Closure

- 3.3.1. Pump out all water contained within the sumps for LTF to location determined by Departmental Representative. This should be done after confirmation sample requirements are met, and approval has been given for disposal.
- 3.3.2. Regrade contaminated soil within Land Treatment Facility to allow water to drain off of Land Treatment Facility.
- 3.3.3. Repair Land Treatment Facility in preparation for winter.
- 3.3.4. Reinstate area in the vicinity of the LTF back to original conditions before concluding the work (i.e LTF ramps, grading of storage area and access road between the LTF and storage area) as directed by the Departmental Representative.

END OF SECTION



SOIL STRIPPING AND STOCKPILING

1. PART 1 – General

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. References

1.3.1. U.S. Environmental Protection Agency (EPA)/Office of Water

1.3.1.1. EPA 832R92005, Storm Water Management for Construction Activities:
Developing Pollution Prevention Plans and Best Management Practices

2. PART 2 – PRODUCTS

2.1. Not Used

3. PART 3 – EXECUTION

3.1. Stripping of Topsoil (Organic Containing Soil)

- 3.1.1. Ensure that procedures are conducted in accordance with applicable Federal requirements.
- 3.1.2. Remove topsoil before construction procedures commence to avoid compaction of topsoil.
- 3.1.3. Handle topsoil only when it is dry and warm.
- 3.1.4. Remove vegetation from targeted areas by non-chemical means and dispose at an appropriate offsite facility.
- 3.1.5. Remove brush from targeted area by non-chemical means and dispose at an appropriate offsite facility.
- 3.1.6. Strip topsoil by scraper to depths as indicated by Drawings and Departmental Representative
 - 3.1.6.1. Avoid mixing topsoil with subsoil.
- 3.1.7. Transfer topsoil to designated soil spoil area and pile by mechanical hoe
 - 3.1.7.1. Stockpile height not to exceed 2.5 - 3 m.
- 3.1.8. Dispose of unused topsoil as directed by Departmental Representative.
- 3.1.9. Protect stockpiles from contamination and compaction.
- 3.1.10. Unused topsoil piles must be spread on Site or removed from Site before Completion of the Work.

3.2. Preparation of Grade



SOIL STRIPPING AND STOCKPILING

- 3.2.1. Verify that grades are correct and notify Departmental Representative if discrepancies occur. Do not begin work until instructed by Departmental Representative.
- 3.2.1.1. Grade soil with scrapers eliminating uneven areas and low spots, ensuring positive drainage.
- 3.2.1.2. Refer to included Borehole and test pit logs.

END OF SECTION

EXCAVATING, TRENCHING AND BACKFILLING

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

- 1.3.1. Temporary Hoarding and Fencing: at least 5 Working Days prior to installation, Submit a description of temporary hoarding and fencing.
- 1.3.2. Sloping, Shoring, Excavation and Backfilling Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit documentation describing excavation Work. Include:
- 1.3.2.1. Excavation temporary slope design.
 - 1.3.2.2. Excavation temporary shoring design.
 - 1.3.2.3. Support of structures design.
 - 1.3.2.4. Sequence, methods and means for excavation dewatering and heave protection.
 - 1.3.2.5. Backfilling requirements. Meet or exceed requirements in accordance with the Contract and any other codes, bylaws, rules and regulations applicable to the performance of the Work. Backfilling requirements includes Imported Backfill and Owner Supplied Backfill.
 - 1.3.2.6. Procedures for excavations adjacent to utilities or other structures if the excavation has the potential to impact utilities or other structures.
 - 1.3.2.7. Monitoring and inspection requirements, including frequency or milestones when a Qualified Professional must inspect Works.
 - 1.3.2.8. Sloping, Shoring, Excavation and Backfilling Plan must be signed and sealed by a Qualified Professional, as required by ground conditions, excavation depth, shoring type, or support type.
- 1.3.3. Monitoring and Testing Results: within 5 Working Days of sampling, Submit all monitoring and testing results. Include procedures, frequency of sampling, Quality Assurance and Quality Control testing and documentation to be provided. Provide monitoring and testing results, including any assessments performed by a Qualified Professional. Include:
- 1.3.3.1. Noise monitoring.
 - 1.3.3.2. Vibration monitoring.
 - 1.3.3.3. Imported backfill material, including geotechnical and environmental quality.
 - 1.3.3.4. Compaction testing results.
- 1.3.4. Weigh Scale Certification: at least 5 Working Days prior to use, Submit a copy of the Measurement Canada, Weigh Scale Certification for any onsite or offsite weigh scale used during transportation, treatment or disposal.

EXCAVATING, TRENCHING AND BACKFILLING

- 1.3.5. Weigh Scale Slips: within 10 days of measurement, Submit all onsite and offsite weigh scale slips for material.

2. PART 2 - PRODUCTS

2.1. Backfill Material

- 2.1.1. Meet backfill requirements according to Drawings.
- 2.1.2. Meet appropriate grain size distribution from Aggregate Gradations of the current version of BC Ministry of Transportation and Infrastructure Standard Specifications for Highway Construction.

3. PART 3 - EXECUTION

3.1. Site Review

- 3.1.1. Ensure that all Works comply with the final sealed design documents as prepared by a Qualified Professional.
- 3.1.2. Qualified Professional to visit Site regularly.

3.2. Install Temporary Hoarding and Fencing

- 3.2.1. Place temporary hoarding and fencing according to Drawings or as otherwise required so as to provide a visual, environmental, and safety barrier between the Site and neighbouring properties. Fencing must be installed where appropriate for safety of workers or public, or to separate work zones of different Prime Contractors.
- 3.2.2. Temporary hoarding and fencing to be a minimum of 2.4 m in height.
- 3.2.3. Temporary hoarding and fencing not to extend beyond the project Site boundary in accordance with the Contract.
- 3.2.4. Remove and replace temporary hoarding and fencing during excavation activities where excavation along the project Site boundary cannot be accomplished while the temporary hoarding is in place.
- 3.2.5. The type of temporary hoarding and fencing used will be as selected by the Contractor, but will be subject to approval by Departmental Representative. The temporary hoarding must not have visible holes and must be a neutral color subject to acceptance by Departmental Representative. Only signage accepted by the Departmental Representative will be allowed. No advertising, company identifications, or other markings permitted.
- 3.2.6. Remove temporary hoarding and fencing from the Site during the Site Restoration.

3.3. Design, Construction and Operation of Onsite Access Road(s)

- 3.3.1. Construct, operate and maintain the onsite access road(s) as required.

EXCAVATING, TRENCHING AND BACKFILLING

- 3.3.2. Design of temporary onsite access roads to be signed and sealed by a Qualified Professional.
- 3.3.3. Qualified Professional to confirm that the temporary onsite access roads allow for the safe transport of materials and equipment.
- 3.3.4. Any temporary access, detour and haul roads associated with the project must be constructed to accommodate all required uses and be maintained throughout the course of construction operations in a safe, environmentally sound manner.
- 3.3.5. Location, alignment, design and construction of all detour, access and haul road(s) subject to the acceptance of the Departmental Representative.
- 3.3.6. Employ suitable measures to maintain quality, visibility, and safe conditions in the use of access, detour and haul road(s) associated with the Work.

3.4. Temporary Sloping and Shoring

- 3.4.1. Determine appropriate sloping or shoring to allow excavation of Contaminated Material Extents according to Drawings or as directed by Departmental Representative.
- 3.4.2. Design Requirements:
 - 3.4.2.1. Act as sloping or shoring structures for excavations during remediation/construction excavation procedures.
 - 3.4.2.2. Allow excavation of all Contaminated Material laterally and vertically on the Site to Contaminated Material Extents in accordance with the Contract. Allow excavation of additional Contaminated Material beyond Contaminated Material Extents as determined by Departmental Representative based on field observations or Confirmation Samples.
 - 3.4.2.3. Provide a safe working environment for personnel and equipment within the dewatered excavation area.
 - 3.4.2.4. Additional sloping or shoring may be required to extend excavation beyond Contaminated Material Extents according to Drawings. Revise Temporary Sloping and Shoring design as required by Qualified Professional.
 - 3.4.2.5. Temporary shoring cannot have any tiebacks or supports which extend beyond the project Site boundary. Temporary shoring must not flex or bend when exposed while excavations are occurring on the Site.
 - 3.4.2.6. Seismic Resistance of Temporary shoring:
 - 3.4.2.6.1. Shoring structures are temporary structures only. Resistance to seismic loads will be at the discretion of the Qualified Professional.
 - 3.4.2.6.2. Be responsible for any failures and resultant costs should the Temporary shoring fail due to a seismic event during the construction period.
 - 3.4.2.7. All Shop Drawings to be signed and sealed by a Qualified Professional.
 - 3.4.2.8. Temporary sloping and shoring designs to be completed in accordance with methods in current version of Canadian Foundation Engineering Manual.
- 3.4.3. Installation:
 - 3.4.3.1. All installation activities must take place on the Site. No staging or construction activities are to take place on adjacent properties.
 - 3.4.3.2. Installation must be regularly inspected by a Qualified Professional.

EXCAVATING, TRENCHING AND BACKFILLING

- 3.4.4. Maintain side slopes of excavations in safe condition by appropriate methods and in accordance with relevant regulations.
- 3.4.5. Construct temporary Works to depths, heights and locations to meet project requirements.
- 3.4.6. During backfill operation:
 - 3.4.6.1. Unless otherwise indicated or as instructed by the Departmental Representative, remove Temporary shoring from excavations.
 - 3.4.6.2. Do not remove shoring until backfilling has reached respective levels of such bracing.
 - 3.4.6.3. Remove shoring in increments that ensure compacted backfill is maintained at elevation at least 500 mm above toe of shoring.

3.5. Dewatering and Heave Protection

- 3.5.1. Keep excavations free of water while Work is in progress unless otherwise indicated or as directed by the Departmental Representative.
- 3.5.2. Provide to Departmental Representative details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- 3.5.3. Plan for excavation below groundwater table to avoid quick conditions or heave.
- 3.5.4. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- 3.5.5. Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- 3.5.6. Keep excavations, staging pads, and other Work areas free from water including standby equipment necessary to ensure continuous operation of dewatering system.
- 3.5.7. Dewatering Methods: includes sheeting and shoring; groundwater control systems; surface or free water control systems employing ditches, diversions, drains, pipes and/or pumps; and other measures necessary to enable Work to be carried out in dry conditions.
- 3.5.8. Separate Contaminated Water from Non-Contaminated Water and collect and divert to Treatment Facility accepted by Departmental Representative, as required.

3.6. Excavation

- 3.6.1. Notify Departmental Representative at least 5 Working Days in advance of excavation operations.
- 3.6.2. Excavate to lines, grades, elevations and dimensions in accordance with the Contract or as instructed by Departmental Representative.
- 3.6.3. Excavate all Contaminated Material laterally and vertically on the Site to Top of Excavation Contaminated Material Extents in accordance with the Contract. Excavate Side Slopes in accordance with Contract. Excavate additional Contaminated Material beyond Contaminated Material Extents at the direction of the Departmental Representative based on field observations or Confirmation Samples.

EXCAVATING, TRENCHING AND BACKFILLING

- 3.6.4. Elevations shown on Drawings are approximate and final excavation elevations to be determined based on field conditions as instructed by the Departmental Representative.
- 3.6.5. Excavation must not interfere with bearing capacity of adjacent foundations and infrastructure.
- 3.6.6. Machine cut banks and slopes.
- 3.6.7. Protect bottom of excavations from excessive traffic.
- 3.6.8. Grade excavation top perimeter to prevent surface water run-off into excavation.
- 3.6.9. Keep excavated and stockpiled materials safe distance away from edge of excavation.
- 3.6.10. Restrict vehicle operations directly adjacent to open excavations.
- 3.6.11. Segregate and handle to minimize the amount of Hazardous Waste materials wherever possible, while complying with Hazardous Waste disposal regulations. Segregation of Hazardous Waste during excavation will be by visual and olfactory characteristics and available in-situ characterization.
- 3.6.12. Contaminated Material onsite classification will be based on available in-situ characterization or ex-situ characterization as instructed by Departmental Representative.
- 3.6.13. Non-Contaminated Material onsite classification will be based on available in-situ characterization or ex-situ characterization as instructed by Departmental Representative.
- 3.6.14. Remove Waste Oversize Debris. Break or cut oversize debris into manageable size.
 - 3.6.14.1. Piles encountered during excavation must be cut off at base of excavation. Piles are not to be extracted.
 - 3.6.14.2. Debris that impinges on infrastructure or neighbouring properties is not to be removed unless instructed by Departmental Representative. Qualified Professional to confirm debris can be removed without impacting infrastructure or neighbouring properties.
- 3.6.15. Remove Non-Contaminated Material to Landfill or re-use as Backfill-Owner Supplied as shown on Drawings and as directed by Departmental Representative.
- 3.6.16. Remove Contaminated Material to onsite Treatment Facility or offsite Treatment Facility or offsite Disposal Facility.
- 3.6.17. Bases of excavations to be undisturbed bedrock, soil or sediment, level, free from loose, soft or organic material. Final depths of excavations to be determined by the Departmental Representative based on actual field conditions.
- 3.6.18. Notify Departmental Representative when bottom of excavation is reached based on Contaminated Material Extents.
- 3.6.19. Provide assistance for collection of Confirmation Samples using a backhoe or excavator, or as directed by the Departmental Representative, to the Departmental Representative. Obtain acceptance by Departmental Representative of completed excavation.

EXCAVATING, TRENCHING AND BACKFILLING

3.7. Backfill Types and Compaction

- 3.7.1. Use only Imported Backfill, Overburden Backfill, or Owner Supplied Backfill in accordance with the Contract and which has been recommended by a Qualified Professional, and been previously accepted as a Submittal.
- 3.7.2. Compact material in accordance with the Contract to ensure no long-term settlement and is suitable for planned post-remediation use:
 - 3.7.2.1. Compact each layer of material to the more stringent of Excavation Plan or Drawings.
 - 3.7.2.2. Machine compact all fill materials unless otherwise shown on Drawings.

3.8. Backfilling

- 3.8.1. Do not proceed with backfilling operations until completion of following:
 - 3.8.1.1. Confirmation Sampling, analysis, and assessment has been completed by the Departmental Representative. Confirmation Sample analysis and assessment may take up to 5 Working Days, not including the day of sample collection. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work can be incurred for Confirmation Sample results provided within 5 Working Days, not including day of sample collection.
 - 3.8.1.2. Surveying has been completed by a Land Surveyor for as-built documents.
 - 3.8.1.3. Departmental Representative has inspected and excavation limits accepted by the Departmental Representative based on survey data and Confirmation Samples results.
 - 3.8.1.4. Departmental Representative has inspected and accepted backfill material.
 - 3.8.1.5. Proposed backfill material can be sampled and tested for geotechnical and environmental quality. Backfill material testing may take up to 5 Working Days not including day of sample collection.
 - 3.8.1.6. Departmental Representative has inspected and accepted compaction results for previous lift.
 - 3.8.1.7. Removal of shoring and bracing; backfilling of voids with satisfactory backfill material.
- 3.8.2. Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- 3.8.3. Do not use backfill material which is frozen or contains ice, snow or debris.
- 3.8.4. Place backfill material in uniform layers not exceeding 300 mm compacted thickness, or in accordance with the Contract. Compact each layer to the satisfaction of the Qualified Professional and in accordance with the Contract before placing succeeding layer.
- 3.8.5. Backfill compaction to be tested by a Qualified Professional in accordance with Excavation Plan.
- 3.8.6. Notify Departmental Representative when final backfill grade is reached.
- 3.8.7. Do not begin subsequent Work until surveying has been completed by the Departmental Representative for documentation.

EXCAVATING, TRENCHING AND BACKFILLING

3.9. Overburden and Owner Supplied Material Backfilling

- 3.9.1. Place in locations in excavation as directed by Departmental Representative.
- 3.9.2. Be responsible for compacting to the satisfaction of the Qualified Professional and in accordance with the Contract.
 - 3.9.2.1. Collect and test samples prior to placement as required by the Qualified Professional.
 - 3.9.2.2. Identify any geotechnical concerns prior to placement, and obtain Departmental Representative approval to proceed.

END OF SECTION

1. PART 1 – General

1.1. REFERENCES

- 1.1.1.** ASTM D746 - 07 Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact ASTM D 698-07e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
- 1.1.2.** ASTM D1004-94a(2003) Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting
- 1.1.3.** ASTM D1505 - 10 Standard Test Method for Density of Plastics by the Density-Gradient Technique
- 1.1.4.** ASTM D1603 - 06 Standard Test Method for Carbon Black Content in Olefin Plastics
- 1.1.5.** ASTM D4833 - 07 Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
- 1.1.6.** ASTM D5199 - 11 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
- 1.1.7.** ASTM D5596 - 03(2009) Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
- 1.1.8.** ASTM D5994 - 10 Standard Test Method for Measuring Core Thickness of Textured Geomembrane
- 1.1.9.** ASTM D6693 - 04(2010) Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

1.2. DELIVERY, STORAGE AND HANDLING

- 1.2.1.** During delivery and storage, protect geo-membranes from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

1.3. WASTE MANAGEMENT AND DISPOSAL

- 1.3.1.** Remove from site and dispose of packaging materials at appropriate recycling facilities.

2. PART 2 - PRODUCTS

2.1. MATERIALS

- 2.1.1.** See attached material specifications or to meet equivalent material specifications.

3. PART 3 - EXECUTION

3.1. INSTALLATION

- 3.1.1.** Maintain area of installation free of water and snow accumulations.
- 3.1.2.** Prepare excessively soft supporting material as directed by Departmental Representative.
- 3.1.3.** Do not proceed with panel placement and seaming when ambient temperatures are below minus 5 degrees C or above 40 degrees C, during precipitation, in presence of excessive moisture (eg. fog, dew), nor in presence of high winds.
- 3.1.4.** Place and seam panels in accordance with manufacturer's recommendations on graded surface. Minimize wrinkles, avoid scratches and crimps to geomembranes and avoid damage to supporting material.
- 3.1.5.** Protect installed membrane from displacement, damage or deterioration before, during and after placement of material layers.
- 3.1.6.** Replace damaged, torn or permanently twisted panels to approval of Departmental Representative. Remove rejected damaged panels from site.
- 3.1.7.** Keep field seaming to minimum. Locate field seams up and down slopes, with no horizontal field seam less than 1.5 m beyond toe of slope.
- 3.1.8.** Keep seam area clean and free of moisture, dust, dirt, debris and foreign material.
- 3.1.9.** Make field seam samples in accordance with requirements described in PART 2 on fragment pieces of geo-membrane and test to verify that seaming conditions are adequate.
- 3.1.10.** Test field seams as seaming work progresses by non-destructive methods over their full length. Repair seams which do not pass non-destructive test. Reconstruct seam between failed location and any passed test location, until non-destructive testing is successful.
- 3.1.11.** Repair minor tears and pinholes by patching until non-destructive testing is successful. Patches to be round or oval in shape, made of same geomembrane material, and extend minimum of 75 mm beyond edge of defect.

3.2. CLEANING

- 3.2.1.** Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner.

3.3. PROTECTION

- 3.3.1.** Do not permit vehicular traffic directly on membrane.

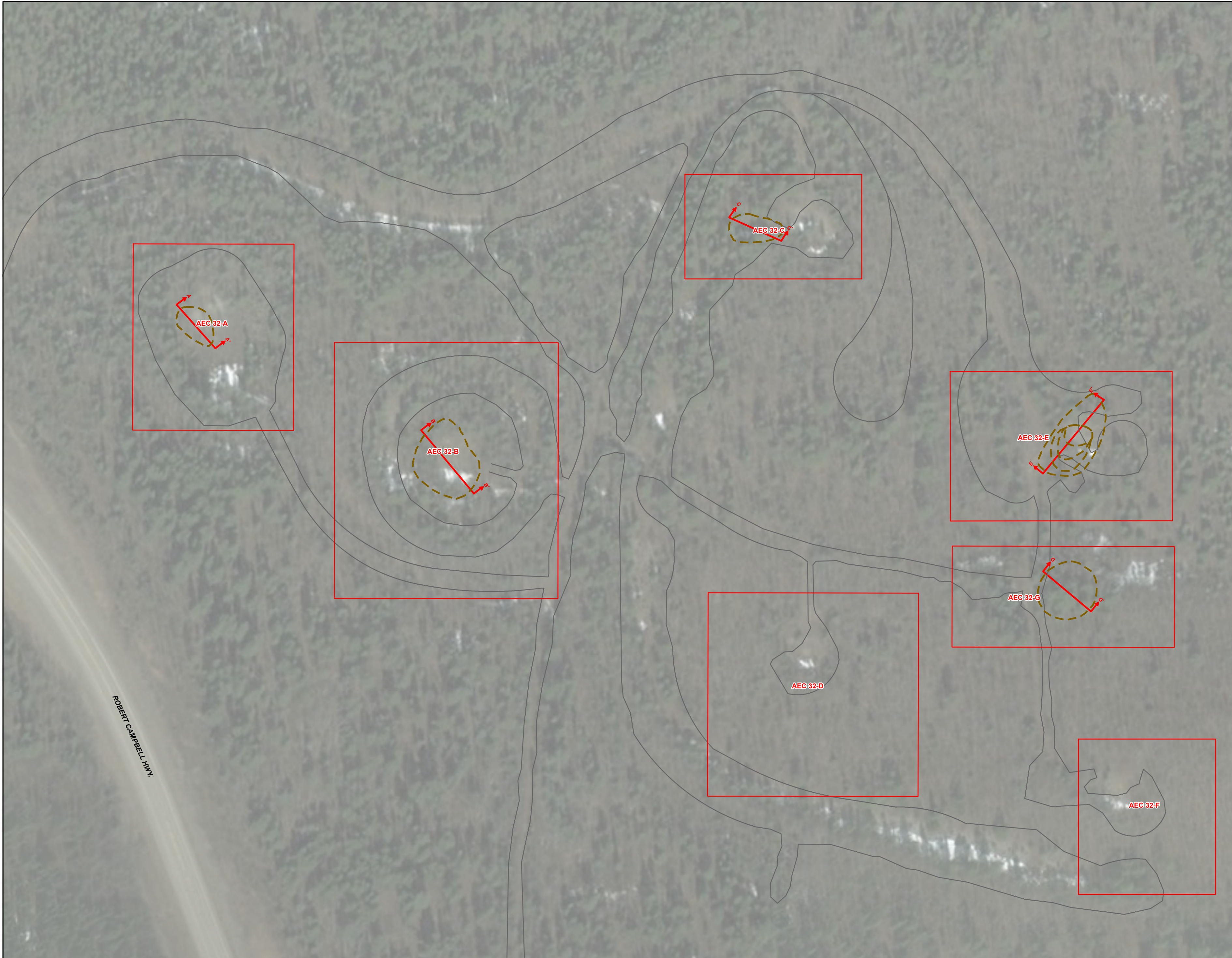
END OF SECTION

Drawings





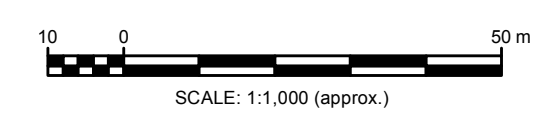
	Watson Lake Airport AEC 32 Watson Lake, YT Public Services and Procurement Canada		Figure 1 Location Plan
	REVISION No. 01	DATE July 2017	



LEGEND

- FORMER ROAD WAY
- TOP OF SLOPE BOUNDARY FOR REMEDIAL EXCAVATION
- AEC
- CROSS SECTION

NOTES:
 1. THIS DRAWING IS FOR GENERAL INFORMATION ONLY.
 LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.
 2. DATE OF AERIAL PHOTO IS 2010.



Watson Lake Airport AEC 32 Watson Lake, YT Public Services and Procurement Canada		
REVISION No.	DATE	PROJECT No.
01	July 2017	13221-04

Figure 2
AEC 32 - Plan View





SOIL

32-BH15-03	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.3-0.75	<20	<20	<RDL	<RDL	<10	<10	<0.1	-
1.8-2.3	<20	<20	<RDL	<RDL	<10	<10	<0.1	5.9
Duplicate	<20	<20	<RDL	<RDL	<10	<10	<0.1	6.8
6.35-6.8	<20	<20	<RDL	<RDL	<10	<10	<0.1	-

SOIL

32-BH14-02	LEPH	HEPH	PAH	B	T	E	X	VH	VPH	MTBE	Lead
0.9-1.4	<200	<200	<RDL	-	-	-	-	-	-	-	-
2-3	<200	<200	<RDL	<0.055	12	12.6	88.9	2100	1990	<0.20	9.65
Duplicate	-	-	-	<0.040	4.2	6.13	42.1	960	910	<0.20	-

SOIL

32-MW14-01	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
2-3	<200	<200	<RDL	-	-	-	-	5.46
10.6-11.2	<200	<200	<RDL	<RDL	<100	<100	<0.20	-
Duplicate	-	-	-	<RDL	<100	<100	<0.20	-
12.7-13.3	<200	230	<RDL	<RDL	<100	<100	<0.20	-
25.7-26.3	<200	<200	<RDL	<RDL	<100	<100	<0.20	-
31.8-32.4	<200	<200	<RDL	-	-	-	-	-
Duplicate	<200	230	<RDL	-	-	-	-	-

GROUNDWATER

32-MW14-01	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Dissolved Lead	Dissolved Uranium	Other Dissolved Metals
11/13/14	<250	<250	<RDL	<RDL	<100	<100	-	-	-	-
9/04/15	-	-	-	<RDL	<100	<100	-	-	-	-
Duplicate	-	-	-	<RDL	<100	<100	-	0.51	-	-
11/27/16	<250	1710	<RDL	<AW/DW	<100	<100	-	0.189	-	-
3/15/17	<200	<200	<RDL	<RDL	<300	<300	<4.0	<0.20	58.9	<AW/DW

SOIL

32-BH15-02	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.3-0.75	<20	<20	<RDL	<RDL	<10	<10	<0.1	-
1.8-2.3	<20	<20	<RDL	<RDL	<10	<10	<0.1	6.8
Duplicate	<20	<20	<RDL	<RDL	<10	<10	<0.1	5.6
6.35-6.8	<20	<20	<RDL	<RDL	<10	<10	<0.1	-

SOIL

32-BH15-01	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.3-0.75	<20	<20	<RDL	<RDL	<10	<10	<0.1	-
1.8-2.3	<20	<20	<RDL	<PL/CL	<10	<10	<0.1	4.8
6.35-6.8	<20	<20	<RDL	<RDL	<10	<10	<0.1	-

SOIL

32-MW14-23	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.9-1.4	<200	<200	<RDL	<RDL	100	100	<0.20	11.4
2-3	<200	<200	<RDL	<PL/CL	200	200	<0.20	-
6-6.6	<200	<200	<RDL	<RDL	<100	<100	<0.20	-
24.2-24.8	<200	<200	<RDL	<RDL	<100	<100	<0.20	-
Duplicate	<200	<200	<RDL	<RDL	<100	<100	<0.20	-
30-30.6	<200	<200	<RDL	<RDL	<100	<100	<0.20	-

GROUNDWATER

32-MW14-23	LEPH	HEPH	PAH	BTEX	VH	VPH	Dissolved Lead
11/13/14	<250	290	<RDL	<RDL	<100	<100	-
9/04/15	<100	360	<PL/CL	<AW/DW	<100	<100	0.39
11/27/16	<250	510	<PL/CL	<AW/DW	<100	<100	0.073

SOIL

32-BH14-04	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
2-3	<200	<200	<RDL	<RDL	<100	<100	<0.20	-

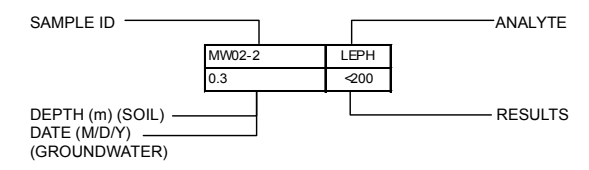
SOIL

32-BH14-03	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
2-3	<200	<200	<RDL	<PL/CL	<100	<100	<0.20	-

LEGEND

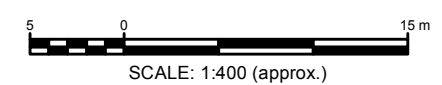
- FORMER ROADWAY
- TOP OF SLOPE BOUNDARY FOR REMEDIAL EXCAVATION
- ⊕ BOREHOLE (BY ARCADIS)
- SOIL/GROUNDWATER CONCENTRATION(S) LESS THAN CSR STANDARDS
- SOIL CONCENTRATION(S) GREATER THAN CSR STANDARDS (PL)
- SOIL CONCENTRATION(S) GREATER THAN CSR STANDARDS (CL)
- GROUNDWATER CONCENTRATION(S) GREATER THAN CSR STANDARDS (AW)
- GROUNDWATER CONCENTRATION(S) GREATER THAN CSR STANDARDS (DW)
- LEPH LIGHT EXTRACTABLE PETROLEUM HYDROCARBONS
- HEPH HEAVY EXTRACTABLE PETROLEUM HYDROCARBONS
- PAH POLYCYCLIC AROMATIC HYDROCARBONS
- VOC VOLATILE ORGANIC COMPOUNDS
- BTEX BENZENE, TOLUENE, ETHYLBENZENE & XYLENE
- VH VOLATILE HYDROCARBONS
- VPH VOLATILE PETROLEUM HYDROCARBONS
- MTBE METHYL TERTIARY BUTYL ETHER
- < LESS THAN
- RDL REPORTED DETECTION LIMIT
- NOT ANALYZED
- PL CSR PARK LAND USE STANDARD
- CL CSR COMMERCIAL LAND USE STANDARD
- AW CSR AQUATIC LIFE STANDARD
- DW CSR DRINKING WATER STANDARD

INFERRED LOCAL GROUNDWATER FLOW DIRECTION



- NOTES:
- Soil Sample values are presented as Micrograms per gram (µg/g) [parts per million (ppm)].
 - Groundwater Sample values are presented as Micrograms per Litre (µg/L) [parts per billion (ppb)].
 - Soil Sample Exceeding CSR (PL) Standard in **ORANGE**.
 - Soil Sample Exceeding CSR (CL) Standard in **DARK RED**.
 - Groundwater Sample Exceeding CSR (AW) Standard in **RED**.
 - Groundwater Sample Exceeding CSR (DW) Standard in **BLUE**.

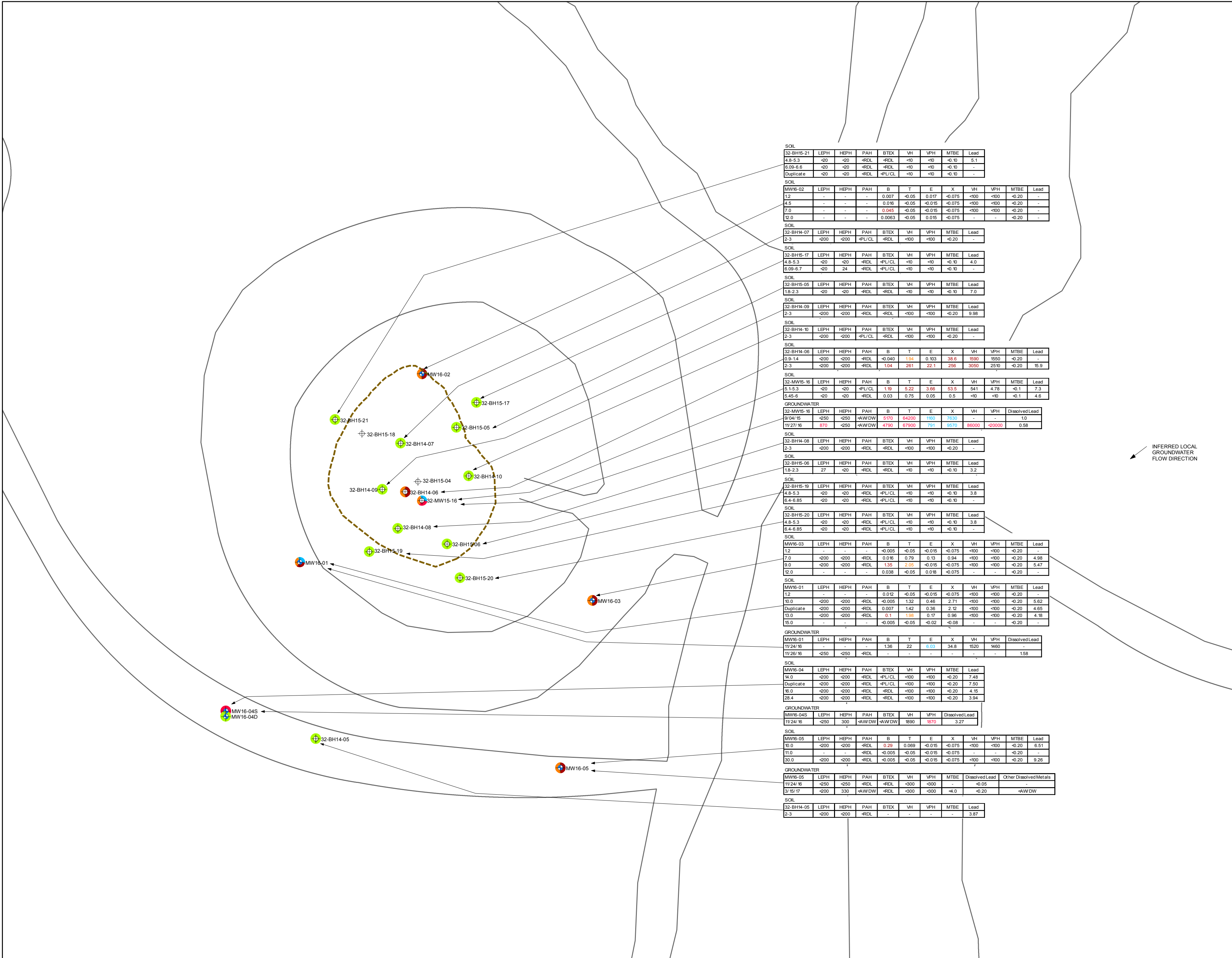
NOTES:
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Watson Lake Airport AEC 32
Watson Lake, YT
Public Services and Procurement Canada

REVISION No.	DATE	PROJECT No.
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Figure 3
Soil & Groundwater Analytical Results
AEC32-A



SOIL											
32-BH15-21	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
4.8-5.3	<20	<20	<RDL	<RDL	<10	<10	<10	<10	5.1		
6.09-6.6	<20	<20	<RDL	<RDL	<10	<10	<10	<10			
Duplicate	<20	<20	<RDL	<PL/CL	<10	<10	<10	<10			
SOIL											
MW16-02	LEPH	HEPH	PAH	B	T	E	X	VH	VPH	MTBE	Lead
12	-	-	-	0.007	<0.05	0.017	<0.075	<100	<100	<0.20	-
4.5	-	-	-	0.016	<0.05	<0.015	<0.075	<100	<100	<0.20	-
7.0	-	-	-	0.045	<0.05	<0.015	<0.075	<100	<100	<0.20	-
12.0	-	-	-	0.0063	<0.05	0.015	<0.075	-	-	<0.20	-
SOIL											
32-BH14-07	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
2-3	<200	<200	<PL/CL	<RDL	<100	<100	<0.20	-			
SOIL											
32-BH15-17	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
4.8-5.3	<20	<20	<RDL	<PL/CL	<10	<10	<10	4.0			
6.09-6.7	<20	24	<RDL	<PL/CL	<10	<10	<10	<10			
SOIL											
32-BH15-05	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
18-2.3	<20	<20	<RDL	<RDL	<10	<10	<10	7.0			
SOIL											
32-BH14-09	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
2-3	<200	<200	<RDL	<RDL	<100	<100	<0.20	9.98			
SOIL											
32-BH14-10	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
2-3	<200	<200	<PL/CL	<RDL	<100	<100	<0.20	-			
SOIL											
32-BH14-06	LEPH	HEPH	PAH	B	T	E	X	VH	VPH	MTBE	Lead
0.9-1.4	<200	<200	<RDL	<0.040	1.04	0.103	38.6	1590	1550	<0.20	-
2-3	<200	<200	<RDL	1.04	261	22.1	256	3050	2510	<0.20	15.9
SOIL											
32-MW15-16	LEPH	HEPH	PAH	B	T	E	X	VH	VPH	MTBE	Lead
5.1-5.3	<20	<20	<PL/CL	1.19	5.22	3.66	53.5	541	4.78	<0.1	7.3
6.45-6	<20	<20	<RDL	0.03	0.75	0.05	0.5	<10	<10	<0.1	4.8
GROUNDWATER											
32-MW15-16	LEPH	HEPH	PAH	B	T	E	X	VH	VPH	MTBE	Lead
9/04/15	<250	<250	<AW/DW	5170	54200	790	7630	-	-	-	1.0
11/27/16	870	<250	<AW/DW	4790	67900	791	6570	85000	<20000	-	0.58
SOIL											
32-BH14-08	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
2-3	<200	<200	<RDL	<RDL	<100	<100	<0.20	-			
SOIL											
32-BH15-06	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
18-2.3	27	<20	<RDL	<RDL	<10	<10	<10	3.2			
SOIL											
32-BH15-19	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
4.8-5.3	<20	<20	<RDL	<PL/CL	<10	<10	<10	3.8			
6.4-6.85	<20	<20	<RDL	<PL/CL	<10	<10	<10	<10			
SOIL											
32-BH15-20	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
4.8-5.3	<20	<20	<RDL	<PL/CL	<10	<10	<10	3.8			
6.4-6.85	<20	<20	<RDL	<PL/CL	<10	<10	<10	<10			
SOIL											
MW16-03	LEPH	HEPH	PAH	B	T	E	X	VH	VPH	MTBE	Lead
12	-	-	-	<0.005	<0.05	<0.015	<0.075	<100	<100	<0.20	-
10.0	<200	<200	<RDL	<0.005	1.32	0.46	2.71	<100	<100	<0.20	5.62
Duplicate	<200	<200	<RDL	0.007	1.42	0.36	2.12	<100	<100	<0.20	4.65
13.0	<200	<200	<RDL	0.1	1.55	0.17	0.96	<100	<100	<0.20	4.18
15.0	-	-	-	<0.005	<0.05	<0.02	<0.08	-	-	<0.20	-
GROUNDWATER											
MW16-01	LEPH	HEPH	PAH	B	T	E	X	VH	VPH	MTBE	Lead
11/24/16	-	-	-	1.36	22	6.03	34.8	1520	1460	-	-
11/28/16	<250	<250	<RDL	-	-	-	-	-	-	-	1.58
SOIL											
MW16-04	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
14.0	<200	<200	<RDL	<PL/CL	<100	<100	<0.20	7.48			
Duplicate	<200	<200	<RDL	<PL/CL	<100	<100	<0.20	7.50			
16.0	<200	<200	<RDL	<RDL	<100	<100	<0.20	4.15			
28.4	<200	<200	<RDL	<RDL	<100	<100	<0.20	3.94			
GROUNDWATER											
MW16-04S	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
11/24/16	<250	300	<AW/DW	<AW/DW	890	970	-	-	-	-	3.27
SOIL											
MW16-05	LEPH	HEPH	PAH	B	T	E	X	VH	VPH	MTBE	Lead
10.0	<200	<200	<RDL	0.29	0.069	<0.015	<0.075	<100	<100	<0.20	6.51
11.0	-	-	<RDL	<0.005	<0.05	<0.015	<0.075	-	-	<0.20	-
30.0	<200	<200	<RDL	<0.005	<0.05	<0.015	<0.075	<100	<100	<0.20	9.26
GROUNDWATER											
MW16-05	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead	Other Dissolved Metals		
11/24/16	<250	<250	<RDL	<RDL	<100	<100	-	<0.05	-	-	-
3/15/17	<200	330	<AW/DW	<RDL	<100	<100	4.0	<0.20	<AW/DW	-	-
SOIL											
32-BH14-05	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead			
2-3	<200	<200	<RDL	<RDL	-	-	-	3.87			

INFERRED LOCAL GROUNDWATER FLOW DIRECTION

LEGEND

- FORMER ROADWAY
- TOP OF SLOPE BOUNDARY FOR REMEDIAL EXCAVATION
- BOREHOLE (BY ARCADIS)
- KEYSTONE MONITORING WELL (2016)
- SOIL/GROUNDWATER CONCENTRATION(S) LESS THAN CSR STANDARDS
- SOIL CONCENTRATION(S) GREATER THAN CSR STANDARDS (PL)
- SOIL CONCENTRATION(S) GREATER THAN CSR STANDARDS (CL)
- GROUNDWATER CONCENTRATION(S) GREATER THAN CSR STANDARDS (AW)
- GROUNDWATER CONCENTRATION(S) GREATER THAN CSR STANDARDS (DW)
- LEPH LIGHT EXTRACTABLE PETROLEUM HYDROCARBONS
- HEPH HEAVY EXTRACTABLE PETROLEUM HYDROCARBONS
- PAH POLYCYCLIC AROMATIC HYDROCARBONS
- VOC VOLATILE ORGANIC COMPOUNDS
- BTEX BENZENE, TOLUENE, ETHYLBENZENE & XYLENE
- VH VOLATILE HYDROCARBONS
- VPH VOLATILE PETROLEUM HYDROCARBONS
- MTBE METHYL TERTIARY BUTYL ETHER
- < LESS THAN
- RDL REPORTED DETECTION LIMIT
- NOT ANALYZED
- PL CSR PARK LAND USE STANDARD
- CL CSR COMMERCIAL LAND USE STANDARD
- AW CSR AQUATIC LIFE STANDARD
- DW CSR DRINKING WATER STANDARD

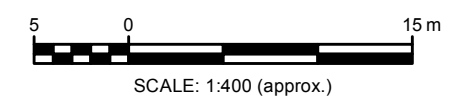
SAMPLE ID: MW16-02 LEPH <200

DEPTH (m) (SOIL) DATE (M/D/Y) (GROUNDWATER) RESULTS

NOTES:
 1. Soil Sample values are presented as Micrograms per gram (µg/g) [parts per million (ppm)].
 2. Groundwater Sample values are presented as Micrograms per Litre (µg/L) [parts per billion (ppb)].
 3. Soil Sample Exceeding CSR (PL) Standard in ORANGE.
 4. Soil Sample Exceeding CSR (CL) Standard in DARK RED.
 5. Groundwater Sample Exceeding CSR (AW) Standard in RED.
 6. Groundwater Sample Exceeding CSR (DW) Standard in BLUE.

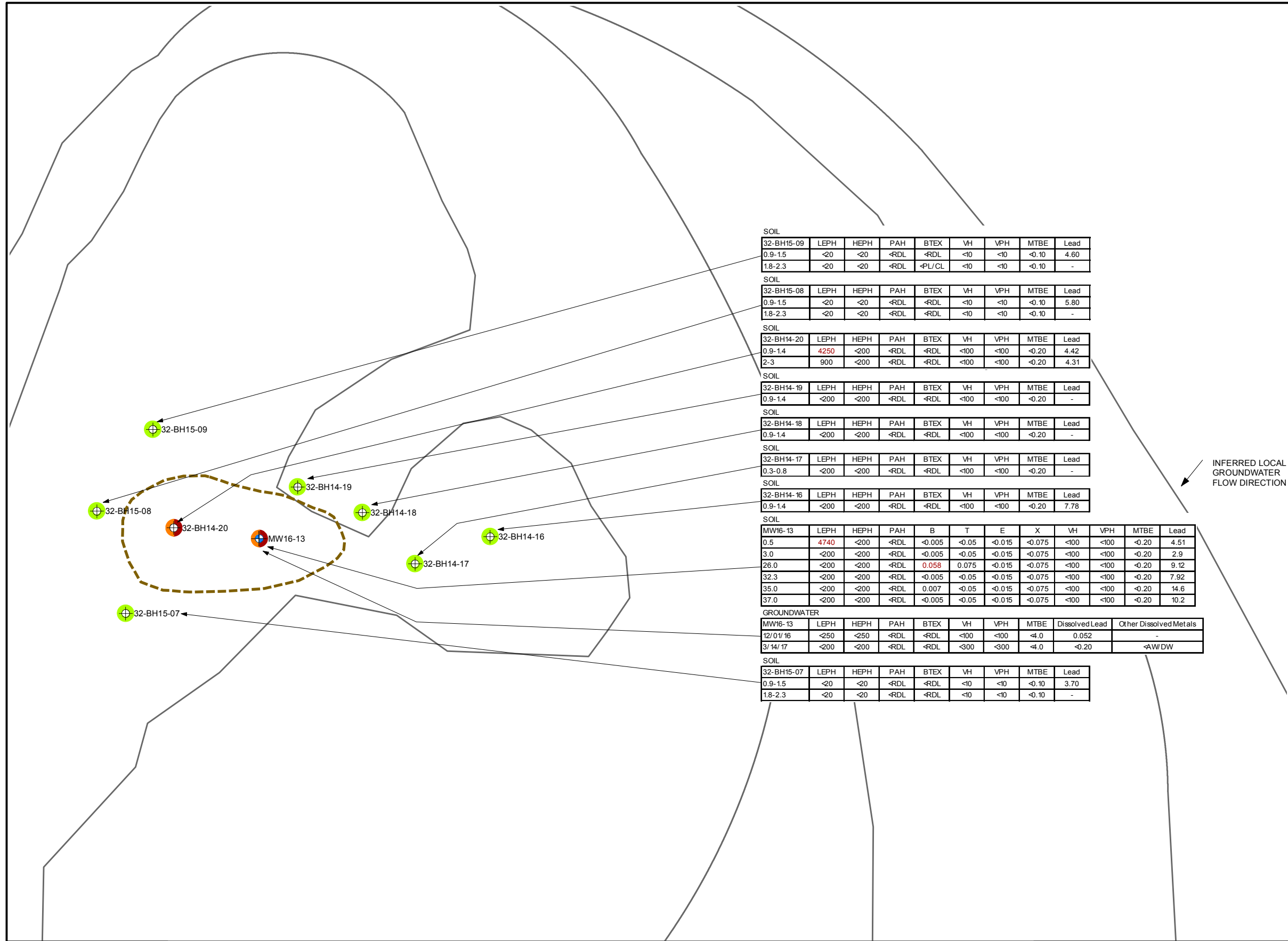


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 LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.



Watson Lake Airport AEC 32 Watson Lake, YT Public Services and Procurement Canada		
REVISION No.	DATE	PROJECT No.
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Figure 4
Soil & Groundwater Analytical Results
AEC32-B



SOIL

32-BH15-09	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.9-1.5	<20	<20	<RDL	<RDL	<10	<10	<0.10	4.60
1.8-2.3	<20	<20	<RDL	<PL/CL	<10	<10	<0.10	-

SOIL

32-BH15-08	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.9-1.5	<20	<20	<RDL	<RDL	<10	<10	<0.10	5.80
1.8-2.3	<20	<20	<RDL	<RDL	<10	<10	<0.10	-

SOIL

32-BH14-20	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.9-1.4	4250	<200	<RDL	<RDL	<100	<100	<0.20	4.42
2-3	900	<200	<RDL	<RDL	<100	<100	<0.20	4.31

SOIL

32-BH14-19	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.9-1.4	<200	<200	<RDL	<RDL	<100	<100	<0.20	-

SOIL

32-BH14-18	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.9-1.4	<200	<200	<RDL	<RDL	<100	<100	<0.20	-

SOIL

32-BH14-17	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.3-0.8	<200	<200	<RDL	<RDL	<100	<100	<0.20	-

SOIL

32-BH14-16	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.9-1.4	<200	<200	<RDL	<RDL	<100	<100	<0.20	7.78

SOIL

MW16-13	LEPH	HEPH	PAH	B	T	E	X	VH	VPH	MTBE	Lead
0.5	4740	<200	<RDL	<0.005	<0.05	<0.15	<0.075	<100	<100	<0.20	4.51
3.0	<200	<200	<RDL	<0.005	<0.05	<0.15	<0.075	<100	<100	<0.20	2.9
26.0	<200	<200	<RDL	0.058	0.075	<0.15	<0.075	<100	<100	<0.20	9.12
32.3	<200	<200	<RDL	<0.005	<0.05	<0.15	<0.075	<100	<100	<0.20	7.92
35.0	<200	<200	<RDL	0.007	<0.05	<0.15	<0.075	<100	<100	<0.20	14.6
37.0	<200	<200	<RDL	<0.005	<0.05	<0.15	<0.075	<100	<100	<0.20	10.2

GROUNDWATER

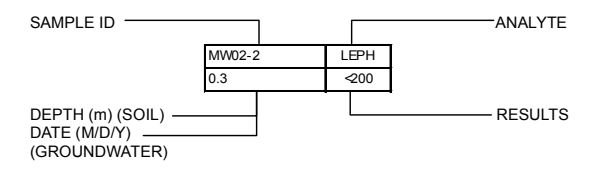
MW16-13	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Dissolved Lead	Other Dissolved Metals
12/01/16	<250	<250	<RDL	<RDL	<100	<100	<4.0	0.052	-
3/14/17	<200	<200	<RDL	<RDL	<300	<300	<4.0	<0.20	<AW/DW

SOIL

32-BH15-07	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
0.9-1.5	<20	<20	<RDL	<RDL	<10	<10	<0.10	3.70
1.8-2.3	<20	<20	<RDL	<RDL	<10	<10	<0.10	-

LEGEND

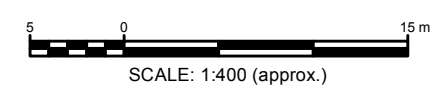
- FORMER ROADWAY
- TOP OF SLOPE BOUNDARY FOR REMEDIAL EXCAVATION
- ⊕ BOREHOLE (BY ARCADIS)
- ⊕ KEYSTONE MONITORING WELL (2016)
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- SOIL CONCENTRATION(S) GREATER THAN CSR STANDARDS (PL)
- SOIL CONCENTRATION(S) GREATER THAN CSR STANDARDS (CL)
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- GROUNDWATER CONCENTRATION(S) GREATER THAN CSR STANDARDS (DW)
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- PAH POLYCYCLIC AROMATIC HYDROCARBONS
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- VPH VOLATILE PETROLEUM HYDROCARBONS
- MTBE METHYL TERTIARY BUTYL ETHER
- < LESS THAN
- RDL REPORTED DETECTION LIMIT
- NOT ANALYZED
- PL CSR PARK LAND USE STANDARD
- CL CSR COMMERCIAL LAND USE STANDARD
- AW CSR AQUATIC LIFE STANDARD
- DW CSR DRINKING WATER STANDARD



- NOTES:
1. Soil Sample values are presented as Micrograms per gram (µg/g) [parts per million (ppm)].
 2. Groundwater Sample values are presented as Micrograms per Litre (µg/L) [parts per billion (ppb)].
 3. Soil Sample Exceeding CSR (PL) Standard in **ORANGE**.
 4. Soil Sample Exceeding CSR (CL) Standard in **DARK RED**.
 5. Groundwater Sample Exceeding CSR (AW) Standard in **RED**.
 6. Groundwater Sample Exceeding CSR (DW) Standard in **BLUE**.

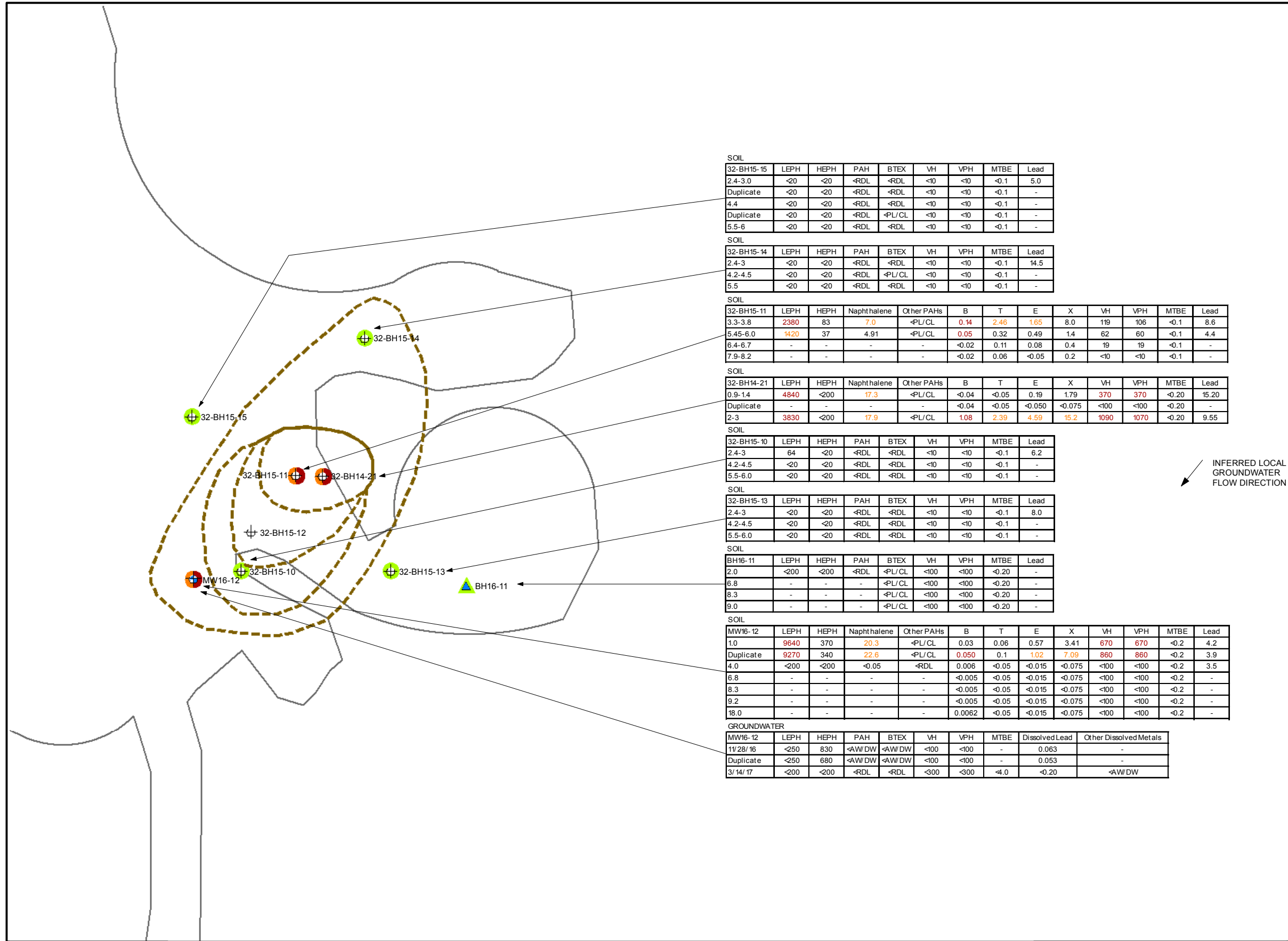


NOTES:
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Watson Lake Airport AEC 32 Watson Lake, YT Public Services and Procurement Canada		
REVISION No.	DATE	PROJECT No.
01	July 2017	13221-04

Figure 5
Soil & Groundwater Analytical Results
AEC32-C



SOIL

32-BH15-15	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
2.4-3.0	<20	<20	<RDL	<RDL	<10	<10	<0.1	5.0
Duplicate	<20	<20	<RDL	<RDL	<10	<10	<0.1	-
4.4	<20	<20	<RDL	<RDL	<10	<10	<0.1	-
Duplicate	<20	<20	<RDL	<PL/CL	<10	<10	<0.1	-
5.5-6	<20	<20	<RDL	<RDL	<10	<10	<0.1	-

SOIL

32-BH15-14	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
2.4-3	<20	<20	<RDL	<RDL	<10	<10	<0.1	14.5
4.2-4.5	<20	<20	<RDL	<PL/CL	<10	<10	<0.1	-
5.5	<20	<20	<RDL	<RDL	<10	<10	<0.1	-

SOIL

32-BH15-11	LEPH	HEPH	Naphtalene	Other PAHs	B	T	E	X	VH	VPH	MTBE	Lead
3.3-3.8	2380	83	7.0	<PL/CL	0.14	2.46	1.65	8.0	119	106	<0.1	8.6
5.45-6.0	1420	37	4.91	<PL/CL	0.05	0.32	0.49	1.4	62	60	<0.1	4.4
6.4-6.7	-	-	-	-	<0.02	0.11	0.08	0.4	19	19	<0.1	-
7.9-8.2	-	-	-	-	<0.02	0.06	<0.05	0.2	<10	<10	<0.1	-

SOIL

32-BH14-21	LEPH	HEPH	Naphtalene	Other PAHs	B	T	E	X	VH	VPH	MTBE	Lead
0.9-1.4	4840	<200	17.3	<PL/CL	<0.04	<0.05	0.19	1.79	370	370	<0.20	15.20
Duplicate	-	-	-	-	<0.04	<0.05	<0.050	<0.075	<100	<100	<0.20	-
2-3	3830	<200	17.9	<PL/CL	1.08	2.39	4.59	15.2	1090	1070	<0.20	9.55

SOIL

32-BH15-10	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
2.4-3	64	<20	<RDL	<RDL	<10	<10	<0.1	6.2
4.2-4.5	<20	<20	<RDL	<RDL	<10	<10	<0.1	-
5.5-6.0	<20	<20	<RDL	<RDL	<10	<10	<0.1	-

SOIL

32-BH15-13	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
2.4-3	<20	<20	<RDL	<RDL	<10	<10	<0.1	8.0
4.2-4.5	<20	<20	<RDL	<RDL	<10	<10	<0.1	-
5.5-6.0	<20	<20	<RDL	<RDL	<10	<10	<0.1	-

SOIL

BH16-11	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
2.0	<200	<200	<RDL	<PL/CL	<100	<100	<0.20	-
6.8	-	-	-	<PL/CL	<100	<100	<0.20	-
8.3	-	-	-	<PL/CL	<100	<100	<0.20	-
9.0	-	-	-	<PL/CL	<100	<100	<0.20	-

SOIL

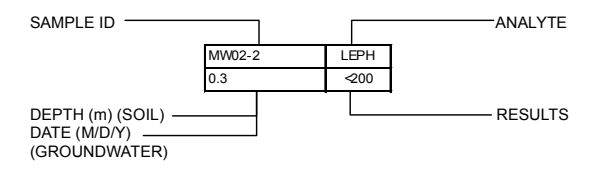
MW16-12	LEPH	HEPH	Naphtalene	Other PAHs	B	T	E	X	VH	VPH	MTBE	Lead
1.0	9640	370	20.3	<PL/CL	0.03	0.06	0.57	3.41	670	670	<0.2	4.2
Duplicate	9270	340	22.6	<PL/CL	0.050	0.1	1.02	7.09	860	860	<0.2	3.9
4.0	<200	<200	<0.05	<RDL	0.006	<0.05	<0.015	<0.075	<100	<100	<0.2	3.5
6.8	-	-	-	-	<0.005	<0.05	<0.015	<0.075	<100	<100	<0.2	-
8.3	-	-	-	-	<0.005	<0.05	<0.015	<0.075	<100	<100	<0.2	-
9.2	-	-	-	-	<0.005	<0.05	<0.015	<0.075	<100	<100	<0.2	-
18.0	-	-	-	-	0.0062	<0.05	<0.015	<0.075	<100	<100	<0.2	-

GROUNDWATER

MW16-12	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Dissolved Lead	Other Dissolved Metals
11/28/16	<250	830	<AW/DW	<AW/DW	<100	<100	-	0.063	-
Duplicate	<250	680	<AW/DW	<AW/DW	<100	<100	-	0.053	-
3/14/17	<200	<200	<RDL	<RDL	<300	<300	4.0	<0.20	<AW/DW

LEGEND

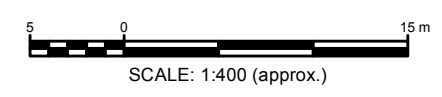
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- LEPH LIGHT EXTRACTABLE PETROLEUM HYDROCARBONS
- HEPH HEAVY EXTRACTABLE PETROLEUM HYDROCARBONS
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- VOC VOLATILE ORGANIC COMPOUNDS
- BTEX BENZENE, TOLUENE, ETHYLBENZENE & XYLENE
- VH VOLATILE HYDROCARBONS
- VPH VOLATILE PETROLEUM HYDROCARBONS
- MTBE METHYL TERTIARY BUTYL ETHER
- < LESS THAN
- RDL REPORTED DETECTION LIMIT
- NOT ANALYZED
- PL CSR PARK LAND USE STANDARD
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- NOTES:
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 - Soil Sample Exceeding CSR (PL) Standard in **ORANGE**.
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 - Groundwater Sample Exceeding CSR (AW) Standard in **RED**.
 - Groundwater Sample Exceeding CSR (DW) Standard in **BLUE**.

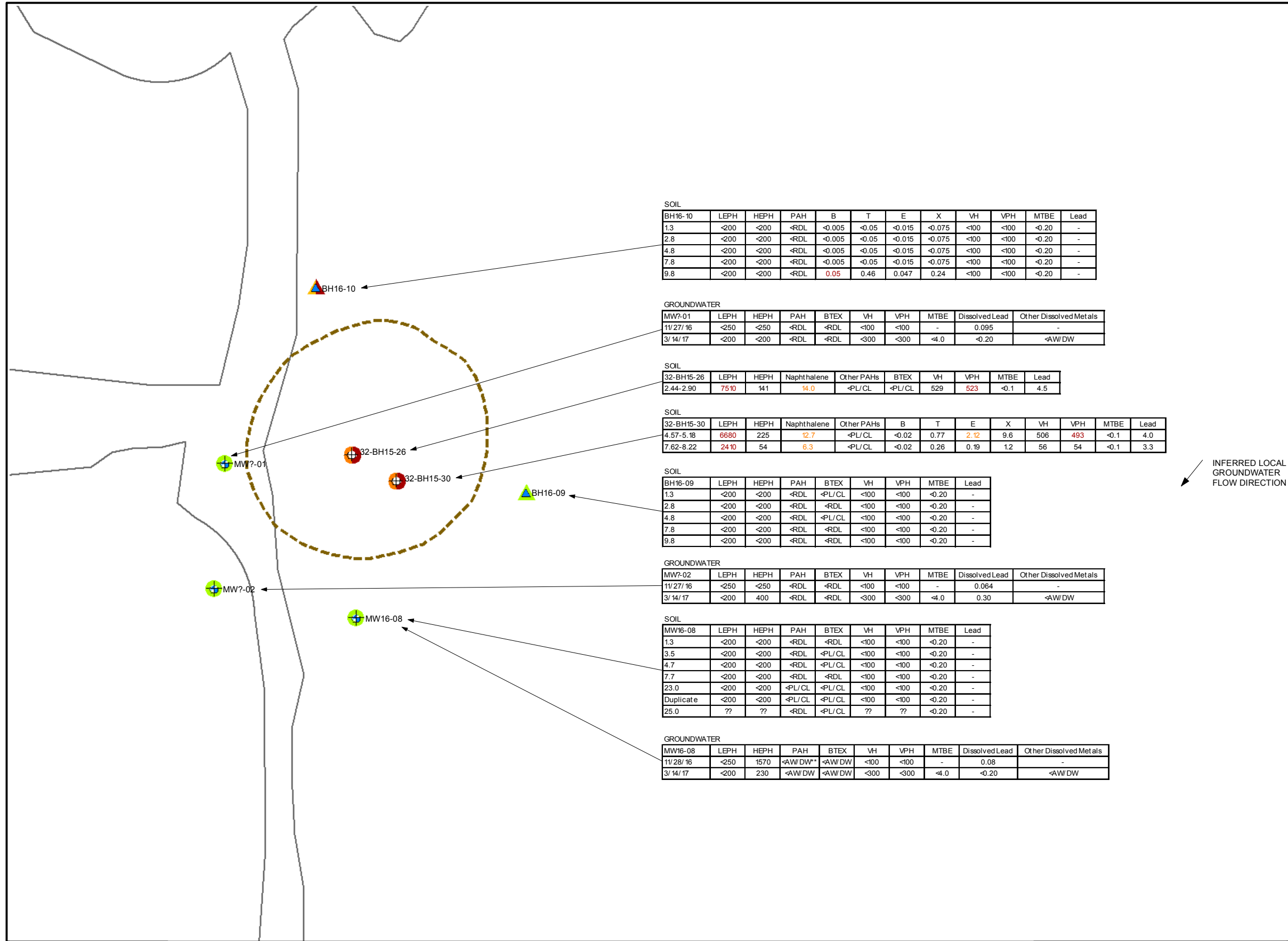


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Watson Lake Airport AEC 32 Watson Lake, YT Public Services and Procurement Canada		
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Figure 6
Soil & Groundwater Analytical Results
AEC32-E



SOIL

BH16-10	LEPH	HEPH	PAH	B	T	E	X	VH	VPH	MTBE	Lead
1.3	<200	<200	<RDL	<0.005	<0.05	<0.015	<0.075	<100	<100	<0.20	-
2.8	<200	<200	<RDL	<0.005	<0.05	<0.015	<0.075	<100	<100	<0.20	-
4.8	<200	<200	<RDL	<0.005	<0.05	<0.015	<0.075	<100	<100	<0.20	-
7.8	<200	<200	<RDL	<0.005	<0.05	<0.015	<0.075	<100	<100	<0.20	-
9.8	<200	<200	<RDL	0.05	0.46	0.047	0.24	<100	<100	<0.20	-

GROUNDWATER

MW?-01	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Dissolved Lead	Other Dissolved Metals
11/27/16	<250	<250	<RDL	<RDL	<100	<100	-	0.095	-
3/14/17	<200	<200	<RDL	<RDL	<300	<300	<4.0	<0.20	<AW/DW

SOIL

32-BH15-26	LEPH	HEPH	Naphthalene	Other PAHs	BTEX	VH	VPH	MTBE	Lead
2.44-2.90	7510	141	14.0	<PL/CL	<PL/CL	529	523	<0.1	4.5

SOIL

32-BH15-30	LEPH	HEPH	Naphthalene	Other PAHs	B	T	E	X	VH	VPH	MTBE	Lead
4.57-5.18	6680	225	12.7	<PL/CL	<0.02	0.77	2.12	9.6	506	493	<0.1	4.0
7.62-8.22	2410	54	6.3	<PL/CL	<0.02	0.26	0.19	1.2	56	54	<0.1	3.3

SOIL

BH16-09	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
1.3	<200	<200	<RDL	<PL/CL	<100	<100	<0.20	-
2.8	<200	<200	<RDL	<RDL	<100	<100	<0.20	-
4.8	<200	<200	<RDL	<PL/CL	<100	<100	<0.20	-
7.8	<200	<200	<RDL	<RDL	<100	<100	<0.20	-
9.8	<200	<200	<RDL	<RDL	<100	<100	<0.20	-

GROUNDWATER

MW?-02	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Dissolved Lead	Other Dissolved Metals
11/27/16	<250	<250	<RDL	<RDL	<100	<100	-	0.064	-
3/14/17	<200	400	<RDL	<RDL	<300	<300	<4.0	0.30	<AW/DW

SOIL

MW16-08	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Lead
1.3	<200	<200	<RDL	<RDL	<100	<100	<0.20	-
3.5	<200	<200	<RDL	<PL/CL	<100	<100	<0.20	-
4.7	<200	<200	<RDL	<PL/CL	<100	<100	<0.20	-
7.7	<200	<200	<RDL	<RDL	<100	<100	<0.20	-
23.0	<200	<200	<PL/CL	<PL/CL	<100	<100	<0.20	-
Duplicate	<200	<200	<PL/CL	<PL/CL	<100	<100	<0.20	-
25.0	??	??	<RDL	<PL/CL	??	??	<0.20	-

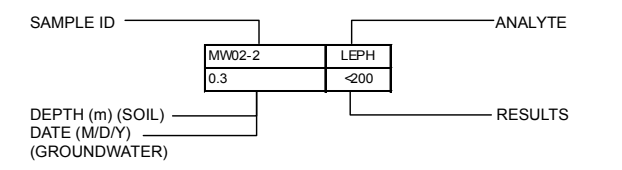
GROUNDWATER

MW16-08	LEPH	HEPH	PAH	BTEX	VH	VPH	MTBE	Dissolved Lead	Other Dissolved Metals
11/28/16	<250	1570	<AW/DW**	<AW/DW	<100	<100	-	0.08	-
3/14/17	<200	230	<AW/DW	<AW/DW	<300	<300	<4.0	<0.20	<AW/DW

LEGEND

- FORMER ROADWAY
- TOP OF SLOPE BOUNDARY FOR REMEDIAL EXCAVATION
- ⊕ BOREHOLE (BY ARCADIS)
- ▲ KEYSTONE BOREHOLE (2016)
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- MTBE METHYL TERTIARY BUTYL ETHER
- < LESS THAN
- RDL REPORTED DETECTION LIMIT
- ** RDL EXCEEDS STANDARDS
- NOT ANALYZED
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- AW CSR AQUATIC LIFE STANDARD
- DW CSR DRINKING WATER STANDARD

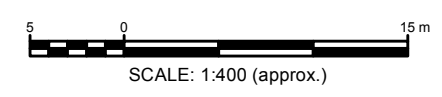
INFERRED LOCAL GROUNDWATER FLOW DIRECTION



- NOTES:
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 - Soil Sample Exceeding CSR (PL) Standard in **ORANGE**.
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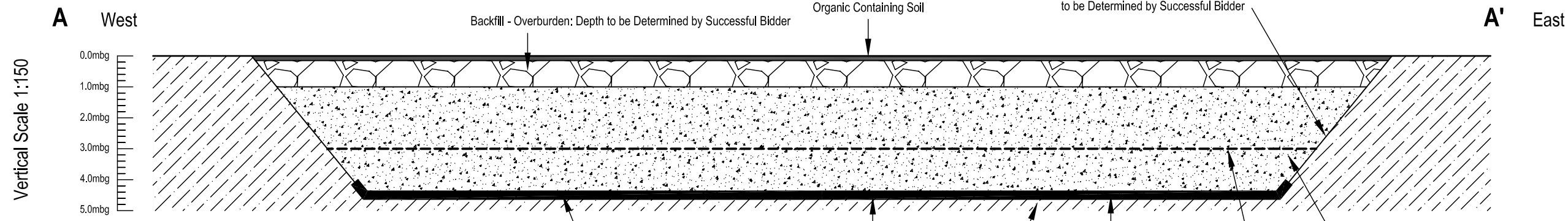


Watson Lake Airport AEC 32
Watson Lake, YT
Public Services and Procurement Canada

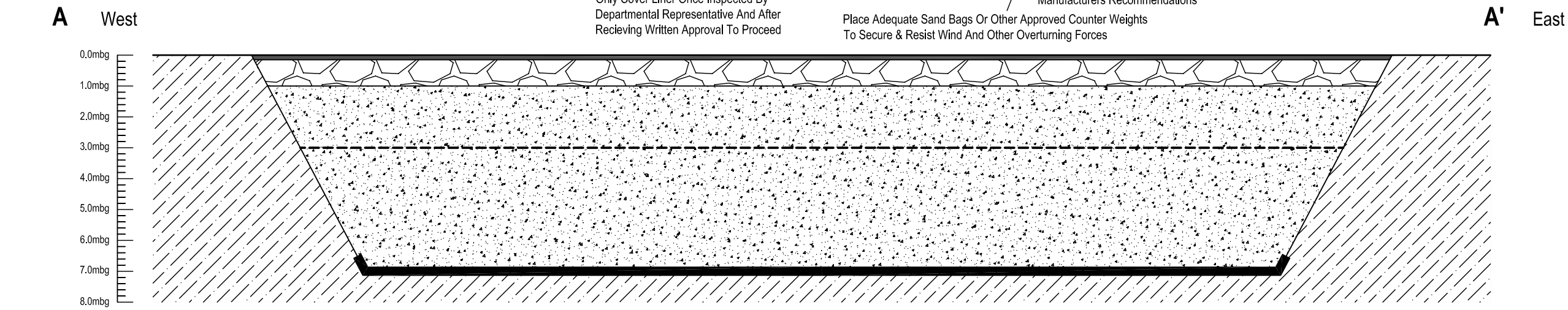
REVISION No.	DATE	PROJECT No.
01	July 2017	13221-04

Figure 7
Soil & Groundwater Analytical Results
AEC32-G

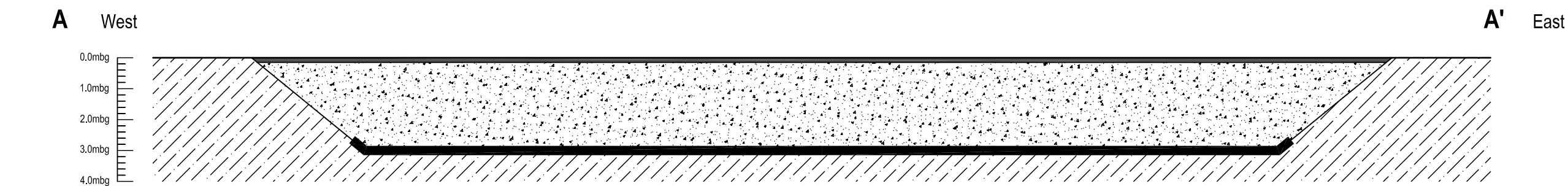
AEC 32 A - GENERIC BACKFILL CROSS SECTION



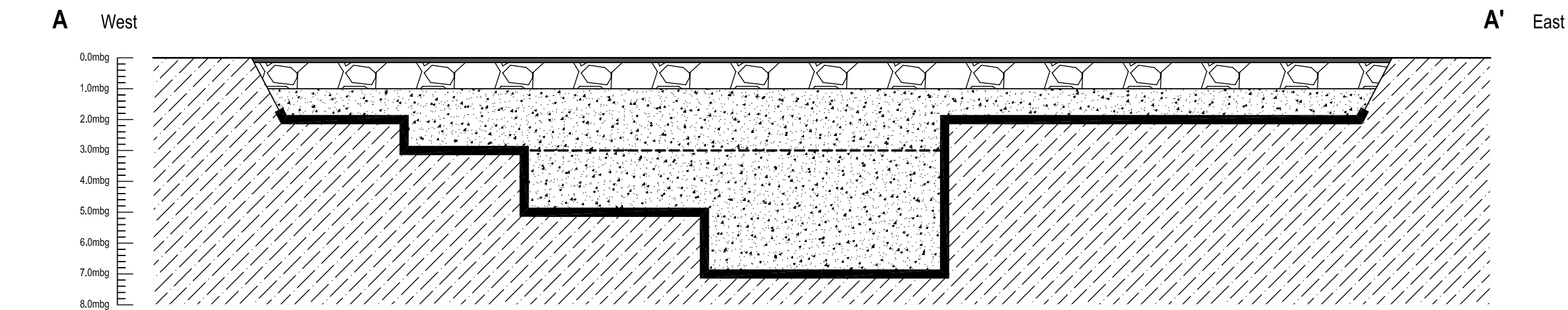
AEC 32 B



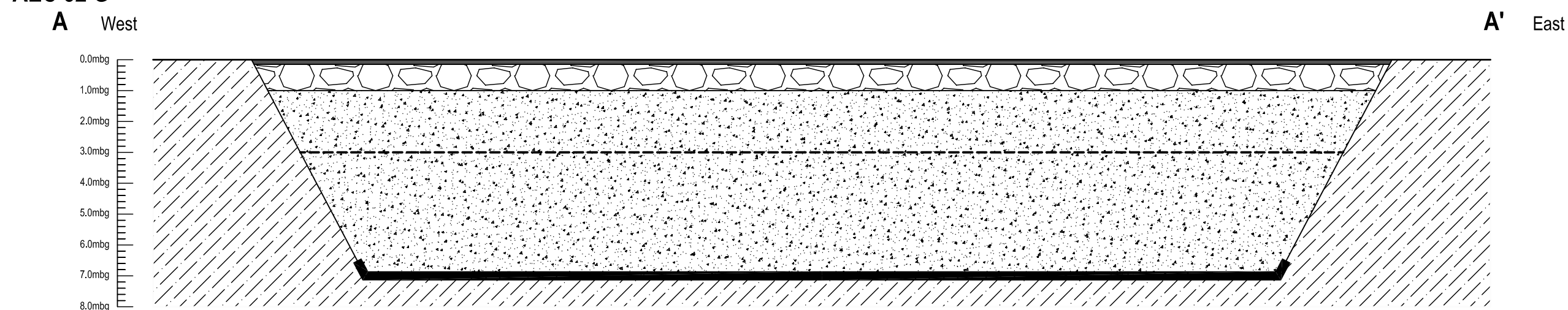
AEC 32 C



AEC 32 E



AEC 32 G



COMPACTION

Compact to density of not less than 95% maximum dry density in accordance with Standard Proctor Maximum Dry Density (ASTM D 698). Contractor may have to use static rolling techniques.

BACKFILLING

Do not use backfill material which is frozen or contains ice, snow or debris. Compact each layer to the satisfaction of the Qualified Professional and in accordance with the Contract before placing a succeeding layer.

GRADING

Grade to match surrounding grades. Compact each layer to the satisfaction of the Qualified Professional and in accordance with the Contract before placing a succeeding layer.

EROSION AND SEDIMENT CONTROL

Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas, from stockpiles, staging areas, and other work areas. Prevent erosion and sedimentation.

EXCAVATION - CONTAMINATED SOIL

Depth of excavation to be confirmed through field analytical results. Side slope excavation to be determined by successful bidder.

EXCAVATION -- OVERBURDEN

Overburden volume to be confirmed using analytical results. Side slope excavation to be determined by successful bidder. Overburden to be set aside for reuse as backfill within approximately 300m of excavation.

See analytical results in Appendix E of the Specifications.

EXCAVATION - ORGANIC CONTAINING SOIL

Excavate organic containing soil and set aside within approximately 300m of excavation for reuse over overburden layer.

BACKFILL - IMPORTED/OWNER SUPPLIED

Place approved backfill only. Remove large organic debris during placement.

PLACEMENT OF BACKFILL OVER LINER

The minimum thickness of the first lift is 300mm. No machine travel over liner until 0.5m of backfill has been placed over liner. No sharp turning of equipment permitted.

PLACEMENT OF BACKFILL OVER GEOTEXTILE

The minimum thickness of the first lift is 300mm. No machine travel over liner until 0.5m of backfill has been placed over geotextile.

BACKFILL - OVERBURDEN

Overburden must be compatible with existing granular material on Site. Remove large organic debris during placement.

PREPARATION OF BASE OF EXCAVATION FOR LINER PLACEMENT

The Base of Excavation shall be cleared of snow, water, and debris prior to liner placement. The base surface shall be a smooth, continuous surface, free of debris that could puncture the liner.

REVEGETATION

Broadcast native seed mix compatible with the biological and geological climate zone of the Site. Seed mix shall contain a forest species mix.

LEGEND


	Organic Containing Soil
	Soil
	Overburden
	Approved Backfill
	Approved Geotextile
	Approved Recontamination Prevention Liner

Scale: NTS

Title:	AEC 32 EXCAVATION & BACKFILL - CROSS SECTIONS
Project:	EXCAVATION & BACKFILL
Client:	PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
Date:	JULY 2017
	Keystone Environmental Drawing 8


APPENDIX A


Site Photographs


Client Name: Public Services and Procurement Canada	Site Location: AEC 32 Watson Lake Airport, Yukon Territory	Project No.
Photo No. 1		
Date: July 13, 2017		
Direction Photo taken: East		
Description: Road access to AEC 32		


Client Name: Public Services and Procurement Canada	Site Location: AEC 32 Watson Lake Airport, Yukon Territory	Project No.
Photo No. 2		
Date: July 13, 2017		
Direction Photo taken: South		
Description: Access road to AEC 32		


Client Name: Public Services and Procurement Canada	Site Location: AEC 32 Watson Lake Airport, Yukon Territory	Project No.
Photo No. 3		
Date: July 13, 2017		
Direction Photo taken: West		
Description: Access road to AEC 32 A		


Client Name: Public Services and Procurement Canada	Site Location: AEC 32 Watson Lake Airport, Yukon Territory	Project No.
Photo No. 4		
Date: July 13, 2017		
Direction Photo taken: West		
Description: AEC 32 A		

Client Name: Public Services and Procurement Canada	Site Location: AEC 32 Watson Lake Airport, Yukon Territory	Project No.
Photo No. 5		
Date: July 13, 2017		
Direction Photo taken: Northwest		
Description: AEC 32 B		

Client Name: Public Services and Procurement Canada	Site Location: AEC 32 Watson Lake Airport, Yukon Territory	Project No.
Photo No. 6		
Date: July 13, 2017		
Direction Photo taken: West		
Description: AEC 32 C		

Client Name: Public Services and Procurement Canada	Site Location: AEC 32 Watson Lake Airport, Yukon Territory	Project No.
Photo No. 7		
Date: July 13, 2017		
Direction Photo taken: North		
Description: AEC 32 E		

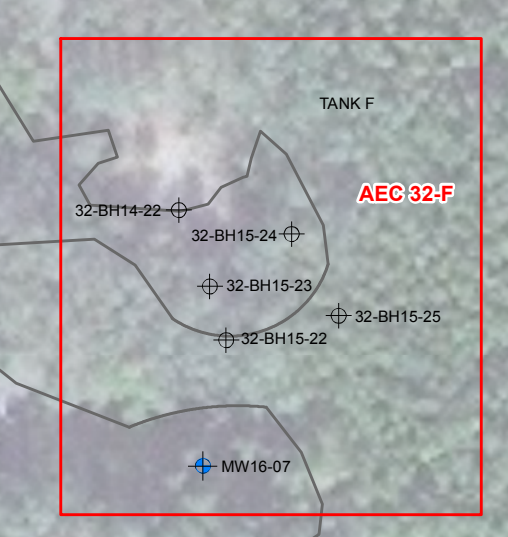
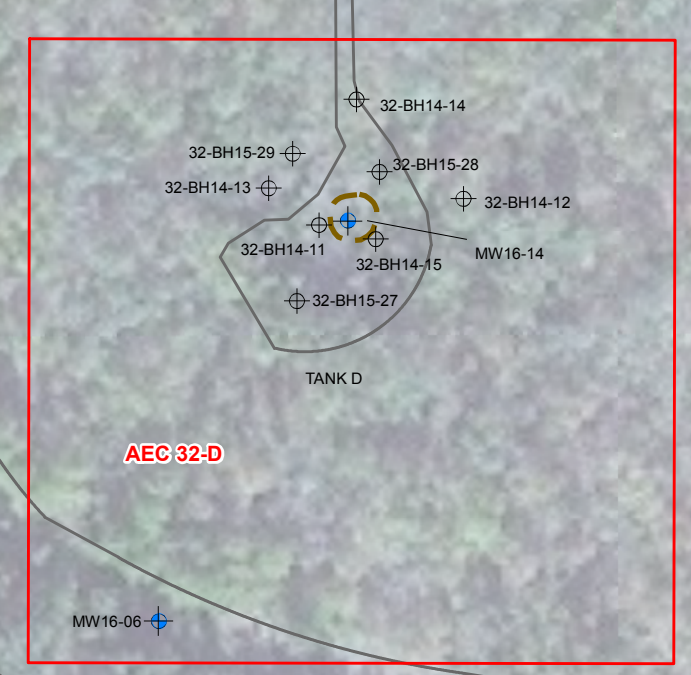
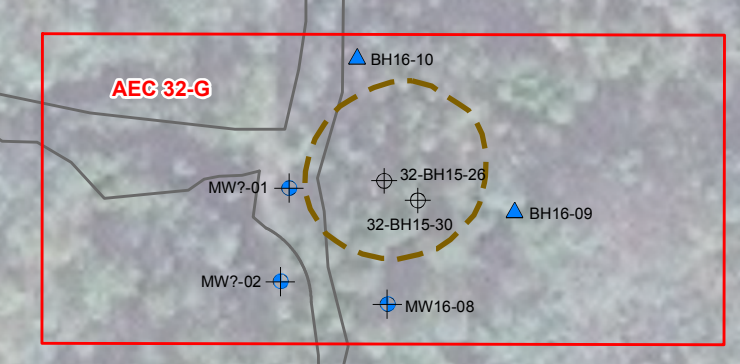
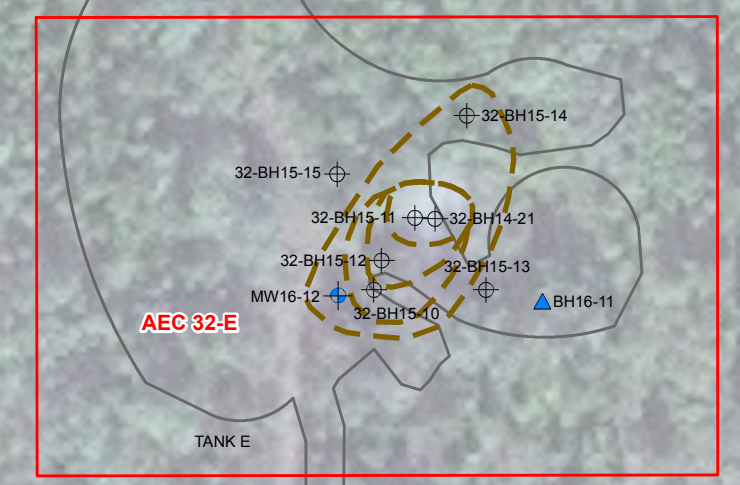
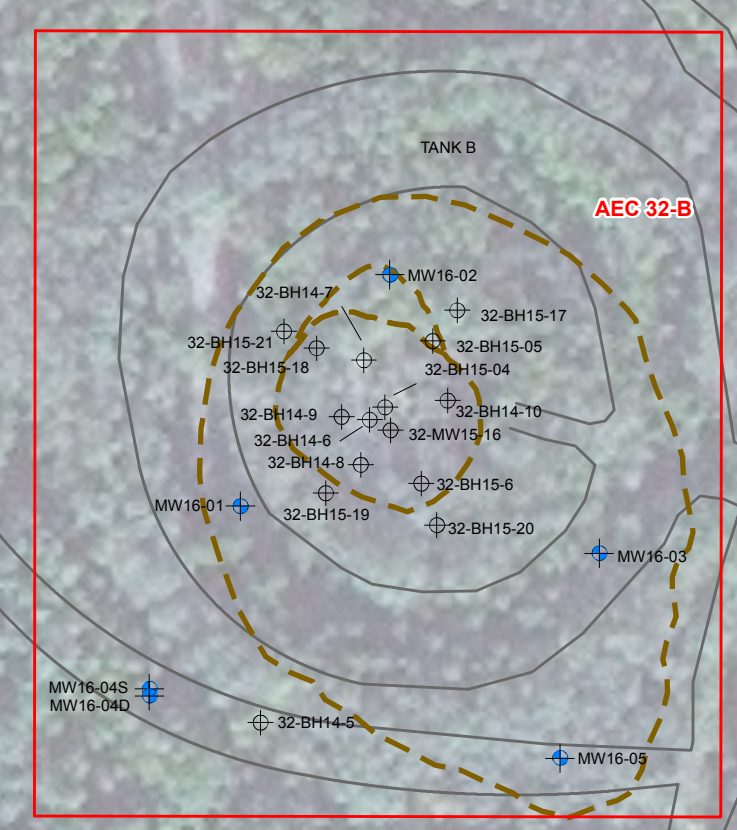
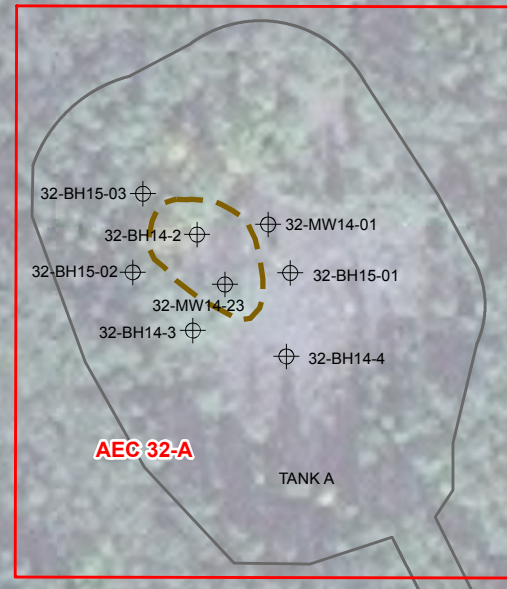
Client Name: Public Services and Procurement Canada	Site Location: AEC 32 Watson Lake Airport, Yukon Territory	Project No.
Photo No. 8		
Date: July 13, 2017		
Direction Photo taken: Northeast		
Description: AEC 32 G		

Client Name: Public Services and Procurement Canada	Site Location: AEC 32 Watson Lake Airport, Yukon Territory	Project No.
Photo No. 9		
Date: July 13, 2017		
Direction Photo taken: North		
Description: Access road adjacent to AEC 32 G		

APPENDIX B

**Environmental Investigations
(Test Pit and Borehole Logs)**

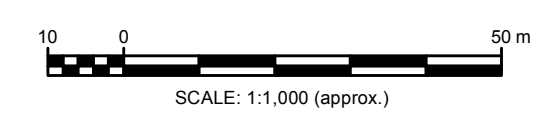




ROBERT CAMPBELL HWY.

- LEGEND**
- FORMER ROAD WAY
 - REMEDIAL EXCAVATION AREAS
 - AEC
 - BOREHOLE (BY ARCADIS)
 - KEYSTONE BOREHOLE (2016)
 - KEYSTONE MONITORING WELL (2016)

NOTES:
 1. THIS DRAWING IS FOR GENERAL INFORMATION ONLY.
 LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.
 2. DATE OF AERIAL PHOTO IS 2010.



Watson Lake Airport AEC 32		
Watson Lake, YT		
PWGSC		
REVISION No.	DATE	PROJECT No.
00	Mar. 2017	13221-04

Figure 3
 Sample Location Plan and Remedial Excavation Areas





Project No: 639-1403 **Borehole Log: 32-MW14-1**

Project: Watson Lake Drilling

Client: PWGSC

Site Location: APEC 32

Logged by: OC

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0	0	Ground Surface							
1		SAND AND GRAVEL some silt, fine to medium, brown, loose, dry	1-1	G			15		
2									
3									
4	1	*compact - dense from 1m							
5									
6									
7	2		1-2	G			0		
8									
9									
10	3		1-3	G			0		
11									
12									
13	4								
14									
15			1-4				0		
16	5								
17		*trace silt, compact, moist from 5.6m							
18									
19									
20	6		1-5				0		
21									
22									
23	7								
24									
25									
26	8		1-6				0		
27									
28									
29	9								
30									
31			1-7				0		
32	10								
33									
34									
35									
36	11		1-8		Dup-1		0		
37									

Drilled By: Uniwide Drilling Ltd.

Drill Method: Solid Stem Auger/ODEX

Drill Date: 5/11/2014 to 9/11/2014

Hole Diameter: 6"

Well Diameter: 2"/NA in BH

Sheet: 1 of 3



Project No: 639-1403 **Borehole Log: 32-MW14-1**

Project: Watson Lake Drilling

Client: PWGSC

Site Location: APEC 32

Logged by: OC

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM	5000	
							3000		
38	12	SAND some gravel, trace silt, fine to medium, brown, compact, moist							
39									
40									
41			1-9				0		
42	13	PEAT soft, black/brown, moist							
43				1-10				45	
44									
45	14	SAND AND GRAVEL trace silt, fine to medium, brown, compact, moist							
46				1-11					
47									
48	15								
49									
50									
51	16		1-12				0		
52									
53									
54	17								
55				1-13				0	
56									
57	18								
58									
59									
60	19		1-14				0		
61									
62									
63	20								
64				1-15				0	
65									
66	21	SAND trace gravel, fine, light brown, loose, moist							
67									
68									
69	22		1-16				0		
70									
71									
72									
73									
74				1-17				0	

Drilled By: Uniwide Drilling Ltd.

Drill Method: Solid Stem Auger/ODEX

Drill Date: 5/11/2014 to 9/11/2014

Hole Diameter: 6"

Well Diameter: 2"/NA in BH

Sheet: 2 of 3



Project No: 639-1403 **Borehole Log: 32-MW14-1**

Project: Watson Lake Drilling

Client: PWGSC

Site Location: APEC 32

Logged by: OC

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details	
Depth	Symbol	Description	Number	Type	Duplicate	0	1000	PPM 3000		5000
75	23		1-17			0				
76							0			
77	24		1-18			0				
78										
79	25	SILT soft, brown, moist								
80										
81	26		1-19			0				
82										
83	27	*grey from 28m								
84										
85	28	*wet at 29m	1-20			0				
86										
87	29	*stiff from 31m								
88										
89	30		1-21			0				
90										
91	31									
92										
93	32		1-22			0				
94										
95	33	End of Borehole	1-23		Dup-2	0				
96										
97			1-24		Dup-3	0				
98										
99										
100										
101										
102										
103										
104										
105										
106										
107										
108										
109										
110										
111										

Drilled By: Uniwide Drilling Ltd.

Drill Method: Solid Stem Auger/ODEX

Drill Date: 5/11/2014 to 9/11/2014

Hole Diameter: 6"

Well Diameter: 2"/NA in BH

Sheet: 3 of 3



Project No: 639-1403 **Borehole Log: 32-BH14-2**
Project: Watson Lake Drilling
Client: PWGSC **Logged by: OC**
Site Location: APEC 32 **Checked By: CMcD**

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Sand and Gravel]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry, HC odour	2-1	G		390			
2									
3									
4	[Symbol: Dense]	* dense from 1m	2-2	G		1400			
5									
6	[Symbol: Grey/Brown]	*grey/brown, moist from 2.2m	2-3	G			3100		
7									
8									
9									
10	[Symbol: End of Borehole]	End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.	Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX	Well Diameter: 2"/NA in BH
Drill Date: 9/11/2014	Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-3**
Project: Watson Lake Drilling
Client: PWGSC **Logged by: OC**
Site Location: APEC 32 **Checked By: CMcD**

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Sand and Gravel]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	3-1	G					
2									
3		* dense from 1m	3-2	G					
4									
5									
6		*grey/brown, moist from 2.2m							
7			3-3	G					
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.	Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX	Well Diameter: 2"/NA in BH
Drill Date: 9/11/2014	Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-4**
Project: Watson Lake Drilling
Client: PWGSC **Logged by: OC**
Site Location: APEC 32 **Checked By: CMcD**

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Sand and Gravel]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	4-1	G			0		
2									
3		* dense from 1m	4-2	G				0	
4									
5		*grey/brown, moist from 2.2m							
6									
7			4-3	G			55		
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.	Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX	Well Diameter: 2"/NA in BH
Drill Date: 9/11/2014	Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-5**
Project: Watson Lake Drilling
Client: PWGSC **Logged by: OC**
Site Location: APEC 32 **Checked By: CMcD**

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Sand and Gravel]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	5-1	G			0		
2									
3		* dense from 1m	5-2	G				0	
4	[Symbol: Sand and Gravel]	*grey/brown, moist from 2.2m							
5									
6				5-3	G			10	
7									
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.	Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX	Well Diameter: 2"/NA in BH
Drill Date: 9/11/2014	Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-6**
Project: Watson Lake Drilling
Client: PWGSC **Logged by:** OC
Site Location: APEC 32 **Checked By:** CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Sand and Gravel]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry, HC odour	6-1	G		600			
2									
3		* dense from 1m	6-2	G			2800		
4	[Symbol: Sand and Gravel]	*grey/brown, moist from 2.2m	6-3	G				5500	
5									
6									
7		End of Borehole							
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd. Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX Well Diameter: 2"/NA in BH
Drill Date: 9/11/2014 Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-7**
Project: Watson Lake Drilling
Client: PWGSC **Logged by: OC**
Site Location: APEC 32 **Checked By: CMcD**

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Dotted pattern]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry, * dense from 1m *grey/brown, moist from 2.2m	7-1	G		10			
2									
3			7-2	G		10			
4									
5									
6									
7			7-3	G		45			
8									
9									
10									
11		End of Borehole							
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.	Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX	Well Diameter: 2"/NA in BH
Drill Date: 9/11/2014	Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-8**

Project: Watson Lake Drilling

Client: PWGSC

Logged by: OC

Site Location: APEC 32

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Sand and Gravel]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	8-1	G			10		
2									
3		* dense from 1m	8-2	G				0	
4									
5		*grey/brown, moist from 2.2m	8-3	G			60		
6									
7									
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.

Hole Diameter: 6"

Drill Method: Solid Stem Auger/ODEX

Well Diameter: 2"/NA in BH

Drill Date: 9/11/2014

Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-9**
Project: Watson Lake Drilling
Client: PWGSC **Logged by: OC**
Site Location: APEC 32 **Checked By: CMcD**

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Dotted pattern]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry, * dense from 1m *grey/brown, moist from 2.2m	9-1	G		0			
2									
3									
4			9-2	G		0			
5									
6									
7			9-3	G		80			
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.	Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX	Well Diameter: 2"/NA in BH
Drill Date: 9/11/2014	Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-10**
Project: Watson Lake Drilling
Client: PWGSC **Logged by: OC**
Site Location: APEC 32 **Checked By: CMcD**

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Sand and Gravel]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	10-1	G			10		
2									
3		* dense from 1m	10-2	G				5	
4									
5		*grey/brown, moist from 2.2m	10-3	G			65		
6									
7									
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.	Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX	Well Diameter: 2"/NA in BH
Drill Date: 9/11/2014	Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-11**
Project: Watson Lake Drilling
Client: PWGSC **Logged by: OC**
Site Location: APEC 32 **Checked By: CMcD**

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Sand and Gravel]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	11-1	G		0			
2									
3									
4	[Symbol: Sand and Gravel]	* dense from 1m	11-2	G		0			
5									
6									
7	[Symbol: Sand and Gravel]	*grey/brown, moist from 2.2m	11-3	G		0			
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.	Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX	Well Diameter: 2"/NA in BH
Drill Date: 9/11/2014	Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-12**

Project: Watson Lake Drilling

Client: PWGSC

Logged by: OC

Site Location: APEC 32

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM	5000	
							3000		
0		Ground Surface							
1	[Symbol: Sand and Gravel]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	12-1	G			45		
2									
3		* dense from 1m	12-2	G			10		
4									
5		*grey/brown, moist from 2.2m	12-3	G			0		
6									
7									
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.

Hole Diameter: 6"

Drill Method: Solid Stem Auger/ODEX

Well Diameter: 2"/NA in BH

Drill Date: 9/11/2014

Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-13**
Project: Watson Lake Drilling
Client: PWGSC **Logged by: OC**
Site Location: APEC 32 **Checked By: CMcD**

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Sand and Gravel]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	13-1	G			0		
2									
3									
4	[Symbol: Sand and Gravel]	* dense from 1m	13-2	G			0		
5									
6									
7	[Symbol: Sand and Gravel]	*grey/brown, moist from 2.2m	13-3	G			0		
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.	Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX	Well Diameter: 2"/NA in BH
Drill Date: 9/11/2014	Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-14**
Project: Watson Lake Drilling
Client: PWGSC **Logged by: OC**
Site Location: APEC 32 **Checked By: CMcD**

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Sand and Gravel]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	14-1	G			0		
2									
3		* dense from 1m	14-2	G				0	
4	[Symbol: Sand and Gravel]	*grey/brown, moist from 2.2m	14-3	G				0	
5									
6									
7		End of Borehole							
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.	Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX	Well Diameter: 2"/NA in BH
Drill Date: 9/11/2014	Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-15**

Project: Watson Lake Drilling

Client: PWGSC

Logged by: OC

Site Location: APEC 32

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Dotted pattern]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	15-1	G		0			
2									
3									
4	1	* dense from 1m	15-2	G		0			
5									
6		*grey/brown, moist from 2.2m	15-3	G		30			
7	2								
8									
9									
10	3	End of Borehole							
11									
12									
13	4								
14									
15									
16	5								
17									
18									
19	6								
20									
21									
22	7								
23									
24									
25	8								
26									
27									
28	9								
29									
30									

Drilled By: Uniwide Drilling Ltd.

Hole Diameter: 6"

Drill Method: Solid Stem Auger/ODEX

Well Diameter: 2"/NA in BH

Drill Date: 9/11/2014

Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-16**

Project: Watson Lake Drilling

Client: PWGSC

Site Location: APEC 32

Logged by: OC

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Dotted pattern]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	16-1	G			0		
2									
3		* dense from 1m	16-2	G				45	
4									
5		*grey/brown, moist from 2.2m							
6									
7			16-3	G			0		
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.

Drill Method: Solid Stem Auger/ODEX

Drill Date: 10/11/2014

Hole Diameter: 6"

Well Diameter: 2"/NA in BH

Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-17**

Project: Watson Lake Drilling

Client: PWGSC

Logged by: OC

Site Location: APEC 32

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Dotted pattern]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	17-1	G		0			
2									
3									
4	1	* dense from 1m	17-2	G		0			
5									
6									
7	2	*grey/brown, moist from 2.2m	17-3	G		0			
8									
9									
10	3	End of Borehole							
11									
12									
13	4								
14									
15									
16	5								
17									
18									
19	6								
20									
21									
22	7								
23									
24									
25	8								
26									
27									
28	9								
29									
30									

Drilled By: Uniwide Drilling Ltd.

Hole Diameter: 6"

Drill Method: Solid Stem Auger/ODEX

Well Diameter: 2"/NA in BH

Drill Date: 10/11/2014

Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-18**

Project: Watson Lake Drilling

Client: PWGSC

Logged by: OC

Site Location: APEC 32

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Dotted pattern]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	18-1	G			0		
2									
3		* dense from 1m	18-2	G				65	
4									
5		*grey/brown, moist from 2.2m							
6									
7			18-3	G			0		
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.

Hole Diameter: 6"

Drill Method: Solid Stem Auger/ODEX

Well Diameter: 2"/NA in BH

Drill Date: 10/11/2014

Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-19**

Project: Watson Lake Drilling

Client: PWGSC

Logged by: OC

Site Location: APEC 32

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Dotted pattern]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	19-1	G		0			
2									
3									
4	1	* dense from 1m	19-2	G		0			
5									
6									
7	2	*grey/brown, moist from 2.2m	19-3	G		0			
8									
9									
10	3	End of Borehole							
11									
12									
13	4								
14									
15									
16	5								
17									
18									
19	6								
20									
21									
22	7								
23									
24									
25	8								
26									
27									
28	9								
29									
30									

Drilled By: Uniwide Drilling Ltd.

Hole Diameter: 6"

Drill Method: Solid Stem Auger/ODEX

Well Diameter: 2"/NA in BH

Drill Date: 10/11/2014

Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-20**

Project: Watson Lake Drilling

Client: PWGSC

Logged by: OC

Site Location: APEC 32

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Dotted pattern]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry, HC odour	20-1	G			35		
2									
3									
4		* dense from 1m	20-2	G			450		
5									
6									
7		*grey/brown, moist from 2.2m	20-3	G			445		
8									
9									
10		End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.

Hole Diameter: 6"

Drill Method: Solid Stem Auger/ODEX

Well Diameter: 2"/NA in BH

Drill Date: 10/11/2014

Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-21**
Project: Watson Lake Drilling
Client: PWGSC **Logged by: OC**
Site Location: APEC 32 **Checked By: CMcD**

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	●	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry, HC odour	21-1	G		420			
2									
3									
4	●	* dense from 1m	21-2	G		830			
5									
6	●	*grey/brown, moist from 2.2m	21-3	G		900			
7									
8									
9									
10	●	End of Borehole							
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Drilled By: Uniwide Drilling Ltd.	Hole Diameter: 6"
Drill Method: Solid Stem Auger/ODEX	Well Diameter: 2"/NA in BH
Drill Date: 10/11/2014	Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-BH14-22**

Project: Watson Lake Drilling

Client: PWGSC

Logged by: OC

Site Location: APEC 32

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0		Ground Surface							
1	[Symbol: Dotted pattern]	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry,	22-1	G		0			
2									
3									
4	1	* dense from 1m	22-2	G		0			
5									
6									
7	2	*grey/brown, moist from 2.2m	22-3	G		0			
8									
9									
10	3	End of Borehole							
11									
12									
13	4								
14									
15									
16	5								
17									
18									
19	6								
20									
21									
22	7								
23									
24									
25	8								
26									
27									
28	9								
29									
30									

Drilled By: Uniwide Drilling Ltd.

Hole Diameter: 6"

Drill Method: Solid Stem Auger/ODEX

Well Diameter: 2"/NA in BH

Drill Date: 10/11/2014

Sheet: 1 of 1



Project No: 639-1403 **Borehole Log: 32-MW14-23**

Project: Watson Lake Drilling

Client: PWGSC

Site Location: APEC 32

Logged by: OC

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM 3000	5000	
0	ft	Ground Surface							
1	m	SAND AND GRAVEL some silt, fine to medium, brown, loose, dry	23-1	G			0		
2									
3	1								
4									
5		*compact - dense, HC odour from 1m							
6	2								
7		*grey/brown, moist from 2.2m	23-2	G			>6000		
8									
9									
10	3	*no odour from 6m							
11			23-3	G			>6000		
12									
13	4								
14									
15			23-4				270		
16	5								
17									
18									
19	6								
20			23-5				45		
21									
22	7								
23									
24									
25									
26	8		23-6				0		
27									
28									
29	9								
30			23-7				35		
31									
32	10								
33									
34									
35									
36	11		23-8		Dup-1		45		
37									

Drilled By: Uniwide Drilling Ltd.

Drill Method: Solid Stem Auger/ODEX

Drill Date: 10/11/2014 to 12/11/2014

Hole Diameter: 6"

Well Diameter: 2"/NA in BH

Sheet: 1 of 3



Project No: 639-1403 **Borehole Log: 32-MW14-23**

Project: Watson Lake Drilling

Client: PWGSC

Site Location: APEC 32

Logged by: OC

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration			Well Completion Details
Depth	Symbol	Description	Number	Type	Duplicate	1000	PPM	5000	
							3000		
38	12	SAND some silt, trace gravel, fine to medium, brown, dense, moist							
39									
40									
41	13		23-9	█			25		
42									
43			23-10	█			150		
44									
45	14	SAND AND GRAVEL trace silt, fine to medium, brown, compact, moist							
46									
47			23-11	█					
48									
49	15								
50									
51			23-12	█			140		
52	16								
53									
54									
55	17								
56									
57			23-13	█			25		
58	18								
59									
60									
61			23-14	█			0		
62	19								
63									
64									
65	20								
66									
67			23-15	█			0		
68	21	SAND trace gravel, fine, light brown, loose, moist							
69									
70									
71			23-16	█			0		
72	22								
73									
74					23-17	█			0

Drilled By: Uniwide Drilling Ltd.

Drill Method: Solid Stem Auger/ODEX

Drill Date: 10/11/2014 to 12/11/2014

Hole Diameter: 6"

Well Diameter: 2"/NA in BH

Sheet: 2 of 3



Project No: 639-1403 **Borehole Log: 32-MW14-23**

Project: Watson Lake Drilling

Client: PWGSC

Site Location: APEC 32

Logged by: OC

Checked By: CMcD

SUBSURFACE PROFILE			SAMPLE			VOC Concentration				Well Completion Details	
Depth	Symbol	Description	Number	Type	Duplicate	0	1000	3000 PPM	5000		
75	23		23-17			0					
76							25				
77	24		23-18			0					
78											
79	25	SILT soft, brown, moist				0					
80											
81											
82	26	*grey from 28m	23-19			35					
83											
84	27	*wet at 29m				0					
85											
86											
87	28	*stiff from 31m	23-20			0					
88											
89	29					10					
90											
91											
92	30		23-21		Dup-7	0					
93											
94	31	End of Borehole				0					
95											
96											
97	32		23-22			0					
98											
99	33					0					
100											
101											
102			23-23			0					
103											
104											
105											
106											
107											
108											
109											
110											
111											

Drilled By: Uniwide Drilling Ltd.

Drill Method: Solid Stem Auger/ODEX

Drill Date: 10/11/2014 to 12/11/2014

Hole Diameter: 6"

Well Diameter: 2"/NA in BH

Sheet: 3 of 3



ARCADIS Canada Inc
 308-1080 Mainland Street
 Vancouver, V6B 2T4
 Telephone: 604-632-9941
 Fax: 604-632-9942

Borehole Log: 32-BH15-01

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING METHOD Solid Stem

GROUND ELEVATION _____

DRILL DATE 28-8-15

NORTHING _____ EASTING _____

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL , some silt, brown, fine to medium grained, loose, dry	G	1-1			5 = ppm	
0.4	0.4			G	1-2			0 = ppm	
0.6	0.6								
0.8	0.8								
1.0	1.0								
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8								
2.0	2.0								
2.2	2.2								
2.4	2.4								
2.6	2.6								
2.8	2.8								
3.0	3.0								
3.2	3.2								
3.4	3.4		3.35 Some gravel at 11ft						
3.6	3.6								
3.8	3.8								
4.0	4.0								
4.2	4.2								
4.4	4.4								
4.6	4.6								
4.8	4.8								
5.0	5.0								
5.2	5.2								
5.4	5.4								
5.6	5.6								
5.8	5.8		5.79 Grey at 19ft						
6.0	6.0								
6.2	6.2								
6.4	6.4								
6.6	6.6								
6.8	6.8								
7.0	7.0								
7.2	7.2								
7.4	7.4								
7.6	7.6		7.62 Bottom of borehole at 7.62 meters						

MONITORING WELL TEMPLATE 1 BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22-3-16



ARCADIS Canada Inc
 308-1080 Mainland Street
 Vancouver, V6B 2T4
 Telephone: 604-632-9941
 Fax: 604-632-9942

Borehole Log: 32-BH15-02

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING METHOD Solid Stem

GROUND ELEVATION _____

DRILL DATE 28-8-15

NORTHING _____ EASTING _____

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL , some silt, brown, fine to medium grained, loose, dry	G	2-1			0 = ppm	
0.4	0.4			G	2-2			0 = ppm	
0.6	0.6								
0.8	0.8								
1.0	1.0								
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8								
2.0	2.0								
2.2	2.2			G	2-3				
2.4	2.4			G	Dup1			0 = ppm	
2.6	2.6								
2.8	2.8			G	2-4			0 = ppm	
3.0	3.0		Dense at 9ft						
3.2	3.2								
3.4	3.4								
3.6	3.6			G	2-5			0 = ppm	
3.8	3.8								
4.0	4.0								
4.2	4.2			G	2-6			0 = ppm	
4.4	4.4								
4.6	4.6								
4.8	4.8								
5.0	5.0			G	2-7			0 = ppm	
5.2	5.2								
5.4	5.4								
5.6	5.6								
5.8	5.8								
6.0	6.0			G	2-8			0 = ppm	
6.2	6.2								
6.4	6.4								
6.6	6.6			G	2-9			0 = ppm	
6.8	6.8								
7.0	7.0								
7.2	7.2								
7.4	7.4								
7.6	7.6			G	2-10			0 = ppm	

Bottom of borehole at 7.62 meters



ARCADIS Canada Inc
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 Telephone: 604-632-9941
 Fax: 604-632-9942

Borehole Log: 32-BH15-03

CLIENT PWGSC
 PROJECT NAME Watson Lake AEC 32 Drilling
 PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
 PROJECT NUMBER 639-1501
 DRILLING CONTRACTOR Uniwide
 DRILLING METHOD Solid Stem
 DRILL DATE 28-8-15
 LOGGED BY Kimberley Head CHECKED BY Sean Dignan
 HOLE DIAMETER 6 " WELL DIAMETER _____
 GROUND ELEVATION _____
 NORTHING _____ EASTING _____
 GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL, some silt, brown, fine to medium grained, loose, dry	G	3-1			0 = ppm	
0.4	0.4								
0.6	0.6								
0.8	0.8								
1.0	1.0								
1.2	1.2								
1.4	1.4			G	3-2			5 = ppm	
1.6	1.6								
1.8	1.8			G	3-3			5 = ppm	
2.0	2.0			G	Dup1				
2.2	2.2								
2.4	2.4								
2.6	2.6	G	3-4			0 = ppm			
2.8	2.8								
3.0	3.0								
3.2	3.2								
3.4	3.4	G	3-5			0 = ppm			
3.6	3.6								
3.8	3.8								
4.0	4.0	G	3-6			0 = ppm			
4.2	4.2								
4.4	4.4								
4.6	4.6								
4.8	4.8								
5.0	5.0	G	3-7			0 = ppm			
5.2	5.2								
5.4	5.4								
5.6	5.6	G	3-8			0 = ppm			
5.8	5.8								
6.0	6.0								
6.2	6.2								
6.4	6.4	G	3-9			0 = ppm			
6.6	6.6								
6.8	6.8								
7.0	7.0								
7.2	7.2	G	3-10						
7.4	7.4								
7.6	7.6					0 = ppm			

Bottom of borehole at 7.62 meters



ARCADIS Canada Inc
 308-1080 Mainland Street
 Vancouver, V6B 2T4
 Telephone: 604-632-9941
 Fax: 604-632-9942

Borehole Log: 32-BH15-04

CLIENT PWGSC
 PROJECT NAME Watson Lake AEC 32 Drilling
 PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
 PROJECT NUMBER 639-1501
 DRILLING CONTRACTOR Uniwide
 DRILLING METHOD Solid Stem
 DRILL DATE 26-8-15
 LOGGED BY Kimberley Head CHECKED BY Sean Dignan
 HOLE DIAMETER 6" WELL DIAMETER _____
 GROUND ELEVATION _____
 NORTHING _____ EASTING _____
 GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM	
0.2	0.2		SAND AND GRAVEL , some silt, light brown, medium grained, loose, dry, hydrocarbon odour							
0.4	0.4									
0.6	0.6									
0.8	0.8									
1.0	1.0									
1.2	1.2									
1.4	1.4									
1.6	1.6									
1.8	1.8									
2.0	2.0									
2.2	2.2									
2.4	2.4									
2.6	2.6									
2.8	2.8									
3.0	3.0									
3.2	3.2									
3.4	3.4					G	4-1			100 = lel
3.6	3.6									
3.8	3.8									
4.0	4.0			G	4-2			80 = lel		
4.2	4.2									
4.4	4.4									
4.6	4.6									
4.8	4.8									
5.0	5.0			G	4-3			34 = lel		
5.2	5.18									
5.4	5.4		SANDY SILT , trace gravel, dark brown, loose, damp, hydrocarbon odour							
5.6	5.6			G	4-4			27 = lel		
5.8	5.8									
6.0	6.10		Strong hydrocarbon odour							
6.2	6.2									
6.4	6.4									
6.6	6.6			G	4-5			66 = lel		
6.8	6.8									
7.0	7.0									
7.2	7.2			G	4-6			84 = lel		
7.4	7.4									
7.6	7.62		Moist at 26ft							
7.8	7.8									
8.0	8.0			G	4-7			9 = lel		
8.2	8.2									
8.4	8.4									
8.6	8.6									
8.8	8.8			G	4-8			25 = lel		
9.0	9.14									

Bottom of borehole at 9.14 meters

MONITORING WELL TEMPLATE 1 BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22-3-16



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Borehole Log: 32-BH15-05

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING METHOD Solid Stem

GROUND ELEVATION _____

DRILL DATE 26-8-15

NORTHING _____ EASTING _____

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM	
0.2	0.2		SAND AND GRAVEL , some silt, light brown, medium grained, loose, dry	G	5-1			55 = ppm		
0.4	0.4			G	5-2			30 = ppm		
0.6	0.6									
0.8	0.8									
1.0	1.0									
1.2	1.2									
1.4	1.4									
1.6	1.6									
1.8	1.8									
2.0	2.0					G	5-3			25 = ppm
2.2	2.2									
2.4	2.4									
2.6	2.6									
2.8	2.8									
3.0	3.0			G	5-4		5 = ppm			
3.2	3.2									
3.4	3.4									
3.6	3.6			G	5-5		18 = lel			
3.8	3.8									
4.0	4.0									
4.2	4.2			G	5-6		15 = lel			
4.4	4.4									
4.6	4.6									
4.8	4.8			G	5-7		600 = ppm			
5.0	5.0									
5.2	5.2									
5.4	5.4									
5.6	5.6			G	5-8		90 = ppm			
5.8	5.8									
6.0	6.0									
6.2	6.2									
6.4	6.4									
6.6	6.6			G	5-9		320 = ppm			
6.8	6.8									
7.0	7.0									
7.2	7.2			G	5-10		150 = ppm			
7.4	7.4									
7.6	7.6									
7.8	7.8									
8.0	8.0			G	5-11		145 = ppm			
8.2	8.2									
8.4	8.4									
8.6	8.6									
8.8	8.8			G	5-12		105 = ppm			
9.0	9.0									

MONITORING WELL TEMPLATE 1 BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22-3-16

9.14

Bottom of borehole at 9.14 meters



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Borehole Log: 32-BH15-06

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

HOLE DIAMETER 6" WELL DIAMETER _____

DRILLING METHOD Solid Stem

GROUND ELEVATION _____

DRILL DATE 26-8-15

NORTHING _____ EASTING _____

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL , some silt, light brown, loose, dry	G	6-1			15 = ppm	
0.4	0.4			G	6-2			25 = ppm	
0.6	0.6								
0.8	0.8								
1.0	1.0								
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8								
2.0	2.0								
2.2	2.2								
2.4	2.4								
2.6	2.6								
2.8	2.8								
3.0	3.0								
3.2	3.2								
3.4	3.4								
3.6	3.6								
3.8	3.8								
4.0	4.0								
4.2	4.2								
4.4	4.4								
4.6	4.6								
4.8	4.8								
5.0	5.0								
5.2	5.2								
5.4	5.4								
5.6	5.6								
5.8	5.8								
6.0	6.0								
6.2	6.2								
6.4	6.4								
6.6	6.6								
6.8	6.8								
7.0	7.0								
7.2	7.2								
7.4	7.4								
7.6	7.6								
7.8	7.8								
8.0	8.0								
8.2	8.2								
8.4	8.4								
8.6	8.6								
8.8	8.8								
9.0	9.0								

MONITORING WELL TEMPLATE 1 BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22-3-16

3.35
Strong HC Odour at 11ft

4.42
SANDY SILT, light brown, dense, moist, No HC odour at 17ft

9.14

Bottom of borehole at 9.14 meters



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Borehole Log: 32-BH15-07

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

DRILLING METHOD Solid Stem

DRILL DATE 28-8-15

LOGGED BY Kimberley Head **CHECKED BY** Sean Dignan

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

HOLE DIAMETER 6 " **WELL DIAMETER** _____

GROUND ELEVATION _____

NORTHING _____ **EASTING** _____

GROUND WATER LEVELS ▼ _____

MONITORING WELL TEMPLATE 1 BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22-3-16

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
			SAND AND GRAVEL , some silt, light brown, loose, dry						
	0.2			G	7-1			0 = ppm	
	0.4								
	0.6			G	7-2			0 = ppm	
	0.8								
	1.0								
	1.2								
	1.4								
	1.6								
	1.8			G	7-3			0 = ppm	
	2.0								
	2.2								
	2.4								
	2.6		G	7-4			0 = ppm		
	2.8								
	3.0								
	3.2								
	3.4		G	7-5			0 = ppm		
	3.6								
	3.8								
	4.0		G	7-6			0 = ppm		
	4.2								
	4.4								
	4.6								
	4.8								
	5.0		G	7-7			0 = ppm		
	5.2								
	5.4								
	5.6		G	7-8			0 = ppm		
	5.8								
	6.0								
	6.2								
	6.4		G	7-9			0 = ppm		
	6.6								
	6.8								
	7.0								
	7.2		G	7-10			0 = ppm		
	7.4								
	7.6								
	7.8								
	8.0								
	8.2		G	7-11			0 = ppm		
	8.4								
	8.6								
	8.8								
	9.0								



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Borehole Log: 32-BH15-07

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT NUMBER 639-1501

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM	
9.2	9.4		SAND AND GRAVEL , some silt, light brown, loose, dry <i>(continued)</i> Some cobbles							
9.4	9.6									
9.6	9.8									
9.8	10.0									
10.0	10.2					G	7-12			0 = ppm
10.2	10.4									
10.4	10.6									
10.6	10.8									
10.8	11.0									
11.0	11.2					G	7-13			10 = ppm
11.2	11.4									
11.4	11.6									
11.6	11.8									
11.8	12.0									
12.0										

Bottom of borehole at 12.19 meters



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Borehole Log: 32-BH15-08

CLIENT PWGSC
 PROJECT NAME Watson Lake AEC 32 Drilling
 PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
 PROJECT NUMBER 639-1501
 DRILLING CONTRACTOR Uniwide
 DRILLING METHOD Solid Stem
 DRILL DATE 28-8-15
 LOGGED BY Kimberley Head CHECKED BY Sean Dignan
 HOLE DIAMETER 6 " WELL DIAMETER _____
 GROUND ELEVATION _____
 NORTHING _____ EASTING _____
 GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
	0.2		SAND AND GRAVEL , some silt, light brown, loose, damp 1.83 Some cobbles	G	8-1			0 = ppm	
	0.4			G	8-2			0 = ppm	
	0.6								
	0.8								
	1.0								
	1.2								
	1.4								
	1.6								
	1.8								
	2.0					G	8-3		
	2.2								
	2.4								
	2.6			G	8-4			0 = ppm	
	2.8								
	3.0								
	3.2								
	3.4			G	8-5			0 = ppm	
	3.6								
	3.8								
	4.0			G	8-6			0 = ppm	
	4.2								
	4.4								
	4.6								
	4.8			G	8-7			5 = ppm	
	5.0								
	5.2								
	5.4								
	5.6			G	8-8			0 = ppm	
	5.8								
	6.0								
	6.2								
	6.4								
	6.6			G	8-9			0 = ppm	
	6.8								
	7.0								
	7.2			G	8-10			0 = ppm	
	7.4								
	7.6								

Bottom of borehole at 7.62 meters



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Borehole Log: 32-BH15-09

CLIENT PWGSC
PROJECT NAME Watson Lake AEC 32 Drilling
PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
PROJECT NUMBER 639-1501
DRILLING CONTRACTOR Uniwide
DRILLING METHOD Solid Stem
DRILL DATE 28-8-15
LOGGED BY Kimberley Head **CHECKED BY** Sean Dignan
HOLE DIAMETER 6 " **WELL DIAMETER** _____
GROUND ELEVATION _____
NORTHING _____ **EASTING** _____
GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
			SAND AND GRAVEL, some silt, light brown, loose, damp						
	0.2			G	9-1			0 = ppm	
	0.4								
	0.6			G	9-2			0 = ppm	
	0.8								
	1.0			G	9-3			0 = ppm	
	1.2								
	1.4			G	9-4			0 = ppm	
	1.6								
	1.8								
	2.0								
	2.2								
	2.4								
	2.6								
	2.8								
	3.0								
	3.2								
	3.4								
	3.6								
	3.8								
	4.0								
	4.2								
	4.4								
	4.6								
	4.8								
	5.0								
	5.2								
	5.4								
	5.6								
	5.8								
	6.0								
			Bottom of borehole at 6.10 meters						

MONITORING WELL TEMPLATE 1 BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22-3-16



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Borehole Log: 32-BH15-10

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

DRILLING METHOD Solid Stem

DRILL DATE 28-8-15

LOGGED BY Kimberley Head **CHECKED BY** Sean Dignan

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

HOLE DIAMETER 6 " **WELL DIAMETER** _____

GROUND ELEVATION _____

NORTHING _____ **EASTING** _____

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
	0.2		SAND AND GRAVEL, some silt, light brown, loose, dry						
	0.4			G	10-1			0 = ppm	
	0.6								
	0.8								
	1.0			G	10-2			0 = ppm	
	1.2								
	1.4								
	1.6								
	1.8								
	2.0			G	10-3			0 = ppm	
	2.2								
	2.4								
	2.6	G	10-4			0 = ppm			
	2.8								
	3.0								
	3.2								
	3.4								
	3.6	G	10-5			0 = ppm			
	3.8								
	4.0								
	4.2	G	10-6			0 = ppm			
	4.4								
	4.6								
	4.8								
	5.0	G	10-7			0 = ppm			
	5.2								
	5.4								
	5.6	G	10-8			0 = ppm			
	5.8								
	6.0								
	6.2								
	6.4								
	6.6	G	10-9			0 = ppm			
	6.8								
	7.0								
	7.2	G	10-10			0 = ppm			
	7.4								
	7.6								

Bottom of borehole at 7.62 meters



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Borehole Log: 32-BH15-11

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

DRILLING METHOD Solid Stem/Odex

DRILL DATE 29-8-15

LOGGED BY Kimberley Head **CHECKED BY** Sean Dignan

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

HOLE DIAMETER 6" **WELL DIAMETER** _____

GROUND ELEVATION _____

NORTHING _____ **EASTING** _____

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM	
0.2	0.2		SAND AND GRAVEL , some silt, light grayish brown, compact, dry	G	11-1			310 = ppm		
0.4	0.4			G	11-2			210 = ppm		
0.6	0.6									
0.8	0.8									
1.0	1.0									
1.2	1.2									
1.4	1.4									
1.6	1.6									
1.8	1.8									
2.0	2.0					G	11-3			16 = lel
2.2	2.2									
2.4	2.4									
2.6	2.6			G	11-4		15 = lel			
2.8	2.8		2.74							
3.0	3.0		Strong hydrocarbon odour at 9ft							
3.2	3.2									
3.4	3.4									
3.6	3.6			G	11-5		9 = lel			
3.8	3.8									
4.0	4.0			G	11-6		8 = lel			
4.2	4.2									
4.4	4.4									
4.6	4.6									
4.8	4.8			G	11-7		520 = ppm			
5.0	5.0									
5.2	5.2									
5.4	5.4									
5.6	5.6			G	11-8		300 = ppm			
5.8	5.8									
6.0	6.0									
6.2	6.2									
6.4	6.4									
6.6	6.6			G	11-9		130 = ppm			
6.8	6.8									
7.0	7.0									
7.2	7.2			G	11-10		140 = ppm			
7.4	7.4									
7.6	7.6									
7.8	7.8									
8.0	8.0			G	11-11		35 = ppm			
8.2	8.2									
8.4	8.4									
8.6	8.6									
8.8	8.8			G	11-12		250 = ppm			
9.0	9.0		9.14							

MONITORING WELL TEMPLATE 1 BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22-3-16



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Borehole Log: 32-BH15-11

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT NUMBER 639-1501

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
9.2	9.4		SANDY SILT , some cobbles, light brown, dense, dry	G	11-13			210 = ppm	
9.6	9.8								
10.0	10.2			G	11-14			70 = ppm	
10.4	10.6								
10.8	11.0			G	11-15			130 = ppm	
11.2	11.4								
11.6	11.8								
12.0	12.2			X	11-16			0 = ppm	
12.4	12.6								
12.8	13.0								
13.0	13.11								
13.2	13.4		SAND , light brown, fine to medium grained, dense, dry						
13.6	13.8								
14.0	14.2			X	11-17			15 = ppm	
14.4	14.6								
14.8	15.0								
15.2	15.4			X	11-18			15 = ppm	
15.6	15.8								
16.0	16.2								
16.4	16.6								
16.8	17.0			X	11-19			10 = ppm	
17.2	17.4								
17.6	17.8								
18.0	18.2								
18.2	18.29								
18.4	18.6			X	11-20			15 = ppm	
18.8	19.0								
19.2									

MONITORING WELL TEMPLATE 1 BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22-3-16



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Borehole Log: 32-BH15-11

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT NUMBER 639-1501

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM		
65	19.6		<p>SAND AND GRAVEL, light brown, compact, dry</p>		11-21			15 = ppm			
20.0											
20.2											
20.4											
20.6											
20.8											
21.0											
21.2											
70	21.4							11-22			10 = ppm
21.6											
21.8											
22.0	21.95										
22.2											
22.4											
22.6											
75	22.8				11-23		45 = ppm				
23.0											
23.2											
23.4	23.47										
23.6											
23.8											
24.0											
24.2											
80	24.4				11-24		15 = ppm				
24.6											
24.8											
25.0											
25.2											
25.4											
25.6											
25.8											
85	25.91										

Bottom of borehole at 25.91 meters



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Borehole Log: 32-BH15-12

CLIENT PWGSC
PROJECT NAME Watson Lake AEC 32 Drilling
PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
PROJECT NUMBER 639-1501
DRILLING CONTRACTOR Uniwide
DRILLING METHOD Solid Stem
DRILL DATE 28-8-15
LOGGED BY Kimberley Head **CHECKED BY** Sean Dignan
HOLE DIAMETER 6 " **WELL DIAMETER** _____
GROUND ELEVATION _____
NORTHING _____ **EASTING** _____
GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL , some silt, light brown, loose, dry, strong hydrocarbon odour	G	12-1			0 = ppm	
0.4	0.4			G	12-2			120 = ppm	
0.6	0.6								
0.8	0.8			G	12-3			210 = ppm	
1.0	1.0								
1.2	1.2			G	12-4			15 = lel	
1.4	1.4								
1.6	1.6			G	12-5			19 = lel	
1.8	1.8								
2.0	2.0			G	12-6			11 = lel	
2.2	2.2								
2.4	2.4								
2.6	2.6								
2.8	2.8								
3.0	3.0								
3.2	3.2								
3.4	3.4								
3.6	3.6								
3.8	3.8								
4.0	4.0								
4.2	4.2								
4.4	4.4								
4.57	4.57								

Bottom of borehole at 4.57 meters



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Borehole Log: 32-BH15-13

CLIENT PWGSC
 PROJECT NAME Watson Lake AEC 32 Drilling
 PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
 PROJECT NUMBER 639-1501
 DRILLING CONTRACTOR Uniwide
 DRILLING METHOD Solid Stem
 DRILL DATE 28-8-15
 LOGGED BY Kimberley Head CHECKED BY Sean Dignan
 HOLE DIAMETER 6 " WELL DIAMETER _____
 GROUND ELEVATION _____
 NORTHING _____ EASTING _____
 GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
			SAND AND GRAVEL , some silt, light brown, loose, dry	G	13-1			15 = ppm	
				G	13-2			10 = ppm	
				G	13-3			5 = ppm	
				G	13-4			0 = ppm	
				G	13-5			5 = ppm	
				G	13-6			0 = ppm	
				G	13-7			5 = ppm	
				G	13-8			5 = ppm	
				G	13-9			0 = ppm	
				G	13-10			0 = ppm	
			6.71 Refusal at 23ft 7.01						

Bottom of borehole at 7.01 meters



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Borehole Log: 32-BH15-14

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING METHOD Solid Stem

GROUND ELEVATION _____

DRILL DATE 28-8-15

NORTHING _____ EASTING _____

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
	0.2		SAND AND GRAVEL, some silt, light brown, loose, dry						
	0.4			G	14-1			50 = ppm	
	0.6								
	0.8								
	1.0			G	14-2			570 = ppm	
	1.2								
	1.4								
	1.6								
	1.8			G	14-3			5 = ppm	
	2.0								
	2.2								
	2.4	G	14-4			5 = ppm			
	2.6								
	2.8								
	3.0								
	3.2								
	3.4	G	14-5			0 = ppm			
	3.6								
	3.8								
	4.0	G	14-6			0 = ppm			
	4.2								
	4.4								
	4.6								
	4.8	G	14-7			0 = ppm			
	5.0								
	5.2								
	5.4								
	5.6	G	14-8			0 = ppm			
	5.8								
	6.0								
	6.2								
	6.4								
	6.6	G	14-9			0 = ppm			
	6.8								
	7.0								
	7.2	G	14-10			0 = ppm			
	7.4								
	7.6								

Bottom of borehole at 7.62 meters



ARCADIS Canada Inc
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 Fax: 604-632-9942

Borehole Log: 32-BH15-15

CLIENT PWGSC
 PROJECT NAME Watson Lake AEC 32 Drilling
 PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
 PROJECT NUMBER 639-1501
 DRILLING CONTRACTOR Uniwide
 DRILLING METHOD Solid Stem
 DRILL DATE 28-8-15
 LOGGED BY Kimberley Head CHECKED BY Sean Dignan
 HOLE DIAMETER 6 " WELL DIAMETER _____
 GROUND ELEVATION _____
 NORTHING _____ EASTING _____
 GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
			SAND AND GRAVEL , some silt, light brown, loose, dry						
	0.2			G	15-1			0 = ppm	
	0.4								
	0.6			G	15-2			0 = ppm	
	0.8								
	1.0								
	1.2			G	15-3			0 = ppm	
	1.4								
	1.6			G	15-4			0 = ppm	
	1.8			G	Dup3			0 = ppm	
	2.0								
	2.2								
	2.4								
	2.6								
	2.8								
	3.0								
	3.2								
	3.4								
	3.6		G	15-5			0 = ppm		
	3.8								
	4.0								
	4.2		G	15-6			0 = ppm		
	4.4		G	Dup4			0 = ppm		
	4.6								
	4.8								
	5.0								
	5.2		G	15-7			0 = ppm		
	5.4								
	5.6								
	5.8		G	15-8			0 = ppm		
	6.0								
	6.2								
	6.4								
	6.6		G	15-9			0 = ppm		
	6.8								
	7.0								
	7.2		G	15-10			0 = ppm		
	7.4								
	7.6								

Bottom of borehole at 7.62 meters



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Borehole Log: 32-BH15-16

CLIENT PWGSC
 PROJECT NAME Watson Lake AEC 32 Drilling
 PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
 PROJECT NUMBER 639-1501
 DRILLING CONTRACTOR Uniwide
 DRILLING METHOD ODEX
 DRILL DATE 27-8-15
 LOGGED BY Kimberley Head CHECKED BY Sean Dignan
 HOLE DIAMETER 6" WELL DIAMETER _____
 GROUND ELEVATION _____
 NORTHING _____ EASTING _____
 GROUND WATER LEVELS ∇ 5.06 m

MONITORING WELL TEMPLATE 1 BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22-3-16

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL , some cobbles, some silt, light brown, loose, dry, hydrocarbon odour						
0.4	0.4								
0.6	0.6								
0.8	0.8								
1.0	1.0								
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8								
2.0	2.0								
2.2	2.2								
2.4	2.4								
2.6	2.6								
2.8	2.8								
3.0	3.0								
3.2	3.2				16-1			440 = ppm	
3.4	3.4								
3.6	3.6								
3.8	3.8				16-2				
4.0	4.0								
4.2	4.2								
4.4	4.4								
4.6	4.6								
4.8	4.8				16-3			62 = lel	
5.0	5.0								
5.2	5.2								
5.4	5.4								
5.6	5.6				16-4			100 = lel	
5.8	5.8								
6.0	6.0								
6.2	6.2								
6.4	6.4				16-5			200 = ppm	
6.6	6.6								
6.8	6.8								
7.0	7.0								
7.2	7.2				16-6			500 = ppm	
7.4	7.4								
7.6	7.6							110 = ppm	

Bottom of borehole at 7.62 meters



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Borehole Log: 32-BH15-17

PROJECT NUMBER 639-1501
 DRILLING CONTRACTOR Uniwide
 DRILLING METHOD ODEX
 DRILL DATE 27-8-15
 LOGGED BY Kimberley Head CHECKED BY Sean Dignan

CLIENT PWGSC
 PROJECT NAME Watson Lake AEC 32 Drilling
 PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
 HOLE DIAMETER 6" WELL DIAMETER _____
 GROUND ELEVATION _____
 NORTHING _____ EASTING _____
 GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM	
0.2	0.2		SAND AND GRAVEL, some silt, light brown, loose, damp							
0.4	0.4									
0.6	0.6									
0.8	0.8									
1.0	1.0									
1.2	1.2									
1.4	1.4									
1.6	1.6									
1.8	1.8									
2.0	2.0									
2.2	2.2									
2.4	2.4									
2.6	2.6									
2.8	2.8									
3.0	3.0									
3.2	3.2									
3.4	3.4									
3.6	3.6								10 = ppm	
3.8	3.8						17-1			
4.0	4.0									
4.11	4.11									
4.2	4.2				SANDY SILT, light brown, dense, dry		17-2			10 = ppm
4.4	4.4									
4.6	4.6									
4.8	4.8									
5.0	5.0							17-3		10 = ppm
5.2	5.2									
5.4	5.4									
5.6	5.6									
5.8	5.8							17-4		10 = ppm
6.0	6.0									
6.2	6.2									
6.4	6.4									
6.6	6.6							17.5		10 = ppm
6.8	6.8									
7.0	7.0									
7.2	7.2									
7.4	7.4									
7.6	7.6									

Bottom of borehole at 7.62 meters



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Borehole Log: 32-BH15-18

CLIENT PWGSC
 PROJECT NAME Watson Lake AEC 32 Drilling
 PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
 PROJECT NUMBER 639-1501
 DRILLING CONTRACTOR Uniwide
 DRILLING METHOD ODEX
 DRILL DATE 27-8-15
 LOGGED BY Kimberley Head CHECKED BY Sean Dignan
 HOLE DIAMETER 6" WELL DIAMETER _____
 GROUND ELEVATION _____
 NORTHING _____ EASTING _____
 GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM			
0.2	0.2		SAND AND GRAVEL , some silt, light brown, loose, damp									
0.4	0.4											
0.6	0.6											
0.8	0.8											
1.0	1.0											
1.2	1.2											
1.4	1.4											
1.6	1.6											
1.8	1.8											
2.0	2.0											
2.2	2.2											
2.4	2.4											
2.6	2.6											
2.8	2.8											
3.0	3.0											
3.2	3.2											
3.4	3.4											
3.6	3.6											
3.8	3.8											
4.0	3.96					X	18-1			50 = ppm		
4.2	4.0				SANDY SILT , light brown, dense, dry	X	18-2			50 = ppm		
4.4	4.2											
4.6	4.4						X	18-3			16 = lel	
4.8	4.6											
5.0	4.8						X	18-4			10 = lel	
5.2	5.0											
5.4	5.2					X	18-5			80 = ppm		
5.6	5.4											
5.8	5.6					X	18-6			30 = ppm		
6.0	5.8											
6.2	6.0											
6.4	6.2											
6.6	6.4											
6.8	6.6											
7.0	6.8											
7.2	7.0											
7.4	7.2											
7.6	7.62											

Bottom of borehole at 7.62 meters



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Borehole Log: 32-BH15-19

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING METHOD Solid Stem

GROUND ELEVATION _____

DRILL DATE 27-8-15

NORTHING _____ EASTING _____

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL , some silt, light brown, loose, damp						
0.4	0.4								
0.6	0.6								
0.8	0.8								
1.0	1.0								
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8								
2.0	2.0								
2.2	2.2								
2.4	2.4								
2.6	2.6								
2.8	2.8								
3.0	3.0								
3.2	3.2			G	19-1			0 = ppm	
3.4	3.4								
3.6	3.6								
3.8	3.8								
4.0	4.0			G	19-2			0 = ppm	
4.2	4.2								
4.4	4.4								
4.42	4.42								
4.6	4.6		SANDY SILT , light brown, dense, dry						
4.8	4.8								
5.0	5.0				G	19-3			0 = ppm
5.2	5.2								
5.4	5.4								
5.6	5.6				G	19-4			0 = ppm
5.8	5.8								
6.0	6.0								
6.2	6.2								
6.4	6.4								
6.6	6.6				G	19-5			0 = ppm
6.8	6.8								
7.0	7.0								
7.2	7.2								
7.4	7.4			G	19-6			20 = ppm	
7.6	7.6								

Bottom of borehole at 7.62 meters



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Borehole Log: 32-BH15-20

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING METHOD Solid Stem

GROUND ELEVATION _____

DRILL DATE 27-8-15

NORTHING _____ EASTING _____

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM	
0.2	0.2		SAND AND GRAVEL, some silt, light brown, loose, damp							
0.4	0.4									
0.6	0.6									
0.8	0.8									
1.0	1.0									
1.2	1.2									
1.4	1.4									
1.6	1.6									
1.8	1.8									
2.0	2.0									
2.2	2.2									
2.4	2.4									
2.6	2.6									
2.8	2.8									
3.0	3.0									
3.2	3.2			G	20-1			0 = ppm		
3.4	3.4									
3.6	3.6									
3.8	3.8									
4.0	4.0									
4.2	4.2			G	20-2			0 = ppm		
4.4	4.4									
4.6	4.6									
4.8	4.8									
5.0	5.0		SANDY SILT, light brown, dense, dry	G	20-3			10 = ppm		
5.2	5.2									
5.4	5.4				G	20-4			30 = ppm	
5.6	5.6									
5.8	5.8									
6.0	6.0									
6.2	6.2									
6.4	6.4									
6.6	6.6			G	20-5			60 = ppm		
6.8	6.8									
7.0	7.0									
7.2	7.2									
7.4	7.4			G	20-6			0 = ppm		
7.6	7.6									

Bottom of borehole at 7.62 meters



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Borehole Log: 32-BH15-21

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING METHOD Solid Stem

GROUND ELEVATION _____

DRILL DATE 27-8-15

NORTHING _____ EASTING _____

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM	
0.2	0.2		SAND AND GRAVEL, some silt, light brown, loose, damp							
0.4	0.4									
0.6	0.6									
0.8	0.8									
1.0	1.0									
1.2	1.2									
1.4	1.4									
1.6	1.6									
1.8	1.8									
2.0	2.0									
2.2	2.2									
2.4	2.4									
2.6	2.6									
2.8	2.8									
3.0	3.0									
3.2	3.2									
3.4	3.4				21-1			0 = ppm		
3.6	3.6									
3.8	3.8									
4.0	4.0									
4.2	4.2									
4.4	4.4									
4.6	4.57				21-2			5 = ppm		
4.8	4.8		SANDY SILT, light brown, dense, dry							
5.0	5.0									
5.2	5.2					21-3		10 = ppm		
5.4	5.4									
5.6	5.6									
5.8	5.8					21-4		0 = ppm		
6.0	6.0									
6.2	6.2									
6.4	6.4					21-5		0 = ppm		
6.6	6.6									
6.8	6.8									
7.0	7.0									
7.2	7.2									
7.4	7.4									
7.6	7.62									

Bottom of borehole at 7.62 meters



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Borehole Log: 32-BH15-22

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING CONTRACTOR Uniwide

GROUND ELEVATION _____

DRILLING METHOD Solid Stem

NORTHING _____ EASTING _____

DRILL DATE 27-8-15

GROUND WATER LEVELS ▼

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL SOME, silt light, brown, loose grained, dry Sand and Gravel		22-1			5 = ppm	
0.4	0.4				22-2			10 = ppm	
0.6	0.6				22-3			15 = ppm	
0.8	0.8				22-4			5 = ppm	
1.0	1.0								
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8								
2.0	2.0								
2.2	2.2								
2.4	2.4								
2.6	2.6								
2.8	2.8								
3.0	3.0								

Bottom of borehole at 3.05 meters



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Borehole Log: 32-BH15-23

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING CONTRACTOR Uniwide

GROUND ELEVATION _____

DRILLING METHOD Solid Stem

NORTHING _____ EASTING _____

DRILL DATE 27-8-15

GROUND WATER LEVELS ▼

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL SOME , silt light, brown, loose grained, dry Sand and Gravel		23-1			10 = ppm	
0.4	0.4				23-2			0 = ppm	
0.6	0.6								
0.8	0.8				23-3			5 = ppm	
1.0	1.0								
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8				23-4			0 = ppm	
2.0	2.0								
2.2	2.2								
2.4	2.4								
2.6	2.6								
2.8	2.8								
3.0	3.0								

Bottom of borehole at 3.05 meters



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Borehole Log: 32-BH15-24

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING METHOD Solid Stem

GROUND ELEVATION _____

DRILL DATE 27-8-15

NORTHING _____ EASTING _____

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL SOME, silt light, brown, loose grained, dry Sand and Gravel		24-1			0 = ppm	
0.4	0.4								
0.6	0.6								
0.8	0.8								
1.0	1.0								
1.2	1.2								
1.4	1.4							5 = ppm	
1.6	1.6								
1.8	1.8				24-3			10 = ppm	
2.0	2.0								
2.2	2.2								
2.4	2.4								
2.6	2.6				24-4			0 = ppm	
2.8	2.8								
3.0	3.0								

Bottom of borehole at 3.05 meters



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Borehole Log: 32-BH15-25

CLIENT PWGSC
PROJECT NAME Watson Lake AEC 32 Drilling
PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
PROJECT NUMBER 639-1501
DRILLING CONTRACTOR Uniwide
DRILLING METHOD Solid Stem
DRILL DATE 27-8-15
LOGGED BY Kimberley Head **CHECKED BY** Sean Dignan
HOLE DIAMETER 6 " **WELL DIAMETER** _____
GROUND ELEVATION _____
NORTHING _____ **EASTING** _____
GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL SOME , silt light, brown, loose grained, dry Sand and Gravel		25-1			0 = ppm	
0.4	0.4				25-2			5 = ppm	
0.6	0.6				25-3			10 = ppm	
0.8	0.8				25-6			0 = ppm	
1.0	1.0								
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8								
2.0	2.0								
2.2	2.2								
2.4	2.4								
2.6	2.6								
2.8	2.8								
3.0	3.0								

Bottom of borehole at 3.05 meters



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Borehole Log: 32-BH15-26

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING METHOD Solid Stem

GROUND ELEVATION _____

DRILL DATE 27-8-15

NORTHING _____ EASTING _____

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL SOME , silt light, brown, loose grained, dry Sand and Gravel						
0.4	0.4			G	26-1			140 = ppm	
0.6	0.6								
0.8	0.8			G	26-2			250 = ppm	
1.0	1.0			G	Dup6				
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8								
2.0	2.0			G	26-3			240 = ppm	
2.2	2.2								
2.4	2.4			G	26-4			200 = ppm	
2.6	2.6								
2.8	2.8								
3.0	3.0			G	26-5			300 = ppm	
3.2	3.2								
3.4	3.4	G	26-6			400 = ppm			
3.6	3.6								
3.8	3.8								
4.0	4.0	G	26-7			420 = ppm			
4.2	4.2								
4.4	4.4								
4.6	4.6								
4.8	4.8								
5.0	5.0	G	26-8			375 = ppm			
5.2	5.2								
5.4	5.4								
5.6	5.6								
5.8	5.8								
6.0	6.0								

Bottom of borehole at 6.10 meters



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Borehole Log: 32-BH15-27

CLIENT PWGSC
PROJECT NAME Watson Lake AEC 32 Drilling
PROJECT LOCATION Watson Lake Airport, Watson Lake, YT
PROJECT NUMBER 639-1501
DRILLING CONTRACTOR Uniwide
DRILLING METHOD Solid Stem
DRILL DATE 27-8-15
LOGGED BY Kimberley Head **CHECKED BY** Sean Dignan
HOLE DIAMETER 6 " **WELL DIAMETER** _____
GROUND ELEVATION _____
NORTHING _____ **EASTING** _____
GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL SOME , silt light, brown, loose grained, dry Sand and Gravel		27-1			0 = ppm	
0.4	0.4				27-2			0 = ppm	
0.6	0.6				27-3			5 = ppm	
0.8	0.8				27-4			0 = ppm	
1.0	1.0								
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8								
2.0	2.0								
2.2	2.2								
2.4	2.4								
2.6	2.6								
2.8	2.8								
3.0	3.0								

Bottom of borehole at 3.05 meters



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Borehole Log: 32-BH15-28

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING CONTRACTOR Uniwide

GROUND ELEVATION _____

DRILLING METHOD Solid Stem

NORTHING _____ EASTING _____

DRILL DATE 27-8-15

GROUND WATER LEVELS ▼

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL SOME, silt light, brown, loose grained, dry Sand and Gravel		28-1			0 = ppm	
0.4	0.4				28-2			5 = ppm	
0.6	0.6				28-3			0 = ppm	
0.8	0.8				28-4			0 = ppm	
1.0	1.0								
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8								
2.0	2.0								
2.2	2.2								
2.4	2.4								
2.6	2.6								
2.8	2.8								
3.0	3.0								

Bottom of borehole at 3.05 meters



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Borehole Log: 32-BH15-29

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING CONTRACTOR Uniwide

GROUND ELEVATION _____

DRILLING METHOD Solid Stem

NORTHING _____ EASTING _____

DRILL DATE 27-8-15

GROUND WATER LEVELS ▼

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
0.2	0.2		SAND AND GRAVEL SOME , silt light, brown, loose grained, dry Sand and Gravel		29-1			0 = ppm	
0.4	0.4				29-2			5 = ppm	
0.6	0.6								
0.8	0.8				29-3			15 = ppm	
1.0	1.0								
1.2	1.2								
1.4	1.4								
1.6	1.6								
1.8	1.8				29-3			15 = ppm	
2.0	2.0								
2.2	2.2								
2.4	2.4				29-4			0 = ppm	
2.6	2.6								
2.8	2.8								
3.0	3.0								

Bottom of borehole at 3.05 meters



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Borehole Log: 32-BH15-30

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

PROJECT NUMBER 639-1501

DRILLING CONTRACTOR Uniwide

HOLE DIAMETER 6 " WELL DIAMETER _____

DRILLING METHOD ODEX

GROUND ELEVATION _____

DRILL DATE 28-8-15

NORTHING _____ EASTING _____

LOGGED BY Kimberley Head CHECKED BY Sean Dignan

GROUND WATER LEVELS ▼ _____

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM	
0.2	0.2		SAND AND GRAVEL , some silt, light brown, loose, dry, strong hydrocarbon odour							
0.4	0.4									
0.6	0.6									
0.8	0.8									
1.0	1.0									
1.2	1.2									
1.4	1.4									
1.6	1.6									
1.8	1.8									
2.0	2.0									
2.2	2.2									
2.4	2.4									
2.6	2.6									
2.8	2.8									
3.0	3.0									
3.2	3.2					X	30-1			250 = ppm
3.4	3.4									
3.6	3.6									
3.8	3.8									
4.0	4.0					X	30-2			310 = ppm
4.2	4.2									
4.4	4.4									
4.6	4.6									
4.8	4.8									
5.0	5.0					X	30-3			230 = ppm
5.2	5.2									
5.4	5.4									
5.6	5.6									
5.8	5.8			X	30-4	0				
6.0	6.0									
6.2	6.2									
6.4	6.4									
6.6	6.6									
6.8	6.8									
7.0	7.0			X	30-5	0				
7.2	7.2									
7.4	7.4									
7.6	7.6			X	30-6			200 = ppm		
7.8	7.8									
8.0	8.0									
8.2	8.2									
8.4	8.4									
8.6	8.6									
8.8	8.8									
9.0	9.0									
			7.62							
			SILTY SAND , some gravel, light brown, dense, dry							
				X	30-7			300 = ppm		
				X	30-8			320 = ppm		

MONITORING WELL TEMPLATE 1 BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22-3-16



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Borehole Log: 32-BH15-30

CLIENT PWGSC

PROJECT NAME Watson Lake AEC 32 Drilling

PROJECT NUMBER 639-1501

PROJECT LOCATION Watson Lake Airport, Watson Lake, YT

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
9.2	9.4		SILTY SAND , some gravel, light brown, dense, dry <i>(continued)</i>	X	30-9			395 = ppm	
9.6	9.8								
10.0	10.2								
10.4	10.6								
35	10.67								

Bottom of borehole at 10.67 meters

BOREHOLE ID: BH16-09



Well Type: Borehole
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Metal Debris Area, BH16 - L

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH / PAD
 Drill Date: November 23, 2016 Page: 1 of 2

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
0		Ground Surface											
0 - 1		SAND and GRAVEL Brown, very fine to medium SAND and fine GRAVEL and some silt. Loose, dry, staining and odours not observed.	G	100	N	BH16-09 (0.2)		1.6					
1 - 4													
4 - 5			G	200	Y	BH16-09 (1.25)		0.7					
5 - 8													
8 - 9		SAND and GRAVEL Brown, very fine to medium SAND and fine to medium GRAVEL with some silt. Loose, dry, staining and odours not observed.	G	100	Y	BH16-09 (2.75)		0.6					
9 - 12													
12 - 13			G	120	N	BH16-09 (3.5)		3.9					
13 - 16													
16 - 17			G	120	Y	BH16-09 (4.75)		0.9					
17 - 18													

Date of Water Level: N/A
 Water Level (from TOC): N/A
 Well-Borehole Diameter: 100mm (4")
 Well Casing Diameter: N/A
 Well Casing Material: N/A
 Well Screen Slot Size: N/A
 Depth of Well (TOC): N/A

MONITORING WELL ID: BH16-09



Well Type: Borehole

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Metal Debris Area, BH16 - L

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: CDH / PAD

Drill Date: November 23, 2016 Page: 2 of 2

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
19		SAND and GRAVEL Brown, very fine to medium SAND and fine to medium GRAVEL with some silt. Loose, dry, staining and odours not observed.											
20	6	SAND and GRAVEL Brown, very fine to medium SAND and fine to medium GRAVEL with some silt. Loose, dry, staining and odours not observed.	G	130	N	BH16-09 (6.0)		3.7					Cuttings and Slough
22													Sand
23	7		G	175	N	BH16-09 (6.7)		1.7					
26	8		G	130	Y	BH16-09 (7.75)		0.8					Bentonite
29	9		G	90	N	BH16-09 (8.75)		1.2					
32	10		G	90	Y	BH16-09 (9.75)		0.6					Slough
33		End of Hole											
34													
35													
36													

Date of Water Level: N/A
Water Level (from TOC): N/A

Well-Borehole Diameter: 100mm (4")
Well Casing Diameter: N/A
Well Casing Material: N/A
Well Screen Slot Size: N/A

Depth of Well (TOC): N/A

BOREHOLE ID: BH16-10



Well Type: Borehole

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Metal Debris Area, BH16-M

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: CDH / PAD

Drill Date: November 23, 2016 Page: 1 of 2

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
0		Ground Surface											
0.2		SAND Brown, fine to medium SAND with trace silt and trace gravel. Loose, dry, staining and odours not observed.	G	100	N	BH16-10 (0.2)	0.2						Sand
1.25													Slough
1.25													Bentonite
2.75													Slough
4.0		SAND Brown SAND with some silt and trace gravel. Compact, moist, staining and odours not observed.	G	110	N	BH16-10 (4.0)	0.2						
4.75		SAND Brown SAND with trace silt and trace fine to medium gravel. Loose, moist, staining and odours not observed.	G	100	Y	BH16-10 (4.75)	0.2						
17													Bentonite

Date of Water Level: N/A
 Water Level (from TOC): N/A
 Well-Borehole Diameter: 100mm (4")
 Well Casing Diameter: N/A
 Well Casing Material: N/A
 Well Screen Slot Size: N/A
 Depth of Well (TOC): N/A

MONITORING WELL ID: BH16-10



Well Type: Borehole

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Metal Debris Area, BH16-M

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: CDH / PAD

Drill Date: November 23, 2016 Page: 2 of 2

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
19	6	SAND Brown SAND with trace silt and trace fine to medium gravel. Loose, moist, staining and odours not observed.	G	110	N	BH16-10 (6.0)	0.4					[Hatched] [Solid Black]	
20							0.2						
21	7	SAND Brown and grey, fine to medium SAND with some silt and trace gravel. Compact, moist, staining and odours not observed.	G	120	N	BH16-10 (7.0)	0.2					[Solid Black]	Slough
22							1.1						
23	8	SAND Brown and grey, fine to medium SAND with some silt and trace gravel. Loose, moist, staining and odours not observed.	G	105	Y	BH16-10 (7.75)	1.1					[Solid Black]	
24							1.9						
25	9	SAND Brown, fine to medium SAND with some silt in layers and trace fine gravel. Loose, moist, staining and odours not observed.	G	111	N	BH16-10 (9.0)	1.9					[Hatched]	Bentonite
26							1.6						
27	10	End of Hole										[Hatched]	
28													
29													
30													
31													
32													
33													
34													
35													
36													

Date of Water Level: N/A	Well-Borehole Diameter: 100mm (4")	Depth of Well (TOC): N/A
Water Level (from TOC): N/A	Well Casing Diameter: N/A	
	Well Casing Material: N/A	
	Well Screen Slot Size: N/A	

BOREHOLE ID: BH16-11



Well Type: Borehole

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Tank E Area, BH16-1

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: CDH/PAD

Drill Date: November 23, 2016 Page: 1 of 2

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
0		Ground Surface											
0.8		SAND Brown, fine to medium SAND with some silt and trace gravel. Compact, dry, staining and odours not observed.	G	120	N	BH16-11 (0.2)							Sand
0.9													Bentonite
4.9		SAND Brown, fine to medium SAND with trace silt and trace gravel. Loose, dry, trace HC like odours, no staining observed.	G	120	Y	BH16-11 (2.0)							
8.0		No HC like odours observed below 2.5m.											Slough
10.4			G	115	N	BH16-11 (3.0)							
13.4			G	115	N	BH16-11 (3.8)							
15.4			G	120	N	BH16-11 (4.4)							Bentonite
17.8		SAND Brown, fine to medium SAND with trace silt and trace gravel. Compact, dry, staining and odours not observed.	G	125	N	BH16-11 (5.0)							Slough

Date of Water Level: N/A
Water Level (from TOC): N/A

Well-Borehole Diameter: 100mm (4")
Well Casing Diameter: N/A
Well Casing Material: N/A
Well Screen Slot Size: N/A

Depth of Well (TOC): N/A

MONITORING WELL ID: BH16-11



Well Type: Borehole

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Tank E Area, BH16-1

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: CDH/PAD

Drill Date: November 23, 2016 Page: 2 of 2

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
19	6	SAND Brown, fine to medium SAND with trace silt and trace gravel. Compact, dry, staining and odours not observed.											
20			G	110	N	BH16-11 (6.0)	0.6						
21	7	SAND Brown, fine to medium SAND with trace silt and trace gravel. Dense, dry, staining and odours not observed.											
22			G	120	Y	BH16-11 (6.75)	1.3						Slough
23	8	SAND Brown, fine to medium SAND with trace silt and trace gravel. Dense, dry, staining and odours not observed.											
24			G	120	Y	BH16-11 (8.25)	2.2						
25	9	SAND Brown, fine to medium SAND with trace silt and trace gravel. Dense, dry, staining and odours not observed.											
26			G	120	Y	BH16-11 (9.0)	2.3						Bentonite
27	10	SAND Brown, fine to medium SAND with trace silt and trace gravel. Dense, dry, staining and odours not observed.											
28			G	120	N	BH16-11 (9.75)	1.8						
29		End of Hole											
30													
31													
32													
33													
34													
35													
36													

Date of Water Level: N/A	Well-Borehole Diameter: 100mm (4")	Depth of Well (TOC): N/A
Water Level (from TOC): N/A	Well Casing Diameter: N/A	
	Well Casing Material: N/A	
	Well Screen Slot Size: N/A	

MONITORING WELL ID: MW16-01



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm B, MW16-B

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 9, 2016 Page: 1 of 3

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
ft m													
-2													
-1													
0		Ground Surface											
1		SAND Light brown, fine to medium SAND with some gravel and trace organics (roots). Loose, dry to moist, staining and odours not observed. No organics below 0.1m.		100	N	MW16-01 (0.5)		0.6					Concrete
2													
3		SAND Brown, fine to medium SAND with some silt and trace gravel. Compact below 1.0m. Moisture, staining and odours not observed.		100	Y	MW16-01 (1.2)		0.8					Bentonite
4													
5													
6													
7													
8		SAND Brown, fine to medium SAND with some silt and some to trace fine gravel. Compact, dense, dry, low to no plasticity, no odours observed.		100	N	MW16-01 (2.4)		0.6					
9													
10													
11													
12		SAND Brown, fine to medium soft SAND. Loose, wet, low plasticity, no odours observed.											
13													
14		SAND Dark brown to brown mottled, fine to medium SAND with some silt and trace fine to medium gravel. Compact, dense, dry, staining and odours not observed.		115	N	MW16-01 (4.0)		0.8					Well Screen and Silica Sand
15													
16													
17													
18													Bentonite

Date of Water Level: November 24, 2016
 Water Level (from TOC): 5.33m
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 5.61m

MONITORING WELL ID: MW16-01



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm B, MW16-B

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 9, 2016 Page: 2 of 3

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
19	6	SAND Dark brown to brown mottled, fine to medium SAND with some silt and trace fine to medium gravel. Compact, dense, dry, staining and odours not observed.											
20		SAND Dark brown, fine to medium SAND with some silt and trace gravel. Very dense, dry, staining and odours not observed.		140	N	MW16-01 (6.0)	0.9						
21	7	SAND Dark brown, fine to medium SAND with some silt and trace gravel. Very dense, dry, staining and odours not observed.											
22		SAND Dark brown, fine to medium SAND with some silt and trace gravel. Very dense, dry, staining and odours not observed.											
23		SAND Dark brown, fine to medium SAND with some silt and trace gravel. Very dense, dry, staining and odours not observed.		140	N	MW16-01 (7.0)	1.4						
24	8	SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.		140	N	MW16-01 (7.2)	1.1						
25		SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.											
26		SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.											
27		SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.		140	N	MW16-01 (8.0)	1.3						
28	9	SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.											
29		SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.											
30		SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.		120	N	MW16-01 (9.0)	4.8						
31	10	SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.											
32		SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.											
33		SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.		120	Y	MW16-01 (10.0)				4000			
34	11	SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.											
35		SAND Grey and dark brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry, staining and odours not observed.		120	Y	DUP B							
36	11	SAND Brown, fine to medium SAND with trace silt and trace gravel. Compact, dry, moderate odours at 10.8m, no staining observed.											
37		SAND Brown, fine to medium SAND with trace silt and trace gravel. Compact, dry, moderate odours at 10.8m, no staining observed.		120	N	MW16-01 (11.0)				1500.0			
38	11	SAND Brown, fine to medium SAND with trace silt and trace gravel. Compact, dry, moderate odours at 10.8m, no staining observed.											
39		SAND Brown, fine to medium SAND with trace silt and trace gravel. Compact, dry, moderate odours at 10.8m, no staining observed.											

Date of Water Level: November 24, 2016
 Water Level (from TOC): 5.33m
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 5.61m

MONITORING WELL ID: MW16-01



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm B, MW16-B

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 9, 2016 Page: 3 of 3

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
40		SAND Brown and grey, fine to medium SAND with some silt and trace gravel. Dense, dry, moderate HC like odours at 11.5m, no staining observed.		120	N	MW16-01 (12.0)		570.0					
41		Sandy SILT Dark grey, very fine sandy SILT with some fine to medium gravel. Very compact, very dense, dry, low odours, no staining observed.											
43					Y	MW16-01 (13.0)		47.2					
46					N	MW16-01 (14.0)		11.1					
48					Y	MW16-01 (15.0)		14.6					
49		End of Hole											
50		Slough encountered at 11.5m. Had significant odour. Interpreted as fall down from section at 10.2m.											
52		Disturbed, not representative.											

Date of Water Level: November 24, 2016
 Water Level (from TOC): 5.33m
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 5.61m

MONITORING WELL ID: MW16-02



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm B, MW16-C

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 10, 2016 Page: 1 of 3

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
0		Ground Surface											
0.5		SAND Brown to orange, fine to medium SAND with some silt, trace to no gravel. Compact, dry, staining and odours not observed.											
1.2		SAND Brown to grey, fine to medium SAND with trace to no silt, trace gravel. Loose, dry, staining and odours not observed.	G	100	N	MW16-02 (0.5)	0.6						
1.2		SAND Brown and grey SAND with some silt and traces of fine to medium gravel. Compact, moist, staining and odours not observed.	G	100	Y	MW16-02 (1.2)	0.6						
1.2		SAND Brown to grey, fine to medium SAND with some silt and trace gravel. Compact, moist, staining and odours not observed.	G	100	N	DUP C							
2.0		SAND Brown to grey, fine to medium SAND with some silt and trace gravel. Compact, moist, staining and odours not observed.											
2.0		SAND Grey, fine to medium SAND with some gravel and trace silt. Loose, dry, staining and odours not observed.	G	100	N	MW16-02 (2.0)	0.7						
3.0		SAND Brown, fine to coarse SAND with some fine to medium gravel. Loose, dry, staining and odours not observed.											
3.0		SAND Brown, fine to coarse SAND with some fine to medium gravel. Loose, dry, staining and odours not observed.	G	140	N	MW16-02 (3.0)	0.4						
4.0		SAND Brown fine to coarse SAND, some gravel and trace silt. Slightly dense, moist, odours and staining were not observed.											
4.0		Silty SAND Brown and grey silty SAND with fine to medium gravel. Dense, compact, moist, staining and odours not observed.	G	140	N	MW16-02 (4.0)	1.8						

Date of Water Level: November 23, 2016
 Water Level (from TOC): Dry at 5.47m
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): N/A

MONITORING WELL ID: MW16-02



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm B, MW16-C

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 10, 2016 Page: 2 of 3

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
14	5	Silty SAND Brown and grey silty SAND with fine to medium gravel. Dense, compact, moist, staining and odours not observed.	G	140	Y	MW16-02 (4.5)	4.0					Well Screen and Sand	
15		Silty SAND Brown silty SAND with some fine gravel. Very compact, very dense, dry, staining and odours not observed.	G	140	N	MW16-02 (5.0)	2.8						
16	6	Silty SAND Dark grey silty SAND with some fine to medium gravel. Very compact, dense, dry, low to no plasticity, odours not observed.	G	106	N	MW16-02 (6.0)	0.7					Bentonite	
17		Silty SAND Dark grey silty SAND with some fine to medium gravel. Very compact, very dense, dry, staining and odours not observed.	G	106	Y	MW16-02 (7.0)	1.2						
18	7	Silty SAND Dark grey silty SAND with some fine to medium gravel. Dense. Moisture, staining and odours not observed.										Sand	
19		Trace gravel below 7.0m.											
20	8	Silty SAND Dark grey silty SAND with some fine to medium gravel. Dense. Moisture, staining and odours not observed.	G	110	N	MW16-02 (8.0)	0.5						
21		SAND Brown, fine to medium SAND with trace silt, trace gravel and trace orange staining. Dense, moist, odours not observed.	G	150	N	MW16-02 (9.0)	0.8						
22	9												
23													

Date of Water Level: November 23, 2016
 Water Level (from TOC): Dry at 5.47m
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): N/A

MONITORING WELL ID: MW16-02



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm B, MW16-C

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 10, 2016 Page: 3 of 3

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
31	10	SAND Brown, fine to medium SAND with trace silt, trace gravel and trace orange staining. Dense, moist, odours not observed.										Sand Bentonite	
33			G	150	N	MW16-02 (10.0)	1.0						
36			G	150	N	MW16-02 (11.0)	1.2						
39	12		G	150	Y	MW16-02 (12.0)	1.8						
40		End of Hole											
43	13												
46	14												

Date of Water Level: November 23, 2016
 Water Level (from TOC): Dry at 5.47m
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): N/A

MONITORING WELL ID: MW16-02



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm B, MW16-C

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 10, 2016 Page: 1 of 3

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
0		Ground Surface											
0.5		SAND Brown to orange, fine to medium SAND with some silt, trace to no gravel. Compact, dry, staining and odours not observed.											
1.2		SAND Brown to grey, fine to medium SAND with trace to no silt, trace gravel. Loose, dry, staining and odours not observed.	G	100	N	MW16-02 (0.5)	0.6						
1.2		SAND Brown and grey SAND with some silt and traces of fine to medium gravel. Compact, moist, staining and odours not observed.	G	100	Y	MW16-02 (1.2)	0.6						
1.2		SAND Brown to grey, fine to medium SAND with some silt and trace gravel. Compact, moist, staining and odours not observed.	G	100	N	DUP C							
2.0		SAND Brown to grey, fine to medium SAND with some silt and trace gravel. Compact, moist, staining and odours not observed.											
2.0		SAND Grey, fine to medium SAND with some gravel and trace silt. Loose, dry, staining and odours not observed.	G	100	N	MW16-02 (2.0)	0.7						
3.0		SAND Brown, fine to coarse SAND with some fine to medium gravel. Loose, dry, staining and odours not observed.											
3.0		SAND Brown, fine to coarse SAND with some fine to medium gravel. Loose, dry, staining and odours not observed.	G	140	N	MW16-02 (3.0)	0.4						
4.0		SAND Brown fine to coarse SAND, some gravel and trace silt. Slightly dense, moist, odours and staining were not observed.											
4.0		Silty SAND Brown and grey silty SAND with fine to medium gravel. Dense, compact, moist, staining and odours not observed.	G	140	N	MW16-02 (4.0)	1.8						

Date of Water Level: November 23, 2016
 Water Level (from TOC): Dry at 5.47m

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): N/A

MONITORING WELL ID: MW16-02



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm B, MW16-C

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 10, 2016 Page: 2 of 3

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
14	5	Silty SAND Brown and grey silty SAND with fine to medium gravel. Dense, compact, moist, staining and odours not observed.	G	140	Y	MW16-02 (4.5)	4.0					Well Screen and Sand	
15		Silty SAND Brown silty SAND with some fine gravel. Very compact, very dense, dry, staining and odours not observed.	G	140	N	MW16-02 (5.0)	2.8						
16	6	Silty SAND Dark grey silty SAND with some fine to medium gravel. Very compact, dense, dry, low to no plasticity, odours not observed.	G	106	N	MW16-02 (6.0)	0.7					Bentonite	
17		Silty SAND Dark grey silty SAND with some fine to medium gravel. Very compact, very dense, dry, staining and odours not observed.	G	106	Y	MW16-02 (7.0)	1.2						
18	7	Silty SAND Dark grey silty SAND with some fine to medium gravel. Dense. Moisture, staining and odours not observed.										Sand	
19		Trace gravel below 7.0m.											
20	8	Silty SAND Dark grey silty SAND with some fine to medium gravel. Dense. Moisture, staining and odours not observed.	G	110	N	MW16-02 (8.0)	0.5						
21		SAND Brown, fine to medium SAND with trace silt, trace gravel and trace orange staining. Dense, moist, odours not observed.	G	150	N	MW16-02 (9.0)	0.8						
22	9												
23													

Date of Water Level: November 23, 2016
 Water Level (from TOC): Dry at 5.47m

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): N/A

MONITORING WELL ID: MW16-02



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm B, MW16-C

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 10, 2016 Page: 3 of 3

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
31	10	SAND Brown, fine to medium SAND with trace silt, trace gravel and trace orange staining. Dense, moist, odours not observed.										Sand Bentonite	
33			G	150	N	MW16-02 (10.0)	1.0						
36			G	150	N	MW16-02 (11.0)	1.2						
39	12		G	150	Y	MW16-02 (12.0)	1.8						
40		End of Hole											
43	13												
46	14												

Date of Water Level: November 23, 2016
 Water Level (from TOC): Dry at 5.47m
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): N/A

MONITORING WELL ID: MW16-04



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm A Access Road

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 11, 2016 Page: 1 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
0		Ground Surface											
1		SAND Brown, fine to medium SAND with trace silt and trace gravel. Loose, dry, staining and odours not observed.	G	100	N	MW16-04 (0.5)	0.4						Sand
2		SAND Brown, fine to medium SAND with some silt and trace gravel. Compact, dry, staining and odours not observed.											
3		SAND Brown SAND with trace silt and trace gravel. Loose, dry, staining and odours not observed.	G	120	N	MW16-04 (2.0)	0.6						Bentonite
4		SAND Brown SAND with some silt and some fine gravel. Compact, dense, moist, staining and odours not observed.											
5		SAND Brown SAND with some silt and some fine gravel. Slightly dense, wet, staining and odours not observed.	G	115	N	MW16-04 (3.0)	0.7						
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													

Date of Water Level: November 22, 2016
 Water Level (from TOC): P1: 18.193 P2: Dry
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): P1: 18.432 P2: N/A

MONITORING WELL ID: MW16-04



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm A Access Road

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 11, 2016 Page: 2 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
16	5	SAND Brown SAND with some silt and some fine gravel. Slightly dense, wet, staining and odours not observed.											
17		Silty SAND Brown silty SAND with some fine to medium gravel and trace orange staining below 5.5m. Compact, dense, dry, odours not observed.	G	115	N	MW16-04 (5.0)		1.3					
18	6												
19		Silty SAND Grey, silty fine to medium SAND with trace gravel and trace orange staining from 7.2 - 7.4m. Dense, moist, low plasticity, no odours observed.	G	145	N	MW16-04 (6.0)		0.8					
20	7												
21		Silty SAND Grey, silty fine to medium SAND with trace gravel and trace orange staining from 7.2 - 7.4m. Dense, moist, low plasticity, no odours observed.	G	145	N	MW16-04 (7.0)		0.6					
22	8												
23		Silty SAND Grey, silty fine to medium SAND with trace gravel and trace orange staining from 7.2 - 7.4m. Dense, moist, low plasticity, no odours observed.	G	145	N	MW16-04 (8.0)		0.9					
24	9												
25		Silty SAND Grey, silty fine to medium SAND with trace gravel and trace orange staining from 7.2 - 7.4m. Dense, moist, low plasticity, no odours observed.	G	130	N	MW16-04 (9.0)		0.9					
26	10												
27		Silty SAND Grey, silty fine to medium SAND with trace gravel and trace orange staining from 7.2 - 7.4m. Dense, moist, low plasticity, no odours observed.											
28													
29													
30													
31													
32													
33													

Date of Water Level: November 22, 2016
 Water Level (from TOC): P1: 18.193 P2: Dry
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): P1: 18.432 P2: N/A

MONITORING WELL ID: MW16-04



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm A Access Road

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 11, 2016 Page: 3 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
34	11	Silty SAND Grey, silty fine to medium SAND with trace gravel and trace orange staining from 7.2 - 7.4m. Dense, moist, low plasticity, no odours observed.	G	130	N	MW16-04 (10.0)						Bentonite	
35													
36	11	SAND Grey and orange staining SAND with some silt and trace gravel. Very dense, dry, low plasticity, no odours observed.	G	130	N	MW16-04 (11.0)						Bentonite	
37													
38	12	SAND Brown fine to medium SAND, trace silt, trace to no gravel. Trace orange staining at 12.6 - 12.8m. Loose, moist, no odours were observed.	G	135	N	MW16-04 (12.0)						Bentonite	
39													
40	13											Bentonite	
41													
42	13											Bentonite	
43													
44	14	SILT Brown to grey and grey SILT with some fine to medium sand and trace gravel. Dense, dry, no plasticity, low odours. Trace orange staining at 13.8 - 14.0m on silt, trace fine sand.	G	135	Y	MW16-04 (14.0)						Sand and Well Screen Perched @ 15.2m	
45													
46	14											Sand and Well Screen Perched @ 15.2m	
47													
48	15	SILT Medium stiff, moist, low plasticity, no odours observed.										Sand and Well Screen Perched @ 15.2m	
49													
50	15											Sand and Well Screen Perched @ 15.2m	
51													

Date of Water Level: November 22, 2016
 Water Level (from TOC): P1: 18.193 P2: Dry

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): P1: 18.432 P2: N/A

MONITORING WELL ID: MW16-04



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm A Access Road

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 11, 2016 Page: 4 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
52		SILT Medium stiff, moist, low plasticity, no odours observed.											
53		SAND Grey, fine to medium SAND with trace silt. Compact, wet, staining and odours not observed.	G	110	Y	MW16-04 (16.0)	1.2						
54		SAND Brown, fine to medium SAND with trace silt. Compact, wet, odours not observed.											
55		Orange staining at 17.0 - 17.2m.											
56		Moist below 17.3m.	G	110	N	MW16-04 (17.0)	0.8						
57													
58													
59			G	110	N	MW16-04 (18.0)	3.1						
60													
61													
62			G	110	N	MW16-04 (19.0)	4.1						
63													
64													
65		SAND and GRAVEL Brown fine to medium SAND and GRAVEL, trace to no silt. Compact, dry to moist, staining and odours not observed.	G	110	N	MW16-04 (20.0)	4.0						
66													
67		SAND Brown, fine to medium SAND with trace silt and trace gravel. Compact, dry to moist, staining and odours not observed.											
68													
69													

Date of Water Level: November 22, 2016
 Water Level (from TOC): P1: 18.193 P2: Dry

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): P1: 18.432 P2: N/A

MONITORING WELL ID: MW16-04



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm A Access Road

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 11, 2016 Page: 5 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
70	[Symbol]	SAND Brown, fine to medium SAND with trace silt and trace gravel. Compact, dry to moist, staining and odours not observed.	G	110	N	MW16-04 (21.0)	2.9					[Well Construction Diagram]	
71													
72	[Symbol]	SAND Brown, fine to medium SAND with some gravel. Compact, dry, staining and odours not observed.	G	110	N	MW16-04 (22.0)	1.5					[Well Construction Diagram]	Bentonite
73													
74	[Symbol]	SAND Grey, fine to coarse SAND with trace to no silt, washed look appearance. Loose, wet, staining and odours not observed.	G	110	N	MW16-04 (23.0)	2.5					[Well Construction Diagram]	
75													
76	[Symbol]	SAND Grey, fine to coarse SAND with trace to no silt, washed look appearance. Loose, wet, staining and odours not observed.	G	90	N	MW16-04 (24.0)	1.7					[Well Construction Diagram]	
77													
78	[Symbol]	SAND Grey, fine to coarse SAND with trace silt below 25.2m. Loose, dry, staining and odours not observed.	G	90	N	MW16-04 (25.0)	0.6					[Well Construction Diagram]	Sand and Well Screen
79													
80	[Symbol]	SAND Grey, fine to coarse SAND with trace silt below 25.2m. Loose, dry, staining and odours not observed.	G	90	N	MW16-04 (26.0)	0.8					[Well Construction Diagram]	
81													
82													
83													
84													
85													
86													
87													

Date of Water Level: November 22, 2016
 Water Level (from TOC): P1: 18.193 P2: Dry
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): P1: 18.432 P2: N/A

MONITORING WELL ID: MW16-04



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm A Access Road

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 11, 2016 Page: 6 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
88		SAND Grey, fine to coarse SAND with trace silt below 25.2m. Loose, dry, staining and odours not observed.											
89		SAND Grey, medium to coarse SAND. Loose, saturated, staining and odours not observed.											
92													
93			G	80	Y	MW16-04 (28.4)				1.3			
94		SAND Light brown fine SAND. Loose, wet, staining and odours not observed.	G	80	N	MW16-04 (28.7)				0.5			
96		SILT Brown SILT. Stiff, moist, low plasticity, odours not observed.	G	80	N	MW16-04 (29.3)				0.6			
98		End of Hole											

Date of Water Level: November 22, 2016
 Water Level (from TOC): P1: 18.193 P2: Dry
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): P1: 18.432 P2: N/A

MONITORING WELL ID: MW16-05



Well Type: Groundwater Monitoring Well

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Downgradient Tank B, MW16-O

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: PAD/CDH

Drill Date: November 12, 2016 Page: 1 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
ft m													
-2													
-1													
0		Ground Surface											
1		SAND Brown, fine to medium SAND with some fine gravel and trace silt. Loose, dry, staining and odours not observed.		90	N	MW16-05 (0.2)	0.2						Sand
2		Siltier, compact below 1.6m.											
3	1												
4				90	N	MW16-05 (1.2)	0.4						
5													
6	2												
7				90	N	MW16-05 (2.0)	0.5						
8		GRAVEL Cobble gravel.											
9		SAND Brown, fine to medium SAND with some to trace silt and trace fine gravel. Compact, dense, moist, staining and odours not observed.											
10	3			100	N	MW16-05 (3.0)	0.5						
11													
12													
13	4			110	N	MW16-05 (4.0)	0.4						
14													

Date of Water Level: November 14, 2016
Water Level (from TOC): 30.824

Well-Borehole Diameter: 150mm (6")
Well Casing Diameter: 50mm (2")
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 34.653

MONITORING WELL ID: MW16-05



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Downgradient Tank B, MW16-0

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 12, 2016 Page: 2 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
15		SAND Brown, fine to medium SAND with some silt and trace to no gravel. Dense, moist, staining and odours not observed.											
16	5			110	N	MW16-05 (5.0)		0.7					
17													
18		Silty SAND Brown and grey silty SAND with trace coarse gravel. Dense, moist, low plasticity, no odours observed.											
19	6	Wet below 6.5m.		105	N	MW16-05 (6.0)		1.1					
20													
21													
22													
23	7	SAND Grey, fine to medium SAND with trace silt and trace gravel. Very dense, dry, odours not observed. Trace orange staining at 7.6m.											
24													
25													
26	8	SAND Brown, fine to medium SAND. Compact, moist, staining and odours not observed.		115	N	MW16-05 (8.0)		0.8					
27													
28		SAND Brown and grey, fine to medium SAND with some silt and trace gravel. Dense, moist, low odours, staining not observed.											
29	9	SAND Grey, fine to medium SAND with some silt and trace fine to medium gravel. Compact, dense, dry, odours not observed. Some mottling observed within the silts.		105	N	MW16-05 (9.0)		0.6					
30													
31													
32													

Perched @ 6.5m

Bentonite

Date of Water Level: November 14, 2016
 Water Level (from TOC): 30.824

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 34.653

MONITORING WELL ID: MW16-05



Well Type: Groundwater Monitoring Well

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Downgradient Tank B, MW16-O

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: PAD/CDH

Drill Date: November 12, 2016 Page: 3 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks	
							0	500	1000	1500	2000			
33		<p>SAND Grey, fine to medium SAND with some silt and trace fine to medium gravel. Compact, dense, dry, odours not observed. Some mottling observed within the silts.</p>												
34														
35														
36	11						MW16-05 (10.0)							
37														
38														
39														
40	12													
41		<p>SAND Grey, fine to medium SAND with some silt and trace fine to medium gravel. Compact, dense, dry, staining and odours not observed.</p> <p>Decreasing gravel below 13.0m.</p>												
42														
43	13						MW16-05 (13.0)							
44														
45														
46	14					MW16-05 (14.0)								
47														
48														
49	15													

Date of Water Level: November 14, 2016
Water Level (from TOC): 30.824

Well-Borehole Diameter: 150mm (6")
Well Casing Diameter: 50mm (2")
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 34.653

Bentonite

MONITORING WELL ID: MW16-05



Well Type: Groundwater Monitoring Well

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Downgradient Tank B, MW16-0

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: PAD/CDH

Drill Date: November 12, 2016 Page: 4 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
50		SAND Grey, fine to medium SAND with some silt and trace fine to medium gravel. Compact, dense, dry, staining and odours not observed.				MW16-05 (15.0)	0.4						
51		Decreasing gravel below 13.0m.											
52	16	SAND Brown with orange staining, fine to medium SAND with trace silt and gravel. Compact, moist, low plasticity, odours not observed.				MW16-05 (16.0)	0.2						
53													
54													
55													
56	17	SAND Brown, fine to medium SAND with some to trace silt and trace fine to coarse gravel. Compact, dense, moist, low to no plasticity, odours not observed.				MW16-05 (17.0)	0.7						
57													
58													
59	18	SAND Brown, fine to medium SAND with some to trace silt and trace fine to coarse gravel. Compact, dense, moist, low to no plasticity, odours not observed.				MW16-05 (18.0)	0.7						
60													
61		SAND and GRAVEL Brown, fine to coarse SAND with fine gravel. Loose, dry, staining and odours not observed.				MW16-05 (18.5)	0.2						
62													
63	19	Silty SAND Brown, fine to medium silty SAND to SAND with some silt and trace fine to medium gravel. Dense, moist, staining and odours not observed.				MW16-05 (19.0)	0.5						
64													
65		SAND Brown, fine to medium SAND with trace silt and trace fine gravel. Loose, moist, staining and odours not observed.				MW16-05 (19.5)	0.2						
66													
67	20	SAND Brown, fine to coarse SAND with some silt and fine to medium gravel. Slightly dense, moist, staining and odours not observed.				MW16-05 (20.0)	0.4						

Bentonite

Date of Water Level: November 14, 2016
Water Level (from TOC): 30.824

Well-Borehole Diameter: 150mm (6")
Well Casing Diameter: 50mm (2")
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 34.653

MONITORING WELL ID: MW16-05



Well Type: Groundwater Monitoring Well

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Downgradient Tank B, MW16-0

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: PAD/CDH

Drill Date: November 12, 2016 Page: 5 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
68		SAND Brown, fine to coarse SAND with some silt and fine to medium gravel. Slightly dense, moist, staining and odours not observed.											
69	21			120	N	MW16-05 (21.0)	0.6						
70		SAND Brown, fine to medium SAND with trace silt and some gravel. Loose, dry, staining and odours not observed.											
72	22			120	N	MW16-05 (22.0)	0.3						
74		SAND and GRAVEL Brown, fine to coarse SAND and fine to coarse GRAVEL. Loose, moist, staining and odours not observed.											
76	23			90	N	MW16-05 (23.0)	0.5						
78		SAND Brown medium SAND. Loose, dry, staining and odours not observed.											
79	24			90	N	MW16-05 (24.0)	0.2						
80		SILT Brown, medium SAND. Soft, loose, dry, staining and odours not observed.											
82	25			90	N	MW16-05 (25.0)	0.1						
83													
84													

Date of Water Level: November 14, 2016
Water Level (from TOC): 30.824

Well-Borehole Diameter: 150mm (6")
Well Casing Diameter: 50mm (2")
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 34.653

Bentonite

MONITORING WELL ID: MW16-05



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Downgradient Tank B, MW16-O

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 12, 2016 Page: 6 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
85	26	SILT Brown, medium SAND. Soft, loose, dry, staining and odours not observed.					0.1						
86			90	N		MW16-05 (26.0)							
87													
88													
89	27	SILT Brown SILT with trace fine sand. Very stiff, moist, low plasticity, no odours observed.											
90													
91													
92	28		95	N		MW16-05 (28.0)	0.2						
93													
94													
95	29	COAL SEAM Black COAL (charcoal) SEAM with trace silt. Dense, dry, staining and odours not observed.					0.3						
96			95	N		MW16-05 (29.0)							
97													
98													
99	30	SILT Grey SILT with trace fine sand and trace coal. Stiff, dry, staining and odours not observed.					0.4						
100		No COAL below 30.0m. Wet below 30.0m.					0.2						
101			100	Y		MW16-05 (30.0)							
102	31						0.2						
			100	N		MW16-05 (31.0)							

Date of Water Level: November 14, 2016
 Water Level (from TOC): 30.824

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 34.653

MONITORING WELL ID: MW16-05



Well Type: Groundwater Monitoring Well

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Downgradient Tank B, MW16-O

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: PAD/CDH

Drill Date: November 12, 2016 Page: 7 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
103		SILT Grey SILT with trace fine sand. Stiff, dense, staining and odours not observed.											
104		Dense below 31.7m.											
105	32			100	N	MW16-05 (32.0)	0.1						Sand and Well Screen
106		Moist below 32.8m.											
107													
108	33			100	N	MW16-05 (33.0)	0.9						
109		Very dense below 34.0m.											
110													
111	34			100	N	MW16-05 (34.0)	1.0						
112		Dry below 34.3m.		100	N	DUP G							
113				100	N	MW16-05 (34.5)	0.2						Bentonite
114		SAND Brown fine to medium SAND, trace to no silt. Compact, dry, staining and odours not observed.											
115	35												
116													
117													
118	36			100	N	MW16-05 (36.0)	0.2						
119													

Date of Water Level: November 14, 2016
Water Level (from TOC): 30.824

Well-Borehole Diameter: 150mm (6")
Well Casing Diameter: 50mm (2")
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 34.653

MONITORING WELL ID: MW16-06



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Downgradient from Tank D, MW16-P

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 13, 2016 Page: 1 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
ft m													
-2													
-1													
0		Ground Surface											
1		SAND Brown, fine to medium SAND with some gravel. Loose, dry, staining and odours not observed.	G	75	N	MW16-06 (0.2)	0.6						Concrete
2													
3		SAND Brown, fine to medium SAND with some silt and trace gravel. Loose, moist, staining and odours not observed.	G	75	N	MW16-06 (1.2)	0.5						
4													
5													
6		SAND Brown SAND with trace to no silt and trace gravel. Compact, dry, staining and odours not observed.	G	75	N	MW16-06 (2.0)	0.6						
7													
8													
9		SAND Brown, fine to medium SAND with trace to no silt and trace fine gravel. Loose, dry, staining and odours not observed.	G	100	N	MW16-06 (3.0)	0.5						Bentonite
10													
11													
12		Silty SAND Brown to grey, silty fine to medium SAND with trace fine gravel. Dense, dry, staining and odours not observed.	G	100	N	MW16-06 (4.0)	4.8						
13		Washed gravel lens. Moist to wet below 4.3m.											
14													
15													
16													

Date of Water Level: November 19, 2016
 Water Level (from TOC): 23.086
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 30.720

MONITORING WELL ID: MW16-06



Well Type: Groundwater Monitoring Well

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Downgradient from Tank D, MW16-P

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: PAD/CDH

Drill Date: November 13, 2016 Page: 2 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
17			G	100	Y	MW16-06 (5.0)	4.9						
18		SAND Brown, fine to medium SAND with trace silt and fine gravel. Slightly dense to loose, dry, staining and odours not observed.											
19			G	105	N	MW16-06 (6.0)	0.4						
20		SAND Brown, fine to medium SAND with trace silt and trace fine gravel. Loose, dry, staining and odours not observed.											
21			G	105	N	MW16-06 (7.0)	0.4						
22													
23		SAND Brown, fine to medium SAND with some silt. Slightly dense, moist, staining and odours not observed.	G	105	N	MW16-06 (7.5)	0.2						
24													
25		SAND Brown, medium to coarse SAND with some fine gravel. Loose, dry, staining and odours not observed.	G	105	N	MW16-06 (8.0)	0.5						
26		Low odours below 8.9m.											
27													
28													
29			G	90	N	MW16-06 (9.0)	11.1						
30		Silty SAND Brown silty SAND with trace gravel. Odorous.	G	90	Y	MW16-06 (9.3)	19.3						
31			G	90	Y	DUP H							
32		SAND Brown, fine to medium SAND with some fine gravel. Loose, dry, staining and odours not observed.											
33			G	90	N	MW16-06 (10.0)	3.4						
34													
35													

Date of Water Level: November 19, 2016
Water Level (from TOC): 23.086

Well-Borehole Diameter: 150mm (6")
Well Casing Diameter: 50mm (2")
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 30.720

MONITORING WELL ID: MW16-06



Well Type: Groundwater Monitoring Well

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Downgradient from Tank D, MW16-P

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: PAD/CDH

Drill Date: November 13, 2016 Page: 3 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
36	11	Silty SAND Brown, silty very fine to medium SAND with trace gravel.	G	90	N	MW16-06 (11.0)	1.0					Bentonite	
37													
38	12	Silty SAND Brown, silty very fine to medium SAND with trace fine gravel. Loose, moist, staining and odours not observed.	G	100	N	MW16-06 (12.0)	0.5					Bentonite	
39													
40	13	Silty SAND Grey, silty very fine to medium SAND with trace fine to medium gravel. Compact, dense, dry, staining and odours not observed.	G	100	N	MW16-06 (13.0)	1.0					Sand and Bentonite	
41													
42	14	Silty SAND Grey, silty very fine to medium SAND with some fine to medium gravel. Compact, slightly dense, moist, staining and odours not observed.	G	100	N	MW16-06 (14.0)	1.8					Sand and Bentonite	
43													
44	15	Silty SAND Grey, silty very fine to medium SAND with some fine to medium gravel. Compact, slightly dense, moist, staining and odours not observed.	G	110	N	MW16-06 (15.0)	0.5					Bentonite	
45													
46	16	SAND Brown, fine to medium SAND with trace gravel and trace silt. Loose, dry, staining and odours not observed.	G	110	N	MW16-06 (16.0)	0.6					Bentonite	
47													
48													
49													
50													
51													
52													
53													
54													

Date of Water Level: November 19, 2016
Water Level (from TOC): 23.086

Well-Borehole Diameter: 150mm (6")
Well Casing Diameter: 50mm (2")
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 30.720

MONITORING WELL ID: MW16-06



Well Type: Groundwater Monitoring Well

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Downgradient from Tank D, MW16-P

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: PAD/CDH

Drill Date: November 13, 2016 Page: 4 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
55		SAND Brown, fine to medium SAND with trace gravel and trace silt. Loose, dry, staining and odours not observed.											
56	17		G	110	N	MW16-06 (17.0)	0.8						Bentonite
57													
58													
59	18												Sand and Bentonite
60													
61			G	90	N	MW16-06 (18.5)	0.4						
62													
63	19		G	90	N	MW16-06 (19.0)	0.4						Bentonite
64													
65													
66	20		G	90	N	MW16-06 (20.0)	0.3						
67													
68		SILT and SAND Brown, grey and orange mottled SILT and very fine to fine SAND with some fine gravel. Slightly dense, moist, staining and odours not observed.											
69	21		G	80	N	MW16-06 (21.0)	0.3						Sand and Bentonite
70													
71													
72	22	Siltier. Slightly dense, dry, staining and odours not observed.	G	80	N	MW16-06 (22.0)	0.3						
73													

Date of Water Level: November 19, 2016
Water Level (from TOC): 23.086

Well-Borehole Diameter: 150mm (6")
Well Casing Diameter: 50mm (2")
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 30.720

MONITORING WELL ID: MW16-06



Well Type: Groundwater Monitoring Well

Project Location: Watson Lake Airport - AEC 32, YT

Drilling Contractor: Omega Environmental Drilling Ltd.

Drilling Equipment/Method: Sonic

Well Location: Downgradient from Tank D, MW16-P

Project Name/No.: 13221-04

Client: PWGSC

Engineer/Geologist: PAD/CDH

Drill Date: November 13, 2016 Page: 5 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
74		Siltier. Slightly dense, dry, staining and odours not observed.											
75	23	SILT Dark grey variegated, compact SILT with fine gravel and trace clay, trace sand (till).	G	80	N	MW16-06 (23.0)	0.4						Sand and Bentonite
76													
77													
78													
79	24		G	130	N	MW16-06 (24.0)	0.4						Bentonite
80													
81													
82	25	Olive below 25.2m.	G	130	N	MW16-06 (25.0)	0.3						
83													
84													
85	26	Clay chunks and trace orange staining below 26.0m.	G	100	N	MW16-06 (26.0)	0.3						
86													
87													
88	27	SAND Grey, fine to medium SAND. Loose, moist to wet, staining and odours not observed.	G	95	Y	MW16-06 (27.0)	0.2						Sand and Well Screen
89													
90													
91		SILT Olive SILT lens 27.3 to 27.6m. Stiff, dry, staining and odours not observed.											
92	28	SAND Grey, fine to medium SAND. Loose, moist											

Date of Water Level: November 19, 2016
Water Level (from TOC): 23.086

Well-Borehole Diameter: 150mm (6")
Well Casing Diameter: 50mm (2")
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 30.720

MONITORING WELL ID: MW16-06



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Downgradient from Tank D, MW16-P

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 13, 2016 Page: 6 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
93		SAND Grey, fine to medium SAND. Loose, moist to wet, staining and odours not observed.	G	95	N	MW16-06 (28.0)	0.2						Sand and Well Screen
94		SILT Olive SILT with some fine to medium sand and trace clay chunks and orange staining. Stiff, moist, odours not observed.											
95			G	110	Y	MW16-06 (29.0)	0.2						
96		BEDROCK Grey ROCK. No fissures or cracking. Very dense, dry, staining and odours not observed.	G	110	N	DUP I							
97													
98			G	110	N	MW16-06 (29.7)	0.3						Bentonite
99													
100													
101													
102													
103													
104													
105													
106													
107													
108													
109													
110													
111													

Date of Water Level: November 19, 2016
 Water Level (from TOC): 23.086
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 30.720

MONITORING WELL ID: MW16-07



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Downgradient from Tank F, MW16-Q

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 14, 2016 Page: 1 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
ft m													
-2													
-1													
0		Ground Surface											
1		SAND Brown, fine to medium SAND with trace gravel. Loose, moist, staining and odours not observed.	G	80	N	MW16-07 (0.2)	0.5						Concrete
2		SAND Brown, fine to medium SAND with trace silt and trace gravel. Compact, moist, staining and odours not observed.											
3	1		G	80	N	MW16-07 (1.0)	0.4						Bentonite
4													
5													
6													
7	2	SAND Brown SAND with trace gravel and trace to no silt. Loose, moist, staining and odours not observed.											
8			G	80	N	MW16-07 (2.3)	1.4						
9													
10	3		G	95	N	MW16-07 (3.0)	0.0						Sand
11													
12													
13	4		G	95	N	MW16-07 (4.0)	0.2						
14													
15													
16													

Date of Water Level: November 21, 2016
 Water Level (from TOC): 31.254

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 31.432

MONITORING WELL ID: MW16-07



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Downgradient from Tank F, MW16-Q

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 14, 2016 Page: 2 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
17	6	SAND Grey, fine to medium SAND with trace gravel. Compact, dry, staining and odours not observed.	G	95	N	MW16-07 (5.3)	0.2					Bentonite	
20			G	110	N	MW16-07 (6.0)	0.4						
21	7	SAND Brown, fine to medium SAND with some silt and trace gravel. Compact, dry, staining and odours not observed.	G	110	N	MW16-07 (6.8)	1.6					Sand	
26			G	110	N	MW16-07 (8.0)	0.3						
30	9	SAND Brown, fine to medium SAND with some gravel. Very dense, moist, staining and odours not observed.	G	120	N	MW16-07 (9.3)	0.1					Bentonite	
34			G	120	N	MW16-07 (10.5)	0.3						

Date of Water Level: November 21, 2016
 Water Level (from TOC): 31.254

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 31.432

MONITORING WELL ID: MW16-07



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Downgradient from Tank F, MW16-Q

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 14, 2016 Page: 3 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
36	11	SILT Grey SILT with trace fine to medium sand. Stiff, moist, staining and odours not observed.											
37		SAND Brown, fine to medium SAND with trace to no silt and trace gravel. Dense, moist, staining and odours not observed.	G	120	N	MW16-07 (11.2)	0.3						
38													
39	12	SAND Brown, fine SAND. Loose, moist, staining and odours not observed.	G	110	N	MW16-07 (12.0)	0.0						
40													
41													
42													
43	13		G	110	N	MW16-07 (13.0)	0.1						
44													
45		SAND Brown, fine to medium SAND with trace silt and trace gravel. Compact, moist, staining and odours not observed.											
46	14		G	110	N	MW16-07 (14.0)	0.1						
47													
48													
49	15	SAND Brown, fine to medium SAND. Loose, moist, staining and odours not observed.	G	90	N	MW16-07 (15.0)	1.2						
50													
51		Faint HC like odour below 15.8m.											
52													
53	16		G	90	N	MW16-07 (16.0)	24.9						
54													

Date of Water Level: November 21, 2016
 Water Level (from TOC): 31.254

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 31.432

MONITORING WELL ID: MW16-07



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Downgradient from Tank F, MW16-Q

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 14, 2016 Page: 4 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
55	17	SAND Brown, fine to medium SAND. Loose, moist, staining and odours not observed. Faint HC like odour below 15.8m.											
56			G	90	Y	MW16-07 (17.0)		32.4					
57			G	80	Y	DUP J							
58													
59	18		G	80	Y	MW16-07 (18.0)		0.7					
60													
61													
62	19		G	80	N	MW16-07 (19.0)		0.4					
63													
64													
65	20		G	80	Y	MW16-07 (20.0)		0.4					
66													
67													
68	21	SAND Brown, fine to medium SAND with trace silt and trace gravel. Very dense, dry to moist, staining and odours not observed.	G	100	N	MW16-07 (21.0)		0.0					
69													
70													
71	22	Gravelly SAND Grey gravelly SAND. Compact, dry, staining and odours not observed.	G	100	N	MW16-07 (22.0)		2.6					
72													
73													

Date of Water Level: November 21, 2016
 Water Level (from TOC): 31.254
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 31.432

MONITORING WELL ID: MW16-07



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Downgradient from Tank F, MW16-Q

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 14, 2016 Page: 5 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks	
							0	500	1000	1500	2000			
74		Gravelly SAND Grey gravelly SAND. Compact, dry, staining and odours not observed.												
75														
76			G	100	Y	MW16-07 (23.0)	17.1							
77														
78														
79			G	110	N	MW16-07 (24.0)	0.4							
80														
81														
82			G	110	N	MW16-07 (25.0)	1.5							
83														
84														
85			G	110	Y	MW16-07 (26.0)	0.2							
86														
87		NO RECOVERY NO RECOVERY - Drill bit welded to stem.												
88														
89														
90														
91														
92														

Date of Water Level: November 21, 2016
 Water Level (from TOC): 31.254
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 31.432

MONITORING WELL ID: MW16-07



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Downgradient from Tank F, MW16-Q

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 14, 2016 Page: 6 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
93		NO RECOVERY NO RECOVERY - Drill bit welded to stem.											
94		Gravelly SAND Brown gravelly SAND. Dense, dry, staining and odours not observed.											
95	29		G	80	N	MW16-07 (29.0)	0.0						
96													
97													
98			G	80	N	MW16-07 (29.0)	0.0						
99													
100													
101		SILT Olive SILT with trace sand and trace gravel. Stiff, moist, staining and odours not observed.	G	70	Y	MW16-07 (30.8)	0.6						
102		BEDROCK Grey fractured ROCK or BEDROCK. Very dense, dry, staining and odours not observed.	G	70	N	DUP K							
103			G	70	N	MW16-07 (31.3)	0.4						
104													
105	32		G	90	N	MW16-07 (32.0)	0.4						
106													
107													
108													
109													
110													
111													

Date of Water Level: November 21, 2016
 Water Level (from TOC): 31.254
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 31.432

MONITORING WELL ID: MW16-08



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm E South, MW16-K

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 21, 2016 Page: 1 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
ft m													
-2													
-1													
0		Ground Surface											
1		SAND Brown to orange SAND with some silt and trace gravel. Compact, moist odours not observed.	G	110	N	MW16-08 (0.2)		0.8					Concrete
2													
3	1												
4		SAND Brown SAND with trace gravel. Loose, moist, staining and odours not observed.	G	110	Y	MW16-08 (1.3)		1.2					Bentonite
5													
6													
7	2	SAND Grey SAND with trace gravel. Loose, dry, staining and odours not observed.	G	110	N	MW16-08 (2.0)		0.4					
8		Dense below 7.0m.											
9													
10	3		G	90	N	MW16-08 (2.7)		0.9					
11													
12			G	90	Y	MW16-08 (3.5)		4.6					Cuttings and Slough
13	4												
14													
15													
16	5		G	90	Y	MW16-08 (4.7)		2.4					
17													

Date of Water Level: November 25, 2016
 Water Level (from TOC): 28.356

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 31.495

MONITORING WELL ID: MW16-08



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm E South, MW16-K

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 21, 2016 Page: 2 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
18													
19													
20	6		G	40	N	MW16-08 (6.0)		3.3					
21													
22													
23	7												
24													
25													
26	8		G	40	Y	MW16-08 (7.7)		2.4					
27													
28													
29													
30	9												
31		SAND Grey SAND with some silt and trace gravel. Dense, moist, staining and odours not observed.	G	105	N	MW16-08 (9.4)		0.7					
32		SAND Brown SAND with trace gravel. Loose, dry to moist, staining and odours not observed.											
33	10		G	105	N	MW16-08 (10.0)		0.3					
34													
35													
36	11		G	105	N	MW16-08 (11.0)		0.1					
37													

Date of Water Level: November 25, 2016
 Water Level (from TOC): 28.356

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 31.495

MONITORING WELL ID: MW16-08



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm E South, MW16-K

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 21, 2016 Page: 3 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks	
							0	500	1000	1500	2000			
38	12	SAND Brown SAND with trace gravel. Loose, dry to moist, staining and odours not observed.												
39														
40			G	90	N	MW16-08 (12.0)	2.1							
41														
42														
43			G	90	N	MW16-08 (13.0)	1.4							
44														
45														
46			G	90	N	MW16-08 (14.0)	0.4							
47														
48														
49			G	95	N	MW16-08 (15.0)	0.1							
50														
51														
52														
53			G	95	N	MW16-08 (16.0)	0.0							
54														
55														
56	G	95	N	MW16-08 (17.0)	0.0									
57														

Date of Water Level: November 25, 2016
 Water Level (from TOC): 28.356
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 31.495

MONITORING WELL ID: MW16-08



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm E South, MW16-K

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 21, 2016 Page: 4 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
58		SAND Brown SAND with trace gravel. Loose, dry to moist, staining and odours not observed.											
59	18	SAND Brown fine to medium SAND with trace silt. Loose, dry, staining and odours not observed.	G	80	N	MW16-08 (18.0)	1.2						
60		SAND Brown, fine to medium SAND with trace silt. Loose, dry, staining and odours not observed.											
61													
62	19		G	80	N	MW16-08 (19.0)	0.6						Cuttings and Slough
63													
64													
65													
66	20		G	80	N	MW16-08 (20.0)	0.8						
67													
68		Silty SAND Brown, silty very fine to fine SAND. Slightly dense, dry, staining and odours not observed.	G	80	N	MW16-08 (20.5)	2.0						
69	21		G	90	N	MW16-08 (21.0)	1.7						Bentonite
70													
71		SAND Brown, very fine to medium SAND with fine to medium gravel and some silt. Loose, dry, staining and odours not observed.											
72	22		G	90	N	MW16-08 (22.0)	12.7						Cuttings and Slough
73													
74													
75													
76	23		G	90	Y	MW16-08 (23.0)	98.0						
77			G	90	Y	DUP L							

Date of Water Level: November 25, 2016
 Water Level (from TOC): 28.356

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 31.495

MONITORING WELL ID: MW16-08



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm E South, MW16-K

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 21, 2016 Page: 5 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks	
							0	500	1000	1500	2000			
78	24	SAND Brown, very fine to medium SAND with fine to medium gravel and some silt. Loose, dry, staining and odours not observed.												
79			G	120	N	MW16-08 (24.0)	2.8							
80														
81														
82			G	120	N	MW16-08 (25.0)	2.3							
83	25													
84														
85														
86	G	120	N	MW16-08 (26.0)	2.6									
87	26													
88														
89	G	90	N	MW16-08 (27.0)	0.8									
90	27	SAND Brown, very fine to medium SAND with fine to medium gravel and trace to some silt. Dense, moist, staining and odours not observed.												
91														
92	G	90	N	MW16-08 (28.0)	1.6									
93	28	Sandy SILT Grey, very fine sandy SILT. Stiff, moist, low plasticity, no odours observed.												
94														
95	G	120	N	MW16-08 (29.0)	1.5									
96	29	Sandy SILT Grey, very fine sandy SILT with fine to medium angular gravel. Dense, moist, staining and odours not observed.												
97														

Date of Water Level: November 25, 2016
 Water Level (from TOC): 28.356

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 31.495

MONITORING WELL ID: MW16-08



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm E South, MW16-K

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD
 Drill Date: November 21, 2016 Page: 6 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
98		Silty GRAVEL Grey silty GRAVEL (till) with rock clasts and medium to coarse gravel. Very compact, dense, dry, staining and odours not observed.	G	100	N	MW16-08 (30.0)	2.4						Sand and Well Screen
99		Silty GRAVEL Grey silty GRAVEL (till) with rock clasts and medium to coarse gravel. Very dense, dry to moist, staining and odours not observed.											
00													
01													
02													
03													
04													
05													
06													
07													
08													
09													
10													
11													
12													
13													
14													
15													
16													
17													

Date of Water Level: November 25, 2016
 Water Level (from TOC): 28.356
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 31.495

MONITORING WELL ID: MW16-12



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank E Area, MW16-G

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 24, 2016 Page: 1 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
ft m													
-2													
-1													
0		Ground Surface											
1	1	SAND Brown, very fine to medium SAND with some silt to silty sand. Loose to slightly dense, dry, low to moderate odours, staining not observed.	G	50	N	MW16-12 (0.2)		119.0					Concrete
2													
3	1	Siltier, slightly dense, dry, strong odours, staining not observed.	G	120	Y	MW16-12 (1.0)			482.0				Bentonite
4						DUP M							
5		SAND and GRAVEL Grey, fine to coarse SAND and fine to medium GRAVEL. Loose, dry, strong odours, staining not observed.											
6													
7	2		G	120	N	MW16-12 (2.0)		338.0					
8													
9		SAND Brown, fine to medium SAND with trace silt and trace gravel. Loose, dry, staining and odours not observed.											
10	3		G	90	N	MW16-12 (3.0)		2.3					
11													
12													
13	4		G	90	Y	MW16-12 (4.0)		3.6					
14													
15													
16	5												
17			G	100	N	MW16-12 (5.0)		3.0					Cuttings and Slough
18													

Date of Water Level: November 27, 2016
 Water Level (from TOC): 33.67

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 36.59

MONITORING WELL ID: MW16-12



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank E Area, MW16-G

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 24, 2016 Page: 2 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
19	6	SAND Brown, fine to medium SAND with some silt and trace gravel. Compact, dense, dry, staining and odours not observed.	G	80	N	MW16-12 (6.0)		1.5					Cuttings and Slough
20			G	80	Y	MW16-12 (6.75)		5.0					
21	7	SAND Brown, fine to medium SAND with some silt and trace to some fine gravel. Dense, dry, staining and odours not observed.										Bentonite	
22			G	80	Y	MW16-12 (8.25)		5.1					
23	8	SAND Brown, fine to medium SAND with trace silt and trace fine gravel. Loose, dry, staining and odours not observed.										Bentonite	
24			G	80	Y	MW16-12 (9.2)		17.3					
25	9	SAND Brown, fine to medium SAND with trace silt and trace fine gravel. Loose, dry, staining and odours not observed.										Bentonite	
26			G	100	Y	MW16-12 (10.0)		3.3					
27	10	Silty SAND Brown, silty fine to medium SAND. Compact, moist, staining and odours not observed.										Bentonite	
28			G	100	N	MW16-12 (10.5)		3.4					
29	11	SAND Brown, fine to medium SAND with some fine gravel. Dry, staining and odours not observed.										Bentonite	
30			G	100	N	MW16-12 (11.5)		7.2					
31	11	SAND Brown, fine to medium SAND with fine gravel. Slightly dense, moist to wet, staining and odours not observed.										Bentonite	
32			G	100	N	MW16-12 (11.5)		7.2					

Date of Water Level: November 27, 2016
 Water Level (from TOC): 33.67

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 36.59

MONITORING WELL ID: MW16-12



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank E Area, MW16-G

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 24, 2016 Page: 3 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
40		SAND Brown, fine to medium SAND with trace silt. Loose, moist, staining and odours not observed.	G	100	N	MW16-12 (12.0)	2.5						
41		SAND Brown, fine to medium SAND with trace silt and trace fine gravel. Loose, dry, staining and odours not observed.											
42			G	100	N	MW16-12 (13.0)	3.1						
43													
44													
45													
46		Slightly siltier, compact lens (10cm).	G	100	N	MW16-12 (14.0)	2.3						
47													
48													
49		SAND Brown, fine to medium SAND with trace silt and trace coarse sand. Loose, dry, staining and odours not observed.	G	85	N	MW16-12 (15.0)	1.1						
50													
51													
52		Trace silt at 16.0m.											
53			G	85	N	MW16-12 (16.0)	4.5						
54		Trace gravel at 16.5m.											
55													
56			G	85	N	MW16-12 (17.0)	1.0						
57													
58													
59		SAND Grey, medium SAND. Loose, saturated, staining and odours not observed.	G	70	Y	MW16-12 (18.0)	34.0						
60													

Cuttings and Slough
 Bentonite
 Cuttings and Slough

Perched @ 18.0m

Date of Water Level: November 27, 2016
 Water Level (from TOC): 33.67

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 36.59

MONITORING WELL ID: MW16-12



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank E Area, MW16-G

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 24, 2016 Page: 4 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
61		SAND Brown, fine to medium SAND with trace silt and trace fine gravel.											
62		Silty SAND Brown, silty fine to medium SAND. Compact, dense, moist to wet, staining and odours not observed.	G	70	N	MW16-12 (19.0)	0.6						Cuttings and Slough
65		SAND Brown, fine to medium SAND with some silt. Loose, moist, staining and odours not observed.	G	70	N	MW16-12 (20.0)	0.4						Bentonite Perched @ 21.0m
69		SAND Brown, fine to coarse SAND. Loose, wet, staining and odours not observed.	G	80	N	MW16-12 (21.0)	2.8						
73		Sandy SILT Grey brown, very fine sandy SILT, laminated. Dense, moist, staining and odours not observed.	G	80	N	MW16-12 (22.2)	2.9						
76		Stones at 23.5m.	G	80	N	MW16-12 (23.0)	5.8						Cuttings and Slough
79		Sandy SILT Brown, fine to medium gravelly and very fine to medium sandy SILT.	G	105	N	MW16-12 (24.0)	0.5						

Date of Water Level: November 27, 2016
 Water Level (from TOC): 33.67

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 36.59

MONITORING WELL ID: MW16-12



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank E Area, MW16-G

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 24, 2016 Page: 5 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
82	25	SAND and GRAVEL Brown, fine to medium SAND and fine to medium GRAVEL. Loose, dry, staining and odours not observed.	G	105	N	MW16-12 (25.0)	0.7						
83													
84													
85	26		G	105	N	MW16-12 (26.0)	9.5						Cuttings and Slough
86													
87													
88													
89	27	SILT Grey SILT with trace sand. Stiff, wet, staining and odours not observed.	G	70	N	MW16-12 (27.0)	3.8						
90		SAND Brown SAND with some gravel and trace to no silt. Loose, dry, staining and odours not observed.											Bentonite
91													
92	28		G	70	N	MW16-12 (28.0)	2.3						
93													
94													
95	29		G	70	N	MW16-12 (29.0)	2.4						Slough
96		SAND Brown SAND with some silt and trace fine to medium gravel. Loose, moist, staining and odours not observed.											
97													
98	30	SAND and GRAVEL Brown, fine to medium SAND and fine to medium GRAVEL with some silt and trace grey cobbles. Loose, dry, staining and odours not observed.	G	55	N	MW16-12 (30.0)	1.4						
99													
100		SAND and GRAVEL Brown, fine to medium SAND and fine to coarse GRAVEL with some silt. Loose, dry, staining and odours not observed.											Bentonite
101													
102	31												

Date of Water Level: November 27, 2016
 Water Level (from TOC): 33.67

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 36.59

MONITORING WELL ID: MW16-12



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank E Area, MW16-G

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: PAD/CDH
 Drill Date: November 24, 2016 Page: 6 of 6

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
03		SAND and GRAVEL Brown, fine to medium SAND and fine to coarse GRAVEL with some silt. Loose, dry, staining and odours not observed.	G	55	N	MW16-12 (31.0)	■						Bentonite
04		Grey silt lense at 30.8m.											
05			G	55	N	MW16-12 (32.0)	■						Silica Sand and Well Screen
06													
08		Silty SAND and GRAVEL Grey to grey brown, silty fine to coarse SAND and fine to medium GRAVEL (till). Compact, dense, moist to wet, low plasticity, odours not observed.	G	80	N	MW16-12 (33.0)	■						Silica Sand and Well Screen
09													
12			G	80	N	MW16-12 (34.0)	■						Silica Sand and Well Screen
13													
15			G	80	N	MW16-12 (35.0)	■						Silica Sand and Well Screen
16													
17		BEDROCK Dark grey metamorphic BEDROCK, very competent. Staining and odours were not observed.											Silica Sand and Well Screen
18													
21													

Date of Water Level: November 27, 2016
 Water Level (from TOC): 33.67
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 36.59

MONITORING WELL ID: MW16-13



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm C, MW16-E

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH/PAD
 Drill Date: November 26, 2016 Page: 1 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
ft m													
-2													
-1													
0		Ground Surface											
1		SAND and GRAVEL Brown, fine to coarse SAND and fine GRAVEL. Loose, dry, low odours, staining not observed.	G	85	Y	MW16-13 (0.5)		79.1					Concrete
2		SAND Brown, very fine to medium SAND with some silt and trace fine gravel. Dense, dry, low odours, staining not observed.	G	85	N	MW16-13 (1.0)		61.4					Bentonite
3													
4													
5													
6		SAND and GRAVEL Brown, fine to coarse SAND and fine GRAVEL. Loose, dry, low to no odours, staining not observed.	G	85	N	MW16-13 (2.0)		2.1					
7													
8													
9													
10			G	100	Y	MW16-13 (3.0)		1.5					Cuttings and Slough
11													
12													
13			G	100	N	MW16-13 (4.0)		1.3					
14													
15		SAND and GRAVEL Brown, fine to coarse SAND and fine GRAVEL. Loose, dry, staining and odours not observed.											

Date of Water Level: November 30, 2016
 Water Level (from TOC): 34.342

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 37.672

MONITORING WELL ID: MW16-13



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm C, MW16-E

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH/PAD
 Drill Date: November 26, 2016 Page: 2 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
16	5		G	105	N	MW16-13 (5.0)						[Cross-hatched pattern]	
17													
18	6	SAND Brown, fine to medium SAND with some coarse sand and fine to medium gravel, trace silt. Loose, dry, staining and odours not observed.	G	100	N	MW16-13 (6.0)						[Cross-hatched pattern]	
19													
20	7		G	120	N	MW16-13 (7.0)						[Cross-hatched pattern]	
21													
22	8	SAND Brown, fine to medium SAND with some fine gravel and trace silt. Loose, dry, staining and odours not observed.	G	120	N	MW16-13 (8.0)						[Cross-hatched pattern]	Cuttings and Slough
23													
24	9		G	105	N	MW16-13 (9.0)						[Cross-hatched pattern]	
25													
26	10		G	105	N	MW16-13 (10.0)						[Cross-hatched pattern]	
27													
28													
29													
30													
31													
32													
33													
34													

Date of Water Level: November 30, 2016
 Water Level (from TOC): 34.342

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 37.672

MONITORING WELL ID: MW16-13



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm C, MW16-E

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH/PAD
 Drill Date: November 26, 2016 Page: 3 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
35		SAND Brown, fine to medium SAND with some fine gravel and trace silt. Loose, dry, staining and odours not observed.											
36	11	Silty SAND Brown, silty fine to medium SAND, laminated. Dense, dry, staining and odours not observed.	G	105	N	MW16-13 (11.1)	1.1						
37		SAND Brown, fine to medium SAND with some fine gravel. Loose, dry, staining and odours not observed.											
38		SAND Brown, fine to medium SAND with some fine gravel. Loose, dry, staining and odours not observed.											
39	12	SAND Brown, fine to medium SAND with trace coarse sand and fine gravel. Loose, dry, staining and odours not observed.	G	95	N	MW16-13 (12.0)	1.4						
40		SAND Brown, fine to medium SAND with trace coarse sand and fine gravel. Loose, dry, staining and odours not observed.											
41		SAND Brown, fine to medium SAND with trace coarse sand and fine gravel. Loose, dry, staining and odours not observed.											
42		SAND Brown, fine to medium SAND with trace coarse sand and fine gravel. Loose, dry, staining and odours not observed.											
43	13	SAND Brown, fine to medium SAND with trace coarse sand and fine gravel. Loose, dry, staining and odours not observed.	G	95	N	MW16-13 (13.0)	1.6						
44		SAND Brown, fine to medium SAND with trace coarse sand and fine gravel. Loose, dry, staining and odours not observed.											
45		SAND Brown, fine to medium SAND with trace coarse sand and fine gravel. Loose, dry, staining and odours not observed.											
46	14	SAND Brown, fine to medium SAND with trace coarse sand and fine gravel. Loose, dry, staining and odours not observed.	G	95	N	MW16-13 (14.0)	1.2						
47		SAND Brown, fine to medium SAND with trace coarse sand and fine gravel. Loose, dry, staining and odours not observed.											
48		SAND Brown, fine to medium SAND with trace coarse sand and fine gravel. Loose, dry, staining and odours not observed.											
49	15	SAND Brown, fine to medium SAND with trace silt and trace fine gravel. Loose, dense, staining and odours not observed.	G	80	N	MW16-13 (15.0)	1.3						
50		SAND Brown, fine to medium SAND with trace silt and trace fine gravel. Loose, dense, staining and odours not observed.											
51		SAND Brown, fine to medium SAND with trace silt and trace fine gravel. Loose, dense, staining and odours not observed.											
52	16	SAND Brown, fine to medium SAND with trace silt and trace fine gravel. Loose, dense, staining and odours not observed.											

Date of Water Level: November 30, 2016
 Water Level (from TOC): 34.342
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 37.672

MONITORING WELL ID: MW16-13



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm C, MW16-E

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH/PAD
 Drill Date: November 26, 2016 Page: 4 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
53		SAND Brown, fine to medium SAND with trace silt and trace fine gravel. Loose, dense, staining and odours not observed.	G	80	N	MW16-13 (16.0)	1.9						
54													
55													
56	17		G	80	N	MW16-13 (17.0)	1.0						Cuttings and Slough
57													
58		Silty SAND and GRAVEL Brown, silty very fine to medium SAND and fine to medium GRAVEL. Compact, dense, moist, staining and odours not observed.											
59	18		G	75	N	MW16-13 (18.0)	1.3						
60													
61		Silty SAND and GRAVEL Brown, silty SAND and GRAVEL. Dense, moist, staining and odours not observed.											
62	19		G	75	N	MW16-13 (19.0)	1.8						Bentonite
63													
64													
65													
66	20	Cobbles at 20.0m.	G	75	N	MW16-13 (20.0)	1.5						
67													
68													
69	21		G	80	N	MW16-13 (21.0)	1.9						Cuttings and Slough
70													
71													

Date of Water Level: November 30, 2016
 Water Level (from TOC): 34.342

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 37.672

MONITORING WELL ID: MW16-13



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm C, MW16-E

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH/PAD
 Drill Date: November 26, 2016 Page: 5 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
72	22	SAND and GRAVEL Brown, fine to medium SAND and fine GRAVEL. Loose, dry, staining and odours not observed.	G	80	N	MW16-13 (22.0)	1.1					Cuttings and Slough	
73													
74	23										Cuttings and Slough		
75													
76	23		G	80	N	MW16-13 (23.0)	1.3				Cuttings and Slough		
77													
78	24	Silty SAND and GRAVEL Brown, silty fine to coarse SAND and fine GRAVEL to SAND and GRAVEL with some silt (washed). Loose, wet to moist, staining and odours not observed.									Cuttings and Slough		
79													
80	24		G	65	N	MW16-13 (24.0)	1.6				Cuttings and Slough		
81													
82	25	SAND and GRAVEL Brown, fine to medium SAND and fine to medium GRAVEL with trace silt. Loose, dry, staining and odours not observed.									Cuttings and Slough		
83													
84	25		G	65	N	MW16-13 (25.0)	1.1				Cuttings and Slough		
85													
86	26	Sand and Gravel Brown, medium to very coarse SAND and fine to medium GRAVEL (washed) with some silt. Loose, wet, staining and odours not observed.									Cuttings and Slough		
87													
88	26		G	65	Y	MW16-13 (26.0)	7.0				Cuttings and Slough		
89													
89	27		G	85	N	MW16-13 (27.0)	0.6				Cuttings and Slough		

Date of Water Level: November 30, 2016
 Water Level (from TOC): 34.342

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 37.672

Perched @ 25.8m
 Bentonite
 Cuttings and Slough

MONITORING WELL ID: MW16-13



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm C, MW16-E

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH/PAD
 Drill Date: November 26, 2016 Page: 6 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
90	28	SAND and GRAVEL Brown, fine to very coarse SAND and fine gravel with some silt. Loose to slightly compact, moist, staining and odours not observed. Coal seam (charcoal) (<10cm) at 28.0m.	G	85	N	MW16-13 (28.0)	2.6					Cuttings and Slough	
91													
92	29	SAND and GRAVEL Brown, fine to coarse SAND and fine GRAVEL with trace silt. Loose, dry, low odours, staining not observed.	G	85	N	MW16-13 (29.0)	8.8					Bentonite	
93													
94	30	Sandy SILT Brown, very fine to fine sandy SILT, laminated. Dense, moist, staining and odours not observed.	G	90	N	MW16-13 (30.2)	0.4					Silica Sand and Well Screen	
95													
96	31	SAND Brown, fine SAND with trace silt. Loose, moist, staining and odours not observed.	G	90	N	MW16-13 (31.5)	0.4						
97													
98	32	Sandy SILT Brown, very fine to fine sandy SILT with trace orange staining. Stiff, wet, odours not observed.	G	90	Y	MW16-13 (32.3)	0.3						
99													
100													
101													
102													
103													
104													
105													
106													
107													
108													

Date of Water Level: November 30, 2016
 Water Level (from TOC): 34.342
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 37.672

MONITORING WELL ID: MW16-13



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm C, MW16-E

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH/PAD
 Drill Date: November 26, 2016 Page: 7 of 7

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
09	[Symbol]	Sandy SILT Brown, very fine to fine sandy SILT with trace orange staining. Stiff, wet, odours not observed.	G	85	N	MW16-13 (33.0)	4.3					[Well Construction Diagram]	Silica Sand and Well Screen
12			G	85	N	MW16-13 (34.0)	2.5						
13	[Symbol]	SILT Brown SILT with trace fine to medium sand. Hard, moist, staining and odours not observed.										[Well Construction Diagram]	Bentonite
15			G	85	Y	MW16-13 (35.0)	28.9						
18	[Symbol]	Sandy SILT Brown, very fine sandy SILT with gravel (till). Dense, compact, dry to moist, staining and odours not observed.	G	120	N	MW16-13 (36.0)	2.2					[Well Construction Diagram]	Slough
21			G	120	Y	MW16-13 (37.0)	1.6						
21	[Symbol]	Sandy SILT Brown, very fine sandy SILT and fine GRAVEL (till). Very dense, dry to moist, low plasticity, odours not observed.										[Well Construction Diagram]	
22			G	120	Y	MW16-13 (37.0)	1.6						
23	[Symbol]										[Well Construction Diagram]		
24													
25	[Symbol]										[Well Construction Diagram]		
26													

Date of Water Level: November 30, 2016
 Water Level (from TOC): 34.342
 Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot
 Depth of Well (TOC): 37.672

MONITORING WELL ID: MW16-14



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm D Area, MW16-F

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH/PAD
 Drill Date: November 30, 2016 Page: 1 of 4

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
ft m													
-2													
-1													
0		Ground Surface											
1		SAND and GRAVEL Brown, very fine to medium SAND and fine GRAVEL with some trace silt in areas. Loose, dry, staining and odours not observed.											
2				85	N	MW16-14 (0.5)		0.4					Concrete
3													
4				85	N	MW16-14 (1.0)		0.4					Bentonite
5													
6													
7				85	N	MW16-14 (2.0)		0.7					
8													
9		SAND Brown, very fine to medium SAND with some fine gravel and some to trace silt. Loose, dry, staining and odours not observed.											
10				110	N	MW16-14 (3.0)		0.9					Cuttings and Slough
11													
12													
13				110	N	MW16-14 (4.0)		0.5					

Date of Water Level: November 16, 2016
 Water Level (from TOC): Dry at 13.488m

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 13.488m

MONITORING WELL ID: MW16-14



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm D Area, MW16-F

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH/PAD
 Drill Date: November 30, 2016 Page: 2 of 4

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
14		SAND Brown, very fine to medium SAND with some fine gravel and some to trace silt. Loose to slightly dense, dry, staining and odours not observed.											
15													
16	5												
17				105	N	MW16-14 (5.0)	7.6						Cuttings and Slough
18		SAND Brown, very fine to medium SAND with some fine gravel and some silt. Slightly dense, dry, staining and odours not observed.											
19													
20	6												
21		SAND Brown, very fine to medium SAND with some silt and some fine gravel. Dense, moist, staining and odours not observed.		115	Y	MW16-14 (6.0)	514.0						
22				115	Y	DUP O							
23													
24	7												
25		SAND and GRAVEL Brown, fine to medium SAND and fine GRAVEL. Loose, dry, staining and odours not observed.											
26													
27	8												
28		SAND and GRAVEL Brown, fine to medium SAND and fine GRAVEL with trace silt (washed in sections). Loose, moist to wet, staining and odours not observed.											
29													
30	9			60	N	MW16-14 (9.0)	2.8						Slough Bentonite

Date of Water Level: November 16, 2016
 Water Level (from TOC): Dry at 13.488m

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 13.488m

MONITORING WELL ID: MW16-14



Well Type: Groundwater Monitoring Well
 Project Location: Watson Lake Airport - AEC 32, YT
 Drilling Contractor: Omega Environmental Drilling Ltd.
 Drilling Equipment/Method: Sonic
 Well Location: Tank Farm D Area, MW16-F

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH/PAD
 Drill Date: November 30, 2016 Page: 3 of 4

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
31	10	SAND and GRAVEL Brown, fine to medium SAND and fine GRAVEL with trace silt (washed in sections). Loose, moist to wet, staining and odours not observed.											
32		SAND and GRAVEL Brown, fine to medium SAND and fine GRAVEL with trace silt. Loose, dry, staining and odours not observed.											
33				60	N	MW16-14 (10.0)	3.3						
34													
35	11	SAND and GRAVEL Brown, fine to medium SAND and fine GRAVEL with trace silt. Slightly dense, moist to wet, staining and odours not observed.											
36													
37													
38													
39	12												
40				140	N	MW16-14 (12.0)	1.2						
41	13	SILT Grey SILT with some fine to medium sand and trace gravel. Dense, dry, staining and odours not observed.											
42													
43				140	N	MW16-14 (13.0)	5.6						
44													
45	14												
46				140	N	MW16-14 (14.0)	6.7						

Date of Water Level: November 16, 2016
 Water Level (from TOC): Dry at 13.488m

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 13.488m

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Well Type: Groundwater Monitoring Well
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 Well Location: Tank Farm D Area, MW16-F

Project Name/No.: 13221-04
 Client: PWGSC
 Engineer/Geologist: CDH/PAD
 Drill Date: November 30, 2016 Page: 4 of 4

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID)					Well Construction	Remarks
							0	500	1000	1500	2000		
47		SILT Grey SILT with some fine to medium sand and trace gravel. Dense, dry, staining and odours not observed.											
48		SAND Fine to coarse SAND seam. Dense, wet, staining and odours not observed.											
49				100	Y	MW16-14 (15.0)	19.0						
50		SAND and GRAVEL Brown, very fine to medium SAND and fine GRAVEL with trace silt. Loose, dry, staining and odours not observed.											
52		Fine to coarse gravel seam at 16.0m.		100	N	MW16-14 (16.0)	23.0						
53		Silty SAND Brown, silty very fine to fine SAND with some coarse gravel.		100	Y	MW16-14 (16.5)	2.6						
54	End of Hole												
56													
59													
62													

Date of Water Level: November 16, 2016
 Water Level (from TOC): Dry at 13.488m

Well-Borehole Diameter: 150mm (6")
 Well Casing Diameter: 50mm (2")
 Well Casing Material: Schedule 40 PVC
 Well Screen Slot Size: 10 Slot

Depth of Well (TOC): 13.488m

APPENDIX C

YESAB Decision Documents and Permits



YESAB

Yukon Environmental and
Socio-economic Assessment Board

Designated Office Evaluation Report

Transport Canada - Remediation of Watson Lake Airport APEC 32

Project Number: 2017-0117

Proponent: Transport Canada

Assessment Completion Date: July 11, 2017

Watson Lake Designated Office

PO Box 294

Watson Lake, YT Y0A 1C0

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Watson Lake Designated Office Evaluation Report

Transport Canada - Remediation of Watson Lake Airport APEC 32 – 2017-0117

Summary

Transport Canada is proposing a series of activities associated with the remediation of soil and groundwater within the former Watson Lake Airport fuel tank storage area (Area of Environmental Concern 32) approximately 2 km east of the Watson Lake Airport. The Project proposes the clearing of brush and timber to construct access and drill pads, and delineate areas of concern; construction of temporary access trails and drill pads; drilling for soil sampling and groundwater monitoring wells; excavation/stockpiling of contaminated sediment; backfill, compaction, and revegetation of the site; and the transport of contaminated soils and groundwater to the Land Treatment Facility (LTF) at the Watson Lake Airport. The Project is expected to begin in summer 2017 and be completed by March 31, 2018.

The Watson Lake Designated Office solicited views and information on the Project, from June 7 until June 22, 2017. Comments were submitted by Yukon Government (YG).

Based on the project proposal, information available to the Designated Office and views and information received, the Designated Office identified the following valued environmental and socio-economic components: environmental quality and wildlife. The Designated Office determined that the Project is likely to result in significant adverse effects to wildlife such that further mitigation is required. The application of existing legislation, the Proponent's mitigations (Appendix A), as well as the recommended measures in this report are adequate to mitigate the significant adverse effects of the Project.

The Decision Body, Government of Yukon, Environmental Programs, will review the Recommendation and the accompanying reasons described in this Evaluation Report. The Decision Body will issue a Decision Document within 37 days, as prescribed under s. 2 of the *Decision Body Time Periods and Consultation Regulations*, that will either a) accept the recommendation, b) vary the recommendation, or c) reject the recommendation.

Assessment Outcome

Under s. 56(1)(b) of the Yukon Environmental and Socio-economic Assessment Act, the Watson Lake Designated Office recommends to the Decision Body that the Project be allowed to proceed, subject to specified terms and conditions. The Designated Office determined that the Project is likely to have significant adverse environmental effects in or outside Yukon that can be mitigated by those terms and conditions.

The terms and conditions of the recommendations are as follows:

1. The Proponent should contact the Regional Biologist prior to work commencing for guidance on raptor nest locations and setbacks
2. The Proponent shall develop an attractant management plan which outlines how human-bear conflicts will be minimized
3. The Operator shall report any incidents involving wildlife including when bears frequent the worksite area to the area's District Conservation Officer

For more information, please contact:

Watson Lake Designated Office

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PART A. BACKGROUND

Part A provides the context and background information required for the assessment of the Project. Section 1.0 identifies the requirement for an assessment under the *Yukon Environmental and Socio-economic Assessment Act*, while Sections 2.0 and 3.0 provide information and baseline data for the Project and project area. Section 4.0 identifies the scope of the assessment, including matters that were considered in evaluating the significance of potential effects of the Project.

1.0 REQUIREMENT FOR AN ASSESSMENT

The purpose of the proposed project is to remediate the soil and groundwater within the former fuel tank storage area (Area of Environmental Concern 32) east of Watson Lake Airport. While several activities are likely to be undertaken in conjunction with this Project, under s. 47 of the *Yukon Environmental and Socio-economic Assessment Act*, the Project is subject to an assessment by the Watson Lake Designated Office due to the following circumstances:

- The proposed activity is listed in column 1 of Schedule 1 of the *Assessable Activities, Exceptions and Executive Committee Projects Regulations* (Activity Regulations) and not listed in column 2 as excepted. The proponent proposes to undertake activities listed in Part 8, item 2 of the Activity Regulations. The specific activity is listed as:

Removing, destroying or containing, or any other activity intended to reduce the exposure of human beings, animals and plants to, materials containing a contaminant found on a contaminate site.
- Is proposed to be undertaken in the Yukon; and
- A federal agency or federal independent regulatory agency is the proponent.

Table 1: The Decision Body and the triggering authorizations required for the Project. This information is based on the project proposal and other information submitted to the Designated Office during the assessment.

Decision Body	Authorization Required	Act or Regulation
Government of Yukon, Environment, Environmental Programs	Relocation Permit	<i>Environment Act, Contaminated Sites Regulation</i>
	Land Use Permit	<i>Territorial Lands (Yukon) Act, Lands Act, Land Use Regulation</i>
	Access Permit	<i>Highways Act</i>

2.0 PROJECT DESCRIPTION

2.1 Proponent Information

The Proponent for the Project is Transport Canada. Contact information can be found on the YESAB online registry.

2.2 Geographical Context

The Project is located within the Watson Lake municipal boundary along the Robert Campbell highway. The project site is located at the former Watson Lake Airport tank farm approximately 9 km from the town centre and 2km from the Watson Lake Airport. Access to the project area is by way of an old, overgrown road off the Robert Campbell highway.

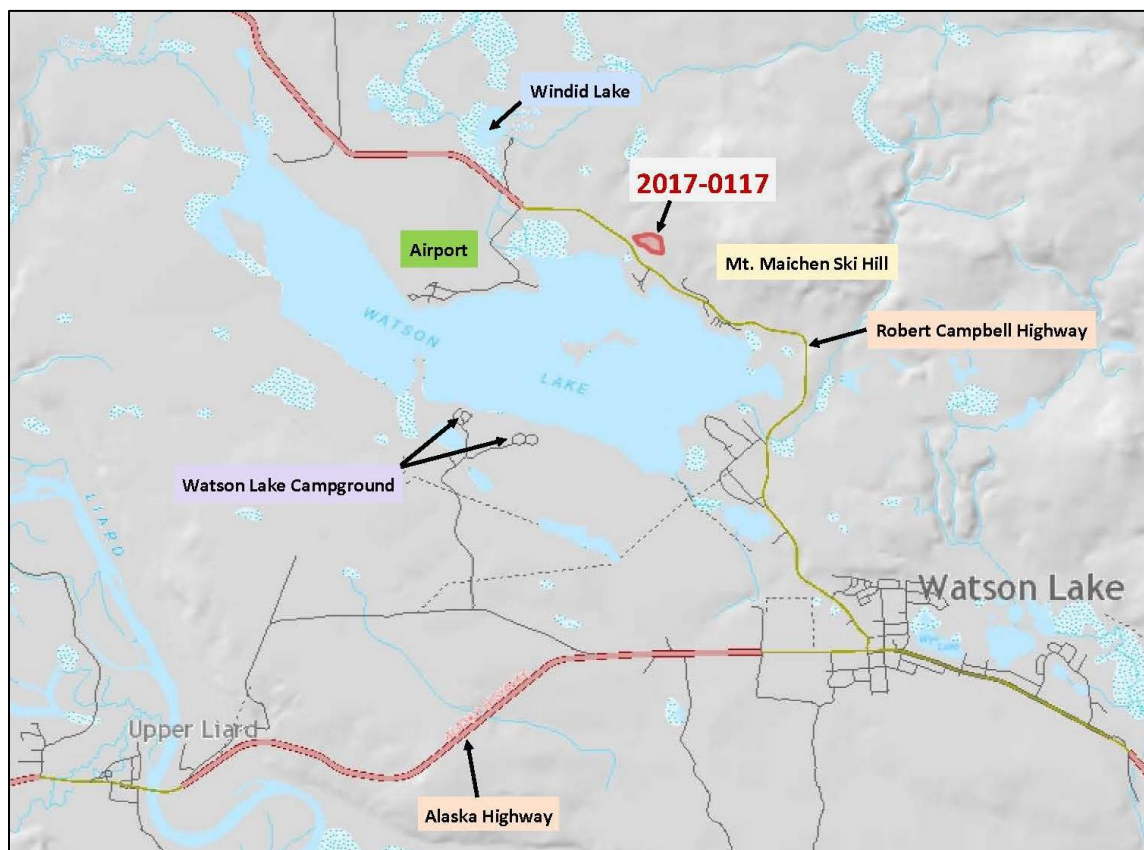


Figure 1: Project Location

Table 2: Project Location, Coordinates and Geographical Parameters

Project Coordinates:	Decimal Degrees
Map Sheet: 105A/02	NW 60.1191° N 128.7719° W NE 60.1191° N 128.7621° W SW 60.1156° N 128.7720° W SE 60.1155° N 128.7621° W
First Nation Traditional Territories Involved:	Liard First Nation Ross River Dena
Drainage Region:	Major Drainage Area: <i>Arctic Drainage Area</i> Sub Drainage Area: <i>Upper Liard</i> Sub-sub Drainage Area: <i>Headwaters Liard</i>
Nearby Watercourses or Waterbodies:	Watson Lake, approximately 400 m southwest

2.3 Project History

The following information was noted in the project proposal (YOR Document 2017-0117-001-1). This area was identified as Area of Environmental Concern (AEC) 32 following the results from a Phase 1 Environmental Site Assessment completed by Franz Environmental Inc (2015). The AEC 32 includes six aboveground storage tanks (ASTs) which were identified using aerial photos taken in 1946, 1952, and 1961.¹ These sites are labeled area A to F in Figure 2. Although there are no longer any ASTs on site, evidence of the past site activities remains which includes gaskets, tank straps, metal piping protruding from the ground and concrete platforms. In addition, an area containing pipeline debris was identified by Arcadis (2016), as illustrated as area G in Figure 4.

Through the site investigations conducted by Franz (2015), Arcadis (2016) and analytical results obtained from the October 2016 drilling program by Keystone Environmental Ltd, the presence of certain petroleum hydrocarbon Contaminates of Concern (COCs) were detected in the soil and groundwater at concentrations greater than the Yukon Contaminated Sites Regulation (CSR) standards. Site F (Figure 2) showed sufficient delineation of groundwater and soil contamination that no further remediation work is required. The contaminated soils and groundwater collected at sites A-E and G will be transported to the Land Treatment Facility (LTF) located at the Watson Lake Airport.

The LTF at the Watson Lake Airport has been operated by Transport Canada since 2001. The facility was initially built to treat contaminated soils from the airport fire training area site. In the summer of 2010, the construction of a new two-celled LTF was completed and two of the three original LTFs were decommissioned. The expected life span of the LTF is for another 14 years.²

The LTF that will be used for the treatment of the contaminated soils and water is a previously assessed project and is therefore not part of the project scope. When the contaminated soils are transported to the LTF they will be placed into one of three cells. Contaminated soils are placed directly into treatment cells #1 and #2 if space permits. If the treatment cells have reached capacity, any additional quantities of soils delivered to site are placed into the stockpiling cell. Treatment of material in the LTF occurs through natural bioremediation of the soils and is enhanced through the use of mechanical tilling which is carried out by utilizing an agricultural cultivator, or disc. Tilling is used to aerate the contaminated soil and upon confirmation of successful treatment, the treated material is removed from the LTF. The LTF is a non-commercial multi-use treatment facility, used for treatment of soils that have hydrocarbon contamination generated from the lands of the Watson Lake Airport.

Several projects have been previously submitted for assessment under YESAA for proposed works at the Watson Lake Airport (Table 3). These projects are related to the proposed project and therefore, a brief summary is provided below.

¹ YOR 2017-0117-001-1, p.6-7.

² YOR 2014-0146-024-1, p.10

Watson Lake Designated Office Evaluation Report

Transport Canada - Remediation of Watson Lake Airport APEC 32 – 2017-0117

Table 3: Previous projects submitted for assessment under YESAA for proposed works at the Watson Lake Airport

Project Number	Project Title
2007-0101	Contaminated Sites: Watson Lake Airport APEC 10
2007-0113	Land Treatment Facility: Watson Lake Airport
2008-0088	Land Treatment Facility: Watson Lake Airport
2008-0150	Land Treatment Facility: Watson Lake Airport
2009-0073	Watson Lake Airport – Studies and Investigations at 14 APECs
2009-0111	Watson Lake Airport Landfill Capping
2010-0085	Watson Lake Airport – APEC 7 Remediation
2011-0307	Watson Lake Airport LTF – Permit Renewal
2014-0146	Watson Lake Airport LTF- Permit Renewal

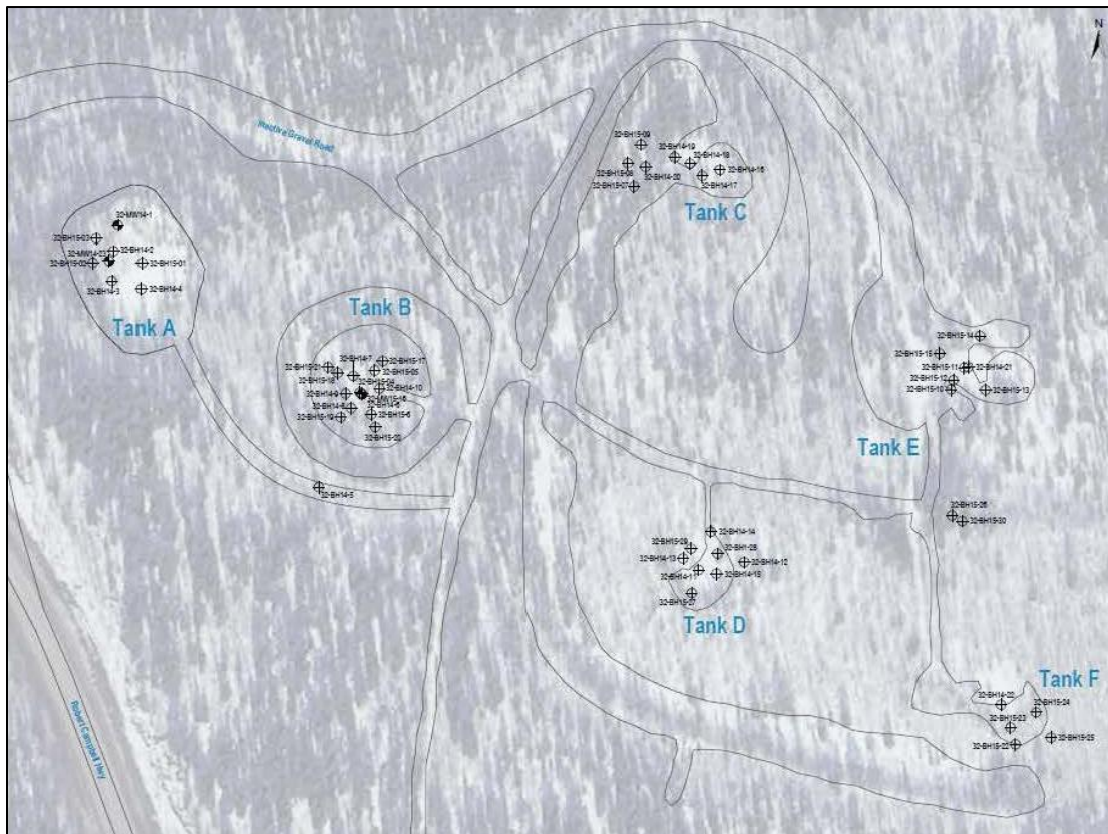


Figure 2: Tank areas A-F³

³ YOR 2017-0117-004-1

2.4 Project Scope

The Proponent, Transport Canada is proposing to remediate the soil and groundwater within the former Watson Lake Airport fuel tank storage area (APEC 32) east of the Watson Lake Airport. The site is located along the Robert Campbell Highway, approximately 2 km from the airport. The Project is expected to begin in summer 2017 and be completed by March 31, 2018.

Project Activities:

- Use of heavy equipment
- Clearing of brush and timber (max 6 650 m²) to delineate areas of concern, construct access and drill pads, and for excavation and lay down areas
- Construction of temporary access trails (totalling approx. 1 km and up to 3 m wide)
- Construction of drill pads (up to 16 m x 20 m)
- Drilling (approx. 30 new holes – for soil sampling and for groundwater monitoring wells)
- Excavation/stockpiling (approx. 18 000 m³ of soil, approx. 10 000 m³ of which is expected to be contaminated)
- Transportation of contaminated soils and groundwater
- Reclamation (backfilling and revegetation)
- Groundwater monitoring (yearly over approx. 5 years)

2.5 Project Details

The following is a summary of the operations at AEC 32 provided by the Proponent.^{4,5}

The proposed project is the remediation of soil and groundwater within the former Watson Lake Airport fuel tank storage area (AEC 32). AEC 32 is located east of the Watson Lake Airport along the Robert Campbell Highway (Figure 3). Activities proposed for remediation of the site include clearing, drilling, sampling, remedial excavation, backfill, compaction, and revegetation. These activities are proposed to occur in the summer of 2017 and be completed by March 31, 2018. Groundwater monitoring of the site is planned to occur once a year for up to five years.

Clearing and Grubbing

Clearing of brush and timber will occur. This work will be done using an excavator with a grubbing head. Six areas are to be cleared for drilling and excavation activities. It is expected that a maximum of up to about 6 650 m² will be cleared. This includes up to 4 000 m² for temporary access trails and drill pads and up to 2 650 m² for excavation areas and lay down areas.

⁴ YOR 2017-0117-001-1

⁵ YOR 2017-0117-006-1

Watson Lake Designated Office Evaluation Report

Transport Canada - Remediation of Watson Lake Airport APEC 32 – 2017-0117

Trees at the site that may be cleared are generally around 15 cm diameter at breast height (dbh) up to about 30 cm dbh. An excavator will be used to remove trees below 10 m in height and 15 cm in dbh. A chain saw and feller will be used for trees exceeding those parameters. Cleared material and woody debris will be chipped or mulched and used to reclaim the cleared areas or removed from site and disposed of. The Proponent intends to minimize the number of mature trees to be cut and brush to be thinned.

Temporary Access Trails

The temporary access trails will be developed using an excavator and will be less than 3 m across and 1 km in length. The use of existing trails for project activities is also proposed and would require clearing. These trails will allow equipment access to the site.

Drilling

Approximately 22 boreholes will be drilled, some of which will be completed as groundwater monitoring wells. Holes will be drilled to a maximum of 33 m below ground surface (mbgs). Soil cuttings will be used to backfill the borehole and bagged bentonite will be used to seal off any zones of water encountered. Sediment-laden water generated during development of the new groundwater monitoring wells will be placed into drums and transported to the LTF. A surveyor will survey and record the locations of the monitoring wells. Proposed investigation sites are identified in Figure 4.

Groundwater Sampling

Groundwater monitoring will occur at 17 existing wells. The water collected during sampling will be stored in drums and disposed of at the Watson Lake Airport LTF. Environmental monitoring will continue to occur once per year for up to 5 years.

Excavation and Backfill

Seven former tank and pipeline debris areas were identified at AEC 32, six of which will require remedial excavation (areas A-E and G). Areas requiring remediation will be excavated to a maximum depth of 7 mbgs. The total excavation volume is anticipated to be approximately 18 000 m³. Of this volume, it is expected that approximately 10 000 m³ will be contaminated. Soils exceeding regulatory standards will be removed and placed in the LTF; soils that do not exceed regulatory standards will be used as backfill. Additional backfill will be purchased and brought to the site. Once backfilled, the areas will be compacted with the excavator.

Revegetation

Following backfill and compaction, the area will be revegetated. The material produced from clearing activities will be mulched or chipped and used to reclaim the cleared areas.

Watson Lake Designated Office Evaluation Report

Transport Canada - Remediation of Watson Lake Airport APEC 32 – 2017-0117

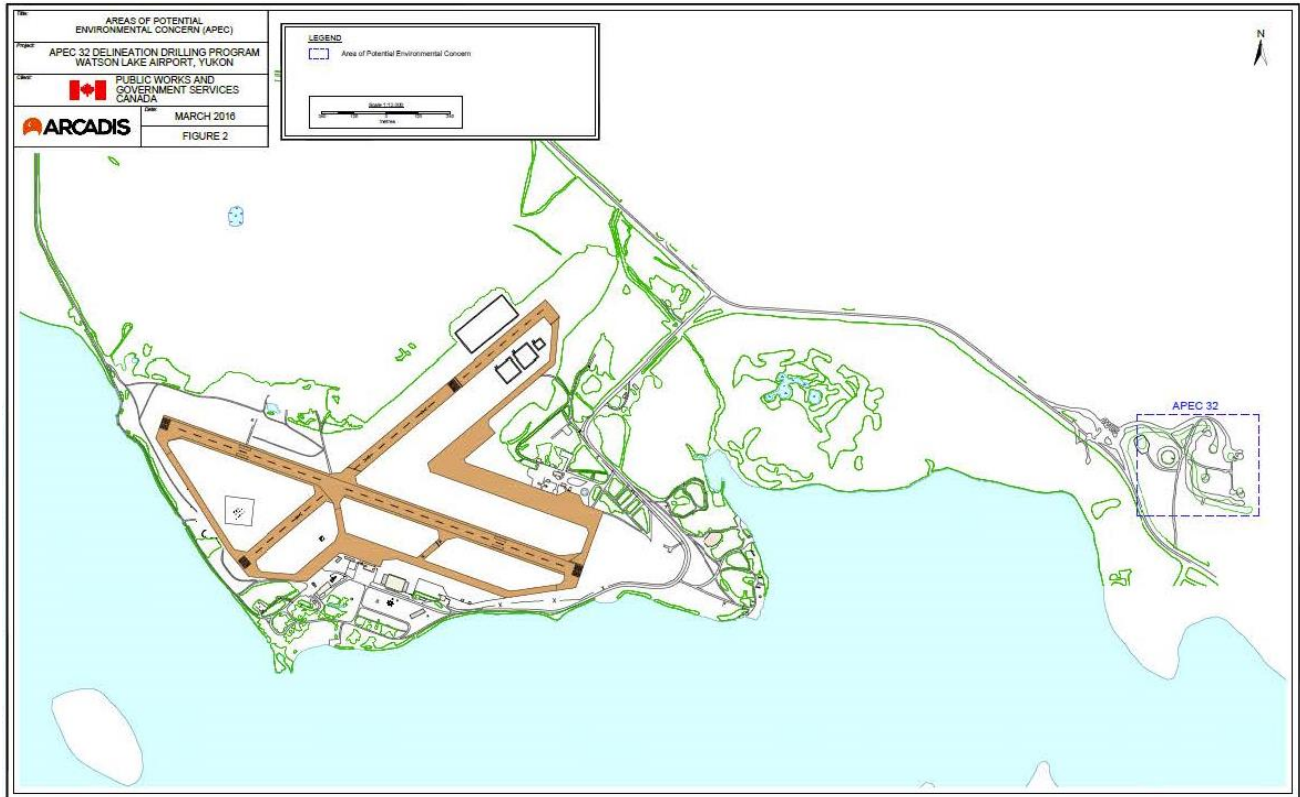


Figure 3: Location of APEC 32 along the Robert Campbell Highway and in relation to the Watson Lake Airport⁶

⁶ YOR 2017-0117-004-1

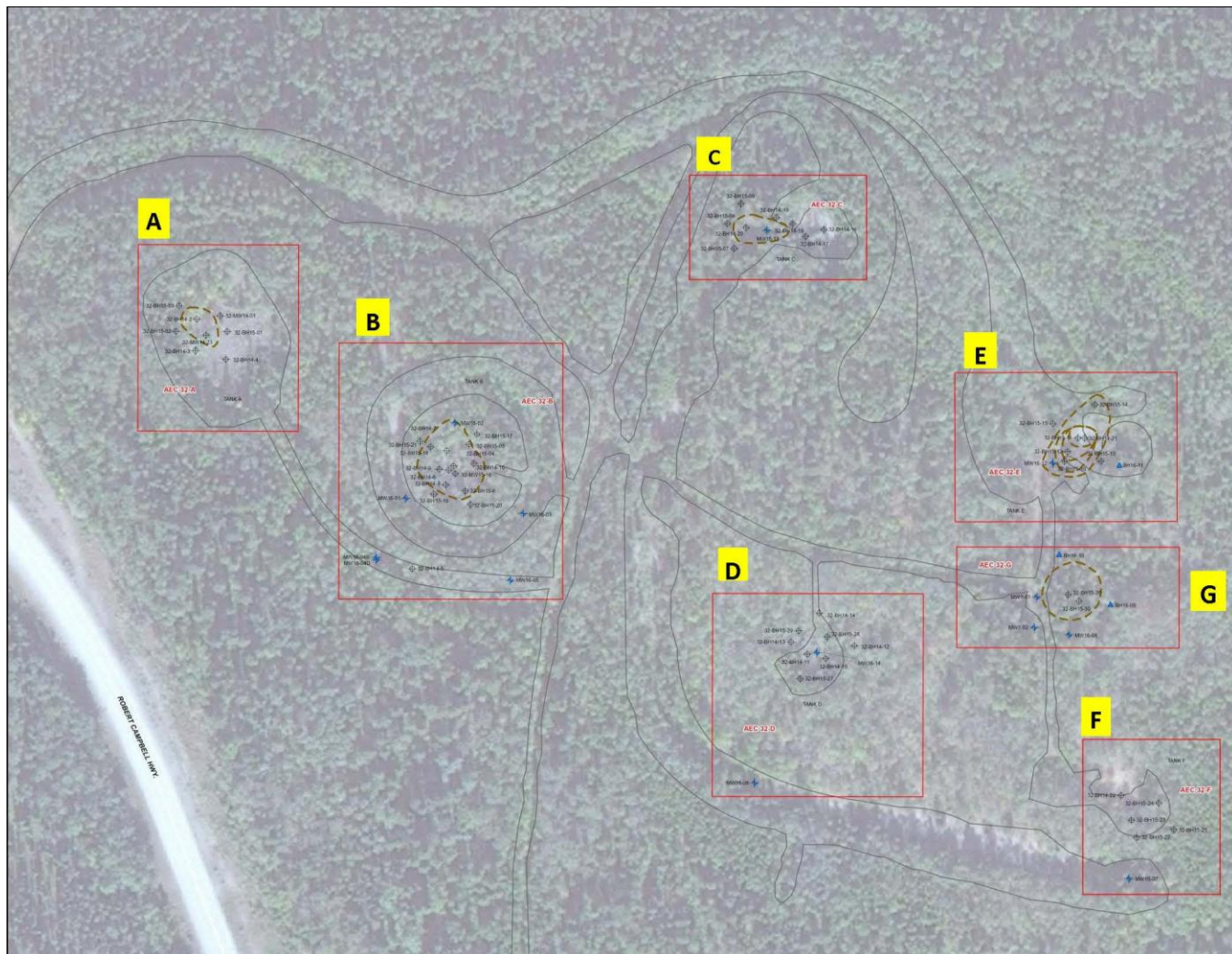


Figure 4: APEC 32 - Proposed site investigation/remedial excavation plan⁷

3.0 ENVIRONMENTAL AND SOCIO-ECONOMIC SETTING

3.1 Physical Environment

The Project is located within the Liard Basin Ecoregion⁸ at the former Watson Lake Airport tank farm, approximately 2 km east of the Watson Lake Airport, along the Robert Campbell Highway. The site is bordered by wetlands to the north and east and by Watson Lake to the south and west. Sites A-G are surrounded by bush and forest. Through groundwater monitoring studies, groundwater was found to flow southwest towards Watson Lake which is located >400 m from the Project. The Proponent has indicated that most of the area is underlain by sedimentary rock, consisting of shale, slate, conglomerate, limestone, chert, argillite and dolomite and to a lesser extent, metamorphic rocks.

⁷ YOR 2017-0117-006-1, Adapted

⁸ Smith et al., 2004

The LTF is located at the secured and fenced grounds of the Watson Lake Airport. The closest waterbodies are Watson Lake (>100 m south) and Windid Lake (across the Robert Campbell Highway). Windid Lake is drained by Windid Creek into Watson Lake which then drains into the Liard River through Watson Creek. Shallow ditches at the Watson Lake Airport provide local drainage to the site.

3.2 Biological Environment

The Project is located within the low elevation environment of the Liard Basin Ecoregion. This boreal forest is largely composed of lodge pole pine, white and black spruce and aspen with various shrubs and brush. Prior to installing the fuel tanks, the area was cleared and the vegetation now consists of young poplar regrowth with an herbaceous understory.

A variety of wildlife species are found in the area surrounding Watson Lake including moose, grizzly and black bears, wolves, fox, snowshoe hare, marten and other furbearers, grouse, and other bird species. The fuel tank storage area is not fenced, and therefore allows the movement of wildlife through the site. Many streams and lakes surrounding the project area support an abundance of fish species such as whitefish, northern pike, lake trout, Arctic grayling, and burbot.

Wildlife Key Areas (WKAs) are locations used by wildlife for important, seasonal life functions. WKAs are often used around the same time each year, and during these times, animals can aggregate in relatively large numbers. Both of these factors make animals vulnerable to direct habitat loss or disturbance. According to the YESAB Geolocator, the Project is located within the WKA for bald eagle, merlin, rough-legged hawk, osprey, and falcon summer reproduction (Jun-Aug).

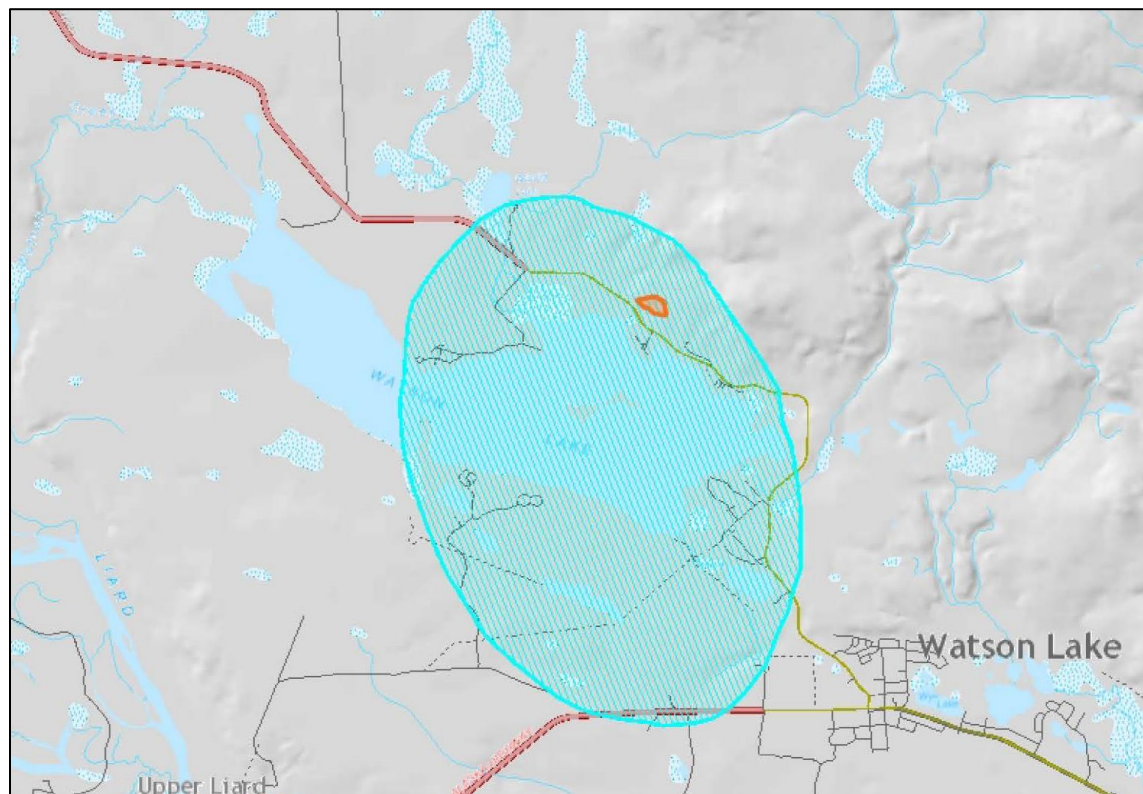


Figure 5: Wildlife Key Area for Bald Eagle, Merlin, Rough-Legged Hawk, Osprey, and Falcon

3.3 Socio-economic Environment

The Project is located in southeast Yukon within the traditional territories of the Liard First Nation (LFN) and the Ross River Dena (RRD), as well as within the municipal boundaries of the Town of Watson Lake (population of approximately 1 471).⁹ The former Watson Lake Airport tank farm (AEC 32) is situated along the Robert Campbell Highway approximately 2 km east of the airport.

Several residential developments along the shore of Watson Lake are in close proximity to the Project. The closest development is approximately 300m south of the site, on the south side of the Robert Campbell Highway, bordering the lake. In addition to housing residential developments, Watson Lake is frequently used for a variety of recreational activities such as fishing and water sports.

The LTF is located on the Watson Lake Airport property. This area is also subject to frequent use from personal and commercial air traffic and aircraft maintenance. The site is also the location for the BC Fire Base, floatplane docks, and storage hangers.

4.0 SCOPE OF THE ASSESSMENT

The scope of the assessment identifies the matters considered in an assessment. It is determined by considering the activities described in the scope of the Project (identified in Section 2.4) and, based on consideration of the matters set out in s. 42(1) of YESAA, identifying the valued environmental and socio-economic components that may be affected by project activities. Views and information submitted during the assessment help to identify values and potential effects of the Project to these values.

4.1 Views and Information Submitted

During the Seeking Views and Information period, comments were received from various branches of the Yukon Government. Tourism-Heritage indicated they have no concerns with the proposed project as the project location presents a low potential for the presence of intact archeological sites. The Land-Use Branch and Transportation Engineering Branch indicated that a Land Use Permit and an Access Permit will be required for site activities. Health and Social Services indicated that the contaminants on site pose a risk to human health to both employees during site activities and the public, as the site is easily accessible. Government of Yukon, Environment commented that the proposed activities may negatively affect several values including soils and water quality, biodiversity, nesting birds, and bears. They also noted the overlap between AEC 32 and the bald eagle WKA.

4.2 Consideration of Significance

In order to mitigate a potential adverse effect, the Designated Office must first find significance. In addressing what may constitute a “significant” adverse effect, the Designated Office considered the following factors:

Magnitude: The intensity of an effect or extent of change, where "effect" is defined as the change from baseline conditions resulting from an activity.

Probability: The likelihood that an adverse effect will occur.

⁹ Yukon Bureau of Statistics, 2016

Geographic Extent: The geographic extent of project effects (e.g. the distance from the project and/or the area in which effects are detectable). The geographic extent of effects can be local or regional.

Duration and Frequency: The length of time the effect lasts and how often the effect occurs. The duration of an effect can be short term or long term. The frequency of an effect can be frequent or infrequent.

Reversibility: The degree to which the effect is reversible. Effects can be reversible or permanent. Reversible effects may have lower impacts than irreversible or permanent effects.

Context: The particular environmental and/or socio-economic context within which the project occurs. Context is related to the importance of valued environmental and socio-economic components, their resiliency to potential effects and the extent to which those valued components may successfully adapt to change.

4.3 Consideration of Cumulative Effects

With regards to cumulative effects, subsection 42(1)(d) of the *Yukon Environmental and Socio-economic Assessment Act* (YESAA) instructs Designated Offices to consider:

42(1)(d) the significance of any adverse cumulative environmental or socio-economic effects that have occurred or might occur in connection with the project or existing project in combination with the effects of other projects for which proposals have been submitted under subsection 50(1) or any activities that have been carried out, are being carried out or are likely to be carried out in or outside Yukon;

(d)(1) any studies or research undertaken under subsection 112(1) that are relevant to the project or existing project;

(d)(2) the need for effects monitoring.

In the situation where the Designated Office determined that there would be no residual effects of the proposed project on a specific value then a cumulative effects assessment (for that value) was not necessary.

4.4 Valued Environmental and Socio-economic Components

The following valued environmental and socio-economic components (VESEC) are the specific values that have been identified by the Watson Lake Designated Office as being adversely affected by the Project:

- Environmental Quality (Section 5.0)
- Wildlife (Section 6.0)

PART B. ASSESSMENT AND REASONS FOR RECOMMENDATION

Part B of this evaluation report presents the effects assessment of the Project on valued environmental and socio-economic components (VESEC) identified in Section 4.0. For each VESEC, an overview is provided followed by the effects characterization analysis. Where relevant, measures to reduce significant adverse effects of the Project on the VESEC are identified. The effects characterization ends with a conclusion on the key findings of the assessment.

5.0 ENVIRONMENTAL QUALITY

5.1 Overview

The Project may adversely affect environmental quality in the area. Specific values related to environmental quality that may be affected by project activities include soil, water and vegetation. Project activities have the potential to contaminate soil, water and vegetative resources by introducing contaminants and deleterious substances through the use of heavy equipment, the transport of contaminated soils to the LTF, and fuel spills. Contamination of the surrounding environment may affect the long-term survival of organisms or populations within the area. Although soil and water quality is at risk due to the project activities, without proper remediation, the hydrocarbon contaminated materials on site pose a greater threat to the environment.

The following potential project effects on environmental quality have been considered:

- Environmental contamination

The Designated Office has determined that the Project will not result in significant adverse effects to environmental quality such that further mitigation is required. The following sections describe the rationale used to determine the significance of project effects on environmental quality.

5.2 Project Effects – Environmental Contamination

5.2.1 Release of Contaminants

Contaminants within soil and groundwater maybe be re-introduced into the environment during excavation work. Such an event may occur during the excavation of pits, transport of soils within the site, and loading the soil into trucks. Contamination may affect the long-term survival of organisms or populations within the area and, in high enough concentrations, be lethal. Furthermore, bioaccumulation of chemical contaminants can result in effects that may take a long time to be observed and affect organisms throughout the food web, including humans.

There is a risk of contaminant release during precipitation events where the contaminants may leach into the environment. Contaminants have the potential to affect water resources through surface runoff or by migration in groundwater to surrounding watercourses. This may occur if the contaminants travel through the soil until they reach the water table below or through the erosion and runoff of contaminated soils and sediment. Potential impacts from contaminant leaching and pollution run off may have a significant adverse effect to the surrounding environment. The Proponent has indicated that an erosion and sediment control (ESC) plan will be prepared by the contractor detailing the type and location of ESC features in order to prevent the release of contaminants through erosion and sedimentation. The site has

a relatively flat topography with no evidence regarding channeling of surface runoff with the closest waterbody located approximately 400m away. Deposition of soil is therefore not expected to adversely affect environmental quality; nor are contaminants expected to enter the nearest watercourse by transport through surface run-off. The excavated materials will also be directly transferred to the LTF. This reduces the opportunity for contaminants in the soil to leach into the surrounding environment. Furthermore, post-remedial monitoring and risk assessment will provide an avenue for the Proponent to determine whether any remaining contaminants in the soil or groundwater pose a risk to ecological or human health. Post-remedial monitoring includes the installation of a groundwater monitoring well in the footprint of soil excavation.

5.2.2 Transportation of Contaminated Materials

The transportation of contaminated material to the LTF may lead to contamination of the surrounding environment through improper loading procedures or an accidental release of materials during transport. During transport, the contaminated soils are subject to greater wind velocity and jarring. The Proponent has indicated that the standard practice for transportation of materials includes the use of a suitable cover to prevent the escape of any contaminated soil and that the speeds of haul trucks will be reduced along the access road and between the site and the LTF. In addition, spills, leaks, accidents and/or malfunctions related to the haul trucks could result in the release of these substances into the environment. If steps are not taken to immediately clean up the spill, it could result in the contamination of the terrestrial and/or aquatic ecosystems.

5.2.3 Use and Storage of Fuel

Proper handling, storage and disposal of petroleum waste and contaminated materials plays an important role in preventing environmental contamination. Heavy equipment (e.g. an excavator) will be utilized for project activities. The use of this equipment may result in the accidental release of deleterious substances, which may include diesel fuel, gasoline, hydraulic fluids, coolants, lubricants, solvents and cleansers. The release of these substances may occur as a result of spills, leaks, refuelling, poor maintenance, accidents and/or malfunctions during the use of heavy equipment resulting in the contamination of terrestrial and/or aquatic ecosystems. The Proponent has indicated that fuels or oils will not be stored on site and that refuelling will occur off-site.

A lack of appropriate spill containment equipment or instructions on site in the event of a spill may result in an inadequate response to a spill. This may increase the amounts of contaminant released resulting in greater environmental contamination. Although the Proponent has indicated that a spill kit will be located on site, a spill response plan was not provided. The *Environment Act* and the *Spills Regulations* regulate the management of spills, specifically the requirement of written emergency spill procedures, the availability of appropriate clean-up equipment, and spill reporting. In addition to the proposed mitigations, the Proponent is remediating and reclaiming the site that, if left untreated, could cause further degradation to environmental quality. This is considered an improvement to the current condition of the site.

5.2.4 Relevant Proponent Commitments

These identified commitments mitigate specific adverse effects of the Project and are instrumental in the Designated Office's significance determination. These commitments demonstrate the Proponent's efforts under s. 42(1) of YESAA to consider adverse project effects and mitigation measures. These specific commitments mitigate adverse effects and in some cases may surpass the requirements of other legislation. The following proponent commitments can be found in YOR document 2017-117-001-1:

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- A erosion and sediment control (ESC) plan will be prepared by the contractor detailing the type and location of ESC features
- Wet excavation soils will be side cast and drained before loading into trucks
- Haul trucks for excavated soil transport to the LTF will be tarped and end gates sealed
- Stockpiles will be covered to prevent disturbances by wind
- Water or other non-toxic dust suppressants may be used when conditions require
- Speed of haul trucks will be reduced along access roads and between the site and the LTF
- Silt fencing will be installed around the excavation areas to prevent off-site mobilization of sediments
- Roadways will be swept or cleaned with equivalent techniques to remove sediment tracked by trucks and equipment
- Drill cuttings/wastes will be contained in drums or approved equivalents
- Vacuum trucks or equivalent containment systems will be used where necessary to contain potentially contaminated liquids within remedial excavation areas
- Spill kits will be available at excavation, staging, and refuelling areas of the site
- Refuelling will be completed using containment trays of equivalent materials
- Fuel and other petroleum products will be not be stored on site
- Refuelling of equipment will be done offsite
- The contractor will have absorbent pads to contain hydraulic oil leaks from the excavator, drill rig, and/or support trucks
- Equipment will be checked daily to maintain condition of working parts and prevent leaks of oils and fluids
- Workers will use appropriate personal protective equipment for storage, handling and incident response to prevent contact with skin, eyes, and/or lungs

5.2.5 Relevant Legislation

The Watson Lake Designated Office considered the following legislative requirements. The exclusion of other legislation listed here does not preclude compliance; rather, the Watson Lake Designated Office reviewed this specific legislation because of its direct relevance to the environment.

- *Waters Act*
- *Environment Act*

- Spills Regulations
- Contaminated Sites Regulations
- Special Waste Regulations

5.2.6 Significance Determination

The Project includes activities that may adversely affect environmental quality as a result of a release of contaminants into the environment from excavation activities, transportation, and fuel spills. However, given the Proponent's commitments outlined in Section 5.2.4, the legislation to which the Proponent is required to comply, and the short duration of project activities, the probability of adverse effects is considered low.

The release of contaminants will be controlled and prevented through the use of erosion and sediment control measures. The site location is adequately removed from any water courses and has a flat topography, therefore, the likelihood of contaminant release from surface runoff or sediment transport is considered low. The use of haul truck covers and inspections to ensure adequate containment of contaminated soils will also decrease the likelihood and extent of a contaminant release.

Although the Proponent has indicated that a spill kit will be located on site, a spill response plan was not provided. The *Environment Act* and the *Spills Regulations* adequately regulate the management of spills, specifically the requirement of written emergency spill procedures, the availability of appropriate clean-up equipment, and spill reporting. The nearest water body to the site is 400m away. Spilt fuel and/or other contaminants, therefore, have a low likelihood of reaching nearby watercourses.

The Watson Lake Designated Office has determined that the Project will not have significant adverse environmental or socio-economic effects to environmental quality.

5.3 Residual Effects

Residual effects are those project effects that remain following the application of legislation, the Proponent's commitments and any mitigation measures identified by the Designated Office. The Project may have residual effects on environmental quality relating to environmental contamination. The Designated Office is satisfied that existing legislation and Proponent commitments listed in this report are sufficient to ensure that residual effects from the Project on environmental quality are not significant and adverse.

5.4 Cumulative Effects

A cumulative effect occurs when a residual effect interacts with effects from other projects or activities to form an effect larger than the residual effect in isolation. For consideration of cumulative effects on environmental quality, the Designated Office considered the temporal scope of the Project (Summer 2017 to March 31, 2018) and considered that residual effects have the ability to extend beyond this timeframe. The spatial scope includes the project footprint and may extend past the borders of the former fuel tank storage area, particularly in the event of contamination to the environment.

Past activities within this area include the use of the tanks for fuel storage, use of access road, and drilling of boreholes for soil and groundwater well sampling. These activities may have residual effects

similar to the proposed project in the form of environmental contamination. Residual effects are associated with the use and storage of fuel on site, drilling activities, clearing, and excavating.

Traditional, recreational, trapping and outfitting activities may occur in the area and may have residual effects to environmental quality in relation to contamination if activities include use of fuel operated motorized vehicles (ATV's, snowmobiles, vehicles). In addition, fuel is also used by the Watson Lake Airport for air travel. Traditional, recreational, transportation, trapping and outfitting activities occurring in this area may have residual effects to environmental quality; however, these are expected to be minor.

The project's short duration and small footprint make it unlikely for its residual effects to combine with the effects of other activities. Moreover, the Project includes removing existing contamination, thereby reducing the potential for cumulative effects. Consequently, the Watson Lake Designated Office has determined that the Project will not have significant adverse cumulative environmental effects to environmental quality in connection with the effects of other activities. Therefore, no further mitigation is required.

6.0 WILDLIFE

6.1 Overview

The Project will begin during summer 2017 and is expected to be complete by March 21, 2018. Species of conservation concern and other wildlife may be found within or in close proximity to the project area. The site overlaps with the WKA for bald eagle, merlin, rough-legged hawk, osprey, and falcon summer reproduction (Jun-Aug). Grizzly and black bears are common to the Project area. Project activities such as excavation, clearing, felling, trail construction, presence of attractants, and increased human presence may result in injury and/or mortality to wildlife.

The following potential project effects on wildlife have been considered:

- Injury and/or Mortality to Wildlife

The Watson Lake Designated Office determined that the proposed project will result in significant adverse effects to wildlife, such that further mitigation is required. The following sections provide the rationale for this determination.

6.2 Project Effects – Injury and/or Mortality to Wildlife

6.2.1 Effects Characterization

Avian Wildlife

Bird injury and/or mortality may occur from clearing of vegetation, through the destruction of nests, eggs or burrows. In Yukon, the core breeding period for most, though not all, migratory and resident birds extends from approximately May 1 to August 15. Project construction is proposed to occur during the summer and fall seasons, and may extend to March 31, 2018, thus overlapping with the typical nesting season in Yukon. The site overlaps directly with the WKA for bald eagle, merlin, rough-legged hawk, osprey, and falcon (Figure 5) which is used for summer reproduction from June until August.

Migratory, resident birds, and raptors may nest in a variety of habitat types and features, which makes it difficult to predict or locate the nests. Locations that birds may select to nest include on the ground or in ground cavities; in grasses and shrubs, in trees or tree cavities; and other sites that are often well

concealed and difficult to identify. The disturbance of raptor nests during key breeding times could also result in the injury and/or death of nesting raptors. The nesting stage is essential in maintaining sustainable populations of migratory birds and raptor species.

It is the Proponent's responsibility to ensure activities are managed in compliance with relevant legislation including but not limited to the Migratory Birds Regulations, the *Migratory Birds Convention Act*, the *Species at Risk Act*, and the *Yukon Wildlife Act*. Such compliance reduces the likelihood and magnitude of any adverse effects to migratory birds. In the event of accidental destruction of nests/eggs, the magnitude of the effects will depend on the species affected and the number of active nests lost. The Designated Office considers the amount of clearing to be minimal, and mostly occurring on already disturbed land, therefore the likelihood of the destruction of a large number of migratory bird nests is low.

The Proponent has indicated that although site preparation and remediation activities will overlap with the WKA for several raptors, the duration of the overlap will be approximately 45 days and will only occur over one breeding season. Although the temporal overlap is minimal, raptor species are sensitive during this time period and as a result, adverse effects to raptors is anticipated and further mitigation is required.

Bears

Although on-site activities have a short duration, the likelihood of human-bear encounters is considered high as the Project is likely to contribute to an increase in wildlife attractants (fuel, food and waste) in the area. This poses a significant safety concern to wildlife and humans. Habituated bears that are successful at procuring garbage as a food source are particularly at risk. Habituated bears will return to a site where they have previously obtained a food reward due to inadequate garbage management. These bears tend to become increasingly bold and are often killed in protection of property or life, resulting in direct wildlife mortality as an adverse effect of the project. Given the likelihood of the bears at the project area, human/bear encounters at this location are considered high and increases with poor garbage handling. The Proposal did not provide any mitigations in relation to limiting bear habituation, injury or mortality and as a result, adverse effects to bears are anticipated and further mitigation is required.

6.2.2 Relevant Proponent Commitments

These identified commitments mitigate specific adverse effects of the Project and are instrumental in the Designated Office's significance determination. These commitments demonstrate the Proponent's efforts under s. 42(1) of YESAA to consider adverse project effects and mitigation measures. These specific commitments mitigate adverse effects and in some cases, may surpass the requirements of other legislation. The following proponent commitments can be found in YOR document 2017-0117-001-1:

- A desktop review will be conducted to identify potential species under the Species at Risk Act
- A qualified environmental professional (QEP) will perform a pre-clearing survey of the areas that require vegetation removal to confirm the presence/absence of wildlife and species at risk following the Canadian Wildlife Services best management practices
- Care will be given to minimize the falling of mature trees, and to minimize the amount of brush generated
- A QEP will walk the project footprint and document the location of species at risk and/or potential habitat

- If species at risk are present on site, the QEP will determine appropriate setbacks or changes to the timing of the Project

6.2.3 Relevant Legislation

The Watson Lake Designated Office considered the following legislative requirements. The exclusion of other legislation listed here does not preclude compliance; rather, the Watson Lake Designated Office reviewed this specific legislation because of its direct relevance to the environment.

- *Environment Act*
- *Wildlife Act*
- *Species At Risk Act*
- *Migratory Birds Convention Act*
- Migratory Birds Regulations

6.2.4 Significance Determination

The Project includes activities that may result in injury and/or mortality of wildlife as a result of clearing, felling, excavating, and construction also well as increased presence of humans and attractants. In the determination of significance of adverse effects to wildlife from the Project, the Designated Office considered the project design, location and size, as well as information gathered during the assessment, existing legislative requirements and the Proponent's commitments listed above.

The location and timing of the Project overlaps with the WKA for several raptor species, and activities such as felling may result in raptor injury and/or mortality. Although the Proponent has indicated that appropriate setbacks will be determined if species at risk are present on site, a setback distance was not specified for raptors. Government of Yukon's typical buffer to avoid disturbing nesting raptors is 1 km, therefore, the Designated Office recommends additional mitigations

The increased presence of humans and attractants is also of concern due to the presence of grizzly and black bears in the area and the lack of an attractant management plan. In order to reduce the frequency of bears on site, and thus reduce the potential for human bear conflict, and ultimately bear mortality, further mitigation is required.

The Watson Lake Designated Office has determined that the Project is likely to have significant adverse environmental and socio-economic effects on wildlife in relation to injury and/or mortality of both raptors and bears. These effects can be eliminated, reduced or controlled by the application of the following terms and conditions:

1. The Proponent should contact the Regional Biologist (867-536-3210) prior to work commencing for guidance on raptor nest locations and setbacks
2. The Proponent shall develop an attractant management plan which outlines how human-bear conflicts will be minimized
3. The Operator shall report any incidents involving wildlife including when bears frequent the worksite area to the area's District Conservation Officer

6.3 Residual Effects

Residual effects are those project effects that remain following the application of applicable legislation, the Proponent's commitments and any mitigation measures identified by the Designated Office. Residual effects from the Project to wildlife may include wildlife injury and/or mortality. The Designated Office is satisfied that existing legislation and Proponent commitments listed in this report and the additional mitigations provided by the Designated Office are sufficient to ensure that residual effects from the Project on wildlife are not significant and adverse.

6.4 Cumulative Effects

A cumulative effect occurs when a residual effect interacts with effects from other projects or activities to form an effect larger than the residual effect in isolation. The spatial scope includes the project area footprint. The temporal scope includes the length of remediation and reclamation activities (summer 2017 to March 31, 2018) followed by monitoring activities occurring yearly over the course of up to 5 years. Other current and future activities in this area may include future residential or commercial developments, and recreational use of the surrounding forest and lakes. Given the relatively small time scale and spatial scope of project activities (within a disturbed area adjacent to the Robert Campbell Highway), it is unlikely that the residual effects of the Project will interact significantly with the residual effects of existing or future projects and activities.

The Watson Lake Designated Office has determined that the Project will not have significant adverse cumulative environmental effects to wildlife in connection with the effects of other activities.

7.0 CONCLUSION OF THE ASSESSMENT

Under s. 56(1)(b) of the Yukon Environmental and Socio-economic Assessment Act, the Watson Lake Designated Office recommends to the Decision Body that the Project be allowed to proceed, subject to specified terms and conditions. The Designated Office determined that the Project is likely to have significant adverse environmental effects in or outside Yukon that can be mitigated by those terms and conditions.

The terms and conditions of the recommendations are as follows:

1. The Proponent should contact the Regional Biologist (867-536-3210) prior to work commencing for guidance on raptor nest locations and setbacks
2. The Proponent shall develop an attractant management plan which outlines how human-bear conflicts will be minimized
3. The Operator shall report any incidents involving wildlife including when bears frequent the worksite area to the area's District Conservation Officer

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The undersigned is authorized pursuant to s.23(2) of YESAA to make this recommendation/referral.



July 11, 2017

Signature

Date

Martin Haefele, Manager Designated Office

Name

Appendix A RELEVANT PROPONENT COMMITMENTS

The following is a compilation of relevant commitments proposed by the Proponent that were considered by the Watson Lake Designated Office because they contribute to the mitigation of significant adverse effects of the Project. The inclusion of these commitments was essential to the final determination of whether a specific project effect was determined to be significantly adverse. The recommendation is based on the understanding that they will be reflected as terms and conditions of the Proponent's permit.

- A erosion and sediment control (ESC) plan will be prepared by the contractor detailing the type and location of ESC features
- Wet excavation soils will be side cast and drained before loading into trucks
- Haul trucks for excavated soil transport to the LTF will be tarped and end gates sealed
- Stockpiles will be covered to prevent disturbances by wind
- Water or other non-toxic dust suppressants may be used when conditions require
- Speed of haul trucks will be reduced along access roads and between the site and the LTF
- Silt fencing will be installed around the excavation areas to prevent off-site mobilization of sediments
- Roadways will be swept or cleaned with equivalent techniques to remove sediment tracked by trucks and equipment
- Drill cuttings/wastes will be contained in drums or approved equivalents
- Vacuum trucks or equivalent containment systems will be used where necessary to contain potentially contaminated liquids within remedial excavation areas
- Spill kits will be available at excavation, staging, and refuelling areas of the site
- Refuelling will be completed using containment trays of equivalent materials
- Fuel and other petroleum products will be not be stored on site
- Refuelling of equipment will be done offsite
- The contractor will have absorbent pads to contain hydraulic oil leaks from the excavator, drill rig, and/or support trucks
- Equipment will be checked daily to maintain condition of working parts and prevent leaks of oils and fluids
- Workers will use appropriate personal protective equipment for storage, handling and incident response to prevent contact with skin, eyes, and/or lungs
- A desktop review will be conducted to identify potential species under the Species at Risk Act
- A qualified environmental professional (QEP) will perform a pre-clearing survey of the areas that require vegetation removal to confirm the presence/absence of wildlife and species at risk following the Canadian Wildlife Services best management practices

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- Care will be given to minimize the falling of mature trees, and to minimize the amount of brush generated
- A QEP will walk the project footprint and document the location of species at risk and/or potential habitat
- If species at risk are present on site, the QEP will determine appropriate setbacks or changes to the timing of the Project

Appendix B REFERENCES

All references to documents on the YESAB Online Registry (YOR) can be found by searching for the Project and document number on the YOR at <http://www.yesab.ca/registry>.

Smith, C.A.S, J.C. Meikle, and C.F. Roots. 2004. Ecoregions of the Yukon Territory: Biophysical Properties of Yukon Landscapes. PARC Technical Bulletin No. 04-01. Summerland, British Columbia: Agriculture and Agri-Food Canada.

APPENDIX D

Geomembrane and Geotextile Specifications



30 Mil High Density Poly Ethylene Geomembrane Liner Specifications

Property	Unit English (Metric)	Value English (Metric)
Thickness	Mil (mm)	30 (0.75)
Density	g/cm ³	0.94
Tensile Properties Break Strength Break Elongation	lb/in (N/mm) %	114 (20) – 120 (21) 700 – 800
Tear Resistance	lb (N)	16 (71) – 21 (93)
Puncture Resistance	lb (N)	42 (186) – 60 (267)
Stress Crack Resistance	hr	300 – 500
Carbon Black Content	%	2.0 – 3.0
Oxidative Induction Time (OIT)	Min	100
High Pressure OIT - % retained after 90 days	%	60 - 80
High Pressure OIT - % retained after 1600 hr	%	35 - 50

Woven Geotextile Specifications

Property	Unit English (Metric)	Value English (Metric)
Tensile Properties Grab Tensile Elongation	lb (N) %	200 (889) –(900) 15
Tear Resistance	lb (N)	(330) - 75 (333)
CBR Puncture Strength	lb (N)	700 (3115) – (3120)
Apparent Opening Size	Sieve size (microns)	40 (425) - 50 (300)
Permittivity	sec ⁻¹	0.05
UV Resistance	500 hrs	70

APPENDIX E
Analytical Data

GLOSSARY: GROUNDWATER ANALYTICAL RESULTS

13221

Project #: 13221-04
March 2017

List of Acronyms

AW_{FW}	Aquatic Life Water Use (freshwater)
AW_M	Aquatic Life Water Use (marine)
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CSR	British Columbia Contaminated Sites Regulation
DW	Drinking Water Use
EPHw₁₀₋₁₉	Extractable Petroleum Hydrocarbons (carbon range 10 to 19)
EPHw₁₉₋₃₂	Extractable Petroleum Hydrocarbons (carbon range 19 to 32)
HEPHw	Heavy Extractable Petroleum Hydrocarbons (corrected for PAHs)
HMW-PAHs	Heavy Molecular Weight Polycyclic Aromatic Hydrocarbons
HWR	British Columbia Hazardous Waste Regulation
IW	Irrigation Water Use
LEPHw	Light Extractable Petroleum Hydrocarbons (corrected for PAHs)
LMW-PAHs	Light Molecular Weight Polycyclic Aromatic Hydrocarbons
LW	Livestock Water Use
MS	Maximum Spread
MTBE	Methyl tert-Butyl Ether
n/s	No Standard
PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
RDL	Reported Detection Limit
RPD	Relative Percent Difference
TDS	Total Dissolved Solids
VHw₆₋₁₀	Volatile Petroleum Hydrocarbons (carbon range 6 to 10)
VOC	Volatile Organic Compounds
VPHw	Volatile Petroleum Hydrocarbons (corrected for BTEX)
YT	Yukon Territory

Formulas

MS	MS = (Max. Concentration - Min. Concentration); reported as MS \leq RDL <i>Note: MS used in place of RPD when concentration of sample and/or duplicate is less than 5x RDL.</i>
RPD	RPD = ((Max. Concentration - Min. Concentration)/((Max. Concentration + Min. Concentration)/2))*100

List of Symbols

<	Concentration is less than the laboratory reported detection limit
*	Laboratory reported detection limit is greater than applicable standard/guideline
--	Sample was not analyzed for the specified constituent
a	CSR standard is hardness dependent
b	CSR standard is pH dependent
c	Minimum standards applied, as per Technical Guidance 9 (BC MOE, 2005)

List of Units

mbg	Metres below grade
µg/L	Micrograms per litre
mg/L	Milligrams per litre

Groundwater Exceedances

<u>125</u>	Exceeds CSR DW standards
125	Exceeds CSR AFW standards

QA/QC Exceedances

45%	RPD exceeds 20%
5>3	MS exceeds RDL

**TABLE 2:
GROUNDWATER ANALYTICAL RESULTS: HYDROCARBONS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
March 2017

CSR DW YT Standards	CSR AWF _W YT Standards
n/s	n/s
n/s	n/s
5000	5000
n/s	n/s
n/s	n/s
n/s	500
n/s	1500
15000	15000
15000	15000
n/s	1500
5	4000
2.4	2000
n/s	720
24	390
n/s	n/s
n/s	n/s
300	n/s
n/s	60
n/s	n/s
n/s	0.5
n/s	1
n/s	1
0.01	0.1
n/s	n/s
n/s	n/s
n/s	n/s
n/s	n/s
n/s	1
n/s	n/s
n/s	2
n/s	120
n/s	n/s
n/s	n/s
n/s	10
n/s	3
n/s	0.2
n/s	34
n/s	n/s
n/s	n/s
n/s	n/s
n/s	n/s
n/s	n/s

AEC AREA ID SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID TOP OF SCREEN (mbg) BOTTOM OF SCREEN (mbg)	Units	AEC 32 - A	AEC 32 - A	AEC 32 - A	RPD	AEC 32 - A	AEC 32 - A	AEC 32 - A	AEC 32 - A	AEC 32 - A	AEC 32 - B	AEC 32 - B	AEC 32 - B	AEC 32 - B	AEC 32 - B	AEC 32 - B	AEC 32 - B	
32-MW14-01 32-MW14-01		32-MW14-01 32-MW14-01	32-MW14-01 32-MW14-01	DUP1 DUP1		32-MW14-01 32-MW14-01	32-MW14-01 32-MW14-01	32-MW14-23 32-MW14-23	32-MW14-23 32-MW14-23	32-MW14-23 32-MW14-23	32-MW15-16 32-MW15-16	32-MW15-16 32-MW15-16	MW16-01 MW16-01	MW16-01 MW16-01	MW16-04S MW16-04S	MW16-05 MW16-05	MW16-05 MW16-05	
		13-Nov-14 L1546424	04-Sep-15 15V016382	04-Sep-15 15V016382		27-Nov-16 L1865285 L1865285-8	15-Mar-17 B720175 QT1223	13-Nov-14 L1546424	04-Sep-15 15V016382 11472	27-Nov-16 L1865285 L1865285-9	04-Sep-15 15V016382	27-Nov-16 L1865285 L1865285-10	24-Nov-16 L1864737 L1864737-1	26-Nov-16 L1865285 L1865285-3	24-Nov-16 L1864737 L1864737-2	24-Nov-16 L1864737 L1864737-3	15-Mar-17 B720175 QT1222	
			30.0	30.0							4.5		3.4	3.4		30.5	30.5	
			31.5	31.5							6.0		4.9	4.9		33.3	33.3	
Conventionals																		
hardness	mg/L	--	--	--	--	446	--	--	--	580	--	530	--	209	151	259	--	
pH	pH	--	--	--	--	8.06	--	--	--	7.86	--	7.26	7.85	7.85	8.02	7.89	--	
Petroleum Hydrocarbons																		
EPHW ₁₀₋₁₉	µg/L	<250	--	--	--	<250	<200	<250	<100	<250	560	870	--	<250	<250	<250	<200	
EPHW ₁₉₋₃₂	µg/L	<250	--	--	--	1710	<200	290	360	510	<100	<250	--	<250	300	<250	330	
HEPHw	µg/L	<250	--	--	--	1710	<200	290	360	510	<100	<250	--	<250	300	<250	330	
LEPHw	µg/L	<250	--	--	--	<250	<200	<250	<100	<250	560	870	--	<250	<250	<250	<200	
VPHw	µg/L	--	--	--	--	<100	<300	--	--	<100	--	<20000	1460	--	1870	<100	<300	
VHW ₆₋₁₀	µg/L	--	--	--	--	<100	<300	--	--	<100	--	86000	1520	--	1890	<100	<300	
VH C6-C10	µg/L	<100	<100	<100	NC	--	--	<100	<100	--	76000	--	--	--	--	--	--	
VPH (VH6-10) minus BTEX	µg/L	<100	<100	<100	NC	--	--	<100	<100	--	<100	--	--	--	--	--	--	
Monocyclic Aromatic Hydrocarbons																		
benzene	µg/L	<0.50	<0.5	<0.5	NC	<0.5	<0.40	<0.50	<0.5	<0.5	5170	4790	1.36	--	<0.5	<0.5	<0.40	
ethylbenzene	µg/L	<0.50	<0.5	<0.5	NC	0.64	<0.40	<0.50	<0.5	0.77	1160	791	6.03	--	<0.5	<0.5	<0.40	
styrene	µg/L	<0.50	<0.5	<0.5	NC	<0.5	<0.40	<0.50	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.40	
toluene	µg/L	<0.50	<0.5	<0.5	NC	2.31	<0.40	<0.50	0.6	4.55	64200	67900	22	--	1.07	<0.5	<0.40	
m-p-Xylene	µg/L	<0.50	<0.5	<0.5	NC	--	--	<0.50	<0.5	--	5250	--	--	--	--	--	--	
o-Xylene	µg/L	<0.50	<0.5	<0.5	NC	--	--	<0.50	<0.5	--	2380	--	--	--	--	--	--	
xylene (total)	µg/L	<0.75	<1	<1	NC	4.09	<0.40	<0.75	<1	4.12	7630	9570	34.8	--	19.2	<0.75	<0.40	
Polycyclic Aromatic Hydrocarbons																		
acenaphthene	µg/L	<0.050	--	--	--	<0.05	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.050	
acenaphthylene	µg/L	<0.050	--	--	--	<0.05	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.050	
acridine	µg/L	<0.050	--	--	--	<0.05	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.050	
anthracene	µg/L	<0.050	--	--	--	<0.05	<0.010	<0.050	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.010	
benzo[a]anthracene	µg/L	<0.050	--	--	--	<0.05	<0.010	<0.050	0.15	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.010	
benzo[a]pyrene	µg/L	<0.010	--	--	--	<0.005	<0.0050	<0.010	<0.01	<0.005	<0.01	<0.005	--	<0.005	<0.005	<0.005	<0.0050	
benzo[b]fluoranthene	µg/L	<0.050	--	--	--	<0.05	<0.030	<0.050	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.030	
benzo[g,h,i]perylene	µg/L	<0.050	--	--	--	<0.05	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.050	
benzo[j]fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
benzo[k]fluoranthene	µg/L	<0.050	--	--	--	<0.05	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.050	
benzo[b+j]fluoranthene	µg/L	--	--	--	--	--	--	--	<0.1	--	<0.1	--	--	--	--	--	--	
chrysene	µg/L	<0.050	--	--	--	<0.05	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.050	
dibenz[a,h]anthracene	µg/L	<0.050	--	--	--	<0.02	<0.0030	<0.050	<0.05	<0.005	<0.05	<0.005	--	<0.005	<0.005	<0.005	<0.0030	
fluoranthene	µg/L	<0.050	--	--	--	<0.05	<0.020	<0.050	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	0.038	
fluorene	µg/L	<0.050	--	--	--	<0.05	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.050	
indeno[1,2,3-cd]pyrene	µg/L	<0.050	--	--	--	<0.05	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.050	
methylnaphthalene, 2-	µg/L	--	--	--	--	--	<0.10	--	--	--	--	--	--	--	--	--	<0.10	
naphthalene	µg/L	<0.050	--	--	--	0.08	<0.10	<0.050	<0.05	0.106	1.32	1.2	--	<0.05	0.266	<0.05	<0.10	
phenanthrene	µg/L	<0.050	--	--	--	<0.05	<0.050	<0.050	<0.05	<0.05	<0.05	<0.3	--	<0.05	<0.05	<0.05	<0.050	
pyrene	µg/L	<0.050	--	--	--	<0.05	<0.020	<0.050	<0.02	<0.05	<0.02	<0.05	--	<0.05	<0.05	<0.05	0.029	
quinoline	µg/L	<0.050	--	--	--	<0.05	<0.020	<0.050	<0.1	<0.05	<0.1	<0.05	--	<0.05	<0.05	<0.05	<0.020	
Total HMW-PAHs	µg/L	--	--	--	--	--	<0.050	--	--	--	--	--	--	--	--	--	0.067	
Total LMW-PAHs	µg/L	--	--	--	--	--	<0.10	--	87	--	84	--	--	--	--	--	<0.10	
Total PAHs	µg/L	--	--	--	--	--	<0.10	--	--	--	--	--	--	--	--	--	<0.10	
Non-Halogenated Aliphatics																		
methyl tert-butyl ether	µg/L	<0.50	<1	<1	NC	<0.5	<4.0	<0.50	<1	<0.5	<1	<20	<0.5	--	<0.5	<0.5	<4.0	

Groundwater Exceedances
125 Exceeds CSR DW standards
125 Exceeds CSR AFW standards
QA/QC Exceedances
45% RPD exceeds 20%
5>3 MS exceeds RDL



**TABLE 2:
GROUNDWATER ANALYTICAL RESULTS: HYDROCARBONS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
March 2017

CSR DW YT Standards	CSR AWF _W YT Standards
n/s	n/s
n/s	n/s
5000	5000
n/s	n/s
n/s	n/s
n/s	500
n/s	1500
15000	15000
15000	15000
n/s	1500
5	4000
2.4	2000
n/s	720
24	390
n/s	n/s
n/s	n/s
300	n/s
n/s	60
n/s	n/s
n/s	0.5
n/s	1
n/s	1
0.01	0.1
n/s	n/s
n/s	n/s
n/s	n/s
n/s	n/s
n/s	1
n/s	n/s
n/s	2
n/s	120
n/s	n/s
n/s	10
n/s	3
n/s	0.2
n/s	34
n/s	n/s
n/s	n/s
n/s	n/s
n/s	n/s
n/s	n/s
n/s	n/s

AEC	Units	AEC 32 - C	AEC 32 - C	AEC 32 - D	AEC 32 - D	AEC 32 - D	RPD	AEC 32 - E	AEC 32 - E	RPD	AEC 32 - E	AEC 32 - G	AEC 32 - G	AEC 32 - G	AEC 32 - G	AEC 32 - G	AEC 32 - G
AREA ID																	
SAMPLE ID		MW16-13	MW16-13	MW16-06	MW16-06	MW17-A	RPD	MW16-12	MW16 (N)	RPD	MW16-12	MW?01	MW?01	MW?02	MW?02	MW16-08	MW16-08
FIELD LABEL		MW16-13	MW16-13	MW16-06	MW16-06	MW17-A		MW16-12	MW16 (N)		MW16-12	MW?01	MW?01	MW?02	MW?02	MW16-08	MW16-08
DUPLICATE ID						MW16-06		MW16 (N)	MW16-12								
DATE SAMPLED		01-Dec-16	14-Mar-17	24-Nov-16	14-Mar-17	14-Mar-17		28-Nov-16	28-Nov-16		14-Mar-17	27-Nov-16	14-Mar-17	27-Nov-16	14-Mar-17	28-Nov-16	14-Mar-17
LAB CERTIFICATE		L1865894	B720175	L1864737	B720175	B720175		L1865285	L1865285		B720175	L1865285	B720175	L1865285	B720175	L1865285	B720175
LAB SAMPLE ID		L1865894-1	QT1220	L1864737-4	QT1217	QT1221		L1865285-5	L1865285-6		QT1219	L1865285-1	QT1215	L1865285-2	QT1216	L1865285-7	QT1218
TOP OF SCREEN (mbg)		32.3	32.3	26.7	26.7	26.7		32.7	32.7		32.7	--	--	--	--	27.7	27.7
BOTTOM OF SCREEN (mbg)		35.4	35.4	29.8	29.8	29.8		35.8	35.8		35.8	23.0	23.0	24.0	24.0	30.8	30.8
Conventionals																	
hardness	mg/L	205	--	210	--	--	--	198	196	1%	--	172	--	186	--	224	--
pH	pH	8.11	--	8.37	--	--	--	8.06	--	--	--	7.95	--	8.83	--	8.68	--
Petroleum Hydrocarbons																	
EPHW ₁₉₋₁₉	µg/L	<250	<200	<250	<200	<200	--	<250	<250	NC	<200	<250	<200	<250	<200	<250	<200
EPHW ₁₉₋₃₂	µg/L	<250	400	<250	<200	<200	--	830	680	20%	<200	<250	<200	<250	400	1570	230
HEPHw	µg/L	<250	400	<250	<200	<200	--	830	680	20%	<200	<250	<200	<250	400	1570	230
LEPHw	µg/L	<250	<200	<250	<200	<200	--	<250	<250	NC	<200	<250	<200	<250	<200	<250	<200
VPHw	µg/L	<100	<300	<100	<300	<300	--	<100	<100	NC	<300	<100	<300	<100	<300	<100	<300
VHW ₆₋₁₀	µg/L	<100	<300	<100	<300	<300	--	<100	<100	NC	<300	<100	<300	<100	<300	<100	<300
VH C6-C10	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VPH (VH6-10) minus BTEX	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Monocyclic Aromatic Hydrocarbons																	
benzene	µg/L	<0.5	<0.40	<0.5	<0.40	<0.40	--	<0.5	<0.5	NC	<0.40	<0.5	<0.40	<0.5	<0.40	2.89	2.6
ethylbenzene	µg/L	<0.5	<0.40	<0.5	<0.40	<0.40	--	<0.5	<0.5	NC	<0.40	<0.5	<0.40	<0.5	<0.40	2.06	0.62
styrene	µg/L	<0.5	<0.40	<0.5	<0.40	<0.40	--	<0.5	<0.5	NC	<0.40	<0.5	<0.40	<0.5	<0.40	<0.5	<0.40
toluene	µg/L	<0.5	<0.40	<0.5	<0.40	<0.40	--	0.58	0.6	3%	<0.40	<0.5	<0.40	<0.5	<0.40	7.51	3.6
m+p-Xylene	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
o-Xylene	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
xylenes (total)	µg/L	<0.75	<0.40	<0.75	<0.40	<0.40	--	<0.75	<0.75	NC	<0.40	<0.75	<0.40	<0.75	<0.40	7.96	1.3
Polycyclic Aromatic Hydrocarbons																	
acenaphthene	µg/L	<0.05	<0.050	<0.05	<0.050	<0.050	--	<0.05	<0.05	NC	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05	<0.050
acenaphthylene	µg/L	<0.05	<0.050	<0.05	<0.050	<0.050	--	<0.05	<0.05	NC	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05	<0.050
acridine	µg/L	<0.05	<0.050	<0.05	<0.050	<0.050	--	<0.05	<0.05	NC	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05	<0.050
anthracene	µg/L	<0.05	<0.010	<0.05	<0.010	<0.010	--	<0.05	<0.05	NC	<0.010	<0.05	<0.010	<0.05	<0.010	<0.05	<0.010
benzo[a]anthracene	µg/L	<0.05	<0.010	<0.05	<0.010	<0.010	--	<0.05	<0.05	NC	<0.010	<0.05	<0.010	<0.05	<0.010	<0.05	<0.010
benzo[a]pyrene	µg/L	<0.005	<0.0050	<0.005	<0.0050	<0.0050	--	<0.005	<0.005	NC	<0.0050	<0.005	<0.0050	<0.005	<0.0050	<0.02	<0.0050
benzo[b]fluoranthene	µg/L	<0.05	<0.030	<0.05	<0.030	<0.030	--	<0.05	<0.05	NC	<0.030	<0.05	<0.030	<0.05	<0.030	<0.05	<0.030
benzo[g,h,i]perylene	µg/L	<0.05	<0.050	<0.05	<0.050	<0.050	--	<0.05	<0.05	NC	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05	<0.050
benzo[j]fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
benzo[k]fluoranthene	µg/L	<0.05	<0.050	<0.05	<0.050	<0.050	--	<0.05	<0.05	NC	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05	<0.050
benzo[b+j]fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
chrysene	µg/L	<0.05	<0.050	<0.05	<0.050	<0.050	--	<0.05	<0.05	NC	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05	<0.050
dibenz[a,h]anthracene	µg/L	<0.005	<0.0030	<0.005	<0.0030	<0.0030	--	<0.03	<0.03	NC	<0.0030	<0.005	<0.0030	<0.005	<0.0030	<0.02	<0.0030
fluoranthene	µg/L	<0.05	<0.020	<0.05	<0.020	<0.020	--	<0.05	<0.05	NC	<0.020	<0.05	<0.020	<0.05	<0.020	<0.05	<0.020
fluorene	µg/L	<0.05	<0.050	<0.05	<0.050	<0.050	--	<0.05	<0.05	NC	<0.050	<0.05	<0.050	<0.05	<0.050	0.057	<0.050
indeno[1,2,3-cd]pyrene	µg/L	<0.05	<0.050	<0.05	<0.050	<0.050	--	<0.05	<0.05	NC	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05	<0.050
methylnaphthalene, 2-	µg/L	--	<0.10	--	<0.10	<0.10	--	--	--	--	<0.10	--	<0.10	--	<0.10	--	0.12
naphthalene	µg/L	<0.05	<0.10	<0.05	<0.10	<0.10	--	0.144	0.14	3%	<0.10	<0.05	<0.10	<0.05	<0.10	0.945	0.21
phenanthrene	µg/L	<0.05	<0.050	<0.05	<0.050	<0.050	--	<0.05	<0.05	NC	<0.050	<0.05	<0.050	<0.05	<0.050	0.098	<0.050
pyrene	µg/L	<0.05	<0.020	<0.05	<0.020	<0.020	--	<0.05	<0.05	NC	<0.020	<0.05	<0.020	<0.05	<0.020	0.074	0.022
quinoline	µg/L	<0.05	<0.020	<0.05	<0.020	<0.020	--	<0.05	<0.05	NC	<0.020	<0.05	<0.020	<0.05	<0.020	<0.09	<0.020
Total HMW-PAHs	µg/L	--	<0.050	--	<0.050	<0.050	--	--	--	--	<0.050	--	<0.050	--	<0.050	--	<0.050
Total LMW-PAHs	µg/L	--	<0.10	--	<0.10	<0.10	--	--	--	--	<0.10	--	<0.10	--	<0.10	--	0.33
Total PAHs	µg/L	--	<0.10	--	<0.10	<0.10	--	--	--	--	<0.10	--	<0.10	--	<0.10	--	0.36
Non-Halogenated Aliphatics																	
methyl tert-butyl ether	µg/L	<0.5	<4.0	<0.5	<4.0	<4.0	--	<0.5	<0.5	NC	<4.0	<0.5	<4.0	<0.5	<4.0	<0.5	<4.0

Groundwater Exceedances	
125	Exceeds CSR DW standards
125	Exceeds CSR AWF _W standards
QA/QC Exceedances	
45%	RPD exceeds 20%
5>3	MS exceeds RDL



**TABLE 3:
GROUNDWATER ANALYTICAL RESULTS: INORGANICS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
March 2017

CSR DW YT Standards	CSR AWF _W YT Standards
n/s	n/s
n/s	n/s
n/s	n/s
n/s	n/s

200	n/s
6	200
25	50
1000	10000
n/s	53
n/s	n/s
5000	50000
5	0.6
n/s	n/s
50	10
n/s	9
1000	90
300	n/s
10	40-160a
n/s	n/s
100000	n/s
50	n/s
1	1
250	10000
n/s	1500
n/s	n/s
10	10
n/s	n/s
n/s	15
22000	n/s
n/s	n/s
n/s	3
22000	n/s
n/s	1000
100	3000
n/s	n/s
5000	1650
n/s	n/s

AEC AREA ID SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID TOP OF SCREEN (mbg) BOTTOM OF SCREEN (mbg)	Units	AEC 32 - A	AEC 32 - A	AEC 32 - A	AEC 32 - A	AEC 32 - A	AEC 32 - B	AEC 32 - B	AEC 32 - B	AEC 32 - B	AEC 32 - B	AEC 32 - B	AEC 32 - C	AEC 32 - C
DUP1 DUP1 32-MW14-01 04-Sep-15 15V016382		32-MW14-01 32-MW14-01 27-Nov-16 L1865285 L1865285-8	32-MW14-01 32-MW14-01	32-MW14-23 32-MW14-23	32-MW14-23 32-MW14-23	32-MW14-01 32-MW14-01 15-Mar-17 B720175 QT1223	32-MW15-16 32-MW15-16	32-MW15-16 32-MW15-16	MW16-01 MW16-01	MW16-04S MW16-04S	MW16-05 MW16-05	MW16-05 MW16-05	MW16-13 MW16-13	MW16-13 MW16-13
30.0 31.5						-- --	4.5 6.0		3.4 4.9			30.5 33.3	30.5 33.3	32.3 35.4
pH (field)	pH	--	8.06	--	7.86	--	--	7.26	7.85	8.02	7.89	--	8.11	--
hardness	mg/L	--	446	--	580	425	--	530	209	151	259	267	205	191
chloride	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
salinity	psu	--	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Metals														
aluminum	µg/L	--	--	--	--	14.9	--	--	--	--	--	3.4	--	<3.0
antimony	µg/L	--	--	--	--	1.07	--	--	--	--	<0.50	--	--	<0.50
arsenic	µg/L	--	--	--	--	2.63	--	--	--	--	--	4.74	--	0.25
barium	µg/L	--	--	--	--	282	--	--	--	--	--	208	--	94.7
beryllium	µg/L	--	--	--	--	<0.10	--	--	--	--	--	<0.10	--	<0.10
bismuth	µg/L	--	--	--	--	<1.0	--	--	--	--	--	<1.0	--	<1.0
boron	µg/L	--	--	--	--	<50	--	--	--	--	--	<50	--	<50
cadmium	µg/L	--	--	--	--	0.015	--	--	--	--	--	0.01	--	0.021
calcium	µg/L	--	--	--	--	121000	--	--	--	--	--	77800	--	48900
chromium (total)	µg/L	--	--	--	--	<1.0	--	--	--	--	--	<1.0	--	<1.0
cobalt	µg/L	--	--	--	--	1.32	--	--	--	--	--	2.04	--	<0.20
copper	µg/L	--	--	--	--	0.68	--	--	--	--	--	<0.20	--	0.47
iron	µg/L	--	--	--	--	59.7	--	--	--	--	--	81.9	--	<5.0
lead	µg/L	0.51	0.189	0.39	0.073	<0.20	1.00	0.58	1.58	3.27	<0.05	<0.20	0.052	<0.20
lithium	µg/L	--	--	--	--	3.7	--	--	--	--	--	2.6	--	<2.0
magnesium	µg/L	--	--	--	--	29600	--	--	--	--	--	17600	--	16700
manganese	µg/L	--	--	--	--	<u>243</u>	--	--	--	--	--	<u>346</u>	--	<u>752</u>
mercury	µg/L	--	--	--	--	<0.010	--	--	--	--	--	<0.010	--	<0.010
molybdenum	µg/L	--	--	--	--	1.7	--	--	--	--	--	4.3	--	1.1
nickel	µg/L	--	--	--	--	2.8	--	--	--	--	--	5.5	--	<1.0
potassium	µg/L	--	--	--	--	3180	--	--	--	--	--	1510	--	886
selenium	µg/L	--	--	--	--	0.39	--	--	--	--	--	<0.10	--	<0.10
silicon	µg/L	--	--	--	--	6910	--	--	--	--	--	7830	--	6210
silver	µg/L	--	--	--	--	<0.020	--	--	--	--	--	<0.020	--	<0.020
strontium	µg/L	--	--	--	--	660	--	--	--	--	--	303	--	257
sulphur	µg/L	--	--	--	--	5400	--	--	--	--	--	<3000	--	<3000
thallium	µg/L	--	--	--	--	<0.010	--	--	--	--	--	<0.010	--	<0.010
tin	µg/L	--	--	--	--	<5.0	--	--	--	--	--	<5.0	--	<5.0
titanium	µg/L	--	--	--	--	<5.0	--	--	--	--	--	<5.0	--	<5.0
uranium	µg/L	--	--	--	--	58.9	--	--	--	--	--	2.12	--	1.06
vanadium	µg/L	--	--	--	--	5	--	--	--	--	--	<5.0	--	<5.0
zinc	µg/L	--	--	--	--	<5.0	--	--	--	--	--	<5.0	--	<5.0
zirconium	µg/L	--	--	--	--	0.23	--	--	--	--	--	<0.10	--	<0.10

Groundwater Exceedances

125	Exceeds CSR DW standards
125	Exceeds CSR AFW standards

QA/QC Exceedances

45%	RPD exceeds 20%
5>3	MS exceeds RDL

**TABLE 3:
GROUNDWATER ANALYTICAL RESULTS: INORGANICS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
March 2017

CSR DW YT Standards	CSR AWF _W YT Standards
n/s	n/s
n/s	n/s
n/s	n/s
n/s	n/s

200	n/s
6	200
25	50
1000	10000
n/s	53
n/s	n/s
5000	50000
5	0.6
n/s	n/s
50	10
n/s	9
1000	90
300	n/s
10	40-160a
n/s	n/s
100000	n/s
50	n/s
1	1
250	10000
n/s	1500
n/s	n/s
10	10
n/s	n/s
n/s	15
22000	n/s
n/s	n/s
n/s	3
22000	n/s
n/s	1000
100	3000
n/s	n/s
5000	1650
n/s	n/s

AEC AREA ID SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID TOP OF SCREEN (mbg) BOTTOM OF SCREEN (mbg)	Units	AEC 32 - D	AEC 32 - D	AEC 32 - D	RPD	AEC 32 - E	AEC 32 - E	AEC 32 - E	AEC 32 - G	AEC 32 - G	AEC 32 - G	AEC 32 - G	AEC 32 - G	AEC 32 - G	
MW16-06 MW16-06		MW16-06 MW16-06	MW16-06 MW17-A	MW17-A MW16-06		MW16-12 MW16-12	MW16 (N) MW16 (N)	MW16-12 MW16-12	MW?01 MW?01	MW?02 MW?02	MW16-08 MW16-08	MW?01 MW?01	MW?02 MW?02	MW16-08 MW16-08	
24-Nov-16 L1864737 L1864737-4		14-Mar-17 B720175 QT1217	14-Mar-17 B720175 QT1221	28-Nov-16 L1865285 L1865285-5		28-Nov-16 L1865285 L1865285-6	14-Mar-17 B720175 QT1219	27-Nov-16 L1865285 L1865285-1	27-Nov-16 L1865285 L1865285-2	28-Nov-16 L1865285 L1865285-7	14-Mar-17 B720175 QT1215	14-Mar-17 B720175 QT1216	14-Mar-17 B720175 QT1218		
26.7 29.8		26.7 29.8	26.7 29.8	32.7 35.8		32.7 35.8	32.7 35.8	-- 23.0	-- 24.0	27.7 30.8	-- 23.0	-- 24.0	27.7 30.8		
pH (field)	pH	8.37	--	--	--	8.06	--	--	7.95	8.83	8.68	--	--	--	
hardness	mg/L	210	215	210	--	198	196	191	172	186	224	161	185	244	
chloride	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	
salinity	psu	--	--	--	--	--	--	--	--	--	--	--	--	--	
Dissolved Metals															
aluminum	µg/L	--	3.6	5	1.4<3	--	--	5.4	--	--	--	6.2	3.8	5.9	
antimony	µg/L	--	<0.50	<0.50	--	--	--	<0.50	--	--	--	<0.50	<0.50	<0.50	
arsenic	µg/L	--	1.57	1.59	1%	--	--	0.63	--	--	--	0.24	1.03	1.24	
barium	µg/L	--	99.8	101	1%	--	--	88.9	--	--	--	369	303	53.5	
beryllium	µg/L	--	<0.10	<0.10	--	--	--	<0.10	--	--	--	<0.10	<0.10	<0.10	
bismuth	µg/L	--	<1.0	<1.0	--	--	--	<1.0	--	--	--	<1.0	<1.0	<1.0	
boron	µg/L	--	<50	<50	--	--	--	<50	--	--	--	<50	<50	64	
cadmium	µg/L	--	<0.010	<0.010	--	--	--	0.012	--	--	--	0.02	0.01	<0.010	
calcium	µg/L	--	56200	54700	3%	--	--	54700	--	--	--	47800	55000	63900	
chromium (total)	µg/L	--	<1.0	<1.0	--	--	--	<1.0	--	--	--	2	<1.0	<1.0	
cobalt	µg/L	--	1.26	1.27	1%	--	--	0.46	--	--	--	<0.20	0.26	1.06	
copper	µg/L	--	0.28	0.23	0.05<0.2	--	--	1.19	--	--	--	0.67	6.03	0.55	
iron	µg/L	--	77.3	77.2	0%	--	--	5.7	--	--	--	<5.0	16.9	56.6	
lead	µg/L	0.165	<0.20	<0.20	--	0.063	0.053	<0.20	0.095	0.064	0.08	<0.20	0.3	<0.20	
lithium	µg/L	--	2.2	2.2	0<2	--	--	4.1	--	--	--	2	2.6	13.3	
magnesium	µg/L	--	18200	17900	2%	--	--	13100	--	--	--	10000	11500	20600	
manganese	µg/L	--	<u>316</u>	<u>320</u>	1%	--	--	<u>184</u>	--	--	--	1.5	<u>148</u>	<u>492</u>	
mercury	µg/L	--	<0.010	<0.010	--	--	--	<0.010	--	--	--	<0.010	<0.010	<0.010	
molybdenum	µg/L	--	3.1	3.1	0<1	--	--	2.9	--	--	--	<1.0	1.2	4.6	
nickel	µg/L	--	1.5	1.5	0<1	--	--	1	--	--	--	<1.0	<1.0	2.5	
potassium	µg/L	--	1170	1200	3%	--	--	1590	--	--	--	740	789	2930	
selenium	µg/L	--	<0.10	<0.10	--	--	--	0.73	--	--	--	0.8	0.65	0.31	
silicon	µg/L	--	7850	7610	3%	--	--	5500	--	--	--	5500	5570	4970	
silver	µg/L	--	<0.020	<0.020	--	--	--	<0.020	--	--	--	<0.020	<0.020	<0.020	
strontium	µg/L	--	264	270	2%	--	--	216	--	--	--	157	160	263	
sulphur	µg/L	--	3800	3600	200<3000	--	--	<3000	--	--	--	<3000	<3000	11900	
thallium	µg/L	--	<0.010	<0.010	--	--	--	0.019	--	--	--	<0.010	<0.010	<0.010	
tin	µg/L	--	<5.0	<5.0	--	--	--	<5.0	--	--	--	<5.0	<5.0	<5.0	
titanium	µg/L	--	<5.0	<5.0	--	--	--	<5.0	--	--	--	<5.0	<5.0	<5.0	
uranium	µg/L	--	1.58	1.6	1%	--	--	2.24	--	--	--	2.02	4.99	4.68	
vanadium	µg/L	--	<5.0	<5.0	--	--	--	<5.0	--	--	--	<5.0	<5.0	<5.0	
zinc	µg/L	--	<5.0	<5.0	--	--	--	<5.0	--	--	--	<5.0	8.7	<5.0	
zirconium	µg/L	--	<0.10	<0.10	--	--	--	<0.10	--	--	--	<0.10	<0.10	<0.10	

Groundwater Exceedances

125 Exceeds CSR DW standards

125 Exceeds CSR AFW standards

QA/QC Exceedances

45% RPD exceeds 20%

5>3 MS exceeds RDL

GLOSSARY: SOIL ANALYTICAL RESULTS

Watson Lake Airport - AEC 32
 PWGSC
 Project #: 13221-04
 February 2017

List of Acronyms

AL	Agricultural Land Use
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CL	Commercial Land Use
CSR	British Columbia Contaminated Sites Regulation
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
EPHs₁₀₋₁₉	Extractable Petroleum Hydrocarbons (carbon range 10 to 19)
EPHs₁₉₋₃₂	Extractable Petroleum Hydrocarbons (carbon range 19 to 32)
HEPHs	Heavy Extractable Petroleum Hydrocarbons (corrected for PAH)
HMW-PAHs	Heavy Molecular Weight Polycyclic Aromatic Hydrocarbons
HWR	British Columbia Hazardous Waste Regulation
IL	Industrial Land Use
LEPHs	Light Extractable Petroleum Hydrocarbons (corrected for PAH)
LMW-PAHs	Light Molecular Weight Polycyclic Aromatic Hydrocarbons
MS	Maximum Spread
MTBE	Methyl tert-Butyl Ether
n/s	No Standard
PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCDD	Polychlorinated Dibenzodioxins
PCDF	Polychlorinated Dibenzofurans
PL	Park Land Use
RDL	Reported Detection Limit
RL	Residential Land Use
RPD	Relative Percent Difference
TEQ	Toxicity Equivalence Quotient
VHs₆₋₁₀	Volatile Petroleum Hydrocarbons (carbon range 6 to 10)
VOC	Volatile Organic Compounds
VPHs	Volatile Petroleum Hydrocarbons (corrected for BTEX)
YT	Yukon Territory

List of Symbols

<	Concentration is less than the laboratory reported detection limit
*	Laboratory reported detection limit is greater than applicable standard/guideline
--	Sample was not analyzed for the specified constituent
a	BC CSR Matrix Numerical Soil Standards (BC CSR Schedule 5) site specific factors: 1 Intake of contaminated soil 2 Groundwater used for drinking water 3 Toxicity to soil invertebrates and plants 6 Groundwater flow to surface water used by aquatic life (freshwater)
b	CSR standard is pH dependent
c	CSR standard for hexavalent chromium (Cr VI) used for conservativeness
d	Regional background soil quality for metals analyses from BC MOE Protocol 4
e	CSR standard for VPHs/LEPHs/HEPHs used for comparison

List of Units

mbg	Metres below grade
µg/g	Micrograms per gram
pg/g	Picograms per gram

Soil Exceedances

125	Exceeds CSR PL standards
125	Exceeds CSR CL standards

QA/QC Exceedances

45%	RPD exceeds 35%
5>3	MS exceeds RDL

1000 BC Standard adopted (where there are no YK Standards)

Formulas

MS	MS = (Max. Concentration - Min. Concentration); reported as MS \leq/\geq RDL Note: MS used in place of RPD when concentration of sample and/or duplicate is less than 5x RDL.
PAH TEQ	TEQ = 0.1*(Benzo[a]anthracene + Benzo[b]fluoranthene + Benzo[k]fluoranthene) + Benzo[a]pyrene + 0.2*(Indeno[1,2,3-cd]pyrene) + 1.1*(Dibenzo[a,h]anthracene) Note: For PAH concentrations below the analytical relative detection limit, a value of one half the detection limit is used in the calculations.
PCDD & PCDF TEQ	TEQ = 2,3,7,8-TCDD + 0.5*(1,2,3,7,8-PCDD + 2,3,4,7,8-PCDF) + 0.1*(1,2,3,4,7,8-TCDD + 1,2,3,7,8,9-HCDD + 1,2,3,6,7,8-HCDD + 2,3,7,8-TCDF + 1,2,3,4,7,8-HCDF + 1,2,3,7,8,9-HCDF + 1,2,3,6,7,8-HCDF + 2,3,4,6,7,8-HCDF) + 0.05*(1,2,3,7,8-PCDF) + 0.01*(1,2,3,4,6,7,8-HCDD + 1,2,3,4,6,7,8-HCDF + 1,2,3,4,7,8,9-HCDF) + 0.001*(OCDD + OCDF) Note: For PCDD/PCDF concentrations below the analytical relative detection limit, a value of one half the detection limit is used in the calculations.
RPD	RPD = ((Max. Concentration - Min. Concentration)/((Max. Concentration + Min. Concentration)/2))*100

**TABLE 1:
SOIL ANALYTICAL RESULTS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
February 2017

CSR CL YT Standards	CSR PL YT Standards	AEC SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID SAMPLE DEPTH (mbg)	Units	AEC 32 - A 32-BH14-2	AEC 32 - A 32-BH14-2	AEC 32 - A DUP4 32-BH14-2-3	RPD	AEC 32 - A 32-BH14-3	AEC 32 - A 32-BH14-4	AEC 32 - A 32-MW14-1	AEC 32 - A 32-MW14-1-8	AEC 32 - A DUP-1 32-MW14-1-8	RPD	AEC 32 - A 32-MW14-1-10	AEC 32 - A 32-MW14-1-20	AEC 32 - A 32-MW14-1-24	AEC 32 - A DUP3 32-MW14-1-24	RPD	AEC 32 - A 32-MW14-23-2	AEC 32 - A 32-MW14-23-3	AEC 32 - A 32-MW14-23-6
				0.9 - 1.4	2.0 - 3.0	2.0 - 3.0		2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	10.6 - 11.2	10.6 - 11.2		12.7 - 13.3	25.7 - 26.3	31.8 - 32.4	31.8 - 32.4		0.9 - 1.4	2.0 - 3.0	6.0 - 6.6
Inorganics / Metals																					
100-4000b	100-4000b	lead	µg/g	--	9.65	--	--	--	--	5.46	--	--	--	--	--	--	--	--	11.4	--	--
n/s	n/s	Moisture content	%	6.23	7.54	7.25	4%	6.40	7.46	5.92	5.37	4.82	11%	15.8	22.8	23.7	24.4	7%	6.53	5.62	8.26
n/s	n/s	pH	pH	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Petroleum Hydrocarbons																					
200	200	VPHs	µg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
200	200	VPH (VH6-10) minus BTEX	µg/g	--	1990	910	74%	<100	<100	--	<100	<100	NC	<100	<100	--	--	--	100	200	<100
200	200	VH ₆₋₁₀	µg/g	--	2100	960	75%	<100	<100	--	<100	<100	NC	<100	<100	--	--	--	100	200	<100
2000	1000	LEPHs	µg/g	<200	<200	--	--	<200	<200	<200	<200	--	--	<200	<200	<200	<200	NC	<200	<200	<200
2000	1000	EPHs ₁₀₋₁₉	µg/g	<200	<200	--	--	<200	<200	<200	<200	--	--	<200	<200	<200	<200	NC	<200	<200	<200
n/s	n/s	EPHs ₁₀₋₃₂	µg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5000	1000	EPHs ₁₉₋₃₂	µg/g	<200	<200	--	--	<200	<200	<200	<200	--	--	230	<200	<200	230	NC	<200	<200	<200
5000	1000	HEPHs	µg/g	<200	<200	--	--	<200	<200	<200	<200	--	--	230	<200	<200	230	NC	<200	<200	<200
Monocyclic Aromatic Hydrocarbons																					
0.04	0.04	benzene	µg/g	--	<0.055	<0.040	NC	<0.040	<0.040	--	<0.040	<0.040	NC	<0.040	<0.040	--	--	--	<0.040	<0.040	<0.040
7	1	ethylbenzene	µg/g	--	12.6	6.13	69%	<0.050	<0.050	--	<0.050	<0.050	NC	<0.050	<0.050	--	--	--	<0.050	0.183	<0.050
50	5	styrene	µg/g	--	<0.050	<0.050	NC	<0.050	<0.050	--	<0.050	<0.050	NC	<0.050	<0.050	--	--	--	<0.050	<0.050	<0.050
2.5	1.5	toluene	µg/g	--	12.0	4.2	96%	0.051	<0.050	--	<0.050	<0.050	NC	<0.050	<0.050	--	--	--	<0.050	<0.050	<0.050
20	5	xylene	µg/g	--	88.9	42.1	71%	<0.075	<0.075	--	<0.075	<0.075	NC	<0.075	<0.075	--	--	--	<0.075	1.19	<0.075
n/s	n/s	total xylenes (total)	µg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n/s	n/s	m+p-Xylene	µg/g	--	55.4	25.0	76%	<0.050	<0.050	--	<0.050	<0.050	NC	<0.050	<0.050	--	--	--	<0.050	0.596	<0.050
n/s	n/s	o-Xylene	µg/g	--	33.5	17.1	65%	<0.050	<0.050	--	<0.050	<0.050	NC	<0.050	<0.050	--	--	--	<0.050	0.592	<0.050
Non-Halogenated Aliphatics / VOCs																					
700	320	methyl tert-butyl ether	µg/g	-	<0.20	<0.20	NC	<0.20	<0.20	-	<0.20	<0.20	NC	<0.20	<0.20	--	--	--	<0.20	<0.20	<0.20
Polycyclic Aromatic Hydrocarbons																					
n/s	n/s	acenaphthene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
n/s	n/s	acenaphthylene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
n/s	n/s	anthracene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
10	1	benzo[a]anthracene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
10	1	benzo[a]pyrene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
10	1	benzo[b]fluoranthene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
n/s	n/s	Benzo[b+j]fluoranthene	µg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n/s	n/s	benzo[g,h,i]perylene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
n/s	n/s	benzo[j]fluoranthene	µg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10	1	benzo[k]fluoranthene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
n/s	n/s	chrysene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
10	1	dibenz[a,h]anthracene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
n/s	n/s	fluoranthene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
n/s	n/s	fluorene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
n/s	n/s	High molecular weight PAHs	µg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10	1	indeno[1,2,3-cd]pyrene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
n/s	n/s	Low molecular weight PAHs	µg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n/s	n/s	1-Methylnaphthalene	µg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n/s	n/s	methylnaphthalene, 2-	µg/g	<0.050	0.603	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
50	5	naphthalene	µg/g	<0.050	0.633	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
50	5	phenanthrene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050
100	10	pyrene	µg/g	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	--	--	<0.050	<0.050	<0.050	<0.050	NC	<0.050	<0.050	<0.050

Soil Exceedances

125
125

Exceeds CSR PL standards
Exceeds CSR CL standards

QA/QC Exceedances

45%
5>3

RPD exceeds 35%
MS exceeds RDL



**TABLE 1:
SOIL ANALYTICAL RESULTS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
February 2017

CSR CL YT Standards	CSR PL YT Standards	AEC SAMPLE ID	Units	AEC 32 - A 32-MW14-23-21	AEC 32 - A DUP-7	RPD	AEC 32 - A 32-MW14-23-23	AEC 32 - A 32-BH15-1	AEC 32 - A 32-BH15-1-1	AEC 32 - A 32-BH15-1-3	AEC 32 - A 32-BH15-1-9	AEC 32 - A 32-BH15-2-1	AEC 32 - A 32-BH15-2	AEC 32 - A 32-BH15-2-3	AEC 32 - A DUP 1 DUP 1	RPD	AEC 32 - A 32-BH15-2-9	AEC 32 - A 32-BH15-3	AEC 32 - A 32-BH15-3-1	AEC 32 - A 32-BH15-3-3	AEC 32 - A DUP 2 DUP 2	RPD	AEC 32 - A 32-BH15-3-9	AEC 32 - B 32-BH14-5	AEC 32 - B 32-BH14-6	AEC 32 - B 32-BH14-6-3	
100-4000b	100-4000b	DATE SAMPLED		11-Nov-14	11-Nov-14		12-Nov-14	26-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15		26-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15	26-Aug-15		26-Aug-15	9-Nov-14	9-Nov-14	9-Nov-14	
n/s	n/s	LAB CERTIFICATE		L1545666	L1545666		L1546432	15V014984	15V014984	15V014984	15V014984	15V014984	15V014984	15V014984	15V014984		15V014984	15V014984	15V014984	15V014984	15V014984		15V014984	L1545666	L1545666	L1545666	
n/s	n/s	LAB SAMPLE ID																									
		SAMPLE DEPTH (mbg)		24.2 - 24.8	24.2 - 24.8		30.0 - 30.6	0.3 - 0.8	1.8 - 2.3	6.4 - 6.8	0.3 - 0.8	1.8 - 2.3	1.8 - 2.3	1.8 - 2.3	1.8 - 2.3		6.4 - 6.8	0.3 - 0.8	1.8 - 2.3	1.8 - 2.3	1.8 - 2.3		6.4 - 6.8	2.0 - 3.0	0.9 - 1.4	2.0 - 3.0	
		Inorganics / Metals																									
		lead	μg/g	--	--	--	--	--	4.80	--	--	6.80	5.60	19%	--	--	--	5.90	6.80	14%	--	--	--	3.87	--	15.9	
		Moisture content	%	18.7	17.6	6%	19.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8.07	6.82	5.83	
		pH	pH	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		Petroleum Hydrocarbons																									
		VPHs	μg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		VPH (VH6-10) minus BTEX	μg/g	<100	<100	NC	<100	<10	<10	<10	<10	<10	<10	<10	<10	NC	<10	<10	<10	<10	<10	NC	<10	--	1550	2510	
		VHs ₆₋₁₀	μg/g	<100	<100	NC	<100	<10	<10	<10	<10	<10	<10	<10	<10	NC	<10	<10	<10	<10	<10	NC	<10	--	1590	3050	
		LEPHs	μg/g	<200	<200	NC	<200	<20	<20	<20	<20	<20	<20	<20	<20	NC	<20	<20	<20	<20	<20	NC	<20	<200	<200	<200	
		EPHs ₁₀₋₁₉	μg/g	<200	<200	NC	<200	<20	<20	<20	<20	<20	<20	<20	<20	NC	<20	<20	<20	<20	<20	NC	<20	<200	<200	<200	
		EPHs ₁₀₋₃₂	μg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		EPHs ₁₉₋₃₂	μg/g	<200	<200	NC	<200	<20	<20	<20	<20	<20	<20	<20	<20	NC	<20	<20	<20	<20	<20	NC	<20	<200	<200	<200	
		HEPHs	μg/g	<200	<200	NC	<200	<20	<20	<20	<20	<20	<20	<20	<20	NC	<20	<20	<20	<20	<20	NC	<20	<200	<200	<200	
		Monocyclic Aromatic Hydrocarbons																									
		benzene	μg/g	<0.040	<0.040	NC	<0.040	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	--	<0.040	1.04	
		ethylbenzene	μg/g	<0.050	<0.050	NC	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	--	0.103	22.1	
		styrene	μg/g	<0.050	<0.050	NC	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	--	<0.050	<0.050	
		toluene	μg/g	<0.050	<0.050	NC	<0.050	<0.05	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	--	1.94	261	
		xylenes	μg/g	<0.075	<0.075	NC	<0.075	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38.6	256
		total xylenes (total)	μg/g	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NC	<0.1	<0.1	<0.1	<0.1	<0.1	NC	<0.1	--	--	--	
		m+p-Xylene	μg/g	<0.050	<0.050	NC	<0.050	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	--	20.3	182	
		o-Xylene	μg/g	<0.050	<0.050	NC	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	--	18.3	73.9	
		Non-Halogenated Aliphatics / VOCs																									
		methyl tert-butyl ether	μg/g	<0.20	<0.20	NC	<0.20	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NC	<0.1	<0.1	<0.1	<0.1	<0.1	NC	<0.1	-	<0.20	<0.20	
		Polycyclic Aromatic Hydrocarbons																									
		acenaphthene	μg/g	<0.050	<0.050	NC	<0.050	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NC	<0.01	<0.01	<0.01	<0.01	<0.01	NC	<0.01	<0.050	<0.050	<0.050	
		acenaphthylene	μg/g	<0.050	<0.050	NC	<0.050	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NC	<0.01	<0.01	<0.01	<0.01	<0.01	NC	<0.01	<0.050	<0.050	<0.050	
		anthracene	μg/g	<0.050	<0.050	NC	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.050	<0.050	<0.050	
		benzo[a]anthracene	μg/g	<0.050	<0.050	NC	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.050	<0.050	<0.050	
		benzo[a]pyrene	μg/g	<0.050	<0.050	NC	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.050	<0.050	<0.050	
		benzo[b]fluoranthene	μg/g	<0.050	<0.050	NC	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.050	<0.050	<0.050	
		Benzo[b+j]fluoranthene	μg/g	--	--	--	--	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	NC	<0.03	<0.03	<0.03	<0.03	<0.03	NC	<0.03	--	--	--	
		benzo[g,h,i]perylene	μg/g	<0.050	<0.050	NC	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.050	<0.050	<0.050	
		benzo[j]fluoranthene	μg/g	--	--	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	--	--	--	
		benzo[k]fluoranthene	μg/g	<0.050	<0.050	NC	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.050	<0.050	<0.050	
		chrysene	μg/g	<0.050	<0.050	NC	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.050	<0.050	<0.050	
		dibenz[a,h]anthracene	μg/g	<0.050	<0.050	NC	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.050	<0.050	<0.050	
		fluoranthene	μg/g	<0.050	<0.050	NC	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.05	<0.05	<0.05	<0.05	NC	<0.05	<0.050	<0.050	<0.050	
		fluorene	μg/g	<0.050	<0.050	NC	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.050	<0.050	<0.050	
		High molecular weight PAHs	μg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		indeno[1,2,3-cd]pyrene	μg/g	<0.050	<0.050	NC	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.02	<0.02	<0.02	<0.02	NC	<0.02	<0.050	<0.050	<0.050	
		Low molecular weight PAHs	μg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		1-Methylnaphthalene	μg/g	--	--	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NC	<0.01	<0.01	<0.01	<0.01	<0.01	NC	<0.01	--	--	--	
		methylnaphthalene, 2-	μg/g	<0.050	<0.050	NC	<0.050	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NC	<0.01	<0.01	<0.01	&							

**TABLE 1:
SOIL ANALYTICAL RESULTS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
February 2017

CSR CL YT Standards	CSR PL YT Standards	AEC SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID SAMPLE DEPTH (mbg)	Units	AEC 32 - B 32-BH14-7-3	AEC 32 - B 32-BH14-8-3	AEC 32 - B 32-BH14-9-3	AEC 32 - B 32-BH14-10-3	AEC 32 - B 32-BH15-5-3	AEC 32 - B 32-BH15-6-3	AEC 32 - B 32-MW15-16-3	AEC 32 - B 32-MW15-16-4	AEC 32 - B 32-BH15-17-3	AEC 32 - B 32-BH15-17-5	AEC 32 - B 32-BH15-19-3	AEC 32 - B 32-BH15-19-5	AEC 32 - B 32-BH15-20-3	AEC 32 - B 32-BH15-20-5	AEC 32 - B 32-BH15-21-3	AEC 32 - B 32-BH15-21-5	AEC 32 - B DUP5 DUP5 32-BH15-21-5	RPD	AEC 32 - B MW16-01 (1.2) MW16-01 (1.2)	
100-4000b	100-4000b																						
n/s	n/s																						
n/s	n/s																						
200	200																						
200	200																						
200	200																						
2000	1000																						
2000	1000																						
n/s	n/s																						
5000	1000																						
5000	1000																						
0.04	0.04																						
7	1																						
50	5																						
2.5	1.5																						
20	5																						
n/s	n/s																						
n/s	n/s																						
n/s	n/s																						
700	320																						
n/s	n/s																						
n/s	n/s																						
n/s	n/s																						
10	1																						
10	1																						
10	1																						
n/s	n/s																						
n/s	n/s																						
n/s	n/s																						
10	1																						
n/s	n/s																						
10	1																						
n/s	n/s																						
n/s	n/s																						
10	1																						
n/s	n/s																						
n/s	n/s																						
10	1																						
n/s	n/s																						
n/s	n/s																						
50	5																						
50	5																						
100	10																						

Soil Exceedances

125
125

Exceeds CSR PL standards
Exceeds CSR CL standards

QA/QC Exceedances

45%
5>3

RPD exceeds 35%
MS exceeds RDL

**TABLE 1:
SOIL ANALYTICAL RESULTS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
February 2017

CSR CL YT Standards	CSR PL YT Standards	AEC SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID SAMPLE DEPTH (mbg)	Units	AEC 32 - B MW16-01 (10.0)	AEC 32 - B MW16-01 (10.0)	RPD	AEC 32 - B MW16-01 (13.0)	AEC 32 - B MW16-01 (15.0)	AEC 32 - B MW16-02 (1.2)	AEC 32 - B MW16-02 (4.5)	AEC 32 - B MW16-02 (7.0)	AEC 32 - B MW16-02 (12.0)	AEC 32 - B MW16-03 (1.2)	AEC 32 - B MW16-03 (7.0)	AEC 32 - B MW16-03 (9.0)	AEC 32 - B MW16-03 (12.0)	AEC 32 - B MW16-04 (14.0)	AEC 32 - B MW16-04 (14.0)	RPD	AEC 32 - B MW16-04 (16.0)	AEC 32 - B MW16-04 (28.4)	AEC 32 - B MW16-05 (10.0)
100-4000b	100-4000b																					
n/s	n/s																					
n/s	n/s																					
200	200																					
200	200																					
200	200																					
2000	1000																					
2000	1000																					
n/s	n/s																					
5000	1000																					
5000	1000																					
0.04	0.04																					
7	1																					
50	5																					
2.5	1.5																					
20	5																					
n/s	n/s																					
n/s	n/s																					
n/s	n/s																					
700	320																					
n/s	n/s																					
n/s	n/s																					
n/s	n/s																					
10	1																					
10	1																					
10	1																					
n/s	n/s																					
n/s	n/s																					
n/s	n/s																					
10	1																					
n/s	n/s																					
n/s	n/s																					
10	1																					
n/s	n/s																					
n/s	n/s																					
50	5																					
50	5																					
100	10																					

Soil Exceedances

125
125

Exceeds CSR PL standards
Exceeds CSR CL standards

QA/QC Exceedances

45%
5>3

RPD exceeds 35%
MS exceeds RDL



**TABLE 1:
SOIL ANALYTICAL RESULTS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
February 2017

CSR CL YT Standards	CSR PL YT Standards	AEC SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID SAMPLE DEPTH (mbg)	Units	AEC 32 - B MW16-05 (11.0)	AEC 32 - B MW16-05 (30.0)	AEC 32 - C 32-BH14-16	AEC 32 - C 32-BH14-17	AEC 32 - C 32-BH14-18	AEC 32 - C 32-BH14-19	AEC 32 - C 32-BH14-20	AEC 32 - C 32-BH14-20	AEC 32 - C 32-BH15-7	AEC 32 - C 32-BH15-7	AEC 32 - C 32-BH15-8	AEC 32 - C 32-BH15-9	AEC 32 - C 32-BH15-9	AEC 32 - C MW16-13 (0.5)	AEC 32 - C MW16-13 (3.0)	AEC 32 - C MW16-13 (26.0)	AEC 32 - C MW16-13 (32.3)	
				12-Nov-16 L1858797 L1858797-14	12-Nov-16 L1858797 L1858797-18	10-Nov-14 L1545666	10-Nov-14 L1545666	10-Nov-14 L1545666	10-Nov-14 L1545666	10-Nov-14 L1545666	10-Nov-14 L1545666	26-Aug-15 15V014984	26-Aug-15 15V014984	26-Aug-15 15V014984	26-Aug-15 15V014984	26-Aug-15 15V014984	25-Nov-16 L1865287 L1865287-11	25-Nov-16 L1865287 L1865287-12	25-Nov-16 L1865287 L1865287-15	29-Nov-16 L1865287 L1865287-18	
				11.0	30.0	0.9 - 1.4	0.3 - 0.8	0.9 - 1.4	0.9 - 1.4	0.9 - 1.4	0.9 - 1.4	0.9 - 1.5	1.8 - 2.3	0.9 - 1.5	1.8 - 2.3	0.9 - 1.5	1.8 - 2.3	0.5	3.0	26.0	32.3
Inorganics / Metals																					
100-4000b	100-4000b		lead	µg/g	--	9.26	7.78	--	--	4.42	4.31	3.7	--	5.8	--	4.6	--	4.51	2.9	9.12	7.92
n/s	n/s		Moisture content	%	7.63	22.9	9.01	5.64	8.85	7.65	9.34	6.76	--	--	--	--	--	--	--	--	--
n/s	n/s		pH	pH	--	8.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Petroleum Hydrocarbons																					
200	200		VPHs	µg/g	--	<100	--	--	--	--	--	--	--	--	--	--	--	<100	<100	<100	<100
200	200		VPH (VH6-10) minus BTEX	µg/g	--	--	<100	<100	<100	<100	<100	<10	<10	<10	<10	<10	<10	--	--	--	--
200	200		VH ₆₋₁₀	µg/g	--	<100	<100	<100	<100	<100	<100	<10	<10	<10	<10	<10	<10	<100	<100	<100	<100
2000	1000		LEPHs	µg/g	--	<200	<200	<200	<200	<200	4250	900	<20	<20	<20	<20	<20	<200	<200	<200	<200
2000	1000		EPHs ₁₀₋₁₉	µg/g	--	<200	<200	<200	<200	<200	4250	900	<20	<20	<20	<20	<20	<200	<200	<200	<200
n/s	n/s		EPHs ₁₀₋₃₂	µg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5000	1000		EPHs ₁₉₋₃₂	µg/g	--	<200	<200	<200	<200	<200	<200	<20	<20	<20	<20	<20	<20	<200	<200	<200	<200
5000	1000		HEPHs	µg/g	--	<200	<200	<200	<200	<200	<200	<20	<20	<20	<20	<20	<20	<200	<200	<200	<200
Monocyclic Aromatic Hydrocarbons																					
0.04	0.04		benzene	µg/g	<0.005	<0.005	<0.040	<0.040	<0.040	<0.040	<0.040	<0.02	<0.02	<0.02	<0.02	<0.02	<0.005	<0.005	0.0579	<0.005	
7	1		ethylbenzene	µg/g	<0.015	<0.015	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.015	<0.015	<0.015	<0.015	
50	5		styrene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
2.5	1.5		toluene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	<0.075	
20	5		xylenes	µg/g	<0.075	<0.075	<0.075	<0.075	<0.075	<0.075	<0.075	--	--	--	--	--	<0.075	<0.075	<0.075	<0.075	
n/s	n/s		total xylenes (total)	µg/g	--	--	--	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--	
n/s	n/s		m+p-Xylene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	--	--	--	
n/s	n/s		o-Xylene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--	--	
Non-Halogenated Aliphatics / VOCs																					
700	320		methyl tert-butyl ether	µg/g	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.2	
Polycyclic Aromatic Hydrocarbons																					
n/s	n/s		acenaphthene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.20	<0.050	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	
n/s	n/s		acenaphthylene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.10	<0.050	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	
n/s	n/s		anthracene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	
10	1		benzo[a]anthracene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	
10	1		benzo[a]pyrene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
10	1		benzo[b]fluoranthene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	
n/s	n/s		Benzo[b+j]fluoranthene	µg/g	--	--	--	--	--	--	--	<0.03	<0.03	<0.03	<0.03	<0.03	--	--	--	--	
n/s	n/s		benzo[g,h,i]perylene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
n/s	n/s		benzo[j]fluoranthene	µg/g	--	--	--	--	--	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	--	--	--	--	
10	1		benzo[k]fluoranthene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	
n/s	n/s		chrysene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
10	1		dibenz[a,h]anthracene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	
n/s	n/s		fluoranthene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
n/s	n/s		fluorene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.2	<0.05	<0.05	<0.05	
n/s	n/s		High molecular weight PAHs	µg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
10	1		indeno[1,2,3-cd]pyrene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	
n/s	n/s		Low molecular weight PAHs	µg/g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
n/s	n/s		1-Methylnaphthalene	µg/g	--	--	--	--	--	--	--	<0.01	<0.01	<0.01	<0.01	<0.01	--	--	--	--	
n/s	n/s		methylnaphthalene, 2-	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.01	<0.01	<0.01	<0.01	<0.01	<0.06	<0.05	<0.05	<0.05	
50	5		naphthalene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.20	<0.050	<0.01	<0.01	<0.01	<0.01	<0.3	<0.05	<0.05	<0.05	
50	5		phenanthrene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	
100	10		pyrene	µg/g	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	

Soil Exceedances

125
125
45%
5>3

Exceeds CSR PL standards
Exceeds CSR CL standards
RPD exceeds 35%
MS exceeds RDL



**TABLE 1:
SOIL ANALYTICAL RESULTS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
February 2017

CSR CL YT Standards	CSR PL YT Standards	AEC SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID SAMPLE DEPTH (mbg)	Units	AEC 32 - C MW16-13 (35.0)	AEC 32 - C MW16-13 (37.0)	AEC 32 - D 32-BH14-11 32-BH14-11-2	AEC 32 - D 32-BH14-12 32-BH14-12-2	AEC 32 - D 32-BH14-13 32-BH14-13-3	AEC 32 - D 32-BH14-14 32-BH14-14-1	AEC 32 - D 32-BH14-15 32-BH14-15-3	AEC 32 - D MW16-06 (5.0) MW16-06 (9.3)	AEC 32 - D MW16-06 (9.3) MW16 (H) MW16 (H)	RPD	AEC 32 - D MW16-06 (27.0) MW16-06 (27.0)	AEC 32 - D MW16-06 (29.0) MW16-06 (29.0)	AEC 32 - D MW16-14 (6.0) MW16-14 (6.0)	AEC 32 - D MW16-0 MW16-0 MW16-14 (6.0)	RPD	AEC 32 - D MW16-14 (11.0) MW16-14 (11.0)	AEC 32 - D MW16-14 (15.0) MW16-14 (15.0)	AEC 32 - D MW16-14 (16.5) MW16-14 (16.5)	
100-4000b	100-4000b																					
n/s	n/s																					
n/s	n/s																					
200	200																					
200	200																					
200	200																					
2000	1000																					
2000	1000																					
n/s	n/s																					
5000	1000																					
5000	1000																					
0.04	0.04																					
7	1																					
50	5																					
2.5	1.5																					
20	5																					
n/s	n/s																					
n/s	n/s																					
n/s	n/s																					
700	320																					
n/s	n/s																					
n/s	n/s																					
n/s	n/s																					
10	1																					
10	1																					
10	1																					
n/s	n/s																					
n/s	n/s																					
n/s	n/s																					
10	1																					
n/s	n/s																					
10	1																					
n/s	n/s																					
10	1																					
n/s	n/s																					
n/s	n/s																					
10	1																					
n/s	n/s																					
50	5																					
50	5																					
100	10																					

Soil Exceedances

125
125

Exceeds CSR PL standards
Exceeds CSR CL standards

QA/QC Exceedances

45%
5>3

RPD exceeds 35%
MS exceeds RDL

**TABLE 1:
SOIL ANALYTICAL RESULTS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
February 2017

CSR CL YT Standards	CSR PL YT Standards	AEC SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID SAMPLE DEPTH (mbg)	Units	AEC 32 - E 32-BH14-21	AEC 32 - E DUP-6 32-BH14-21-2	RPD	AEC 32 - E 32-BH14-21-3	AEC 32 - E 32-BH15-10-4	AEC 32 - E 32-BH15-10-6	AEC 32 - E 32-BH15-10-8	AEC 32 - E 32-BH15-11-5	AEC 32 - E 32-BH15-11-8	AEC 32 - E 32-BH15-11-9	AEC 32 - E 32-BH15-11-11	AEC 32 - E 32-BH15-13-4	AEC 32 - E 32-BH15-13-6	AEC 32 - E 32-BH15-13-8	AEC 32 - E 32-BH15-14-4	AEC 32 - E 32-BH15-14-6	AEC 32 - E 32-BH15-14-8	
100-4000b	100-4000b																				
n/s	n/s																				
n/s	n/s																				
200	200																				
200	200																				
200	200																				
2000	1000																				
2000	1000																				
n/s	n/s																				
5000	1000																				
5000	1000																				
0.04	0.04																				
7	1																				
50	5																				
2.5	1.5																				
20	5																				
n/s	n/s																				
n/s	n/s																				
n/s	n/s																				
700	320																				
n/s	n/s																				
n/s	n/s																				
n/s	n/s																				
10	1																				
10	1																				
10	1																				
n/s	n/s																				
n/s	n/s																				
n/s	n/s																				
10	1																				
n/s	n/s																				
10	1																				
n/s	n/s																				
n/s	n/s																				
10	1																				
n/s	n/s																				
n/s	n/s																				
50	5																				
50	5																				
100	10																				

Soil Exceedances

125
125

Exceeds CSR PL standards
Exceeds CSR CL standards

QA/QC Exceedances

45%
5>3

RPD exceeds 35%
MS exceeds RDL



**TABLE 1:
SOIL ANALYTICAL RESULTS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
February 2017

CSR CL YT Standards	CSR PL YT Standards	AEC SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID SAMPLE DEPTH (mbg)	Units	AEC 32 - E 32-BH15-15-4	AEC 32 - E DUP3 32-BH15-15-4	RPD	AEC 32 - E 32-BH15-15-6 DUP4	AEC 32 - E DUP4 32-BH15-15-6	RPD	AEC 32 - E 32-BH15-15-8	AEC 32 - E BH16-11 (2.0) MW16-11 (6.75)	AEC 32 - E BH16-11 (6.75) MW16-11 (8.25)	AEC 32 - E BH16-11 (9.0) MW16-11 (9.0)	AEC 32 - E MW16-12 (1.0) MW16 (M)	AEC 32 - E MW16 (M) MW16-12 (1.0)	RPD	AEC 32 - E MW16-12 (4.0) MW16-12 (4.0)	AEC 32 - E MW16-12 (6.75) MW16-12 (6.75)	AEC 32 - E MW16-12 (8.25) MW16-12 (8.25)	AEC 32 - E MW16-12 (9.2) MW16-12 (9.2)	AEC 32 - E MW16-12 (18.0) MW16-12 (18.0)	AEC 32 - F 32-BH14-22 32-BH14-22-2
100-4000b	100-4000b																					
n/s	n/s																					
n/s	n/s																					
200	200																					
200	200																					
200	200																					
2000	1000																					
2000	1000																					
n/s	n/s																					
5000	1000																					
5000	1000																					
0.04	0.04																					
7	1																					
50	5																					
2.5	1.5																					
20	5																					
n/s	n/s																					
n/s	n/s																					
n/s	n/s																					
700	320																					
n/s	n/s																					
n/s	n/s																					
n/s	n/s																					
10	1																					
10	1																					
10	1																					
n/s	n/s																					
n/s	n/s																					
n/s	n/s																					
10	1																					
n/s	n/s																					
10	1																					
n/s	n/s																					
10	1																					
n/s	n/s																					
n/s	n/s																					
10	1																					
n/s	n/s																					
n/s	n/s																					
50	5																					
50	5																					
100	10																					

Soil Exceedances

125
125

Exceeds CSR PL standards
Exceeds CSR CL standards

QA/QC Exceedances

45%
5>3

RPD exceeds 35%
MS exceeds RDL



**TABLE 1:
SOIL ANALYTICAL RESULTS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
February 2017

CSR CL YT Standards	CSR PL YT Standards	AEC SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID SAMPLE DEPTH (mbg)	Units	AEC 32 - F 32-BH15-22 32-BH15-22-1	AEC 32 - F 32-BH15-23 32-BH15-23-3	AEC 32 - F 32-BH15-24 32-BH15-24-3 DUP 7	AEC 32 - F DUP 7 32-BH15-24-3	RPD	AEC 32 - F 32-BH15-25 32-BH15-25-3	AEC 32 - F MW16-07 (17.0) MW16-07 (17.0) MW16 (J)	AEC 32 - F MW16 (J) MW16-07 (17.0) MW16 (J)	RPD	AEC 32 - F MW16-07 (20.0) MW16-07 (20.0) MW16-07 (20.0)	AEC 32 - F MW16-07 (26.0) MW16-07 (26.0) MW16-07 (26.0)	AEC 32 - F MW16-07 (30.8) MW16-07 (30.8) MW16-07 (30.8)	AEC 32 - G 32-BH15-26 32-BH15-26-4	AEC 32 - G 32-BH15-30 32-BH15-30-3	AEC 32 - G 32-BH15-30-7	AEC 32 - G MW16-08 (1.3) MW16-08 (1.3) MW16-08 (1.3)	AEC 32 - G MW16-08 (3.5) MW16-08 (3.5) MW16-08 (3.5)	AEC 32 - G MW16-08 (4.7) MW16-08 (4.7) MW16-08 (4.7)	AEC 32 - G MW16-08 (7.7) MW16-08 (7.7) MW16-08 (7.7)
100-4000b	100-4000b																					
n/s	n/s																					
n/s	n/s																					
200	200																					
200	200																					
200	200																					
2000	1000																					
2000	1000																					
n/s	n/s																					
5000	1000																					
5000	1000																					
0.04	0.04																					
7	1																					
50	5																					
2.5	1.5																					
20	5																					
n/s	n/s																					
n/s	n/s																					
n/s	n/s																					
700	320																					
n/s	n/s																					
n/s	n/s																					
n/s	n/s																					
10	1																					
10	1																					
10	1																					
n/s	n/s																					
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10	1																					
n/s	n/s																					
n/s	n/s																					
10	1																					
n/s	n/s																					
n/s	n/s																					
10	1																					
n/s	n/s																					
50	5																					
50	5																					
100	10																					

Soil Exceedances

125
125

Exceeds CSR PL standards
Exceeds CSR CL standards

QA/QC Exceedances

45%
5>3

RPD exceeds 35%
MS exceeds RDL

**TABLE 1:
SOIL ANALYTICAL RESULTS**

Watson Lake Airport - AEC 32
PWGSC
Project #: 13221
February 2017

CSR CL YT Standards	CSR PL YT Standards	AEC SAMPLE ID FIELD LABEL DUPLICATE ID DATE SAMPLED LAB CERTIFICATE LAB SAMPLE ID SAMPLE DEPTH (mbg)	Units	AEC 32 - G MW16-08 (23.0)	AEC 32 - G MW16 (L) MW16 (L)	RPD	AEC 32 - G MW16-08 (25.0)	AEC 32 - G BH16-09 (1.25) MW16-09 (1.25)	AEC 32 - G BH16-09 (2.75) MW16-09 (2.75)	AEC 32 - G BH16-09 (4.75) MW16-09 (4.75)	AEC 32 - G BH16-09 (7.75) MW16-09 (7.75)	AEC 32 - G BH16-09 (9.75) MW16-09 (9.75)	AEC 32 - G BH16-10 (1.25) MW16-10 (1.25)	AEC 32 - G BH16-10 (2.75) MW16-10 (2.75)	AEC 32 - G BH16-10 (4.75) MW16-10 (4.75)	AEC 32 - G BH16-10 (7.75) MW16-10 (7.75)	AEC 32 - G BH16-10 (9.75) MW16-10 (9.75)	
100-4000b	100-4000b																	
n/s	n/s																	
n/s	n/s																	
200	200																	
200	200																	
200	200																	
2000	1000																	
2000	1000																	
n/s	n/s																	
5000	1000																	
5000	1000																	
0.04	0.04																	
7	1																	
50	5																	
2.5	1.5																	
20	5																	
n/s	n/s																	
n/s	n/s																	
n/s	n/s																	
700	320																	
n/s	n/s																	
n/s	n/s																	
n/s	n/s																	
10	1																	
10	1																	
10	1																	
n/s	n/s																	
n/s	n/s																	
n/s	n/s																	
10	1																	
n/s	n/s																	
n/s	n/s																	
10	1																	
n/s	n/s																	
n/s	n/s																	
10	1																	
n/s	n/s																	
n/s	n/s																	
50	5																	
50	5																	
100	10																	

Soil Exceedances

125
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Exceeds CSR PL standards
Exceeds CSR CL standards

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RPD exceeds 35%
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