Public Works and Government Services Canada

Requisition No.: EZ897-172420

Buy and Sell ID No.: _____

Specifications for

Esquimalt Fill Site Eastern Remediation

Esquimalt Harbour, BC

Project No. R.077399.003 2016Dec09

APPROVED BY:

_____ 2016-12-12
Regional Manager ES Date

_____ 2016.12.12
Construction Safety Coordinator Date

TENDER:

_____ 2016 Dec 09
Project Manager Date

Real Property Services Branch, Professional and Technical Services, Pacific Region
#219 – 800 Burrard Street, Vancouver, B.C. V6Z 0B9

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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.

1.1.3. Site 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. 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, access, onsite roadways, temporary hoarding, security fencing, federal signage, office facilities, sanitary facilities, stormwater management infrastructure, lighting, and utilities.

1.1.5. Site Facilities - Operation will be paid in accordance with lump sum price established to operate and maintain all infrastructure between mobilization and demobilization. Measurement as recorded time by Departmental Representative. Includes temporary structures and facilities, environmental protection, stockpile areas, access, onsite roadways, temporary hoarding, security fencing, federal signage, office facilities, sanitary facilities, stormwater management infrastructure, lighting, and utilities. Also includes ongoing services including administration, overhead, project management, security, surveying, noise monitoring, vibration monitoring, 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.

1.1.6. 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.

1.1.7. Contaminated Water Treatment - Provision will be paid in accordance with lump sum price established to design, temporarily provide for duration of Work, and erect all onsite ancillary tanks, storage containers, equipment and piping to collect, store, and sample contaminated or potentially Contaminated Water. Includes dewatering of Contaminated Water from excavation. Includes provision of onsite Water Treatment Plant. Includes provision of bulk storage tanks and loading facilities for offsite Water Treatment Plant.

1.1.8. Contaminated Water Treatment - Operation will be paid in accordance with lump sum price established for volume of water treated to operate and maintain onsite Contaminated Water Treatment facilities. Includes all onsite ancillary tanks, storage containers, equipment and piping to collect, store, and sample contaminated or potentially Contaminated Water. Includes dewatering of Contaminated Water from excavation. Includes treating Non-Aqueous Phase Liquids. Includes operation of onsite Water Treatment Plant and discharge piping. Includes operation of bulk storage tanks and loading facilities for offsite Water Treatment Plant, and transport to offsite facility. Includes analytical testing to demonstrate compliance with Contract.

1.1.9. Temporary Sloping and Shoring will be paid in accordance with lump sum price established to design and provide temporary sloping and/or shoring required to excavate to Contaminated Material Extents according to Drawings. Includes backfilling and compaction within excavation any temporary slope material accepted by Qualified Professional and Departmental Representative as suitable for backfill.

1.1.10. Waste Oversize Debris Removal will be paid in accordance with unit rate price established for time to remove oversize material from excavation. Measurement as recorded time by Departmental Representative. Does not include Transport or Disposal of debris.

1.1.11. Excavation will be paid in accordance with unit rate price established for volume of material removed to excavate to Contaminated Material Extents according to Drawings. Measurement as recorded insitu Excavation volume of final Contaminated Material Extents and overlying incidental material as Surveyed by Departmental Representative. Insitu volume is simple dimensions of excavation and includes exsitu bulking (expansion or swell) and insitu compaction (densifying) factors. Includes incidental Contaminated Material and Non-Contaminated Material immediately above Contaminated Material (eg Topsoil, Overburden). Includes all handling, loading, hauling, unloading and stockpiling.

Material to be stockpiled within work area as directed by Departmental Representative. Does not include material excavated as part of Temporary Sloping and Shoring.

1.1.12. Backfill – Imported will be paid in accordance with unit rate price established per weight for material imported for 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 is simple dimensions of excavation and includes exsitu bulking (expansion or swell) and insitu compaction (densifying) factors. Includes analytical testing and inspections to demonstrate compliance with Contract, provision, all handling, loading, hauling, unloading, placing, grading and compacting. Does not include material backfilled as part of Temporary Sloping and Shoring.

1.1.13. Transport - Contaminated Material: Hazardous Waste will be paid in accordance with unit rate price established for weight of Hazardous Waste material transported. Measurement as recorded on Treatment Facility or Disposal Facility weigh scale certified by Measurement Canada and results provided to Departmental Representative. Includes all handling, loading, hauling, unloading, interim storage, and final placement. If material is taken to a Treatment Facility Offsite before a Disposal Facility, payment includes transport to both Treatment Facility and Disposal Facility. Does not include material excavated as part of Temporary Sloping and Shoring and required to be disposed offsite due to unsuitability.

1.1.14. Transport - Contaminated Material: Waste Quality will be paid in accordance with unit rate price established for weight of Waste Quality material transported. Measurement as recorded on Treatment Facility or Disposal Facility weigh scale certified by Measurement Canada and results provided to Departmental Representative. Includes all handling, loading, hauling, unloading, interim storage, and final placement. If material is taken to a Treatment Facility Offsite before a Disposal Facility, payment includes transport to both Treatment Facility and Disposal Facility. Does not include material excavated as part of Temporary Sloping and Shoring and required to be disposed offsite due to unsuitability.

1.1.15. Transport - Non-Contaminated Material and Waste will be paid in accordance with unit rate price established for weight of material removed. Measurement as recorded on Landfill weigh scale certified by Measurement Canada and results provided to Departmental Representative. Includes all handling, loading, hauling, unloading, interim storage, and final placement. Does not include material excavated as part of Temporary Sloping and Shoring and required to be disposed offsite due to unsuitability.

1.1.16. Disposal - Contaminated Material: Hazardous Waste will be paid in accordance with unit rate price established for weight of Hazardous 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. Does not include material excavated as part of Temporary Sloping and Shoring and required to be disposed offsite due to unsuitability.

1.1.17. Disposal - Contaminated Material: Waste Quality will be paid in accordance with unit rate price established for weight of Waste Quality 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. Does not include material excavated as part of Temporary Sloping and Shoring and required to be disposed offsite due to unsuitability.

1.1.18. Disposal - Non-Contaminated Material and Waste will be paid in accordance with unit rate price established for weight of material disposed. Measurement as recorded on Landfill facility weigh scale certified by Measurement Canada and results provided to Departmental Representative on Landfill Receipts. Does not include material excavated as part of Temporary Sloping and Shoring and required to be disposed offsite due to unsuitability

1.1.19. Site Restoration will be paid in accordance with the lump sum price established to restore the Site to make suitable for post-Work use according to Drawings. Includes re-establishment of pre-existing infrastructure, final grading, topsoil reuse, revegetation, and deconstructing and removal from Site all temporary facilities and removal of any incidental or generated material.

1.1.20. 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.

1.1.21. 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 directed by the Departmental Representative.

1.2. Definitions

1.2.1. Certificate of Completion: see General Conditions.

1.2.2. Change Order: PWGSC 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 directed by the Departmental Representative, include:

1.2.4.1. For all sites: Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines and CCME Canada-Wide Standards.

1.2.4.2. For sites in BC, may include risk-based site-specific target levels for remediation objectives (ie CCME Tier 3): BC Hazardous Waste Regulation, BC Approved Water Quality Guidelines, BC Contaminated Sites Regulation.

1.2.4.3. For sites in Yukon, may include risk-based site-specific target levels for remediation objectives (ie CCME Tier 3): Yukon Special Waste Regulation, Yukon Contaminated Sites Regulation.

1.2.5. Contaminated Material Extents: lateral and vertical 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, Overburden, or material excavated as part of Temporary Sloping and Shoring.

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 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 or Yukon Contaminated Sites Regulation, as applicable. Includes NonAqueous 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 all sites: Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines and CCME Canada-Wide Standards.

1.2.6.2. For sites in BC, may include risk-based site-specific target levels for remediation objectives (ie CCME Tier 3): BC Hazardous Waste Regulation, BC Contaminated Sites Regulation.

1.2.6.3. For sites in Yukon, may include risk-based site-specific target levels for remediation objectives (ie CCME Tier 3): 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: PWGSC 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, license, or other required 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.
1.2.18. Extension of Time: see General Conditions.
1.2.19. Extension of Time on Contracts: PWGSC 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 Treatment Facility: equivalent of Soil Treatment Facility.
1.2.23. 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.
1.2.24. 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.

1.2.25. Non-Contaminated Material: soil, sediment, and other solid material excavated incidentally which meets:

1.2.25.1. For Sites in BC: the BC Contaminated Sites Regulation Schedule 7 Column IV.

1.2.25.2. For sites in Yukon: the Yukon Contaminated Sites Regulation most stringent of Schedule 1 and 2.

1.2.26. Non-Contaminated Water: liquids which are suitable for direct discharge to the environment, and which is not Contaminated Water or Sewage Wastewater. Includes surface runoff, stormwater, and groundwater which has not come into contact with Contaminated Material.

1.2.27. On Site Instruction: notices, instructions, or directions issued by the Departmental Representative to the Contractor.

1.2.28. On Site Notice: notice or other communication issued by the Contractor to the Departmental Representative.

1.2.29. Overburden: Non-Contaminated Material excavated incidentally above Contaminated Material Extents that is suitable as Backfill. Does not include Topsoil or material excavated as part of Temporary Sloping and Shoring.

1.2.30. Progress Payment: see General Conditions.

1.2.31. PWGSC: Public Works and Government Services Canada. Representative of Canada with control of the Site.

1.2.32. 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.

1.2.33. Quote: Contractor's cost estimate issued to the Departmental Representative as per the relevant Contemplated Change Notice via an On Site Notice.

1.2.34. Remediation by Excavation: complete excavation of Contaminated Material and incidental Non-Contaminated Material to the Site boundaries 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.

1.2.35. 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.

1.2.36. Site: work area available to Contractor according to Drawings. Does not include shared or public areas, including common roads.

1.2.37. Special Waste: Yukon equivalent of Hazardous Waste.

1.2.38. Subcontractor: see General Conditions.

1.2.39. 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.

1.2.40. Substantial Performance: see General Conditions.

1.2.41. Superintendent: see General Conditions

1.2.42. Supplier: see General Conditions.

1.2.43. 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 (eg tape measurer) or by survey equipment (eg Global Positioning System, total station). Contractor may perform independent survey using a Qualified Professional to confirm Survey by Departmental Representative.

1.2.44. Topsoil: Non-Contaminated Material excavated incidentally above Contaminated Material Extents that is a surface organic layer to facilitate vegetation growth. Does not include Overburden or material excavated as part of Temporary Sloping and Shoring.

1.2.45. Transfer/Interim Storage Facility: a facility specifically used to transfer or short term storage Contaminated Material during offsite transport.

1.2.46. Treatment Facility: a facility specifically used to treat Contaminated Material. May be Owner's (PWGSC provided) or Offsite (Contractor provided). Owner's Soil Treatment Facility is located on property under PWGSC control, but may be located at a different location than where construction work occurs. Offsite Treatment Facility may treat soil, sediment, or water.

1.2.47. 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.

1.2.48. 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 bedrock, boulders, pilings, pipes, building structures, and concrete foundations.

1.2.49. 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.

1.2.50. Waste Reduction Plan: a written report which addresses opportunities for reduction, reuse or recycling of materials.

1.2.51. Work: see General Conditions.

1.2.52. 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 Preparation.
1.4.2.4. Site Facilities Provision.
1.4.2.5. Site Facilities Operation.
1.4.2.6. Standby Time.
1.4.2.7. Contaminated Water Treatment Provision.
1.4.2.8. Contaminated Water Treatment Operation.
1.4.2.9. Temporary Sloping and Shoring.
1.4.2.10. Waste Oversize Debris Removal.
1.4.2.11. Excavation.
1.4.2.12. Backfill – Imported.
1.4.2.13. Backfill – Overburden.
1.4.2.14. Transport – Contaminated Material: Hazardous Waste.
1.4.2.15. Transport – Contaminated Material: Waste Quality.
1.4.2.16. Transport – Non-Contaminated Material and Waste.
1.4.2.17. Disposal – Contaminated Material: Hazardous Waste.
1.4.2.18. Disposal – Contaminated Material: Waste Quality.
1.4.2.19. Disposal – Non-Contaminated Material and Waste.
1.4.2.20. Site Restoration.
1.4.2.21. Demobilization.
1.4.2.22. Closeout Submittals.

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 Work with contaminated materials. Complete list of anticipated contaminants and concentration levels on the Site available separately in assessment reports and/or Drawings.
1.6.2. Existing condition on the Site identified according to Drawings.
1.6.3. Utilities/services availability on Site:
1.6.3.1. Electrical power is not available on Site.
1.6.3.2. Water is not available on Site.
1.6.3.3. Sanitary sewer is not available on Site.
1.6.3.4. Storm sewer is not available on Site.
1.6.3.5. Telecommunications 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 directions from Departmental Representative.
1.7.5. Coordinate Work with that of other contractors. 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. None

1.11. Schedule Requirements
1.11.1. Work to be initiated: within 5 Working Days of Contract Award.
1.11.2. Pre-Mobilization Submittals: within 10 Working Days of Contract Award.
1.11.3. Mobilization: within 10 Working Days of Contract Award.
1.11.4. Site Works: Final Completion no later than 2017Mar15.
1.11.5. Offsite Treatment and Disposal Works: Final Completion no later than 2017Mar31.
1.11.6. Completion of the Work: no later than 2017Mar31. 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.
1.12.2. Obtain consent from Departmental Representative for all after hours Work, including weekends and holidays.
1.12.2.1. Proceed only as directed 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 directed 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 directed 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.

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.

1.3.6. Quality Management Plan: within 10 Working Days after Contract award, Submit a quality management plan. Include:

1.3.6.1. Details on planned review, inspection and testing to provide Quality Assurance and Quality Control for the Work.

1.3.6.2. Subcontractors responsible for review, inspection and testing.

1.3.6.3. Schedule of submittals of review, inspection and testing results.

1.3.7. 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 and sampling chains of custody.

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 Shop 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 according to 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

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 directed 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. Submit as directed by the Departmental Representative the requested Shop Drawings, product data, MSDS sheets and samples in accordance with the Contract.
1.9.2. Allow sufficient time for the following:
1.9.2.1. Review of product data.
1.9.2.2. Acceptance of Shop Drawings.
1.9.2.3. Review of re-submission.
1.9.2.4. 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 Instruction: 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 ladings 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 a change 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.

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 directed 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 Meetings: 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 directed by the Departmental Representative.

1.4.4. Provide physical space and make arrangements for meetings, or arrange for teleconference meetings, as directed 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.

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. 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.
1.6.3.10. Problems which impede construction schedule.

1.6.3.11. Corrective measures and procedures to regain projected schedule.
1.6.3.12. Revision to construction schedule.
1.6.3.13. Progress schedule, during succeeding Work period.
1.6.3.14. Review submittal schedules: expedite as required.
1.6.3.15. Maintenance of quality standards.
1.6.3.16. Quantities of material transported, treated, and disposed.
1.6.3.17. Review proposed changes for effect on construction schedule and on Final Completion date.
1.6.3.18. 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.

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 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. 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 directed by the Departmental Representative.

1.4.9. Notify Departmental Representative in writing, when resubmitting, of any revisions other than those directed 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 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 directed by the Departmental Representative, electronic and 2 hard copies of Shop Drawings for each requirement requested in the specification sections and/or as directed 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 directed 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 directions.

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 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

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.

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, 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, 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.

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, 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.

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

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 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. For all transfer stations and interim storage 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.

1.3.1.4. Sequence, methods and means to treat Contaminated Material 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.

1.3.1.5. Sequence, methods and means to dispose Contaminated Material and 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 for the facility; and evidence of compliance with municipal zoning and bylaws of facility.

1.3.2. Contaminated Water Treatment Provision Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit design, operation procedures, manufacturers' instructions, and monitoring and sampling plan of

onsite Contaminated Water Treatment. Includes onsite infrastructure for onsite or offsite Water Treatment Plant.

1.3.3. Onsite Contaminated Water Treatment Plant Initial Testing: within 5 Working Days of conducting initial operations testing, and prior to operating or discharge, Submit results of initial operations test.

1.3.4. Onsite Contaminated Water Treatment Plant Operational Testing: within 5 Working Days of sampling Submit sampling results of operational (recurrent) testing.

1.3.5. Certificate of Seaworthiness: Prior to barge shipments, Submit a Certificate of Seaworthiness by an independent licensed Marine Surveyor for all marine vessels transporting Contaminated Material.

1.3.6. Transport Manifests: within 5 Working Days of offsite transport, Submit documentation verifying that material has been transported appropriately. Include:

1.3.6.1. Method of transport.

1.3.6.2. Name of transport company.

1.3.6.3. Weigh scale receipt including location, date, and weight of loading, as appropriate.

1.3.6.4. Weigh scale receipt including location, date, and weight of unloading.

1.3.7. Certificate of Treatment: within 30 Working Days of treatment at Treatment Facility, Submit documentation verifying that materials have been treated by Contractor. Include:

1.3.7.1. Issued by the Treatment Facility.

1.3.7.2. On company letterhead.

1.3.7.3. Name and location of facility where the material is being treated.

1.3.7.4. Date and weight for each shipment received and total weight received at the offsite facility.

1.3.7.5. Date and weight for each treatment event and total weight treated at the offsite facility.

1.3.7.6. Treatment methodology.

1.3.7.7. Laboratory certificates demonstrating treatment objectives were met.

1.3.7.8. Disposition of treated material.

1.3.7.9. Signed by identified authorized treatment company representative.

1.3.8. Certificate of Disposal: within 30 Working Days of disposal at Disposal Facility, Submit documentation verifying that materials have been disposed by Contractor. Include:

1.3.8.1. Issued by the Disposal Facility.

1.3.8.2. On company letterhead.

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

1.3.8.4. Date and weight for each shipment received and total weight received at the Disposal Facility.

1.3.8.5. Identification of acceptance of final ownership of material.

1.3.8.6. 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.

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.

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, including surface runoff 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

1.8.7.2. Waste Quality

1.8.8. Segregate different suspect material in discrete stockpiles to facilitate ex-situ characterization as directed 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 Samples 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 directed by Departmental Representative.

1.9. Equipment Decontamination

1.9.1. At minimum, perform 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 directed 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 directed 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.
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 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 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 Contaminated Water Treatment Plant.

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 or once it enters the Contaminated Water Treatment Plant.

1.15. Onsite Contaminated Water Treatment Plant

1.15.1. Onsite Contaminated Water Treatment: at Contractor's discretion, treat at Treatment Facility onsite provided by Contractor and accepted by the Departmental Representative.
1.15.2. Design Requirements:
1.15.2.1. Design and Operating Criteria: design Contaminated Water Treatment Plant capable of treating Contaminated Water generated from dewatering excavations and Work areas to meet Discharge Approval requirements, capable of removing oil, suspended solids, particulates, and asbestos fibers, and filter water through 5-micron particulate filter prior to discharge.
1.15.2.2. Ensure that discharges from Site are in compliance with applicable permit requirements and limitations.
1.15.2.3. Design piping to transfer liquid/solid mixtures generated by dewatering operations which require treatment to Contaminated Water Treatment Plant.
1.15.2.4. Design Contaminated Water Treatment Plant capable of receiving liquid/solid mixtures and not causing delay to dewatering operations.
1.15.2.5. Piping: suitable material type, of sufficient diameter and structural thickness for purpose intended; satisfactorily tested for leaks with potable water in presence of Departmental Representative before handling Contaminated Water.
1.15.3. Installation:
1.15.3.1. Prepare Site for Contaminated Water Treatment Plant.
1.15.3.2. Install component systems in accordance with installation procedures and as required.
1.15.3.3. Following installation of system, implement initial operation test in accordance with procedures developed by Contractor and submit results as directed by the Departmental Representative.
1.15.3.4. Install piping in accordance with manufacturer's instructions and test for leakage using potable water prior to commencing dewatering and treatment operations.
1.15.4. Initial Testing: determine performance of Contaminated Water Treatment Plant provided by Contractor as follows prior to commencing excavation:
1.15.4.1. Test run with potable water to ensure it is operating currently and no leaks are occurring.
1.15.4.2. Performance verification (contaminant removal) of Contaminated Water treated, stored, tested, assessed, and accepted by Departmental Representative prior to discharge.
1.15.4.3. Provide access for independent collection of treated stored water samples by the Departmental Representative.
1.15.5. Operational Testing:
1.15.5.1. Operate Contaminated Water Treatment Plant using experienced, qualified personnel and in accordance with manufacturer's instructions and procedures as Submittals by Contractor.
1.15.5.2. Collect, analyze, and assess samples as required by a Qualified Professional.

1.15.5.3. Provide access for independent collection of samples by the Departmental Representative.
1.15.5.4. On basis of analytical results by Contractor or Departmental Representative obtained from samples collected at the discharge point, make system modifications required for effluent to satisfy effluent criteria, or continue with normal dewatering operations as directed by the Departmental Representative.
1.15.6. Decommissioning/Dismantling:
1.15.6.1. Decontaminate and remove salvageable components of Contaminated Water Treatment Plant including treatment system, pumps, piping, and electrical equipment.
1.15.6.2. Dispose of non-salvageable equipment and materials at Disposal Facility accepted by the Departmental Representative. Decontaminate salvageable equipment as required prior to demobilization from Site.
1.15.7. Discharge to environment: obtain Discharge Approval from authority having jurisdiction.

1.16. Offsite Contaminated Water Treatment Plant
1.16.1. Offsite Contaminated Water Treatment: at Contractor's discretion, treat at Treatment Facility offsite provided by Contractor and accepted by the Departmental Representative.
1.16.2. Offsite Treatment Facility must:
1.16.2.1. Be an existing offsite facility located in Canada or the United States.
1.16.2.2. 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
1.16.2.3. 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.
1.16.2.4. Comply with applicable municipal zoning, bylaws, and other applicable requirements.
1.16.3. Facility Authority:
1.16.3.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.
1.16.3.2. For facilities on First Nations reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.
1.16.3.3. 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.
1.16.3.4. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.

1.16.4. 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.

1.17. Contaminated Material Management

1.17.1. Remove all Contaminated Material within Work areas in accordance with the Contract and as directed by the Departmental Representative.

1.17.2. 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.

1.17.3. 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 directed by the Departmental Representative based on insitu results, field observations, field measurements, and/or ex-situ characterization:

1.17.3.1. Hazardous Waste

1.17.3.2. Waste Quality

1.17.4. Handle, stockpile, load, unload, haul, and interim store Contaminated Material from the Site separately from material from other sites.

1.17.5. Treat and dispose Contaminated Material from the Site separately from material from other sites to greatest extent practicable as acceptable to the Departmental Representative.

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

1.18. Offsite Contaminated Material Disposition

1.18.1. Treat Contaminated Material offsite as follows, otherwise in accordance with the Contract, or as directed by the Departmental Representative:

1.18.1.1. Hazardous 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.

1.18.1.2. 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.

1.18.2. Dispose of Contaminated Material offsite as follows, otherwise in accordance with the Contract, or as directed by the Departmental Representative:

1.18.2.1. Hazardous Waste: Must be disposed at a Disposal Facility regardless of Treatment.

1.18.2.2. Waste Quality: Must be disposed at a Disposal Facility regardless of Treatment.

1.19. Contaminated Material Transport - Offsite

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

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

1.19.3. Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material.

1.19.4. Excess water in material must not be allowed to flow out of vehicle or vessel during transport.

1.19.5. Stabilize material as necessary.

1.19.6. All vehicles, vessels and operators must be appropriately licensed and equipped to transport Contaminated Material.

1.19.7. Barges must be inspected by an independent Marine Surveyor and Submit a copy of the Certificate of Seaworthiness to Departmental Representative.

1.19.8. 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.

1.19.9. Material transported with discrepancies in manifests must be resolved as required by regulations and as acceptable to the Departmental Representative. Discrepancies include:

1.19.9.1. No manifest or an incomplete manifest.

1.19.9.2. The material transported does not match the description in the manifest.

1.19.9.3. The amount transported differs by more than 5% in the manifest.

1.19.9.4. The material transported is in a hazardous condition.

1.19.10. Transfer/Interim Storage Facility must:

1.19.10.1. Be an existing offsite facility located in Canada or the United States.

1.19.10.2. Be designed, constructed and operated for the transfer or interim storage of Contaminated Material.

1.19.10.3. 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.

1.19.10.4. Comply with applicable municipal zoning, bylaws, and other applicable requirements.

1.19.11. Facility Authority:

1.19.11.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.

1.19.11.2. For facilities on First Nations reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.

1.19.11.3. 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.

1.19.12. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.

1.20. Contaminated Material Treatment - Offsite

1.20.1. Assume ownership of, and be responsible for, Contaminated Material treated offsite.

1.20.2. Contaminated Material Treatment - Offsite: treat at Treatment Facility provided by Contractor and accepted by the Departmental Representative.

1.20.3. Offsite Treatment 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 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

1.20.3.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the treatment 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.

1.20.5. 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.

1.20.6. Material sent to an offsite Treatment Facility must subsequently be disposed of at a Disposal Facility after treatment.

1.20.7. If proposed Treatment Facility is not acceptable to Departmental Representative, provide an alternate Treatment Facility that is acceptable.

1.20.8. Submit Certificates of Treatment for all Contaminated material treated offsite.

1.21. Contaminated Material Disposal

1.21.1. Assume ownership of, and be responsible for, Contaminated Material disposed.

1.21.2. 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.

1.21.3. Disposal Facility must:

1.21.3.1. Be an existing offsite facility located in Canada or the United States.

1.21.3.2. 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.

1.21.3.3. 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.

1.21.3.4. Comply with applicable municipal zoning, bylaws, and other applicable requirements.

1.21.4. Facility Authority:

1.21.4.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.

1.21.4.2. For facilities on First Nations reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.

1.21.4.3. 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.

1.21.4.4. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.

1.21.5. 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.

1.21.6. Material sent to a Disposal Facility must be permanently stored at that facility.

1.21.7. If proposed Disposal Facility is not acceptable to Departmental Representative, provide an alternate Disposal Facility that is acceptable.

1.21.8. Submit Certificates of Disposal for all Contaminated Material disposed offsite.

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. 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:
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 Workplace Hazardous Materials Information System (WHMIS) requirements.
1.3.3.5. Emergency Procedures.
1.3.3.6. Notice of Project.
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:
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 (as appropriate):
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 direct on the course of action to be followed.

1.6. Worker's Coverage

1.6.1. Comply fully with the relevant 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 coverage as required by relevant acts and regulations 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. PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, 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.

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.

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 (PWGSC) 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:
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 (WHMIS) 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 documents as required.
1.16.2.2. As required, in conjunction with Departmental Representative, schedule to carry out Work during "off hours" when tenants have left the building.
1.16.2.3. 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.
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 (WHMIS) 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:

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 PWGSC 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 emergency number 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. Unless authorized to do so, do not allow anyone to 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. Contractor is solely responsible for utility clearance.

1.22.2. Contractor will not rely upon Drawings or other information provided with utility locations.

1.23. Personal Protective Equipment Program

1.23.1. Submit Personal Protective Equipment (PPE) program to the Departmental Representative addressing as appropriate:

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.

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 volatile contaminated work areas, as appropriate.

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.

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

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, 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, provincial, or municipal requirements; and in accordance with the Contract. Include thresholds and procedures if: noise does not comply 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, 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. 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, 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 directed by the Departmental Representative; and federal, 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 Facility.

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, 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. Wastewater 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 Disposal Facility and/or copy of municipal permit to discharge to sewer system

1.3.1.20. 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, provincial, and municipal laws and regulations.

1.3.2. Pollution Control Procedures Modification: immediately when pollution control procedures are inadequate, as directed by the Departmental Representative, Submit modified procedures to resolve problem.

1.3.3. Pollution Control Remediation: immediately when soil, sediment or water contaminated by Contractor's activities are inadequate as directed 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 directed 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, 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 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 directed 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 directed by the Departmental Representative.

1.6.4. Wrap salvaged trees 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

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.
1.9.2. Immediately sweep or scrape up debris or material on public roads.
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 quantities 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.
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 directed 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 directed by the Departmental Representative during Work and in accordance with regulations and in accordance with the Contract.
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 directed 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.

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 the environment, to onsite or offsite 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 directed 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.
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 directed 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 directed 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 directed by the Departmental Representative.

1.17. Work In or Adjacent to Waterways

1.17.1. Approvals and Practices:
1.17.1.1. Obtain Discharge Approval prior to commencing work which may impact waterways.
1.17.1.2. As required, comply with Fisheries Act Authorization and other relevant authorizations and in accordance with the Contract.

1.17.1.3. Follow practices described in Fisheries and Oceans Canada (September 1993) Land Development Guidelines for the Protection of Aquatic Habitat.
1.17.1.4. Follow practices described in BC Ministry of Environment (March 2004) Standards and Best Practices for Instream Works.
1.17.2. Timing
1.17.2.1. Time work in water to respect timing windows to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.
1.17.2.2. Minimize duration of in-water work.
1.17.2.3. Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
1.17.2.4. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
1.17.3. Site Selection
1.17.3.1. Design and plan activities and works in wetland and waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.
1.17.3.2. Design and construct approaches to wetland and waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation.
1.17.3.3. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures.
1.17.3.4. Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.
1.17.4. Contaminant and Spill Management
1.17.4.1. Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, poured concrete or other chemicals do not enter the watercourse.
1.17.4.2. Develop a response plan and implement immediately in the event of a sediment release or spill of a deleterious substance and keep an emergency spill kit on site.
1.17.4.3. Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.
1.17.5. Erosion and Sediment Control
1.17.5.1. Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the wetland or waterbody during all phases of the project. Maintain erosion and sediment control measures until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the wetland or waterbody or settling basin and runoff water is clear.
1.17.6. Erosion and Sediment Control Plan includes:

1.17.6.1. Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
1.17.6.2. Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. This includes pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system.
1.17.6.3. Site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g., dredging, underwater cable installation).
1.17.6.4. Measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
1.17.6.5. Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
1.17.6.6. Repairs to erosion and sediment control measures and structures if damage occurs.
1.17.6.7. Removal of non-biodegradable erosion and sediment control materials once site is stabilized.
1.17.7. Shoreline/Bank Re-vegetation and Stabilization
1.17.7.1. Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction.
1.17.7.2. To greatest extent practicable, prune or top the vegetation instead of grubbing/uprooting.
1.17.7.3. Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.
1.17.7.4. Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.
1.17.7.5. Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
1.17.7.6. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.
1.17.7.7. Remove all construction materials from site upon project completion.
1.17.8. Aquatic Life Protection
1.17.8.1. Ensure that all in-water activities, or associated in-water structures, do not interfere with aquatic life passage, constrict the channel width, or reduce flows.

1.17.8.2. Retain a qualified environmental professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site.

1.17.8.3. Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.

1.17.8.4. Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.

1.17.9. Operation of Machinery

1.17.9.1. Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds.

1.17.9.2. Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody.

1.17.9.3. Limit machinery fording of the watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.

1.17.9.4. Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.

1.17.9.5. Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water

1.18. Noncompliance

1.18.1. Departmental Representative will inform Contractor in writing of observed noncompliance with federal, provincial or municipal environmental laws, regulations, permits, or other environmental procedure violations.

1.18.2. After receipt of notice, inform the Departmental Representative of the proposed corrective action. Corrective action will be subject to acceptance of Departmental Representative.

1.18.2.1. Do not take action until after receipt of written acceptance.

1.18.3. 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, territorial 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.

1.6.2. Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative directions, 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 reinspection.

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.

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, PWGSC 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.

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: Contaminated Water Treatment Plant, truck wash and decontamination units, office trailers, modular camp structures, 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 and Consultant Offices

1.11.1. Provide office facilities for the exclusive use of the Departmental Representative and their consultants 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 (minimum size 120 cm x 50 cm, minimum height 70 cm), 1 swivel desk chair (minimum load requirement 100 kg), 1 bookshelf (minimum 3 shelves with a minimum shelf height of 32 cm), 1 locking filing cabinet (minimum dimensions 50 cm x 39 cm x 60 cm), 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 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 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 consultants adjacent to offices.

1.12. Equipment, Tools and Materials Storage

1.12.1. Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
1.12.2. Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.13. Sanitary Facilities

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

1.14. Construction Signage

1.14.1. Provide and erect project signs within 10 Working Days of mobilization in a location designated by Departmental Representative.
1.14.2. Provide project identification site sign comprising foundation, framing, and one 1200 x 2400 mm signboard as detailed and as described below.
1.14.2.1. Foundations: 15 MPa concrete to CSA-A23.1 minimum 200 mm x 900 mm deep.
1.14.2.2. Framework and battens: SPF, pressure treated minimum 89 x 89 mm.

1.14.2.3. Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA O121.
1.14.2.4. Paint: alkyd enamel to CAN/CGSB-1.59 over exterior alkyd primer to CAN/CGSB 1.189.
1.14.2.5. Fasteners: hot-dip galvanized steel nails and carriage bolts.
1.14.2.6. Vinyl sign face: printed project identification, self adhesive, vinyl film overlay, supplied by Departmental Representative.
1.14.3. Locate project identification sign as directed by Departmental Representative and construct as follows:
1.14.3.1. Build concrete foundation, erect framework, and attach signboard to framing.
1.14.3.2. Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
1.14.3.3. Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.
1.14.4. Direct requests for approval to erect Contractor signboard to Departmental Representative. For consideration general appearance of Contractor signboard must conform to project identification site sign. Wording in both official languages.
1.14.5. Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
1.14.6. Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.15. Protection and Maintenance of Traffic

1.15.1. Provide access and temporary relocated roads as necessary to maintain traffic.
1.15.2. Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
1.15.3. 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.
1.15.4. Protect travelling public from damage to person and property.
1.15.5. Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
1.15.6. Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
1.15.7. Construct access and haul roads necessary.
1.15.8. Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic must be avoided.
1.15.9. Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
1.15.10. Dust control: adequate to ensure safe operation at all times.

1.15.11. Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.
1.15.12. Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
1.15.13. Provide snow removal during period of Work.
1.15.14. Remove, upon completion of work, haul roads designated by Departmental Representative.

1.16. Truck Wash and Decontamination Units

1.16.1. Supply, install and operate the truck wash, including the installation of a water supply.
1.16.1.1. No vehicles which have come in contact with Contaminated Material must leave the Site without passing through the truck wash.
1.16.1.2. 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.
1.16.1.3. 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.
1.16.1.4. Recycle or treat as Contaminated Water truck wash water.
1.16.2. 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
1.16.2.1. At least one personnel decontamination unit must have overhead shower capability.
1.16.2.2. The personnel decontamination units to be available to Departmental Representative and their consultants.
1.16.2.3. The personnel decontamination units are subject to acceptance of Departmental Representative.
1.16.3. The truck wash and personnel decontamination units must be maintained in good working order during onsite Work.
1.16.4. The truck wash and personnel decontamination units must be removed from the Site during Site Decommissioning.

1.17. Clean-Up

1.17.1. Remove construction debris, waste materials, packaging material from work site daily.
1.17.2. Clean dirt or mud tracked onto paved or surfaced roadways.
1.17.3. Store materials resulting from demolition activities that are salvageable.
1.17.4. 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 s.

1.4.4. Notify Departmental Representative in writing of any conflict between Contract and manufacturer's instructions. Departmental Representative will instruct which document must 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.

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 directed 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 directed 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
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 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 directed 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 directed 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.

1.14. Storage Tanks

1.14.1. Abide by the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations for stored petroleum products and allied petroleum products tank system located on federal or Aboriginal land, or within federal jurisdiction as described in the regulations.
1.14.2. Temporary storage tanks subject to the regulations must be registered with Environment Canada.
1.14.3. Mobile tanks subject to the regulations must be certified to be mobile.
1.14.4. Storage tanks to meet the following minimum requirements:
1.14.4.1. Corrosion protection.
1.14.4.2. Secondary containment.
1.14.4.3. Containment sumps, if applicable.
1.14.4.4. Overfill protection.
1.14.5. All components of tank system must bear certification marks indicating that they conform to the standards set out in the regulations.
1.14.6. Product transfer area must be designed to contain spills.
1.14.7. Prepare an emergency plan.
1.14.8. Prior to first filling, storage tanks must:
1.14.8.1. Be registered.
1.14.8.2. Be certified and marked.
1.14.8.3. Transfer area be constructed.
1.14.8.4. Emergency plan in place.

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

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 (ie 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

1.6.3. Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.
1.6.4. Maintain and protect from damage all utilities and structures encountered, unless Work involves temporarily breaking, rerouting, or connecting into existing utilities.
1.6.5. 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.
1.6.6. 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.
1.6.7. Provide temporary services as required to maintain critical building and tenant systems.
1.6.8. 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

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.

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. Barges must be inspected by an independent Marine Surveyor and Submit a copy of the Certificate of Seaworthiness to Departmental Representative.
1.5.8. 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.
1.5.9. Material transported with discrepancies in manifests must be resolved as required by regulations and as acceptable to the Departmental Representative. Discrepancies include:
1.5.9.1. No manifest or an incomplete manifest.
1.5.9.2. The material transported does not match the description in the manifest.
1.5.9.3. The amount transported differs by more than 5% in the manifest.
1.5.9.4. The material transported is in a hazardous condition.
1.5.10. Transfer/Interim Storage Facility must:
1.5.10.1. Be an existing offsite facility located in Canada or the United States.
1.5.10.2. Be designed, constructed and operated for the transfer or interim storage of Contaminated Material.
1.5.10.3. 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.
1.5.10.4. Comply with applicable municipal zoning, bylaws, and other applicable requirements.
1.5.11. Facility Authority:
1.5.11.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.
1.5.11.2. For facilities on First Nations reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.
1.5.11.3. 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.
1.5.11.4. 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.
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 Non-Contaminated 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.
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 for Recycling
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 Recycling Facility 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 directed 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 directed 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 directed 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

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. 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:

1.3.1.1. Grain-size distribution information.

1.3.1.2. Chemical analyses for Potential Contaminants of Concern, including metals.

1.3.1.3. Testing to be performed by a Qualified Professional at sufficient frequency to characterize all Imported Backfilled. Test using appropriate guidelines and practices.

1.3.2. Import Backfill Samples: at least 5 Working Days prior to bringing material to Site, Submit samples of Imported Backfilled.

1.3.2.1. Samples to be representative of all Imported Backfilled. Sample frequency subject to acceptance by Departmental Representative.

1.3.2.2. Submit sufficient sample size to allow geotechnical and environmental quality testing as directed by Departmental Representative.

1.4. Sequencing for Free Phase Products

1.4.1. When floating free phase substance (NonAqueous 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, and transport 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.

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 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 clay lumps, wood and free from an excess of flat or elongated pieces.

2.1.3.2. Import fill materials must originate from a clean source, and be the lesser of the Canadian Council of Ministers of the Environment Soil Quality Guidelines for Commercial and Industrial Land Uses, and the British Columbia Contaminated Sites Regulation Schedule 7- Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Non-agricultural Land.

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 Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials MEND Report 1.20.1, Natural Resources Canada, Price 2009.

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 directed by the Departmental Representative, and an alternate source of backfill 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 directed 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 directed 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,

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. 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

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 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 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:

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 as required.

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. Re-establish pre-existing drainage, unless otherwise specified.

3.5.3. Clean permanent access roads of contamination resulting from project activity as required or as directed of Departmental Representative, with no increases to Contract Amount or Extension of Time for completion of the Work.

3.5.4. Decontaminate equipment used in construction processes and remove from Site at end of construction activities.

3.5.5. Remove all temporary structures including subsurface structures for shoring support.

3.5.6. Upon Final Completion of Work, remove Non-Contaminated Material and debris, trim slopes, and correct defects as directed by the Departmental Representative.

3.5.7. 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.

3.5.8. Reinstate pre-existing utilities and other infrastructure to original location and condition, meeting current standards, codes, and other requirements, unless otherwise indicated or as directed by the Departmental Representative.

3.5.9. Reinstate surface to pre-existing conditions, including surface material (eg vegetation, gravel, pavement), unless otherwise indicated or as directed by the Departmental Representative.

3.6. Demobilization

3.6.1. Do not demobilize until directed by Departmental Representative.

3.6.2. Demobilize all necessary equipment, materials, and personnel from Site in an orderly and efficient manner.

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. 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 Backfilled, including geotechnical and environmental quality.

1.3.3.4. Compaction testing results.

1.3.3.5. Contaminated Water Treatment Plant water testing.

1.3.3.6. Environmental analytical results for spill or other environmental testing.

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

2. PART 2 - PRODUCTS

2.1. Imported Backfilled

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 be 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.

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. Construction of the onsite access road(s) may require the removal of historic infrastructure.

3.3.5. 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.

3.3.6. Location, alignment, design and construction of all detour, access and haul road(s) subject to the acceptance of the Departmental Representative.

3.3.7. 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 as well as for stability of foundations and infrastructure 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 in order to result in no residual contamination at the Site 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.

3.4.2.6. Temporary shoring must not flex or bend when exposed while excavations are occurring on the Site.

3.4.2.7. Sloping and shoring structures are temporary structures only. Resistance to seismic loads will be at the discretion of the Qualified Professional.

3.4.2.8. Be responsible for any failures and resultant costs should the temporary sloping or shoring fail due to a seismic event during the construction period.

3.4.2.9. All Shop Drawings of sloping and shoring design to be signed and sealed by a Qualified Professional.

3.4.2.10. 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.
3.4.4. Maintain side slopes of excavations in safe condition by appropriate methods and in accordance with relevant regulations.
3.4.5. During backfill operation:
3.4.5.1. Unless otherwise indicated or as directed by the Departmental Representative, remove temporary shoring from excavations.
3.4.5.2. Do not remove support until backfilling has reached respective levels of such bracing.
3.4.5.3. Remove support in increments that ensure compacted backfill is maintained at elevation at least 500 mm above toe of support.
3.4.6. Temporary sloping and shoring excavated material:
3.4.6.1. Material excavated for sloping or shoring may be re-used as backfill to replace material removed as accepted by Qualified Professional and Departmental Representative.
3.4.6.2. Material excavated for sloping or shoring that is accepted for backfilling must follow procedures in accordance with requirements of Qualified Professional and meet Contract Documents.
3.4.6.3. Material excavated for sloping or shoring not accepted must be removed from Site at Contractor's expense.

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 Contaminated Water Treatment Plant 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 according to Drawings or as directed by Departmental Representative.

3.6.3. Excavate all Contaminated Material laterally and vertically on the Site to Contaminated Material Extents in accordance with the Contract. Excavate additional Contaminated Material beyond Contaminated Material Extents in order to result in no residual contamination at the Site based on field observations or Confirmation Samples

3.6.4. Excavation must not interfere with bearing capacity of adjacent foundations and infrastructure.

3.6.5. Machine cut banks and slopes.

3.6.6. Protect bottom of excavations from excessive traffic.

3.6.7. Grade excavation top perimeter to prevent surface water run-off into excavation.

3.6.8. Keep excavated and stockpiled materials safe distance away from edge of excavation.

3.6.9. Restrict vehicle operations directly adjacent to open excavations.

3.6.10. 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.

3.6.11. Contaminated Material onsite classification will be based on available in-situ characterization or ex-situ characterization as directed by Departmental Representative.

3.6.12. Non-Contaminated Material onsite classification will be based on available in-situ characterization or ex-situ characterization as directed by Departmental Representative.

3.6.13. Remove Waste Oversize Debris. Break or cut oversize debris into manageable size.

3.6.13.1. Piles encountered during excavation must be cut off at base of excavation. Piles are not to be extracted beyond the base of the excavation.

3.6.13.2. Debris that impinges on infrastructure or neighbouring properties is not to be removed unless directed by Departmental Representative. Qualified Professional to confirm debris can be removed without impacting infrastructure or neighbouring properties.

3.6.14. Remove Non-Contaminated Material to Landfill or re-use as Owner Supplied Backfill according to Drawings and as directed by Departmental Representative.

3.6.15. Remove Contaminated Material to onsite Treatment Facility or offsite Treatment Facility or offsite Disposal Facility.

3.6.16. Earth bottoms of excavations to be undisturbed soil or sediment, level, free from loose, soft or organic material.

3.6.17. Notify Departmental Representative when bottom of excavation is reached based on Contaminated Material Extents.
3.6.18. Provide assistance for collection of Confirmation Samples as directed to the Departmental Representative.
3.6.19. Obtain acceptance by Departmental Representative of completed excavation.

3.7. Backfill Types and Compaction

3.7.1. Use only Imported Backfilled, Overburden Backfill, or Owner Supplied Backfill in accordance with the Contract and which has been recommended by a Qualified Professional, and 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 according to Drawings.

3.8. Backfilling

3.8.1. Do not proceed with backfilling operations until completion of following:
3.8.1.1. Confirmation Samples collection, analysis, and assessment has been completed by the Departmental Representative. Confirmation Samples analysis and assessment may take up to 5 Working Days. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work can be incurred for Confirmation Samples 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 to greatest extent practicable.
3.8.3. Do not use backfill material which is frozen or contains ice, snow or debris to greatest extent practicable.
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.

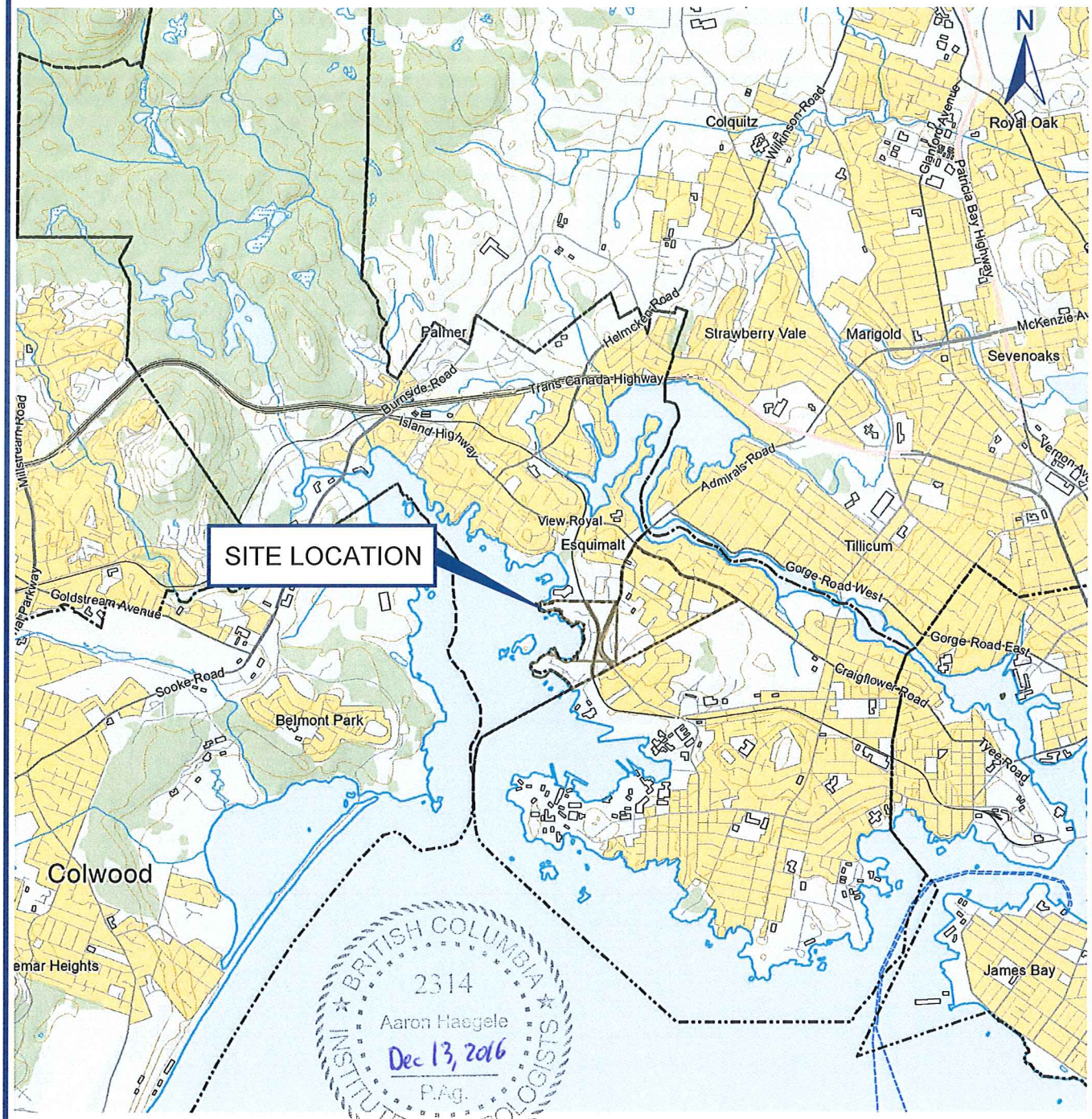
3.8.5. Backfill compaction to be tested by a Qualified Professional in accordance with Excavation Plan.
3.8.6. Notify Departmental Representative when final backfill grade is reached.
3.8.7. Do not begin subsequent Work until surveying has been completed by the Departmental Representative for documentation.

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 as required by the Qualified Professional prior to placement.
3.9.2.2. Identify any geotechnical concerns prior, and obtain Departmental Representative approval to proceed, prior to placement.

END OF SECTION

DRAWINGS

Esquimalt Fill Site Eastern Remediation Specifications
Esquimalt, BC
SLR Project No.: 205. 03844.00000



BASEDATA:
© Department of Natural Resources Canada, All rights reserved; National Road Network, National Railway Network Geobase®, Downloaded March 2014; Aboriginal Lands, Geobase®, Downloaded March, 2014; BC regional Districts and Municipalities, GeoBC,Downloaded March 2014;Fresh Water Atlas, GeoBC®, Downloaded December 2014

- Rail Line
- Contour (20m)
- Municipality Boundary
- Watercourse
- Wetlands
- Buildings
- First Nations Reservation
- Wooded Area
- Developed Area
- Expressway / Highway
- Freeway
- Arterial
- Collector
- Local / Street
- Alleyway / Lane
- Resource / Recreation

0 0.5 1 2 3 km

SCALE 1:50,000
WHEN PLOTTED CORRECTLY ON A 8.5 x 11 PAGE LAYOUT
NAD 1983 UTM Zone 10N

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

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PUBLIC WORKS AND GOVERNMENT SERVICES
ESQUIMALT FILL SITE
ESQUIMALT, BC

EASTERN UPLAND REMEDIATION

SITE LOCATION MAP

Date: December 13, 2016

Project No. 205.03844.00000

Drawing No. 1

Cadfile name: S_205-03844-00000-A1.dwg

NOTES:
REFERENCED FROM: NTS MAP 92 B/06, WSP SURVEY TAKEN JUNE 8, 2015, GOLDER ASSOCIATES DRAWINGS, FILES: 1418637-4000-05, BASE_SLR_EXCAVATION BOUNDARIES, BASE_SLR EXCAVATION SAMPLES, HISTORIC_HOLE_SLR_PWGSC, HOLE_WSP_2015, WSP_TOPO_SITE AND SITE RECONNAISSANCE INFORMATION.

IMAGERY: GOOGLE © 2012 DIGITAL GLOBE (IMAGE DATE: 2014)

LEGEND:

- ESQUIMALT NATION RESERVE BOUNDARY
- ESQUIMALT FILL SITE
- TRANSPORT CANADA PARCEL BOUNDARIES
- MOU AREA
- TRUCK ROUTE
- FLAGGER LOCATION

0 20 40 80 120 m

SCALE 1:2,000
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10N

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PUBLIC WORKS AND GOVERNMENT SERVICES
ESQUIMALT FILL SITE
ESQUIMALT, BC

EASTERN UPLAND REMEDIATION

SITE AND SURROUNDING LAND USE PLAN

Date: December 13, 2016
Project No. 205.03844.00000
Drawing No. 2

SLR global environmental solutions

Cadfile name: S_205-03844-00000-A1.dwg

ESQUIMALT INDIAN RESERVE

N

A

A'

B

B'

CF-88
CF-250
CF-621
CF-245
CF-241
CW-634
CW-626
CW-625
CW-624
CW-623
CW-622
MW15-05
CF-246
CF-606
CF-605
BH09-53
CW-267
CW-266
CW-265
CF-249
CF-240
CW-55
CW-56
BH15-10
CW-549
CS-01
CS-11
CS-12
CF-239
CF-346
CW-295
CW-294
CW-293
CF-238
CF-506
CF-287
BH15-09
CS-03
CS-04
CF-569
CF-347
TP08-19
TP09-74
CS-02
CF-237
CW-272
CW-273
CW-274
CW-39
CW-499
CW-500
CW-501
CW-502
CW-503
CW-40
CW-41
CW-42
CF-286
CW-298
CW-297
CW-296
CS-13
CS-14
CF-236
TP01-01
MW09-50
TP97-17
TP01-04
CW-242
CW-243
CW-244
BH15-06
TP97-20
MW15-04
TP08-18
CW-299
CW-300
MW09-55
TP01-02
TP08-25
SV09-51
TP08-17
MW08-04
PP
CS-09
CS-10
PP
BH15-03
TP09-69
BH08-10
BH15-08
CS-05
CS-06
TP15-06
TP15-07
CS-07
CS-08
MW15-02
BH09-54
TP09-72
TP09-73
BH15-07
TP015-05
TP15-04
TP15-03
TP15-02

NOTES:
REFERENCED FROM: NTS MAP 92 B/06, WSP SURVEY TAKEN JUNE 8, 2015, GOLDER ASSOCIATES DRAWINGS, FILES: 1418637-4000-05, BASE_SLR_EXCAVATION BOUNDARIES, BASE_SLR EXCAVATION SAMPLES, HISTORIC_HOLE_SLR_PWGSC, HOLE_WSP_2015, WSP_TOPO_SITE AND SITE RECONNAISSANCE INFORMATION.

IMAGERY: GOOGLE © 2012 DIGITAL GLOBE (IMAGE DATE: 2014)

LEGEND:

- ESQUIMALT FILL SITE
- TRANSPORT CANADA PARCEL BOUNDARIES
- BOUNDARY OF UPLAND PORTION OF SITE
- LIMITS OF PREVIOUS REMEDIAL EXCAVATION
- BOREHOLE LOCATION
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL
- TEST PIT LOCATION
- SOIL VAPOUR WELL LOCATION
- SOIL SAMPLE, WALL
- SOIL SAMPLE, BASE
- A A' — CROSS SECTION A-A' / CROSS SECTION B-B'
- PP — UTILITIES AND SYMBOLS / POWER POLE

BRITISH COLUMBIA INSTITUTE OF AGROLOGISTS
2314
Aaron Hacgele
Dec 13, 2016
P.Ag.

0 5 10 20 30 m

SCALE 1:500
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10N

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PUBLIC WORKS AND GOVERNMENT SERVICES
ESQUIMALT FILL SITE
ESQUIMALT, BC

EASTERN UPLAND REMEDIATION

INVESTIGATION AND CROSS SECTION LOCATONS

Date: December 13, 2016
Project No. 205.03844.00000
Drawing No. 3

SLR global environmental solutions

Cadfile name: S_205-03844-00000-A1.dwg

ESQUIMALT INDIAN RESERVE

N

CF-88
CF-245
CF-250
CF-621
CW-623
CW-622
CW-634
CW-626
CW-625
CW-624
MW15-05
CF-241
CF-246
CF-606
CF-605
BH09-53
CW-55
CW-56
BH15-10
CW-549
CF-346
CW-267
CW-266
CW-265
CF-249
CS-11
CS-12
CS-01
CF-240
CF-239
CW-295
CW-294
CW-293
CF-238
CF-506
CF-287
BH15-09
TP08-19
CF-347
CS-03
CS-04
TP09-74
CS-02
CF-237
CW-272
CW-273
CW-274
CF-569
CW-39
CW-499
CW-500
CW-501
CW-502
CW-503
CW-40
CW-41
CW-42
CF-286
CW-298
CW-297
CW-296
CS-13
CS-14
CF-236
TP01-01
MW09-50
TP97-17
TP01-04
CW-242
CW-243
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TP01-02
MW15-04
CW-299
CW-300
MW09-55
BH15-06
TP97-20
TP08-18
TP08-25
SV09-51
TP08-17
MW08-04
CS-09
CS-10
BH15-03
TP09-69
BH15-08
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TP15-06
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BH09-54
BH15-07
TP015-05
TP15-04
TP15-03
TP15-02

Cadfile name: S_205-03844-00000-A1.dwg

NOTES:
REFERENCED FROM: NTS MAP 92 B/06, WSP SURVEY TAKEN JUNE 8, 2015, GOLDER ASSOCIATES DRAWINGS, FILES: 1418637-4000-05, BASE_SLR_EXCAVATION BOUNDARIES, BASE_SLR EXCAVATION SAMPLES, HISTORIC_HOLE_SLR_PWGSC, HOLE_WSP_2015, WSP_TOPO_SITE AND SITE RECONNAISSANCE INFORMATION.

IMAGERY: DND ORTHOPHOTO 79-71 AND 80-71 (IMAGE DATE: 2014)

LEGEND:

- ESQUIMALT FILL SITE
- TRANSPORT CANADA PARCEL BOUNDARIES
- BOUNDARY OF UPLAND PORTION OF SITE
- LIMITS OF PREVIOUS REMEDIAL EXCAVATION
- POTENTIAL UPLAND EAST WEST DIVISION
- IMPORTED SAND BACKFILL
- LIMITS OF EASTERN UPLAND REMEDIATION
- LIMITS OF WESTERN UPLAND REMEDIAL EXCAVATION
- BEDROCK
- BOREHOLE LOCATION
- BOREHOLE LOCATION (OTHERS)
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL
- TEST PIT LOCATION
- SOIL VAPOUR WELL LOCATION
- SOIL SAMPLE, WALL
- SOIL SAMPLE, BASE
- **SOIL LABORATORY ANALYSIS RESULTS**
  CONCENTRATIONS LESS THAN OR EQUAL TO APPLICABLE CCME CL GUIDELINES
- CONCENTRATION(S) GREATER THAN APPLICABLE CCME CL GUIDELINES
- CONCENTRATIONS GREATER THAN THE APPLICABLE BC HAZARDOUS WASTE REGULATION

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Aaron Haegele
Dec 13, 2016
P.Ag.

0 5 10 20 30 m

SCALE 1:500
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10N

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PUBLIC WORKS AND GOVERNMENT SERVICES
ESQUIMALT FILL SITE
ESQUIMALT, BC

EASTERN UPLAND REMEDIATION

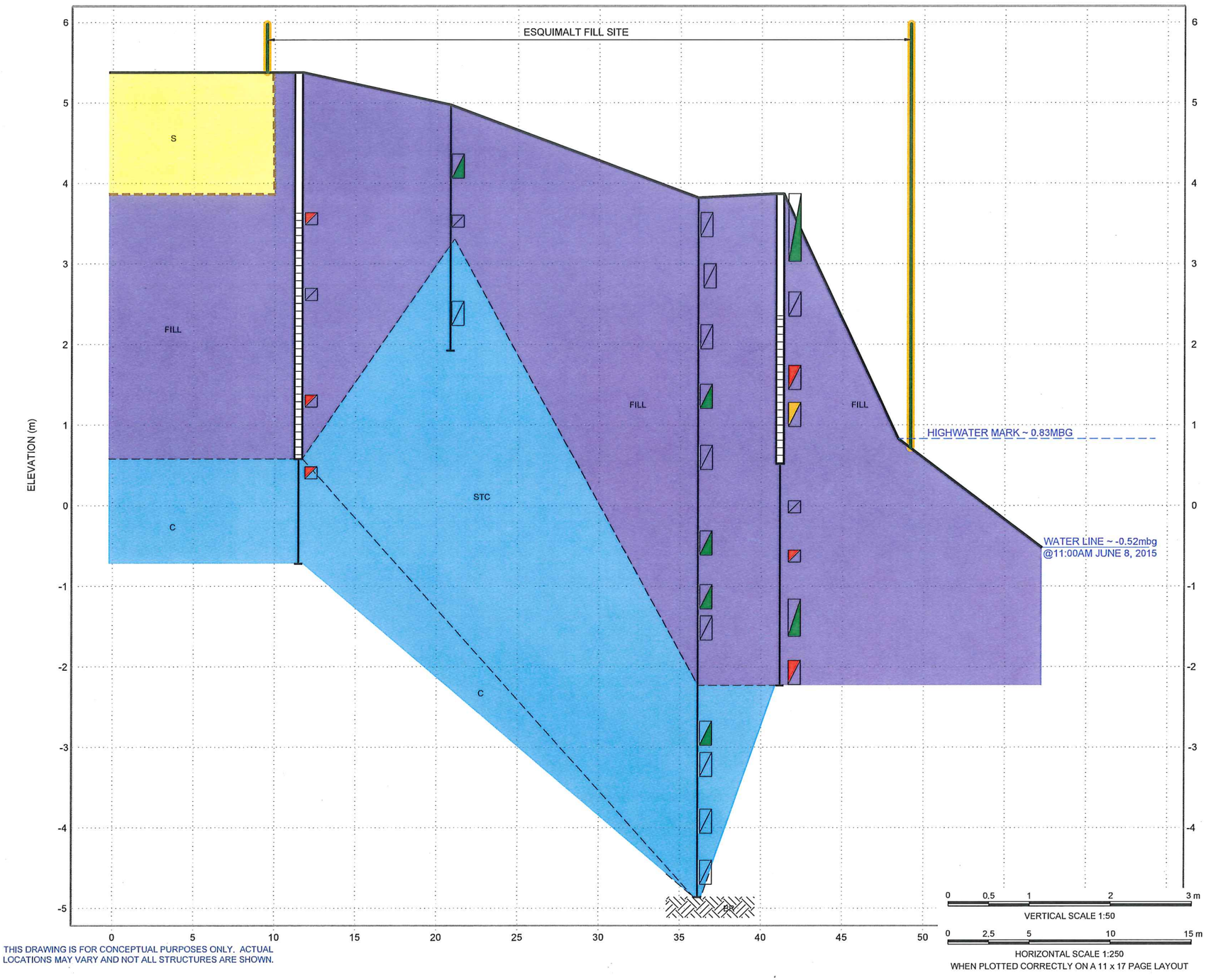
EXCAVATION LIMITS AND SUMMARY OF SOIL CONTAMINATION

Date: December 13, 2016
Project No. 205.03844.00000
Drawing No. 4

SLR global environmental solutions

A
NORTHEAST

A'
SOUTHWEST



THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

0 0.5 1 2 3 m
VERTICAL SCALE 1:50

0 2.5 5 10 15 m
HORIZONTAL SCALE 1:250
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT

NOTES:
REFERENCED FROM: NTS MAP 92 B/06, WSP SURVEY TAKEN JUNE 8, 2015, GOLDER ASSOCIATES DRAWINGS, FILES: 1418637-4000-05, BASE_SLR_EXCAVATION BOUNDARIES, BASE_SLR EXCAVATION SAMPLES, HISTORIC_HOLE_SLR_PWGSC, HOLE_WSP_2015, WSP_TOPO_SITE AND SITE RECONNAISSANCE INFORMATION.

IMAGERY: GOOGLE © 2012 DIGITAL GLOBE (IMAGE DATE: 2014)

- ESQUIMALT FILL SITE
- TRANSPORT CANADA PARCEL BOUNDARIES
- LIMITS OF EXCAVATION
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL
- TEST PIT LOCATION
- WATER LEVEL (DATE)
- SOIL SAMPLE LOCATION
- CONCENTRATIONS LESS THAN OR EQUAL TO THE APPLICABLE CCME CL GUIDELINES
- CONCENTRATIONS GREATER THAN THE APPLICABLE CCME CL GUIDELINES
- CONCENTRATIONS GREATER THAN THE APPLICABLE BC HAZARDOUS WASTE REGULATION
- S — SAND BACKFILL
- FILL — FILL
- STC — SILT AND CLAY
- C — CLAY
- BR — BEDROCK

BRITISH COLUMBIA INSTITUTE OF AGROLOGISTS
2314
Aaron Haegele
Dec 13, 2016
P.Ag.

- WELL
- SCREENED INTERVAL
- BOREHOLE OR TESTPIT
- END OF HOLE

PUBLIC WORKS AND GOVERNMENT SERVICES
ESQUIMALT FILL SITE
ESQUIMALT, BC

EASTERN UPLAND REMEDIATION

CROSS SECTION A-A'

Date: December 13, 2016
Project No. 205.03844.00000
Drawing No. 5

SLR global environmental solutions

Cadfile name: S_205-03844-00000-A1.dwg

B
NORTHEAST

B'
SOUTHWEST

BH15-10
5.23 m

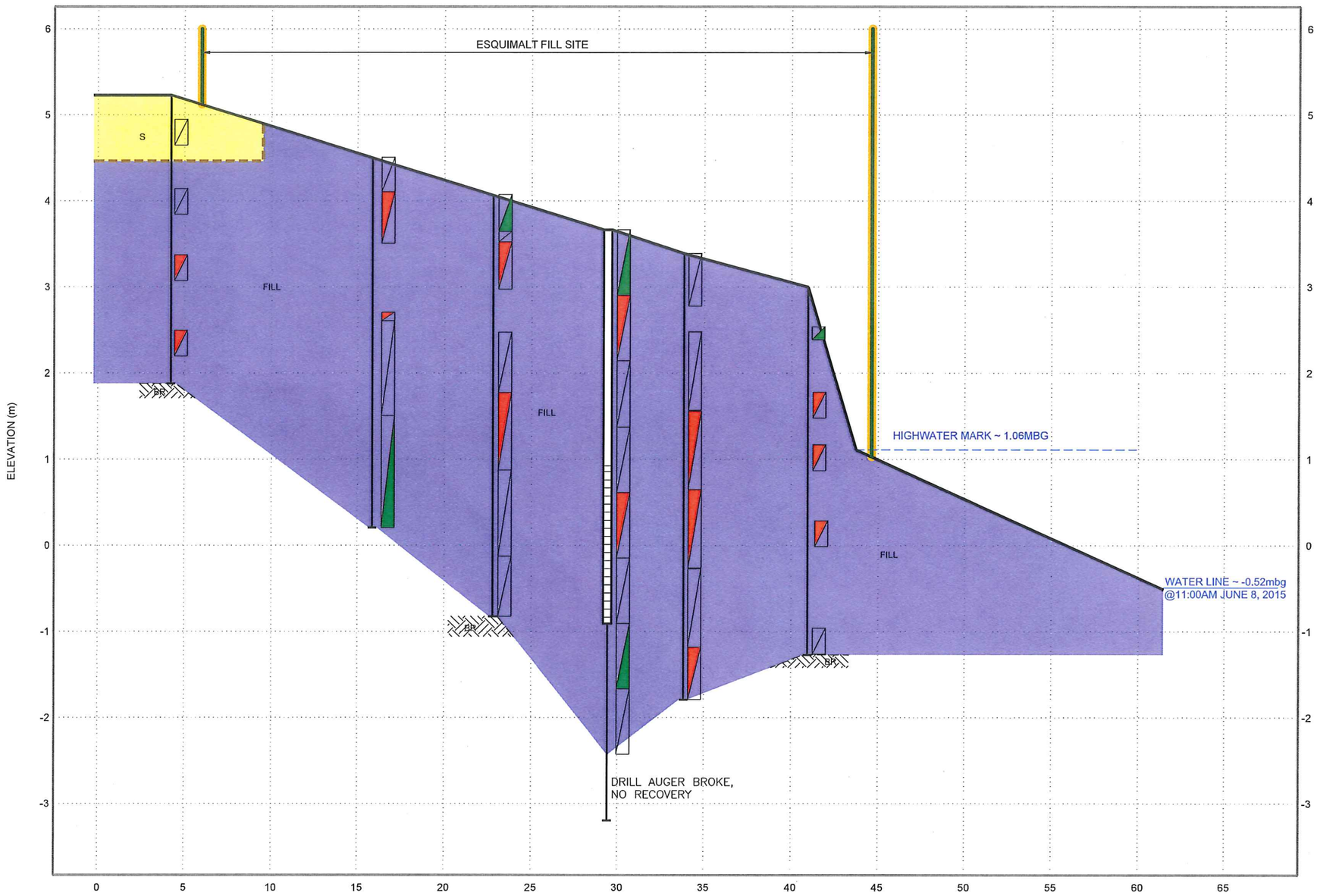
TP08-19

TP08-17

MW08-04

TP15-07
3.39 m

BH09-54
3.0 m



0 0.5 1 2 3 m
VERTICAL SCALE 1:50

0 2.5 5 10 15 m
HORIZONTAL SCALE 1:250
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

Cadfile name: S_205-03844-00000-A1.dwg

NOTES:
REFERENCED FROM: NTS MAP 92 B/06, WSP SURVEY TAKEN JUNE 8, 2015, GOLDER ASSOCIATES DRAWINGS, FILES: 1418637-4000-05, BASE_SLR_EXCAVATION BOUNDARIES, BASE_SLR EXCAVATION SAMPLES, HISTORIC_HOLE_SLR_PWGSC, HOLE_WSP_2015, WSP_TOPO_SITE AND SITE RECONNAISSANCE INFORMATION.

IMAGERY: GOOGLE © 2012 DIGITAL GLOBE (IMAGE DATE: 2014)

LEGEND:
- ESQUIMALT FILL SITE
- TRANSPORT CANADA PARCEL BOUNDARIES
- LIMITS OF REMEDIAL EXCAVATION
- BOREHOLE LOCATION
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL
- TEST PIT LOCATION
- WATER LEVEL (DATE)
- SOIL SAMPLE LOCATION
- CONCENTRATIONS LESS THAN OR EQUAL TO THE APPLICABLE CCME CL GUIDELINES
- CONCENTRATIONS GREATER THAN THE APPLICABLE CCME CL GUIDELINES
- S — SAND BACKFILL
- FILL — FILL
- BR — BEDROCK

- WELL
- SCREENED INTERVAL
- BOREHOLE OR TESTPIT
- END OF HOLE

PUBLIC WORKS AND GOVERNMENT SERVICES
ESQUIMALT FILL SITE
ESQUIMALT, BC

EASTERN UPLAND REMEDIATION

CROSS SECTION B-B'

Date: December 13, 2016	Drawing No. 6
Project No. 205.03844.00000	

SLR global environmental solutions

APPENDIX A – SITE PHOTOGRAPHS

Esquimalt Fill Site Eastern Remediation Specifications
Esquimalt, BC
SLR Project No.: 205.03844.00000

Photo 1: A view of Thomas Road off of Admirals Road, looking west. The flagger station is next to the stop sign on Thomas Road. Flaggers stop traffic on Admirals road to allow trucks to turn.

Photo 2: A view of Modeste Road, which is the first right off of Thomas Road, looking north.

Photo 3: A view of the entrance to the Trio Ready-Mix yard at the end of Modeste Road, looking west.

Photo 4: A view of the Trio Ready-Mix yard, looking northwest. The site is accessed by driving west through the yard.

Photo 5: A view of the exit of the Trio Ready-Mix yard and the road to the site, looking west.

Photo 6: A view of the site from the western side, looking east.

Photo 7: A view of the site from the western side, looking northeast. The site is bordered by a chain link fence. The MOU area is on the other side of the fence between the site and the gravel access road.

Photo 8: A view of the site from the east side, looking west.

Photo 9: A view of the site from the fence along the norther border of the site, looking east.

Photo 10: A view of the site from the fence along the norther border of the site, looking south.

Photo 9: A view of the site from the fence along the norther border of the site, looking west. The gravel fill from the western upland remediation is visible in the background.

Photo 10: A view of the site from Plumper Bay, looking north.

APPENDIX B – GEOTECHNICAL INVESTIGATIONS

Esquimalt Fill Site Eastern Remediation Specifications
Esquimalt, BC
SLR Project No.: 205. 03844.00000

Transport Canada Transports Canada

Public Works and Government Services Canada Travaux public et Services gouvernementaux Canada

GEOTECHNICAL FORESHORE INVESTIGATION, Parcel 44, Transport Canada, Esquimalt, BC

May 2016

Rev. 1

Prepared for:

Public Works and Government Services Canada
Environmental Services, Pacific Region
#641-800 Burrard Street
Vancouver, BC
V6Z 2V8

On behalf of Transport Canada

Prepared by:
Golder Associates Ltd.
2nd Floor, 3795 Carey Road
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Canada

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Public Works and Government Services Canada (PWGSC) to provide a geotechnical assessment of the subsurface conditions along the south foreshore boundary of the Parcel 44 site, located in Esquimalt, BC, (herein referred to as "the Site"). The project is being managed by PWGSC on behalf of Transport Canada (TC), who currently own the Site. This work was carried out under terms of Standing Offer E0276-110680/003/XSB, task authorization (TA) # 700333380.

Golder understands the purpose of the geotechnical subsurface investigation is to provide additional geotechnical information to assess conceptual shoring and marine barrier options for use during future site remediation activities. The scope of work was determined to address data gaps identified during the Part 1 Supplemental Site Investigation (Part 1 SSI), carried out by Golder in the spring of 2015. The geotechnical investigation was carried out in accordance with the scope of work outlined in our proposal dated August 26, 2015 (Golder file reference P1535154-001-WP-Rev0). The agreed geotechnical scope of work comprised the following:

- Review of existing site information and preparation of a site specific Health and Safety plan
- Subsurface drilling field investigation to collect geotechnical subsurface data
- Performance of geotechnical laboratory testing of samples collected
- Preparation of a factual geotechnical report documenting factual results of the drilling investigation and providing geotechnical comments on the subsurface soil conditions
- Preparation of a separate technical memorandum discussing conceptual marine barrier options (for example shoring, berm or cofferdam), based on the conditions encountered
- Geo-environmental sampling and testing of the soils was conducted concurrently to the geotechnical investigation and assessment; the results of this work will be provided in a separate report

This report should be read in conjunction with the *Important Information and Limitations of This Report*, included in Appendix A. We specifically draw the reader's attention to this information, as it is essential for the proper use and interpretation of this report. The scope of work does not include provision for assessment of archaeological or bio-environmental aspects associated with site development.

2.0 BACKGROUND AND SITE DESCRIPTION

The Site includes upland and foreshore areas in the northeast corner of Plumper Bay, Esquimalt Harbour, adjacent to the west side of the Trio Ready-Mix Ltd. concrete plant and Esquimalt IR#1 Reserve (Esquimalt First Nation). The shoreline southwest of the site is owned by Defense Construction Canada (DCC). The site has been used for various industrial activities including a cannery, sawmill, and log sort.

The upland area of the site was observed to be generally flat with a gentle slope downwards towards the southwest foreshore. In the east and southeast corner of the site, the ground surface was observed to slope steeply upwards beyond the site boundaries. The upland area was observed to have limited vegetation (grass and bushes), stockpiles of soil and debris (bricks), and a dilapidated concrete shed. Between the upland area and the foreshore, the banks slope steeply downwards (1 horizontal to 1 vertical or steeper) and drop 2 to 3 m in elevation. The foreshore slopes were covered by boulders, rip rap, debris, and were overgrown by vegetation.

Between 1992 and 2015, multiple investigations were conducted on the Site and adjacent areas. These investigations include: Environment Site Assessments (Phase I, Phase II and Phase III ESAs), a Preliminary Quantitative Risk Assessment (PQRA), and various remediation planning reports. These are discussed in further detail in the Part 1 SSI report submitted on March 31, 2015 to PWGSC by Golder.

3.0 GEOTECHNICAL INVESTIGATION

On September 3, 2015, in preparation for drilling, Golder carried out pre-investigation activities including having an excavator improve site access in the vicinity of the drilling investigation and having a utility locating contractor carry out a utility clearance of the proposed drilling locations. Vegetation was cleared and minor surficial excavation was completed to provide drill access to the site and foreshore. The vegetation clearing work and surficial excavation was carried out using an excavator supplied and operated by Don Mann Excavating Ltd. of Victoria, BC, under the full time supervisor of Golder personnel.

The geotechnical subsurface investigation of the foreshore portion of the Site was carried out from September 8 to September 11, 2015. The investigation work was carried out during low tide to allow access to the foreshore locations. The boreholes were advanced using a remote access “Mole Rat” auger drill rig, supplied and operated by Grassroots Drilling Inc. of Duncan, BC. The boreholes were advanced using both solid stem and hollow stem augers. The investigation consisted of advancing eight boreholes to depths varying between 0.3 m to 5.8 m below ground surface (bgs) to visually characterize the soil, and collect samples for further assessment. Drill refusal was encountered at shallow depths in two of the boreholes (BH15-12 and BH15-16), as such the borehole locations were moved over approximately one metre and re-drilled (BH15-12B, BH15-16B and BH15-16C). Representative photos of the investigation are provided in Appendix B.

The proposed borehole locations were selected to provide geotechnical information along the foreshore to assist in the assessment of shoring and potential marine barrier options. The final borehole locations were selected in the field by Golder based on drill access and tidal constraints. After drilling, the borehole locations were measured in the field using a handheld GPS device with approximately ±5 m of accuracy, and are shown on Figure 1.

The drilling investigation was conducted under the full-time supervision of a member of Golder’s geotechnical staff, who visually examined and logged the subsurface conditions encountered. Subsurface conditions were assessed based on auger runs and split spoon samples, used in Standard Penetration Testing (SPT). SPT methods were also used to assess in-situ relative density and consistency of the soils. SPT testing was conducted using a 63.5 kg automatic hammer dropped 760 mm. An open sampler was driven 600 mm (24 in) and the SPT blow “N” value was determined based on the blow count between 150 and 450 mm of driving. Shear vane testing was also conducted to assess the consistency of the in-situ soils.

Samples were collected directly from the auger flights and from the SPT split spoon sampler. A total of 21 disturbed samples were collected in plastic bags and transported to Golder’s geotechnical testing laboratory in Victoria, BC for laboratory testing.

During drilling, the drill cuttings were observed and stockpiled to be used during backfilling of the boreholes. Where sheen or odour was observed on the drill cuttings, they were placed in a drum for disposal. The drummed cuttings were moved to the upland portion of the Site and will be disposed of by others, as part of later remediation activities as previously agreed with PWGSC. The boreholes were backfilled with bentonite and the remaining drill cuttings, consistent with the requirements under the *BC Groundwater Protection Regulation.* Detailed descriptions of the soils encountered and backfilling details are provided in the Record of Boreholes, included in Appendix C.

3.1 Laboratory Testing

The following laboratory tests were carried out on select samples at Golder's geotechnical testing laboratory:

- Determination of Water Content of Soil and Rock by Mass (ASTM D2216) – 12 samples
- Particle-Size Distribution of Soils Using Sieve Analysis (ASTM D6913) – 6 samples
- Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) – 2 samples
- Particle-Size Analysis of Soils (ASTM D422) – 2 samples

Grain size distributions, water contents, liquid limits and plastic limits for select soil samples are provided on individual borehole logs in the Record of Boreholes (Appendix C). The complete laboratory results are provided in Appendix D, Geotechnical Laboratory Testing.

4.0 SUBSURFACE STRATIGRAPHY

The soil and groundwater descriptions provided in this report are based on commonly accepted methods of classification and identification employed in geotechnical practice. Classification and identification of soil involves judgement and Golder infers the accuracy of soil descriptions to the extent that is common in current geotechnical practice. The depths to stratigraphic changes are generally approximate and inferred since there is frequently a gradual transition between soil types. Detailed soil descriptions, groundwater conditions, natural water contents, plastic and liquid limits, SPT blow counts and shear vane strength results are presented in the Record of Boreholes (Appendix C). Variations in the subsurface stratigraphy should be expected, and caution is required when interpreting conditions between boreholes.

4.1 Stratigraphy

For discussion purposes, the subsurface soils encountered during the investigation have been grouped into the following stratigraphic units, in order of increasing depth below ground surface:

- Fill / Wood Chips (0.0 m to 1.8 m in thickness encountered)
- Gravelly Silty Clayey Sand (0.0 m to 2.0 m in thickness encountered)
- Silty Sand (0.0 m to 2.7 m in thickness encountered)
- Inferred Bedrock (encountered at depths of 0.3 to 5.8 m bgs)

The interpreted stratigraphy of the foreshore is shown in Figure 2, which is based on information collected during this investigation as well as previous investigations on the Site.

Fill / Wood Chips

Fill, consisting predominantly of wood chips, was encountered from surface in five of the boreholes (BH15-12, BH15-12B, BH15-15, BH15-22 and BH15-29). In these boreholes, the fill was encountered from surface and extended to between 1.5 and 1.8 m bgs. Borehole BH15-12B terminated within this material at 1.5 m bgs; the drill reaction and drill cuttings indicated the refusal was due to woody debris clogging the hollow stem drill bit. The fill was observed to consist of wood chips (estimated 40 to 100 percent by volume) and silty to sandy peat with some gravel and organics (roots). Near surface, the fill was observed to be gravelly, with gravel content decreasing with depth. The fill was described as light brown to black, having an organic odour, non-cohesive, moist to wet, and very loose to loose.

In borehole BH15-29 a void was encountered underlying the fill. At 1.4 m bgs the drill reaction and cuttings indicated the presence of wood. The drill steel then fell approximately 10 cm, to 1.5 m bgs, below which the gravelly silty clayey sand material was encountered.

Standard Penetration Test (SPT) resistance (‘N’) values of 0 and 1 blows per 300 mm were recorded within this material. The resistance value of 0 blows per 300 mm indicates the sampler was pushed 300 mm into the ground by the weight of the hammer (63.5 kg).

Gravelly Silty Clayey Sand

Gravelly silty clayey sand was encountered underlying the fill material in boreholes BH15-15, BH15-22 and BH15-29, and from surface in BH15-16A, B and C. The gravelly, silty clayey sand ranged from 0.3 to 2.0 m thick. The material was also observed to contain sea shells. In borehole BH15-16C, wood chips (estimated 5 percent by volume) were observed in this material. The material was grey to dark grey and slightly plastic. The consistency ranged from firm (with a water content below the plastic limit) to very soft (with a water content above the plastic limit).

In borehole BH15-29, gravelly silty clayey sand was encountered at 1.5 m bgs underlying the previously described void.

The measured natural water contents for this material are summarized in Table 1 below.

Table 1: Summary of Natural Water Contents for Gravelly Silty Clayey Sand

Sample	Sample Depth (m)	Natural Water Content (%)
BH15-15 SA-4	1.8 – 3.0	28
BH15-15 SA-5	3.1 – 3.7	17
BH15-22 SA-4	1.8 – 2.1	35
BH15-22 SA-5a	2.7 – 3.0	34
BH15-29 SA-3/4	1.5 – 2.1	35

The measured liquid and plastic limits as well as the calculated plasticity and liquidity indices from a selected sample of this material are summarized in Table 2 below.

Table 2: Summary of Index Testing for Gravelly Silty Clayey Sand

Sample	Sample Depth (m)	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index
BH15-29 SA-3/4	1.5 – 2.1	45	25	20.0	0.5

The particle-size distributions of several samples are summarized in Table 3 below.

Table 3: Particle-size Distributions for Gravelly Silty Clayey Sand

Sample	Sample Depth (m)	Percent Gravel by Weight	Percent Sand by Weight	Percent Fines by Weight
BH15-15 SA-4	1.8 – 3.0	36.1	48.2	15.7
BH15-22 SA-5a	2.7 – 3.0	19.8	64.6	15.6
BH15-22 SA-5b	2.7 – 3.0	28.2	55.1	16.7*
BH15-29 SA-3/4	1.5 – 2.1	24.2	59.5	16.3

*Hydrometer testing carried out on sample

A field shear vane test was carried out in this material in BH15-29, the vane tip was inserted to 2.74 m bgs. A peak shear strength of 131 kPa and a remoulded shear strength of 101 kPa was measured. During the testing, the field personnel reported hearing “gravel-like grinding” sounds during rotation of the shear vane. The presence of gravel may have artificially increased the measured shear strength of this material. It should be noted the actual shear strength may be significantly lower than measured.

A Standard Penetration Test (SPT) resistance (‘N’) value of 2 blows per 300 mm was recorded within this material.

Silty Sand

Silty sand was encountered underlying the fill material in borehole BH15-12 and underlying the gravelly silty clayey sand in boreholes BH15-22 and BH15-29. The silty sand encountered ranged in thickness from 1.5 m to 2.7 m. Borehole BH15-12 terminated within this material at 3.0 m bgs due to the borehole wall surrounds collapsing. The composition of the silty sand material was variable and ranged from some fines to silty and some gravel to gravelly. In BH15-12 shells (10 to 30% by volume) were encountered within this material between 1.5 and 3.0 m bgs. The material was described as grey to dark grey, non-cohesive, moist to wet, and loose to dense. In BH15-22, between 3.0 m and 3.7 m bgs, the material was observed to be cohesive and soft with water content above the plastic limit.

The measured natural water contents for this material are summarized in Table 4 below.

Table 4: Summary of Natural Water Contents for Silty Sand

Sample	Sample Depth (m)	Natural Water Content (%)
BH15-12 SA-2	1.5 – 3.0	52
BH15-22 SA-6	3.4 – 3.7	21
BH15-22 SA-7	4.0 – 4.3	13
BH15-22 SA-8	4.6 – 5.2	11
BH15-22 SA-9	5.2 – 5.8	12
BH15-29 SA-5	3.0 – 3.7	12
BH15-29 SA-6	4.6 – 4.9	6

The measured liquid and plastic limits as well as the calculated plasticity and liquidity indices within one sample of this material (from the cohesive zone noted above) are summarized in Table 5 below.

Table 5: Summary of Index Testing for Silty Sand

Sample	Sample Depth (m)	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index
BH15-22 SA-6	3.4 – 3.7	16	10	6.0	1.8

Particle-size distributions are summarized in Table 6 below.

Table 6: Particle-size Distributions for Silty Sand

Sample	Sample Depth (m)	Percent Gravel by Weight	Percent Sand by Weight	Percent Fines by Weight
BH15-12 SA-2	1.5 – 3.0	22.0	66.3	11.7
BH15-22 SA-7	4.0 – 4.3	9.4	63.0	27.6
BH15-22 SA-9	5.2 – 5.8	12.4	64.1	23.5
BH15-29 SA-5	3.0 – 3.7	26.8	53.5	19.7*

*Hydrometer testing carried out on sample.

A field shear vane test was carried out in this material in BH15-22 with the vane tip depth at 3.66 m bgs (within the cohesive zone noted above). A peak shear strength of 35 kPa and a remoulded shear strength of 10 kPa was measured at this depth.

Standard Penetration Test (SPT) resistance ('N') values of 27, 28 and greater than 50 blows per 300 mm were recorded within this material. Where the resistance value of greater than 50 blows per 300 mm was recorded, broken rock material was observed within the sampler indicating the sampler was driven through gravel or bedrock artificially increasing the resistance values.

Bedrock

Bedrock was encountered at depths ranging from 0.3 m to 5.8 m bgs in boreholes BH15-15, BH15-16A, B and C, BH15-22 and BH15-29 underlying the gravelly silty clayey sand, or the silty sand. The bedrock surface was observed to be trough shaped, as shown on Figure 2. An outcrop of bedrock adjacent to borehole BH15 16C was described as having a rock mass strength classification of R5 (very strong rock), based on manual rock hammer testing in the field.

4.2 Groundwater

The subsurface investigation was carried out on the beach during low tide due to drill access. Groundwater along the shoreline is anticipated to be highly influenced by tidal action and seasonal variation. The gravelly, silty, clayey, sand material is anticipated to act as a confining layer between the fill and the underlying silty sand. However, a hydrogeological assessment of the site and associated in-situ testing was not a component of the scope for this investigation.

While tidal influences are expected to strongly influence groundwater movements and seepage, during the investigation, flowing water was observed from borehole BH15-12 when the auger advanced from 1.5 to 3.0 m bgs.

5.0 COMMENTS

The geotechnical subsurface investigation was carried out to provide factual additional geotechnical data on the subsurface material strength, composition and depth within the close proximity of anticipated future location of shoring as well as assessing the depth to bedrock along the property boundaries. The information collected will be used to assess potential shoring and marine barrier options to facilitate excavation up to the property boundary. Additional assessment of soil conditions may be necessary if the assumed location of the shoring or future barrier wall changes appreciably from the current location.

The assessment and description of potential marine barrier options will be provided in a subsequent technical memorandum.

6.0 CLOSURE

We trust the information contained in this report is sufficient for your present needs. Should you have any additional questions regarding the project, please do not hesitate to contact the undersigned.

GOLDER ASSOCIATES LTD.

Reviewed by

Sarah Morse, PEng, PMP
Senior Geotechnical Engineer

Randy Williams, PEng
Principal, Senior Geotechnical Engineer

SEM/RW/lih/lmk

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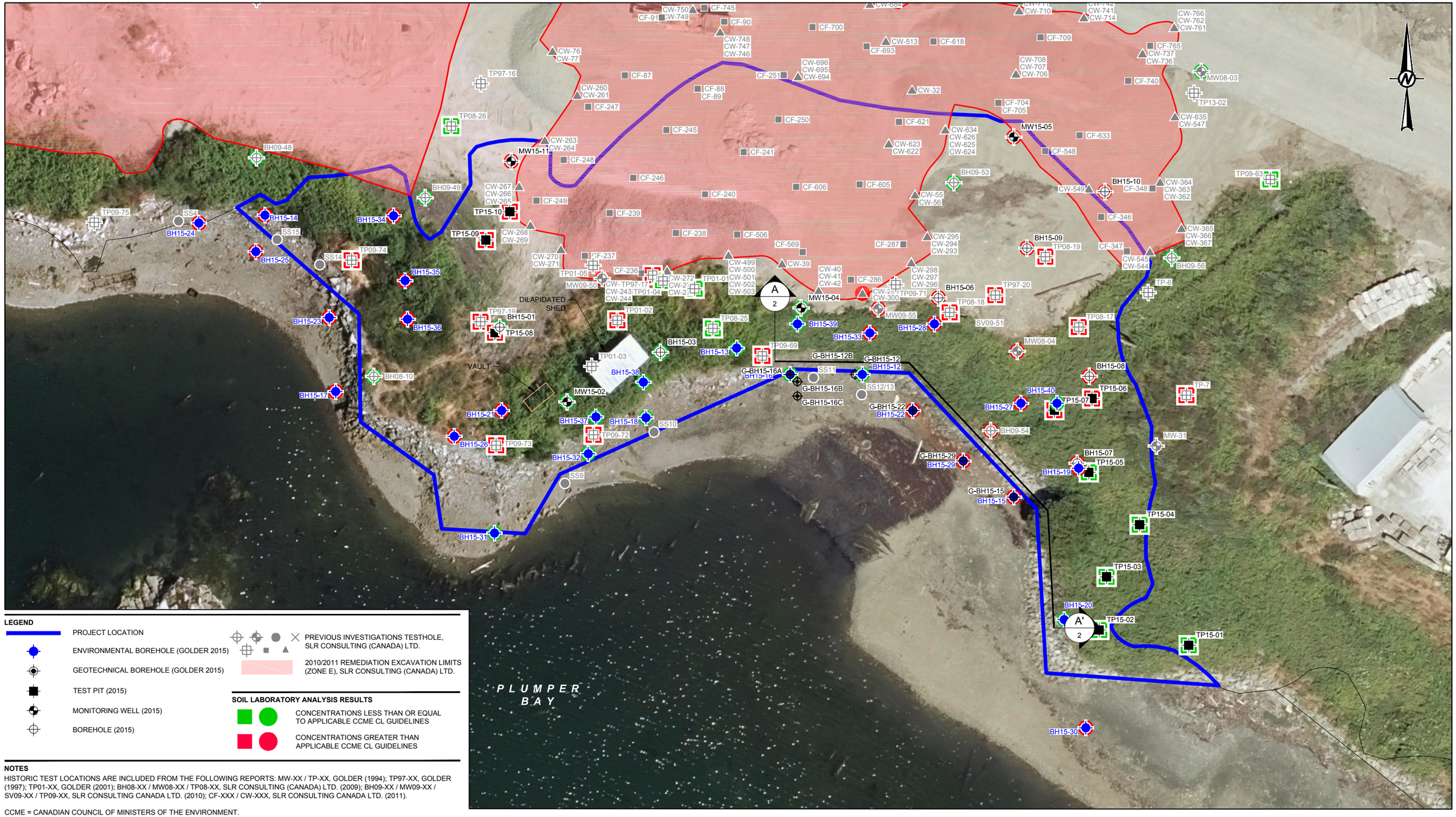

LEGEND

- PROJECT LOCATION
- ENVIRONMENTAL BOREHOLE (GOLDER 2015)
- GEOTECHNICAL BOREHOLE (GOLDER 2015)
- TEST PIT (2015)
- MONITORING WELL (2015)
- BOREHOLE (2015)
- PREVIOUS INVESTIGATIONS TESTHOLE, SLR CONSULTING (CANADA) LTD.
- 2010/2011 REMEDIATION EXCAVATION LIMITS (ZONE E), SLR CONSULTING (CANADA) LTD.

SOIL LABORATORY ANALYSIS RESULTS

- CONCENTRATIONS LESS THAN OR EQUAL TO APPLICABLE CCME CL GUIDELINES
- CONCENTRATIONS GREATER THAN APPLICABLE CCME CL GUIDELINES

NOTES

HISTORIC TEST LOCATIONS ARE INCLUDED FROM THE FOLLOWING REPORTS: MW-XX / TP-XX, GOLDER (1994); TP97-XX, GOLDER (1997); TP01-XX, GOLDER (2001); BH08-XX / MW08-XX / TP08-XX, SLR CONSULTING (CANADA) LTD. (2009); BH09-XX / MW09-XX / SV09-XX / TP09-XX, SLR CONSULTING CANADA LTD. (2010); CF-XXX / CW-XXX, SLR CONSULTING CANADA LTD. (2011).

CCME = CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT.

CL = COMMERCIAL LAND USE .

BOREHOLE LOCATIONS WERE OBTAINED USING FIELD GPS AND ARE APPROXIMATE ONLY.

REFERENCE

IMAGE OBTAINED FROM CAPITAL REGIONAL DISTRICT'S WEB MAPPING SERVICE.

BASE DATA OBTAINED FROM WSP SYRVEYS (BC) LIMITED PARTNERSHIP. FILENAME: ACAD-010052620-CNSI01-R00 [UTM].dwg DATED: 2015-02-27.

EXCAVATION DATA OBTAINED FROM PWGSC, MARCH 12, 2015. FILENAME: S_205-03424-00-C8.dwg

HISTORICAL SITE FEATURES OBTAINED FROM PDF OF SLR DRAWING, DATED APRIL 6, 2011.

0 10 20
1:500 METRES

CLIENT
PUBLIC WORKS GOVERNMENT SERVICES CANADA

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-05-11
PREPARED	J. FARAH
DESIGN	A. RAMEY
REVIEW	A. RAMEY
APPROVED	S. MORSE

PROJECT
PARCEL 44 GEOTECHNICAL INVESTIGATION
ESQUIMALT, BC

TITLE
SITE PLAN

PROJECT No.	PHASE	Rev.	FIGURE
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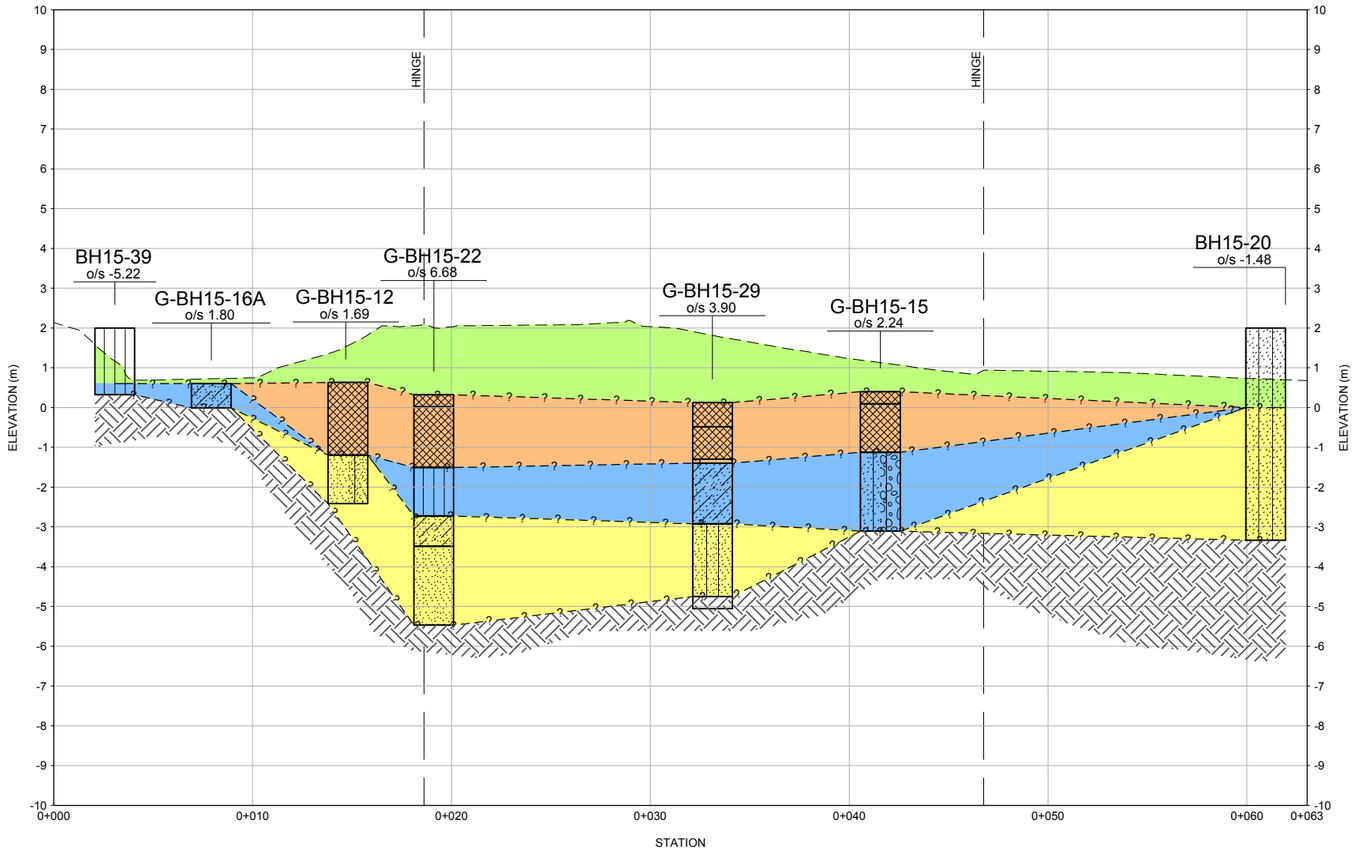

CROSS-SECTION A-A'
2x VERTICAL EXAGGERATION

LEGEND

- – – ? – – ? – INFERRED STRATIGRAPHIC BOUNDARY
- RIPRAP FILL
- FILL/WOOD CHIPS
- SILTY CLAYEY SAND
- SILTY SAND
- BEDROCK

NOTES

DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT TEST HOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN TEST HOLES HAS BEEN INFERRED FROM GEOLOGICAL EVIDENCE AND MAY VARY FROM THAT SHOWN.

REFERENCE

BASE DATA OBTAINED FROM WSP SURVEYS (BC) LIMITED PARTNERSHIP. FILENAME: ACAD-010052620-CNSI01-R00 [UTM].dwg DATED: 2015-02-27.

0 5 10
1:300 METRES

CLIENT
PUBLIC WORKS GOVERNMENT SERVICES CANADA

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-05-11
PREPARED	J. FARAH
DESIGN	A. RAMEY
REVIEW	A. RAMEY
APPROVED	S. MORSE

PROJECT
PARCEL 44 GEOTECHNICAL INVESTIGATION
ESQUIMALT, BC

TITLE
CROSS-SECTION A-A'

PROJECT No.	PHASE	Rev.	FIGURE
1535154	1000	0	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25 mm

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APPENDIX A

Important Information and Limitations of This Report

APPENDIX A
Important Information and Limitations of This Report

This report was prepared for Canada in accordance with terms and conditions of the task authorization contract # E0276-110680/003/XSB, and based on the project Task Authorization # 700333380. Liability and Copyright is specified in the Contract with PWGSC.

The inferences concerning the Site conditions contained in this report are based on information obtained during the assessment conducted by Golder personnel, and are based solely on historical information obtained by Golder, as described in this report.

This report was prepared, based in part, on information obtained from historic information sources. In evaluating the subject Site, Golder has relied in good faith on information provided. We accept no responsibility for any deficiency or inaccuracy contained in this report as a result of our reliance on the aforementioned information.

The findings and conclusions documented in this report have been prepared for the specific application to this project, and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practicing under similar conditions in the jurisdiction.

With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, these should be reviewed.

If new information is discovered during future work, the conclusions of this report should be re-evaluated and the report amended, as required, prior to any reliance upon the information presented herein.

APPENDIX B

Photographic Summary

APPENDIX B
Photographic Summary

Photograph 1: Looking northwest at the foreshore area.

Photograph 2: Looking east at the foreshore area.

Photograph 3: Looking west at the excavator-mounted auger rig set up on the foreshore area.

APPENDIX B
Photographic Summary

Photograph 4: Setting up the excavator-mounted auger rig for BH15-12.

APPENDIX B
Photographic Summary

Photograph 5: Small (top) and large (bottom) shear vanes used for shear vane testing.

Photograph 6: Surficial fill material on auger flight prior to collection of a bulk sample.

Photograph 7: Silty sand on auger flight prior to collection of a bulk sample.

Photograph 8: silty sand on auger flight prior to collection of a bulk sample.

Photograph 9: Example of silty clayey sand in split spoon.

Photograph 10: Example of silty sand in split spoon.

Photograph 11: Example of silty clayey sand and mechanically fractured bedrock in split spoon.

APPENDIX C

Record of Boreholes

PROJECT No.: 1535154 / 1000 / 2000

RECORD OF BOREHOLE: G-BH15-12

SHEET 1 OF 1

CLIENT: Public Works and Government Services Canada
PROJECT: Transport Canada Parcel 44
LOCATION: Esquimalt, BC
N: ~5365905 E: ~467928
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: September 8, 2015
DRILLING CONTRACTOR: Grassroots Drilling Inc.

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	ppm (0 0 0 0)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface														Backfilling
0	Track Mounted Auger Drill / Solid Stem Auger	FILL - **(PT)** SILTY PEAT, some sand, some gravel; dark brown, organic odour, contains wood chips (approximately 70% by volume of organics); non-cohesive, wet, loose.		0.00	1	AS										Cuttings
1																
2		**(SP-SM)** gravelly SAND, some non-plastic fines; dark grey, contains shells (10-30%); non-cohesive, wet, loose.		1.83	2	AS								52		
3		End of Borehole. Note: Drilling stopped due to hole collapsing.		3.05												
4																
5																
6																
7																
8																
9																
10																

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AR
CHECKED: AR

Golder Associates

PROJECT No.: 1535154 / 1000 / 2000

RECORD OF BOREHOLE: G-BH15-12B

SHEET 1 OF 1

CLIENT: Public Works and Government Services Canada
PROJECT: Transport Canada Parcel 44
LOCATION: Esquimalt, BC
N: ~5365905 E: ~467927
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: September 8, 2015
DRILLING CONTRACTOR: Grassroots Drilling Inc.

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	ppm (0 0 0 0)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface														Backfilling
0	Track Mounted Auger Drill / Hollow Stem Auger	FILL - **(PT)** SILTY PEAT, some sand, some gravel; dark brown, organic odour, contains wood chips (approximately 70% by volume of organics); non-cohesive, wet, loose.		0.00												Cuttings
1																
		End of Borehole. (Refusal)		1.52												
		Note: Refusal on woody debris at 1.24 m depth.														
2																
3																
4																
5																
6																
7																
8																
9																
10																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AR
CHECKED: AR

PROJECT No.: 1535154 / 1000 / 2000

RECORD OF BOREHOLE: G-BH15-15

SHEET 1 OF 1

CLIENT: Public Works and Government Services Canada
PROJECT: Transport Canada Parcel 44
LOCATION: Esquimalt, BC
N: ~5365888 E: ~467949
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: September 9, 2015
DRILLING CONTRACTOR: Grassroots Drilling Inc.

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	ppm (0 0 0 0)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface														Backfilling
0	Track Mounted Auger Drill / Solid Stem Auger	FILL - **(SM/GM)** SILTY SAND and GRAVEL, sub-angular gravel; light brown, contains organics; non-cohesive, moist, loose.		0.00	1	AS										
		FILL - **(PT)** SILTY PEAT, some sand, some gravel; dark brown / black, organic odour, contains wood chips (approximately 90 - 100% by volume of organics); non-cohesive, moist, very loose.		0.30	2	AS										Cuttings
1					3	SS										
		(SM/GM) SILTY SAND and GRAVEL; dark grey, contains shells; cohesive, w~PL, soft.		1.52												Bentonite Plug
2		- w>PL from 2.44 m to 3.51 m depth.			4	AS										
																Cuttings
3					5	SS	>50									
		End of Borehole. (Refusal)		3.51												
		Note: Inferred bedrock.														
4																
5																
6																
7																
8																
9																
10																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AR
CHECKED: AR

PROJECT No.: 1535154 / 1000 / 2000

RECORD OF BOREHOLE: G-BH15-16A

SHEET 1 OF 1

CLIENT: Public Works and Government Services Canada
PROJECT: Transport Canada Parcel 44
LOCATION: Esquimalt, BC
N: ~5365905 E: ~467918
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: September 9, 2015
DRILLING CONTRACTOR: Grassroots Drilling Inc.

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	ppm (0 0 0 0)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface														Backfilling
0	Track Mounted Auger Drill / Solid Stem Auger	**(SC)** gravelly silty CLAYEY SAND; grey, contains shells; cohesive, w>PL, soft to firm.		0.00												Cuttings
1		End of Borehole. (Refusal) Note: Inferred bedrock.		0.61												
2																
3																
4																
5																
6																
7																
8																
9																
10																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AR
CHECKED: AR

PROJECT No.: 1535154 / 1000 / 2000

RECORD OF BOREHOLE: G-BH15-16B

SHEET 1 OF 1

CLIENT: Public Works and Government Services Canada
PROJECT: Transport Canada Parcel 44
LOCATION: Esquimalt, BC
N: ~5365904 E: ~467919
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: September 9, 2015
DRILLING CONTRACTOR: Grassroots Drilling Inc.

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	ppm (0 0 0 0)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface														Backfilling
0	Track Mounted Auger Drill / Solid Stem Auger	**(SC)** gravelly silty CLAYEY SAND; grey; cohesive, w>PL, soft.		0.00												Cuttings
		End of Borehole. (Refusal) Note: Inferred bedrock.		0.30												
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AR
CHECKED: AR

Golder Associates

PROJECT No.: 1535154 / 1000 / 2000

RECORD OF BOREHOLE: G-BH15-16C

SHEET 1 OF 1

CLIENT: Public Works and Government Services Canada
PROJECT: Transport Canada Parcel 44
LOCATION: Esquimalt, BC
N: ~5365902 E: ~467919
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: September 9, 2015
DRILLING CONTRACTOR: Grassroots Drilling Inc.

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	ppm (0 0 0 0)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface														Backfilling
0	Track Mounted Auger Drill / Solid Stem Auger	**(SC)** gravelly silty CLAYEY SAND; grey, contains organics (approximately <5% wood chips), contains shells; cohesive, w>PL, soft.		0.00												Cuttings
		End of Borehole. (Refusal) Note: Inferred bedrock.		0.30												
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AR
CHECKED: AR

Golder Associates

PROJECT No.: 1535154 / 1000 / 2000

RECORD OF BOREHOLE: G-BH15-22

SHEET 1 OF 1

CLIENT: Public Works and Government Services Canada
PROJECT: Transport Canada Parcel 44
LOCATION: Esquimalt, BC
N: ~5365900 E: ~467935
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: September 10, 2015
DRILLING CONTRACTOR: Grassroots Drilling Inc.

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	ppm (0 0 0 0)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT % (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface														Backfilling
0	Track Mounted Auger Drill / Solid Stem Auger	FILL - **(PT)** SANDY PEAT, some gravel; black, organic odour, contains wood chips (approximately 90% by volume of organics); non-cohesive, moist, very loose.		0.00	1	AS										
		FILL - **(PT)** SILTY PEAT, some sand, some gravel; brown, contains wood chips (approximately 90 - 100% by volume of organics); non-cohesive, moist, very loose.		0.30	2	AS										Cuttings
1					3	SS	1		21							
2		**(SM)** gravelly SILTY SAND; grey, contains shells; cohesive, w>PL, soft.		1.83	4	AS								○		Bentonite
		- w~LL, very soft from 2.44m to 3.05 m depth.														Cuttings
3					5a 5b	AS AS								○		
		(SM) SILTY SAND, some fine gravel to gravelly; grey; cohesive, w>PL, soft. - fines content decreases with depth.		3.05	6	AS								⊢○		Bentonite
4		**(SM)** SILTY SAND, some gravel to gravelly; grey; non-cohesive, moist, compact. - possible cobbles / boulders at 4.27 m depth.		3.81	7	AS								○		
					8	SS	28		63					○		Slough
5					9	AS								○		
		End of Borehole. Note: Inferred bedrock		5.79												
6																
7																
8																
9																
10																

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AR
CHECKED: AR

Golder Associates

PROJECT No.: 1535154 / 1000 / 2000

RECORD OF BOREHOLE: G-BH15-29

SHEET 1 OF 1

CLIENT: Public Works and Government Services Canada
PROJECT: Transport Canada Parcel 44
LOCATION: Esquimalt, BC
N: ~5365893 E: ~467942
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: September 11, 2015
DRILLING CONTRACTOR: Grassroots Drilling Inc.

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	GEOTECH SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	CHEMISTRY SAMPLES: NUMBER	SCN	ANALYSED	ppm	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / WATER CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface											0 0 0 0	20 40 60 80 / Wp W Wl 10 20 30 40		Backfilling
0	Track Mounted Auger Drill	Solid Stem Auger	FILL - **(PT)** SANDY PEAT, some gravel, some fines; black, strong organic odour, contains wood chips (approximately 90% by volume of organics); non-cohesive, moist, loose.		0.00	1	AS										
			FILL - **(PT)** SILTY PEAT, some sand, some gravel; brown, contains wood chips (approximately 90 - 100% by volume of organics); non-cohesive, moist. loose.		0.61	2	AS										Cuttings
1			Void - 0.1 m thick.		1.42												
			(SC) gravelly silty CLAYEY SAND; grey, contains shells; cohesive, soft, w>PL.		1.52	3/4	SS	2		21							
2			- possible cobbles / boulders at 2.29m depth.														
3			**(SM)** gravelly clayey SILTY SAND; grey; non-cohesive, wet, compact to dense.		3.05	5	SS	27		42							Bentonite
4						6A	SS	>50		76							
5			Inferred bedrock.		4.88	6B											
			End of Borehole.		5.18												Note: Wood encountered at ~1.52 m depth. Note: Heard gravel scraping during rotation of vane.
6																	
7																	
8																	
9																	
10																	

DEPTH SCALE
1 : 50

Golder Associates

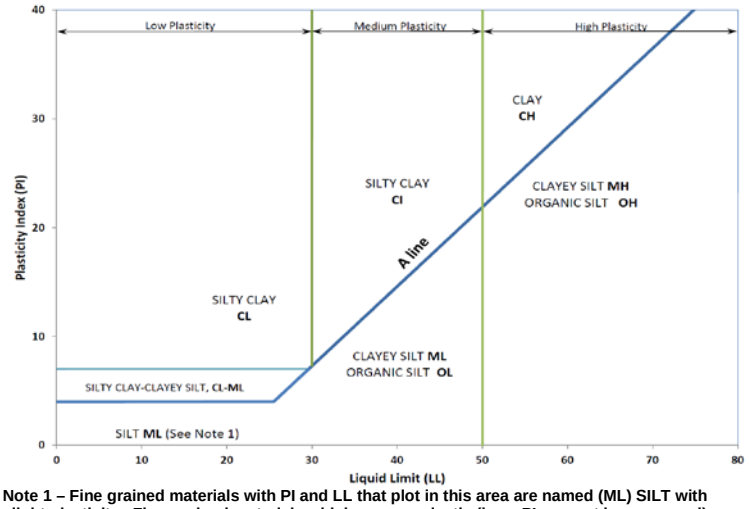
SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AR
CHECKED: AR

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil		Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
					Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)		Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
					Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
					Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
				Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
					None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)		Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% (see Note 2)	CL	SILTY CLAY
				Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
				Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures								30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat								75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to ~~or~~ indicate~~s~~ a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL, SAND and CLAY)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
GS	Grab Sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 - 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.
2. Definition of compactness descriptions based on SPT 'N' ranges from Terzaghi and Peck (1967) and correspond to typical average N_{60} values.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
σ_1, σ_2, σ_3	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c′	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

APPENDIX D

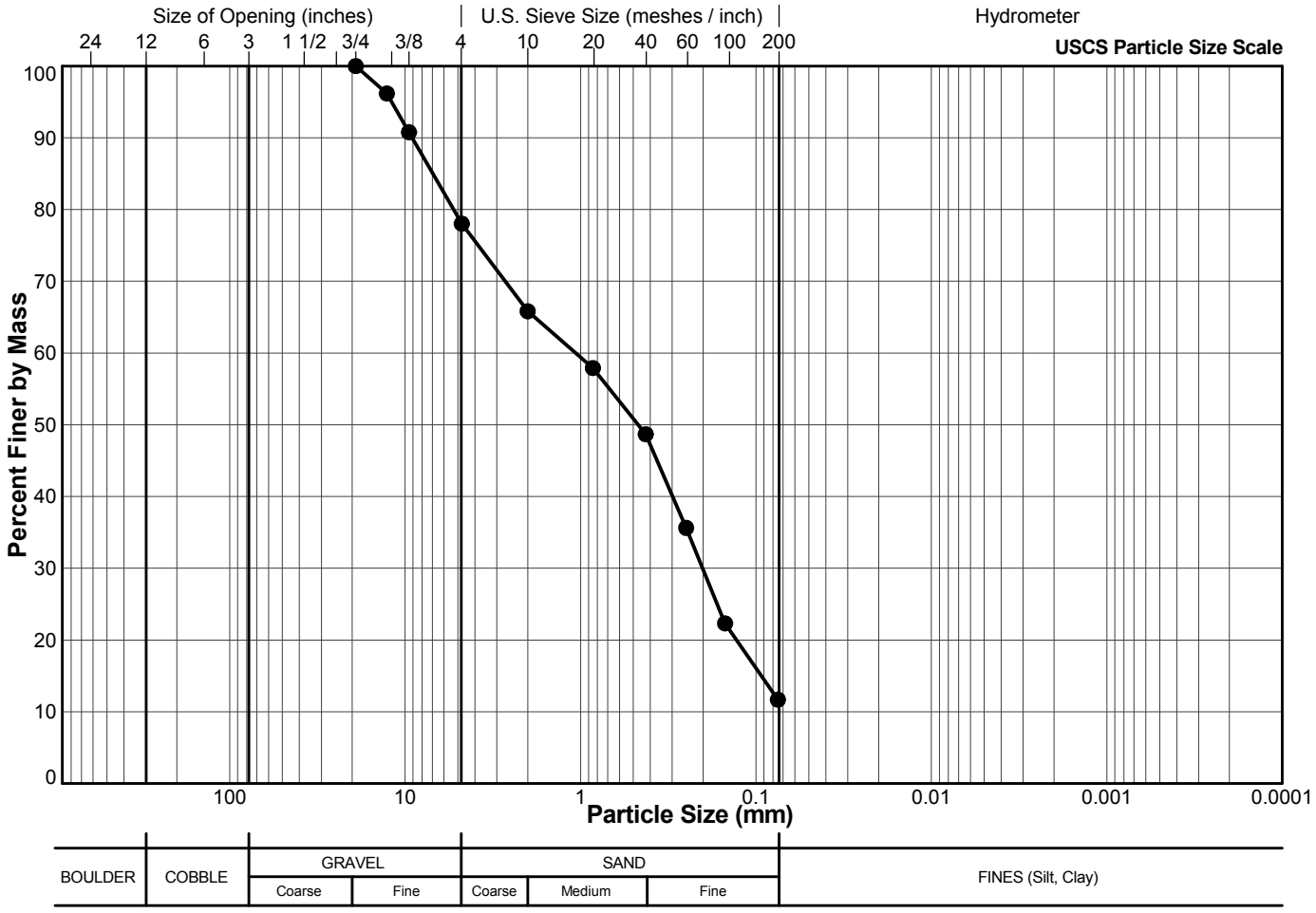
Geotechnical Laboratory Testing

SUMMARY OF PARTICLE SIZE DISTRIBUTION

ASTM C136, C117

Client: Public Works and Government Services Canada
Project: Transport Canada Parcel 44
Location: Esquimalt, BC
Project No.: 1535154 **Phase:** 1000 **Task:** 2000

Sample Location: G-BH15-12
Sample No.: 2
Depth Interval (m): 1.52 to 3.05
Lab Schedule No.:



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
3/4"	19.1		100.0
1/2"	12.7		96.2
3/8"	9.5		90.8
#4 US MESH	4.75		78.0
#10 US MESH	2		65.8
#20 US MESH	0.85		57.9
#40 US MESH	0.425		48.7
#60 US MESH	0.25		35.6
#100 US MESH	0.15		22.3
#200 US MESH	0.075		11.7

AA	9/25/2015	DGM	10/7/2015
Tech	Date	Checked	Date

National IM Server:GINT_GAL_NATIONALIM Unique Project ID:1046 Output Form:_LAB_PARTICLE SIZE (W/ GRADATIONS) 2015 dmackie 10/7/15

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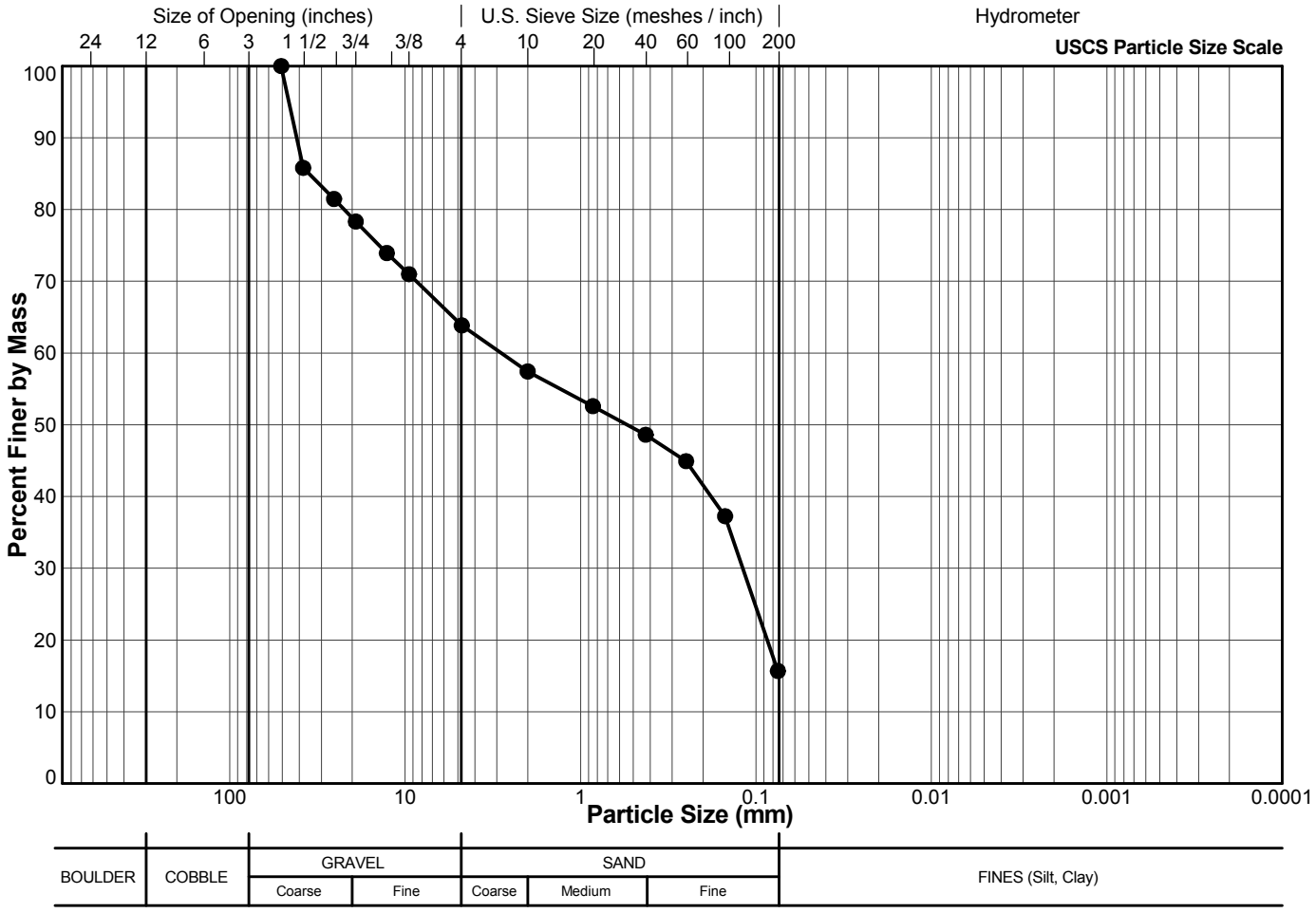
SUMMARY OF PARTICLE SIZE DISTRIBUTION

ASTM C136, C117

Client: Public Works and Government Services Canada
Project: Transport Canada Parcel 44
Location: Esquimalt, BC
Project No.: 1535154 **Phase:** 1000 **Task:** 2000

Sample Location: G-BH15-15
Sample No.: 4
Depth Interval (m): 1.52 to 1.83
Lab Schedule No.:



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
2"	50.8		100.0
1 1/2"	38.1		85.8
1"	25.4		81.5
3/4"	19.1		78.3
1/2"	12.7		73.9
3/8"	9.5		71.0
#4 US MESH	4.75		63.9
#10 US MESH	2		57.4
#20 US MESH	0.85		52.6
#40 US MESH	0.425		48.6
#60 US MESH	0.25		44.9
#100 US MESH	0.15		37.3
#200 US MESH	0.075		15.7

AA	9/22/2015	DGM	10/7/2015
Tech	Date	Checked	Date

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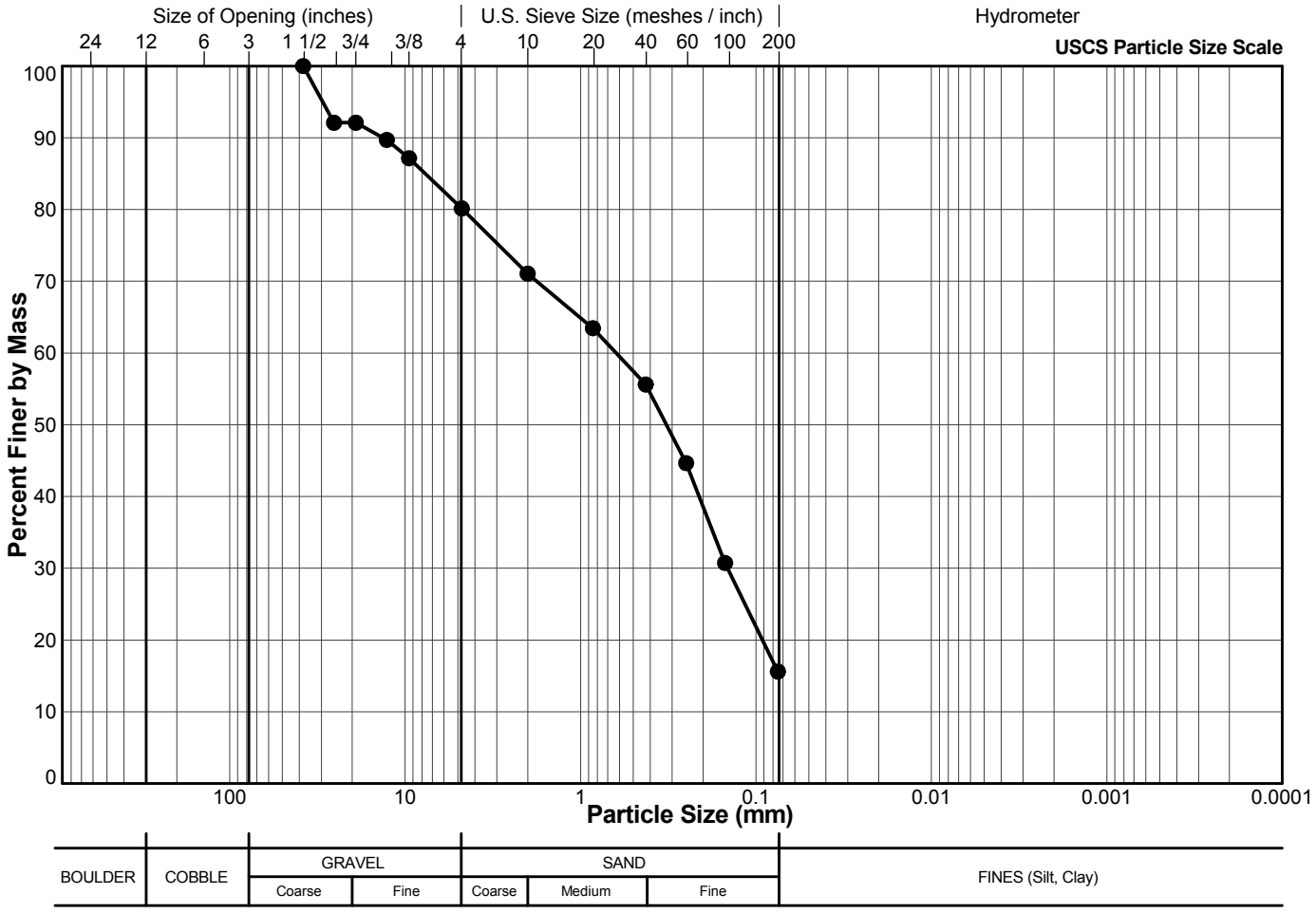
SUMMARY OF PARTICLE SIZE DISTRIBUTION

ASTM C136, C117

Client: Public Works and Government Services Canada
Project: Transport Canada Parcel 44
Location: Esquimalt, BC
Project No.: 1535154 **Phase:** 1000 **Task:** 2000

Sample Location: G-BH15-22
Sample No.: 5a
Depth Interval (m): 2.74 to 3.05
Lab Schedule No.:



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
1 1/2"	38.1		100.0
1"	25.4		92.1
3/4"	19.1		92.1
1/2"	12.7		89.7
3/8"	9.5		87.2
#4 US MESH	4.75		80.2
#10 US MESH	2		71.1
#20 US MESH	0.85		63.5
#40 US MESH	0.425		55.6
#60 US MESH	0.25		44.7
#100 US MESH	0.15		30.7
#200 US MESH	0.075		15.6

AA	9/25/2015	DGM	10/7/2015
Tech	Date	Checked	Date

National IM Server:GINT_GAL_NATIONALIM Unique Project ID:1046 Output Form:_LAB_PARTICLE SIZE (W/ GRADATIONS) 2015 dmackie 10/7/15

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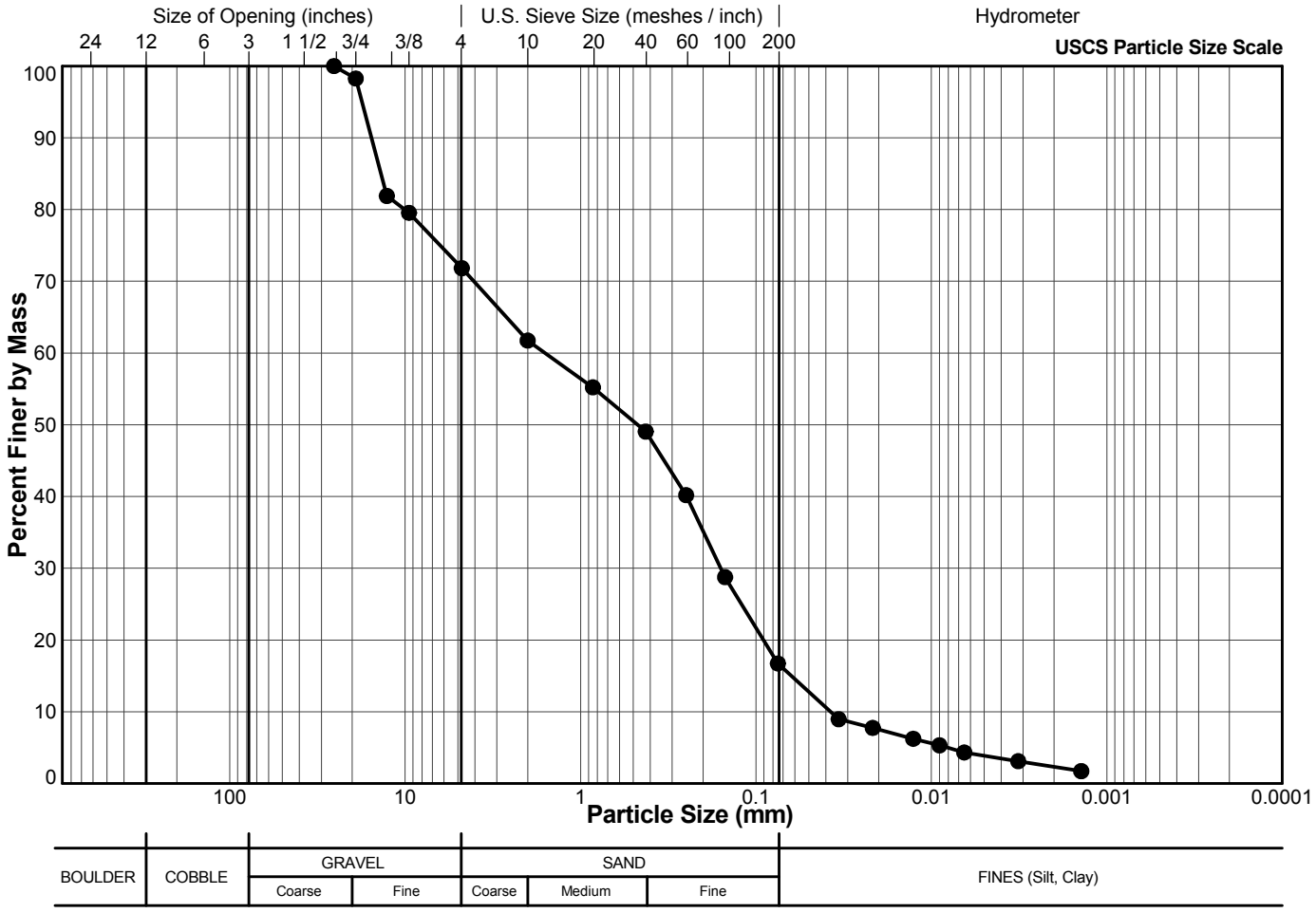
SUMMARY OF PARTICLE SIZE DISTRIBUTION

ASTM D 422

Client: Public Works and Government Services Canada
Project: Transport Canada Parcel 44
Location: Esquimalt, BC
Project No.: 1535154 **Phase:** 1000 **Task:** 2000

Sample Location: G-BH15-22
Sample No.: 5b
Depth Interval (m): 2.74 to 3.05
Lab Schedule No.:



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
1"	25.4		100.0
3/4"	19.1		98.3
1/2"	12.7		81.9
3/8"	9.5		79.5
#4 US MESH	4.75		71.8
#10 US MESH	2		61.7
#20 US MESH	0.85		55.2
#40 US MESH	0.425		49.0
#60 US MESH	0.25		40.2
#100 US MESH	0.15		28.8
#200 US MESH	0.075		16.7
		0.0338	9.0
		0.0216	7.7
		0.0127	6.2
		0.0090	5.3
		0.0065	4.3
		0.0032	3.1
		0.0014	1.7

AA	9/28/2015	DGM	10/7/2015
Tech	Date	Checked	Date

National IM Server:GINT_GAL_NATIONALIM Unique Project ID:1046 Output Form:_LAB_PARTICLE SIZE (W/ GRADATIONS) 2015 dmackie 10/7/15

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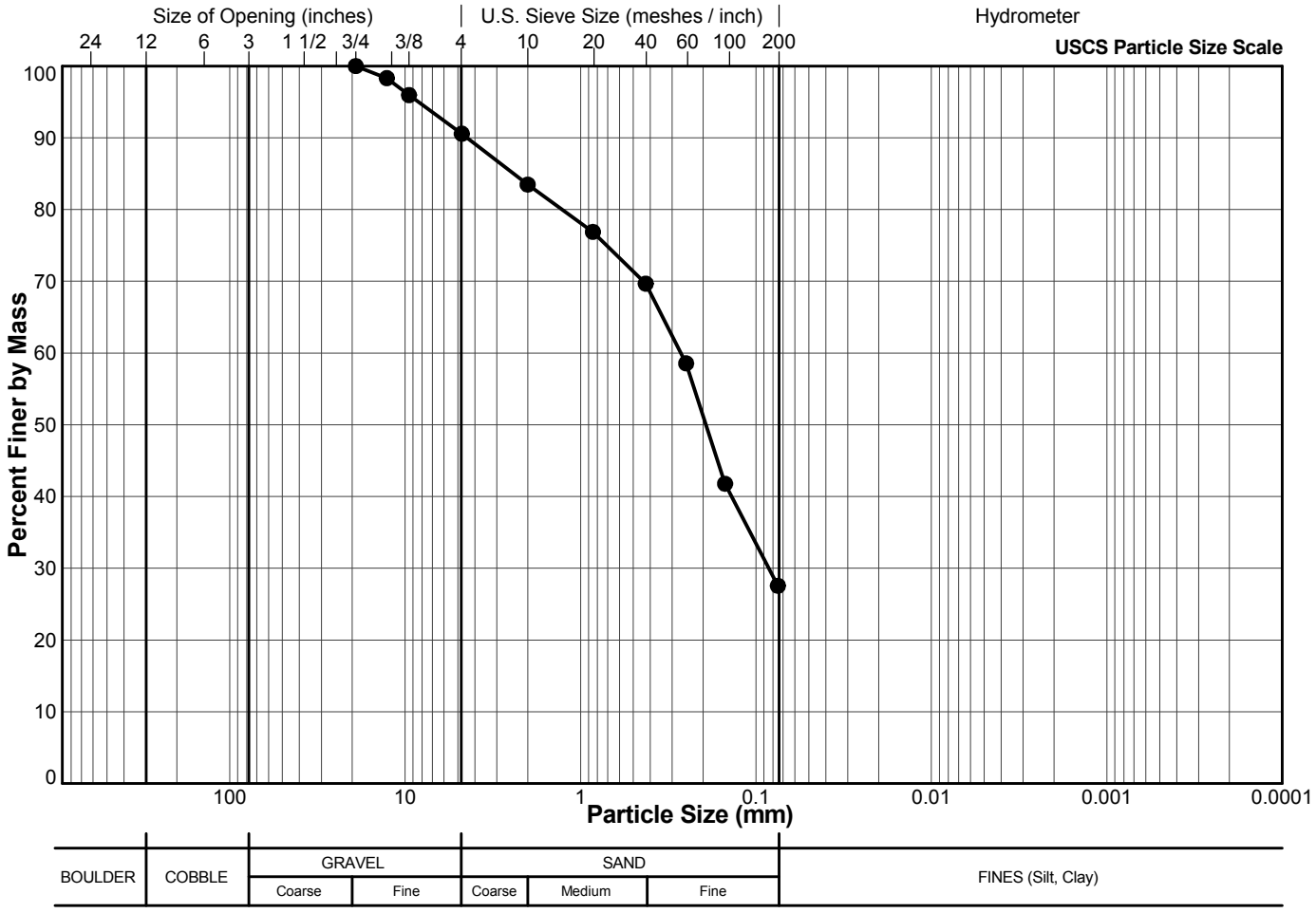
SUMMARY OF PARTICLE SIZE DISTRIBUTION

ASTM C136, C117

Client: Public Works and Government Services Canada
Project: Transport Canada Parcel 44
Location: Esquimalt, BC
Project No.: 1535154 **Phase:** 1000 **Task:** 2000

Sample Location: G-BH15-22
Sample No.: 7
Depth Interval (m): 3.96 to 4.27
Lab Schedule No.:



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
3/4"	19.1		100.0
1/2"	12.7		98.3
3/8"	9.5		96.0
#4 US MESH	4.75		90.6
#10 US MESH	2		83.5
#20 US MESH	0.85		76.9
#40 US MESH	0.425		69.7
#60 US MESH	0.25		58.6
#100 US MESH	0.15		41.8
#200 US MESH	0.075		27.6

AA/AB	9/25/2015	DGM	10/7/2015
Tech	Date	Checked	Date

National IM Server:GINT_GAL_NATIONALIM Unique Project ID:1046 Output Form:_LAB_PARTICLE SIZE (W/ GRADATIONS) 2015 dmackie 10/7/15

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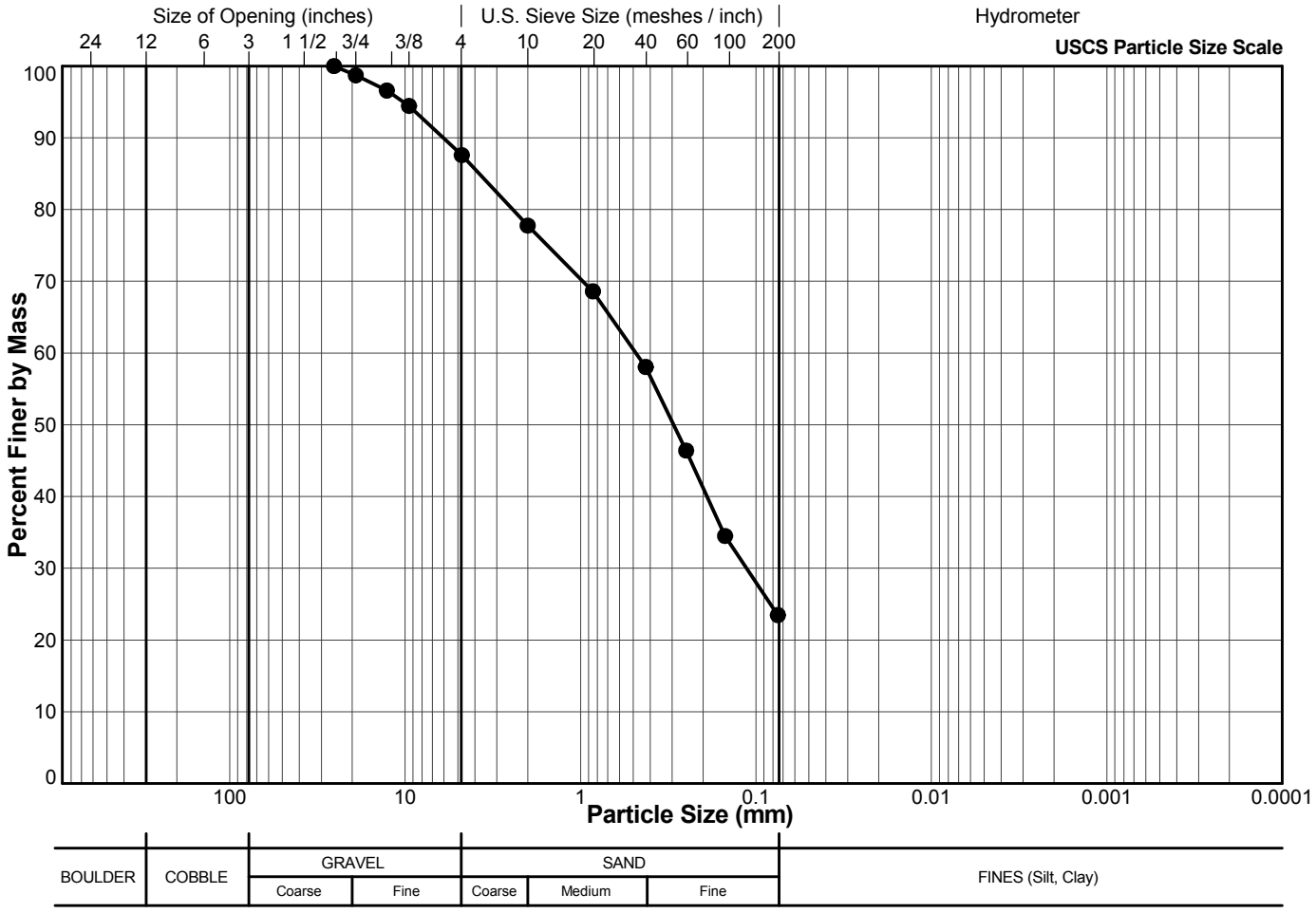
SUMMARY OF PARTICLE SIZE DISTRIBUTION

ASTM C136, C117

Client: Public Works and Government Services Canada
Project: Transport Canada Parcel 44
Location: Esquimalt, BC
Project No.: 1535154 **Phase:** 1000 **Task:** 2000

Sample Location: G-BH15-22
Sample No.: 9
Depth Interval (m): 5.18 to 5.79
Lab Schedule No.:



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
1"	25.4		100.0
3/4"	19.1		98.7
1/2"	12.7		96.6
3/8"	9.5		94.4
#4 US MESH	4.75		87.6
#10 US MESH	2		77.8
#20 US MESH	0.85		68.6
#40 US MESH	0.425		58.1
#60 US MESH	0.25		46.4
#100 US MESH	0.15		34.5
#200 US MESH	0.075		23.5

AA/AB	9/25/2015	DGM	10/7/2015
Tech	Date	Checked	Date

National IM Server:GINT_GAL_NATIONALIM Unique Project ID:1046 Output Form:_LAB_PARTICLE SIZE (W/ GRADATIONS) 2015 dmackie 10/7/15

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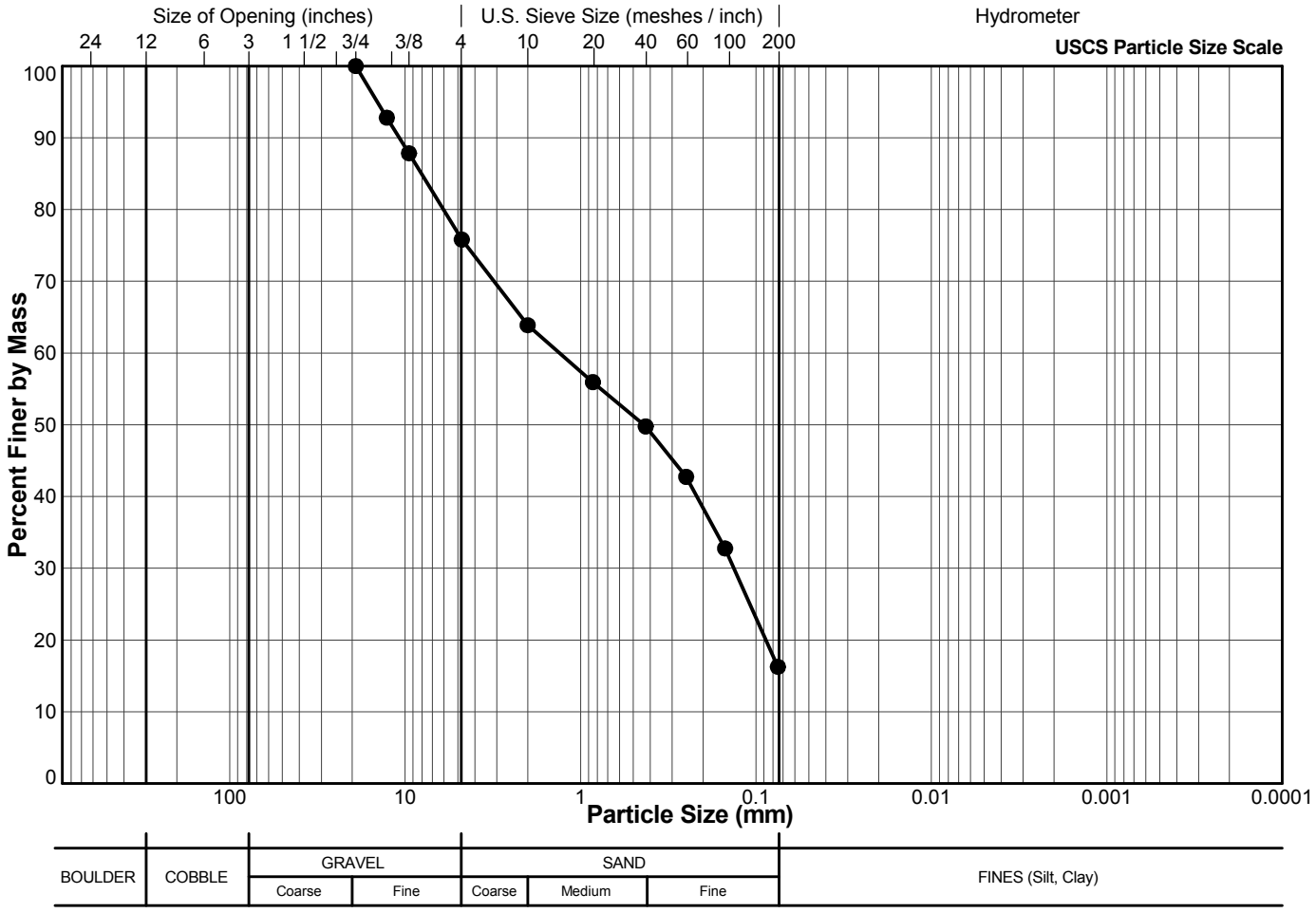
SUMMARY OF PARTICLE SIZE DISTRIBUTION

ASTM C136, C117

Client: Public Works and Government Services Canada
Project: Transport Canada Parcel 44
Location: Esquimalt, BC
Project No.: 1535154 **Phase:** 1000 **Task:** 2000

Sample Location: G-BH15-29
Sample No.: 3/4
Depth Interval (m): 1.52 to 2.13
Lab Schedule No.:



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
3/4"	19.1		100.0
1/2"	12.7		92.8
3/8"	9.5		87.8
#4 US MESH	4.75		75.8
#10 US MESH	2		63.9
#20 US MESH	0.85		55.9
#40 US MESH	0.425		49.8
#60 US MESH	0.25		42.7
#100 US MESH	0.15		32.8
#200 US MESH	0.075		16.3

AA	9/25/2015	DGM	10/7/2015
Tech	Date	Checked	Date

National IM Server:GINT_GAL_NATIONALIM Unique Project ID:1046 Output Form:_LAB_PARTICLE SIZE (W/ GRADATIONS) 2015 dmackie 10/7/15

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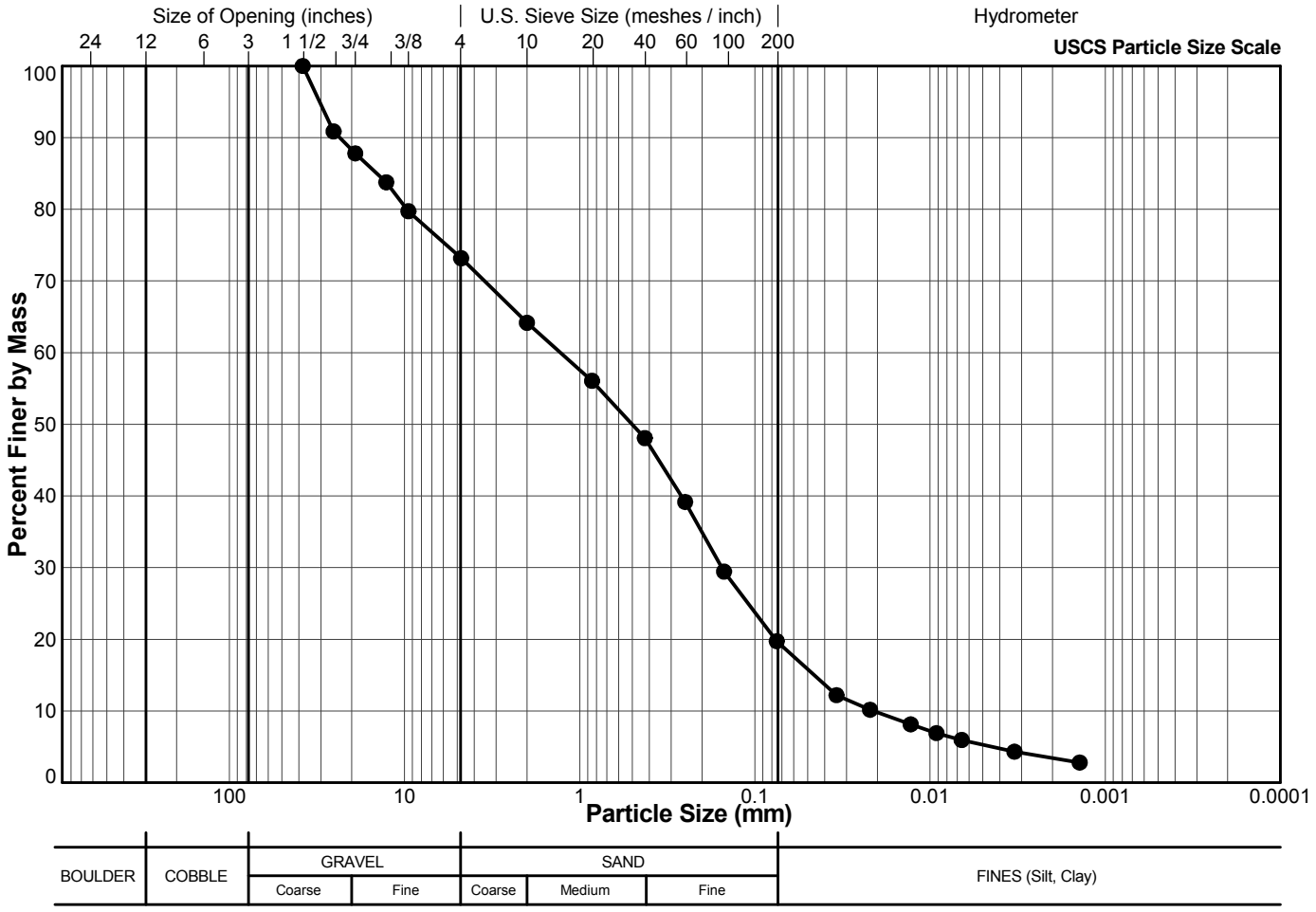
SUMMARY OF PARTICLE SIZE DISTRIBUTION

ASTM D 422

Client: Public Works and Government Services Canada
Project: Transport Canada Parcel 44
Location: Esquimalt, BC
Project No.: 1535154 **Phase:** 1000 **Task:** 2000

Sample Location: G-BH15-29
Sample No.: 5
Depth Interval (m): 3.05 to 3.66
Lab Schedule No.:



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
1 1/2"	38.1		100.0
1"	25.4		90.9
3/4"	19.1		87.8
1/2"	12.7		83.8
3/8"	9.5		79.7
#4 US MESH	4.75		73.2
#10 US MESH	2		64.2
#20 US MESH	0.85		56.1
#40 US MESH	0.425		48.1
#60 US MESH	0.25		39.2
#100 US MESH	0.15		29.5
#200 US MESH	0.075		19.7
		0.0342	12.2
		0.0220	10.2
		0.0129	8.1
		0.0092	6.9
		0.0066	5.9
		0.0033	4.3
		0.0014	2.8

AA	9/28/2015	DGM	10/7/2015
Tech	Date	Checked	Date

National IM Server:GINT_GAL_NATIONALIM Unique Project ID:1046 Output Form:_LAB_PARTICLE SIZE (W/ GRADATIONS) 2015 dmackie 10/7/15

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

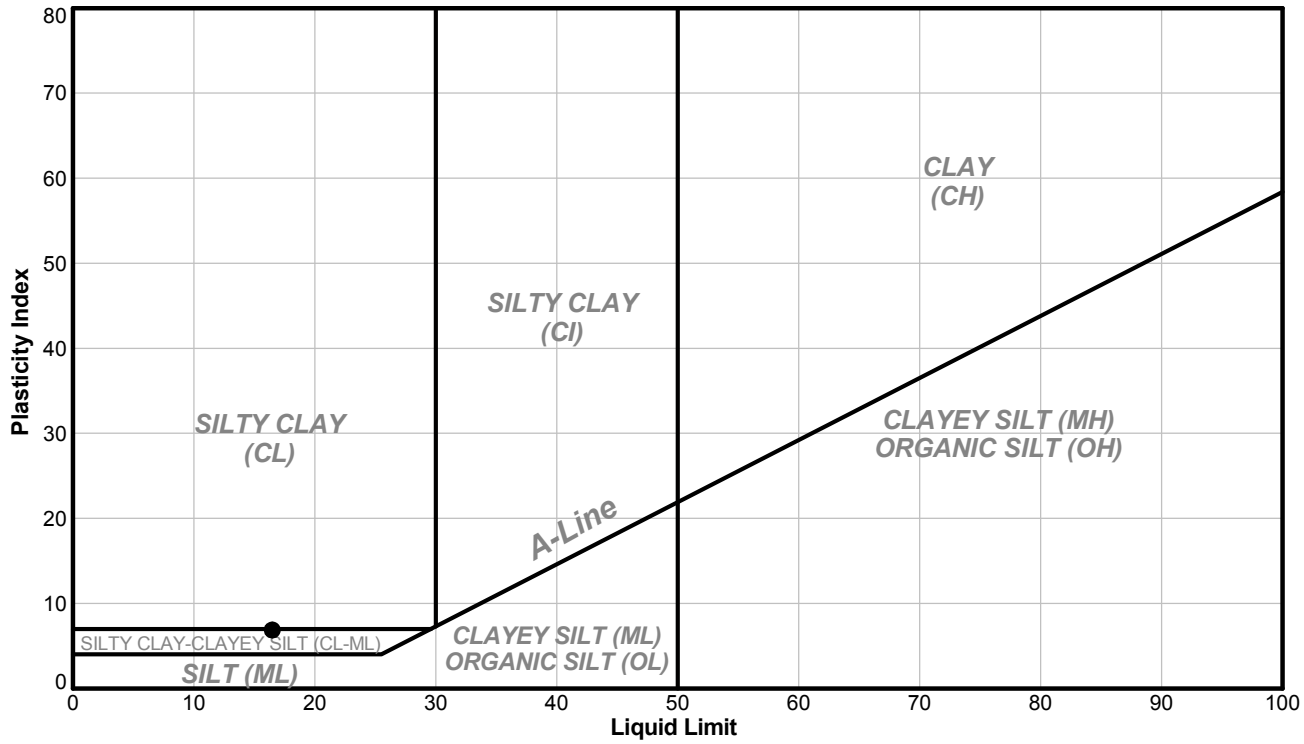
ASTM D 4318-10

Client:	Public Works and Government Services Canada	**Borehole ID:**	**G-BH15-22**
Project:	Transport Canada Parcel 44	**Sample No.:**	**6**
Location:	Esquimalt, BC	**Depth Interval (m):**	3.35 to 3.66
Project No.:	1535154 **Phase:** 1000 **Task:** 2000	**Lab Schedule No.:**	

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	G-BH15-22	6	3.35	3.66	ND	16	10	6.0	20.6	1.8

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

AA/AB	9/28/2015	DGM	10/7/2015
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

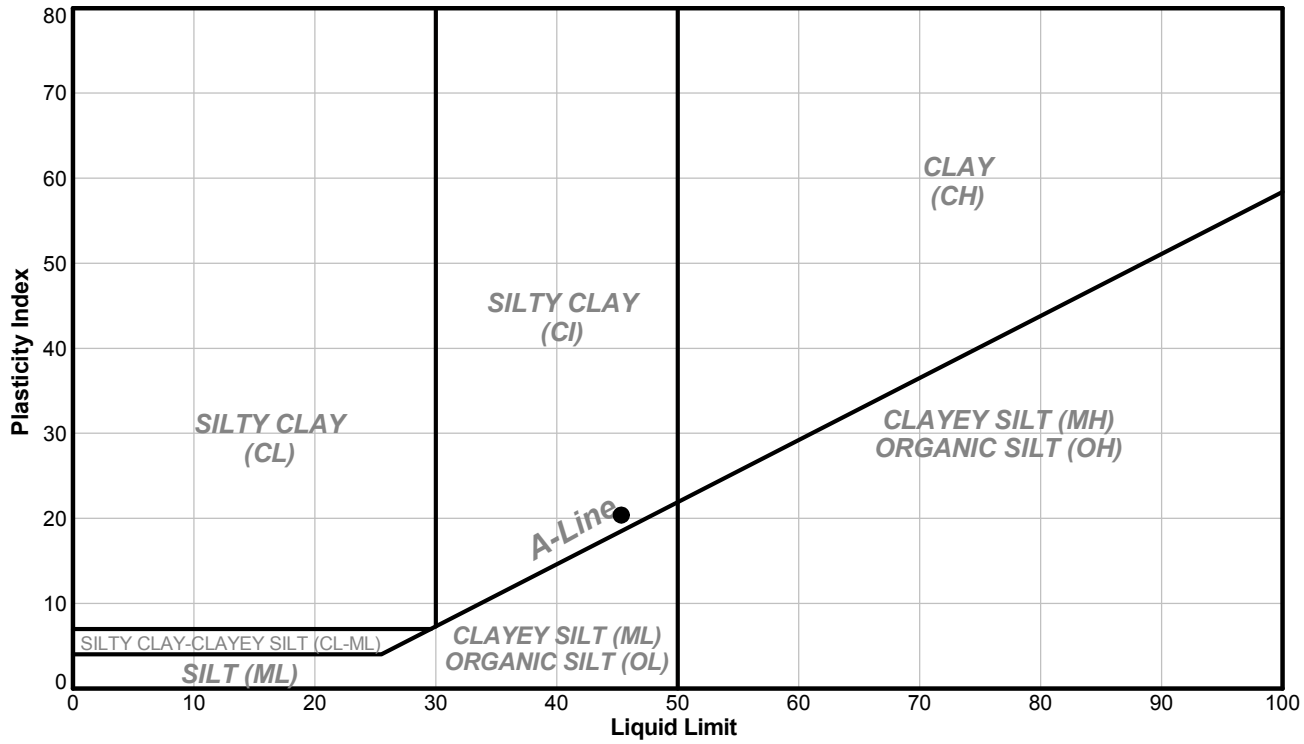
ASTM D 4318-10

Client:	Public Works and Government Services Canada	**Borehole ID:**	**G-BH15-29**
Project:	Transport Canada Parcel 44	**Sample No.:**	**3/4**
Location:	Esquimalt, BC	**Depth Interval (m):**	1.52 to 2.13
Project No.:	1535154 **Phase:** 1000 **Task:** 2000	**Lab Schedule No.:**	

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	G-BH15-29	3/4	1.52	2.13	50	45	25	20.0	35.0	0.5

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

AA/AB	9/28/2015	DGM	10/7/2015
Tech	Date	Checked	Date

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WATER CONTENT DETERMINATION

ASTM D 2216

Client: Public Works and Government Services Canada
Project: Transport Canada Parcel 44
Location: Esquimalt, BC
Project No.: 1535154 **Phase:** 1000 **Task:** 2000

Project No.: 1535154 **Phase:** 1000 **Task:** 2000
Lab Schedule No.:

Sample Location	Sample No.	Specimen No.	Depth Interval		Water Content (%)
			Depth (m)	Bottom (m)	
G-BH15-12	**2**		1.52	3.05	**52.2**
G-BH15-15	**4**		1.52	1.83	**28.2**
G-BH15-15	**5**		1.83	3.05	**16.9**
G-BH15-22	**4**		1.83	2.13	**34.7**
G-BH15-22	**6**		3.35	3.66	**20.6**
G-BH15-22	**7**		3.96	4.27	**13.0**
G-BH15-22	**8**		4.57	5.18	**11.3**
G-BH15-22	**9**		5.18	5.79	**11.6**
G-BH15-22	**5a**		2.74	3.05	**33.8**
G-BH15-29	**5**		3.05	3.66	**12.4**
G-BH15-29	**6**		4.57	5.18	**5.8**
G-BH15-29	**3/4**		1.52	2.13	**35.0**

DGM 10/7/2015
Checked Date

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APPENDIX C – ENVIRONMENTAL INVESTIGATIONS

Esquimalt Fill Site Eastern Remediation Specifications
Esquimalt, BC
SLR Project No.: 205. 03844.00000

TABLE 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) (page 1 of 2)								
Sample ID	**TP08-17A**	**TP08-17C**	**TP08-17D (BFD of TP08-17C)**	**TP08-17G**	**TP08-18A**	**TP08-18C**	**CCME**	**CSR**
Date	**11-Mar-2008**	**11-Mar-2008**	**11-Mar-2008**	**11-Mar-2008**	**11-Mar-2008**	**11-Mar-2008**	**Residential**	**Residential**
Depth (m)	0.00-0.43	0.55-1.10	0.55-1.10	2.30-3.20	0.00-0.75	0.75-1.10	ng	ns
pH	6.35	6.99	7.13	7.43	7.90	6.98	ng	ns
Antimony	< 10	< 10	< 10	< 10	< 10	< 10	20	20
Arsenic	< 5	< 5	< 5	< 5	6.2	< 5	12	25
Barium	76.9	154	147	132	151	95.9	500	500
Beryllium	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	4	4
Cadmium	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	10	2 @ pH<7.0 3[+]
Chromium (total)	33.6	42.1	35.5	26.8	34.0	37.7	64	60
Cobalt	11.3	8.8	8.6	8.9	12.7	12.3	50	50
Copper	61.8	122[1]	117[1]	29.8	97.2[1]	84.6[1]	63	90 @ pH<5.0 100 @ pH>=5.0<5.5 150 @ pH>=5.5
Lead	43	98	91	39	**213**	99	140	150 @ pH<5.5 250 @ pH>=5.5<6.0 500 @ pH>=6.0
Mercury	0.499	0.735	0.756	0.213	1.25	0.771	6.6	15
Molybdenum	< 4	< 4	< 4	< 4	< 4	< 4	10	10
Nickel	23.3	22.0	21.1	19.9	27.3	28.9	50	100
Selenium	< 2*	< 2*	< 3*	< 2*	< 2*	< 2*	1	3
Silver	< 2	< 2	< 2	< 2	< 2	< 2	20	20
Thallium	< 1	< 1	< 1	< 1	< 1	< 1	1	ns
Tin	< 5	9.1	7.4	< 5	5.2	< 5	50	50
Vanadium	68.5	51.3	50.4	60.4	72.1	65.9	130	200
Zinc	106	**250**	**235**	131	**205**	180	200	150 @ pH<6.5 300 @ pH>=6.5<7.0 450 @ pH>=7.0

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
ns - no standard listed
ng - no guideline listed
* - detection limit greater than the applicable standard
[+] - BC CSR, Schedule 4, Schedule 5 (intake of contaminated soil) and/or Schedule 10, Residential

[1] - Concentration exceeds CCME RL guidelines and/or CSR standards, but is below the Vancouver Island Regional background soil concentration as defined in MOE Protocol 4 (Determining Background Soil Quality)
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines for Soil, Residential/Parkland
Exceeds CSR RLm: BC CSR, Schedule 4, Schedule 5 (groundwater flow to surface water used by Marine Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential BC CSR, Schedules 4, 5 and/or 10, Residential

TABLE 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) (page 2 of 2)

Sample ID Date	TP08-18F 11-Mar-2008	TP08-19A 11-Mar-2008	TP08-19C 11-Mar-2008	TP08-19E 11-Mar-2008	TP08-25A 12-Mar-2008	TP08-25E 12-Mar-2008	CCME Residential	CSR Residential
Depth (m)	2.80-3.60	0.00-0.40	1.80-1.90	3.00-4.30	0.00-0.50	1.20-1.70	ng	ns
pH	6.39	8.49	7.53	7.29	6.74	7.92	ng	ns
Antimony	< 10	< 10	< 10	< 10	< 10	< 10	20	20
Arsenic	**62.4**	5.5	6.4	8.4	< 5	5.3	12	25
Barium	76.7	124	139	146	88.4	105	500	500
Beryllium	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	4	4
Cadmium	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	10	2 @ pH<7.0 3[+]
Chromium (total)	31.2	34.4	77.7[1]	36.6	28.0	50.2	64	60
Cobalt	9.3	14.1	9.8	11.1	13.3	16.3	50	50
Copper	127[1]	71.7[1]	121[1]	57.8	74.9[1]	57.0	63	90 @ pH<5.0 100 @ pH>=5.0<5.5 150 @ pH>=5.5
Lead	75	112	104	81	< 30	< 30	140	150 @ pH<5.5 250 @ pH>=5.5<6.0 500 @ pH>=6.0
Mercury	5.32	0.446	0.660	2.90	0.0321	0.0615	6.6	15
Molybdenum	< 4	< 4	8.8	< 4	< 4	< 4	10	10
Nickel	28.4	34.1	38.8	28.3	25.2	39.2	50	100
Selenium	< 2*	< 2*	< 3*	< 2*	< 2*	< 2*	1	3
Silver	< 2	< 2	< 2	< 2	< 2	< 2	20	20
Thallium	< 1	< 1	< 1	< 1	< 1	< 1	1	ns
Tin	18.0	46.3	14.2	5.8	< 5	< 5	50	50
Vanadium	49.1	73.0	58.6	60.7	86.4	100	130	200
Zinc	**214**	143	**509**	286	47.1	68.9	200	150 @ pH<6.5 300 @ pH>=6.5<7.0 450 @ pH>=7.0

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
ns - no standard listed
ng - no guideline listed
* - detection limit greater than the applicable standard
[+] - BC CSR, Schedule 4, Schedule 5 (intake of contaminated soil) and/or Schedule 10, Residential

[1] - Concentration exceeds CCME RL guidelines and/or CSR standards, but is below the Vancouver Island Regional background soil concentration as defined in MOE Protocol 4 (Determining Background Soil Quality)
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines for Soil, Residential/Parkland
Exceeds CSR RLm: BC CSR, Schedule 4, Schedule 5 (groundwater flow to surface water used by Marine Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential BC CSR, Schedules 4, 5 and/or 10, Residential

TABLE 2: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg) (page 1 of 3)

Sample ID Date	TP08-17C 11-Mar-2008	B[a]P TPE	TP08-17D (BFD of TP08-17C) 11-Mar-2008	B[a]P TPE	TP08-17G 11-Mar-2008	B[a]P TPE	CCME Residential	CSR Residential
Depth (m)	0.55-1.10	-	0.55-1.10	-	2.30-3.20	-	ng	ns
Acenaphthene	< 0.04	-	< 0.04	-	< 0.04	-	ng	ns
Acenaphthylene	< 0.05	-	< 0.05	-	< 0.05	-	ng	ns
Anthracene	< 0.05	-	< 0.05	-	< 0.05	-	2.5	ns
Benzo(a)anthracene	0.070	0.005	0.137	0.0137	< 0.05	0.005	ng	1
Benzo(a)pyrene	0.054	0.054	0.116	0.116	< 0.05	0.05	20	1
Benzo(b)fluoranthene	0.073	0.0073	0.171	0.0171	0.057	0.0057	ng	1
Benzo(g,h,i)perylene	< 0.05	0.0005	0.083	0.00083	< 0.05	0.0005	ng	ns
Benzo(k)fluoranthene	< 0.05	-	0.061	-	< 0.05	-	ng	1
Chrysene	0.073	0.00073	0.209	0.00209	0.051	0.00051	ng	ns
Dibenzo(a,h)anthracene	< 0.05	0.05	< 0.05	0.05	< 0.05	0.05	ng	1
Fluoranthene	0.191	-	0.562	-	0.088	-	50	ns
Fluorene	< 0.05	-	< 0.05	-	< 0.05	-	ng	ns
Indeno(1,2,3-c,d)pyrene	< 0.05	0.05	0.075	0.0075	< 0.05	0.005	ng	1
2-Methylnaphthalene	0.059	-	0.057	-	< 0.05	-	ng	ns
Naphthalene	0.129	-	0.109	-	< 0.05	-	ng	5
Phenanthrene	0.210	-	0.324	-	0.062	-	ng	5
Pyrene	0.170	-	0.498	-	0.083	-	ng	10
Total	-	0.11353	-	0.09122	-	0.11671	5.3	ns

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
PAH - polycyclic aromatic hydrocarbons
B[a]P TPE - Benzo(a)pyrene total potency equivalent
ns - no standard listed
ng - no guideline listed
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines for Soil, Residential/Parkland
Exceeds CSR RLm: BC CSR, Schedule 4, Schedule 5 (groundwater flow to surface water used by Marine Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential BC CSR, Schedules 4, 5 and/or 10, Residential

TABLE 2: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg) (page 2 of 3						
Sample ID	**TP08-18C**		**TP08-19B**		**CCME**	**CSR**
Date	**11-Mar-2008**	**B[a]P TPE**	**11-Mar-2008**	**B[a]P TPE**	**Residential**	**Residential**
Depth (m)	0.75-1.10	-	0.40-1.00	-	ng	ns
Acenaphthene	< 0.04	-	0.082	-	ng	ns
Acenaphthylene	< 0.05	-	< 0.05	-	ng	ns
Anthracene	< 0.05	-	0.057	-	2.5	ns
Benzo(a)anthracene	0.078	0.0078	0.136	0.0136	ng	1
Benzo(a)pyrene	< 0.08	< 0.08	0.123	0.123	20	1
Benzo(b)fluoranthene	< 0.1	0.01	0.171	0.0171	ng	1
Benzo(g,h,i)perylene	0.062	0.00062	0.106	0.00106	ng	ns
Benzo(k)fluoranthene	< 0.05	-	0.061	-	ng	1
Chrysene	0.088	0.00088	0.157	0.00157	ng	ns
Dibenzo(a,h)anthracene	< 0.05	0.05	< 0.05	0.05	ng	1
Fluoranthene	0.178	-	0.344	-	50	ns
Fluorene	< 0.05	-	0.060	-	ng	ns
Indeno(1,2,3-c,d)pyrene	0.051	0.0051	0.084	0.0084	ng	1
2-Methylnaphthalene	< 0.05	-	0.065	-	ng	ns
Naphthalene	< 0.05	-	0.097	-	ng	5
Phenanthrene	0.147	-	0.343	-	ng	5
Pyrene	0.167	-	0.319	-	ng	10
Total	-	0.0744	-	0.09173	5.3	ns

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
PAH - polycyclic aromatic hydrocarbons
B[a]P TPE - Benzo(a)pyrene total potency equivalent
ns - no standard listed
ng - no guideline listed
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines for Soil, Residential/Parkland
Exceeds CSR RLm: BC CSR, Schedule 4, Schedule 5 (groundwater flow to surface water used by Marine Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential BC CSR, Schedules 4, 5 and/or 10, Residential

TABLE 3: SOIL CHEMISTRY RESULTS - PETROLEUM HYDROCARBON CONSTITUENTS AND MTBE (mg/kg) (page 1 of 1)							
Sample ID	**TP08-17C**	**TP08-17D (BFD of TP08-17C)**	**TP08-17G**	**TP08-18C**	**TP08-19B**	**CCME**	**CSR**
Date	**11-Mar-2008**	**11-Mar-2008**	**11-Mar-2008**	**11-Mar-2008**	**11-Mar-2008**	**Coarse Grained**	**Residential**
Depth (m)	0.55-1.10	0.55-1.10	2.30-3.20	0.75-1.10	0.40-1.00	ns	ns
HSVL (ppmv)	105	105	185	125	320	ns	ns
Benzene	---	---	---	---	---	0.0095	2.5
Ethylbenzene	---	---	---	---	---	0.082	1
Toluene	---	---	---	---	---	0.37	1.5
Xylenes	---	---	---	---	---	11	5
MTBE	---	---	---	---	---	ns	170
EPHs (C10-19)	< 200	< 200	< 200	< 200	< 200	ns	ns
EPHs (C19-32)	510	670	< 200	1500	1210	ns	ns
LEPHs	< 200	< 200	< 200	< 200	< 200	ns	1000
HEPHs	510	670	< 200	**1500**	**1210**	ns	1000

Notes:
m - metres
mg/kg - milligrams per kilogram
HSVL (ppmv) - headspace vapour level (parts per million by volume)
< - less than analytical detection limit indicated
* - detection limit greater than the applicable standard
'---' - sample not analyzed for parameter indicated
MTBE - methyl tert-butyl ether
EPHs - extractable petroleum hydrocarbons
LEPHs - light extractable petroleum hydrocarbons (C10-19), excluding nine specific polycyclic aromatic hydrocarbon parameters
HEPHs - heavy extractable petroleum hydrocarbons (C19-32), excluding nine specific polycyclic aromatic hydrocarbon parameters
ns - no standard listed
ng - no guideline listed

Exceeds CCME RLCGs: CCME Canadian Soil Quality Guidelines for BTEX, Residential Coarse-grained Sub-surface (lowest of the human and environmental health guidelines and check values)

Exceeds CSR RLm: BC CSR, Schedule 4, Schedule 5 (groundwater flow to surface water used by Marine Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential

TABLE 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) (page 1 of 3)

Sample ID	MW09-50-1	MW09-50-3	MW09-50-4 (BFD of MW09-50-3)	MW09-50-6	SV09-51-3	BH09-53-1	MW09-55-1	MW09-55-3	CSR RLmw	CCME RL
Date	18-Aug-2009	18-Aug-2009	18-Aug-2009	18-Aug-2009	18-Aug-2009	18-Aug-2009	20-Aug-2009	20-Aug-2009		
Depth (m)	0-0.30	0.76-1.07	0.76-1.07	2.44-2.74	0.91-1.22	0.61-0.91	0-0.81	2.13-2.44	ns	ns
pH	7.44	7.45	7.33	7.27	7.49	9.21	5.45	5.86	ns	ns
Antimony	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	20	20
Arsenic	10.1	< 5.0	6.1	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	25	12
Barium	120	201	227	120	142	88.0	83.2	59.1	1000	500
Beryllium	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4	4
Cadmium	< 0.50	0.83	< 0.50	< 0.50	0.53	< 0.50	< 0.50	< 0.50	2@pH<7.0 3.5@pH>=7.0<7.5 35@pH>=7.5	10
Chromium (total)	38.7	20.7	21.0	37.7	28.3	29.7	31.6	63.1*	60	64
Cobalt	14.6	7.9	7.6	13.8	9.1	9.9	11.0	8.3	50	50
Copper	88.3*	**156**	69.0*	47.7	73.4*	61.6	64.8*	63.5*	100@pH>=5.0<5.5 150@pH>=5.5 90@pH<5.0	63
Lead	< 30	139	137	67	96	45	< 30	< 30	150@pH<5.5 250@pH>=5.5<6.0 500@pH>=6.0	140
Mercury	0.102	0.429	0.452	0.109	0.616	0.285	0.145	0.0659	15	6.6
Molybdenum	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	5.7	10	10
Nickel	30.8	18.9	18.6	31.9	22.5	22.2	23.5	23.1	100	50
Selenium	< 2.0	< 2.0	< 3.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	3	1
Silver	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	20	20
Thallium	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	ns	1
Tin	< 5.0	12.7	14.7	7.8	6.8	< 5.0	< 5.0	< 5.0	50	50
Vanadium	97.9	45.9	45.0	85.6	54.2	65.1	62.8	61.3	200	130
Zinc	102	196	**314**	94.3	172	82.6	113	55.7	150@pH<6.5 300@pH>=6.5<7.0 450@pH>=7.0	200

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines for Soil, Residential/Parkland
Exceeds CSR RLmw: BC CSR, Schedule 4, Schedule 5 (groundwater flow to surface water used by Marine Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
* Concentration is less than the BC MOE Regional Background Concentration for Vancouver Island, therefore is not considered an exceedance of CSR CL, CSR RL, and CSR CSRA standards and CCME IL guidelines.

TABLE 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) (page 2 of 3)

Sample ID	MW09-55-4	MW09-55-7	MW09-55-9	TP09-69-3	TP09-69-4	TP09-72-2	TP09-72-3 (BFD of TP09-72-2)	TP09-72-6	CSR RLmw	CCME RL
Date	20-Aug-2009	20-Aug-2009	20-Aug-2009	8-Oct-2009	8-Oct-2009	8-Oct-2009	8-Oct-2009	8-Oct-2009		
Depth (m)	2.59-2.90	4.42-4.57	5.79-6.10	0.99-1.07	1.07-1.43	0.76-1.06	0.76-1.06	2.29-2.44	ns	ns
pH	6.50	7.25	7.73	7.38	7.86	7.13	7.34	7.58	ns	ns
Antimony	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	20	20
Arsenic	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**13.7**	**13.0**	< 5.0	25	12
Barium	92.4	81.5	46.1	307	72.1	156	198	70.9	1000	500
Beryllium	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4	4
Cadmium	< 0.50	< 0.50	1.24	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2@pH<7.0 3.5@pH>=7.0<7.5 35@pH>=7.5	10
Chromium (total)	87.2*	59.5	21.6	22.5	35.3	42.6	42.4	44.8	60	64
Cobalt	11.2	10.7	5.1	7.9	13.8	13.2	13.5	15.3	50	50
Copper	73.9*	58.4	34.4	**1630**	83.2*	142*	149*	52	100@pH>=5.0<5.5 150@pH>=5.5 90@pH<5.0	63
Lead	< 30	< 30	62	49	83	95	76	< 30	150@pH<5.5 250@pH>=5.5<6.0 500@pH>=6.0	140
Mercury	0.0673	0.0962	0.434	0.0158	0.107	0.293	0.257	0.0579	15	6.6
Molybdenum	**19.2**	**10.8**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	10	10
Nickel	**56.4**	40.6	14.7	24.1	25.6	29.6	31.6	31.8	100	50
Selenium	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.50	3	1
Silver	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	20	20
Thallium	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	ns	1
Tin	< 5.0	< 5.0	15.0	**107**	< 5.0	< 5.0	8.8	< 5.0	50	50
Vanadium	73.3	66.7	39.3	48.5	89.6	70.8	73.2	94.1	200	130
Zinc	78.2	82.2	75.3	**260**	86.0	**236**	**282**	64.7	150@pH<6.5 300@pH>=6.5<7.0 450@pH>=7.0	200

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines for Soil, Residential/Parkland
Exceeds CSR RLmw: BC CSR, Schedule 4, Schedule 5 (groundwater flow to surface water used by Marine Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
* Concentration is less than the BC MOE Regional Background Concentration for Vancouver Island, therefore is not considered an exceedance of CSR CL, CSR RL, and CSR CSRA standards and CCME IL guidelines.

TABLE 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) (page 3 of 3)

Sample ID	TP09-73-1	TP09-73-2	TP09-73-3	TP09-74-1	TP09-74-3	MW09-74-4	CSR RLmw	CCME RL
Date	8-Oct-2009	8-Oct-2009	8-Oct-2009	8-Oct-2009	8-Oct-2009	8-Oct-2009		
Depth (m)	0.15-0.45	0.76-1.06	1.45-1.60	0.61-0.91	1.12-1.20	1.98-2.13	ns	ns
pH	6.96	7.66	7.75	6.00	8.49	7.89	ns	ns
Antimony	< 10	< 10	< 10	< 10	< 10	< 10	20	20
Arsenic	8.1	< 5.0	9.8	< 5.0	11.3	7.8	25	12
Barium	102	89.1	180	64.8	111	222	1000	500
Beryllium	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4	4
Cadmium	< 0.50	< 0.50	1.27	< 0.50	< 0.50	0.74	2@pH<7.0 3.5@pH>=7.0<7.5 35@pH>=7.5	10
Chromium (total)	34.5	36.2	43.3	28.6	33.5	41.8	60	64
Cobalt	13.2	14.7	12.5	8.8	10.8	11.6	50	50
Copper	80.3*	77.7*	**416**	50.5	51.3	**219**	100@pH>=5.0<5.5 150@pH>=5.5 90@pH<5.0	63
Lead	39	< 30	97	< 30	129	**171**	150@pH<5.5 250@pH>=5.5<6.0 500@pH>=6.0	140
Mercury	0.225	0.0820	0.196	0.0533	0.0128	0.298	15	6.6
Molybdenum	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	10	10
Nickel	23.6	25.1	30.0	17.3	20.0	29.9	100	50
Selenium	< 3.0	< 2.0	< 2.0	< 3.0	< 2.0	< 2.0	3	1
Silver	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	20	20
Thallium	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	ns	1
Tin	< 5.0	< 5.0	6.5	< 5.0	< 5.0	8.0	50	50
Vanadium	79.2	90.2	68.9	61.3	84.7	69.4	200	130
Zinc	119	56.8	**610**	58.4	110	**575**	150@pH<6.5 300@pH>=6.5<7.0 450@pH>=7.0	200

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines for Soil, Residential/Parkland
Exceeds CSR RLmw: BC CSR, Schedule 4, Schedule 5 (groundwater flow to surface water used by Marine Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
* Concentration is less than the BC MOE Regional Background Concentration for Vancouver Island, therefore is not considered an exceedance of CSR CL, CSR RL, and CSR CSRA standards and CCME IL guidelines.

TABLE 2: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg) (page 1 of 2)

Sample ID	MW09-50-3	MW09-50-4	MW09-55-3	MW09-55-4	MW09-55-5 (BFD of MW09-55-4)	MW09-55-7	CCME RLe	CSR RLmw
Date	18-Aug-2009	18-Aug-2009	20-Aug-2009	20-Aug-2009	20-Aug-2009	20-Aug-2009		
Depth (m)	0.76-1.07	0.76-1.07	2.13-2.44	2.59-2.90	2.59-2.90	4.42-4.57	ns	ns
Acenaphthene	< 0.0050	0.0115	0.0508	0.320	0.569	0.0776	ns	ns
Acenaphthylene	0.0074	0.0085	< 0.010	0.203	< 0.060	< 0.015	ns	ns
Anthracene	0.0096	0.0298	0.0209	0.907	0.851	0.0943	2.5	ns
Benzo(a)anthracene	0.022	0.068	0.039	2.90	1.62	0.158	ns	1
Benzo(a)pyrene	0.022	0.064	< 0.025	3.27	1.23	0.113	20	1
Benzo(b)fluoranthene	0.036	0.092	< 0.20	< 3.6	< 1.6	< 0.25	ns	1
Benzo(g,h,i)perylene	0.034	0.065	0.026	1.58	0.63	0.063	ns	ns
Benzo(k)fluoranthene	0.011	0.028	< 0.080	< 2.1	< 0.70	< 0.080	ns	1
Chrysene	0.035	0.083	0.068	3.28	1.75	0.187	ns	ns
Dibenzo(a,h)anthracene	< 0.0050	0.0104	< 0.015	0.546	0.196	< 0.025	ns	1
Fluoranthene	0.046	0.151	0.106	4.13	3.33	0.334	50	ns
Fluorene	< 0.010	0.015	0.035	0.38	0.63	0.078	ns	ns
Indeno(1,2,3-c,d)pyrene	0.026	0.059	< 0.030	1.76	0.75	0.075	ns	1
2-Methylnaphthalene	0.023	0.024	0.074	0.17	0.37	0.061	ns	ns
Naphthalene	0.032	0.035	0.091	< 0.20	0.32	0.067	ns	5
Phenanthrene	0.044	0.129	0.141	3.31	4.04	0.446	ns	5
Pyrene	0.051	0.155	0.116	5.48	3.29	0.324	ns	10

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
ns - no standard listed
Exceeds CCME RLe: CCME Canadian Soil Quality Guidelines for PAH, Residential/Parkland, Environmental Health
Exceeds CSR RLmw: BC CSR, Schedule 4, Schedule 5 (groundwater flow to surface water used by Marine Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential

TABLE 2: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg) (page 2 of 2)

Sample ID	MW09-55-8	MW09-55-9	TP09-69-3	TP09-74-3	MW09-74-4	CCME RLe	CSR RLmw
Date	20-Aug-2009	20-Aug-2009	8-Oct-2009	8-Oct-2009	8-Oct-2009		
Depth (m)	5.03-5.49	5.79-6.10	0.99-1.07	1.12-1.20	1.98-2.13	ns	ns
Acenaphthene	< 0.0050	0.0172	< 0.0060	0.0160	0.0346	ns	ns
Acenaphthylene	< 0.0050	0.0166	< 0.0060	0.0245	0.0177	ns	ns
Anthracene	< 0.0040	0.0348	0.0165	0.0426	0.0499	2.5	ns
Benzo(a)anthracene	< 0.010	0.095	< 0.020	0.031	0.043	ns	1
Benzo(a)pyrene	< 0.010	0.087	< 0.010	< 0.030	0.019	20	1
Benzo(b)fluoranthene	< 0.010	0.120	0.026	0.053	0.038	ns	1
Benzo(g,h,i)perylene	< 0.010	0.048	< 0.010	0.012	0.011	ns	ns
Benzo(k)fluoranthene	< 0.010	0.043	< 0.010	0.015	< 0.010	ns	1
Chrysene	< 0.010	0.106	< 0.030	0.052	0.063	ns	ns
Dibenzo(a,h)anthracene	< 0.0050	0.0153	< 0.0050	< 0.0050	< 0.0050	ns	1
Fluoranthene	< 0.010	0.208	0.070	0.109	0.241	50	ns
Fluorene	< 0.010	0.016	< 0.020	0.056	0.043	ns	ns
Indeno(1,2,3-c,d)pyrene	< 0.010	0.055	< 0.010	0.013	0.011	ns	1
2-Methylnaphthalene	< 0.010	0.013	0.044	0.129	0.166	ns	ns
Naphthalene	< 0.010	0.034	0.182	0.203	0.389	ns	5
Phenanthrene	< 0.010	0.131	0.242	0.200	0.452	ns	5
Pyrene	< 0.010	0.194	< 0.070	0.099	0.195	ns	10

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
ns - no standard listed
Exceeds CCME RLe: CCME Canadian Soil Quality Guidelines for PAH, Residential/Parkland, Environmental Health
Exceeds CSR RLmw: BC CSR, Schedule 4, Schedule 5 (groundwater flow to surface water used by Marine Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential

TABLE 4: SOIL CHEMISTRY RESULTS - PETROLEUM HYDROCARBON FRACTIONS - COARSE (mg/kg) (page 1 of 2)

Sample ID	MW09-55-3	MW09-55-4	MW09-55-5 (BFD of MW09-55-4)	CCME RLvs	CCME RLesc	CCME sRLml	CCME sRLal	HWR
Date	**20-Aug-2009**	**20-Aug-2009**	**20-Aug-2009**					
Depth	2.13-2.44	2.59-2.90	2.59-2.90	ns	ns	ns	ns	ns
F2 (C10-16)	< 30	504	481	150	150	1000	600	ns
F3 (C16-34)	**3110**	**52300**	**41300**	ns	300	2500	ns	ns
F4 (C34-50+)	1280	7840	6090	ns	2800	10000	ns	ns
HWOG	---	*35100*	*46100*	ns	ns	ns	ns	30000

Notes:
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
Exceeds CCME RLvs: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Coarse-grained surface soil, Vapour Inhalation (indoor, slab-on-grade)
Exceeds CCME RLesc: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Coarse-grained surface soil, Eco Soil Contact
Exceeds CCME sRLml: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Subsoil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Coarse-grained subsoil, Management Limit
Exceeds CCME sRLal: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Subsoil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Coarse-grained subsoil, Protection of Groundwater for Aquatic Life
Exceeds HWR: BC Hazardous Waste Regulation for HWOG
* Analytical result has been conservatively compared to the CCME RLesc guidelines as the site topography varies and future site grading has not been determined.

TABLE 4: SOIL CHEMISTRY RESULTS - PETROLEUM HYDROCARBON FRACTIONS - COARSE (mg/kg) (page 2 of 2)

Sample ID	MW09-55-7	MW09-55-8	MW09-55-9	CCME RLvs	CCME RLesc	CCME sRLml	CCME sRLal	HWR
Date	20-Aug-2009	20-Aug-2009	20-Aug-2009					
Depth	4.42-4.57	5.03-5.49	5.79-6.10	ns	ns	700	ns	ns
F2 (C10-16)	270	< 30	66	150	150	1000	600	ns
F3 (C16-34)	**22100**	182	**5830**	ns	300	2500	ns	ns
F4 (C34-50+)	2910	57	867	ns	2800	10000	ns	ns
HWOG	---	---	---	ns	ns	ns	ns	30000

Notes:
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed

Exceeds CCME RLvs: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Coarse-grained surface soil, Vapour Inhalation (indoor, slab-on-grade)

Exceeds CCME RLesc: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Coarse-grained surface soil, Eco Soil Contact

Exceeds CCME sRLml: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Subsoil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Coarse-grained subsoil, Management Limit

Exceeds CCME sRLal: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Subsoil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Coarse-grained subsoil, Protection of Groundwater for Aquatic Life

Exceeds HWR: BC Hazardous Waste Regulation for HWOG

* Analytical result has been conservatively compared to the CCME RLesc guidelines as the site topography varies and future site grading has not been determined.

Table 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) (page 1 of 6)

Sample ID	CW-39	CW-40	CW-41	CW-42 (BFD of CW-41)	CW-55	CF-236	CF-237	CF-240	CF-241	CCME RL
Date	12-Nov-2010	12-Nov-2010	12-Nov-2010	12-Nov-2010	12-Nov-2010	24-Nov-2010	24-Nov-2010	24-Nov-2010	24-Nov-2010	
Depth (m)	0-0.4	0.25-0.45	0-0.25	0-0.25	---	---	---	---	---	ns
pH	7.70	8.20	8.30	8.29	7.34	7.43	7.79	8.04	8.06	>6<8
Antimony	1.28	0.91	1.87	1.07	1.48	0.22	1.13	0.20	0.99	20
Arsenic	4.20	6.62	4.09	4.82	4.63	3.66	5.94	4.06	4.60	12
Barium	42.8	34.3	79.8	87.1	89.2	45.4	125	90.9	98.2	500
Beryllium	0.30	0.27	0.29	0.28	0.25	0.24	0.39	0.26	0.29	4
Cadmium	0.17	0.16	0.18	0.19	0.20	< 0.10	0.28	< 0.10	0.48	10
Chromium (total)	28.1	48.0	32.8	31.7	29.7	24.0	41.9	23.6	29.4	64
Cobalt	12.0	10.4	12.5	11.7	11.3	12.7	13.6	12.4	12.6	50
Copper	65.1[1]	74.8[1]	73.2[1]	79.7[1]	72.9[1]	55.9	65.4[1]	70.7[1]	93.2[1]	63
Lead	47.3	37.1	52.3	57.3	67.5	6.66	58.0	12.7	46.1	140
Mercury	0.297	0.118	0.241	0.264	0.735	0.0473	0.359	0.0542	0.134	6.6
Molybdenum	< 0.50	2.43	< 0.50	0.54	0.74	0.60	0.83	< 0.50	0.88	10
Nickel	24.1	20.3	26.1	25.2	24.6	21.7	32.8	24.9	25.2	50
Selenium	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	1
Silver	< 0.10	0.82	< 0.10	< 0.10	< 0.10	< 0.10	0.18	< 0.10	0.11	20
Thallium	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.104	< 0.050	0.071	1
Tin	2.9	2.9	3.2	2.7	4.3	< 2.0	3.6	< 2.0	3.2	50
Uranium	0.384	0.339	0.344	0.404	0.353	0.247	0.503	0.247	0.305	23
Vanadium	59.7	53.5	75.0	72.4	54.2	61.5	78.3	76.9	72.2	130
Zinc	103	74.2	85.5	81.9	112	46.1	123	111	154	200

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
BFD - Blind Field Duplicate
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Residential/Parkland
[1] Exceeds CCME RL Guidelines but below BC CSR Protocol 4: Regional Background Soil Quality Value for one or more of the following parameters: Chromium, Copper, Nickel, Vanadium

Table 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) (page 2 of 6)

Sample ID	CW-242	CW-243	CW-244	CF-245	CF-246	CF-247	CF-248	CF-249	CF-250	CCME RL
Date	24-Nov-2010	24-Nov-2010	24-Nov-2010	24-Nov-2010	24-Nov-2010	26-Nov-2010	26-Nov-2010	26-Nov-2010	26-Nov-2010	
Depth (m)	0-0.5	0.5-0.9	0.9-1.5	---	---	---	---	---	---	ns
pH	7.08	7.79	7.20	7.91	7.90	7.61	7.55	7.99	8.15	>6<8
Antimony	2.74	0.17	0.98	0.37	0.83	0.60	0.36	0.36	0.14	20
Arsenic	10.4	3.77	8.29	3.49	4.07	3.36	8.80	4.21	4.23	12
Barium	86.3	70.1	301	68.2	71.6	74.7	173	73.9	60.3	500
Beryllium	0.34	0.30	0.58	0.29	0.25	0.30	0.48	0.29	0.30	4
Cadmium	0.22	< 0.10	2.42	0.14	0.25	0.16	< 0.10	0.14	< 0.10	10
Chromium (total)	34.0	31.1	43.6	25.3	25.3	30.5	60.2	26.8	30.4	64
Cobalt	13.8	10.8	11.9	11.0	11.8	12.7	16.8	12.6	16.2	50
Copper	63.3[1]	39.2	72.1[1]	66.4[1]	70.5[1]	60.3	45.1	55.6	63.8[1]	63
Lead	26.3	4.32	**172**	12.4	26.0	24.5	19.4	17.7	2.94	140
Mercury	0.0861	0.0367	0.518	0.482	0.317	0.353	0.0793	0.116	0.0256	6.6
Molybdenum	1.07	< 0.50	0.58	< 0.50	0.72	0.84	0.50	0.57	< 0.50	10
Nickel	26.8	21.1	39.8	24.5	25.1	26.0	41.7	25.2	27.9	50
Selenium	0.24	< 0.20	0.72	< 0.20	< 0.20	< 0.20	0.27	< 0.20	< 0.20	1
Silver	< 0.10	< 0.10	0.41	< 0.10	< 0.10	< 0.10	0.12	< 0.10	< 0.10	20
Thallium	0.074	< 0.050	0.231	< 0.050	0.052	0.055	0.102	0.051	< 0.050	1
Tin	2.2	< 2.0	34.5	< 2.0	2.1	2.4	2.7	< 2.0	< 2.0	50
Uranium	0.400	0.343	0.902	0.254	0.284	0.353	0.786	0.278	0.229	23
Vanadium	81.1	81.6	65.3	76.7	68.3	83.9	111	79.3	87.7	130
Zinc	105	36.1	**437**	69.0	94.2	69.2	48.1	58.5	44.2	200

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
BFD - Blind Field Duplicate
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Residential/Parkland
[1] Exceeds CCME RL Guidelines but below BC CSR Protocol 4: Regional Background Soil Quality Value for one or more of the following parameters: Chromium, Copper, Nickel, Vanadium

Table 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) (page 3 of 6)

Sample ID	CW-265	CW-267	CW-268	CW-272	CW-273	CW-274	CF-286	CF-287	CW-293	CCME RL
Date	26-Nov-2010	26-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010	
Depth (m)	0.7-1.4	0-0.3	0.3-1.2	1.1-1.4	0.5-1.1	0-0.2	---	---	1.0-1.5	ns
pH	8.08	7.44	7.44	7.11	7.33	6.34	8.20	6.80	6.41	>6<8
Antimony	0.81	2.59	0.85	0.68	0.21	0.58	0.27	0.88	1.12	20
Arsenic	5.55	7.02	6.84	5.66	4.87	4.90	7.12	5.96	5.94	12
Barium	126	92.8	217	95.8	77.2	69.7	97.8	118	86.9	500
Beryllium	0.37	0.24	0.40	0.28	0.38	0.25	0.50	0.42	< 0.20	4
Cadmium	0.32	0.26	1.08	0.28	< 0.10	0.21	< 0.10	0.17	0.43	10
Chromium (total)	35.7	30.7	31.9	28.9	36.6	32.4	54.4	38.4	25.4	64
Cobalt	13.1	10.0	11.1	11.6	14.6	13.8	17.3	13.0	7.39	50
Copper	69.5[1]	58.7	71.1[1]	72.1[1]	72.9[1]	62.4	56.8	47.7	49.3	63
Lead	58.0	45.7	92.7	36.6	4.13	14.5	6.63	116	43.9	140
Mercury	0.159	0.191	0.467	0.143	0.0405	0.0863	0.0672	0.127	0.413	6.6
Molybdenum	0.76	1.04	0.63	0.64	< 0.50	0.86	< 0.50	< 0.50	1.33	10
Nickel	27.8	23.7	29.7	25.5	28.1	26.5	44.1	28.2	17.0	50
Selenium	0.28	0.25	0.51	< 0.20	< 0.20	< 0.20	< 0.20	0.26	< 0.20	1
Silver	0.11	< 0.10	< 0.40	< 0.20	< 0.10	< 0.10	0.13	0.13	< 0.30	20
Thallium	0.097	0.080	0.057	< 0.050	< 0.050	< 0.050	0.061	0.057	< 0.050	1
Tin	9.6	5.6	9.2	16.8	< 2.0	< 2.0	< 2.0	7.5	7.3	50
Uranium	0.455	0.356	0.610	0.354	0.302	0.267	0.327	0.496	0.429	23
Vanadium	80.2	61.9	58.9	77.8	96.0	87.4	109	91.1	42.5	130
Zinc	125	108	**229**	140	46.4	66.8	67.9	71.1	113	200

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
BFD - Blind Field Duplicate
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Residential/Parkland
[1] Exceeds CCME RL Guidelines but below BC CSR Protocol 4: Regional Background Soil Quality Value for one or more of the following parameters: Chromium, Copper, Nickel, Vanadium

Table 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) (page 4 of 6)

Sample ID	CW-294	CW-295	CW-296	CW-297	CW-298	CW-299	CW-300	CW-499	CW-500	CCME RL
Date	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010	22-Dec-10	22-Dec-10	
Depth (m)	0.5-1.0	0-0.5	0.8-1.1	0.2-0.6	0-0.2	0.5-1.5	0-0.5	1.3-1.8	0.6-1.1	ns
pH	7.61	6.95	7.33	8.06	6.21	6.93	7.07	7.81	7.01	>6<8
Antimony	0.19	0.76	0.85	1.97	1.10	2.64	0.72	2.99	0.20	20
Arsenic	4.05	3.91	5.25	6.73	1.91	5.16	4.10	5.50	4.93	12
Barium	79.6	67.8	98.7	111	62.1	103	66.7	135	74.9	500
Beryllium	0.36	0.23	0.26	0.32	< 0.20	0.26	0.32	0.22	0.33	4
Cadmium	< 0.10	0.21	0.40	0.31	0.15	0.50	0.20	0.78	< 0.10	10
Chromium (total)	34.1	32.5	32.3	32.2	14.4	34.1	30.8	30.9	31.8	64
Cobalt	12.4	12.5	11.9	13.6	4.92	13.1	12.8	11.3	14.7	50
Copper	58.7	61.0	68.1[1]	95.0[1]	34.7	**7170**	75.7[1]	110[1]	67.9[1]	63
Lead	8.41	40.7	41.4	**200**	32.3	61.5	45.8	53.7	5.36	140
Mercury	0.0399	1.16	0.454	1.86	1.06	0.384	0.315	0.143	0.0339	6.6
Molybdenum	< 0.50	0.58	1.19	0.78	1.69	1.15	0.55	1.86	< 0.50	10
Nickel	25.7	27.1	27.4	27.5	9.92	28.7	25.9	26.2	27.8	50
Selenium	< 0.20	< 0.20	0.24	0.21	< 0.20	0.20	< 0.20	< 0.20	< 0.20	1
Silver	< 0.10	< 0.10	< 0.20	< 0.10	< 0.10	1.93	< 0.10	0.18	< 0.10	20
Thallium	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.058	< 0.050	< 0.050	< 0.050	1
Tin	5.2	7.3	7.6	9.8	6.2	**743**	7.2	4.3	< 2.0	50
Uranium	0.351	0.257	0.348	0.353	0.229	0.478	0.295	0.559	0.276	23
Vanadium	91.7	72.8	63.9	80.8	25.5	67.7	77.5	69.5	92.3	130
Zinc	45.2	90.8	126	188	57.8	167	90.1	**252**	51.5	200

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
BFD - Blind Field Duplicate
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Residential/Parkland
[1] Exceeds CCME RL Guidelines but below BC CSR Protocol 4: Regional Background Soil Quality Value for one or more of the following parameters: Chromium, Copper, Nickel, Vanadium

Table 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) (page 5 of 6)

Sample ID	CW-501 (BFD of CW-500)	CW-502	CW-503	CF-506	CW-549	CF-569	CF-605	CF-606	CF-621	CCME RL
Date	**22-Dec-10**	**22-Dec-10**	**22-Dec-10**	**22-Dec-2010**	**6-Jan-2011**	**7-Jan-2011**	**21-Jan-2011**	**21-Jan-2011**	**27-Jan-2011**	
Depth (m)	0.6-1.1	0.25-0.5	0-0.25	---	3.0-4.0	---	---	---	---	ns
pH	7.00	6.98	6.76	7.58	7.79	8.08	**8.28**	**8.49**	7.96	>6<8
Antimony	0.21	0.15	0.95	0.30	0.62	0.30	0.21	0.13	< 0.10	20
Arsenic	5.08	4.13	4.50	7.53	7.63	3.48	3.84	3.24	2.71	12
Barium	80.7	68.8	66.4	115	104	72.3	75.2	66.4	39.6	500
Beryllium	0.34	0.26	0.23	0.42	0.54	0.28	0.33	0.30	< 0.20	4
Cadmium	< 0.10	0.10	0.19	0.12	< 0.10	0.12	< 0.10	< 0.10	0.15	10
Chromium (total)	34.6	28.9	28.1	52.2	62.8	30.5	32.7	32.4	11.7	64
Cobalt	15.8	14.3	12.1	17.8	19.1	13.7	14.1	13.9	5.60	50
Copper	70.9[1]	76.6[1]	70.6[1]	57.8	65.0[1]	68.9[1]	61.2	66.2[1]	13.0	63
Lead	6.05	3.58	26.3	11.4	6.54	9.64	8.22	3.70	5.23	140
Mercury	0.0365	0.0241	0.117	0.0693	0.0992	0.0424	0.0837	0.0354	0.0341	6.6
Molybdenum	< 0.50	< 0.50	1.32	0.55	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	10
Nickel	29.9	26.7	24.6	44.2	48.9	25.9	28.7	27.6	9.38	50
Selenium	< 0.20	< 0.20	< 0.20	< 0.20	0.22	< 0.20	< 0.20	< 0.20	< 0.20	1
Silver	< 0.10	< 0.10	< 0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10	0.11	20
Thallium	< 0.050	< 0.050	< 0.050	0.065	0.066	< 0.050	< 0.050	< 0.050	< 0.050	1
Tin	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	50
Uranium	0.293	0.216	0.253	0.331	0.347	0.266	0.247	0.236	0.291	23
Vanadium	93.0	81.9	65.0	101	115	82.3	92.1	82.4	36.3	130
Zinc	55.8	45.3	83.9	78.9	81.1	51.2	53.4	46.3	31.4	200

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
BFD - Blind Field Duplicate
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Residential/Parkland
[1] Exceeds CCME RL Guidelines but below BC CSR Protocol 4: Regional Background Soil Quality Value for one or more of the following parameters: Chromium, Copper, Nickel, Vanadium

Table 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) (page 6 of 6)

Sample ID	CW-622	CW-623	CW-624	CW-625	CW-626	CW-634	CCME RL
Date	25-Jan-2011	25-Jan-2011	25-Jan-2011	25-Jan-2011	25-Jan-2011	25-Jan-2011	
Depth (m)	0.5-0.9	0-0.3	4-4.5	2.1-2.6	1.5-1.9	0-0.5	ns
pH	7.41	7.99	7.63	**8.38**	**8.11**	7.44	>6<8
Antimony	0.31	0.25	0.37	0.30	0.23	0.18	20
Arsenic	5.34	4.06	9.28	7.58	4.43	4.03	12
Barium	130	83.3	159	131	81.8	82.4	500
Beryllium	0.52	0.34	0.43	0.52	0.30	0.35	4
Cadmium	< 0.10	< 0.10	0.46	< 0.10	< 0.10	< 0.10	10
Chromium (total)	57.6	27.3	40.9	58.4	28.2	31.0	64
Cobalt	17.7	13.8	13.6	19.7	13.9	13.3	50
Copper	63.2[1]	58.8	50.0	67.3[1]	61.1	58.7	63
Lead	9.44	8.34	88.0	8.65	6.17	5.18	140
Mercury	0.0688	0.0525	0.213	0.0766	0.149	0.0399	6.6
Molybdenum	< 0.50	< 0.50	0.51	< 0.50	< 0.50	< 0.50	10
Nickel	44.9	25.5	33.3	48.6	25.1	25.8	50
Selenium	< 0.20	< 0.20	0.44	< 0.20	< 0.20	< 0.20	1
Silver	0.14	< 0.10	0.15	0.10	< 0.10	< 0.10	20
Thallium	0.066	< 0.050	0.052	0.065	< 0.050	< 0.050	1
Tin	< 2.0	2.2	7.3	< 2.0	< 2.0	< 2.0	50
Uranium	0.430	0.251	0.427	0.339	0.245	0.279	23
Vanadium	117	84.8	75.8	118	86.6	82.9	130
Zinc	70.4	51.5	127	82.1	54.9	46.9	200

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
BFD - Blind Field Duplicate
Exceeds CCME RL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Residential/Parkland
[1] Exceeds CCME RL Guidelines but below BC CSR Protocol 4: Regional Background Soil Quality Value for one or more of the following parameters: Chromium, Copper, Nickel, Vanadium

Table 2: SOIL CHEMISTRY RESULTS - PETROLEUM HYDROCARBON FRACTIONS - COARSE (mg/kg) (page 1 of 1)

Sample ID	CF-287	CW-294	CW-297	CW-300	CCME RLesc	CCME sRLml
Date	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010		
Depth	---	0.5-1.0	0.2-0.6	0-0.5	0-3	>3
F1 (C6-10)	---	---	---	---	210	700
F2 (C10-16)	< 30	< 30	< 30	< 30	150	1000
F3 (C16-34)	< 50	< 50	248	198	300	2500
F4 (C34-50+)	< 50	< 50	251	434	2800	10000
PSA % > 75um	51.7	60.3	60.3	60.3	>50<100	>50<100

Notes:
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
BFD - blind field duplicate
Exceeds CCME RLesc: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Coarse-grained surface soil, Eco Soil Contact
Exceeds CCME sRLml: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Subsoil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Coarse-grained subsoil, Management Limit

Table 3: SOIL CHEMISTRY RESULTS - PETROLEUM HYDROCARBON FRACTIONS - FINE (mg/kg) (page 1 of 1)

Sample ID	CF-286	CW-293	CW-295	CW-296	CW-298	CW-299	CCME RLescf	CCME sRLmlf
Date	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010	29-Nov-2010		
Depth	---	1.0-1.5	0-0.5	0.8-1.1	0-0.2	0.5-1.5	0-3	>3
F1 (C6-10)	---	---	---	---	---	---	210	800
F2 (C10-16)	< 30	48	< 30	< 30	< 42	< 33	150	1000
F3 (C16-34)	< 50	1200	387	795	598	1070	1300	3500
F4 (C34-50+)	< 50	458	319	434	628	474	5600	10000
PSA % > 75um	15.5	40.5	18.1	40.5	18.1	40.5	< 50	< 50

Notes:
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
BFD - blind field duplicate
Exceeds CCME RLescf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Fine-grained surface soil, Eco Soil Contact
Exceeds CCME sRLmlf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Subsoil, Tier 1 Levels for PHC fractions(F1-F4) for Residential Fine-grained subsoil, Management Limit

Table 4: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg) (page 1 of 1)

Sample ID	CW-40	CW-41	CW-42 (BFD of CW-41)	CW-272	CCME RLsc	CCME RLsf	CCME RLi	CCME RLe
Date	12-Nov-2010	12-Nov-2010	12-Nov-2010	29-Nov-2010				
Depth (m)	0.25-0.45	0-0.25	0-0.25	1.1-1.4	ns	ns	ns	ns
Acenaphthene	0.0088	0.0203	0.0145	< 0.0050	ns	21.5	ns	ns
Acenaphthylene	0.0084	0.138	0.197	0.0087	ns	ns	ns	ns
Anthracene	0.0167	0.118	0.102	0.0132	2.5	61.5	ns	2.5
Benzo(a)anthracene	0.042	0.309	0.313	0.022	ns	6.2	1	ns
Benzo(a)pyrene	0.055	0.453	0.565	0.017	20	0.6	ns	20
Benzo(b)fluoranthene	0.065	0.536	0.661	0.021	ns	6.2	1	ns
Benzo(g,h,i)perylene	0.028	0.219	0.264	0.011	ns	ns	ns	ns
Benzo(k)fluoranthene	0.025	0.204	0.247	< 0.010	ns	6.2	1	ns
Chrysene	0.048	0.336	0.349	0.028	ns	6.2	ns	ns
Dibenzo(a,h)anthracene	0.0071	0.0601	0.0756	< 0.0050	ns	ns	1	ns
Fluoranthene	0.088	0.545	0.477	0.055	50	15.4	ns	50
Fluorene	< 0.010	0.033	< 0.030	< 0.010	ns	15.4	ns	ns
Indeno(1,2,3-c,d)pyrene	0.032	0.283	0.352	< 0.010	ns	ns	1	ns
2-Methylnaphthalene	0.015	0.023	0.040	0.022	ns	ns	ns	ns
Naphthalene	0.040	0.042	0.054	0.051	ns	8.8	ns	0.6
Phenanthrene	0.064	0.350	0.244	0.085	ns	43	5	ns
Pyrene	0.082	0.573	0.587	0.064	ns	7.7	10	ns

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard/guideline listed
Exceeds CCME RLsc: CCME Canadian Soil Quality Guidelines for PAH, Residential/Parkland, Environmental Health guidelines, Soil Contact
Exceeds CCME RLsf: CCME Canadian Soil Quality Guidelines for PAH, Residential/Parkland, Environmental Health guidelines, Soil and Food Ingestion
Exceeds CCME RLi: CCME Canadian Soil Quality Guidelines for PAH, Residential/Parkland, Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
Exceeds CCME RLe: CCME Canadian Soil Quality Guidelines for PAH, Residential/Parkland, Environmental Health guidelines, Environmental Health

TABLE 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) [1 of 4]

Sample ID	TP15-02-B	TP15-02-E	TP15-03-B	TP15-03-C (BFD of TP15-03-B)	TP15-03-E	CSR NL	CSR RLfw	CSR CLfw	CCME CL
Date	**27-May-2015**	**27-May-2015**	**27-May-2015**	**27-May-2015**	**27-May-2015**				
Depth (m)	**0.61 - 1.52**	**3.05 - 3.96**	**0.91 - 1.83**	**0.91 - 1.83**	**2.44 - 3.05**				
pH	7.73	7.86	7.68	7.64	7.91	ns	ns	ns	ns
Aluminum	13300	11700	11200	11400	12800	ns	ns	ns	ns
Antimony	< 0.10	0.12	0.20	0.21	0.18	20	20	40	40
Arsenic	2.26	3.11	2.17	2.22	2.15	15	20	20	12
Barium	137	141	200	182	144	400	1000	1500	2000
Beryllium	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	4	4	8	8
Bismuth	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	ns	ns	ns	ns
Cadmium	0.652	0.672	0.851	0.936	0.600	1.5	2@pH<7.0 2.5@pH>=7.0<7.5 25@pH>=7.5<8.0 35@pH>=8.0	2@pH<7.0 2.5@pH>=7.0<7.5 25@pH>=7.5<8.0 100@pH>=8.0	22
Chromium (total)	15.1	16.6	21.3	15.2	16.4	60	300	700	87
Cobalt	6.11	6.12	5.18	5.23	6.03	50	50	300	300
Copper	33.9	33.7	41.8	40.4	51.3	90	90@pH<5.0 100@pH>=5.0<5.5 150@pH>=5.5	90@pH<5.0 100@pH>=5.0<5.5 200@pH>=5.5<6.0 250@pH>=6.0	91
Iron	14900	14800	13800	13500	15600	ns	ns	ns	ns
Lead	12.8	9.69	*105*	*149*	68.7	100	150@pH<5.5 250@pH>=5.5<6.0 400@pH>=6.0	150@pH<5.5 250@pH>=5.5<6.0 700@pH>=6.0	260
Lithium	7.0	8.0	7.1	6.5	7.5	ns	1600	20000	ns
Magnesium	4260	4100	3380	3360	4650	ns	ns	ns	ns
Manganese	515	557	560	586	482	ns	1800	ns	ns
Mercury	< 0.050	< 0.050	0.259	0.237	0.121	15	15	40	24
Molybdenum	0.25	0.38	0.29	0.28	0.26	10	10	40	40
Nickel	12.8	13.3	11.6	12.1	13.3	100	100	500	50
Selenium	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3	3	10	2.9
Silver	0.129	0.115	0.221	0.225	0.143	20	20	40	40
Strontium	562	663	757	665	653	ns	47000	100000	ns
Thallium	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	ns	ns	ns	1
Tin	1.20	0.81	7.02	6.01	5.18	50	50	300	300
Titanium	362	367	281	257	377	ns	ns	ns	ns
Uranium	0.312	0.354	0.348	0.357	0.328	ns	16	200	33
Vanadium	30.7	31.3	21.8	21.7	31.5	200	200	ns	130
Zinc	104	115	164	159	121	150	150@pH<6.0 300@pH>=6.0<6.5 450@pH>=6.5	150@pH<6.0 300@pH>=6.0<6.5 600@pH>=6.5	360

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
* Value is less than Vancouver Island regional background level as per CSR Protocol 4, therefore it is not considered an exceedence of CCME guidelines or CSR standards
ns - no standard listed

ITALICS	Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
UNDERLINED	Exceeds CSR RLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
BOLD	Exceeds CSR CLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Commercial
SHADE	Exceeds CCME CL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Commercial

TABLE 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) [2 of 4]

Sample ID	TP15-03-G	TP15-04-A	TP15-04-C	TP15-04-D	TP15-05-B	CSR NL	CSR RLfw	CSR CLfw	CCME CL
Date	27-May-2015	27-May-2015	27-May-2015	27-May-2015	27-May-2015				
Depth (m)	3.96 - 4.88	0 - 0.61	1.52 - 2.13	2.13 - 2.74	0.91 - 1.83				
pH	7.96	7.83	7.97	7.81	7.80	ns	ns	ns	ns
Aluminum	9750	13900	14000	13600	33700	ns	ns	ns	ns
Antimony	0.13	0.34	0.13	0.27	0.18	20	20	40	40
Arsenic	3.21	2.85	2.81	3.22	2.67	15	20	20	12
Barium	158	147	150	156	37.7	400	1000	1500	2000
Beryllium	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	4	4	8	8
Bismuth	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	ns	ns	ns	ns
Cadmium	0.595	0.668	0.676	0.668	0.197	1.5	2@pH<7.0 2.5@pH>=7.0<7.5 25@pH>=7.5<8.0 35@pH>=8.0	2@pH<7.0 2.5@pH>=7.0<7.5 25@pH>=7.5<8.0 100@pH>=8.0	22
Chromium (total)	13.8	18.8	16.9	17.9	41.4	60	300	700	87
Cobalt	4.91	6.53	6.56	6.43	24.1	50	50	300	300
Copper	33.4	37.2	36.3	39.5	59.5	90	90@pH<5.0 100@pH>=5.0<5.5 150@pH>=5.5	90@pH<5.0 100@pH>=5.0<5.5 200@pH>=5.5<6.0 250@pH>=6.0	91
Iron	13500	17000	16000	16400	52200	ns	ns	ns	ns
Lead	10.7	72.7	19.2	82.7	13.1	100	150@pH<5.5 250@pH>=5.5<6.0 400@pH>=6.0	150@pH<5.5 250@pH>=5.5<6.0 700@pH>=6.0	260
Lithium	7.4	8.5	8.5	8.1	11.6	ns	1600	20000	ns
Magnesium	3530	5340	5170	4530	22300	ns	ns	ns	ns
Manganese	571	523	532	502	1110	ns	1800	ns	ns
Mercury	< 0.050	0.137	0.052	0.281	0.063	15	15	40	24
Molybdenum	0.25	0.45	0.29	0.36	0.40	10	10	40	40
Nickel	13.2	15.5	14.6	14.6	30.9	100	100	500	50
Selenium	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3	3	10	2.9
Silver	0.111	0.143	0.137	0.169	0.076	20	20	40	40
Strontium	662	614	597	574	46.8	ns	47000	100000	ns
Thallium	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	ns	ns	ns	1
Tin	1.05	5.79	1.70	6.82	0.46	50	50	300	300
Titanium	310	460	428	421	1070	ns	ns	ns	ns
Uranium	0.286	0.506	0.363	0.370	0.200	ns	16	200	33
Vanadium	25.7	34.3	33.7	34.1	116	200	200	ns	130
Zinc	102	122	113	147	85.8	150	150@pH<6.0 300@pH>=6.0<6.5 450@pH>=6.5	150@pH<6.0 300@pH>=6.0<6.5 600@pH>=6.5	360

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
* Value is less than Vancouver Island regional background level as per CSR Protocol 4, therefore it is not considered an exceedence of CCME guidelines or CSR standards
ns - no standard listed

ITALICS	Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
UNDERLINED	Exceeds CSR RLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
BOLD	Exceeds CSR CLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Commercial
SHADE	Exceeds CCME CL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Commercial

TABLE 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) [3 of 4]

Sample ID	TP15-05-C	TP15-06-B	TP15-06-C (BFD of TP15-06-B)	TP15-06-E	CSR NL	CSR RLfw	CSR CLfw	CCME CL
Date	**27-May-2015**	**27-May-2015**	**27-May-2015**	**27-May-2015**				
Depth (m)	**1.83 - 2.74**	**0.91 - 1.52**	**0.91 - 1.52**	**2.44 - 3.05**				
pH	7.98	7.33	7.39	7.85	ns	ns	ns	ns
Aluminum	22300	21900	21700	20100	ns	ns	ns	ns
Antimony	0.22	1.64	1.82	0.36	20	20	40	40
Arsenic	3.64	10.7	7.87	4.73	15	20	20	12
Barium	54.1	153	153	83.7	400	1000	1500	2000
Beryllium	< 0.40	< 0.40	0.42	0.42	4	4	8	8
Bismuth	< 0.10	0.17	0.23	< 0.10	ns	ns	ns	ns
Cadmium	0.341	*1.56*	*1.53*	0.335	1.5	2@pH<7.0 2.5@pH>=7.0<7.5 25@pH>=7.5<8.0 35@pH>=8.0	2@pH<7.0 2.5@pH>=7.0<7.5 25@pH>=7.5<8.0 100@pH>=8.0	22
Chromium (total)	33.5	36.2	36.9	30.4	60	300	700	87
Cobalt	15.3	14.7	13.4	10.5	50	50	300	300
Copper	49.3	*115*	*118*	43.8	90	90@pH<5.0 100@pH>=5.0<5.5 150@pH>=5.5	90@pH<5.0 100@pH>=5.0<5.5 200@pH>=5.5<6.0 250@pH>=6.0	91
Iron	34200	37200	35500	26100	ns	ns	ns	ns
Lead	18.6	*131*	*138*	27.5	100	150@pH<5.5 250@pH>=5.5<6.0 400@pH>=6.0	150@pH<5.5 250@pH>=5.5<6.0 700@pH>=6.0	260
Lithium	10.8	14.7	13.6	12.4	ns	1600	20000	ns
Magnesium	12200	8450	8280	7640	ns	ns	ns	ns
Manganese	737	930	922	496	ns	1800	ns	ns
Mercury	0.123	2.95	3.04	0.190	15	15	40	24
Molybdenum	0.97	1.59	1.47	0.80	10	10	40	40
Nickel	23.9	34.5	32.2	22.1	100	100	500	50
Selenium	< 0.50	< 0.50	< 0.50	< 0.50	3	3	10	2.9
Silver	0.082	0.211	0.250	0.107	20	20	40	40
Strontium	76.9	73.8	75.8	140	ns	47000	100000	ns
Thallium	< 0.050	< 0.050	< 0.050	< 0.050	ns	ns	ns	1
Tin	1.19	8.86	9.23	2.09	50	50	300	300
Titanium	783	882	919	835	ns	ns	ns	ns
Uranium	0.371	0.416	0.435	0.469	ns	16	200	33
Vanadium	76.4	63.9	62.2	69.0	200	200	ns	130
Zinc	88.0	***2170***	***2170***	82.0	150	150@pH<6.0 300@pH>=6.0<6.5 450@pH>=6.5	150@pH<6.0 300@pH>=6.0<6.5 600@pH>=6.5	360

Notes:
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mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
* Value is less than Vancouver Island regional background level as per CSR Protocol 4, therefore it is not considered an exceedence of CCME guidelines or CSR standards
ns - no standard listed

ITALICS	Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
UNDERLINED	Exceeds CSR RLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
BOLD	Exceeds CSR CLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Commercial
SHADE	Exceeds CCME CL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Commercial

TABLE 1: SOIL CHEMISTRY RESULTS - METALS PARAMETERS (mg/kg) [4 of 4]

Sample ID	TP15-07-C	TP15-07-D	TP15-07-E (BFD of TP15-17-D)	TP15-07-G	CSR NL	CSR RLfw	CSR CLfw	CCME CL
Date	28-May-2015	28-May-2015	28-May-2015	28-May-2015				
Depth (m)	1.83 - 2.74	2.74 - 3.66	2.74 - 3.66	4.57 - 5.18				
pH	7.72	7.41	7.33	7.29	ns	ns	ns	ns
Aluminum	19400	18700	16100	24700	ns	ns	ns	ns
Antimony	1.56	0.92	0.85	0.60	20	20	40	40
Arsenic	6.50	5.06	4.90	4.71	15	20	20	12
Barium	128	99.3	97.4	108	400	1000	1500	2000
Beryllium	0.45	< 0.40	< 0.40	0.49	4	4	8	8
Bismuth	0.16	< 0.10	< 0.10	< 0.10	ns	ns	ns	ns
Cadmium	0.530	0.623	0.505	0.298	1.5	2@pH<7.0 2.5@pH>=7.0<7.5 25@pH>=7.5<8.0 35@pH>=8.0	2@pH<7.0 2.5@pH>=7.0<7.5 25@pH>=7.5<8.0 100@pH>=8.0	22
Chromium (total)	39.0	33.6	27.4	41.1	60	300	700	87
Cobalt	12.6	10.6	10.6	15.0	50	50	300	300
Copper	*105*	59.7	56.3	42.9	90	90@pH<5.0 100@pH>=5.0<5.5 150@pH>=5.5	90@pH<5.0 100@pH>=5.0<5.5 200@pH>=5.5<6.0 250@pH>=6.0	91
Iron	32900	25800	23600	32700	ns	ns	ns	ns
Lead	78.3	67.6	57.7	30.9	100	150@pH<5.5 250@pH>=5.5<6.0 400@pH>=6.0	150@pH<5.5 250@pH>=5.5<6.0 700@pH>=6.0	260
Lithium	15.1	12.1	11.2	17.4	ns	1600	20000	ns
Magnesium	7880	7340	6450	9170	ns	ns	ns	ns
Manganese	808	542	464	435	ns	1800	ns	ns
Mercury	1.81	1.55	1.73	0.346	15	15	40	24
Molybdenum	1.26	1.37	0.82	0.68	10	10	40	40
Nickel	33.7	26.5	23.4	31.6	100	100	500	50
Selenium	< 0.50	< 0.50	< 0.50	< 0.50	3	3	10	2.9
Silver	0.177	0.142	0.828	0.077	20	20	40	40
Strontium	80.6	160	76.7	60.8	ns	47000	100000	ns
Thallium	0.061	0.082	< 0.050	0.061	ns	ns	ns	1
Tin	14.0	9.15	4.41	2.64	50	50	300	300
Titanium	771	878	777	955	ns	ns	ns	ns
Uranium	0.373	0.514	0.388	0.503	ns	16	200	33
Vanadium	67.2	58.4	53.3	84.1	200	200	ns	130
Zinc	204	157	148	91.9	150	150@pH<6.0 300@pH>=6.0<6.5 450@pH>=6.5	150@pH<6.0 300@pH>=6.0<6.5 600@pH>=6.5	360

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
* Value is less than Vancouver Island regional background level as per CSR Protocol 4, therefore it is not considered an exceedence of CCME guidelines or CSR standards
ns - no standard listed

ITALICS	Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
UNDERLINED	Exceeds CSR RLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
BOLD	Exceeds CSR CLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Commercial
SHADE	Exceeds CCME CL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Commercial

TABLE 2: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg) [1 of 6]

Sample ID	TP15-02-B	TP15-02-E	TP15-03-B	TP15-03-C (BFD of TP15-03-B)	CSR NL	CSR RLfw	CSR CLfw	CCME CLe	CCME CLi	CCME CLfl	CCME CLsc	CCME TPE
Date	**27-May-2015**	**27-May-2015**	**27-May-2015**	**27-May-2015**								
Depth (m)	**0.61 - 1.52**	**3.05 - 3.96**	**0.91 - 1.83**	**0.91 - 1.83**								
Acenaphthene	< 0.0050	< 0.0050	< 0.0050	< 0.0050	ns	ns	ns	ns	ns	0.28	ns	ns
Acenaphthylene	< 0.0050	< 0.0050	0.0053	0.0051	ns	ns	ns	ns	ns	320	ns	ns
Anthracene	< 0.0040	< 0.0040	0.0043	< 0.0040	ns	ns	ns	32	ns	ns	32	ns
Benzo(a)anthracene	< 0.020	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Benzo(a)pyrene	< 0.020	< 0.020	< 0.020	< 0.020	1	1	10	72	ns	8800	72	ns
Benzo(b)fluoranthene	< 0.020	< 0.020	0.022	0.028	1	1	10	ns	10	ns	ns	ns
Benzo(g,h,i)perylene	< 0.050	< 0.050	< 0.050	< 0.050	ns	ns	ns	ns	ns	ns	ns	ns
Benzo(k)fluoranthene	< 0.020	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Chrysene	< 0.020	< 0.020	0.027	0.029	ns	ns	ns	ns	ns	ns	ns	ns
Dibenz(a,h)anthracene	< 0.050	< 0.050	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
Fluoranthene	< 0.020	< 0.020	0.040	0.041	ns	ns	ns	180	ns	ns	180	ns
Fluorene	< 0.020	< 0.020	< 0.020	< 0.020	ns	ns	ns	ns	ns	0.25	ns	ns
Indeno(1,2,3-c,d)pyrene	< 0.050	< 0.050	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
2-Methylnaphthalene	< 0.020	< 0.020	< 0.020	< 0.020	ns	ns	ns	ns	ns	ns	ns	ns
Naphthalene	< 0.010	0.011	< 0.010	< 0.010	5	5	50	22	ns	0.013	ns	ns
Phenanthrene	< 0.020	< 0.020	0.021	< 0.020	5	5	50	ns	50	0.046	ns	ns
Pyrene	< 0.020	< 0.020	0.035	0.034	10	10	100	ns	100	ns	ns	ns
Benzo(a)pyrene Equivalency	< 0.10	< 0.10	< 0.10	< 0.10	ns	ns	ns	ns	ns	ns	ns	5.3

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard/guideline listed
TPE - Total Potency Equivalency (1X10-5). This is only applicable in the top 1.5m

ITALICS	Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
UNDERLINED	Exceeds CSR RLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
BOLD	Exceeds CSR CLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Commercial
SHADE	Exceeds CCME CLe: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Environmental Health
SHADE	Exceeds CCME CLi: CCME Canadian Soil Quality Guidelines for PAH, Commerical, Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
SHADE	Exceeds CCME CLfl: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Protection of Freshwater Life
SHADE	Exceeds CCME CLsc: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Soil Contact
SHADE	Exceeds CCME TPE: CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - TPE Calculation

TABLE 2: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg) [2 of 6]

Sample ID	TP15-03-E	TP15-03-G	TP15-04-A	CSR NL	CSR RLfw	CSR CLfw	CCME CLe	CCME CLi	CCME CLfl	CCME CLsc	CCME TPE
Date	27-May-2015	27-May-2015	27-May-2015								
Depth (m)	2.44 - 3.05	3.96 - 4.88	0 - 0.61								
Acenaphthene	< 0.0050	< 0.0050	< 0.0050	ns	ns	ns	ns	ns	0.28	ns	ns
Acenaphthylene	< 0.0050	< 0.0050	< 0.0050	ns	ns	ns	ns	ns	320	ns	ns
Anthracene	0.0047	< 0.0040	< 0.0040	ns	ns	ns	32	ns	ns	32	ns
Benzo(a)anthracene	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Benzo(a)pyrene	< 0.020	< 0.020	< 0.020	1	1	10	72	ns	8800	72	ns
Benzo(b)fluoranthene	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Benzo(g,h,i)perylene	< 0.050	< 0.050	< 0.050	ns	ns	ns	ns	ns	ns	ns	ns
Benzo(k)fluoranthene	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Chrysene	0.022	< 0.020	< 0.020	ns	ns	ns	ns	ns	ns	ns	ns
Dibenz(a,h)anthracene	< 0.050	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
Fluoranthene	0.033	< 0.020	0.026	ns	ns	ns	180	ns	ns	180	ns
Fluorene	< 0.020	< 0.020	< 0.020	ns	ns	ns	ns	ns	0.25	ns	ns
Indeno(1,2,3-c,d)pyrene	< 0.050	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
2-Methylnaphthalene	< 0.020	< 0.020	< 0.020	ns	ns	ns	ns	ns	ns	ns	ns
Naphthalene	< 0.010	< 0.010	< 0.010	5	5	50	22	ns	0.013	ns	ns
Phenanthrene	< 0.020	< 0.020	< 0.020	5	5	50	ns	50	0.046	ns	ns
Pyrene	0.032	< 0.020	0.022	10	10	100	ns	100	ns	ns	ns
Benzo(a)pyrene Equivalency	< 0.10	< 0.10	< 0.10	ns	ns	ns	ns	ns	ns	ns	5.3

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard/guideline listed
TPE - Total Potency Equivalency (1X10-5). This is only applicable in the top 1.5m

ITALICS	Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
UNDERLINED	Exceeds CSR RLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
BOLD	Exceeds CSR CLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Commercial
SHADE	Exceeds CCME CLe: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Environmental Health
SHADE	Exceeds CCME CLi: CCME Canadian Soil Quality Guidelines for PAH, Commerical, Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
SHADE	Exceeds CCME CLfl: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Protection of Freshwater Life
SHADE	Exceeds CCME CLsc: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Soil Contact
SHADE	Exceeds CCME TPE: CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - TPE Calculation

TABLE 2: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg) [3 of 6]

Sample ID	TP15-04-C	TP15-04-D	TP15-05-B	CSR NL	CSR RLfw	CSR CLfw	CCME CLe	CCME CLi	CCME CLfl	CCME CLsc	CCME TPE
Date	27-May-2015	27-May-2015	27-May-2015								
Depth (m)	1.52 - 2.13	2.13 - 2.74	0.91 - 1.83								
Acenaphthene	< 0.0050	< 0.0050	< 0.0050	ns	ns	ns	ns	ns	0.28	ns	ns
Acenaphthylene	< 0.0050	0.0051	< 0.0050	ns	ns	ns	ns	ns	320	ns	ns
Anthracene	< 0.0040	0.0040	< 0.0040	ns	ns	ns	32	ns	ns	32	ns
Benzo(a)anthracene	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Benzo(a)pyrene	< 0.020	< 0.020	< 0.020	1	1	10	72	ns	8800	72	ns
Benzo(b)fluoranthene	< 0.020	0.023	< 0.020	1	1	10	ns	10	ns	ns	ns
Benzo(g,h,i)perylene	< 0.050	< 0.050	< 0.050	ns	ns	ns	ns	ns	ns	ns	ns
Benzo(k)fluoranthene	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Chrysene	< 0.020	0.029	< 0.020	ns	ns	ns	ns	ns	ns	ns	ns
Dibenz(a,h)anthracene	< 0.050	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
Fluoranthene	< 0.020	0.045	< 0.020	ns	ns	ns	180	ns	ns	180	ns
Fluorene	< 0.020	< 0.020	< 0.020	ns	ns	ns	ns	ns	0.25	ns	ns
Indeno(1,2,3-c,d)pyrene	< 0.050	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
2-Methylnaphthalene	< 0.020	< 0.020	< 0.020	ns	ns	ns	ns	ns	ns	ns	ns
Naphthalene	< 0.010	< 0.010	< 0.010	5	5	50	22	ns	0.013	ns	ns
Phenanthrene	< 0.020	0.025	< 0.020	5	5	50	ns	50	0.046	ns	ns
Pyrene	< 0.020	0.041	< 0.020	10	10	100	ns	100	ns	ns	ns
Benzo(a)pyrene Equivalency	< 0.10	< 0.10	< 0.10	ns	ns	ns	ns	ns	ns	ns	5.3

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard/guideline listed
TPE - Total Potency Equivalency (1X10-5). This is only applicable in the top 1.5m

ITALICS	Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
UNDERLINED	Exceeds CSR RLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
BOLD	Exceeds CSR CLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Commercial
SHADE	Exceeds CCME CLe: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Environmental Health
SHADE	Exceeds CCME CLi: CCME Canadian Soil Quality Guidelines for PAH, Commerical, Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
SHADE	Exceeds CCME CLfl: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Protection of Freshwater Life
SHADE	Exceeds CCME CLsc: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Soil Contact
SHADE	Exceeds CCME TPE: CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - TPE Calculation

TABLE 2: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg) [4 of 6]

Sample ID	TP15-05-C	TP15-06-B	TP15-06-C (BFD of TP15-06-B)	CSR NL	CSR RLfw	CSR CLfw	CCME CLe	CCME CLi	CCME CLfl	CCME CLsc	CCME TPE
Date	**27-May-2015**	**27-May-2015**	**27-May-2015**								
Depth (m)	**1.83 - 2.74**	**0.91 - 1.52**	**0.91 - 1.52**								
Acenaphthene	< 0.0050	< 0.0050	< 0.0050	ns	ns	ns	ns	ns	0.28	ns	ns
Acenaphthylene	< 0.0050	0.012	0.010	ns	ns	ns	ns	ns	320	ns	ns
Anthracene	< 0.0040	0.0080	0.0067	ns	ns	ns	32	ns	ns	32	ns
Benzo(a)anthracene	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Benzo(a)pyrene	< 0.020	< 0.020	< 0.020	1	1	10	72	ns	8800	72	ns
Benzo(b)fluoranthene	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Benzo(g,h,i)perylene	< 0.050	< 0.050	< 0.050	ns	ns	ns	ns	ns	ns	ns	ns
Benzo(k)fluoranthene	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Chrysene	< 0.020	0.025	0.021	ns	ns	ns	ns	ns	ns	ns	ns
Dibenz(a,h)anthracene	< 0.050	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
Fluoranthene	0.022	0.10	0.082	ns	ns	ns	180	ns	ns	180	ns
Fluorene	< 0.020	< 0.020	< 0.020	ns	ns	ns	ns	ns	0.25	ns	ns
Indeno(1,2,3-c,d)pyrene	< 0.050	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
2-Methylnaphthalene	< 0.020	0.027	0.022	ns	ns	ns	ns	ns	ns	ns	ns
Naphthalene	< 0.010	0.055	0.041	5	5	50	22	ns	0.013	ns	ns
Phenanthrene	< 0.020	0.096	0.076	5	5	50	ns	50	0.046	ns	ns
Pyrene	< 0.020	0.071	0.062	10	10	100	ns	100	ns	ns	ns
Benzo(a)pyrene Equivalency	< 0.10	< 0.10	< 0.10	ns	ns	ns	ns	ns	ns	ns	5.3

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard/guideline listed
TPE - Total Potency Equivalency (1X10-5). This is only applicable in the top 1.5m

ITALICS	Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
UNDERLINED	Exceeds CSR RLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
BOLD	Exceeds CSR CLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Commercial
SHADE	Exceeds CCME CLe: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Environmental Health
SHADE	Exceeds CCME CLi: CCME Canadian Soil Quality Guidelines for PAH, Commerical, Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
SHADE	Exceeds CCME CLfl: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Protection of Freshwater Life
SHADE	Exceeds CCME CLsc: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Soil Contact
SHADE	Exceeds CCME TPE: CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - TPE Calculation

TABLE 2: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg) [5 of 6]

Sample ID	TP15-06-E	TP15-07-C	TP15-07-D	CSR NL	CSR RLfw	CSR CLfw	CCME CLe	CCME CLi	CCME CLfl	CCME CLsc	CCME TPE
Date	27-May-2015	28-May-2015	28-May-2015								
Depth (m)	2.44 - 3.05	1.83 - 2.74	2.74 - 3.66								
Acenaphthene	< 0.0050	< 0.0050	0.017	ns	ns	ns	ns	ns	0.28	ns	ns
Acenaphthylene	0.0060	0.0051	0.022	ns	ns	ns	ns	ns	320	ns	ns
Anthracene	< 0.0040	0.0044	0.015	ns	ns	ns	32	ns	ns	32	ns
Benzo(a)anthracene	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Benzo(a)pyrene	< 0.020	< 0.020	< 0.020	1	1	10	72	ns	8800	72	ns
Benzo(b)fluoranthene	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Benzo(g,h,i)perylene	< 0.050	< 0.050	< 0.050	ns	ns	ns	ns	ns	ns	ns	ns
Benzo(k)fluoranthene	< 0.020	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Chrysene	< 0.020	< 0.020	0.027	ns	ns	ns	ns	ns	ns	ns	ns
Dibenz(a,h)anthracene	< 0.050	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
Fluoranthene	0.021	0.053	0.086	ns	ns	ns	180	ns	ns	180	ns
Fluorene	< 0.020	< 0.020	< 0.020	ns	ns	ns	ns	ns	0.25	ns	ns
Indeno(1,2,3-c,d)pyrene	< 0.050	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
2-Methylnaphthalene	< 0.020	< 0.020	0.065	ns	ns	ns	ns	ns	ns	ns	ns
Naphthalene	0.019	0.039	0.11	5	5	50	22	ns	0.013	ns	ns
Phenanthrene	0.024	0.055	0.10	5	5	50	ns	50	0.046	ns	ns
Pyrene	0.026	0.034	0.096	10	10	100	ns	100	ns	ns	ns
Benzo(a)pyrene Equivalency	< 0.10	< 0.10	< 0.10	ns	ns	ns	ns	ns	ns	ns	5.3

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard/guideline listed
TPE - Total Potency Equivalency (1X10-5). This is only applicable in the top 1.5m

ITALICS	Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
UNDERLINED	Exceeds CSR RLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
BOLD	Exceeds CSR CLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Commercial
SHADE	Exceeds CCME CLe: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Environmental Health
SHADE	Exceeds CCME CLi: CCME Canadian Soil Quality Guidelines for PAH, Commerical, Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
SHADE	Exceeds CCME CLfl: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Protection of Freshwater Life
SHADE	Exceeds CCME CLsc: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Soil Contact
SHADE	Exceeds CCME TPE: CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - TPE Calculation

TABLE 2: SOIL CHEMISTRY RESULTS - PAH PARAMETERS (mg/kg) [6 of 6]

Sample ID	TP15-07-E (BFD of TP15-17-D)	TP15-07-G	CSR NL	CSR RLfw	CSR CLfw	CCME CLe	CCME CLi	CCME CLfl	CCME CLsc	CCME TPE
Date	**28-May-2015**	**28-May-2015**								
Depth (m)	**2.74 - 3.66**	**4.57 - 5.18**								
Acenaphthene	0.062	0.010	ns	ns	ns	ns	ns	0.28	ns	ns
Acenaphthylene	0.037	0.0085	ns	ns	ns	ns	ns	320	ns	ns
Anthracene	0.048	0.012	ns	ns	ns	32	ns	ns	32	ns
Benzo(a)anthracene	0.035	< 0.020	1	1	10	ns	10	ns	ns	ns
Benzo(a)pyrene	< 0.020	< 0.020	1	1	10	72	ns	8800	72	ns
Benzo(b)fluoranthene	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Benzo(g,h,i)perylene	< 0.050	< 0.050	ns	ns	ns	ns	ns	ns	ns	ns
Benzo(k)fluoranthene	< 0.020	< 0.020	1	1	10	ns	10	ns	ns	ns
Chrysene	0.056	< 0.020	ns	ns	ns	ns	ns	ns	ns	ns
Dibenz(a,h)anthracene	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
Fluoranthene	0.18	0.068	ns	ns	ns	180	ns	ns	180	ns
Fluorene	0.058	< 0.020	ns	ns	ns	ns	ns	0.25	ns	ns
Indeno(1,2,3-c,d)pyrene	< 0.050	< 0.050	1	1	10	ns	10	ns	ns	ns
2-Methylnaphthalene	0.085	0.027	ns	ns	ns	ns	ns	ns	ns	ns
Naphthalene	0.20	0.067	5	5	50	22	ns	0.013	ns	ns
Phenanthrene	0.29	0.061	5	5	50	ns	50	0.046	ns	ns
Pyrene	0.24	0.075	10	10	100	ns	100	ns	ns	ns
Benzo(a)pyrene Equivalency	< 0.10	< 0.10	ns	ns	ns	ns	ns	ns	ns	5.3

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard/guideline listed
TPE - Total Potency Equivalency (1X10-5). This is only applicable in the top 1.5m

ITALICS	Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
UNDERLINED	Exceeds CSR RLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
BOLD	Exceeds CSR CLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Commercial
SHADE	Exceeds CCME CLe: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Environmental Health
SHADE	Exceeds CCME CLi: CCME Canadian Soil Quality Guidelines for PAH, Commerical, Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
SHADE	Exceeds CCME CLfl: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Protection of Freshwater Life
SHADE	Exceeds CCME CLsc: CCME Canadian Soil Quality Guidelines for PAH, Commercial, Environmental Health guidelines, Soil Contact
SHADE	Exceeds CCME TPE: CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - TPE Calculation

TABLE 3: SOIL CHEMISTRY RESULTS - SALINITY PARAMETERS (mg/kg)

Sample ID	TP15-03-G	TP15-07-C	TP15-07-G	CSR NL	CSR RLfw	CSR ILfw	CCME CL
Date	27-May-2015	28-May-2015	28-May-2015				
Depth (m)	3.96 - 4.88	1.83 - 2.74	4.57 - 5.18				
Calculated Chloride	15.1	6.5	16.6	35	350	550	ns
Calculated Sodium	20.0	9.5	7.6	200	200	1000	ns

Notes:
mg/kg - milligrams per kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed

ITALICS	Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
UNDERLINED	Exceeds CSR RLfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Residential
BOLD	Exceeds CSR ILfw: BC Contaminated Sites Regulation, Schedule 4, Schedule 5 (groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors) and/or Schedule 10, Industrial
SHADE	Exceeds CCME CL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Commercial

TABLE 5: RELATIVE PERCENTAGE DIFFERENCE (RPD) - METALS IN SOIL (page 1 of 2)

Sample ID	TP15-03-B	TP15-03-C (BFD of TP15-03-B)	RPD %	TP15-06-B	TP15-06-C (BFD of TP15-06-B)	RPD %	Detection Limits	MDL x 5
Date	**27-May-2015**	**27-May-2015**		**27-May-2015**	**27-May-2015**			
pH	7.68	7.64	1	7.33	7.39	1	-	-
Aluminum	11200	11400	2	21900	21700	1	100.00	500.00
Antimony	0.20	0.21	5	1.64	1.82	10	0.10	0.50
Arsenic	2.17	2.22	2	10.7	7.87	30	0.50	2.50
Barium	200	182	9	153	153	0	0.10	0.50
Beryllium	< 0.40	< 0.40	na	< 0.40	0.42	na	0.40	2.00
Bismuth	< 0.10	< 0.10	na	0.17	0.23	na	0.10	0.50
Cadmium	0.851	0.936	10	*1.56*	*1.53*	2	0.05	0.25
Chromium (total)	21.3	15.2	33	36.2	36.9	2	1.00	5.00
Cobalt	5.18	5.23	1	14.7	13.4	9	0.30	1.50
Copper	41.8	40.4	3	115	118	3	0.50	2.50
Iron	13800	13500	2	37200	35500	5	100.00	500.00
Lead	105	149	35	131	138	5	0.10	0.50
Lithium	7.1	6.5	9	14.7	13.6	8	5.00	25.00
Magnesium	3380	3360	1	8450	8280	2	100.00	500.00
Manganese	560	586	5	930	922	1	0.20	1.00
Mercury	0.259	0.237	9	2.95	3.04	3	0.05	0.25
Molybdenum	0.29	0.28	4	1.59	1.47	8	0.10	0.50
Nickel	11.6	12.1	4	34.5	32.2	7	0.80	4.00
Selenium	< 0.50	< 0.50	na	< 0.50	< 0.50	na	0.50	2.50
Silver	0.221	0.225	2	0.211	0.250	17	0.05	0.25
Strontium	757	665	13	73.8	75.8	3	0.10	0.50
Thallium	< 0.050	< 0.050	na	< 0.050	< 0.050	na	0.05	0.25
Tin	7.02	6.01	16	8.86	9.23	4	0.10	0.50
Titanium	281	257	9	882	919	4	1.00	5.00
Uranium	0.348	0.357	3	0.416	0.435	4	0.05	0.25
Vanadium	21.8	21.7	0	63.9	62.2	3	2.00	10.00
Zinc	164	159	3	2170	2170	0	1.00	5.00
Average RPD	-	-	7	-	-	5	-	-

Notes:
all results expressed as milligrams per kilogram
< - less than the analytical detection limit indicated
na - not applicable, samples below detection limits or less than five times detection limits
BFD - Blind Field Duplicate
RPD - relative percent difference

BOLD	Bold - Exceeds individual RPD of 60%
UNDERLINED	Underlined - Exceeds batch average RPD of 60 %

TABLE 5: RELATIVE PERCENTAGE DIFFERENCE (RPD) - METALS IN SOIL (page 2 of 2)

Sample ID	TP15-07-D	TP15-07-E (BFD of TP15-17-D)	RPD %	Detection Limits	MDL x 5
Date	28-May-2015	28-May-2015			
pH	7.41	7.33	1	-	-
Aluminum	18700	16100	15	100.00	500.00
Antimony	0.92	0.85	8	0.10	0.50
Arsenic	5.06	4.90	3	0.50	2.50
Barium	99.3	97.4	2	0.10	0.50
Beryllium	< 0.40	< 0.40	na	0.40	2.00
Bismuth	< 0.10	< 0.10	na	0.10	0.50
Cadmium	0.623	0.505	21	0.05	0.25
Chromium (total)	33.6	27.4	20	1.00	5.00
Cobalt	10.6	10.6	0	0.30	1.50
Copper	59.7	56.3	6	0.50	2.50
Iron	25800	23600	9	100.00	500.00
Lead	67.6	57.7	16	0.10	0.50
Lithium	12.1	11.2	8	5.00	25.00
Magnesium	7340	6450	13	100.00	500.00
Manganese	542	464	16	0.20	1.00
Mercury	1.55	1.73	11	0.05	0.25
Molybdenum	1.37	0.82	50	0.10	0.50
Nickel	26.5	23.4	12	0.80	4.00
Selenium	< 0.50	< 0.50	na	0.50	2.50
Silver	0.142	0.828	na	0.05	0.25
Strontium	160	76.7	**70**	0.10	0.50
Thallium	0.082	< 0.050	na	0.05	0.25
Tin	9.15	4.41	**70**	0.10	0.50
Titanium	878	777	12	1.00	5.00
Uranium	0.514	0.388	28	0.05	0.25
Vanadium	58.4	53.3	9	2.00	10.00
Zinc	157	148	6	1.00	5.00
Average RPD	-	-	18	-	-

Notes:
all results expressed as milligrams per kilogram
< - less than the analytical detection limit indicated
na - not applicable, samples below detection limits or less than five times detection limits
BFD - Blind Field Duplicate
RPD - relative percent difference

BOLD	Bold - Exceeds individual RPD of 60%
UNDERLINED	Underlined - Exceeds batch average RPD of 60 %

TABLE 6: RELATIVE PERCENTAGE DIFFERENCE (RPD) - PAH PARAMETERS IN SOIL (page 1 of 2)

Sample ID	TP15-03-B	TP15-03-C (BFD of TP15-03-B)	RPD %	TP15-06-B	TP15-06-C (BFD of TP15-06-B)	RPD %	Detection Limits	MDL x 5
Date	**27-May-2015**	**27-May-2015**		**27-May-2015**	**27-May-2015**			
Acenaphthene	< 0.0050	< 0.0050	na	< 0.0050	< 0.0050	na	0.005	0.025
Acenaphthylene	0.0053	0.0051	na	0.012	0.010	na	0.005	0.025
Anthracene	0.0043	< 0.0040	na	0.0080	0.0067	na	0.004	0.020
Benzo(a)anthracene	< 0.020	< 0.020	na	< 0.020	< 0.020	na	0.020	0.100
Benzo(a)pyrene	< 0.020	< 0.020	na	< 0.020	< 0.020	na	0.020	0.100
Benzo(b)fluoranthene	0.022	0.028	na	< 0.020	< 0.020	na	0.020	0.100
Benzo(g,h,i)perylene	< 0.050	< 0.050	na	< 0.050	< 0.050	na	0.050	0.250
Benzo(k)fluoranthene	< 0.020	< 0.020	na	< 0.020	< 0.020	na	0.020	0.100
Chrysene	0.027	0.029	na	0.025	0.021	na	0.020	0.100
Dibenzo(a,h)anthracene	< 0.050	< 0.050	na	< 0.050	< 0.050	na	0.050	0.250
Fluoranthene	0.040	0.041	na	0.10	0.082	na	0.020	0.100
Fluorene	< 0.020	< 0.020	na	< 0.020	< 0.020	na	0.020	0.100
Indeno(1,2,3-c,d)pyrene	< 0.050	< 0.050	na	< 0.050	< 0.050	na	0.050	0.250
2-Methylnaphthalene	< 0.020	< 0.020	na	0.027	0.022	na	0.020	0.100
Naphthalene	< 0.010	< 0.010	na	0.055	0.041	na	0.010	0.050
Phenanthrene	0.021	< 0.020	na	0.096	0.076	na	0.020	0.100
Pyrene	0.035	0.034	na	0.071	0.062	na	0.020	0.100
B(a)P TPE	< 0.10	< 0.10	na	< 0.10	< 0.10	na	-	-
IACR	0.47	0.52	10	0.32	0.31	3	-	-
Average RPD	-	-	10	-	-	3	-	-

Notes:
PAH - polycyclic aromatic hydrocarbons
all results expressed as milligrams per kilogram
< - less than analytical detection limit indicated
na - not applicable, samples below detection limits or less than five times detection limits
BFD- Blind Field Duplicate
RPD - relative percent difference

BOLD	Bold - Exceeds individual RPD of 100%
UNDERLINED	Underlined - Exceeds batch average RPD of 100 %

TABLE 6: RELATIVE PERCENTAGE DIFFERENCE (RPD) - PAH PARAMETERS IN SOIL (page 2 of 2)

Sample ID	TP15-07-D	TP15-07-E (BFD of TP15-17-D)	RPD %	Detection Limits	MDL x 5
Date	28-May-2015	28-May-2015			
Acenaphthene	0.017	0.062	na	0.005	0.025
Acenaphthylene	0.022	0.037	na	0.005	0.025
Anthracene	0.015	0.048	na	0.004	0.020
Benzo(a)anthracene	< 0.020	0.035	na	0.020	0.100
Benzo(a)pyrene	< 0.020	< 0.020	na	0.020	0.100
Benzo(b)fluoranthene	< 0.020	< 0.020	na	0.020	0.100
Benzo(g,h,i)perylene	< 0.050	< 0.050	na	0.050	0.250
Benzo(k)fluoranthene	< 0.020	< 0.020	na	0.020	0.100
Chrysene	0.027	0.056	na	0.020	0.100
Dibenzo(a,h)anthracene	< 0.050	< 0.050	na	0.050	0.250
Fluoranthene	0.086	0.18	na	0.020	0.100
Fluorene	< 0.020	0.058	na	0.020	0.100
Indeno(1,2,3-c,d)pyrene	< 0.050	< 0.050	na	0.050	0.250
2-Methylnaphthalene	0.065	0.085	na	0.020	0.100
Naphthalene	0.11	0.20	na	0.010	0.050
Phenanthrene	0.10	0.29	97	0.020	0.100
Pyrene	0.096	0.24	na	0.020	0.100
B(a)P TPE	< 0.10	< 0.10	na	-	-
IACR	0.32	0.54	51	-	-
Average RPD	-	-	74	-	-

Notes:
PAH - polycyclic aromatic hydrocarbons
all results expressed as milligrams per kilogram
< - less than analytical detection limit indicated
na - not applicable, samples below detection limits or less than five times detection limits
BFD- Blind Field Duplicate
RPD - relative percent difference

BOLD	Bold - Exceeds individual RPD of 100%
UNDERLINED	Underlined - Exceeds batch average RPD of 100 %