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Former Refuse Site – Wilmer Marsh Unit
Columbia National Wildlife Area
Near Wilmer, British Columbia

DFRP# 16096, ARMS #00394, FCSI# 16096079

2013/2014 Site Works Summary and Remedial Action Plan Report

March 2014
SLR Project No.: 219.05112.00008

2013/2014 SITE WORKS SUMMARY
AND REMEDIAL ACTION PLAN REPORT
FORMER REFUSE SITE – WILMER MARSH UNIT
COLUMBIA NATIONAL WILDLIFE AREA
NEAR WILMER, BRITISH COLUMBIA

SLR Project No.: 219.05112.00008

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EXECUTIVE SUMMARY

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Works and Government Services Canada (PWGSC) on behalf of Environment Canada (EC) to conduct a subsurface investigation and geotechnical assessment and to develop a Remedial Action Plan (RAP) for the unofficial refuse area within the Wilmer Marsh Unit of the Columbia National Wildlife Area (the Site). Unauthorized disposal of refuse has historically occurred at the Site and has resulted in the contamination of soil, sediment and surface water at the Site.

SLR was present at the Site in October 2013 to locate, delineate and attempt to quantify debris and associated soil contamination (if present) identified on the southern portion of the Site during a geophysical survey conducted in February 2013. Prior to the intrusive works, the geotechnical consultant (Clarke Geoscience Ltd.) reviewed the proposed work area to assess slope stability, evaluate potential work restrictions and identify erosion and sediment control measures. SLR's Environmental Monitor also reviewed site conditions prior to the commencement of the test pit program.

SLR advanced fourteen test pits in the area of the access trail to a maximum investigated depth of 4.5 m below grade using a spider-type excavator supplied and operated by SPIDEX All Terrain Excavating. SLR visually assessed the test pits for refuse/debris and collected soil samples at regular intervals for laboratory analysis of potential contaminants of concern (PCOCs). Excavations were terminated when native material was encountered or the test pit was deemed too deep to safely excavate further. Additionally, SLR collected surficial soil samples along the southern edge of the uplands bench above the access trail and submitted the samples for chemical analysis.

Three areas of highest debris occurrence were identified from the test pit works and coincided with areas of anomalous response noted during the February 2013 geophysical survey. Debris consisted of automobile parts and tires, bedsprings, and minor household garbage. Mounded soil was observed along the trail and adjacent slopes but was largely found to consist of disturbed soil/fill. Soil metals contamination above Canadian Council of Ministers of the Environment (CCME) Agricultural land use guidelines was identified in three test pits in the trail area, coincident with the highest densities of debris. The contamination was generally located 1 m or greater below the soil surface. Soil metals contamination was also identified in two samples collected on the uplands bench above the main debris zone in the access trail.

In addition to the test pit works, an area previously identified as being a channel for water flow below the trail was investigated. No water was flowing at the time of the investigation; however, a chamber was found leading to a channel flowing downslope to a lower trail. No debris was observed in this area and it is anticipated that the water channel reflects erosion processes.

Areas previously remediated in 2011 and 2012 were evaluated for restoration progress. Photographs of remediated areas were taken and compared to previous photographs to evaluate recovery. All locations were noted to be recovering well although the most recent disturbance (November 2012) at a larger gully at the northeast side of the upper bench was noted to be recovering slowly; however, silt loss was minimal and being contained by silt fencing.

SLR developed a RAP for both the trail and marsh areas of the Site based on the remedial excavation option outlined in the remedial options analysis (ROA) prepared by SLR in 2012-

2013. The RAP included the presentation of several remediation strategies involving differing levels of excavation and debris removal in the trail and marsh. Costs (including a 20% contingency) associated with the strategies range from $33,000 (no debris removal/excavation) to $5.3 million (complete excavation of the trail area).

SLR completed additional items related to EC policy requirements, including updating the Federal Contaminated Sites Inventory input form, updating the Conceptual Site Model for the Site and completing the relevant parts of the Site Closure Tool.

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LIST OF ACRONYMS

AL	Agricultural Land
AEC	Area of Environmental Concern
APEC	Area of Potential Environmental Concern
AVS	Acid Volatile Sulfides
BC	British Columbia
BC MOE	BC Ministry of Environment
BTEX	Benzene, Toluene, Ethylbenzene, Total Xylenes
CCME	Canadian Council of Ministers of the Environment
COC	Contaminants of Concern
COPC	Contaminants of Potential Concern
CEAA	Canadian Environmental Assessment Act
CSM	Conceptual Site Model
CWS	Canadian Wildlife Service
DQERA	Detailed Quantitative Ecological Risk Assessment
FOC	Fisheries and Oceans Canada
EC	Environment Canada
EKES	East Kootenay Environmental Society
EM	Electromagnetic
EPH	Extractable Petroleum Hydrocarbons
ESA	Environmental Site Assessment
FCSI	Federal Contaminated Sites Inventory
GPS	Global Positioning System
HEPH	Heavy Extractable Petroleum Hydrocarbons
HQ	Human Health Hazard Quotients
ILCR	Incremental Lifetime Cancer Risk
km	Kilometres
LEPH	Light Extractable Petroleum Hydrocarbons
m	Metres
m asl	metres above sea level
m bgs	metres below ground surface
m^3	Cubic Metres
NMS	National Master Specification
NWA	National Wildlife Area

PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCOCs	Potential Contaminants of Concern
PHCs	Petroleum Hydrocarbons
PWGSC	Public Works and Government Services Canada
RAP	Remedial Action Plan
RMP	Risk Management Plan
SAR	Species at Risk
SARA	Species at Risk Act
SCT	Site Closure Tool
SEM	Simultaneously Extractable Metals
SLERA	Screening Level Risk Assessment
SSHHERA	Site-Specific Human Health and Ecological Risk Assessment
VOCs	Volatile Organic Compounds
VPH	Volatile Petroleum Hydrocarbons

1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Works and Government Services Canada (PWGSC), on behalf of Environment Canada (EC), under Task Authorization 700264633 and Standing Offer Agreement number EO276-110680/001XSB to conduct a subsurface investigation and geotechnical assessment and to develop a Remedial Action Plan (RAP) for the unofficial refuse area within the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA) (hereafter referred to as the Site). Unauthorized disposal of refuse has historically occurred at the Site and has resulted in the contamination of soil, sediment and surface water at the Site.

The purpose of this Summary Report is to document works which occurred at the Site in 2013 and 2014 (Section 4.0), to outline the RAP for the debris and associated contaminated media present at the Site (Section 5.0) and to present information (e.g. Site Closure Tool) related to EC policy requirements (Section 6.0).

The project team included the following individuals:

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The project team has over 20 years combined experience in the assessment and remediation of similar projects and is familiar with works carried out at the Site.

2.0 SITE DESCRIPTION

2.1 Site History

The Site is situated within the Wilmer Marsh Unit of the Columbia NWA and is located approximately 1.2 kilometre (km) north of the village of Wilmer, British Columbia (BC) (50°33'00.78"N, 116°04'16.82"W). The Columbia NWA is managed by the Canadian Wildlife Service (CWS) of EC. The Wilmer Marsh Unit is the southernmost of the four units that make up the Columbia NWA. It is SLR's understanding that the Wilmer Marsh Unit, and by extension the Site, is owned by CWS. CWS has indicated that the Wilmer Wildlife Area, as it is also known, was first established in 1973 when CWS acquired privately owned lands that were to be developed into recreational and residential subdivisions. The area was officially designated as a wildlife area under the Canada Wildlife Act, Wildlife Area Regulation in 1978.

The Columbia NWA is a federally protected area designed to conserve wildlife and their habitat and is not intended for recreational uses. It is an important segment of a bird migratory corridor within the Pacific Flyway. Staff from Environment Canada and other federal departments use these lands to conduct research. Human activities by the general public are limited and regulated under the Federal Wildlife Area Regulations (C.R.C., c. 1609), under the Canada Wildlife Act. Under the Wildlife Area Regulations, prohibited human uses include hunting; fishing; grazing livestock; allowing domestic animals to run at large; swimming; picnicking; camping; lighting a fire; operating a conveyance; disturbing or removing plants, soils or any other materials; or dumping or depositing any other materials. These uses are prohibited unless a permit is obtained from an authorized federal authority or a federal authority has posted a notice indicating specific activities are permitted in specific locations.

Past non-permitted human uses of the Wilmer Marsh Unit of the Columbia NWA have included livestock grazing and recreational pursuits such as fishing, hang-gliding, hunting, canoeing, hiking, and all-terrain and off-road vehicle use. However, the most prevalent non-permitted use of the Site has been the unauthorized historical disposal of refuse. Previous reports and site visits have indicated that this has occurred at the Site over the past several decades. Refuse deposited at the Site included, but was not limited to, automobile bodies and parts, cans, glass, building debris, scrap metal, used oil containers and filters, automotive batteries, drums, etc. on both the uplands bench and the shoreline/marsh below. The East Kootenay Environmental Society (EKES) reportedly conducted a clean-up of the Site (uplands, shoreline and marshlands) in 1997 which included the removal of approximately 150 car bodies.

2.2 Physical Setting and Soils

The Site is located within the Columbia River Valley in southeastern British Columbia. The Columbia River Valley is part of the Rocky Mountain Trench which separates the Rocky Mountains to the east from the Purcell Mountains to the west. The Site is located on the western side of the valley, and consists of remnant river bench upland with an adjacent shoreline and marsh below. The benchland is relatively flat, with steep slopes and gullies on the south, east and north boundaries; Wilmer Marsh borders the Site at the bottom of the steep slopes to the east. The average elevation across the benchland is 870 metres above sea level (m asl), and the elevation of Wilmer Marsh below is 810.5 m asl, an elevation change of approximately 60 m (195 feet). A steep trail leads down to the marsh along the southern edge of the uplands bench. A fence borders the Site along the western boundary (along Westside Road); prior to 2012, the fence included a narrow person gate (no vehicle access), but this was removed in 2012 to deter human access to the Site. There are no buildings, utilities or any other structures on the Site.

Soils on the uplands bench are well-drained glacio-lacustrine silts, with minor amounts of clay and fine sands, likely overlying till. The southern and eastern portions of the Site are sparsely vegetated; the vegetative regime includes Sagebrush (*Artemisia cana*), Pasture Sage (*Artemisia frigida*), Sandberg's Bluegrass (*Poa secunda*), Bluebunch Wheatgrass (*Agropyron spicatum*) and various fescues (*Festuca* sp.). The northern portion of the Site is well vegetated; the vegetation regime includes Douglas Fir (*Pseudotsuga menziesii*), Rocky Mountain Juniper (*Juniperus scopulorum*) and Bluebunch Wheatgrass (*Agropyron spicatum*). On the wetter northern aspects, including the gullies leading down to the marsh, the vegetation grades to include Douglas Fir (*Pseudotsuga menziesii*), Pinegrass (*Calamagrostis rubescens*) and Stepmoss (*Hylocomium splendens*).

Soils on the higher areas of the shoreline consist of moderately-drained glacio-lacustrine silts, with minor amounts of clay and fine sands, likely overlying till at depth. Vegetation includes sedges (*Carex* sp.) in areas subject to seasonal flooding, cattails (*Typha latifolia*), bulrushes (*Scripus* sp.) and horsetails (*Equisetum* sp.). Vegetation in the marsh includes bladderwort (*Utricularia vulgaris*), yellow pond lily (*Nuphar variegatum*) and pondweed (*Potamogeton* sp.).

The marsh area is shallow and seasonally fluctuating water levels result in marsh shoreline areas expanding and contracting as determined by elevation and regional climatic influences. Consequently, areas of marsh sediment are under water during higher water levels and exposed as surface soil during lower water levels. The sediments contain visible organic matter and were observed to have a dark appearance and mucky consistency.

2.3 Climatology

Climate normals for the region were reviewed using meteorological data for the Kootenay National Park West Gate Station (ID 1154410), which is the closest station to the Site. Data used was compiled for the years of 1981 to 2010 from the Canadian Climate Normals (web site address-http://climate.weatheroffice.ec.gc.ca/climate_normals). The average annual precipitation for this station was 341.9 mm of rain and 99.2 cm of snowfall, totalling 441.1 mm. The highest average annual rainfall occurs during the months of May to August and ranges from 40.7 mm to 69.0 mm. The highest average annual snowfall occurs in the months of December and January and ranges from 25.5 cm to 27.2 cm. The average annual daily maximum temperature occurs in July at 25.6^{o}C, and the daily minimum temperature occurs in December and January at -9.7^{o}C. Extreme maximum and minimum temperatures were measured in August 1998 (37.5^{o}C) and December 1968 (-37.8^{o}C).

2.4 Hydrogeology

As stated in a previous section, the Site is located within the Columbia River Valley which is part of the Rocky Mountain Trench. The Columbia River flows northwest through this valley until it reaches the northern end of the Selkirk Mountain Range (Big Bend Country), where it turns sharply and then flows south through the Arrow Lakes and into the United States. The Wilmer Marsh Unit is located in the Columbia Wetlands, and is comprised of approximately seventy percent riverine marshlands and approximately thirty percent uplands bench areas.

The regional topography of the Site is fairly flat across the centre of the uplands bench, sloping steeply downwards on the south, east and northern edges of the bench. The shoreline is narrow and slopes towards the marshlands; it is bounded by steep slopes leading to the uplands bench to the west. There is evidence across the Site of rilling and erosion due to surface water runoff.

It is anticipated that groundwater in the area of the Site will be consistent with the elevation of the marsh; consequently, groundwater is assumed to be approximately 60 m below grade in the area of the uplands bench at the Site. No groundwater wells have been advanced on the Site and consequently groundwater flow direction cannot be inferred from measured groundwater elevations. Based on local and regional topography, local groundwater beneath the bench is expected to flow in an eastern to northeastern direction towards Wilmer Marsh and the Columbia River beyond.

No water wells were identified on the BC Water Resources Atlas within a 500 m radius of the Site; water wells were identified southeast of the Site in the village of Wilmer. Well records for these wells indicated that the depth to water-bearing gravels was generally more than 30 m below grade in that area.

2.5 Current and Future Land Use

It is anticipated that the future land use at the Site, and ownership, will be the same as the current use as a federally owned NWA. To the best of SLR's knowledge, there is no plan currently, or in the future, to allow the Site to be used for recreational activities.

2.6 Adjacent Land Use

The adjacent lands to the north, east and west are also part of the Columbia NWA. Similar to the Site, it is anticipated that these lands would continue to be federally protected wildlife areas in the future with no allowance for human recreational use.

Westside Road borders the Site to the west and it is anticipated that it will continue to provide vehicle access between the village of Wilmer and lands further north into the future.

The parcel adjacent to the south boundary of the Site (SE ¼ Lot 5, DL 377, Plan X-15) was forfeited to the Provincial Crown in 1989. The adjacent lands to the south are currently undeveloped.

2.7 Applicable Regulatory Guidelines

The Columbia NWA is owned by the Federal Government and administered by CWS. Therefore, the Site falls under federal regulatory jurisdiction which is subject to the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG). Provincial regulatory standards, guidelines and protocols have also been utilized for comparison purposes.

2.7.1 Land Use

Applicable regulatory guidelines and/or standards are often based on the current and/or potential land use at a site. In the absence of a wildlands land use designation within the federal guidelines, the Site has been classified as Agricultural (AL), for the following reasons:

- The Canadian Council of Ministers of the Environment (CCME) definition for Agricultural land use “includes agricultural lands that provide habitat for resident and transitory wildlife and native flora.”

- The CCME definition for Residential/Parkland land use “excludes wildlands such as national or provincial parks.”

- Agricultural land use guidelines tend to be the most sensitive guidelines and thus are considered appropriate in settings such as national parks or conservation areas, where conservatism is warranted.

2.7.2 CCME Guidelines

On the basis of the land use considerations discussed in the preceding section, as well as the proximity of Wilmer Marsh to the Site, the following federal guidelines are considered to apply to the Site:

- CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (Agricultural land use, fine-grained soil type, 10^{-5} incremental lifetime cancer risk level).

- CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (Freshwater).

- CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (interim sediment quality guidelines and probable effect levels).

- CCME Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil (Agricultural land use, fine-grained soil type).

Please note that the CCME soil quality guidelines have been considered applicable to soils that are located above the natural boundary or high water mark of Wilmer Marsh as well as to sediments that are seasonally exposed during periods of low water.

Exposure pathways considered applicable at the Site with respect to the soil guidelines listed above include:

- Direct contact (ingestion, dermal and/or particulate inhalation) by humans;
- Soil contact by ecological receptors;
- Soil and/or food ingestion by ecological receptors;
- Nutrient cycling;
- Protection of groundwater for aquatic life and;
- Management Limit (to prevent formation of non-aqueous phase liquids, fire/explosion hazards, etc).

Although groundwater in the vicinity of the Site is not used as drinking water currently (i.e. there are no registered water wells or surface water intakes within 500 m of the Site), soil quality guidelines protective of human consumption of groundwater have also been referenced in the event that groundwater in the vicinity of the Site is used as a potable water resource in the future.

2.7.3 BC Ministry of Environment

The BC Ministry of Environment (BCMOE) is the provincial environmental regulatory agency responsible for the administration of contaminated sites policy and management. Although the Site does not fall under provincial regulatory jurisdiction, the following provincial guidelines/standards have been considered for comparison purposes:

- Contaminated Sites Regulation (with amendments to 2014);
- BC Approved Water Quality Guidelines and;
- A Compendium of Working Water Quality Guidelines for British Columbia.

Numerous policies, procedures, protocols and guidance documents related to contaminated sites assessment, management and remediation have been published by BCMOE and are available on-line. Specifically, for determining the background soil concentrations of metals parameters at the Site, SLR has referenced BCMOE Protocol 4 (Determining Background Soil Quality).

3.0 PREVIOUS ENVIRONMENTAL WORKS SUMMARY

Numerous environmental works have been conducted at the Site including investigations of soil, sediment and surface water quality and remedial excavation and debris removal programs. The previous environmental investigations are summarized in the sections below. Please note that interpretation of the analytical results from the previous investigations has been completed with respect to current standards/guidelines rather than the guidelines applicable at the time of the original reports.

3.1 Phase 1 Environmental Site Assessment (ESA) and Soil, Sediment and Surface Water Sampling (PWGSC, dated January 2003)

A Phase 1 ESA was completed by PWGSC in 2002/2003 to determine if historical or current land use practices had resulted in any significant environmental impacts at the Wilmer Marsh Unit of the Columbia NWA (larger area including the Site). Based on the information gathered, the entire extent of the Site was identified as an Area of Potential Environmental Concern (APEC) due to the nature and extent of debris evident across the uplands, on the shoreline and in the marsh. A significant amount of waste material (including car bodies, old drums, cans, batteries, scrap metal, broken glass, and asbestos-containing materials) was noted.

PWGSC conducted an investigation of the APEC (i.e. refuse disposal area) in August 2002. Fifteen soil samples were collected at eight locations and select samples analyzed for metals, petroleum hydrocarbon fractions (PHC) F2 to F4, polychlorinated biphenyls (PCBs), and hazardous materials (asbestos). The analytical results indicated the following:

- Asbestos was found in one bulk sample of building materials at the Site (30-50% chrysotile asbestos by volume).
- PHC F3 concentrations in soil sample WMU2 (0.05-0.2 m below ground surface [m bgs]) exceeded the CWS PHC standards for agricultural land use. A sample from WMU2 at 0.55-0.85 m bgs did not exceed the standards.
- Concentrations of metals (specifically, cadmium, hexavalent chromium, copper, lead, tin and zinc) in four soil samples (WMU2, WMU4, WMU5 and WMU7) exceeded the CCME soil quality guidelines for agricultural land use (CCME AL).

PWGSC also collected one sediment sample and one surface water sample during the investigation. The sediment sample was analyzed for metals, PHC F2 to F4, PCBs, and polycyclic aromatic hydrocarbons (PAH). The surface water sample was analyzed for total metals, PAHs and extractable petroleum hydrocarbons (EPH). The analytical results indicated the following:

- Concentrations of arsenic, lead and zinc in the sediment sample exceeded the CCME interim sediment quality guidelines (ISGQ) and/or probable effect levels (PEL).
- Concentrations of cadmium in the surface water sample exceeded the CCME water quality guideline for protection of aquatic life (CCME AW).

The analytical results for soil, sediment and surface water samples which are assumed to still be present at the Site following subsequent remediation activities are presented on Drawings 3 through 5.

3.2 Phase 2 Environmental Site Assessment (SEACOR, dated January 2004)

A Phase 2 ESA was completed by SEACOR (now part of SLR) in 2003/2004 to provide additional characterization of identified contamination areas in the uplands refuse disposal area and to assess additional areas where refuse was visible. Sampling was also conducted to further assess sediment and surface water contamination in the marsh immediately below the refuse area. A geophysical survey was conducted on the uplands bench to assess the potential for buried objects at the Site. Several anomalies were detected during the geophysical survey; one anomaly near the western side of the bench was inferred to be a drum or small tank while other anomalies located across the bench were likely due to miscellaneous metallic surface debris consistent with previous observations of car parts and other metal debris. The Site reconnaissance indicated that despite snow cover of approximately 10 to 15 cm, metal debris was visible on the uplands bench in areas coincident with the geophysical survey results. It was observed that the asbestos debris previously noted on the Site had been removed.

In November 2003, SLR collected a total of twenty-seven soil samples at fifteen locations (HA1 to HA15), eighteen sediment samples at ten locations (MS1 to MS10) and four surface water samples (SW1 to SW4). Select soil, sediment and surface water samples were analyzed for Benzene, Toluene, Ethylbenzene, Total Xylenes (BTEX), PHC F1 - F4, PAH, metals and pH, Volatile Organic Compounds (VOCs), PCBs, glycols, and/or select pesticides/herbicides. The analytical results indicated the following:

- Lead and thallium in two soil samples (HA5 and HA11) exceeded the CCME AL guidelines; tin in one sample (HA2) exceeded the CCME AL guideline.
- Arsenic, cadmium, copper, lead and zinc in sediment (MS2, MS5, MS7, MS8 and MS9) exceeded the CCME ISQG and/or CCME PEL.
- Selenium concentrations in one sediment sample (MS9) exceeded the CCME AL guidelines for soil (compared to soil guidelines due to seasonal fluctuations in water levels).
- Total aluminum, arsenic, cadmium, copper, iron (also dissolved), lead and zinc concentrations in surface water (SW1, SW2 and SW3) exceeded the CCME AW guidelines.

The analytical results from the remaining soil, sediment and surface water samples submitted for laboratory analysis were less than the applicable CCME guidelines. The analytical results for soil, sediment and surface water samples which are assumed to still be present at the Site following subsequent remediation activities are presented on Drawings 3 through 5.

3.3 Supplemental Phase 2 Environmental Site Assessment (SLR, dated March 2009)

Supplemental Phase 2 Environmental Assessment works were conducted at the Site by SEACOR in October 2005. The works were conducted to provide additional characterization of contamination at the Site and to further assess sediment and surface water contamination in the marsh immediately below the refuse area. A geophysical survey was also conducted at the Site to evaluate potential buried debris on the uplands bench. The results of this survey indicated responses that were consistent with piles of debris noted on the surface of the Site. The fence along Westside Road was also repaired to limit access to the Site.

SLR collected a total of nineteen surficial soil samples (HA05-20 to HA05-38), eight sediment samples (MS05-20 to MS05-27) and six surface water samples (SW05-10 to SW05-15) in October 2005. Select soil, sediment and surface water samples were analyzed for BTEX, PHC

F1 - F4, PAH, metals and pH, VOCs, PCBs and/or acid volatile sulfides/simultaneous extractable metals (AVS/SEM, completed in sediment only). The analytical results indicated the following:

- Concentrations of PAH in soil exceeded the CCME AL guidelines at one location (HA05-31.
- Concentrations of tin and lead in soil exceeded the CCME AL guidelines at one location each (HA05-28 and HA05-37, respectively).
- Concentrations of arsenic, cadmium, copper, lead and zinc exceeded the CCME ISQG and/or CCME PEL in five sediment samples (MS05-21, MS05-22, MS05-23, MS05-24 and MS05-25).
- Total aluminum, cadmium and/or iron concentrations exceeded the CCME AW guidelines in two surface water samples (SW05-12 and SW05-14).

The analytical results from the remaining soil, sediment and surface water samples submitted for analysis were less than the applicable CCME guidelines. The analytical results for soil, sediment and surface water samples which are assumed to still be present at the Site following subsequent remediation activities are presented on Drawings 3 through 5.

3.4 2009/2010 Soil and Sediment Sampling Summary

In late 2009 and early 2010, SLR conducted supplemental soil, sediment and surface water sampling as well as other works at the Site. The purpose of the supplemental investigation was to delineate previously noted exceedances on the uplands and in the marsh, as well as to collect soil samples from the steep gullies that had not previously been investigated.

SLR visited the Site in November 2009 to attempt to collect delineation soil, sediment and surface water samples from the uplands and marsh. Due to unsafe weather conditions on the marsh (high winds) SLR was unable to collect the sediment or surface water samples during the November Site visit. A total of thirty four delineation soil samples were collected and submitted for one or more laboratory analyses including metals, PAHs, BTEX and Volatile Petroleum Hydrocarbons (VPH). Laboratory results for all soil samples submitted were less than the applicable CCME standards for the parameters analyzed.

SLR returned to the Site in February 2010 to collect soil samples from five of the steep uplands gullies to assess the soils in these areas where significant debris accumulations were noted. An attempt was made to collect samples from the top of the slope and at two locations downslope. Twenty-one soil samples were collected and submitted for laboratory analysis of BTEX, PHC F1, EPH, PAH and metals. The analytical results indicated the following:

- Concentrations of PAH in one soil sample exceeded the CCME AL guidelines (M-3).
- Concentrations of copper and lead in one soil sample exceeded the CCME AL guidelines (I-1).

During the February 2010 site visit, SLR again attempted to collect delineation sediment and surface water samples from the marsh. Due to the presence of ice on the marsh, surface water samples were not collected, and as the ice was unsafe in certain areas, only limited sediment sampling was conducted. Nine sediment samples were collected and submitted for laboratory analysis of metals. The analytical results indicated the following:

- Concentrations of arsenic, cadmium, copper, lead and zinc in several sediment samples exceeded the CCME ISQG and/or CCME PEL (1S, 1D, 2S, 3S, 3D, 4S, 4D, 5S).

The analytical results from the remaining soil and sediment samples submitted for laboratory analysis were less than the applicable CCME guidelines. The analytical results for soil and sediment samples, which are assumed to still be present at the Site following subsequent remediation activities, are presented on Drawings 3 through 5.

3.5 2010 Geotechnical Assessment

AMEC provided preliminary geotechnical recommendations for proposed remedial works at the Site in January 2010. Clarke Geoscience Ltd. (CGL) was subsequently contracted to provide a more detailed assessment of slope stability conditions in the area of the trail down to the marsh and the proposed debris removal area along the shoreline, as well as provide recommendations for erosion and sediment control measures to be implemented during and after remedial activities. CGL provided the following conclusions and recommendations:

- The slopes at the Site are inherently unstable and prone to slumping, sloughing and failures;

- A cavity (0.3 m wide by 1.5 m deep by approximately 20 to 30 m in length) is present in the central portion of the trail down to the marsh which may be an issue for equipment;

- The movement of equipment up and down the trail to and from the marsh will likely cause further instability in this area as it is prone to sloughing, piping and slumping; the trail must be improved prior to being used for equipment;

- Work during rainy or wet periods is not recommended as it could exacerbate slope stability issues and could be a health and safety concern;

- A slot approach (3 to 4 m wide) would limit slope instability during removal of debris from the shoreline; and

- A geotechnical monitor should be on-Site for the duration of remedial activities involving the trail, shoreline and marsh works.

3.6 2010 Debris Removal - Gullies

Greely Rock Ltd. (Greely) was contracted to remove debris from the steep gullies adjacent to the uplands portion of the Site in February 2010. Debris was removed by hand and transported to the western Site fence using rubber tire wheelbarrows; no equipment was brought onto the Site. The debris was sorted where possible (wood, metal, mixed) into large disposal bins placed between the Site fence and Westside Road. Seventeen bins (111 m^3) of debris were removed from the Site and disposed by Waste Management Corporation.

3.7 2010 Uplands and Marsh Draft Risk Assessments

In late 2010 and early 2011, SLR completed a draft Site Specific Human Health and Ecological Risk Assessment (SSHHERA) for the uplands area, as well as a draft Screening Level Risk Assessment (SLERA) for the marsh area. Both risk assessments were undertaken to determine data gaps and potential ecological and human health risks at the Site in an effort to determine the most appropriate and least invasive remediation and/or risk management options. The results of the draft SSHHERA for the uplands indicated that source removal of the remaining debris would result in a low potential risk for human and ecological receptors, with no further remedial work required in this area. The results of the marsh SLERA indicated sediment and toxicological data gaps; a supplemental work program was proposed to close these gaps.

The SSHHERA for the uplands area and the SLERA for the marsh area were subsequently updated in 2012 and 2013, respectively, and are discussed in further detail in Sections 3.12 and 3.13.

3.8 2010/2011 Supplemental Site Investigations

SLR conducted a sediment sampling program at the Site in August 2010 to delineate previously identified sediment contamination at the Site, to address data gaps identified in the draft SLERA for the marsh, and to support future risk assessment work. Sediment and surface water samples were collected from forty five locations along the marsh (including two background locations). A total of fifty seven sediment samples (including six blind field duplicates) were submitted for analysis of metals, PAH, BTEX, PHC F1-F4 and/or AVS/SEM. A total of thirty surface water samples (including four blind field duplicates and one field blank) were submitted for analysis of total and dissolved metals, BTEX and/or PHC F1-F4.

In March 2011, additional sediment samples were obtained in areas where the depth of water had previously limited sample collection. A total of thirteen sediment samples were collected from five locations and submitted for analysis of metals, PAH and/or PHC F2-F4. No surface water samples were collected as the marsh was frozen.

The results of the August 2010 and March 2011 sediment and August 2010 surface water sampling programs indicated the following:

- Concentrations of metals and PAH in numerous sediment samples exceeded the CCME ISQG and/or CCME PEL.
- Concentrations of arsenic in two background sediment samples exceeded the CCME ISQG (BG2-10 and BG2-20).

The analytical results for sediment and surface water samples which are assumed to still be present at the Site, following remediation activities at the Site, are presented on Drawings 3 through 5.

3.9 2011 Marsh Foreshore Remediation Program

Based on the results of the sediment and surface water investigations in the marsh area and the observed presence of significant debris along an approximate 60 m length of the marsh shoreline which was eroding into the marsh, SLR recommended the completion of a remedial excavation to remove the debris. Quantum Remediation, a division of Quantum Murray LP (QMLP), conducted the excavation of the marsh foreshore in February and March of 2011. The objective of the remedial works was to:

- remove approximately 300 m^3 of debris and impacted foreshore soils from a 60 m section of foreshore along the marsh;

- remove approximately 35 m^3 of exposed impacted sediment directly adjacent to the foreshore along the marsh; and

- remove approximately 20 m^3 of debris and impacted sediment and debris from four previously identified areas within the marsh adjacent to the foreshore. These four areas consisted of three known areas of large debris accumulation (i.e., portions of car bodies) and one location where a tank was visible.

Prior to the remedial work commencing on the Site, an Environmental Monitor conducted a detailed wildlife survey as required under the CWS permit for the project. No wildlife issues were identified. Per the CWS permit conditions, SLR also provided a Geotechnical Contractor to monitor slope stability and an Environmental Monitor for the duration of the remedial work program.

The remedial excavation was carried out using specialized low-impact excavators (spider hoes) to excavate the material and helicopters to transport materials between the foreshore area and the staging area adjacent to Westside Road. All debris and materials excavated were transported to the Regional District of East Kootenay Columbia Valley Landfill for disposal.

Following the excavation and removal of all debris, soil samples were collected from the excavation limits; a total of thirty seven soil samples were collected from the excavation limits and were submitted for analysis of metals, PAH and/or PHC F2-F4. One soil sample (FS15-1) collected from the limits of the excavation exceeded the applicable guidelines for tin.

Upon completion of the foreshore excavation, fill materials consisting of a mixture of silt, sand and gravel were transported to the foreshore area and the excavation was backfilled and compacted to ensure a stable base for the upper slope. Jute/coir was interwoven with willow stakes which were used for stabilization and the area was then overlain with topsoil from a nearby supply area (outside the NWA) and jute. The upper slopes were re-seeded with a mix of annual stabilizing species and native perennials; the lower slopes were left to naturally re-vegetate with riparian species.

3.10 2011/2012 Supplemental Site Investigations

SLR conducted a sediment sampling program at the Site in August 2011. The purpose of the sediment sampling was to obtain samples from the marsh area for toxicity testing to evaluate the potential for adverse effects to aquatic life in the marsh. SLR collected eight sediment samples at locations where residual refuse was present and where contamination was previously identified; three background samples were also collected. Sample locations were selected to provide a range of contaminant concentrations representative of conditions in the marsh. The samples were submitted to Nautilus Environmental for toxicity tests using *Hyallela azteca*, *Chironimus tentans*, and *Tubifex tubifex*, which were selected to provide a range of chronic and acute endpoints. Sub-samples were submitted to ALS Environmental for the analysis of chemical and physical parameters. The results of the August 2011 soil sampling indicated the following:

- Concentrations of tin in two samples (BF-03 and BF-04) exceeded the CCME AL soil guideline (compared to soil guidelines due to seasonal fluctuations in water levels).
- Concentrations of PAH in two samples (TOX1 and BF-03) exceeded the CCME ISQG.
- Concentrations of arsenic, cadmium, copper, lead and zinc in sediment exceeded the CCME ISQG and/or CCME PEL in numerous samples.

The results of the sediment toxicity tests did not identify any clear relationships between contaminant concentrations in sediment and adverse effects to toxicity test organisms.

As previously stated, the draft SSHHERA completed for the uplands bench in March 2010 indicated that source removal of the remaining debris would result in a low potential risk for human and ecological receptors. Removal of debris from the uplands would also deter future dumping in this location and remove physical hazards to ecological receptors. SLR was retained to oversee the removal of remaining debris from the uplands bench in support of the uplands SSHHERA. Debris removal works were conducted in November 2011 by King Hoe Contracting Ltd. (King Hoe) and consisted of removing the majority of the large debris piles, picking up scattered debris by hand, and hauling five car bodies and a partial car body up from a gully. Debris removed from the uplands included: car bodies; partial car bodies; car pieces (e.g., doors, fenders, engine blocks, engine pieces) and other metal debris that appeared to have been associated with automobiles; numerous tin cans of varying sizes (most too rusted to be able to discern what they previously contained, though some were the size and shape of historical oil cans); carpeting; bed frames; metal plumbing piping; asphalt shingles; treated (construction) wood; glass and plastic bottles/jars; pieces of glass; pieces of plastic (use indiscernible); wire (type used for fencing); rubber tires; empty metal barrels; and other unidentifiable pieces of non-natural materials. As well, two pipes covered with suspected asbestos were identified and bagged for appropriate disposal. Two bins of miscellaneous debris totalling approximately 15 m^3 were removed from the uplands bench; this did not include the car bodies that were also removed.

Additional debris was also removed from a location just north of the Site on the opposite side of Westside Road. Several large piles of garbage/debris were removed from this area; one bin (approximately 8 m^3) of debris was transported from this area for disposal. The types of materials encountered included: empty plastic pails; the remnants of a pickup truck bed topper; carpeting; pallets; construction (treated) wood; drywall; bed frames; a damaged flat screen television; and general household garbage.

All materials removed from the Site and the additional area was sent to the Regional District of East Kootenay Columbia Valley Landfill for recycling and/or disposal where appropriate.

Upon completion of all works at the Site, the fence was repaired, the man-gate access to the Site was blocked using large pieces of wood that were screwed across the entrance, and signs were installed indicating access to the Site is prohibited.

During debris removal activities at the Site, a mound of previously unidentified debris, approximately 2.5 m down a steep slope immediately above the marsh, was located on the eastern part of the uplands bench. This material was not removed due to the likelihood of it being quite unstable. No mitigation strategy was readily available to prevent disturbed materials from falling down the slope into the marsh at that time. Furthermore, equipment capable of removing the material in a safe manner (i.e. large excavator with a reach greater than 8 m) was not present at the Site in November 2011. As such, it was recommended that this material be removed prior to any further works proposed for the marsh.

3.11 2012/2013 Supplemental Site Investigation

Due to on-going concerns regarding unauthorized human access to the Site, the fence bordering Westside Road was replaced in Fall 2012 by One Time Fencing of Briscoe, BC. A number of the original fence posts were salvaged therefore limiting the number of new posts required. The fence was constructed as a seven strand, smooth wire fence to allow for the passage of wildlife. In addition, new signage was placed along the fence, in particular at the historical access gate.

King Hoe returned to the Site in November 2012 to remove the additional debris identified during the November 2011 site works. Soil and debris was excavated as far down slope as safely possible; where out of reach of the excavator arm and bucket, debris was handpicked and thrown upslope. Some debris that couldn't be reached safely by hand, or would result in loss of stability of the slope, was left in place. Silt fencing was installed below the excavated area to mitigate any movement of soil and remaining debris. As part of the November 2012 site works, King Hoe returned to the area north of the Site to collect additional garbage that had been dumped following clean up in November 2011. Approximately 240 m^3 (13 loads) of debris were transported from the gully area and from the area across Westside Road for disposal. The types of materials encountered included: glass bottles, cans, metal debris, wood debris, roofing material, plastics, bricks, and other miscellaneous household garbage.

SLR reviewed the restoration progress along the marsh shoreline in November 2012. A number of pieces of metal and debris were observed during the site visit as there was no ice or snow present to obscure the view. No slumping was observed following disturbance at the toe of the slope. Matting had retained soil and vegetation growth was noted as good in this area.

In early December 2012, Focus Corporation conducted staking of the provincial/federal boundary at the Site. In February 2013, AKS Geoscience Inc. (AKS) conducted a geophysical survey (EM 31/38 survey) of the marsh adjacent to the previously excavated foreshore area and along the trail to the marsh area. The EM survey was started at the federal/provincial boundary marker at the south end of the marsh and completed just north of the previously remediated shore area. Anomalous readings indicative of metallic debris were identified in discrete areas of the marsh and in several areas along the trail, including one very extensive area. Based on the staked location of the federal/provincial boundary, it was confirmed that the majority of the anomalous EM readings noted along the trail fall within the boundaries of the federal land.

During the February 2013 site visit, running water was heard below the ground surface at one section of the trail. The location was noted for future assessment.

3.12 2012 Update to Site Specific Human Health and Ecological Risk Assessment

The SSHHERA for the uplands area of the Site was updated following the debris removal works in November 2012. The SSHHERA indicated the following:

Human Health Risk Assessment (HHRA)

- Human receptors of concern (ROC) included adult and teenaged trespassers and EC/CWS personnel. The teenaged trespasser was considered to be the surrogate receptor for the human ROC.
- Contaminants of potential concern (COPCs) retained with respect to the HHRA included:
    - Cadmium;
    - Hexavalent Chromium;
    - Lead;
    - Thallium;
    - Tin;
    - Zinc; and

    - Pyrene.
- Potentially complete exposure pathways for the human ROC included incidental ingestion of soil, dermal contact with soil and inhalation of fugitive dust.
- Hazard quotients (HQs) and incremental lifetime cancer risks (ILCRs), as well as cumulative exposure to non-carcinogenic and carcinogenic COPCs, were less than the risk based standards (i.e. 0.2 for non-carcinogenic risks and 1E-05 for carcinogenic risks).

Ecological Risk Assessment (ERA)

- Ecological ROCs evaluated in the ERA included:
    - Invertebrates;
    - Plants/trees;
    - Granivorous, invertivorous and omnivorous birds;
    - Herbivorous, invertivorous and omnivorous mammals; and
    - Carnivorous reptiles.
- COPCs retained with respect to the ERA included:
    - Hexavalent chromium;
    - Copper;
    - Lead;
    - Thallium;
    - Tin;
    - Zinc;
    - PHC F3;
    - Benzo[a]pyrene;
    - Dibenz[a,h]anthracene, and;
    - Indeno[1,2,3-c,d]pyrene.
- Potentially complete exposure pathways for the ecological ROC included direct contact with soil (all ROC) and ingestion of food items (wildlife ROC).
- Potentially unacceptable risks to soil invertebrates from exposure to PHC F3 and hexavalent chromium were identified. However, based on the spatial extent of the PHC F3 contamination and the low magnitude of the hexavalent chromium exceedances relative to the soil invertebrate toxicity reference value, these parameters were determined to pose a low risk to soil invertebrates at a population level.

Based on the results of the HHRA and ERA discussed above, no additional remedial works were recommended for the uplands area.

3.13 2013 Detailed Quantitative Ecological Risk Assessment

Following the remediation of the marsh in 2011 and the supplemental sediment investigation (sediment sampling and sediment toxicity testing), SLR updated the SLERA for the marsh portion of the Site through the completion of a detailed quantitative ecological risk assessment (DQERA). The DQERA was submitted to Fisheries and Oceans Canada (FOC) and EC Expert Support for review and comment in March 2013. Following receipt of the FOC and EC review comments, the DQERA was finalized in October 2013. The DQERA indicated the following:

- Ecological ROCs identified for the marsh area included:
    - Phytoplankton, periphyton and macrophytes;
    - Benthic invertebrates;
    - Pelagic invertebrates;

  - Benthivorous, planktivorous and piscivorous fish;
  - Carnivorous amphibians;
  - Omnivorous reptiles;
  - Herbivorous, omnivorous, invertivorous, piscivorous and carnivorous birds; and
  - Herbivorous, omnivorous, piscivorous and carnivorous mammals.
- The following surrogate ROC were selected for evaluation in the DQERA:
  - Benthic invertebrates, Green Frog, Painted Turtle and Muskrat.
- COPCs retained with respect to the DQERA included:
  - Sediment: PHC F4 (aromatic subfraction), barium and tin;
  - Soil: no COPCs retained;
  - Surface Water: no COPCs retained.
- Potentially complete exposure pathways included direct contact with sediment (all ROC) and ingestion of food items (wildlife ROC).
- The results of the DQERA did not identify unacceptable risks to ecological receptors as a result of residual contamination within the marsh.
- The DQERA indicated that further debris removal within areas identified by the EM survey may improve marsh conditions and reduce uncertainties surrounding the presence of metals in the marsh.

4.0 2013/2014 SUPPLEMENTAL SITE INVESTIGATION

4.1 Objectives

The objectives of the 2013/2014 supplemental site investigations at the Site included the following:

- Locate, delineate, and quantify debris and associated soil contamination (if present) identified during the geophysical survey completed in February 2013.
- Complete a geotechnical assessment of the trail area to determine its ability to sustain disturbances during the activities indicated above and during potential future debris removal activities.
- Collect water samples in the trail area during spring melt where there is a potential pathway to the marsh.

4.2 Scope of Work

The following scope of work was developed based on Environment Canada's Terms of Reference dated June 2013:

- Application for a permit from CWS to conduct intrusive investigations in the trail area and liaison with Fisheries and Oceans Canada (FOC) to discuss the proposed program.
- Completion of an initial site visit with the geotechnical consultant (CGL), SLR's Environmental Monitor and the excavation contractor (SPIDEX All Terrain Excavating) to:
    - o assess slope stability and evaluate geotechnical restrictions on completing the proposed test pitting program;
    - o assess equipment access to the proposed investigation areas and any potential restrictions on completing the proposed work;
    - o evaluate any potential restrictions related to wildlife considerations.
- Preparation of a site-specific Health and Safety Plan.
- Verification of potential utilities in the area of the Site through BC One Call prior to the proposed work.
- Coordination with a fencing contractor to allow temporary equipment access through the fence along Westside Road.
- Advancement of fourteen test pits to a maximum investigated depth of 4.5 m bgs using a spider hoe excavator supplied and operated by SPIDEX All Terrain Excavating.
- Review of the test pitting program by the geotechnical consultant (CGL) to provide guidance on slope stability, maximum test pit depths, closure of test pits for stability and requirements for erosion control measures (if any).
- Review of the test pitting program by SLR's Environmental Monitor to document any species at risk or sensitive species and identify any potential impacts to wildlife at the Site.
- Collection of soil samples (including blind field duplicates) at regular intervals during test pit advancement and submission of select soil samples to the project laboratory (ALS

Environmental) for analysis of potential contaminants of concern (PCOCs) including BETX, PHC F1-F4, PAH, metals, total organic carbon content and grain-size.

- Installation of pre-packed piezometers to intercept groundwater (including perched or seasonal groundwater) where encountered during test pit excavation.
- Collection of water samples from the trail area during periods of significant snowmelt to assess presence of PCOCs in surface runoff or groundwater (if encountered during test pitting).
- Collection of additional surficial soil samples in eight locations along the southern edge of the uplands bench using a hand auger to supplement data for the uplands SSHHERA and to reduce some of the uncertainties noted in the SSHHERA.
- Documentation of test pit locations using UTM coordinates, photographs and videos.

4.3 Project Permitting

SLR began discussions with personnel from CWS in July 2013 regarding the proposed test pitting activities along the access trail. A permit (BC-13-0041) for the test pitting program was received from CWS in August 2013. A copy of the permit is provided in Appendix A.

4.4 Initial Site Visit

On August 12, 2013, personnel from SLR, CGL and SPIDEX met on-site to discuss feasibility of advancing test pits in the anomalous areas identified by the geophysical survey in February 2013. Slope integrity, damage to sensitive vegetation and access were discussed.

As a result of information collected during the site visit, CGL determined that:

- The test pit locations are situated within highly erodible soils which may be accelerated by repeated passage by heavy equipment.
- Slope integrity is unlikely to be compromised by shallow test pit excavations.
- Test pit works should occur during a period of dry or frozen ground conditions.
- Test pits should be closed following examination and grading should occur to reduce the occurrence of surface runoff.
- An on-site monitoring plan should be implemented during test pit works.

The CGL report dated September 12, 2013 has been included in Appendix B.

4.5 Test Pit Investigation

SLR, CGL and SPIDEX were present at the Site on October 28 and 29, 2013 to conduct the test pit investigation of the trail. One Time Fencing provided temporary access to the Site via the fence along Westside Road (Photo 1). Invermere Sales and Rentals provided a portable toilet for use by site personnel near the fence access point; per instructions from CWS, a sign was placed on the portable toilet indicating it was for use by on-site workers only. On the morning of the second day of investigations (October 29), the portable toilet was observed to have been pushed over and moved towards the fence (Photo 22). Obvious damage was observed on the outside of the portable toilet.

Test pit locations were concentrated within the areas of anomalous response measured during the geophysical survey performed by AKS Geoscience in February 2013. Throughout the test pit works, the SLR Environmental Monitor and CGL were present to provide guidance on equipment access/egress routes to minimize disturbance to soils and potential wildlife and to review slope stability during and following test pit excavation.

4.5.1 Field Observations

Investigation Locations

SLR used the maps compiled by AKS Geoscience in February 2013 to locate the areas of anomalous responses along and downslope of the trail noted during the geophysical survey. To ensure that the area of response as indicated on the map was located accurately on the ground, SLR downloaded PDF Maps by Avenza Systems Inc., an application for iPhone, that allows the user to download a map and see their placement on the map using the cellular phone as a Global Positioning System (GPS).

Investigation locations were recorded using a Trimble GeoExplorer 6000 Series GPS unit. Following excavation, all test pits were marked with a stake and flagging tape. The following table lists the UTM coordinates for the test pit locations and other areas assessed during the October 2013 site works. Investigation locations are also depicted on Drawing 2.

Table A
Investigation Locations

Investigation Location	Easting	Northing
TP1	565887.68	5600202.75
TP2	565895.22	5600188.58
TP3	565896.35	5600206.94
TP4	565884.07	5600199.62
TP5	565913.57	5600198.30
TP7	565894.15	5600194.95
TP6	565920.14	5600176.53
TP8	565916.41	5600169.27
TP10	565951.82	5600106.73
TP11	565944.36	5600095.84
TP12	565900.15	5600141.40
TP13	565871.91	5600203.62
TP14	565872.90	5600210.77
Surficial Debris Assessed	565851.56	5600190.35
Cavity Test Area	565927.26	5600154.02
Cavity Identified	565931.64	5600147.76
Water Channel outlet	565927.04	5600139.25
RA1	566010.56	5600155.15
RA2	565984.65	5600165.82
RA3	565960.96	5600178.10
RA4	565942.02	5600192.46

Investigation Location	Easting	Northing
RA5	565918.62	5600208.98
RA6	565892.00	5600218.32
RA7	565867.74	5600239.51
RA8	565845.42	5600248.38

Environmental Monitor Observations

The field observations noted by SLR's Environmental Monitor are presented in the summary memo included in Appendix D.

Soil Observations

Detailed test pit logs are included in Appendix I and are summarized below with reference to applicable photographs following the report text.

Test Pit 1 (TP1) – This test pit was established at the top of the trail at the northwest end of the large anomalous response (Photo 2). The excavator scraped the surface at TP1 to 0.5 m bgs (Photo 3). Minor debris was observed. A soil sample was collected at this depth. Excavation continued to 3 m bgs (Photo 4) with samples collected at 1 m bgs, 2 m bgs and 3 m bgs. Only minor debris was observed throughout. The soil material was noted to be mostly disturbed soil/fill and not native material.

Test Pit 2 (TP2) – This test pit was established on the south edge of the trail within an area of anomalous response (Photo 5). Excavation of cover material occurred up to 2 m bgs (Photo 6). Three samples were collected at 0.5 m bgs, 1 m bgs and 2 m bgs. At approximately 2.5 m, metal debris was encountered (Photo 7). This continued to 4.5 m (Photo 8). Excavation was halted at this depth. An additional two soil samples were collected at 3 m bgs and 4 m bgs.

Test Pit 3 (TP3) – This test pit was established upslope of the trail as there was indication of anomalous response in this area (Photo 9). Soil samples were collected below surface at 0.5 m bgs and again at 1 m bgs. Native material was encountered at 1 m bgs (Photo10). Soil above this was mostly disturbed soil/fill material with minor debris likely deposited from the bench above.

Test Pit 4 (TP4) – This test pit was established upslope of TP1, adjacent to the area of anomalous response, to confirm an absence of debris in this area (Photo 11). Soil in the area was observed to be native material (Photo 12). One sample was collected at 0.5 m bgs.

Test Pit 5 (TP5) – This test pit was established upslope of the trail to the east of TP3 (Photo 17). Only native soil was observed (Photo 18). One soil sample was collected at 0.5 m bgs.

Test Pit 7 (TP7) – This test pit was located within the trail adjacent to TP2 due to the volume of debris observed in TP2 (Photo 13). Debris was observed at 0.5 m bgs (Photo 14) to a depth of 4 m (Photo 16). Debris was estimated at 60% to 40% soil (by volume). Vehicle parts and other metal debris were observed throughout (Photo 15). Samples of soil were collected at 0.5 m bgs, 1 m bgs, 2 m bgs, 3 m bgs and 4 m bgs.

Test Pit 6 (TP6) and Test Pit 8 (TP8) – These test pits were located downslope along the trail (Photo 19). TP6 was advanced in an area of humped soil to determine if debris was present;

the area was mostly disturbed soil/fill with a minor amount of metal debris. One sample was collected at 0.5 m bgs. A second test pit (TP8) was advanced towards the trail from TP6 to determine if metal debris in larger volumes was present as indicated by the geophysical survey but not identified in TP6. Within the first 0.5 m bgs, debris was encountered (Photo 20). Debris continued to be observed down to 4 m. Excavation was halted at this point (Photo 21). Samples of soil were collected at 0.5 m bgs, 1 m bgs, 2 m bgs, 3 m bgs and 4 m bgs.

Test Pit 9 (TP9) – This test pit was established in a mounded area along the trail. The mound was scraped with the excavator bucket to assess potential debris; only disturbed soil/fill was observed. No samples were collected.

Test Pit 10 (TP10) – This test pit was advanced along an upper bench at the base of the lower trail (Photo 27). Excavation continued to a depth of 3 m bgs (Photo 28). No debris was found from surface to 3 m bgs. Soil appeared to be comprised of disturbed native soil. A sample was collected at 0.5 m bgs.

Test Pit 11 (TP11) – This test pit was established south of TP 10 in an area of anomalous response (Photo 29). Within the first 2 m bgs metal debris was found. Native soil was noted at 2.3 m bgs. A longer strip was excavated at TP11 to determine the full extent of the debris. Additional debris was observed within the area of the elongated test pit (Photo 30). Excavation was stopped at 2.3 m depth. Three samples were collected at 0.5 m bgs, 1 m bgs and 2 m bgs.

Test Pit 12 (TP12) – TP12 was located downslope of TP6 and TP8 in an area of anomalous response (Photo 31). The area of response was tested in three areas for potential debris. Only disturbed soil/fill and some tires were excavated (Photo 32). Excavation was stopped at 3 m depth. Samples were collected at 0.5 m bgs and 1 m bgs. Based on the presence of metal debris on the slope surface around TP 12, it is likely that the response originates from the surface debris (Photo 33). Upon closer observation, it was noted that some of the large embedded debris in the slope had been used by wildlife in the past as dens (Photo 34). Bedding and tracks were observed in and around the debris cavities.

Test Pit 13 (TP13) and Test Pit 14 (TP14) – An area of piled soil was observed west of TP1. This area was excavated in two locations, one at the base (TP13) (Photo 36) and at an upper area of the soil pile (TP14) (Photo 37). One sample was collected at a depth of 0.5 m bgs at both locations. No obvious debris was observed in this soil pile; surficial debris was observed which was likely deposited from the bench above.

Based on the test pit observations, SLR identified three areas of highest debris density along the trail and south of the trail (Areas of Impact 1 through 3 depicted on Drawing 2). Debris encountered was predominantly metal (vehicle parts, vehicle frames, mattress frames, appliances etc.). Tires, glass, and some plastic were also encountered. Soil excavated from each test pit was placed back in the test pit and contouring of the disturbed soil was conducted.

SLR visually assessed an area of anomalous response in the gully downslope from TP4. Surficial metal debris was noted in the area (Photo 35) which likely resulted in the anomalous response. No excavation was conducted at this location.

SLR collected an additional eight surficial soil samples (RA1 through RA8) along the south edge of the uplands bench using a hand auger to supplement the data in the area and to reduce uncertainties noted in the SSHHERA.

Groundwater/Surface Water Observations

During the test pitting program in October 2013, SLR evaluated an area where water had been heard beneath the trail in February 2013. No anomalous response was noted in the area during the February 2013 EM survey. The area was excavated to determine the origin of the suspected water (i.e. whether a subsurface cavity transmitting surface runoff or perched/seasonal groundwater) (Photo 23). The excavator removed soil at the location of the cavity until an obvious chamber was discovered on the south side of the trail (Photo 24). The chamber was further excavated and determined to flow north/south across the trail (Photo 25). The outlet of the channel was located downslope between the upper and lower trails (Photo 26). The outlet location was recorded for potential water sampling in the future and the excavation was backfilled following examination. No groundwater was observed in the area of the cavity.

Soils in the trail area were observed to be very dry during the test pitting program. No evidence of groundwater was noted during the investigation. Consequently, pre-packed piezometers were not installed in any of the test pits.

Site Restoration Observations (Previously Excavated Areas)

During the 2013 site works, SLR also reviewed the current conditions in areas previously remediated. SLR assessed and photo-documented seven areas. SLR subsequently compared the 2013 photographs to photographs taken at the time of remediation.

Location 0565811E, 5600294N - Cleanup of debris from a small pit occurred in 2011 (Photo 41). The area was noted to have vegetation in 2013 (Photo 42).

Location 0565875E, 5600301N – Cleanup of debris within a wood pile occurred in 2011 (Photo 43). The conditions observed in 2013 are documented in Photo 44.

Location 0565018E, 5601261N – Cleanup of a wood pile at edge of clearing. Left woody debris in place in 2011 as cover (Photo 45). The conditions observed in 2013 are documented in Photo 46.

Location 0565876E, 5600295N – Cleanup of car bodies on slope. A number of car bodies removed using a crane in 2011 (Photo 47). No obvious signs of slope integrity loss were noted in 2013 (Photo 48).

Location 0565901E, 5600278N – Cleanup of a larger gully with metal debris, tree stumps and automobile parts in 2011 (Photo 49). The area was noted to be stable and re-vegetating in 2013 (Photo 50).

Location 0565809E, 5600309N – Cleanup of a small area of metal debris (old cans) in a smaller gully (Photo 51). The conditions observed in 2013 are documented in Photo 52.

Location 0565971E, 5600234N – Cleanup of a large gully occurred in 2012. Silt fencing was erected following the cleanup to reduce sediment loss to the gully and sensitive, restored wetland shore below (Photos 53 and 55). The area was assessed again in 2013 (Photos 54 and 56). Silt fencing will require replacement but is holding sediment well at this time. Re-vegetation is slow but no major loss of sediment was observed. This gully will require installation of stability measures and re-vegetation assistance in the future.

Geotechnical Observations

The field observations noted by CGL are presented in the report dated November 21, 2013 provided in Appendix C and are summarized below.

- No adverse effects associated with slope stability were experienced during the test pitting program.
- There is a potential that the large void (approx. 10 m^3) located below the access trail may collapse.
- There is a concern that soil disturbance on the steeper slopes and along the trail will lead to surface erosion and gullying along the sloping soil surfaces. It is unlikely that mobilized sediment will reach Wilmer Marsh. However, undue gully erosion would have an undesirable effect on the area.
- The total surface area affected by soil disturbance is 135 m^2 and is comprised of the following areas:
    - TP 3 area = 10 m^2 ; steep (70%) slope;
    - TP 6 area = 15 m^2 ; steep (70%) slope;
    - TP 5 area = 10 m^2 ; steep (70%) slope;
    - TP 7 area = 100 m^2 ; moderately steep (30%) slope.

CGL also provided the following erosion and sediment control recommendations for the disturbed areas noted above:

- To provide temporary cover to protect the slope from rain splash erosion and to check surface flow across the slope, a coconut fibre mat cover is recommended.
    - The matting would provide mulch and will protect surface soils until grasses establish.
    - The matting should be natural and biodegradable.
    - The mat should have good contact with the underlying surface (tamp down) and should be installed on the slope, top to bottom, with overlapping edges and pinned in place (install as per manufacturers recommendations). Due to the loose nature of the soils, the pins should be at least 50 cm long.
    - The uphill end of the mat should be buried in a trench at least 300 mm deep and the backfill should be compacted. This will help ensure that water flows over top of the mat and not underneath.
    - In addition, coarse woody debris (CWD) should be scattered over the surface. This will provide a rough surface to aid the establishment of vegetation cover, will reduce runoff velocity, increase surface infiltration and will trap sediment on the slope. CWD is not abundant at the Site but there is some woody debris and some fallen branches in the nearby gully.

CGL noted that the onset of winter conditions prevented the implementation of the above-listed measures immediately following the test pitting program. CGL recommended the installation of the erosion control measures in early Spring 2014.

4.5.2 Analytical Results

The analytical results for the subsurface investigations in the trail area and uplands bench are discussed below. The detailed analytical chemistry report is included in Appendix J.

Trail Area

A total of 31 soil samples (including three blind field duplicates) were submitted to ALS Environmental for analysis of metals, PAH, BTEX, PHC F1-F4, grain size and/or total organic carbon content. The analytical results are presented in Tables 1 through 4 and are summarized below:

- Based on the grain-size distribution of the samples analyzed, the soils in the trail area are considered to be fine-grained.
- Total organic carbon ranged between 0.12% and 1.54% for the samples submitted.
- BTEX and PAH concentrations were below the CCME AL guidelines for all samples submitted.
- PHC F1-F4 concentrations were below the CWS PHC standards for all samples submitted.
- pH values were above CCME AL guidelines for all samples submitted except for TP7-4; however, the pH values at the Site are expected to reflect background concentrations.
- Concentrations of cadmium, lead, nickel, tin and/or zinc exceeded the CCME AL guidelines in TP2, TP7 and TP8. The metals exceedances were delineated vertically to surface (i.e. non-contaminated soil is present overlying the metals exceedances) but were not delineated vertically with depth due to equipment and geotechnical restrictions. The exceedances were laterally delineated by other test pits advanced in the trail area.

Uplands Bench

Nine soil samples (including one blind field duplicate) were also submitted to the project laboratory for analysis of metals, PAH, BTEX, PHC F1-F4, grain size and/or total organic carbon content. The analytical results are presented in Tables 1 through 4 and are summarized below:

- Based on the grain-size distribution of the samples analyzed, the soils in the uplands bench area include both fine-grained and coarse-grained soils.
- Total organic carbon ranged between 0.32% and 1.26% for the samples submitted.
- BTEX and PAH concentrations were below the CCME AL guidelines for all samples submitted.
- PHC F1-F4 concentrations were below the CWS PHC standards for all samples submitted.
- pH values were above CCME AL guidelines for the samples analysed.
- Cadmium, lead, mercury, tin and/or zinc exceeded the CCME AL guidelines in two soil samples located immediately above the main debris zone in the trail (i.e. RA5 and RA6).

Quality Assurance/Quality Control

Two stages of QA/QC were completed for the intrusive investigations at the Site: one by ALS and the other by SLR. A detailed discussion of the QA/QC procedures and results is provided in Appendix H.

Based on a review of the laboratory QA/QC data summary and the relative percent differences calculated for the soil samples and the corresponding blind field duplicate samples submitted by SLR, the laboratory QA/QC data and the analytical data were considered acceptable.

4.6 Surface Runoff Investigation

As discussed in Section 4.5, groundwater was not encountered during the test pitting investigation in October 2013. SLR returned to the Site in March 2014 to evaluate surface runoff in the trail area, particularly in the vicinity of the cavity and outlet which was identified in October 2013. The site visit was scheduled to coincide during a period of predicted above zero daily temperatures (i.e. daily low greater than 0 ˚C), similar to the climatic conditions in February 2013 when the sound of running water was noted in the trail.

SLR was present at the Site on March 10 and 11, 2014. Although snow was observed in shaded parts of the Site (i.e. gully to the south of the trail), very little snow was present in the trail area at the time of the site visit. It is anticipated that the slope aspect (steep, south-facing slope) and very warm climatic conditions over the two days prior to the site visit resulted in significant snowmelt prior to SLR's arrival at the Site. Consequently, no viable surface runoff samples could be collected.

The soils in the area of the outlet were observed to be saturated suggesting that runoff had recently occurred (refer to Photo 57). Based on field observations, runoff from the outlet was observed to continue along the lower branch of the trail (Photos 58 and 59) and then pool in the gully at the base of the slope (Photo 60) where it appeared to infiltrate the soil rather than travelling further east overland toward the marsh. Based on field observations, it is expected that snowmelt will either infiltrate the underlying soils or collect at the bottom of the gully and subsequently infiltrate the soil. No evidence of migration of surface runoff from the trail area to the marsh was observed. Consequently, surface runoff is not considered to be a direct mechanism of migration of potential contamination from the trail area to the marsh.

Although groundwater has not been investigated at the Site, it is SLR's opinion that impacts to groundwater at the Site are likely minimal for the following reasons:

- With the exception of the trail area, the contaminant source zones in the uplands bench are highly localized spatially (in area and with depth) and are unlikely to contribute significant contaminant mass to the groundwater.
- Although a more extensive debris deposit was identified in the trail area, the soil contamination associated with the debris was spatially localized. If soil concentrations are assumed to be an indicator of relative contaminant mass in pore water (and subsequently groundwater), then extensive groundwater contamination is unlikely.
- The type of contamination (i.e. primarily metallic solid waste) requires that contaminants be leached to soil pore water (through direct contact) or released from soil into pore water (via partitioning) before migration to groundwater can occur. The extremely dry soil conditions observed at depth in the trail suggest that there is limited pore water present at depth which can then migrate to the groundwater.
- Area of Impact 3 is located approximately 15 m above the anticipated regional groundwater surface (assumed based on the elevation of surface water in the marsh) while Areas of Impact 1 and 2 are located between 40 m and 50 m above the anticipated regional groundwater surface. The uplands bench is 60 m above the anticipated regional groundwater surface. Based on the depth to the anticipated regional groundwater surface below the contaminant source zones, as well as the soil conditions at the Site (fine-textured glaciolacustrine soils), it is anticipated that very limited migration of contamination to the groundwater will occur.

On this basis, further evaluation of groundwater at the Site is not considered warranted.

5.0 REMEDIAL ACTION PLAN

Per the Terms of Reference for the project (dated June 2013), EC requested the development of a Remedial Action Plan (RAP) for the trail and marsh areas of the Site based on the previously recommended remedial excavation option (SLR, 2013).

The following sections provide background information on the areas of environmental concern (AECs) at the Site and details of the selected remediation strategy. For comparison purposes, SLR has also detailed alternative strategies that incorporate differing levels of excavation and/or debris removal.

5.1 Background Information

5.1.1 Site Summary

Site History Summary

Local anecdotal information, previous reports and site visits have indicated that unauthorized dumping of refuse has occurred at the Site over the past several decades. Refuse disposed of at the Site has included, but is likely not limited to, automobile bodies and parts, cans, glass, building debris, scrap metal, used oil containers and filters, automotive batteries, drums and other miscellaneous debris on both the uplands bench, the shoreline/marsh below and the trail connecting the two areas. To discourage further unauthorized dumping following more recent debris removal efforts at the Site, the fence along the western boundary of the Site (adjacent to Westside Road, refer to Drawing 2) was replaced/upgraded in late 2012. No dumping of debris has been observed at the Site in recent years.

Current and Proposed Future Land Use at the Site

It is anticipated that the future land use at the Site, and ownership, will be the same as the current use as a federally owned NWA. To the best of SLR's knowledge, there is no plan currently, or in the future, to allow the Site to be used for recreational activities.

Current and Probable Future Land Use of Surrounding Lands

The adjacent lands to the north, east and west are also part of the Columbia NWA. As discussed above for the Site, it is anticipated that these lands would continue to be federally protected wildlife areas in the future with no allowance for human recreational use.

Westside Road borders the Site to the west and it is anticipated that it will continue to provide vehicle access between the village of Wilmer and lands further north into the future.

The parcel adjacent to the south boundary of the Site (i.e. SE ¼ Lot 5, DL 377, Plan X-15) was forfeited to the Provincial Crown in 1989 (See Drawings 1 and 2 for provincial/federal boundary). The adjacent lands to the south are currently undeveloped.

Potential Receptors of Concern

Based on the current use, and probable future use, of the Site as an undeveloped NWA, ecological receptors of concern at the Site include, but are not limited to, the following:

- Aquatic and terrestrial plants
- Aquatic and terrestrial invertebrates and microorganisms
- Herbivore, invertivore, omnivore, piscivore and carnivore birds
- Herbivore, invertivore, omnivore, piscivore and carnivore mammals
- Amphibians and reptiles
- Fish

Of particular concern, are species considered to be endangered or at-risk as protection at the individual, rather than population, level may be warranted. Species-at-risk are summarized below.

Table B
Summary of Species-At-Risk

Common Name	Scientific Name	SARA	BC List
Alkaline Wing-Nerved Moss	***Pterygoneurum kozlovii***	***Threatened***	***Red***
American Avocet	*Recurvirostra americana*	-	Red
American Badger	*Taxidea taxus*	*Endangered*	*Red*
American White Pelican	*Pelecanus erythrorhynchos*	-	Red
Bull Trout	*Salvelinus confluentus*	-	Blue
Coeur d'Alene Oregonian	*Cryptomastix mullani*	-	Blue
Cutthroat Trout *lewisi* subsp. (Westslope Cutthroat Trout)	*Oncorhynchus herodia lewisi*	Special Concern	Blue
Flammulated Owl	*Otus flammeolus*	Special Concern	Blue
Great Blue Heron herodias ssp.	***Ardea herodias herodias***	***Special Concern***	***Blue***
Hooker's Townsendia	*Townsendia Hookerii*	-	Red
Lakeshore Sedge	***Carex lenticularis s.l.***	***-***	***Blue***
Lewis's Woodpecker	*Melanerpes lewis*	Threatened	Red
Long-billed Curlew	***Numenius americanus***	***Special Concern***	***Blue***
Monarch	*Danaus plexippus*	*Special Concern*	*Blue*
Nuttall's sunflower	*Hellanthus nuttali var. Nuttali*	-	Red
Olive-sided Flycatcher	*Contopus cooperi*	*Threatened*	*Blue*
Western Painted Turtle – Intermountain – Rocky Mountain Population	***Chrysemys picta pop. 2***	***Special Concern***	***Blue***
Rocky Mountain Tailed Frog	*Ascaphus montanus*	Endangered	Red
Rusty Blackbird	*Euphagus carolinus*	*Special Concern*	*Blue*
Upland Sandpiper	*Bartramia longicauda*	-	Red
Water Marigold	***Megalodonta beckii***	***-***	***Blue***
Western Grebe	*Aechmophorus occidentalis*	-	*Red*
Western Toad	***Anaxyrus boreas***	***Special Concern***	***Blue***
Westslope Cutthroat trout	*Oncorhynchus Clarkii lewisi*	Special Concern	Blue
Williamson's Sapsucker *nataliae* subsp.	*Sphyrapicus thyroideus nataliae*	Endangered	Red
Yellow Rail	*Coturnicpos noveboracensis*	Special Concern	Red

Note:
Italic – Species with the potential to be in the vicinity of Wilmer Marsh.
Bold – Species with the potential to use the Site.

In terms of human receptors of concern, access to the Site is restricted by a continuous six foot (1.8 metre) tall fence and signs are posted stating unauthorized entry and use of the Site is prohibited. EC personnel visit the Site on an infrequent basis (i.e. once annually) to perform maintenance and research. Despite the presence of the fence and “no unauthorized access” signs, persons may gain access to the Site by trespassing onto the lands and SLR has observed evidence of such access in recent years. Accordingly, trespassers and EC personnel are considered to be the primary human receptors of concern at the Site. Based on the undeveloped nature of the immediately adjacent lands and likelihood that land use will remain as such into the future, no off-Site human receptors of concern have been identified.

5.1.2 Environmental Site Conditions

Summary of Contaminants of Concern (COCs)

This section provides information on how and where contamination has been identified and summarizes the identified AECs and associated Contaminants of Concern (COCs). Given that the origin of the contamination at the Site is associated with the historical unauthorized dumping of refuse and debris, the entire Site has generally been identified as one AEC. However, within the Site, there are three sub-areas that reflect differences in refuse deposition and degradation over time. The sub-areas include AEC 1A (uplands bench), AEC 1B (marsh area) and AEC 1C (trail area). COCs were identified if a particular parameter was measured in the media at concentrations exceeding the applicable federal guidelines.

The following table (Table C) outlines the COCs remaining in the different environmental media for AECs 1A, 1B and 1C at the Site following the remediation activities which have been conducted. Drawings depicting sample locations and identified COCs remaining at the Site are included as Drawings 3 through 5.

Table C
Summary of Environmental Site Conditions

AEC	Media	COCs	Rationale for Selection
1A Uplands	Soil	**Metals** – Cadmium, Chromium (hexavalent), Copper, Lead, Mercury, Thallium, Tin, and Zinc **PAHs** –Benz[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[k]fluoranthene, Dibenz[a,h]anthracene, Indeno[1,2,3-c,d]pyrene, and Pyrene. **PHCs** –F3 fraction	Concentrations exceeded the applicable federal guidelines in one or more soil samples analyzed. COCs were generally found in the following locations: Metals • Metals exceedances were generally observed at the top of slope along the northeastern and south edge of AEC 1A. • Delineation samples collected in five separate areas of AEC 1A indicated contamination is highly spatially localized in those areas. PAHs • Exceedances were limited to two samples in the east portion of AEC 1A. • Delineation samples collected in one sample location indicated contamination is highly spatially localized. PHCs • Exceedances limited to one sample on the southeast portion of AEC 1A.
1B Marsh	Soil	**Metals** – Selenium and Tin	Concentrations exceeded the applicable federal guidelines in one or more soil samples analyzed. COCs were generally found in the following locations: • Exceedance of selenium in one soil sample approximately 60 m south of the excavation area at AEC 1B. • Exceedances of tin in three soil samples from the northern limit of the AEC 1B excavation.

AEC	Media	COCs	Rationale for Selection
1B Marsh	Sediment	**Metals** - Arsenic, Cadmium, Lead, Mercury, Zinc **PAHs** - Acenaphthene, Acenaphthylene, Anthracene, Benz[a]anthracene, Benzo[a]pyrene, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, 2-Methylnaphthalene, Naphthalene, Phenanthrene, Pyrene	Concentrations exceeded the applicable federal guidelines in one or more sediment samples analyzed. COCs were generally found in the following locations: • Exceedances of metals and PAHs above the CCME ISQG were observed throughout the investigation area at AEC 1B. • Exceedances of metals above the CCME PEL were limited to an area of 45 m by 30 m adjacent to the AEC 1B excavation. • Exceedances of PAH above the CCME PEL were limited to one sample approximately 20 m offshore from the AEC 1B excavation.
	Surface Water	**Metals** – Aluminum, Cadmium, Iron	Concentrations exceeded the applicable federal guidelines in one or more surface water samples analyzed during the period of 2002-2005. Exceedances primarily found in the area of the AEC 1B excavation as well as in one location approximately 30 m to the north of the AEC 1B excavation. More recent water sampling at AEC 1B (i.e. in 2010) did not identify any exceedances in surface water.
1C Trail	Soil	**Metals** – Cadmium, Lead, Nickel, Tin and Zinc	Concentrations exceeded the applicable guidelines in one or more soil samples analyzed. COCs were concentrated around areas where the largest amount of metal debris was observed.

Uplands (AEC 1A)

Between 2002 and 2013, surface soil samples were collected in the uplands area of the Site and analyzed for VOCs, PCBs, BTEX, CCME PHC fractions F1 through F4, total metals (including hexavalent chromium), pesticides, herbicides, glycols and PAHs. Metals, PAHs and PHC F3 concentrations exceeded the applicable federal guidelines in one or more soil samples.

Marsh (AEC 1B)

Soil samples were collected from the marsh shoreline between 2003 and 2011. Soil was analyzed for CCME PHC F2-F4, PAHs, and metals. Selenium and tin exceeded the applicable federal guidelines in one or more soil samples.

Sediment samples were collected from AEC 1B between 2003 and 2011. Sediment was analyzed for BTEX, CCME PHC F1-F4, PAHs, metals, glycols, VOCs, pesticides and herbicides. Metals and PAHs were identified above the applicable federal guidelines in one or more sediment samples.

Surface water samples were collected from the marsh between 2002 and 2010. Surface water was analyzed for BTEX, CCME PHC F1-F4, VPH, EPH, LEPH, HEPH, PAHs, VOCs, total and dissolved metals, glycols, pesticides and herbicides. Metals were identified above the federal guidelines in one or more surface water samples during the period of 2002-2005 but were not identified above guidelines in 2010.

Trail (AEC 1C)

In 2013, soil samples were collected along the trail and analyzed for PAH, BTEX, CCME PHC F1-F4 and metals (including hexavalent chromium). Cadmium, lead, nickel, tin and zinc were identified above the applicable federal guidelines in one or more soil samples.

Summary of Soil/Debris Volumes

The following table outlines the estimated volumes of debris (and soil/sediment closely associated with the debris) remaining at the AECs.

Table D
Summary of Soil/Debris Volumes

AEC	Volume of Debris	Volume of Associated Soil/Sediment	Total Volume
1A Uplands	0 m^3	None	0 m^3
1B Marsh	46.5 m^3	None	46.5 m^3
1C Area of Impact 3	600 m^3	400 m^3	1000 m^3
1C Surficial Debris	200 m^3	None	200 m^3
1C Main Debris Zone	4900 m^3	3300 m^3	8200 m^3

Uplands (AEC 1A)

No areas of significant debris remain in AEC 1A.

Marsh (AEC 1B)

Based on the 2013 EM survey, there are still several areas of the marsh where anomalous readings were observed (indicative of metallic debris). The areas of debris are fairly discreet and are likely comprised of portions of car bodies or other large materials (tanks or drums). It is anticipated that the debris in these locations will continue to contribute contamination, particularly metals, to the surrounding sediments and surface water over time as a result of weathering processes. Based on the results of the sediment sampling programs conducted in the marsh, the sediment contamination appears to be fairly localized to the areas immediately surrounding the debris.

Based on the preliminary results of the EM survey and visual observations, there are approximately seven areas of debris in the marsh. The largest area is approximately 3 m by

5 m; assuming a thickness of 1.5 m, this area consists of 22.5 m^3 of debris. The remaining six smaller areas are approximately 2.0 m by 2.0 m in area; assuming a thickness of 1 m, these areas represent a collective debris volume of 24 m^3. On this basis, it is anticipated that approximately 46.5 m^3 of debris remains in the marsh.

Trail (AEC 1C)

As described in Section 4.5, the test pit works confirmed debris to be present within the general spatial extent of anomalies identified in the 2013 EM survey. Three areas of highest density of debris along the trail and south of the trail were identified during the test pit works (Area of Impact 1 through 3, refer to Drawing 2). Debris encountered was predominantly metal (vehicle parts, vehicle frames, mattress frames, etc.). Tires, glass, and some plastic were also encountered. Additional surface debris was observed downslope of the trail, particularly in the area of TP12; this debris was noted to consist of car bodies and kitchen appliances.

The 2013 test pit works in the trail were unable to excavate to native soil in the areas of thickest debris (maximum depth excavated was 4.5 m). However, assuming that the debris was historically placed on top of the natural slope and was subsequently buried with soil pushed down the trail from uplands areas (rather than becoming buried by mass wasting of the slope above), SLR has estimated the debris/soil volume in the main portion of the trail (Area of Impact 1 and 2 on Drawing 2) to be approximately 8200 m^3. In order to estimate the amount of debris in Area of Impact 1 and 2, SLR retained FOCUS Surveys to provide slope cross-sections through the impacted areas as well as in an non-impacted area closer to the marsh (to provide a reference for the natural slope in the area). Based on the cross-sectional areas, FOCUS calculated the volume of material sitting over the “natural slope” line throughout the area of anomalous EM readings in the trail to be 8200 m^3 (refer to FOCUS survey plans in Appendix K).

A second significant area of buried debris was observed in the vicinity of TP 11 (Area of Impact 3). Based on the results of the test pitting investigation and EM survey, this material is anticipated to extend over an area of 20 m by 20 m. Assuming a thickness of 2.5 m, this area represents an estimated volume of 1000 m^3 of debris/soil.

Additional surficial debris observed throughout the area is anticipated to comprise another 200 m^3.

Please note that the volumes listed for Area of Impact 1 through 3 are for total soil and debris. Based on test pit observations, the relative proportion of soil to debris is anticipated to be approximately 40:60.

5.1.3 Risk Assessments

Site Specific Human Health and Ecological Risk Assessment

As discussed in Section 3.12, the SSHHERA for the uplands area (AEC 1A) was updated in 2012. The SSHHERA concluded that there are no unacceptable risks to human or ecological receptors from chemical exposure to site-related contaminants remaining in the uplands area. It is noted that PHC F3 and hexavalent chromium were determined to potentially pose ecological risks to soil invertebrates. However, based on the spatial extent of the PHC F3 contamination and the low magnitude of the hexavalent chromium exceedances relative to the soil invertebrate toxicity reference value, these parameters were determined to pose a low risk to soil invertebrates at a population level.

Detailed Quantitative Ecological Risk Assessment

As discussed in Section 3.13, the DQERA for the marsh area (AEC 1B) was completed in 2013. The DQERA concluded that there are no unacceptable risks to ecological receptors from chemical exposure to site-related contaminants remaining in Wilmer Marsh.

Uncertainties with Respect to Site Risk Assessments

Uncertainties highlighted in the Site risk assessments which are of particular note with respect to the remediation planning for the Site are the uncertainties associated with the presence of the remaining debris in the marsh as on-going sources of contamination to the sediment and surface water. There is also uncertainty associated with the composition and chemical nature of debris that was not observed or sampled directly.

5.2 Remedial Options Analysis

SLR conducted a remedial options analysis for both the marsh (AEC 1B) and trail (AEC 1C) areas of the Site in March 2013 (SLR, 2013).

The uplands area (AEC 1A) has undergone remediation via excavation, with the completion of a subsequent risk assessment to address the remaining contamination; no unacceptable risks to human or ecological receptors from chemical exposure to site-related contaminants remaining in AEC 1A were identified.

The following sections summarize the recommended remedial options for AEC 1B and the proposed remedial options for AEC 1C.

5.2.1 AEC 1B - Marsh Area

Remedial excavation and disposal of debris and associated contaminated sediments was recommended as the preferred remedial option based on the uncertainties associated with the presence of the debris as on-going sources of contamination to the sediment and surface water in the marsh.

5.2.2 AEC 1C - Trail Area

SLR provided two remedial options for the trail area:

- remedial excavation and disposal of debris and associated contaminated soil.
- risk assessment/risk management of contaminated soil.

Since the remedial options analysis was conducted prior to the investigation of the trail area in 2013, SLR has reviewed the remedial options based on the recent data collected from the trail.

The remedial excavation option (SLR, 2013) assumed that approximately 5000 m^3 of debris and associated contaminated soil would be identified following test pitting. Based on current data, that volume is likely to be closer to 9400 m^3. The March 2013 remedial option analysis also assumed that contaminants would be similar to those found in other areas of the Site. This assumption was confirmed by the test pit works conducted in 2013. Advantages and disadvantages identified with this option in March 2013 are still considered to be applicable.

The risk assessment/risk management option outlined by SLR in March 2013 recommended that data collected from the trail be compared to the existing SSHHERA for the uplands area (AEC 1A) to determine the level of risk, if any, that the contamination poses to human and ecological receptors at the Site. SLR has conducted a cursory review of the data with respect to the uplands SSHHERA. The test pit works determined that soil contamination was limited to the most extensive debris areas. The contaminant concentrations encountered in the test pit works appear to be consistent with those previously evaluated in the SSHHERA for AEC 1A.

Consequently, it is expected that similar conclusions regarding human health and ecological risks can be drawn for AEC 1C. However, the primary uncertainty with respect to these conclusions is that debris exists at AEC 1C, whereas the debris (i.e. source) has been removed from AEC 1A. Furthermore, the debris at AEC 1C is buried in sloped glacio-lacustrine silt which are prone to slope instability and are susceptible to piping, caving and collapse (CGL, 2010).

It is noted that during SLR's time at the Site, debris not observed in earlier years has become evident along the trail over time. Consequently, there is a degree of uncertainty regarding probable future soil concentrations as well as the future spatial extent of impacts both horizontally and vertically.

The results of the surface runoff assessment conducted in March 2014 (refer to Section 4.6) suggest that snowmelt will either infiltrate the underlying soils at AEC 1C or collect at the bottom of the adjacent gully and subsequently infiltrate the soil. SLR did not observe any evidence of migration of surface runoff from AEC 1C to the marsh. On this basis, surface runoff is not considered to be a direct mechanism of migration of potential contamination from AEC 1C to the marsh. As well, it is SLR's opinion that the debris and soil contamination at AEC 1C is unlikely to result in significant impacts to groundwater in this area (refer to Section 4.6 for further discussion).

Based on the above information as well as on discussions with EC/PWGSC, it is SLR's understanding that a remedial excavation approach to address source removal, with risk assessment/risk management of any residual contamination (if necessary), is preferred for AEC 1C.

5.3 Remediation Strategy – Complete Excavation

Based on the selection of a remediation option comprised of the removal of remaining debris in the marsh area, removal of debris from AEC 1C (Area of Impact 3), removal of surficial debris at AEC 1C and the complete excavation and removal of debris from the main debris zone at AEC 1C, SLR has provided a description of how the selected remediation option should be implemented. Key components of the remediation strategy are described and a conceptual schedule is presented. Costs to execute the remediation strategy are also provided.

5.3.1 Remediation Objectives

The objective of the selected remediation option is to reduce the uncertainty associated with risk assessment of the contamination at the Site, specifically through:

- Removal of on-going sources of contamination to sediment and surface water at AEC 1B.
- Removal of on-going (and potentially unknown) sources of soil contamination at AEC 1C, which may increase in intensity and/or spatial extent through soil erosion processes.

5.3.2 Regulatory Requirements

All intrusive works conducted at the Site require a permit from CWS prior to being completed. As well, it is anticipated that the proposed work in the marsh area will require a review by Fisheries and Oceans Canada (FOC) under the fisheries protection provisions of the Fisheries Act (Section 35(1)). Additionally, it is likely that a Water Act (Section 9) Notification, and possibly an Approval, will be required from the BC MOE Water Stewardship Division prior to the initiation of the works in the marsh.

An Environmental Assessment Screening was previously completed in support of the 2010-2011 remediation activities in the marsh area to meet the requirements of the 1992 CEAA. In 2012, CEAA was revised significantly. Section 67 of CEAA 2012 outlines the responsibilities for the assessment of environmental impacts on federal lands. Environmental Assessments are only required for projects that are listed in the *Regulations Designating Physical Activities*. The proposed remediation activities do not fall under the activities listed in the *Regulations Designating Physical Activities*. It is noted that federal departments must still perform due diligence to ensure that projects on federal lands are not likely to cause significant adverse environmental effects.

Based on previous correspondence with Environment Canada (letter dated November 25, 2010), a Species-at-Risk (SAR) Act permit application is likely not required for the proposed remediation activities. Environment Canada concluded at that time that the potential for SAR species to occur at the Site is low; however, Environment Canada recommended the implementation of a number of measures for select species, specifically the American Badger, Western Toad and Painted Turtle, as well as measures for potentially impacted wildlife trees and migratory bird nests. Those measures included:

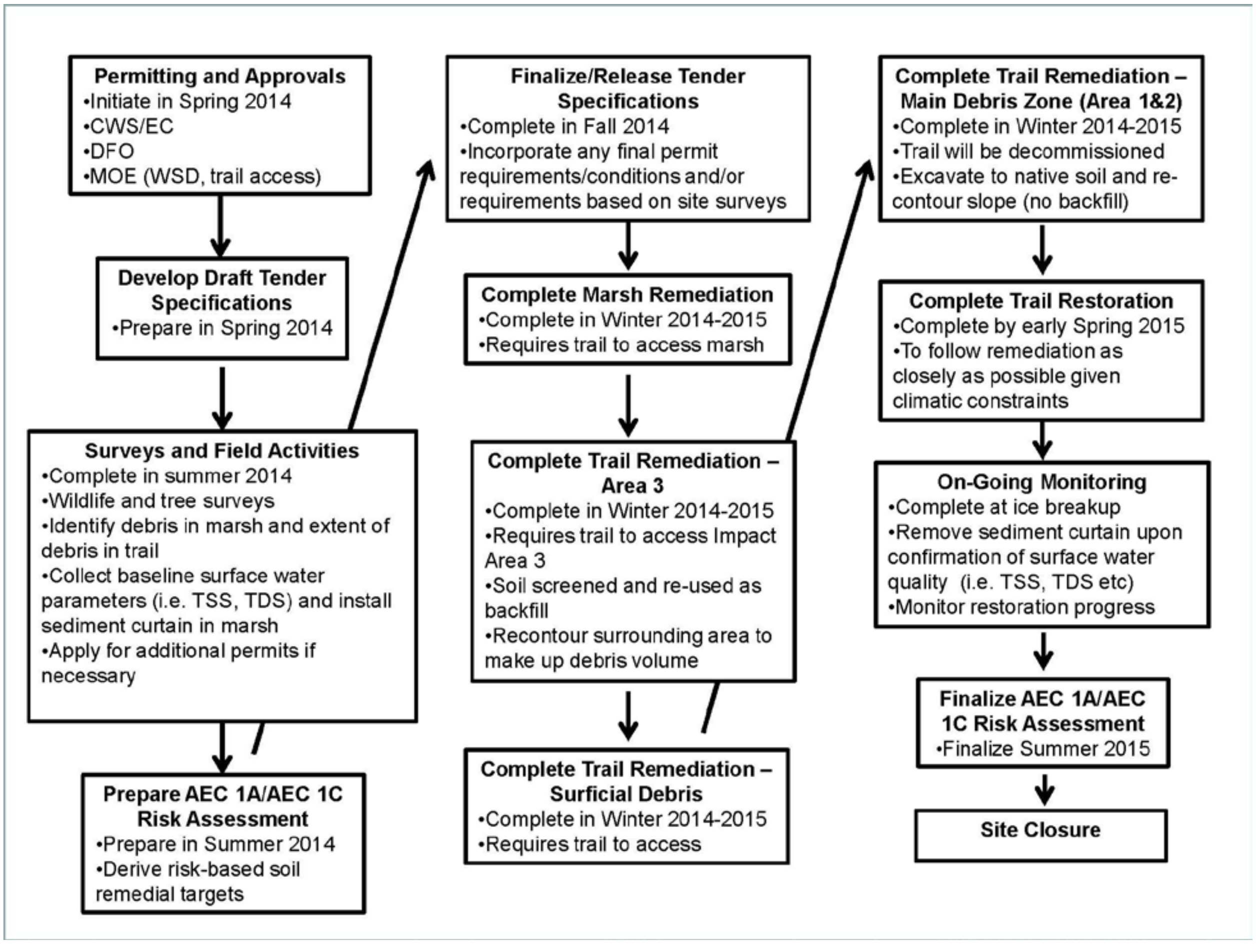
- Completion of Western Toad and Painted Turtle surveys.
- Completion of surveys for active American Badger dens at the Site.
- Completion of surveys to identify potential wildlife trees in the vicinity of the remediation works which may be impacted by the site activities and to identify “no-work” buffer zones around the affected wildlife trees.
- Avoidance of work during the migratory bird breeding season to minimize damage to nests.

It is recommended that Environment Canada be contacted to confirm their position remains unchanged. Pending the outcome of the American Badger, Western Toad and Painted Turtle surveys, a provincial wildlife permit may be required to handle/salvage/re-locate wildlife species.

It is anticipated that approval to use the portion of the trail that is located on the adjacent provincial land will be required to access the remaining debris in the marsh.

5.3.3 Strategy Overview

The components of the remediation strategy are depicted in the flowchart below.



As discussed above, the post-excavation risk assessment completed for the marsh area (AEC 1B) in 2013 concluded that there were no unacceptable risks to ecological receptors from chemical exposure to the contaminants remaining in the marsh. As well, SLR's cursory review of the trail data collected in 2013 suggests that the trail area (AEC 1C) can be incorporated into the uplands SSHHERA with likely similar conclusions. While the removal of potential on-going sources of contamination (i.e. those associated with remaining debris) at AEC 1B and AEC 1C, and subsequent risk assessment of remaining contaminant concentrations, may not necessarily reduce quantifiable risks associated with the AECs, the source removal excavations are expected to significantly reduce the uncertainties associated with the risk assessments at AEC 1B and AEC 1C.

5.3.4 Conceptual Remediation Program

The following sections discuss in further detail the components listed in the previous flowchart.

Remediation Preparation

Four tasks comprise the remediation preparation component of the project:

- Application for permits/approvals and liaison with stakeholders and regulators.
- Preparation of tender specifications (draft and final versions).
- Completion of pre-remediation field activities.

- Preparation of a preliminary risk assessment for AEC 1A and AEC 1C and development of risk-based soil remedial targets.

As discussed in Section 5.3.2, coordination with regulators and other stakeholders (i.e. CWS, FOC, BC MOE Water Stewardship Division, provincial Crown landowner) will be required to facilitate the remediation works. Given SLR's previous experience at the Site, it is recommended that the permitting and approval component of the project be initiated early in Spring 2014.

The preparation of draft National Master Specification (NMS) tender specifications for the project works should be initiated in Spring 2014 to allow for any supplementary remediation planning information to be collected in Summer 2014 and facilitate any modifications to the tender specifications that may result.

The pre-remediation field activities include the completion of wildlife and wildlife tree surveys, identification of the remaining debris in the marsh (UTM coordinates and field-flagging), identification of the limits of the AEC 1C buried and surficial debris areas (UTM coordinates and field-flagging), collection of baseline surface water turbidity parameters and installation of a sediment curtain in the marsh. It is recommended that these activities be completed in Summer 2014 so the results can be incorporated in the final tender specifications for the project.

As discussed in Section 5.2.2, SLR has conducted a cursory review of the AEC 1C data with respect to the current SSHHERA for AEC 1A. The review suggests that similar conclusions regarding human health and ecological risks can be drawn for AEC 1C as for AEC 1A. However, it is recommended that the AEC 1C results be formally incorporated into the existing SSHHERA in Summer 2014. As well, it is recommended that risk-based soil remedial targets be developed for the material to be excavated from AEC 1C for incorporation into the final tender specifications.

Following the completion of the above activities, the tender specifications for the project would be finalized in Fall 2014.

AEC 1B (Marsh Area) Remediation

Based on SLR's previous experience at the Site, equipment access to the marsh debris areas can only occur when there is sufficient ice upon the marsh to support the weight of the equipment. As well, work at the Site is constrained by wildlife breeding and migratory windows. Consequently, it is recommended that the AEC 1B remediation be completed in Winter 2014-2015.

Furthermore, access to the marsh is reliant upon the existence of the current trail; consequently, the AEC 1B remediation must be completed in advance of activities at AEC 1C.

Specialized equipment would be mobilized to the marsh via the existing trail. The trail slope, sensitivity of the Site soils and the presence of the large void space on the lower part of the trail limits the accessibility of the trail to most equipment save for spider-type hoes.

Holes would be cut into the ice at previously identified debris locations, sufficient in size to remove the debris safely without compromising the integrity of the ice to support the equipment. Should debris exceed the safe hole size, the debris would be broken down into smaller pieces for removal. The tender specifications would outline the requirement for the contractor to have personnel qualified to assess the strength of the ice for health and safety considerations. Debris would be contained in impermeable sacks or steel buckets and transported to the staging area for disposal by helicopter.

AEC 1C (Trail Area) Remediation

The remediation of AEC 1C is comprised of three parts: excavation of the debris at Area of Impact 3, removal of surficial debris across the AEC and excavation of the debris in the main debris zone (i.e. Area of Impact 1 and 2). As the excavation of debris at Impact Area 3 and the removal of surficial debris across the AEC are reliant upon access via the existing trail, the remediation of these areas must be completed prior to the excavation of the main debris zone (which will result in the decommissioning of the existing trail).

SLR retained CGL to evaluate the geotechnical implications of remedial excavation activities in AEC 1C (refer to Appendix G). CGL noted that there were no slope stability concerns associated with remedial activities at Area of Impact 3 at AEC 1C based on the shallow depth of the debris in the area and the low slopes. CGL identified the following slope stability and soil erosion concerns associated with the proposed excavation of the main debris zone at AEC 1C, as well as general access activities for any equipment work at the Site:

- Compaction, vibration and rutting caused by repeated access by heavy equipment will accelerate erosion and instability along the trail.
- Since waste is imbedded into the soils, some on-site sorting may be required, increasing the area of disturbance and resulting in unconsolidated soil spoil areas.
- When disturbed by machine access or excavation, the fine-textured soils become loose and are difficult to consolidate without moisture. The loose nature of the soils will make disturbed areas, particularly those on sloping ground, susceptible to surface erosion.
- Excavation to depths of 4 m will result in over-steepened slope, removing the toe support along the slope. Over-steepened excavation cut slopes are more prone to surface erosion and slump failures. Consolidated native (i.e. undisturbed) silts can maintain near vertical (>1.5H:1V) grades on a short-term basis when dry. However, disturbed soils are more prone to erosion and instability and will require additional grading (3H:1V) or terracing to reduce the slope.

CGL concluded that remedial excavation activities in the main debris zone at AEC 1C would accelerate surface erosion, gullying and slump failure across the Site. It was noted that based on the topography and distance between the main debris zone and Wilmer Marsh, the risk of sediment delivery to the marsh was considered to be low to moderate.

CGL recommended the following mitigation measures to complete the remedial excavation activities in a safe and effective manner (report presented in Appendix G):

- Reduce excavation areas and depths to minimize the total area of disturbance and to reduce the height of potentially unstable cut slopes.
- Protect access routes on the Site by installing a 300 mm thick layer of well-graded, crushed angular gravel. The gravel layer must be installed on a layer of filter fabric to prevent the migration of fines into the gravel and to facilitate decommissioning upon completion. [Note: previous discussions with personnel from CWS have suggested that construction of “roads” on-site would likely involve a lengthy approval process and is generally not encouraged.]
- Complete remediation activities in AEC 1C only during extended periods of dry, or frozen, ground conditions.

- Utilize low-impact equipment such as rubber-tired or spider hoe-type excavators to reduce the potential for ground disturbance. Equipment operators should demonstrate experience in working on steep slopes.
- Exercise caution in operating equipment in the vicinity of the identified void.
- Construct cross-ditches at the top of the trail to divert surface flow from the work areas.
- Construct cross-slope terraces along long sections of steep uniform slopes to break the slope and slow surface runoff along the slope (see Figure 3 in the CGL report in Appendix G).
- Provide at least a part-time geotechnical monitor for the duration of the excavation activities.
- Implement erosion and sediment control measures as outlined in the following section.

Based on the above constraints, as well as known constraints related to wildlife breeding and migratory windows and climate (i.e. hot summers), it is recommended that the remediation in AEC 1C be conducted in Winter 2014-2015 immediately following the remediation of AEC 1B.

The remediation works at AEC 1C would involve the use of specialized equipment (i.e. spider-type hoes) to access the debris at Area of Impact 3 and the surficial debris areas. It is assumed that a larger excavator could be utilized on the upper part of the trail in the main debris zone. Given the proportion of soil to debris (approximately 40:60) and the cost differences between disposing debris versus soil contaminated above provincial agricultural land use guidelines (approximately \$200/tonne versus \$100/tonne, or alternatively \$400/m^3 versus \$200/m^3 assuming an average soil/debris density of 2 t/m^3), it is recommended that the majority of the excavated material be screened in a designated staging area, potentially located off-site, to separate out the debris. The remaining soil would be tested to facilitate soil disposal.

Given logistical constraints on importing backfill to Area of Impact 3, it is anticipated that debris and soil would be screened adjacent to the excavation area and the screened soil would be compared to the risk-based soil remedial targets to confirm that the material could be re-used as backfill. Soil above the risk-based targets would be transported off-site for disposal; however, it is assumed that negligible soil would require removal based on analytical results collected to date in the area. In order to compensate for the debris removed, the area around the excavation would need to be recontoured; it is anticipated that soil extending to 20 m from the limits of the excavation would need to be disturbed and recontoured to backfill the excavation.

It is assumed that, with the level of disturbance under this strategy, improvements to the existing trail could be completed that would facilitate transport of the surficial debris from AEC 1C and debris from Area of Impact 3 to the staging area.

The excavation of the main debris zone at AEC 1C would remove all soil and debris down to the native consolidated slope. No backfill would be imported into this area as unconsolidated soils would require significantly more terracing and gentler slopes in order to prevent erosion; this would require importation of a substantial amount of backfill and likely encroachment onto the adjacent provincial lands to the south. Rather, cross-slope terracing of the native consolidated material would be conducted to slow runoff down the slope.

Debris removed from AEC 1B and AEC 1C would be transported for disposal from the designated staging area to the Regional District of East Kootenay Columbia Valley landfill via Westside Road.

Post-Remediation Work

The post-remediation component of the project entails the implementation of sediment and erosion control measures and other restoration activities (see Section 5.3.5 below), post-remediation monitoring (see Section 5.3.6) and finalization of the risk assessment for AEC 1A and AEC 1C. Data and observations from the remediation works would be incorporated into the AEC 1A/AEC 1C risk assessment. The completion of the AEC 1A/AEC 1C risk assessment, in conjunction with the reduction of uncertainties associated with the DQERA for AEC 1B, would result in site closure.

5.3.5 Post-Remediation Sediment and Erosion Control and Other Restoration Activities

The removal of the debris in AEC 1B (marsh area) is anticipated to disturb sediments in the marsh and increase the turbidity of the water in the area of the disturbances. As discussed, a sediment curtain would be installed in advance of the remediation activities and prior to ice formation in the marsh. After ice breakup in the spring following the remediation activities, water quality would be assessed for parameters such as Total Suspended and Total Dissolved Solids and compared to pre-remediation conditions. Once the water quality within the sediment curtain has been confirmed to be consistent with pre-remediation conditions, the barrier would be removed.

As mentioned, the soils within AEC 1C (trail area) are comprised of glacio-lacustrine silts which are prone to slope instability and are susceptible to piping, caving and collapse (CGL, 2010). As discussed in the CGL 2013 report in Appendix G, the creation of surface roughness to control erosion is strongly recommended following remediation. Specifically, surface roughness should be created through the installation of coconut fibre mat cover and/or deposition of coarse woody debris. In the case of the coconut fibre mat cover, the matting would also provide mulch and protect surficial soils until grasses are established. Details of the surface roughness measures include the following (refer to CGL report in Appendix C):

- The matting should be natural and biodegradable.
- The mat should have good contact with the underlying surface, should be installed on the slope, top to bottom, with overlapping edges and pinned in place (pins at least 50 cm long).
- The uphill end of the mat should be buried in a trench at least 300 mm deep and the backfill should be compacted to ensure that water flows over top of the mat and not underneath.
- Coarse woody debris should be sourced from the Site or adjacent areas to prevent the importation of invasive species.

Additional restoration measures include seeding disturbed areas with a native grass mix in the spring following the remediation activities. Other measures that may be considered include the spot-treatment of any observed weed species with a soil contact herbicide.

5.3.6 Remediation and Post-Remediation Monitoring

As discussed above in Section 5.3.2., wildlife and wildlife tree surveys would likely be required in advance of the remediation activities.

No additional sediment or surface water quality monitoring is required in AEC 1B (marsh area) based on the conclusions of the DQERA. Consequently, sediment sampling would not be conducted during the remediation activities. Surface water monitoring at AEC 1B would be limited to the evaluation of turbidity parameters in advance of and following remediation to evaluate the timing of the removal of the sediment curtain. Since the focus of the remediation activities at AEC 1B is to remove on-going sources of contamination (i.e. debris), it is recommended that a contractor be retained to conduct an EM survey of the marsh to confirm that all large debris has been removed prior to equipment demobilization.

As discussed above, geotechnical monitoring of the remediation activities in AEC 1C would be required based on slope stability concerns. Based on SLR's previous experience at the Site, it is likely that an environmental monitor for wildlife considerations would also be required for the duration of the remediation activities.

In terms of soil quality monitoring at AEC 1C, soil samples would be collected from the limits of the excavations (approximate 10 m spacing) as well as from the screened, excavated material (for use as backfill at Area of Impact 3 or to facilitate soil disposal). From a risk assessment perspective, the collection of soil data pertaining to the upper 1.5 metre of the final soil profile is of primary importance for the evaluation of risks to human and ecological receptors of concern in a post-remediation scenario.

As the focus of the remediation activities at AEC 1C is to remove on-going sources of contamination (i.e. debris), the removal of the debris would be monitored visually during the excavation activities.

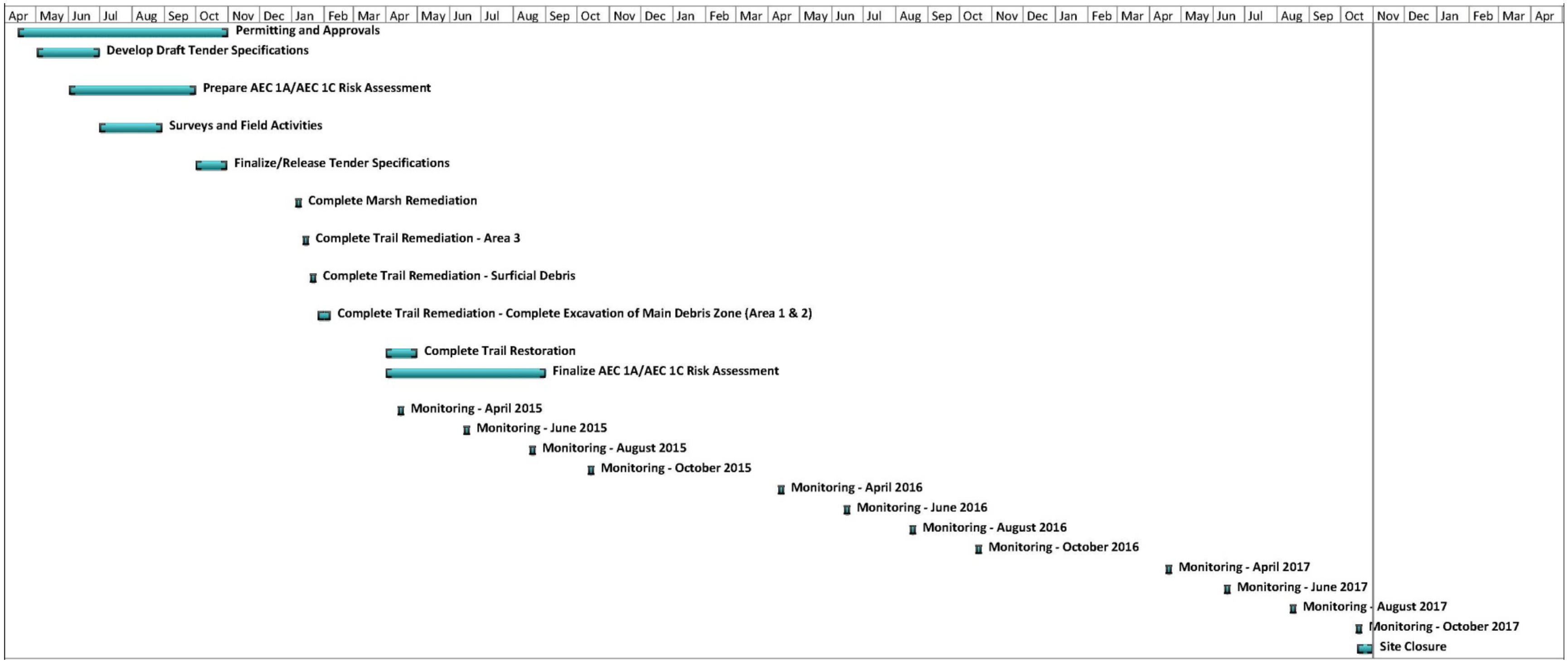
Sediment and erosion control measures and other restoration activities would be required following remediation in AEC 1C. Monitoring of post-remediation restoration progress (i.e. establishment of native grasses/plants) and surface erosion should be conducted every two to three months during non-frozen ground conditions for at least three years following the remediation works. It is assumed that an inspection of slope stability by a geotechnical monitor would be performed annually for a period of three years.

The metrics for evaluating compliance with the remediation objectives include the following:

- AEC 1B – confirmation via EM survey that all large debris has been removed.
- AEC 1B – confirmation that surface water turbidity parameters (e.g. total suspended and total dissolved solids) are consistent with pre-remediation conditions.
- AEC 1C – visual confirmation that all large debris has been removed.
- AEC 1C – confirmation that post-remediation soil concentrations meet risk-based targets (developed prior to remediation).
- AEC 1C – visual confirmation that grasses/plants are re-establishing in disturbed areas and that there is no evidence of significant erosion or slope instability.

5.3.7 Conceptual Schedule

The conceptual schedule for the implementation of the RAP is summarized in the Gantt chart on the following page. Key components of the RAP are identified, including post-remediation monitoring.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Permitting and Approvals
Develop Draft Tender Specifications
Prepare AEC 1A/AEC 1C Risk Assessment
Surveys and Field Activities
Finalize/Release Tender Specifications
Complete Marsh Remediation
Complete Trail Remediation - Area 3
Complete Trail Remediation - Surficial Debris
Complete Trail Remediation - Complete Excavation of Main Debris Zone (Area 1 & 2)
Complete Trail Restoration
Finalize AEC 1A/AEC 1C Risk Assessment
Monitoring - April 2015
Monitoring - June 2015
Monitoring - August 2015
Monitoring - October 2015
Monitoring - April 2016
Monitoring - June 2016
Monitoring - August 2016
Monitoring - October 2016
Monitoring - April 2017
Monitoring - June 2017
Monitoring - August 2017
Monitoring - October 2017
Site Closure

5.3.8 Communication Strategy

In order to minimize conflict with the local population, it is advised that signage be developed in consultation with CWS to indicate the nature of the remediation works. Vandalism of rental equipment (i.e. portable toilet) occurred during site works in 2013 and it is hoped that such acts can be minimized by engaging the public and communicating the benefits of the project.

Following remediation, it is advised that signage be developed to indicate that restoration measures are underway to prevent soil erosion. SLR's previous experience at the Site has suggested that members of the local population do not recognize that the Site is not intended for human use. It is hoped that the added concern of allowing plants to re-establish on the exposed soils may provide an additional incentive for trespassers to avoid the Site.

5.3.9 Contingency Plans

Contingency measures to mitigate potential adverse effects to receptors have been incorporated into the remediation strategy discussed above. Specifically, mitigating potential adverse effects to receptors during the remediation activities requires the completion of a number of tasks prior to the initiation of the remediation, including completion of wildlife and wildlife tree surveys, installation of sediment curtains and barriers during non-frozen ground conditions, and collection of baseline surface water samples. Implementation of additional mitigation measures during remediation, such as creating gravelled access routes, constructing cross-ditches for surface runoff and constructing cross-slope terraces, would also mitigate potential adverse effects to receptors.

Following remediation, the timely restoration of the disturbed areas and frequent monitoring of restoration progress, soil erosion and slope stability (and implementation of additional measures if necessary) would also mitigate potential adverse effects to receptors.

As the focus of the remediation plan is on the removal of potential on-going sources of contamination in order to reduce the uncertainties associated with the Site risk assessments, it is largely anticipated that any new contamination, if discovered, could be incorporated into the existing risk assessments. It is noted however, that if spatially extensive contamination is discovered which significantly exceeds risk-based targets for the Site, then this assumption may not be valid. However, given the amount of investigation that has been completed across the Site and the nature of the contamination source (i.e. domestic refuse/debris), it is unlikely that such spatially extensive contamination has yet to be encountered.

5.3.10 Costs

The table below summarizes the approximate costs associated with the implementation and execution of the RAP through to site closure (exclusive of taxes). A detailed cost breakdown of labour per task (time required and hourly rates), travel and living expenses, analytical fees and subcontractor costs per task (time required and lump sum or hourly rates) is provided in Table 5 following the report text.

Table E
Cost Estimate – Remediation of AEC 1B and AEC 1C (Complete Excavation)

Task	Cost Breakdown	Estimated Cost
1A - Permits/Approvals	Labour (SLR fees)	$6250
1B – Tender Specification Development	Labour (SLR fees)	$12500
	Direct Expenses (Subcontractors)	$4000
1C – Surveys and Field Activities	Labour	$13360
	Travel and Living	$3965
	Direct Expenses (Subcontractors)	$5035
1D – AEC 1A/1C SSHHERA and SSRTs	Labour	$17095
1E – Finalize Tender Specifications	Labour	$7250
	Travel and Living	$915
2A – AEC 1B Remediation	Labour	$13860
	Travel and Living	$3250
	Direct Expenses (Subcontractors)	$79790
2B – AEC 1C (Area 3) Remediation	Labour	$18800
	Travel and Living	$5145
	Direct Expenses (Subcontractors)	$325725
2C – AEC 1C (Surficial Debris) Remediation	Labour	$5690
	Travel and Living	$1895
	Direct Expenses (Subcontractors)	$94710
2D – AEC 1C (Main Zone) Remediation	Labour	$83620
	Travel and Living	$22160
	Direct Expenses (Subcontractors)	$3148685
3A – Site Restoration	Labour	$40450
	Travel and Living	$9750
	Direct Expenses (Subcontractors)	$420000
3B – Post-Remedial Monitoring	Labour	$40450
	Travel and Living	$17760
	Direct Expenses (Subcontractors)	$12185
3C – Finalize AEC 1A/1C SSHHERA	Labour	$4710
3D – Reporting and Site Closure Requirements	Labour	$16600
	Total	$4435605
	20% Contingency	$887120
	Total Including Contingency	$5322725

The cost estimate above assumes the following:

- Permits and approvals would be obtained from regulators and/or stakeholders prior to Fall 2014.
- Any additional wildlife permits (if required following wildlife surveys) would be readily obtained and would not delay the project schedule.
- The volume of materials at AEC 1B and AEC 1C are as estimated.
- The density of debris is approximately two tonnes per cubic metre and the density of soil is approximately two tonnes per cubic metre.
- Sufficient ice would be present on the marsh to support the weight of the necessary equipment.
- Spider-type excavators would be able to remove the debris in the marsh.

- The debris from the marsh would need to be transported to the staging area using helicopters.
- Helicopters could move approximately 6.5 tonnes of debris per hour from the marsh to the staging area.
- The debris from AEC 1C (Area of Impact 3) and the surficial debris at AEC 1C could be transported to the staging area using the existing trail as improvements could be made to the trail.
- The screened soil at AEC 1C (Area of Impact 3) would meet risk-based soil remedial targets and could be re-used. Furthermore, recontouring of the area around the excavation could be conducted to backfill the excavation.
- The excavation in the main debris zone would be completed down to the native consolidated slope and no backfill would be required in this area.
- The debris and excess excavated soil could be disposed at the Regional District of East Kootenay Columbia Valley landfill at the rates quoted in this RAP.
- The surficial debris at AEC 1C could be readily removed manually or by a spider-type excavator and would not result in extensive soil disturbance.
- The slope in the main debris area could be sufficiently stabilized with the construction of cross-ditches for surface runoff, construction of cross-slope terraces, installation of coconut fibre mat cover and/or deposition of coarse woody debris.
- The Environmental and Geotechnical Monitors would not identify any hazards or risks to receptors which requires a work stoppage.
- The coconut fibre mat cover and re-seeding would be sufficient to prevent soil erosion and allow the establishment of native plant communities on the slope within a period of three years following remediation.
- Post-remedial surface water quality would return to baseline conditions.
- SLR field personnel would work on an approximate nine day changeover cycle.

5.3.11 Uncertainties

The primary uncertainties associated with the RAP include the following:

- Issuance of permits/approvals from regulators/stakeholders.
- Estimate of the total volume of material at Area of Impact 1 through 3 at AEC 1C.
- Estimate of the density of the debris at AEC 1C.
- Usability of the access trail to transport debris from AEC 1C (Area of Impact 3) and surface debris from AEC 1C to the staging area.
- Suitability of the screened soil for use as backfill in select locations (i.e. Area of Impact 3).
- Suitability of the excess excavated soil for disposal at the Regional District landfill.
- Potential for increases in landfill tipping fees prior to completing remediation (tipping fees represent the largest single expenditure of the project cost).
- Long-term stability and restoration of remediated slopes at AEC 1C.

5.4 Remediation Strategy – Partial Excavation and Debris Removal

For comparison purposes, SLR has developed a remediation strategy based on partial excavation and/or removal of debris in AEC 1C. Specifically, the remediation option considered is comprised of the removal of the debris remaining in the marsh area, excavation and removal of all debris from Area of Impact 3 at AEC 1C, removal of surficial debris at AEC 1C and removal of debris and potentially contaminated soil in the upper 1.5 m of the soil profile in the main debris zone at AEC 1C. Key components of the remediation strategy are described and a conceptual schedule is presented. Costs to execute the remediation strategy are also provided.

5.4.1 Remediation Objectives

The objective of the selected remediation option is to reduce the uncertainty associated with risk assessment of the contamination at the Site, specifically through:

- Removal of on-going sources of contamination to sediment and surface water at AEC 1B.
- Removal of accessible sources of potential future soil contamination at AEC 1C (i.e. Area of Impact 3 and surficial debris at AEC 1C) and removal of sources of potential future soil contamination (i.e. debris) from the upper 1.5 m of the soil profile from the main debris zone at AEC 1C. Debris located at depths greater than 1.5 m below grade in the main debris zone would remain in place and be capped with non-contaminated imported backfill. The upper 1.5 m of the soil profile is considered the most relevant zone of exposure for potential human and terrestrial ecological receptors of concern at the Site under current Site conditions.

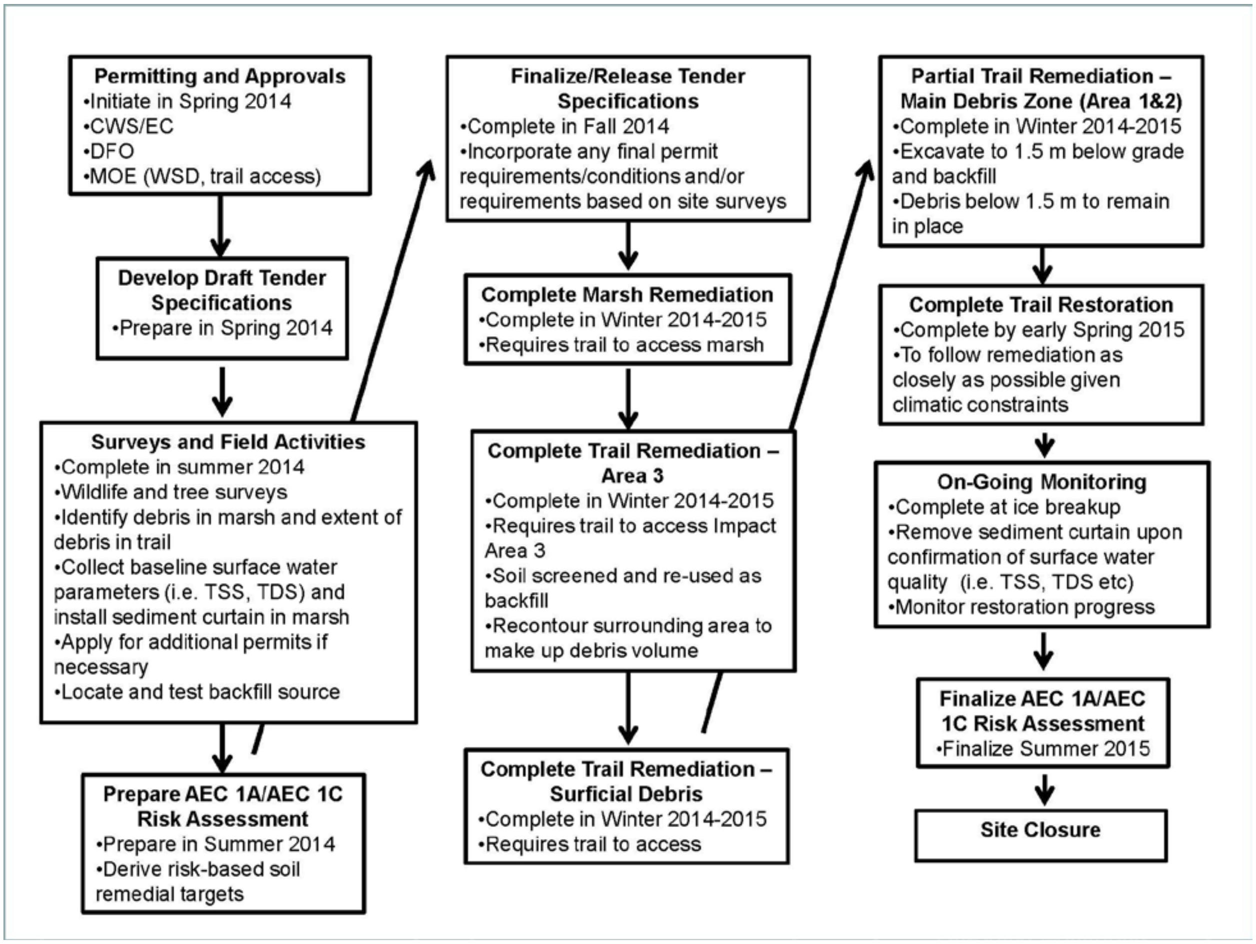
5.4.2 Regulatory Requirements

As outlined in Section 5.3.2, the proposed project works would likely require a permit from CWS, review by FOC, submission of a Water Act Notification (and possibly Approval) to BC MOE Water Stewardship Division and discussions with EC regarding SAR at the Site. Provincial wildlife permits may also be required.

It is anticipated that approval to use the portion of the trail that is located on the adjacent provincial land will be required to access the remaining debris in the marsh.

5.4.3 Strategy Overview

The components of the remediation strategy are depicted in the flowchart below.



As discussed above, the post-excavation risk assessment completed for the marsh area (AEC 1B) in 2013 concluded that there were no unacceptable risks to ecological receptors from chemical exposure to the contaminants remaining in the marsh. As well, SLR's cursory review of the trail data collected in 2013 suggests that the trail area (AEC 1C) can be incorporated into the uplands SSHHERA with likely similar conclusions. While the removal of potential on-going sources of contamination (i.e. those associated with remaining debris) at AEC 1B and AEC 1C, and subsequent risk assessment of remaining contaminant concentrations, may not necessarily reduce quantifiable risks associated with the AECs, the removal of sources in the upper 1.5 m of the soil profile are expected to significantly reduce the uncertainties associated with the risk assessments at AEC 1B and AEC 1C.

5.4.4 Conceptual Remediation Program

The following sections discuss in further detail the components listed in the previous flowchart.

Remediation Preparation

The remediation preparation component of the project is as outlined in Section 5.3.4 with the addition of the identification and testing of a local backfill source (backfill will likely be required to cap the remaining debris in the main debris zone).

AEC 1B (Marsh Area) Remediation

The remediation of AEC 1B has been discussed previously in Section 5.3.4.

AEC 1C (Trail Area) Remediation

The remediation of AEC 1C is comprised of three parts: excavation of the debris at Area of Impact 3, removal of surficial debris across the AEC and excavation of the debris from the upper 1.5 m of the soil profile in the main debris zone (i.e. Area of Impact 1 and 2). Given the need to maintain the access trail to complete the excavation at Impact Area 3 and to remove surficial debris from AEC 1C, the remediation of these areas should be completed prior to the excavation of the main debris zone (in order to minimize soil disturbance following excavation in the main debris zone). For reasons previously discussed, it is recommended that the remediation activities at AEC 1C be conducted in Winter 2014-2015 following the remediation of AEC 1B.

The geotechnical implications of remedial excavation activities at AEC 1C have been discussed in Section 5.3.4. It is noted that limiting the excavation activities to a depth of 1.5 m bgs in the main debris zone is consistent with the recommendation in the CGL Report (Appendix G) to reduce excavation areas and depths to minimize the total area of disturbance and to reduce the height of potentially unstable cut slopes.

The remediation activities at AEC 1C would largely be implemented as discussed in Section 5.3.4, with the exception that excavation would only occur to a depth of 1.5 m in the main debris zone and the area backfilled with non-contaminated imported material to return the area to the existing grade. As well, additional measures (i.e. crane) would be required to move surficial debris at AEC 1C and debris from Area of Impact 3 to the staging area if significant improvements cannot be made to the existing trail.

Post-Remediation Work

The post-remediation components of the project are similar to those discussed in Section 5.3.4.

5.4.5 Post-Remediation Sediment and Erosion Control and Other Restoration Activities

The post-remediation restoration and sediment/erosion control measures required following the removal of debris at AEC 1B and partial excavation of AEC 1C are similar to those discussed in Section 5.3.5. The total area of disturbed soil requiring restoration measures is expected to be less than if complete excavation of AEC 1C was completed.

5.4.6 Remediation and Post-Remediation Monitoring

Remediation and post-remediation monitoring requirements are considered to be similar to those outlined in Section 5.3.6. However, it is anticipated that the geotechnical monitor would be required for a shorter period of time during the remediation activities than if complete excavation was conducted in the main debris zone.

In terms of soil quality monitoring at AEC 1C, soil samples would be collected from the limits of the excavation at Area of Impact 3 (approximate 10 m spacing) as well as from the screened, excavated material to evaluate re-use as backfill. In the main debris zone, soil samples would be collected from the walls of the excavation, from the excavated material (to facilitate disposal) and from the imported backfill material (collected in advance of remedial activities). From a risk assessment perspective, the collection of soil data pertaining to the upper 1.5 metre of the final soil profile is of primary importance for the evaluation of risks to human and ecological receptors of concern in a post-remediation scenario.

The removal of the debris at AEC 1C (Area of Impact 3) would be monitored visually during the excavation activities. The vertical extent of the excavation in the main debris zone at AEC 1C would be limited by depth (i.e. 1.5 m) while the lateral extent would be monitored visually to confirm removal of debris.

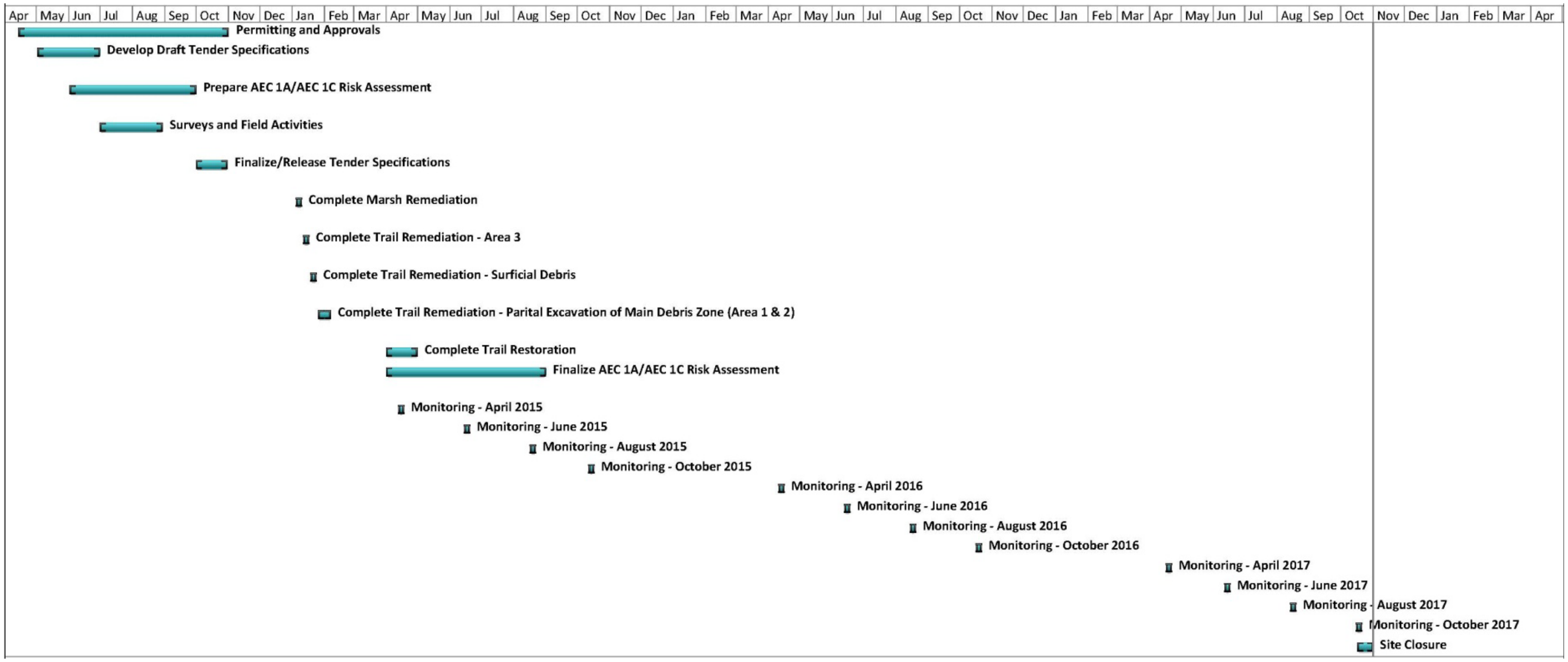
Monitoring of post-remediation restoration progress and evaluation of erosion should be conducted every two to three months during non-frozen ground conditions for at least three years following the remediation works. It is assumed that inspection of slope stability by a geotechnical monitor would be performed annually for a period of three years.

The metrics for evaluating compliance with the remediation objectives include the following:

- AEC 1B – confirmation via EM survey that all large debris has been removed.
- AEC 1B – confirmation that surface water turbidity parameters (e.g. total suspended and total dissolved solids) are consistent with pre-remediation conditions.
- AEC 1C – visual confirmation that all large debris has been removed from the upper 1.5 m of the soil profile in the main debris zone and completely removed at Area of Impact 3.
- AEC 1C – confirmation that post-remediation soil concentrations meet risk-based targets (developed prior to remediation).
- AEC 1C – visual confirmation that grasses/plants are re-establishing in disturbed areas and that there is no evidence of significant erosion or slope instability.

5.4.7 Conceptual Schedule

The conceptual schedule for the implementation of the RAP is summarized in the Gantt chart on the following page. Key components of the RAP are identified, including post-remediation monitoring.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Complete Trail Restoration
Finalize AEC 1A/AEC 1C Risk Assessment
Monitoring - April 2015
Monitoring - June 2015
Monitoring - August 2015
Monitoring - October 2015
Monitoring - April 2016
Monitoring - June 2016
Monitoring - August 2016
Monitoring - October 2016
Monitoring - April 2017
Monitoring - June 2017
Monitoring - August 2017
Monitoring - October 2017
Site Closure

5.4.8 Communication Strategy

The implementation of the communication strategy discussed in Section 5.3.8 is recommended.

5.4.9 Contingency Plans

Contingency measures to mitigate potential adverse effects to receptors have been incorporated into the remediation strategy discussed above. As noted previously, limiting the excavation activities to a depth of 1.5 m below grade in the main debris zone at AEC 1C will minimize the total area of disturbance and reduce the height of potentially unstable cut slopes.

Following remediation, the timely restoration of the disturbed areas and frequent monitoring of restoration progress, soil erosion and slope stability would also mitigate potential adverse effects to receptors.

As discussed in Section 5.3.9, it is anticipated that any new contamination, if discovered, could be incorporated into the existing risk assessments. If spatially extensive contamination is discovered which significantly exceeds risk-based targets for the Site, then additional activities to support the risk assessment may be required. However, given the amount of investigation that has been completed across the Site and the nature of the contamination source, it is unlikely that such spatially extensive contamination has yet to be encountered.

5.4.10 Costs

The table below summarizes the approximate costs associated with the implementation and execution of the RAP (based on partial excavation at AEC 1C) through to site closure. Costs provided are exclusive of taxes. A detailed cost breakdown is provided in Table 6 following the report text.

Table F
Cost Estimate – Remediation of AEC 1B and AEC 1C (Partial Excavation)

Task	Cost Breakdown	Estimated Cost
1A - Permits/Approvals	Labour (SLR fees)	$6250
1B – Tender Specification Development	Labour (SLR fees) Direct Expenses (Subcontractors)	$12500 $4000
1C – Surveys and Field Activities	Labour Travel and Living Direct Expenses (Subcontractors)	$13360 $3965 $9610
1D – AEC 1A/1C SSHHERA and SSRTs	Labour	$17095
1E – Finalize Tender Specifications	Labour Travel and Living	$7250 $915
2A – AEC 1B Remediation	Labour Travel and Living Direct Expenses (Subcontractors)	$13860 $3250 $82790
2B – AEC 1C (Area 3) Remediation	Labour Travel and Living Direct Expenses (Subcontractors)	$18800 $5145 $385925
2C – AEC 1C (Surficial Debris) Remediation	Labour Travel and Living Direct Expenses (Subcontractors)	$5690 $1895 $106510
2D – AEC 1C (Main Zone) Remediation	Labour Travel and Living Direct Expenses (Subcontractors)	$24510 $5935 $579970
3A – Site Restoration	Labour Travel and Living Direct Expenses (Subcontractors)	$40450 $9750 $327500
3B – Post-Remedial Monitoring	Labour Travel and Living Direct Expenses (Subcontractors)	$40450 $17760 $12185
3C – Finalize AEC 1A/1C SSHHERA	Labour	$4710
3D – Reporting and Site Closure Requirements	Labour	$16600
	Total	$1778630
	20% Contingency	$355725
	Total Including Contingency	$2134355

The cost estimate above assumes the following:

- Permits and approvals would be obtained from regulators and/or stakeholders prior to Fall 2014.
- Any additional wildlife permits (if required following wildlife surveys) would be readily obtained and would not delay the project schedule.
- The volume of materials at AEC 1B and AEC 1C are as estimated.
- The density of debris is approximately two tonnes per cubic metre and the density of soil is approximately two tonnes per cubic metre.
- Sufficient ice would be present on the marsh to support the weight of the necessary equipment.
- Spider-type excavators would be able to remove the debris in the marsh.

- The debris from the marsh would need to be transported to the staging area using helicopters.
- Helicopters could move approximately 6.5 tonnes of debris per hour from the marsh to the staging area.
- Transport of the debris from AEC 1C (Area of Impact 3) and the surficial debris at AEC 1C would require additional measures (e.g. crane) if improvements cannot be made to the existing trail.
- The screened soil at AEC 1C (Area of Impact 3) would meet risk-based soil remedial targets and could be re-used. Furthermore, recontouring of the area around the excavation could be conducted to backfill the excavation.
- A suitable source of backfill for the main debris zone could be identified locally.
- The debris and excess excavated soil could be disposed at the Regional District of East Kootenay Columbia Valley landfill at the rates quoted in this RAP.
- The surficial debris at AEC 1C could be readily removed manually or by a spider-type excavator and would not result in extensive soil disturbance.
- The slope in the main debris area could be sufficiently stabilized with the construction of cross-ditches for surface runoff, construction of cross-slope terraces, installation of coconut fibre mat cover and/or deposition of coarse woody debris.
- The Environmental and Geotechnical Monitors would not identify any hazards or risks to receptors which requires a work stoppage.
- The coconut fibre mat cover and re-seeding would be sufficient to prevent soil erosion and allow the establishment of native plant communities on the slope within a period of three years following remediation.
- Post-remedial surface water quality would return to baseline conditions.
- SLR field personnel would work on an approximate nine day changeover cycle.

5.4.11 Uncertainties

The primary uncertainties associated with the RAP include the following:

- Issuance of permits/approvals from regulators/stakeholders.
- Estimate of the total volume of material at Area of Impact 1 through 3 at AEC 1C.
- Estimate of the density of the debris at AEC 1C.
- Approval to conduct improvements to the access trail to transport debris from AEC 1C (Area of Impact 3) and surface debris from AEC 1C to the staging area.
- Suitability of the screened soil for use as backfill in select locations (i.e. Area of Impact 3).
- Suitability of the excess excavated soil for disposal at the Regional District landfill.
- Potential for increases in landfill tipping fees prior to completing remediation (tipping fees represent the largest single expenditure of the project cost).
- Long-term stability and restoration of remediated slopes at AEC 1C.

5.5 Remediation Strategy – Surficial Debris Removal at AEC 1C and Debris Removal at AEC 1B

SLR has also developed a remediation strategy based on the removal of surficial debris in AEC 1C and the removal of debris at AEC 1B (marsh area). Key components of the remediation strategy are described and a conceptual schedule is presented. Costs to execute the remediation strategy are also provided.

5.5.1 Remediation Objectives

The objective of the selected remediation option is to reduce the uncertainty associated with risk assessment of the contamination at the Site, specifically through:

- Removal of on-going sources of contamination to sediment and surface water at AEC 1B.
- Removal of readily accessible sources of potential future soil contamination at AEC 1C (i.e. surficial debris).

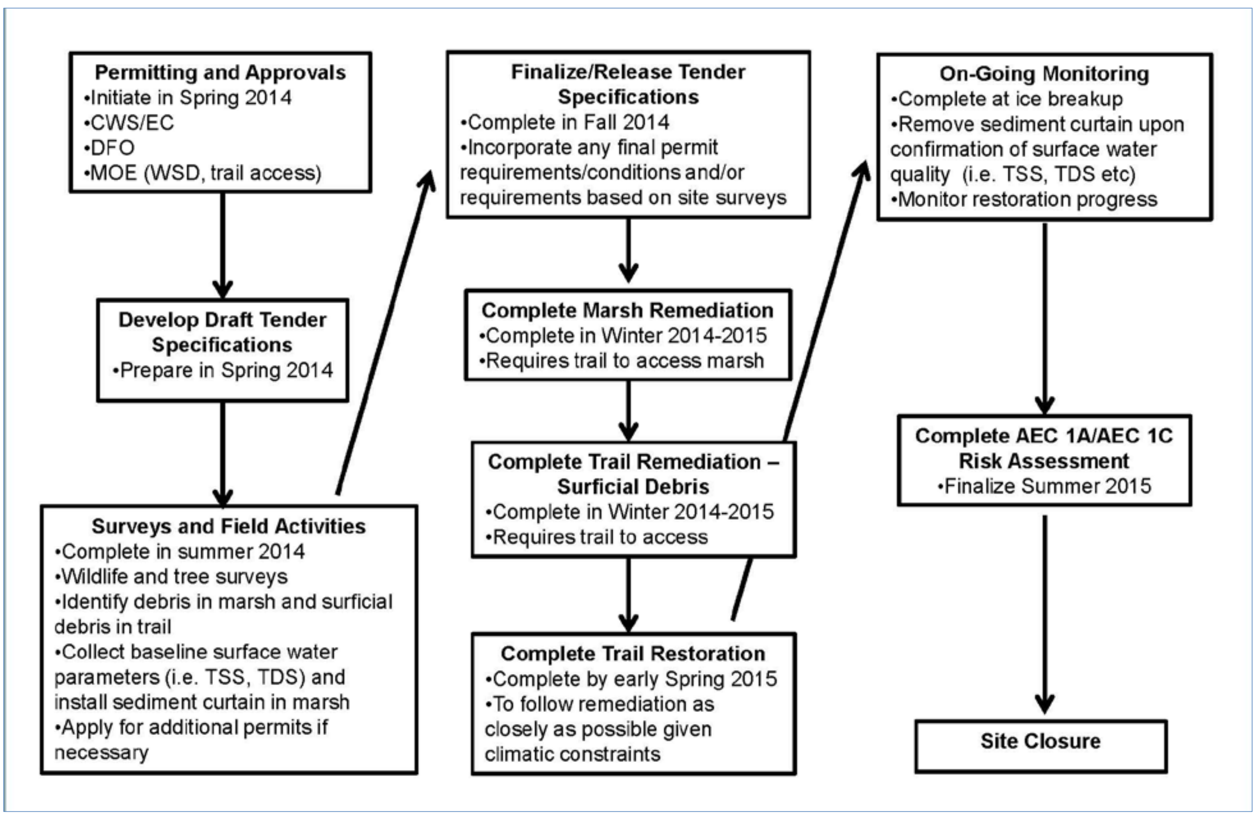
5.5.2 Regulatory Requirements

Proposed project works would likely require a permit from CWS, review by FOC, submission of a Water Act Notification (and possibly Approval) to BC MOE Water Stewardship Division and discussions with EC regarding SAR at the Site. Provincial wildlife permits may also be required.

It is anticipated that approval to use the portion of the trail that is located on the adjacent provincial land will be required to access the remaining debris in the marsh.

5.5.3 Strategy Overview

The components of the remediation strategy are depicted in the flowchart below.



The post-excavation risk assessment completed for the marsh area (AEC 1B) in 2013 concluded that there were no unacceptable risks to ecological receptors from chemical exposure to the contaminants remaining in the marsh. SLR's cursory review of the trail data collected in 2013 suggests that the trail area (AEC 1C) can be incorporated into the uplands SSHHERA with likely similar conclusions. While the removal of potential on-going sources of contamination (i.e. those associated with remaining debris) at AEC 1B and AEC 1C, and subsequent risk assessment of remaining contaminant concentrations, may not necessarily reduce quantifiable risks associated with the AECs, the removal of readily accessible sources at AEC 1B and AEC 1C are expected to reduce the uncertainties associated with the risk assessments in these areas.

5.5.4 Conceptual Remediation Program

The following sections discuss in further detail the components listed in the previous flowchart.

Remediation Preparation

The remediation preparation component of the project is as outlined in Section 5.3.4 excluding the preparation of a preliminary risk assessment for AEC 1A and AEC 1C and development of risk-based soil remedial targets. Rather the completion of the SSHHERA for AEC 1A and AEC 1C would be completed following the debris removal programs. Risk-based soil remedial targets would not be required as no soil would be removed under this strategy.

AEC 1B (Marsh Area) Remediation

The remediation of AEC 1B has been discussed previously in Section 5.3.4.

AEC 1C (Trail Area) Remediation

The remediation of AEC 1C would be limited to the removal of surficial debris across the AEC. It is recommended that the remediation activities at AEC 1C be conducted in Winter 2014-2015 following the remediation of AEC 1B.

The geotechnical implications of remedial excavation activities at AEC 1C have been discussed in Section 5.3.4.

The remediation works at AEC 1C would involve the use of specialized equipment (i.e. spider-type hoes) to remove the surficial debris areas. Additional measures (i.e. crane) would be required to move surficial debris at AEC 1C to the staging area if significant improvements cannot be made to the existing trail.

Debris removed from AEC 1B and AEC 1C would be transported for disposal from the designated staging area to the Regional District of East Kootenay Columbia Valley landfill via Westside Road.

Post-Remediation Work

The post-remediation components of the project are similar to those discussed in Section 5.3.4. Sediment and erosion control measures would be limited to areas where surficial debris removal has resulted in soil disturbance. Following the debris removal programs, the SSHHERA for AEC 1A and AEC 1C would be completed. Details of the post-remediation monitoring program are detailed in Section 5.5.6.

5.5.5 Post-Remediation Sediment and Erosion Control and Other Restoration Activities

The post-remediation restoration and sediment/erosion control measures required following the removal of debris at AEC 1B and removal of surficial debris at AEC 1C are similar to those discussed in Section 5.3.5. However, sediment and erosion control measures at AEC 1C would be more limited due to the anticipated reduced level of disturbance under this strategy (assumed to be a total area of 500 m^2).

5.5.6 Remediation and Post-Remediation Monitoring

Wildlife and wildlife tree surveys would likely be required in advance of the remediation activities.

Remediation and post-remediation monitoring at AEC 1B (marsh area) would be limited to the evaluation of turbidity parameters in advance of and following remediation to evaluate the timing of the removal of the sediment curtain and completion of an EM survey to confirm that all large debris has been removed prior to equipment demobilization.

Geotechnical monitoring of the remediation activities in AEC 1C would be required based on general slope stability concerns and to provide technical advice regarding sediment and erosion control measures following debris removal. An environmental monitor for wildlife considerations would also be required for the duration of the remediation activities.

The removal of the surficial debris at AEC 1C would be monitored visually during the work program.

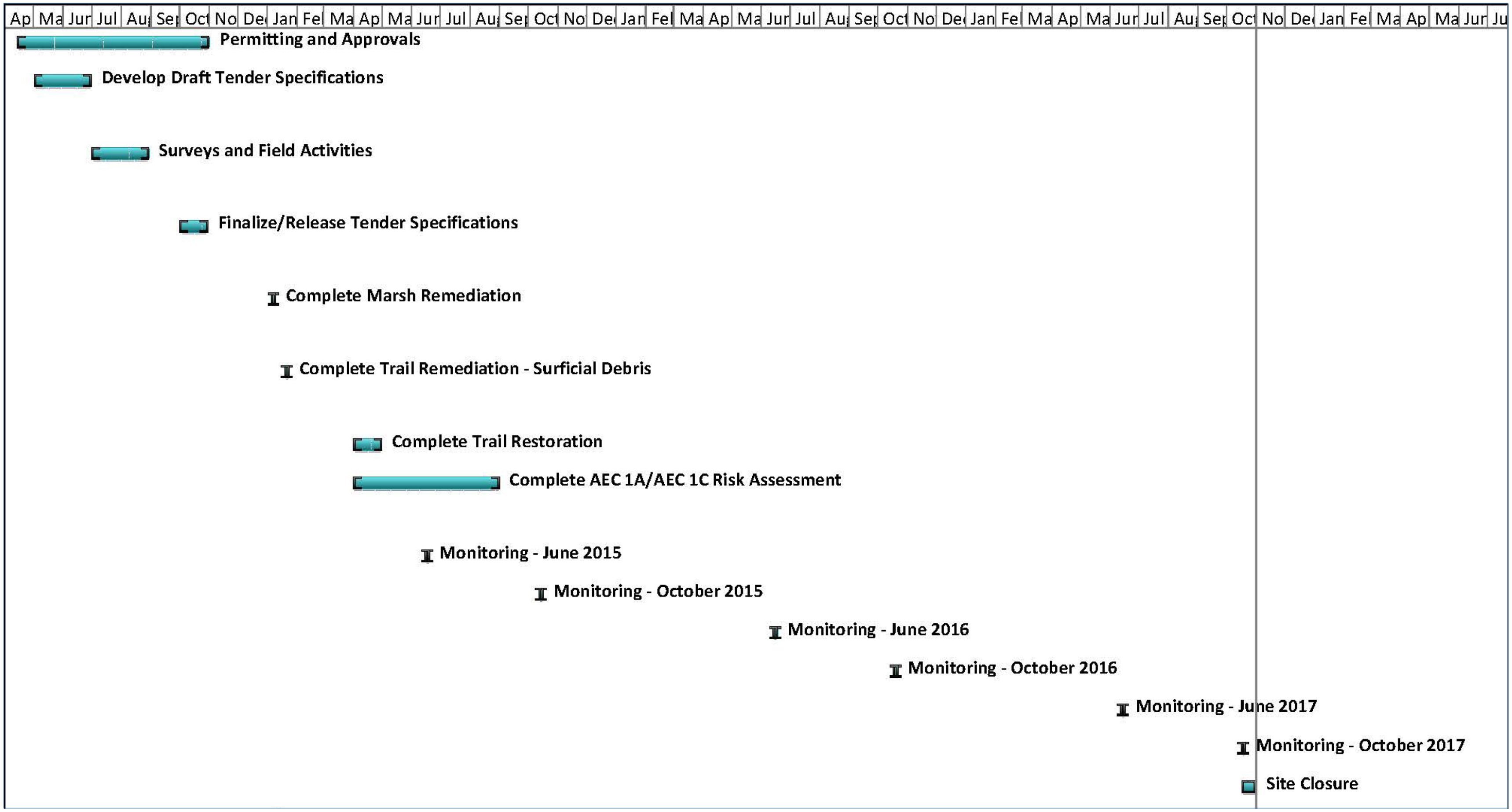
Sediment and erosion control measures and other restoration activities would be required in areas of soil disturbance following the surficial debris removal at AEC 1C. Monitoring of post-remediation restoration progress (i.e. establishment of native grasses/plants) and surface erosion should be conducted twice per year during non-frozen ground conditions for at least three years following the remediation works. Since no excavation of the slope would be conducted under this strategy, it is assumed that a geotechnical monitor would not be required to evaluate slope stability.

The metrics for evaluating compliance with the remediation objectives include the following:

- AEC 1B – confirmation via EM survey that all large debris has been removed.
- AEC 1B – confirmation that surface water turbidity parameters (e.g. total suspended and total dissolved solids) are consistent with pre-remediation conditions.
- AEC 1C – visual confirmation that all large debris has been removed.
- AEC 1C – visual confirmation that grasses/plants are re-establishing in disturbed areas and that there is no evidence of significant erosion.

5.5.7 Conceptual Schedule

The conceptual schedule for the implementation of the RAP is summarized in the Gantt chart on the following page. Key components of the RAP are identified, including post-remediation monitoring.


Permitting and Approvals
Develop Draft Tender Specifications
Surveys and Field Activities
Finalize/Release Tender Specifications
Complete Marsh Remediation
Complete Trail Remediation - Surficial Debris
Complete Trail Restoration
Complete AEC 1A/AEC 1C Risk Assessment
Monitoring - June 2015
Monitoring - October 2015
Monitoring - June 2016
Monitoring - October 2016
Monitoring - June 2017
Monitoring - October 2017
Site Closure

5.5.8 Communication Strategy

The implementation of the communication strategy discussed in Section 5.3.8 is recommended.

5.5.9 Contingency Plans

Contingency measures to mitigate potential adverse effects to receptors have been incorporated into the remediation strategy discussed above. Limiting the work program in AEC 1C to the removal of surficial debris will minimize the total area of disturbance and reduce impacts to slope stability.

Following remediation, the timely restoration of the disturbed areas and monitoring of restoration progress and soil erosion would also mitigate potential adverse effects to receptors.

5.5.10 Costs

The table below summarizes the approximate costs associated with the implementation and execution of the RAP (based on surficial debris removal at AEC 1C and debris removal at AEC 1B) through to site closure. Costs provided are exclusive of taxes. A detailed cost breakdown is provided in Table 7 following the report text.

Table G
Cost Estimate – Remediation of AEC 1B and AEC 1C (Surficial Debris Only)

Task	Cost Breakdown	Estimated Cost
1A - Permits/Approvals	Labour (SLR fees)	$5000
1B – Tender Specification Development	Labour (SLR fees)	$8750
	Direct Expenses (Subcontractors)	$4000
1C – Surveys and Field Activities	Labour	$13360
	Travel and Living	$3965
	Direct Expenses (Subcontractors)	$5035
1D – Finalize Tender Specifications	Labour	$5625
	Travel and Living	$915
2A – AEC 1B Remediation	Labour	$13860
	Travel and Living	$3965
	Direct Expenses (Subcontractors)	$93290
2B – AEC 1C (Surficial Debris) Remediation	Labour	$16070
	Travel and Living	$4975
	Direct Expenses (Subcontractors)	$145310
3A – Site Restoration	Labour	$6000
	Travel and Living	$1985
	Direct Expenses (Subcontractors)	$25000
3B – Post-Remedial Monitoring	Labour	$21600
	Travel and Living	$8880
	Direct Expenses (Subcontractors)	$35
3C – Complete AEC 1A/1C SSHHERA	Labour	$21805
3D – Reporting and Site Closure Requirements	Labour	$16600
	Total	$426025
	20% Contingency	$85205
	Total Including Contingency	$511230

The cost estimate above assumes the following:

- Permits and approvals would be obtained from regulators and/or stakeholders prior to Fall 2014.
- Any additional wildlife permits (if required following wildlife surveys) would be readily obtained and would not delay the project schedule.
- The volume of materials at AEC 1B and AEC 1C are as estimated.
- The density of debris is approximately two tonnes per cubic metre.
- Sufficient ice would be present on the marsh to support the weight of the necessary equipment.
- Spider-type excavators would be able to remove the debris in the marsh.
- The debris from the marsh would need to be transported to the staging area using helicopters.
- Helicopters could move approximately 6.5 tonnes of debris per hour from the marsh to the staging area.
- Transport of the surficial debris at AEC 1C would require additional measures (e.g. crane) if improvements cannot be made to the existing trail.
- The debris could be disposed at the Regional District of East Kootenay Columbia Valley landfill at the rates quoted in this RAP.
- The surficial debris at AEC 1C could be readily removed manually or by a spider-type excavator and would not result in extensive soil disturbance.
- The Environmental and Geotechnical Monitors would not identify any hazards or risks to receptors which requires a work stoppage.
- The coconut fibre mat cover and re-seeding would be sufficient to prevent soil erosion and allow the establishment of native plant communities on the slope within a period of three years following remediation.
- Post-remedial surface water quality would return to baseline conditions.
- SLR field personnel would work on an approximate nine day changeover cycle.

5.5.11 Uncertainties

The primary uncertainties associated with the RAP include the following:

- Issuance of permits/approvals from regulators/stakeholders.
- Estimate of the density of the debris at AEC 1C.
- Approval to conduct improvements to the access trail to transport surficial debris from AEC 1C to the staging area.
- Potential for increases in landfill tipping fees prior to completing remediation.
- Long-term restoration of remediated slopes at AEC 1C.

5.6 Remediation Strategy – Surficial Debris Removal at AEC 1C Only

SLR has also developed a remediation strategy based on the removal of surficial debris in AEC 1C only; no removal of debris at AEC 1B would be conducted. Key components of the remediation strategy are described and a conceptual schedule is presented. Costs to execute the remediation strategy are also provided.

5.6.1 Remediation Objectives

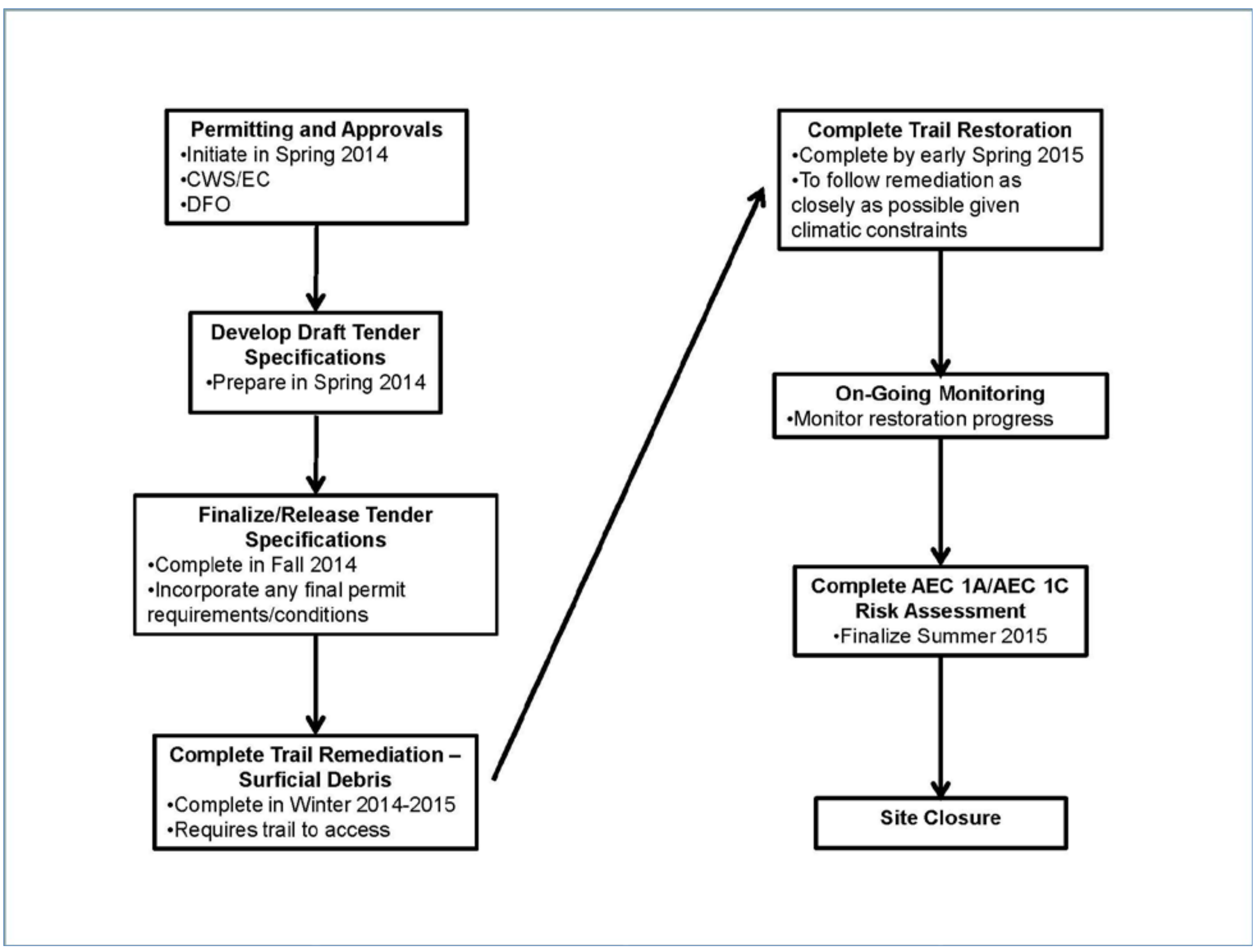
The objective of the selected remediation option is to reduce the uncertainty associated with risk assessment of the contamination at the Site through the removal of readily accessible sources of potential future soil contamination at AEC 1C (i.e. surficial debris).

5.6.2 Regulatory Requirements

As no work would be conducted in the marsh under this strategy, it is anticipated that the regulatory requirements would be limited to the issuance of a permit from CWS and issuance of provincial wildlife permits (if required). However, previous works in the trail area have customarily included discussions with FOC and it is recommended that this approach be taken for the proposed work program. Discussions with EC regarding SAR at the Site are also recommended. It is unlikely that approval to use the portion of the trail that is located on the adjacent provincial land will be required for the work program.

5.6.3 Strategy Overview

The components of the remediation strategy are depicted in the flowchart below.



5.6.4 Conceptual Remediation Program

The following sections discuss in further detail the components listed in the previous flowchart.

Remediation Preparation

Two tasks comprise the remediation preparation component of the project:

- Application for permits/approvals and liaison with stakeholders and regulators.
- Preparation of tender specifications (draft and final versions).

It is recommended that the permitting and approval component of the project be initiated early in Spring 2014. The preparation of draft NMS tender specifications for the project works should be initiated in Spring 2014 to allow for any supplementary remediation planning information to be collected in Summer 2014 and facilitate any modifications to the tender specifications that may result. The tender specifications for the project would be finalized in Fall 2014.

No pre-remediation field activities would be conducted as previous environmental monitoring of the trail area has not identified issues in the proposed work areas; it is anticipated that wildlife surveying can be conducted immediately prior to the debris removal program.

AEC 1C (Trail Area) Remediation

The remediation of AEC 1C would be limited to the removal of surficial debris across the AEC. It is recommended that the remediation activities at AEC 1C be conducted in Winter 2014-2015 to reduce disturbance and due to general slope stability concerns.

The geotechnical implications of remedial excavation activities at AEC 1C have been discussed in Section 5.3.4.

The remediation works at AEC 1C would involve the use of specialized equipment (i.e. spider-type hoes) to remove the surficial debris areas. Additional measures (i.e. crane) would be required to move surficial debris at AEC 1C to the staging area if significant improvements cannot be made to the existing trail.

Debris removed from AEC 1C would be transported for disposal from the designated staging area to the Regional District of East Kootenay Columbia Valley landfill via Westside Road.

Post-Remediation Work

The post-remediation components of the project would be limited to restoration activities, post-remediation monitoring and completion of the SSHHERA for AEC 1A and AEC 1C. Erosion and sediment control measures would only be implemented in areas where surficial debris removal has resulted in soil disturbance. Details of the post-remediation monitoring program are detailed in Section 5.6.6.

5.6.5 Post-Remediation Sediment and Erosion Control and Other Restoration Activities

The creation of surface roughness to control erosion at AEC 1C following debris removal is strongly recommended. Specifically, surface roughness should be created through the installation of coconut fibre mat cover and/or deposition of coarse woody debris. Details of the surface roughness measures are provided in Section 5.3.5. It is assumed that sediment and erosion control measures at AEC 1C would be limited to a total area of 500 m^2.

Additional restoration measures include seeding disturbed areas with a native grass mix in the spring following the remediation activities. Other measures that may be considered include the spot-treatment of any observed weed species with a soil contact herbicide.

5.6.6 Remediation and Post-Remediation Monitoring

Wildlife and wildlife tree surveys would be conducted immediately prior to the remediation activities. An environmental monitor for wildlife considerations would also be required for the duration of the remediation activities.

Geotechnical monitoring of the remediation activities in AEC 1C would be required based on general slope stability concerns and to provide technical advice regarding sediment and erosion control measures following debris removal.

The removal of the surficial debris at AEC 1C would be monitored visually during the work program.

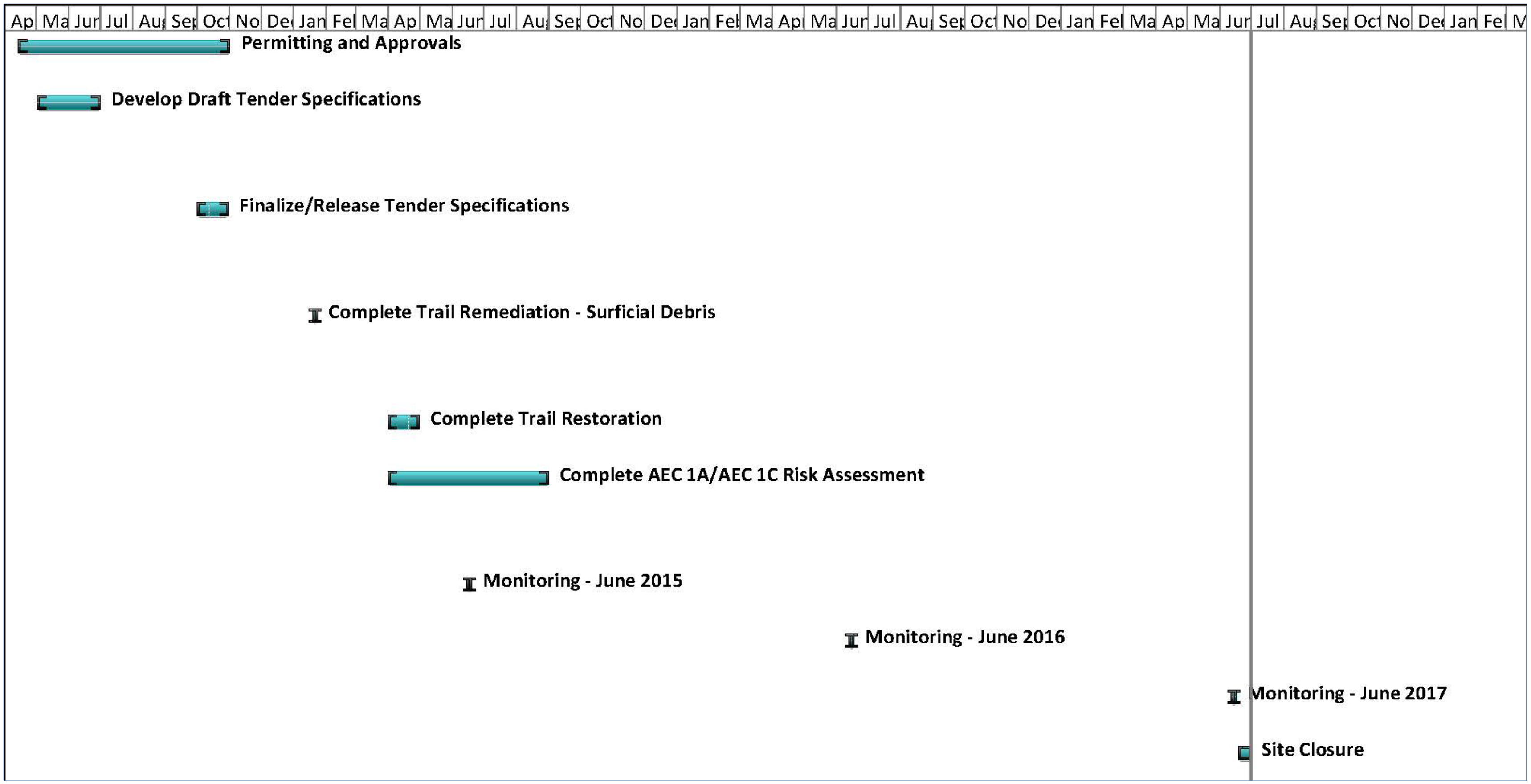
Sediment and erosion control measures and other restoration activities would be required in areas of soil disturbance following the surficial debris removal at AEC 1C. Monitoring of post-remediation restoration progress (i.e. establishment of native grasses/plants) and surface erosion should be conducted annually during non-frozen ground conditions for at least three years following the remediation works. Since no excavation of the slope would be conducted under this strategy, it is assumed that a geotechnical monitor would not be required to evaluate slope stability.

The metrics for evaluating compliance with the remediation objectives at AEC 1C include the following:

- Visual confirmation that all large debris has been removed.
- Visual confirmation that grasses/plants are re-establishing in disturbed areas and that there is no evidence of significant erosion.

5.6.7 Conceptual Schedule

The conceptual schedule for the implementation of the RAP is summarized in the Gantt chart on the following page. Key components of the RAP are identified, including post-remediation monitoring.


Ap Ma Jur Jul Au Sep Oct No De Jan Fel Ma Ap Ma Jur Jul Au Sep Oct No De Jan Fel Ma Ap Ma Jur Jul Au Sep Oct No De Jan Fel Ma Ap Ma Jur Jul Au Sep Oct No De Jan Fel M
Permitting and Approvals
Develop Draft Tender Specifications
Finalize/Release Tender Specifications
Complete Trail Remediation - Surficial Debris
Complete Trail Restoration
Complete AEC 1A/AEC 1C Risk Assessment
Monitoring - June 2015
Monitoring - June 2016
Monitoring - June 2017
Site Closure

5.6.8 Communication Strategy

The implementation of the communication strategy discussed in Section 5.3.8 is recommended.

5.6.9 Contingency Plans

Contingency measures to mitigate potential adverse effects to receptors have been incorporated into the remediation strategy discussed above. Limiting the work program in AEC 1C to the removal of surficial debris will minimize the total area of disturbance and reduce impacts to slope stability.

Following remediation, the timely restoration of the disturbed areas and monitoring of restoration progress and soil erosion would also mitigate potential adverse effects to receptors.

5.6.10 Costs

The table below summarizes the approximate costs associated with the implementation and execution of the RAP (based on surficial debris removal at AEC 1C only) through to site closure. Costs provided are exclusive of taxes. A detailed cost breakdown is provided in Table 8 following the report text.

Table H
Cost Estimate – Remediation of AEC 1C (Surficial Debris Only)

Task	Cost Breakdown	Estimated Cost
1A - Permits/Approvals	Labour (SLR fees)	$3125
1B – Tender Specification Development	Labour (SLR fees)	$5000
	Direct Expenses (Subcontractors)	$4000
1C – Finalize Tender Specifications	Labour	$5625
	Travel and Living	$915
2 – AEC 1C (Surficial Debris) Remediation	Labour	$16070
	Travel and Living	$4975
	Direct Expenses (Subcontractors)	$152310
3A – Site Restoration	Labour	$6000
	Travel and Living	$1980
	Direct Expenses (Subcontractors)	$25000
3B – Post-Remedial Monitoring	Labour	$10800
	Travel and Living	$4440
3C – Complete AEC 1A/1C SSHHERA	Labour	$21805
3D – Reporting and Site Closure Requirements	Labour	$10020
	Total	$272065
	20% Contingency	$54415
	Total Including Contingency	$326480

The cost estimate above assumes the following:

- Permits and approvals would be obtained from regulators and/or stakeholders prior to Fall 2014.
- Wildlife permits are likely not required based on previous observations in the trail area.
- The volume of material at AEC 1C is as estimated.
- The density of debris is approximately two tonnes per cubic metre.

- Transport of the surficial debris at AEC 1C would require additional measures (e.g. crane) if improvements cannot be made to the existing trail.
- The debris could be disposed at the Regional District of East Kootenay Columbia Valley landfill at the rates quoted in this RAP.
- The surficial debris at AEC 1C could be readily removed manually or by a spider-type excavator and would not result in extensive soil disturbance.
- The Environmental and Geotechnical Monitors would not identify any hazards or risks to receptors which requires a work stoppage.
- The coconut fibre mat cover and re-seeding would be sufficient to prevent soil erosion and allow the establishment of native plant communities on the slope within a period of three years following remediation.
- SLR field personnel would work on an approximate nine day changeover cycle.

5.6.11 Uncertainties

The primary uncertainties associated with the RAP include the following:

- Issuance of permits/approvals from regulators/stakeholders.
- Estimate of the density of the debris at AEC 1C.
- Approval to conduct improvements to the access trail to transport surface debris from AEC 1C to the staging area.
- Potential for increases in landfill tipping fees prior to completing remediation.
- Long-term restoration of remediated slopes at AEC 1C.

5.7 Remediation Strategy – Risk Assessment Only

The following section has been prepared to allow comparison of the previous remediation strategies to a baseline which does not include any further removal of debris or soil at the Site.

5.7.1 Remediation Objectives

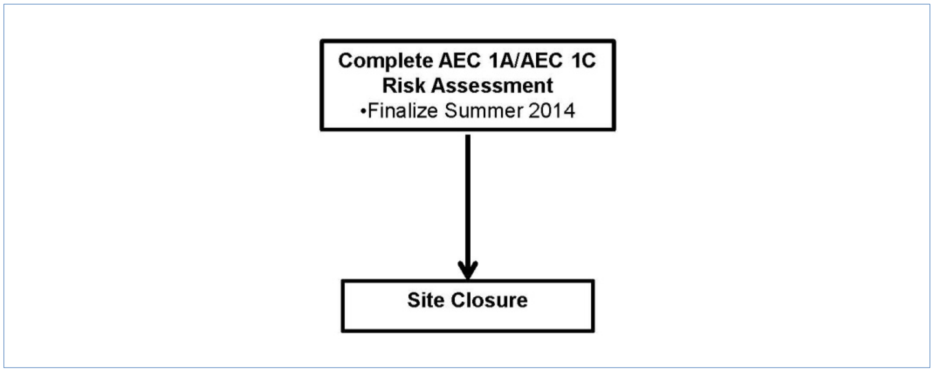
The objective of this strategy is to provide site closure without conducting any additional debris removal at the Site. No reduction in risk assessment uncertainties would be achieved under this strategy.

5.7.2 Regulatory Requirements

No permits would be required under this strategy. However, approval of the landowner (i.e. CWS) and other stakeholders to implement this strategy to achieve site closure would be required.

5.7.3 Strategy Overview

The components of the remediation strategy are depicted in the flowchart below.



5.7.4 Conceptual Remediation Program

The remediation program would consist of the completion of a SSHHERA for AEC 1A and AEC 1C and the SCT to demonstrate site closure.

5.7.5 Post-Remediation Sediment and Erosion Control and Other Restoration Activities

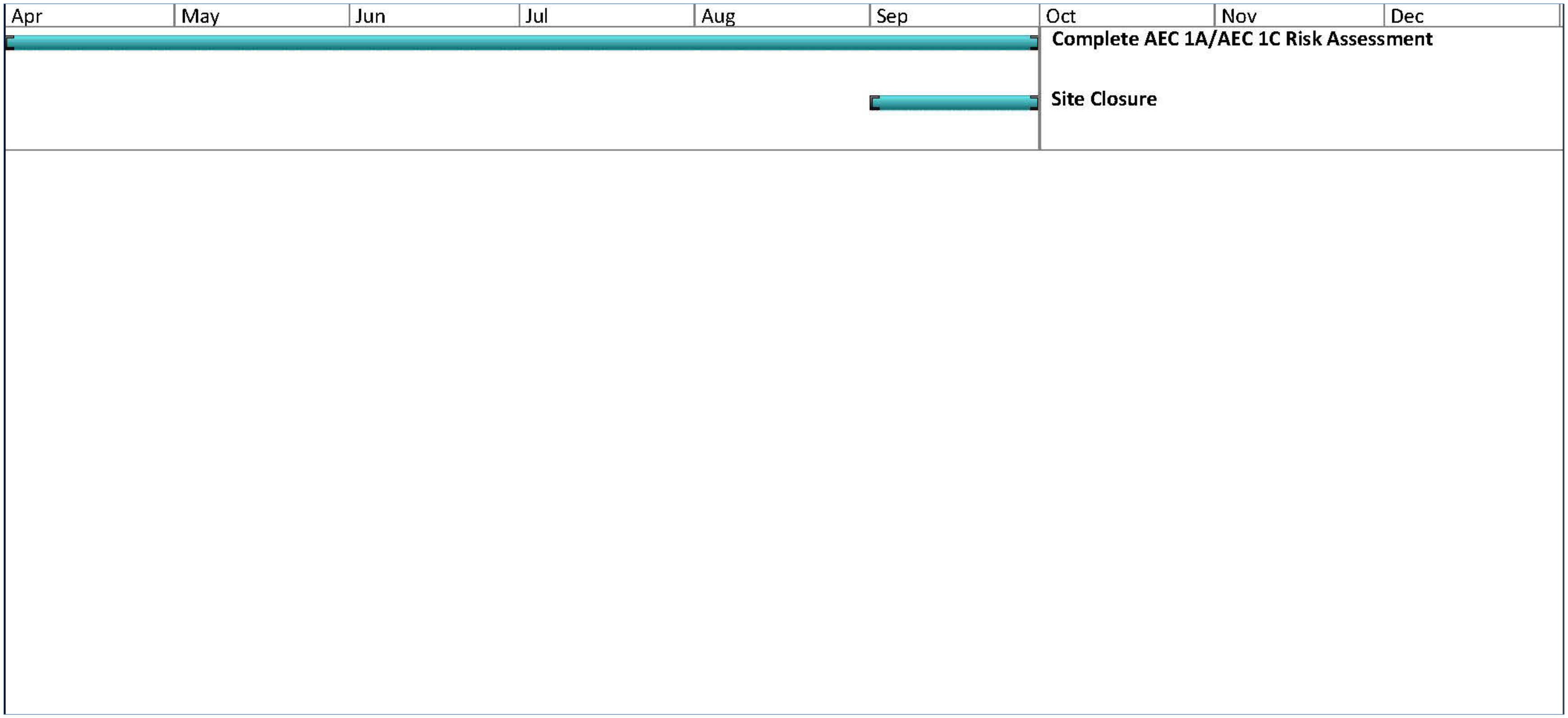
No post-remediation activities would be required.

5.7.6 Remediation and Post-Remediation Monitoring

As no active remediation would be conducted, no monitoring activities would be required.

5.7.7 Conceptual Schedule

The conceptual schedule for the implementation of the RAP is summarized in the Gantt chart on the following page. Key components of the RAP are identified.


Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Complete AEC 1A/AEC 1C Risk Assessment
Site Closure

5.7.8 Communication Strategy

A communication strategy would not be required.

5.7.9 Contingency Plans

Contingency plans would not be required.

5.7.10 Costs

The table below summarizes the approximate costs associated with the implementation and execution of the RAP (based on no debris/soil removal) through to site closure. Costs provided are exclusive of taxes. A detailed cost breakdown is provided in Table 9 following the report text.

Table I
Cost Estimate – Risk Assessment Only

Task	Cost Breakdown		Estimated Cost
1 – Complete AEC 1A/1C SSHHERA and Site Closure Requirements	Labour		$27755
		Total	$27755
		20% Contingency	$5550
		Total Including Contingency	$33305

The cost estimate above assumes the following:

- Approval to implement the strategy to achieve site closure would be obtained from regulators and/or stakeholders.
- The uncertainties associated with the SSHHERA would not preclude site closure.

5.7.11 Uncertainties

The primary uncertainties associated with the RAP include the following:

- Acceptance of the strategy by regulators/stakeholders.
- Long-term impact of the presence of debris and potential on-going contaminant sources at AEC 1B and AEC 1C.
- The natural instability of the glacio-lacustrine silt slopes and the uncertainty regarding the probable future soil concentrations and future spatial extent of impacts both horizontally and vertically.

6.0 ADDITIONAL ENVIRONMENT CANADA POLICY REQUIREMENTS

As part of the 2013-2014 site works, SLR completed the Federal Contaminated Sites Inventory (FCSI) input form, updated the Conceptual Site Model (CSM) prepared previously for the Site and completed all applicable parts of the Site Closure Tool (SCT). The FCSI input form is included in Appendix E, the updated CSM has been included as Drawing 6 and the SCT is included in Appendix F.

7.0 CLOSURE

SLR's liability is specified in the contract with PWGSC. Copyright in the Material shall vest in Canada.

This report has been prepared and the work referred to in this report has been undertaken by SLR for PWGSC. It is intended for the sole and exclusive use of PWGSC and its authorized agents for the purpose(s) set out in this report. Any use of, reliance on or decision made based on this report by any person other than PWGSC for any purpose, or by PWGSC for a purpose other than the purpose(s) set out in this report, is the sole responsibility of such other person or PWGSC. PWGSC and SLR make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

This report has been prepared for specific application to this site and is based on the interpretation of data collected from field investigations and the results of laboratory analyses, which were limited to the quantification in select samples of those substances specifically identified in the report. Unless otherwise stated, the findings set out in this report cannot be extended to previous or future site conditions; portions of the Site which were unavailable for direct investigation; subsurface locations which were not investigated directly; or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the Site; substances addressed by the investigation may exist in areas of the Site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken. SLR expresses no warranty with respect to the accuracy of the laboratory analyses, methodologies used, or presentation of analytical results by the laboratory. Actual concentrations of the substances identified in the samples submitted may vary according to the extraction and testing procedures used.

As the evaluation and conclusions reported herein do not preclude the existence of other chemical compounds and/or that variations of conditions within the site may be possible, this report should be used for informational purposes only and should absolutely not be construed as a comprehensive hydrogeological or chemical characterization of the site. If site conditions change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

Nothing in this report is intended to constitute or provide a legal opinion. SLR makes no representation as to the requirements of or compliance with environmental laws, rules, regulations or policies established by federal, provincial or local government bodies. Revisions to the regulatory standards referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary.

TABLES

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

TABLE 1: SOIL CHEMISTRY RESULTS - PETROLEUM HYDROCARBON CONSTITUENTS AND MTBE (mg/kg)

Sample ID	Date	Depth (m)	HSVL (ppmv)	Benzene	Ethylbenzene	Toluene	Xylenes	MTBE	F1 (C6-10)	F2 (C10-16)	F3 (C16-34)	F4 (C34-50+)
RA1	30-Oct-2013	0.5	5	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
DUP C (Dup RA1)	30-Oct-2013	0.5	---	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
RA2	30-Oct-2013	0.5	LTDL	---	---	---	---	---	---	< 30	< 50	< 50
RA3	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
RA4	30-Oct-2013	0.5	LTDL	---	---	---	---	---	---	< 30	< 50	< 50
RA5	30-Oct-2013	0.3	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	68	< 50
RA6	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	67	188
RA7	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
RA8	30-Oct-2013	0.5	LTDL	---	---	---	---	---	---	< 30	< 50	< 50
TP1-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP1-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP1-4	29-Oct-2013	3.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-3	29-Oct-2013	2.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-4	29-Oct-2013	3.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-5	29-Oct-2013	4.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP3-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP3-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP4-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP5-1	29-Oct-2013	0.5	10	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP6-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-1	29-Oct-2013	0.5	10	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
DUP A (Dup TP7-2)	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-3	29-Oct-2013	2.0	---	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-4	29-Oct-2013	3.0	15	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	170	84
TP7-5	29-Oct-2013	4.0	10	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	64	< 50
TP8-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-2	29-Oct-2013	1.0	5	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-3	29-Oct-2013	2.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-4	29-Oct-2013	3.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-5	29-Oct-2013	4.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP10-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP11-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP11-2	30-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
DUP B (Dup TP11-2)	30-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP11-3	30-Oct-2013	2.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP12-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP13-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP14-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
DUP D (Dup TP14-1)	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
CCME ALfgs		ns	ns	0.0068	0.018	0.08	2.4	ns	---	---	---	---
CCME ALfg		ns	ns	0.0068	0.018	0.08	2.4	ns	---	---	---	---
CCME ALfvs		ns	ns	---	---	---	---	---	610	3100	ns	ns
CCME ALfvb		ns	ns	---	---	---	---	---	710	3600	ns	ns
CCME ALgwf		ns	ns	---	---	---	---	---	170	230	ns	ns
CCME ALml		ns	ns	---	---	---	---	---	800	1000	3500	10000
CCME ALescf		ns	ns	---	---	---	---	---	210	150	1300	5600
CCME ALfdc		ns	ns	---	---	---	---	---	12000	6800	15000	21000
						RPD (%)						
DUPA/TP7-2				n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c
DUPB/TP11-2				n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
DUPC/RA1				n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
DUPD/TP14-1				n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.

Notes:
m - metres
mg/kg - milligrams per kilogram
HSVL (ppmv) - headspace vapour level (parts per million by volume)
LTDL - Less than instrument detection limit
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
MTBE - methyl tert-butyl ether
VPHs - volatile petroleum hydrocarbons (C6-10), excluding benzene, ethylbenzene, toluene, xylenes
ns - no standard listed
CCME ALfgs: CCME Canadian Soil Quality Guidelines for BTEX, Agricultural Fine-grained Sub-surface (lowest human and environmental health guidelines)
CCME ALfg: CCME Canadian Soil Quality Guidelines for BTEX, Agricultural Fine-grained Surface (lowest human and environmental health guidelines)
CCME ALfvs: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Vapour Inhalation (indoor, slab-on-grade)
CCME ALfvb: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Vapour Inhalation (indoor, basement)
CCME ALgwf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Protection of Potable GW
CCME ALml: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Management Limit
CCME ALescf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Eco Soil Contact
CCME ALfdc: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Direct Contact

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

Sample ID	Date	Depth (m)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	IACR	Benzo(a)pyrene Equivalency
RA1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
DUP C (Dup RA1)	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA2	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA3	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA4	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA5	30-Oct-2013	0.3	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	0.018	< 0.01	< 0.01	0.014	< 0.005	0.019	< 0.01	< 0.01	< 0.01	< 0.01	0.025	0.020	0.19	< 0.02
RA6	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA7	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
RA8	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP1-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP1-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	0.013	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.011	0.16	< 0.02
TP1-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-3	29-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-5	29-Oct-2013	4.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP3-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP3-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP4-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP5-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP6-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-2	29-Oct-2013	1.0	< 0.02	< 0.02	< 0.02	< 0.02	0.028	0.037	0.031	< 0.02	0.025	< 0.02	< 0.02	< 0.02	0.021	< 0.02	< 0.02	< 0.02	0.023	0.47	0.046
DUP A (Dup TP7-2)	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-3	29-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	0.015	< 0.01	< 0.01	< 0.01	< 0.005	0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.013	0.17	< 0.02
TP7-5	29-Oct-2013	4.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	0.011	0.023	< 0.01	< 0.01	0.012	< 0.005	< 0.01	< 0.01	0.011	< 0.01	< 0.01	< 0.01	< 0.01	0.24	< 0.02
TP8-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-3	29-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-5	29-Oct-2013	4.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP10-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP11-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP11-2	30-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
DUP B (Dup TP11-2)	30-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP11-3	30-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP12-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP13-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP14-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
DUP D (Dup TP14-1)	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
CCME TPE/IACR		ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	1	5.3
CCME ALpw		ns	ns	ns	ns	see IACR	see IACR	see IACR	see IACR	see IACR	see IACR	see IACR	ns	ns	see IACR	ns	ns	ns	ns	ns	ns
CCME ALdh		ns	ns	ns	ns	see TPE	see TPE	see TPE	see TPE	see TPE	see TPE	see TPE	ns	ns	see TPE	ns	ns	ns	ns	ns	ns
CCME ALsc		ns	ns	ns	2.5	ns	20	ns	ns	ns	ns	ns	50	ns	ns	ns	ns	ns	ns	ns	ns
CCME ALi		ns	21.5	ns	61.5	6.2	0.6	6.2	ns	6.2	6.2	ns	15.4	15.4	ns	ns	8.8	43	7.7	ns	ns
CCME ALfl		ns	0.28	320	ns	ns	8800	ns	ns	ns	ns	ns	ns	0.25	ns	ns	0.013	0.046	ns	ns	ns
CCME ALi		ns	ns	ns	ns	0.1	ns	0.1	ns	0.1	ns	0.1	ns	ns	0.1	ns	ns	0.1	0.1	ns	ns
CCME ALe		ns	ns	ns	2.5	ns	20	ns	ns	ns	ns	ns	50	ns	ns	ns	0.6	ns	ns	ns	ns
RPD (%)																					
DUPA/TP7-2			n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
DUPB/TP11-2			n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
DUPC/RA1			n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
DUPD/TP14-1			n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
TPE - Total Potency Equivalency (1X10-5). This is only applicable in the top 1.5m
IACR - Index of Additive Cancer Risk (for the protection of potable water)
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 ALpw: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Human Health guidelines, Protection of Potable Water
Exceeds CCME ALdh: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Human Health guidelines, Direct Contact
Exceeds CCME ALsc: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Soil Contact
Exceeds CCME ALi: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Soil and Food Ingestion
Exceeds CCME ALfl: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Protection of Freshwater Life
Exceeds CCME ALi: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
Exceeds CCME ALe: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Environmental Health
Exceeds CCME TPE/IACR: CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - TPE and IACR Calculations

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

Sample ID	Date	Depth (m)	pH	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium (+6)	Chromium (total)	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Tin	Uranium	Vanadium	Zinc
RA1	30-Oct-2013	0.5	---	8	---	---	---	---	< 0.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DUP C (Dup RA1)	30-Oct-2013	0.5	---	---	---	---	---	---	< 0.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RA3	30-Oct-2013	0.5	**9.34**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 2	---	---	---
RA4	30-Oct-2013	0.5	**9.43**	---	---	---	---	< 0.050	---	---	---	---	7.46	0.0149	---	---	---	---	---	< 2	---	---	31.6
RA5	30-Oct-2013	0.3	**8.08**	1.13	6.18	200	0.28	**1.94**	0.23	27.6	7.54	26.1	**72.8**	**7.26**	0.74	19.2	< 0.2	4.02	< 0.05	3.9	0.391	10.6	**285**
RA6	30-Oct-2013	0.5	**8.16**	4.90	7.56	136	0.21	0.796	0.10	16.7	8.31	46.0	30.4	0.218	1.25	18.8	0.26	0.15	< 0.05	**50.8**	0.558	8.39	**1020**
RA7	30-Oct-2013	0.5	**9.14**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 2	---	---	52.4
TP1-1	29-Oct-2013	0.5	**8.84**	0.47	6.05	122	0.27	0.140	< 0.1	16.8	8.25	15.4	17.9	0.0196	< 0.5	20.1	< 0.2	< 0.1	< 0.05	2.9	0.803	10.9	65.2
TP1-2	29-Oct-2013	1.0	**8.33**	0.97	6.23	128	0.28	0.371	---	18.2	9.06	18.4	24.9	0.0199	0.54	22.0	< 0.2	< 0.1	< 0.05	4.5	0.696	11.6	111
TP1-3	29-Oct-2013	2.0	**8.46**	---	---	---	---	0.073	---	---	---	---	9.34	---	---	18.6	---	---	---	< 2	---	---	42.7
TP1-4	29-Oct-2013	3.0	**8.90**	0.29	5.78	94.7	0.21	0.054	---	14.1	7.96	13.9	8.10	0.0090	< 0.5	18.4	< 0.2	< 0.1	< 0.05	< 2	0.727	9.35	37.7
TP2-1	29-Oct-2013	0.5	**8.57**	0.44	6.17	111	0.31	0.163	< 0.1	18.4	8.97	16.1	17.3	0.0163	< 0.5	25.0	< 0.2	< 0.1	< 0.05	< 2	0.636	12.3	70.5
TP2-2	29-Oct-2013	1.0	**8.56**	0.43	5.88	107	0.25	0.175	---	16.3	8.43	16.5	18.3	0.0166	< 0.5	19.9	< 0.2	< 0.1	< 0.05	< 2	0.569	10.3	69.5
TP2-3	29-Oct-2013	2.0	**8.32**	1.21	6.58	152	0.30	1.01	---	21.5	9.07	24.4	40.2	0.0190	0.74	21.7	< 0.2	0.11	< 0.05	**7.7**	0.527	11.3	168
TP2-4	29-Oct-2013	3.0	**8.13**	0.31	5.85	107	0.25	0.114	---	14.7	8.12	14.3	9.39	0.0119	< 0.5	18.2	< 0.2	< 0.1	< 0.05	< 2	0.360	10.9	43.6
TP2-5	29-Oct-2013	4.0	**8.25**	1.00	6.96	143	0.24	0.920	---	19.2	8.61	38.3	47.1	0.0208	1.04	21.9	< 0.2	< 0.1	< 0.05	**69.4**	0.512	11.0	179
TP3-1	29-Oct-2013	0.5	**8.86**	0.30	5.56	86.6	0.26	0.071	< 0.1	17.3	8.70	14.2	10.3	0.0211	< 0.5	21.4	< 0.2	< 0.1	< 0.05	< 2	0.686	11.1	46.6
TP3-2	29-Oct-2013	1.0	**8.64**	0.30	5.89	86.5	0.26	0.067	---	17.5	9.47	14.3	9.38	0.0133	0.52	21.5	< 0.2	< 0.1	< 0.05	< 2	0.696	10.8	45.8
TP4-1	29-Oct-2013	0.5	**9.01**	0.40	5.94	107	0.26	0.107	---	16.6	8.27	14.8	13.0	0.0138	< 0.5	19.8	< 0.2	< 0.1	< 0.05	< 2	0.649	11.0	50.4
TP5-1	29-Oct-2013	0.5	**9.16**	0.37	7.14	145	0.25	0.064	---	14.4	8.00	15.4	9.37	0.0198	< 0.5	18.7	< 0.2	< 0.1	< 0.05	< 2	0.739	9.70	37.2
TP6-1	29-Oct-2013	0.5	**8.67**	0.74	5.75	110	0.24	0.101	---	12.1	7.28	14.3	10.6	0.0085	< 0.5	16.6	< 0.2	< 0.1	< 0.05	< 2	0.641	9.04	42.7
TP7-1	29-Oct-2013	0.5	**8.88**	0.39	6.02	101	0.28	0.127	< 0.1	16.8	8.69	15.2	14.9	0.0162	< 0.5	20.9	< 0.2	< 0.1	< 0.05	< 2	0.610	11.2	96.2
TP7-2	29-Oct-2013	1.0	**8.21**	1.40	6.49	138	0.27	0.783	---	18.5	9.06	27.5	45.5	0.0220	0.90	**70.4**	< 0.2	< 0.1	0.053	**25.5**	0.641	10.8	**306**
DUP A (Dup TP7-2)	29-Oct-2013	1.0	**8.25**	1.00	6.04	132	0.28	1.11	---	18.5	8.76	26.6	**76.0**	0.0243	0.72	**72.0**	< 0.2	0.14	< 0.05	**14.8**	0.450	10.0	**251**
TP7-3	29-Oct-2013	2.0	**8.09**	2.94	6.97	173	0.30	0.973	---	18.9	8.69	28.1	**81.4**	0.0302	0.80	21.2	< 0.2	0.16	< 0.05	**10.7**	0.598	11.7	**288**
TP7-4	29-Oct-2013	3.0	7.75	1.47	7.10	159	0.24	**15.6**	---	18.8	8.67	36.8	**127**	0.0245	1.32	22.3	< 0.2	0.11	< 0.05	**13.8**	0.452	9.57	**493**
TP7-5	29-Oct-2013	4.0	**8.45**	1.06	6.13	112	0.24	0.614	---	17.2	8.53	21.1	42.0	0.0435	0.65	21.9	< 0.2	< 0.1	< 0.05	**6.5**	0.559	9.96	**213**
TP8-1	29-Oct-2013	0.5	**8.26**	0.54	6.16	108	0.25	0.283	< 0.1	17.0	8.42	16.4	14.9	0.0190	< 0.5	20.1	< 0.2	< 0.1	< 0.05	< 2	0.604	10.4	61.0
TP8-2	29-Oct-2013	1.0	**8.73**	0.48	6.00	105	0.27	0.212	---	16.0	8.43	16.7	17.5	0.0149	< 0.5	19.7	< 0.2	< 0.1	< 0.05	< 2	0.595	10.5	70.9
TP8-3	29-Oct-2013	2.0	**8.38**	0.90	6.07	138	0.26	0.599	---	17.0	8.25	24.3	41.8	0.0175	0.69	20.2	< 0.2	< 0.1	< 0.05	**9.7**	0.535	10.4	177
TP8-4	29-Oct-2013	3.0	**8.39**	0.50	5.97	121	0.25	0.333	---	14.7	7.79	16.9	24.7	0.0238	< 0.5	18.9	< 0.2	< 0.1	< 0.05	2.1	0.491	9.60	86.9
TP8-5	29-Oct-2013	4.0	**8.41**	0.56	5.93	112	0.24	0.404	---	14.3	7.81	17.2	23.9	0.0261	< 0.5	18.3	< 0.2	< 0.1	< 0.05	3.8	0.510	9.74	158
TP10-1	30-Oct-2013	0.5	**8.49**	0.36	6.30	85.7	0.29	0.085	---	15.9	8.58	14.9	12.9	0.0129	< 0.5	20.9	< 0.2	< 0.1	< 0.05	< 2	0.472	10.7	46.4
TP11-1	30-Oct-2013	0.5	**9.01**	0.29	5.70	70.7	0.27	0.075	< 0.1	16.3	8.09	13.5	9.03	0.0086	< 0.5	20.8	< 0.2	< 0.1	< 0.05	< 2	0.417	10.4	42.7
TP11-2	30-Oct-2013	1.0	**8.50**	0.31	5.76	89.9	0.27	0.064	---	17.3	8.52	14.3	9.92	0.0098	< 0.5	21.1	< 0.2	< 0.1	< 0.05	< 2	0.427	11.2	46.5
DUP B (Dup TP11-2)	30-Oct-2013	1.0	**8.50**	0.31	5.69	86.7	0.29	0.095	---	17.3	8.67	14.6	12.8	0.0213	< 0.5	21.0	< 0.2	< 0.1	< 0.05	< 2	0.434	11.0	54.6
TP11-3	30-Oct-2013	2.0	**9.36**	0.31	6.15	86.6	0.27	0.070	---	17.5	8.47	13.7	9.84	0.0085	< 0.5	21.4	< 0.2	< 0.1	< 0.05	< 2	0.670	11.2	44.9
TP12-1	30-Oct-2013	0.5	**8.46**	0.33	5.79	87.5	0.24	0.071	< 0.1	14.7	7.44	13.6	11.2	0.0156	< 0.5	18.2	< 0.2	< 0.1	< 0.05	< 2	0.478	10.3	43.6
TP13-1	30-Oct-2013	0.5	**8.76**	0.49	5.88	114	0.25	0.184	< 0.1	15.8	8.16	16.3	19.6	0.0298	< 0.5	19.5	< 0.2	< 0.1	< 0.05	2.9	0.626	10.7	72.5
TP14-1	30-Oct-2013	0.5	**8.94**	0.31	6.13	69.1	0.29	0.077	---	20.6	9.91	14.9	12.8	0.0250	< 0.5	25.0	< 0.2	< 0.1	< 0.05	< 2	0.707	12.4	58.5
DUP D (Dup TP14-1)	30-Oct-2013	0.5	**8.96**	0.30	5.91	68.1	0.28	0.066	---	19.8	9.54	14.9	11.1	0.0159	< 0.5	24.0	< 0.2	< 0.1	< 0.05	< 2	0.690	11.7	52.2
CCME AL		ns	>6<8	20	12	750	4	1.4	0.4	64	40	63	70	6.6	5	50	1	20	1	5	23	130	200
											RPD (%)												
DUPA/TP7-2			0.5	33.3	7.2	4.4	n.c.	34.5	---	0.0	3.4	3.3	50.2	n.c.	n.c.	2.2	n.c.	n.c.	n.c.	53.1	35.0	7.7	19.7
DUPB/TP11-2			0.0	n.c.	1.2	3.6	n.c.	n.c.	---	0.0	1.7	2.1	25.4	n.c.	n.c.	0.5	n.c.	n.c.	n.c.	n.c.	1.6	1.8	16.0
DUPC/RA1			---	---	---	---	---	---	n.c.	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DUPD/TP14-1			0.2	n.c.	3.7	1.5	n.c.	n.c.	---	4.0	3.8	0.0	14.2	n.c.	n.c.	4.1	n.c.	n.c.	n.c.	n.c.	2.4	5.8	11.4

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
Exceeds CCME AL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Agricultural

TABLE 4: CHEMISTRY RESULTS - SOIL TEXTURE AND TOTAL ORGANIC CARBON

Sample ID	Date	Particle size > 75µm (%)	Organic Carbon, Total (%)
RA2	30-Oct-2013	26.2	1.26
RA4	30-Oct-2013	55.0	0.33
RA7	30-Oct-2013	0.15	0.32
TP1-1	29-Oct-2013	8.07	0.55
TP2-2	29-Oct-2013	7.28	0.48
TP3-2	29-Oct-2013	1.50	0.40
TP4-1	29-Oct-2013	7.74	0.68
TP5-1	29-Oct-2013	0.12	0.32
TP7-3	29-Oct-2013	12.5	1.54
TP8-1	29-Oct-2013	9.87	0.69
TP10-1	30-Oct-2013	4.41	1.48
TP14-1	30-Oct-2013	0.29	0.28
DUP D (Dup TP14-1)	30-Oct-2013	0.10	0.12
CCME AL		ns	ns
RPD (%)			
DUP D (Dup TP14-1)		-	nc

Notes:
mg/kg - milligrams per kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
Exceeds CCME AL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Agricultural

TABLE 5: REMEDIAL ACTION PLAN (COMPLETE EXCAVATION) - DETAILED COST BREAKDOWN

BUDGET ASSUMPTIONS:

Task 1: Obtain permits, develop and finalize tender specifications, conduct field work in support of remedial planning, prepare draft SSHHERA for AEC 1A/1C
Task 2: Conduct remediation at AEC 1B and AEC 1C
Task 3: Post-remediation site restoration, monitoring and reporting (site works, AEC 1A/1C SSHHERA, SCT, etc).

Item	Task 1 - Remediation Preparation					Task 2 - Remediation Program				Task 3 - Post-Remediation Program				Total Units	Rates
	Task 1A	Task 1B	Task 1C	Task 1D	Task 1E	Task 2A	Task 2B	Task 2C	Task 2D	Task 3A	Task 3B	Task 3C	Task 3D		
	Permiting & Approvals	Develop Tender Specifications	Surveys and Field Activities	AEC1A/1C SSHHERA and SSRTs	Finalize Tender Specifications	AEC 1B Remediation	AEC 1C (Area 3) Remediation	AEC 1C (Surficial Debris) Remediation	AEC 1C (Main Zone) Remediation	Site Restoration	Post-Remedial Monitoring	Finalize AEC1A/1C SSHHERA	Reporting and Site Closure Requirements		
Labour															
Senior Program Coordinator		20			8									28	$ 125.00
Senior Environmental Scientist/Engineer	50	80	10	10	50	14	12	4	60	50	50		40	430	$ 125.00
Senior Risk Assessor				25								10		35	$ 125.00
Intermediate Environmental Scientist/Engineer			70			70	100	30	440	360	360		40	1470	$ 95.00
Intermediate Risk Assessor				60								20		80	$ 95.00
Junior Environmental Scientist/Engineer			70			70	100	30	440				80	790	$ 78.00
Junior Risk Assessor				80								20		100	$ 78.00
CADD				10									20	30	$ 78.00
Travel and Living Expenses															
meals & incidentals (Travel Directive, Apr 1, 2014, $90.95 incl. taxes)			14		3	14	20	6	88	36	36			217	$ 86.62
accommodation (PWGSC 2014 Accomodation Search, Invermere)			12		2	12	18	6	80	33	24			187	$ 109.99
mileage (Travel Directive, Apr 1, 2014, BC, $0.48/km incl. taxes)			950		950	475	950	475	3800					7600	$ 0.46
flights (from Grande Prairie)			1			0.5	1	0.5	4	3	12			22	$ 600.00
rental vehicle			1			0.5	1	0.5	4	3	12			22	$ 250.00
fuel			1			0.5	1	0.5	4	3	12			22	$ 150.00
Direct Expenses															
Geotechnical Consultant		1												1	$ 4,000.00
Geotechnical Monitor							9	3	44		9			65	$ 1,350.00
Erosion Control Contractor (pre remediation)			1											1	$ 5,000.00
Remediation Contractor						54250	64000	8500	350000					476750	$ 1.00
EM Surveyor						1								1	$ 5,000.00
RDEKCV landfill tipping fees (debris) (in tonnes)						100	1200	400	9800					11500	$ 200.00
RDEKCV landfill tipping fees (soil < HW) (in tonnes)									6600					6600	$ 100.00
Trucking fees						4	48	16	656					724	$ 135.00
Restoration Contractor (post remediation)										1				1	$ 420,000.00
Laboratory Analysis (ALS in Vancouver/Calgary)															
Soil															
CCME PAH							10		100					110	$ 110.00
CCME Metals							10		100					110	$ 71.00
CCME BTEX and F1							10		100					110	$ 56.50
CCME F2-F4							10		100					110	$ 67.50
Grain size distribution							2		10					12	$ 22.50
Water															
Total Suspended Solids			2								2			4	$ 9.00
Total Dissolved Solids			2								2			4	$ 9.00

Item	Task 1A Permiting & Approvals	Task 1B Develop Tender Specifications	Task 1C Surveys and Field Activities	Task 1D AEC1A/1C SSHHERA and SSRTs	Task 1E Finalize Tender Specifications	Task 2A AEC 1B Remediation	Task 2B AEC 1C (Area 3) Remediation	Task 2C AEC 1C (Surficial Debris) Remediation	Task 2D AEC 1C (Main Zone) Remediation	Task 3A Site Restoration	Task 3B Post-Remedial Monitoring	Task 3C Finalize AEC1A/1C SSHHERA	Task 3D Reporting and Site Closure Requirements	TOTAL
Labour														
Senior Program Coordinator	$ -	$ 2,500.00	$ -	$ -	$ 1,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,500.00
Senior Environmental Scientist/Engineer	$ 6,250.00	$ 10,000.00	$ 1,250.00	$ 1,250.00	$ 6,250.00	$ 1,750.00	$ 1,500.00	$ 500.00	$ 7,500.00	$ 6,250.00	$ 6,250.00	$ -	$ 5,000.00	$ 53,750.00
Senior Risk Assessor	$ -	$ -	$ -	$ 3,125.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,250.00	$ -	$ 4,375.00
Intermediate Environmental Scientist/Engineer	$ -	$ -	$ 6,650.00	$ -	$ -	$ 6,650.00	$ 9,500.00	$ 2,850.00	$ 41,800.00	$ 34,200.00	$ 34,200.00	$ -	$ 3,800.00	$ 139,650.00
Intermediate Risk Assessor	$ -	$ -	$ -	$ 5,700.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,900.00	$ -	$ 7,600.00
Junior Environmental Scientist/Engineer	$ -	$ -	$ 5,460.00	$ -	$ -	$ 5,460.00	$ 7,800.00	$ 2,340.00	$ 34,320.00	$ -	$ -	$ -	$ 6,240.00	$ 61,620.00
Junior Risk Assessor	$ -	$ -	$ -	$ 6,240.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,560.00	$ -	$ 7,800.00
CADD	$ -	$ -	$ -	$ 780.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,560.00	$ 2,340.00
Labour Subtotal	**$ 6,250.00**	**$ 12,500.00**	**$ 13,360.00**	**$ 17,095.00**	**$ 7,250.00**	**$ 13,860.00**	**$ 18,800.00**	**$ 5,690.00**	**$ 83,620.00**	**$ 40,450.00**	**$ 40,450.00**	**$ 4,710.00**	**$ 16,600.00**	**$ 280,635.00**
Travel and Living Expenses														
meals & incidentals (Travel Directive, Apr 1, 2014, $90.95 incl. taxes)	$ -	$ -	$ 1,212.67	$ -	$ 259.86	$ 1,212.67	$ 1,732.38	$ 519.71	$ 7,622.48	$ 3,118.29	$ 3,118.29	$ -	$ -	$ 18,796.33
accommodation (PWGSC 2014 Accomodation Search, Invermere)	$ -	$ -	$ 1,319.88	$ -	$ 219.98	$ 1,319.88	$ 1,979.82	$ 659.94	$ 8,799.20	$ 3,629.67	$ 2,639.76	$ -	$ -	$ 20,568.13
mileage (Travel Directive, Apr 1, 2014, BC, $0.48/km incl. taxes)	$ -	$ -	$ 434.29	$ -	$ 434.29	$ 217.14	$ 434.29	$ 217.14	$ 1,737.14	$ -	$ -	$ -	$ -	$ 3,474.29
flights (from Grande Prairie)	$ -	$ -	$ 600.00	$ -	$ -	$ 300.00	$ 600.00	$ 300.00	$ 2,400.00	$ 1,800.00	$ 7,200.00	$ -	$ -	$ 13,200.00
rental vehicle	$ -	$ -	$ 250.00	$ -	$ -	$ 125.00	$ 250.00	$ 125.00	$ 1,000.00	$ 750.00	$ 3,000.00	$ -	$ -	$ 5,500.00
fuel	$ -	$ -	$ 150.00	$ -	$ -	$ 75.00	$ 150.00	$ 75.00	$ 600.00	$ 450.00	$ 1,800.00	$ -	$ -	$ 3,300.00
Travel and Living Subtotal	**$ -**	**$ -**	**$ 3,966.83**	**$ -**	**$ 914.12**	**$ 3,249.69**	**$ 5,146.49**	**$ 1,896.80**	**$ 22,158.82**	**$ 9,747.96**	**$ 17,758.05**	**$ -**	**$ -**	**$ 64,838.75**
Direct Expenses														
Geotechnical Consultant	$ -	$ 4,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,000.00
Geotechnical Monitor	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,150.00	$ 4,050.00	$ 59,400.00	$ -	$ 12,150.00	$ -	$ -	$ 87,750.00
Erosion Control Contractor (pre remediation)	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
Remediation Contractor	$ -	$ -	$ -	$ -	$ -	$ 54,250.00	$ 64,000.00	$ 8,500.00	$ 350,000.00	$ -	$ -	$ -	$ -	$ 476,750.00
EM Surveyor	$ -	$ -	$ -	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
RDEKCV landfill tipping fees (debris) (in tonnes)	$ -	$ -	$ -	$ -	$ -	$ 20,000.00	$ 240,000.00	$ 80,000.00	$ 1,960,000.00	$ -	$ -	$ -	$ -	$ 2,300,000.00
RDEKCV landfill tipping fees (soil < HW) (in tonnes)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 660,000.00	$ -	$ -	$ -	$ -	$ 660,000.00
Trucking fees	$ -	$ -	$ -	$ -	$ -	$ 540.00	$ 6,480.00	$ 2,160.00	$ 88,560.00	$ -	$ -	$ -	$ -	$ 97,740.00
Restoration Contractor (post remediation)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 420,000.00	$ -	$ -	$ -	$ 420,000.00
Laboratory Analysis (ALS in Vancouver/Calgary)														
Soil														
CCME PAH	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,100.00	$ -	$ 11,000.00	$ -	$ -	$ -	$ -	$ 12,100.00
CCME Metals	$ -	$ -	$ -	$ -	$ -	$ -	$ 710.00	$ -	$ 7,100.00	$ -	$ -	$ -	$ -	$ 7,810.00
CCME BTEX and F1	$ -	$ -	$ -	$ -	$ -	$ -	$ 565.00	$ -	$ 5,650.00	$ -	$ -	$ -	$ -	$ 6,215.00
CCME F2-F4	$ -	$ -	$ -	$ -	$ -	$ -	$ 675.00	$ -	$ 6,750.00	$ -	$ -	$ -	$ -	$ 7,425.00
Grain size distribution	$ -	$ -	$ -	$ -	$ -	$ -	$ 45.00	$ -	$ 225.00	$ -	$ -	$ -	$ -	$ 270.00
Water														
Total Suspended Solids	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
Total Dissolved Solids	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
Lab Subtotal	**$ -**	**$ -**	**$ 36.00**	**$ -**	**$ -**	**$ -**	**$ 3,095.00**	**$ -**	**$ 30,725.00**	**$ -**	**$ 36.00**	**$ -**	**$ -**	**$ 33,892.00**
Direct Expenses Subtotal	**$ -**	**$ 4,000.00**	**$ 5,036.00**	**$ -**	**$ -**	**$ 79,790.00**	**$ 325,725.00**	**$ 94,710.00**	**$ 3,148,685.00**	**$ 420,000.00**	**$ 12,186.00**	**$ -**	**$ -**	**$ 4,090,132.00**
SUMMARY — **Task Total**	**$ 6,250.00**	**$ 16,500.00**	**$ 22,362.83**	**$ 17,095.00**	**$ 8,164.12**	**$ 96,899.69**	**$ 349,671.49**	**$ 102,296.80**	**$ 3,254,463.82**	**$ 470,197.96**	**$ 70,394.05**	**$ 4,710.00**	**$ 16,600.00**	**$ 4,435,605.75**
20 % Contingency														**$ 887,121.15**
TOTAL COST (INCLUDING CONTINGENCY)														**$ 5,322,726.90**

Assumptions:

Task 1 C: Assumes 1 day for wildlife surveys, 2 days to flag debris AEC 1B/AEC 1C, 1 day to collect baseline water samples, 1 day additional time to oversee sediment curtain installation, 2 day mob/demob. Field day = 10 hr/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Installation of 120 m long sediment curtain by local/regional contractor.

Task 1E: Includes attendance at bidder's meeting which assumes 2 days mob/demob and 1 day on-site. Field day = 10 hrs/day. Assumes attendance by senior scientist only, mobilization from Kelowna, BC.

Task 2A: Assumes 5 days work to cut ice holes, remove debris and transport upslope, 1 day kick off and site prep, 1 day mob to site (i.e. split mob/demob between Task 2A and 2C). Field day = 10 hr/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Assumes EM survey by contractor based in Calgary, Alberta. Assumes 50 m^3 of debris removed from marsh. Assumes portion of total contractor mob/demob, H&S, site prep costs ($3500). Assumes 5 days spider hoe time at $250/hr and 10 hrs/day. Assumes 8 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes helicopter removal cost of $525/$m^3$. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2B: Assumes 8 days to excavate and backfill and recontour, 2 day mob/demob for field cycle/personnel change. Geotechnical monitor assumed to be 8 days on site plus 1 day mobilization (split mobilization with Task 2C). Assumes all soil being re-used as backfill. Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($4000), $33/$m^3$ to excavate soil, transport debris to top of slope and recontour/backfill and $7/$m^3$ to screen and separate debris and soil. Soil plus debris is 1000 m^3 (400 m^3 soil and 600 m^3 debris). Recontouring to makeup backfill may involve an additional 500 m^3 of material. Assumes that access to area can be constructed along trail. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2C: Assumes 2 days to review debris removal, 1 day demob (split with Task 2A). Geotechnical monitor assumed to be 2 days on site plus 1 day demobilization (split mobilization with Task 2A). Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($500), 2 days spider hoe time at $250/hr and 10 hrs/day, 2 days total foreman time at $150/hr and 10 hrs/day (including live out). Debris is 200 m^3. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2D: Assumes 36 days to excavate and terrace, 8 days mob/demob for field cycle/personnel change. Intermediate staff from Grande Prairie and junior staff from Kelowna. Geotechnical monitor assumed to be 36 days on site plus 8 day mob/demob for changeover. Assumes no backfilling. Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($22000), $33/$m^3$ to excavate soil, transport debris to top of slope and terrace and $7/$m^3$ to screen and separate debris and soil. Soil plus debris is 8200 m^3 (3300 m^3 soil and 4900 m^3 debris). Assumes that access to area can be constructed. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 3A: Assumes 30 days field supervision by Environmental Monitor and 6 days mob/demob. Assume 3 personnel cycles from Grande Prairie. Restoration contractor estimate based on 8400 m^2 of area to be addressed (3500 m^2 in main debris area, 3300 m^2 Impact Area 3 and 1600 m^2 additional areas i.e. roads), installation and supply cost of $50/$m^2$.

Task 3B: Assumes 4 trips per year by Environmental Monitor from Grande Prairie for 3 years. One day field time and 2 day mob/demob for each trip (i.e. 36 days total). Assumes one trip per year by Geotechnical Monitor from Kelowna for 3 years to evaluate slope stability. One day field time and 2 days mob/demob per trip (9 days total).

TABLE 6: REMEDIAL ACTION PLAN (PARTIAL EXCAVATION) - DETAILED COST BREAKDOWN

BUDGET ASSUMPTIONS:

Task 1: Obtain permits, develop and finalize tender specifications, conduct field work in support of remedial planning, prepare draft SSHHERA for AEC 1A/1C
Task 2: Conduct remediation at AEC 1B and AEC 1C
Task 3: Post-remediation site restoration, monitoring and reporting (site works, AEC 1A/1C SSHHERA, SCT, etc).

Item	Task 1 - Remediation Preparation					Task 2 - Remediation Program				Task 3 - Post-Remediation Program				Total Units	Rates	Task 1 - Remediation Preparation					Task 2 - Remediation Program				Task 3 - Post-Remediation Program				TOTAL
	Task 1A Permiting & Approvals	Task 1B Develop Tender Specifications	Task 1C Surveys and Field Activities	Task 1D AEC1A/1C SSHHERA and SSRTs	Task 1E Finalize Tender Specifications	Task 2A AEC 1B Remediation	Task 2B AEC 1C (Area 3) Remediation	Task 2C AEC 1C (Surficial Debris) Remediation	Task 2D AEC 1C (Main Zone) Remediation	Task 3A Site Restoration	Task 3B Post-Remedial Monitoring	Task 3C Finalize AEC1A/1C SSHHERA	Task 3D Reporting and Site Closure Requirements			Task 1A Permiting & Approvals	Task 1B Develop Tender Specifications	Task 1C Surveys and Field Activities	Task 1D AEC1A/1C SSHHERA and SSRTs	Task 1E Finalize Tender Specifications	Task 2A AEC 1B Remediation	Task 2B AEC 1C (Area 3) Remediation	Task 2C AEC 1C (Surficial Debris) Remediation	Task 2D AEC 1C (Main Zone) Remediation	Task 3A Site Restoration	Task 3B Post-Remedial Monitoring	Task 3C Finalize AEC1A/1C SSHHERA	Task 3D Reporting and Site Closure Requirements	
Labour																													
Senior Program Coordinator		20			8									28	$ 125.00	$ -	$ 2,500.00	$ -	$ -	$ 1,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,500.00
Senior Environmental Scientist/Engineer	50	80	10	10	50	14	12	4	30	50	50		40	400	$ 125.00	$ 6,250.00	$ 10,000.00	$ 1,250.00	$ 1,250.00	$ 6,250.00	$ 1,750.00	$ 1,500.00	$ 500.00	$ 3,750.00	$ 6,250.00	$ 6,250.00	$ -	$ 5,000.00	$ 50,000.00
Senior Risk Assessor				25								10		35	$ 125.00	$ -	$ -	$ -	$ 3,125.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,250.00	$ -	$ 4,375.00
Intermediate Environmental Scientist/Engineer			70			70	100	30	120	360	360		40	1150	$ 95.00	$ -	$ -	$ 6,650.00	$ -	$ -	$ 6,650.00	$ 9,500.00	$ 2,850.00	$ 11,400.00	$ 34,200.00	$ 34,200.00	$ -	$ 3,800.00	$ 109,250.00
Intermediate Risk Assessor				60								20		80	$ 95.00	$ -	$ -	$ -	$ 5,700.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,900.00	$ -	$ 7,600.00
Junior Environmental Scientist/Engineer			70			70	100	30	120				80	470	$ 78.00	$ -	$ -	$ 5,460.00	$ -	$ -	$ 5,460.00	$ 7,800.00	$ 2,340.00	$ 9,360.00	$ -	$ -	$ -	$ 6,240.00	$ 36,660.00
Junior Risk Assessor				80								20		100	$ 78.00	$ -	$ -	$ -	$ 6,240.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,560.00	$ -	$ 7,800.00
CADD				10									20	30	$ 78.00	$ -	$ -	$ -	$ 780.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,560.00	$ 2,340.00
															Labour Subtotal	**$ 6,250.00**	**$ 12,500.00**	**$ 13,360.00**	**$ 17,095.00**	**$ 7,250.00**	**$ 13,860.00**	**$ 18,800.00**	**$ 5,690.00**	**$ 24,510.00**	**$ 40,450.00**	**$ 40,450.00**	**$ 4,710.00**	**$ 16,600.00**	**$ 221,525.00**
Travel and Living Expenses																													
meals & incidentals (Travel Directive, Apr 1, 2014, $90.95 incl. taxes)			14		3	14	20	6	24	36	36			153	$ 86.62	$ -	$ -	$ 1,212.67	$ -	$ 259.86	$ 1,212.67	$ 1,732.38	$ 519.71	$ 2,078.86	$ 3,118.29	$ 3,118.29	$ -	$ -	$ 13,252.71
accommodation (PWGSC 2014 Accomodation Search, Invermere)			12		2	12	18	6	22	33	24			129	$ 109.99	$ -	$ -	$ 1,319.88	$ -	$ 219.98	$ 1,319.88	$ 1,979.82	$ 659.94	$ 2,419.78	$ 3,629.67	$ 2,639.76	$ -	$ -	$ 14,188.71
mileage (Travel Directive, Apr 1, 2014, BC, $0.48/km incl. taxes)			950		950	475	950	475	950					4750	$ 0.46	$ -	$ -	$ 434.29	$ -	$ 434.29	$ 217.14	$ 434.29	$ 217.14	$ 434.29	$ -	$ -	$ -	$ -	$ 2,171.43
flights (from Grande Prairie)			1			0.5	1	0.5	1	3	12			19	$ 600.00	$ -	$ -	$ 600.00	$ -	$ -	$ 300.00	$ 600.00	$ 300.00	$ 600.00	$ 1,800.00	$ 7,200.00	$ -	$ -	$ 11,400.00
rental vehicle			1			0.5	1	0.5	1	3	12			19	$ 250.00	$ -	$ -	$ 250.00	$ -	$ -	$ 125.00	$ 250.00	$ 125.00	$ 250.00	$ 750.00	$ 3,000.00	$ -	$ -	$ 4,750.00
fuel			1			0.5	1	0.5	1	3	12			19	$ 150.00	$ -	$ -	$ 150.00	$ -	$ -	$ 75.00	$ 150.00	$ 75.00	$ 150.00	$ 450.00	$ 1,800.00	$ -	$ -	$ 2,850.00
															Travel and Living Subtotal	**$ -**	**$ -**	**$ 3,966.83**	**$ -**	**$ 914.12**	**$ 3,249.69**	**$ 5,146.49**	**$ 1,896.80**	**$ 5,932.92**	**$ 9,747.96**	**$ 17,758.05**	**$ -**	**$ -**	**$ 48,612.85**
Direct Expenses																													
Geotechnical Consultant		1												1	$ 4,000.00	$ -	$ 4,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,000.00
Geotechnical Monitor							9	3	12		9			33	$ 1,350.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,150.00	$ 4,050.00	$ 16,200.00	$ -	$ 12,150.00	$ -	$ -	$ 44,550.00
Erosion Control Contractor (pre remediation)			1											1	$ 5,000.00	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
Remediation Contractor						57250	124200	20300	101500					303250	$ 1.00	$ -	$ -	$ -	$ -	$ -	$ 57,250.00	$ 124,200.00	$ 20,300.00	$ 101,500.00	$ -	$ -	$ -	$ -	$ 303,250.00
EM Surveyor						1								1	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
RDEKCV landfill tipping fees (debris) (in tonnes)						100	1200	400	1620					3320	$ 200.00	$ -	$ -	$ -	$ -	$ -	$ 20,000.00	$ 240,000.00	$ 80,000.00	$ 324,000.00	$ -	$ -	$ -	$ -	$ 664,000.00
RDEKCV landfill tipping fees (soil < HW) (in tonnes)									1080					1080	$ 100.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 108,000.00	$ -	$ -	$ -	$ -	$ 108,000.00
Trucking fees						4	48	16	108					176	$ 135.00	$ -	$ -	$ -	$ -	$ -	$ 540.00	$ 6,480.00	$ 2,160.00	$ 14,580.00	$ -	$ -	$ -	$ -	$ 23,760.00
Restoration Contractor (post remediation)										1				1	$ 327,500.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 327,500.00	$ -	$ -	$ -	$ 327,500.00
Laboratory Analysis (ALS in Vancouver/Calgary)																													
Soil																													
CCME PAH			15				10		51					76	$ 110.00	$ -	$ -	$ 1,650.00	$ -	$ -	$ -	$ 1,100.00	$ -	$ 5,610.00	$ -	$ -	$ -	$ -	$ 8,360.00
CCME Metals			15				10		51					76	$ 71.00	$ -	$ -	$ 1,065.00	$ -	$ -	$ -	$ 710.00	$ -	$ 3,621.00	$ -	$ -	$ -	$ -	$ 5,396.00
CCME BTEX and F1			15				10		51					76	$ 56.50	$ -	$ -	$ 847.50	$ -	$ -	$ -	$ 565.00	$ -	$ 2,881.50	$ -	$ -	$ -	$ -	$ 4,294.00
CCME F2-F4			15				10		51					76	$ 67.50	$ -	$ -	$ 1,012.50	$ -	$ -	$ -	$ 675.00	$ -	$ 3,442.50	$ -	$ -	$ -	$ -	$ 5,130.00
Grain size distribution							2		6					8	$ 22.50	$ -	$ -	$ -	$ -	$ -	$ -	$ 45.00	$ -	$ 135.00	$ -	$ -	$ -	$ -	$ 180.00
Water																													
Total Suspended Solids			2								2			4	$ 9.00	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
Total Dissolved Solids			2								2			4	$ 9.00	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
															Lab Subtotal	**$ -**	**$ -**	**$ 4,611.00**	**$ -**	**$ -**	**$ -**	**$ 3,095.00**	**$ -**	**$ 15,690.00**	**$ -**	**$ 36.00**	**$ -**	**$ -**	**$ 23,432.00**
															Direct Expenses Subtotal	**$ -**	**$ 4,000.00**	**$ 9,611.00**	**$ -**	**$ -**	**$ 82,790.00**	**$ 385,925.00**	**$ 106,510.00**	**$ 579,970.00**	**$ 327,500.00**	**$ 12,186.00**	**$ -**	**$ -**	**$ 1,508,492.00**
SUMMARY															**Task Total**	**$ 6,250.00**	**$ 16,500.00**	**$ 26,937.83**	**$ 17,095.00**	**$ 8,164.12**	**$ 99,899.69**	**$ 409,871.49**	**$ 114,096.80**	**$ 610,412.92**	**$ 377,697.96**	**$ 70,394.05**	**$ 4,710.00**	**$ 16,600.00**	**$ 1,778,629.85**
																												20 % Contingency	**$ 355,725.97**
TOTAL COST (INCLUDING CONTINGENCY)																													**$ 2,134,355.82**

Assumptions:
Task 1 C: Assumes 1 day for wildlife surveys, 2 days to flag debris AEC 1B/AEC 1C, 1 day to collect baseline water samples and test potential backfill source, 1 day additional time to oversee sediment curtain installation, 2 day mob/demob. Field day = 10 hr/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Installation of 120 m long sediment curtain by local/regional contractor.
Task 1E: Includes attendance at bidder's meeting which assumes 2 days mob/demob and 1 day on-site. Field day = 10 hrs/day. Assumes attendance by senior scientist only, mobilization from Kelowna, BC.

Task 2A: Assumes 5 days work to cut ice holes, remove debris and transport upslope, 1 day kick off and site prep, 1 day mob to site (i.e. split mob/demob between Task 2A and 2C). Field day = 10 hr/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Assumes EM survey by contractor based in Calgary, Alberta. Assumes 50 m^3 of debris removed from marsh. Assumes portion of total contractor mob/demob, H&S, site prep costs ($6500). Assumes 5 days spider hoe time at $250/hr and 10 hrs/day. Assumes 8 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes helicopter removal cost of $525/$m^3$. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2B: Assumes 8 days to excavate and backfill and recontour, 2 day mob/demob for field cycle/personnel change. Geotechnical monitor assumed to be 8 days on site plus 1 day mobilization (split mobilization with Task 2C). Assumes all soil being re-used as backfill. Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($14,200), $33/$m^3$ to excavate soil, transport debris to top of slope and recontour/backfill and $7/$m^3$ to screen and separate debris and soil. Soil plus debris is 1000 m^3 (400 m^3 soil and 600 m^3 debris). Recontouring to makeup backfill may involve an additional 500 m^3 of material. Assumes that additional $50,000 required to facilitate transport of debris to staging area (e.g. crane). Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2C: Assumes 2 days to review debris removal, 1 day demob (split with Task 2A). Geotechnical monitor assumed to be 2 days on site plus 1 day demobilization (split mobilization with Task 2A). Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($2300), 2 days spider hoe time at $250/hr and 10 hrs/day, 2 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes additional $10,000 to facilitate transport of debris to staging area (e.g. crane). Debris is 200 m^3. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2D: Assumes 10 days to excavate and backfill and terrace, 2 days mob/demob. Intermediate staff from Grande Prairie and junior staff from Kelowna. Geotechnical monitor assumed to be 10 days on site plus 2 day mob/demob. Assumes local backfill source. Remediation contractor cost assumes portion of mob/demob/H&S/site prep costs ($7000), $33/$m^3$ to excavate soil, transport debris to top of slope, $7/$m^3$ to screen and separate debris and soil and $50/$m^3$ to supply, place and contour/terrace backfill. Soil plus debris is 1350 m^3 (540 m^3 soil and 810 m^3 debris). Assumes all excavated soil disposed at landfill. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 3A: Assumes 30 days field supervision by Environmental Monitor and 6 days mob/demob. Assume 3 personnel cycles from Grande Prairie. Restoration contractor estimate based on 6550 m^2 of area to be addressed (1650 m^2 in main debris area, 3300 m^2 Impact Area 3 and 1600 m^2 additional areas i.e. roads), installation and supply cost of $50/$m^2$.

TABLE 7: REMEDIAL ACTION PLAN (DEBRIS REMOVAL AT AEC 1B AND SURFICIAL DEBRIS REMOVAL AT AEC 1C) - DETAILED COST BREAKDOWN

BUDGET ASSUMPTIONS:

Task 1: Obtain permits, develop and finalize tender specifications, conduct field work in support of remedial planning
Task 2: Conduct remediation at AEC 1B and AEC 1C (surficial debris only)
Task 3: Post-remediation site restoration, monitoring and reporting (site works, AEC 1A/1C SSHHERA, SCT, etc).

Item	Task 1 - Remediation Preparation				Task 2 - Remediation Program		Task 3 - Post-Remediation Program				Total Units	Rates
	Task 1A	Task 1B	Task 1C	Task 1D	Task 2A	Task 2B	Task 3A	Task 3B	Task 3C	Task 3D		
	Permiting & Approvals	Develop Tender Specifications	Surveys and Field Activities	Finalize Tender Specifications	AEC 1B Remediation	AEC 1C (Surficial Debris) Remediation	Site Restoration	Post-Remedial Monitoring	Complete AEC1A/1C SSHHERA	Reporting and Site Closure Requirements		
Labour												
Senior Program Coordinator		10		5							15	$ 125.00
Senior Environmental Scientist/Engineer	40	60	10	40	14	4	10	36	10	40	264	$ 125.00
Senior Risk Assessor									35		35	$ 125.00
Intermediate Environmental Scientist/Engineer			70		70	90	50	180		40	500	$ 95.00
Intermediate Risk Assessor									80		80	$ 95.00
Junior Environmental Scientist/Engineer			70		70	90				80	310	$ 78.00
Junior Risk Assessor									100		100	$ 78.00
CADD									10	20	30	$ 78.00
Travel and Living Expenses												
meals & incidentals (Travel Directive, Apr 1, 2014, $90.95 incl. taxes)			14	3	14	18	5	18			72	$ 86.62
accommodation (PWGSC 2014 Accomodation Search, Invermere)			12	2	12	18	5	12			61	$ 109.99
mileage (Travel Directive, Apr 1, 2014, BC, $0.48/km incl. taxes)			950	950	950	950					3800	$ 0.46
flights (from Grande Prairie)			1		1	1	1	6			10	$ 600.00
rental vehicle			1		1	1	1	6			10	$ 250.00
fuel			1		1	1	1	6			10	$ 150.00
Direct Expenses												
Geotechnical Consultant		1									1	$ 4,000.00
Geotechnical Monitor						9					9	$ 1,350.00
Erosion Control Contractor (pre remediation)			1								1	$ 5,000.00
Remediation Contractor					67750	51000					118750	$ 1.00
EM Surveyor					1						1	$ 5,000.00
RDEKCV landfill tipping fees (debris) (in tonnes)					100	400					500	$ 200.00
RDEKCV landfill tipping fees (soil < HW) (in tonnes)											0	$ 100.00
Trucking fees					4	16					20	$ 135.00
Restoration Contractor (post remediation)							1				1	$ 25,000.00
Laboratory Analysis (ALS in Vancouver/Calgary)												
Soil												
CCME PAH											0	$ 110.00
CCME Metals											0	$ 71.00
CCME BTEX and F1											0	$ 56.50
CCME F2-F4											0	$ 67.50
Grain size distribution											0	$ 22.50
Water												
Total Suspended Solids			2					2			4	$ 9.00
Total Dissolved Solids			2					2			4	$ 9.00

Item	Task 1 - Remediation Preparation				Task 2 - Remediation Program		Task 3 - Post-Remediation Program				TOTAL
	Task 1A	Task 1B	Task 1C	Task 1D	Task 2A	Task 2B	Task 3A	Task 3B	Task 3C	Task 3D	
	Permiting & Approvals	Develop Tender Specifications	Surveys and Field Activities	Finalize Tender Specifications	AEC 1B Remediation	AEC 1C (Surficial Debris) Remediation	Site Restoration	Post-Remedial Monitoring	Complete AEC1A/1C SSHHERA	Reporting and Site Closure Requirements	
Labour											
Senior Program Coordinator	$ -	$ 1,250.00	$ -	$ 625.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,875.00
Senior Environmental Scientist/Engineer	$ 5,000.00	$ 7,500.00	$ 1,250.00	$ 5,000.00	$ 1,750.00	$ 500.00	$ 1,250.00	$ 4,500.00	$ 1,250.00	$ 5,000.00	$ 33,000.00
Senior Risk Assessor	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,375.00	$ -	$ 4,375.00
Intermediate Environmental Scientist/Engineer	$ -	$ -	$ 6,650.00	$ -	$ 6,650.00	$ 8,550.00	$ 4,750.00	$ 17,100.00	$ -	$ 3,800.00	$ 47,500.00
Intermediate Risk Assessor	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,600.00	$ -	$ 7,600.00
Junior Environmental Scientist/Engineer	$ -	$ -	$ 5,460.00	$ -	$ 5,460.00	$ 7,020.00	$ -	$ -	$ -	$ 6,240.00	$ 24,180.00
Junior Risk Assessor	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,800.00	$ -	$ 7,800.00
CADD	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 780.00	$ 1,560.00	$ 2,340.00
Labour Subtotal	**$ 5,000.00**	**$ 8,750.00**	**$ 13,360.00**	**$ 5,625.00**	**$ 13,860.00**	**$ 16,070.00**	**$ 6,000.00**	**$ 21,600.00**	**$ 21,805.00**	**$ 16,600.00**	**$ 128,670.00**
Travel and Living Expenses											
meals & incidentals (Travel Directive, Apr 1, 2014, $90.95 incl. taxes)	$ -	$ -	$ 1,212.67	$ 259.86	$ 1,212.67	$ 1,559.14	$ 433.10	$ 1,559.14	$ -	$ -	$ 6,236.57
accommodation (PWGSC 2014 Accomodation Search, Invermere)	$ -	$ -	$ 1,319.88	$ 219.98	$ 1,319.88	$ 1,979.82	$ 549.95	$ 1,319.88	$ -	$ -	$ 6,709.39
mileage (Travel Directive, Apr 1, 2014, BC, $0.48/km incl. taxes)	$ -	$ -	$ 434.29	$ 434.29	$ 434.29	$ 434.29	$ -	$ -	$ -	$ -	$ 1,737.14
flights (from Grande Prairie)	$ -	$ -	$ 600.00	$ -	$ 600.00	$ 600.00	$ 600.00	$ 3,600.00	$ -	$ -	$ 6,000.00
rental vehicle	$ -	$ -	$ 250.00	$ -	$ 250.00	$ 250.00	$ 250.00	$ 1,500.00	$ -	$ -	$ 2,500.00
fuel	$ -	$ -	$ 150.00	$ -	$ 150.00	$ 150.00	$ 150.00	$ 900.00	$ -	$ -	$ 1,500.00
Travel and Living Subtotal	**$ -**	**$ -**	**$ 3,966.83**	**$ 914.12**	**$ 3,966.83**	**$ 4,973.25**	**$ 1,983.05**	**$ 8,879.02**	**$ -**	**$ -**	**$ 24,683.10**
Direct Expenses											
Geotechnical Consultant	$ -	$ 4,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,000.00
Geotechnical Monitor	$ -	$ -	$ -	$ -	$ -	$ 12,150.00	$ -	$ -	$ -	$ -	$ 12,150.00
Erosion Control Contractor (pre remediation)	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
Remediation Contractor	$ -	$ -	$ -	$ -	$ 67,750.00	$ 51,000.00	$ -	$ -	$ -	$ -	$ 118,750.00
EM Surveyor	$ -	$ -	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ -	$ -	$ 5,000.00
RDEKCV landfill tipping fees (debris) (in tonnes)	$ -	$ -	$ -	$ -	$ 20,000.00	$ 80,000.00	$ -	$ -	$ -	$ -	$ 100,000.00
RDEKCV landfill tipping fees (soil < HW) (in tonnes)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Trucking fees	$ -	$ -	$ -	$ -	$ 540.00	$ 2,160.00	$ -	$ -	$ -	$ -	$ 2,700.00
Restoration Contractor (post remediation)	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,000.00	$ -	$ -	$ -	$ 25,000.00
Laboratory Analysis (ALS in Vancouver/Calgary)											
Soil											
CCME PAH	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CCME Metals	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CCME BTEX and F1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CCME F2-F4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Grain size distribution	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Water											
Total Suspended Solids	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
Total Dissolved Solids	$ -	$ -	$ 18.00	$ -	$ -	$ -	$ -	$ 18.00	$ -	$ -	$ 36.00
Lab Subtotal	**$ -**	**$ -**	**$ 36.00**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 36.00**	**$ -**	**$ -**	**$ 72.00**
Direct Expenses Subtotal	**$ -**	**$ 4,000.00**	**$ 5,036.00**	**$ -**	**$ 93,290.00**	**$ 145,310.00**	**$ 25,000.00**	**$ 36.00**	**$ -**	**$ -**	**$ 272,672.00**
SUMMARY — **Task Total**	**$ 5,000.00**	**$ 12,750.00**	**$ 22,362.83**	**$ 6,539.12**	**$ 111,116.83**	**$ 166,353.25**	**$ 32,983.05**	**$ 30,515.02**	**$ 21,805.00**	**$ 16,600.00**	**$ 426,025.10**
20 % Contingency											**$ 85,205.02**
TOTAL COST (INCLUDING CONTINGENCY)											**$ 511,230.13**

Assumptions:
Task 1 C: Assumes 1 day for wildlife surveys, 2 days to flag debris AEC 1B/AEC 1C, 1 day to collect baseline water samples, 1 day additional time to oversee sediment curtain installation, 2 day mob/demob. Field day = 10 hr/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Installation of 120 m long sediment curtain by local/regional contractor.

Task 1D: Includes attendance at bidder's meeting which assumes 2 days mob/demob and 1 day on-site. Field day = 10 hrs/day. Assumes attendance by senior scientist only, mobilization from Kelowna, BC.

Task 2A: Assumes 5 days work to cut ice holes, remove debris and transport upslope, 1 day kick off and site prep, 1 day mob to site (i.e. split mob/demob between Task 2A and 2C). Field day = 10 hrs/day. Assumes mobilization of intermediate scientist/environmental monitor from Grande Prairie and junior scientist from Kelowna. Assumes EM survey by contractor based in Calgary, Alberta. Assumes 50 m^3 of debris removed from marsh. Assumes portion of total contractor mob/demob, H&S, site prep costs ($17000). Assumes 5 days spider hoe time at $250/hr and 10 hrs/day. Assumes 8 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes helicopter removal cost of $525/$m^3$. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 2B: Assumes 1 day prep, 6 days to review debris removal, 2 day mob/demob. Geotechnical monitor assumed to be 7 days on site plus 2 day mob/demob. Remediation contractor cost assumes mob/demob/H&S/site prep costs ($13000), 7 days spider hoe time at $250/hr and 10 hrs/day, 7 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes additional $10,000 to facilitate transport of debris to staging area (e.g. crane). Debris is 200 m^3. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 3A: Assumes 3 days field supervision by Environmental Monitor and 2 days mob/demob. Restoration contractor estimate based on 500 m^2 of area to be addressed, installation and supply cost of $50/$m^2$.

Task 3B: Assumes 2 trips per year by Environmental Monitor from Grande Prairie for 3 years. One day field time and 2 day mob/demob for each trip (i.e. 18 days total).

TABLE 8: REMEDIAL ACTION PLAN (SURFICIAL DEBRIS REMOVAL AT AEC 1C ONLY) - DETAILED COST BREAKDOWN

BUDGET ASSUMPTIONS:

Task 1: Obtain permits, develop and finalize tender specifications for debris removal
Task 2: Remove surficial debris at AEC 1C
Task 3: Post-remediation site restoration, monitoring and reporting (site works, AEC 1A/1C SSHHERA, SCT, etc).

Item	Task 1 - Remediation Preparation			Task 2 - Debris Removal	Task 3 - Post-Remediation Program				Total Units	Rates	Task 1 - Remediation Preparation			Task 2 - Debris Removal	Task 3 - Post-Remediation Program				TOTAL
	Task 1A	Task 1B	Task 1C	Task 2	Task 3A	Task 3B	Task 3C	Task 3D			Task 1A	Task 1B	Task 1C	Task 2	Task 3A	Task 3B	Task 3C	Task 3D	
	Permiting & Approvals	Develop Tender Specifications	Finalize Tender Specifications	AEC 1C (Surficial Debris) Remediation	Site Restoration	Post-Remedial Monitoring	Complete AEC1A/1C SSHHERA	Reporting and Site Closure Requirements			Permiting & Approvals	Develop Tender Specifications	Finalize Tender Specifications	AEC 1C (Surficial Debris) Remediation	Site Restoration	Post-Remedial Monitoring	Complete AEC1A/1C SSHHERA	Reporting and Site Closure Requirements	
Labour																			
Senior Program Coordinator		5	5						10	$ 125.00	$ -	$ 625.00	$ 625.00	$ -	$ -	$ -	$ -	$ -	$ 1,250.00
Senior Environmental Scientist/Engineer	25	35	40	4	10	18	10	40	182	$ 125.00	$ 3,125.00	$ 4,375.00	$ 5,000.00	$ 500.00	$ 1,250.00	$ 2,250.00	$ 1,250.00	$ 5,000.00	$ 22,750.00
Senior Risk Assessor							35		35	$ 125.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,375.00	$ -	$ 4,375.00
Intermediate Environmental Scientist/Engineer				90	50	90		20	250	$ 95.00	$ -	$ -	$ -	$ 8,550.00	$ 4,750.00	$ 8,550.00	$ -	$ 1,900.00	$ 23,750.00
Intermediate Risk Assessor							80		80	$ 95.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,600.00	$ -	$ 7,600.00
Junior Environmental Scientist/Engineer				90				30	120	$ 78.00	$ -	$ -	$ -	$ 7,020.00	$ -	$ -	$ -	$ 2,340.00	$ 9,360.00
Junior Risk Assessor							100		100	$ 78.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,800.00	$ -	$ 7,800.00
CADD							10	10	20	$ 78.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 780.00	$ 780.00	$ 1,560.00
										Labour Subtotal	**$ 3,125.00**	**$ 5,000.00**	**$ 5,625.00**	**$ 16,070.00**	**$ 6,000.00**	**$ 10,800.00**	**$ 21,805.00**	**$ 10,020.00**	**$ 78,445.00**
Travel and Living Expenses																			
meals & incidentals (Travel Directive, Apr 1, 2014, $90.95 incl. taxes)			3	18	5	9			35	$ 86.62	$ -	$ -	$ 259.86	$ 1,559.14	$ 433.10	$ 779.57	$ -	$ -	$ 3,031.67
accommodation (PWGSC 2014 Accomodation Search, Invermere)			2	18	5	6			31	$ 109.99	$ -	$ -	$ 219.98	$ 1,979.82	$ 549.95	$ 659.94	$ -	$ -	$ 3,409.69
mileage (Travel Directive, Apr 1, 2014, BC, $0.48/km incl. taxes)			950	950					1900	$ 0.46	$ -	$ -	$ 434.29	$ 434.29	$ -	$ -	$ -	$ -	$ 868.57
flights (from Grande Prairie)				1	1	3			5	$ 600.00	$ -	$ -	$ -	$ 600.00	$ 600.00	$ 1,800.00	$ -	$ -	$ 3,000.00
rental vehicle				1	1	3			5	$ 250.00	$ -	$ -	$ -	$ 250.00	$ 250.00	$ 750.00	$ -	$ -	$ 1,250.00
fuel				1	1	3			5	$ 150.00	$ -	$ -	$ -	$ 150.00	$ 150.00	$ 450.00	$ -	$ -	$ 750.00
										Travel and Living Subtotal	**$ -**	**$ -**	**$ 914.12**	**$ 4,973.25**	**$ 1,983.05**	**$ 4,439.51**	**$ -**	**$ -**	**$ 12,309.93**
Direct Expenses																			
Geotechnical Consultant		1							1	$ 4,000.00	$ -	$ 4,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,000.00
Geotechnical Monitor				9					9	$ 1,350.00	$ -	$ -	$ -	$ 12,150.00	$ -	$ -	$ -	$ -	$ 12,150.00
Remediation Contractor				58000					58000	$ 1.00	$ -	$ -	$ -	$ 58,000.00	$ -	$ -	$ -	$ -	$ 58,000.00
RDEKCV landfill tipping fees (debris) (in tonnes)				400					400	$ 200.00	$ -	$ -	$ -	$ 80,000.00	$ -	$ -	$ -	$ -	$ 80,000.00
Trucking fees				16					16	$ 135.00	$ -	$ -	$ -	$ 2,160.00	$ -	$ -	$ -	$ -	$ 2,160.00
Restoration Contractor (post remediation)					1				1	$ 25,000.00	$ -	$ -	$ -	$ -	$ 25,000.00	$ -	$ -	$ -	$ 25,000.00
										Direct Expenses Subtotal	**$ -**	**$ 4,000.00**	**$ -**	**$ 152,310.00**	**$ 25,000.00**	**$ -**	**$ -**	**$ -**	**$ 181,310.00**
SUMMARY										**Task Total**	**$ 3,125.00**	**$ 9,000.00**	**$ 6,539.12**	**$ 173,353.25**	**$ 32,983.05**	**$ 15,239.51**	**$ 21,805.00**	**$ 10,020.00**	**$ 272,064.93**
																		20 % Contingency	**$ 54,412.99**
TOTAL COST (INCLUDING CONTINGENCY)																			**$ 326,477.91**

Assumptions:
Task 1C: Includes attendance at bidder's meeting which assumes 2 days mob/demob and 1 day on-site. Field day = 10 hrs/day. Assumes attendance by senior scientist only, mobilization from Kelowna, BC.
Task 2: Assumes 1 day kickoff, 6 days to review debris removal, 2 day mob/demob. Geotechnical monitor assumed to be 7 days on site plus 2 day mob/demob. Remediation contractor cost assumes mob/demob/H&S/site prep costs ($20000), 7 days spider hoe time at $250/hr and 10 hrs/day, 7 days total foreman time at $150/hr and 10 hrs/day (including live out). Assumes additional $10,000 to facilitate transport of debris to staging area (e.g. crane). Debris is 200 m^3. Assumes 12.5 m^3 per truck and pup load to landfill, one hour r.t. and trucking cost of $135/hr.

Task 3A: Assumes 3 days field supervision by Environmental Monitor and 2 days mob/demob. Restoration contractor estimate based on 500 m^2 of area to be addressed, installation and supply cost of $50/$m^2$.
Task 3B: Assumes 1 trip per year by Environmental Monitor from Grande Prairie for 3 years. One day field time and 2 day mob/demob for each trip (i.e. 9 days total).

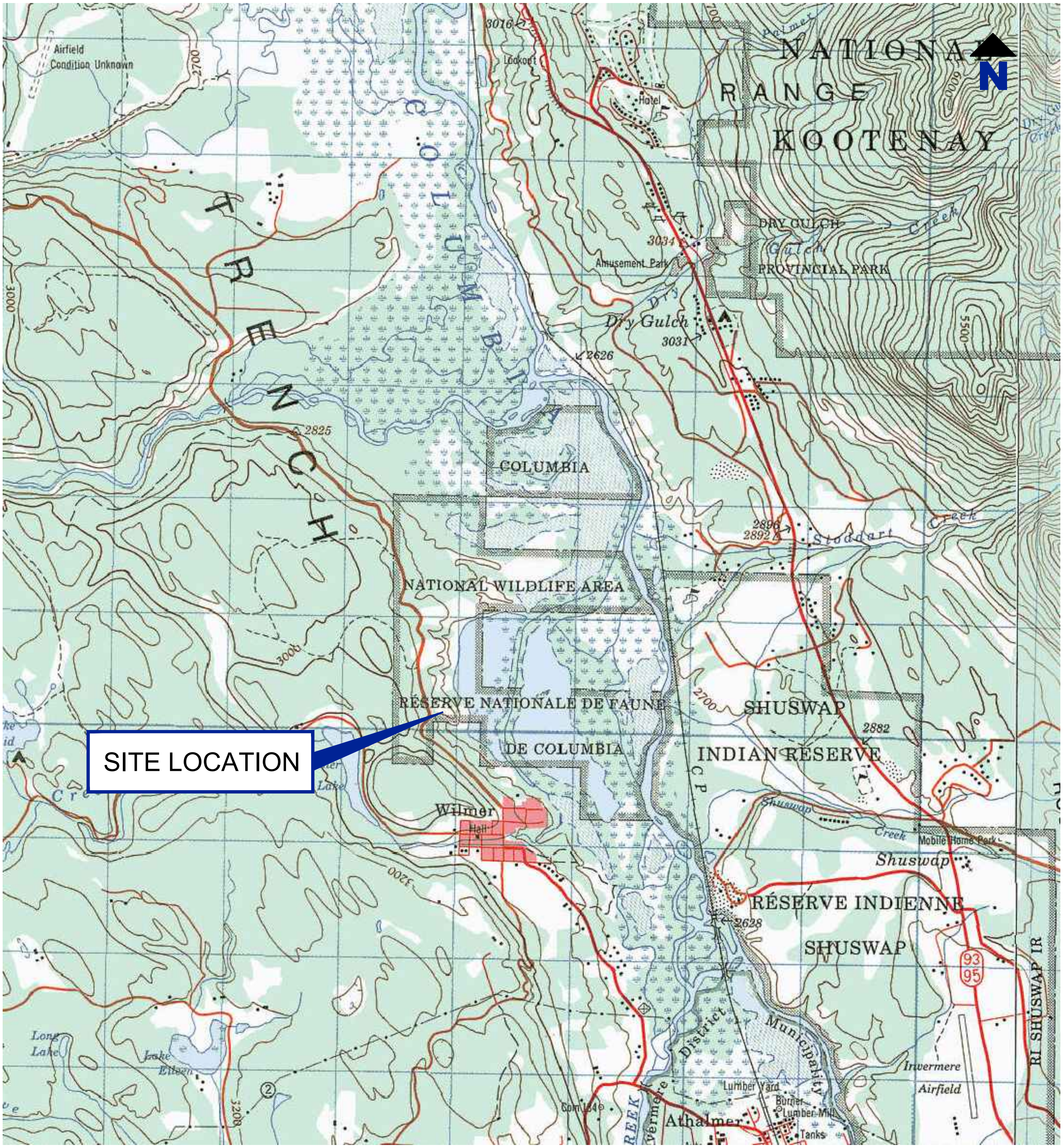
TABLE 9: REMEDIAL ACTION PLAN (NO DEBRIS REMOVAL/EXCAVATION) - DETAILED COST BREAKDOWN					
BUDGET ASSUMPTIONS:	Task 1: Incorporate AEC 1C into uplands SSHHERA and update with new investigation info from AEC 1A/1C. Complete SCT.				
Item	Task 1 - SSHHERA of AEC 1A/1C AEC1A/1C SSHHERA and SCT	Total Units	Rates	Task 1 - SSHHERA of AEC 1A/1C AEC1A/1C SSHHERA and SCT	**TOTAL**
Labour					
Senior Program Coordinator	0	0	$ 125.00	$ -	$ -
Senior Environmental Scientist/Engineer	50	50	$ 125.00	$ 6,250.00	$ 6,250.00
Senior Risk Assessor	35	35	$ 125.00	$ 4,375.00	$ 4,375.00
Intermediate Environmental Scientist/Engineer	10	10	$ 95.00	$ 950.00	$ 950.00
Intermediate Risk Assessor	80	80	$ 95.00	$ 7,600.00	$ 7,600.00
Junior Environmental Scientist/Engineer	0	0	$ 78.00	$ -	$ -
Junior Risk Assessor	100	100	$ 78.00	$ 7,800.00	$ 7,800.00
CADD	10	10	$ 78.00	$ 780.00	$ 780.00
			Labour Subtotal	**$ 27,755.00**	**$ 27,755.00**
SUMMARY			**Task Total**	**$ 27,755.00**	**$ 27,755.00**
				20 % Contingency	**$ 5,551.00**
TOTAL COST (INCLUDING CONTINGENCY)					**$ 33,306.00**

DRAWINGS

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008



REFERENCED FROM : ETOPO MAP SYSTEM
NTS MAP 82 K/09

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WHEN PLOTTED AT 8.5 x 11 PAGE SIZE

0 0.5 1 2 3 km

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

SLR

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT, COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
SITE LOCATION MAP

Date February 25, 2014	Scale AS SHOWN	Drawing No. 1
File Name S_219-05112-00008-D1	Project No. 219.05112.00008	

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

SCALE 1:750
WHEN PLOTTED AT 24 x 24 PAGE SIZE
0 7.5 15 30 45 m

NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS (ACAD2004)030400548-102-TP1-R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

	PROVINCIAL – FEDERAL BOUNDARY
	TEST PIT LOCATION
	SEDIMENT/SOIL SAMPLE LOCATION
X	SEDIMENT SAMPLE LOCATION FOR TOXICITY TESTS
	SURFACE WATER SAMPLE LOCATION
	RISK ASSESSMENT SOIL SAMPLE LOCATION
	LIMITS OF EXCAVATION
	EDGE OF WATER
	HIGH WATER MARK

SAMPLE LABELS

H1–6 I1–6 K1–4 M1–3 N1 +3	SEDIMENT/SOIL SAMPLES COLLECTED 2010
HA05–20 TO HA05–39	SEDIMENT/SOIL SAMPLES COLLECTED 2005
HA1–14	SEDIMENT/SOIL SAMPLES COLLECTED 2003
WMU	SEDIMENT/SOIL SAMPLE COLLECTED AUGUST 2002
MS	SEDIMENT/SOIL SAMPLES COLLECTED NOVEMBER 2003
MS05	SEDIMENT/SOIL SAMPLES COLLECTED OCTOBER 2005
1S,1D ETC.	SEDIMENT/SOIL SAMPLES COLLECTED FEBRUARY 2010
1–1–	SEDIMENT/SOIL SAMPLES COLLECTED AUGUST 2010
FS–10–1	FORESHORE SOIL/SEDIMENT EXCAVATION LIMIT SAMPLES COLLECTED FEBRUARY/MARCH 2011
WMU	SURFACE WATER SAMPLE COLLECTED AUGUST 2002
SW1–4	SURFACE WATER SAMPLES COLLECTED NOVEMBER 2003
SW05–	SURFACE WATER SAMPLES COLLECTED 2005
1–1	SURFACE WATER SAMPLES COLLECTED AUGUST 2010
BG	BACKGROUND SAMPLE LOCATIONS AUGUST 2010 – SEDIMENT/SOIL AND SURFACE WATER
TOX	SEDIMENT SAMPLES FOR TOXICITY TESTING COLLECTED AUGUST 2011

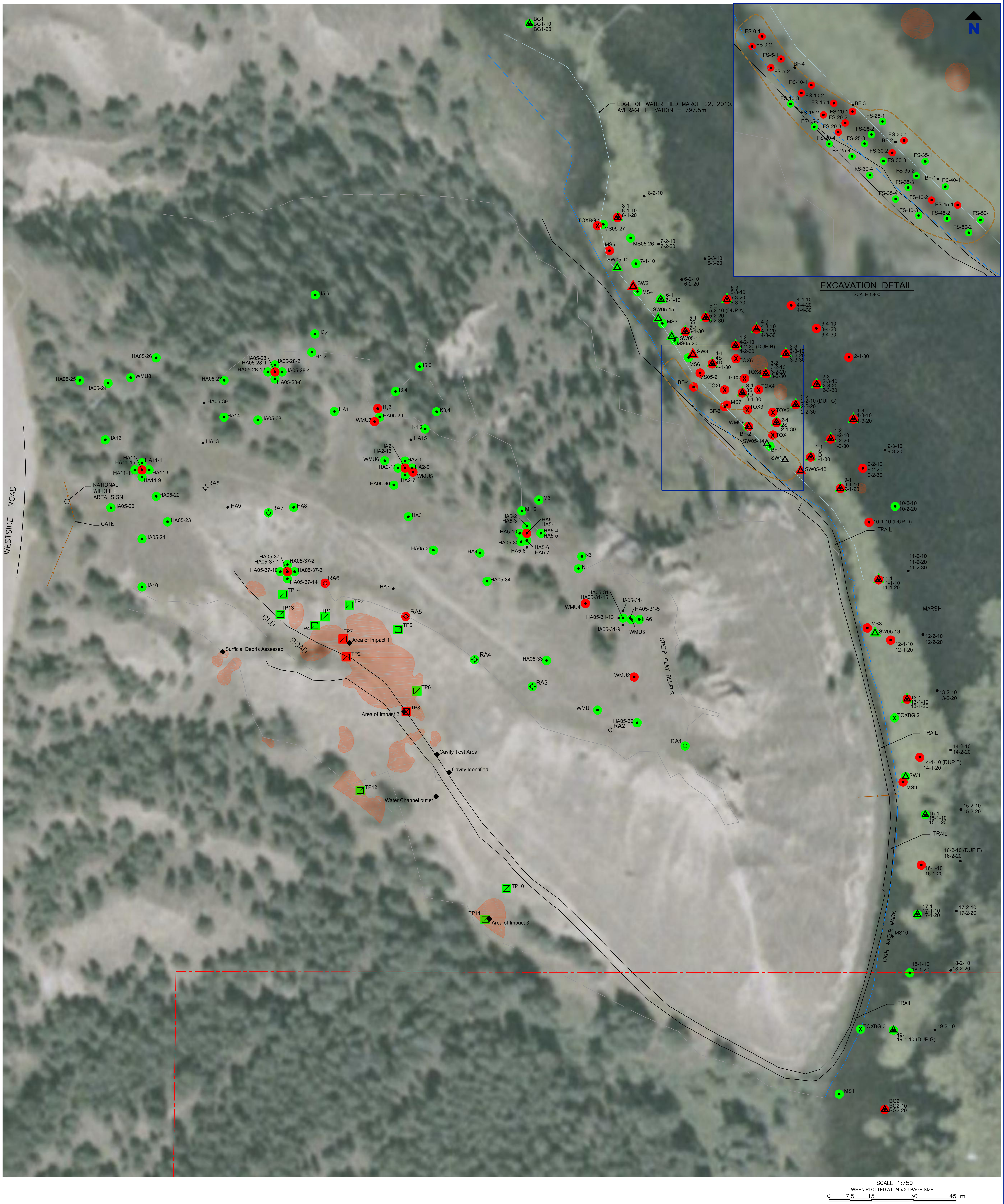
PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
SURROUNDING LAND USE PLAN

Date: February 25, 2014	Scale: AS SHOWN	Drawing No. 2	
File Name: S_219-05112-00008-D2	Project No. 219.05112.00008		

SLR



NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

PROVINCIAL – FEDERAL BOUNDARY
TEST PIT LOCATION
SEDIMENT/SOIL SAMPLE LOCATION
X SEDIMENT SAMPLE LOCATION FOR TOXICITY TESTS
SURFACE WATER SAMPLE LOCATION
RISK ASSESSMENT SOIL SAMPLE LOCATION
LIMITS OF EXCAVATION
EDGE OF WATER
HIGH WATER MARK

SAMPLE LABELS

H1–6 I1–6 K1–4 M1–3 N1 +3	SEDIMENT/SOIL SAMPLES COLLECTED 2010
HA05–20 TO HA05–39	SEDIMENT/SOIL SAMPLES COLLECTED 2005
HA1–14	SEDIMENT/SOIL SAMPLES COLLECTED 2003
WMU	SEDIMENT/SOIL SAMPLE COLLECTED AUGUST 2002
MS	SEDIMENT/SOIL SAMPLES COLLECTED NOVEMBER 2003
MS05	SEDIMENT/SOIL SAMPLES COLLECTED OCTOBER 2005
1S,1D ETC.	SEDIMENT/SOIL SAMPLES COLLECTED FEBRUARY 2010
1–1–	SEDIMENT/SOIL SAMPLES COLLECTED AUGUST 2010
FS–10–1	FORESHORE SOIL/SEDIMENT EXCAVATION LIMIT SAMPLES COLLECTED FEBRUARY/MARCH 2011
WMU	SURFACE WATER SAMPLE COLLECTED AUGUST 2002
SW1–4	SURFACE WATER SAMPLES COLLECTED NOVEMBER 2003
SW05–	SURFACE WATER SAMPLES COLLECTED 2005
1–1	SURFACE WATER SAMPLES COLLECTED AUGUST 2010
BG	BACKGROUND SAMPLE LOCATIONS AUGUST 2010 – SEDIMENT/SOIL AND SURFACE WATER
TOX	SEDIMENT SAMPLES FOR TOXICITY TESTING COLLECTED AUGUST 2011
	LESS THAN OR EQUAL TO CCME GUIDELINES
	GREATER THAN CCME GUIDELINES

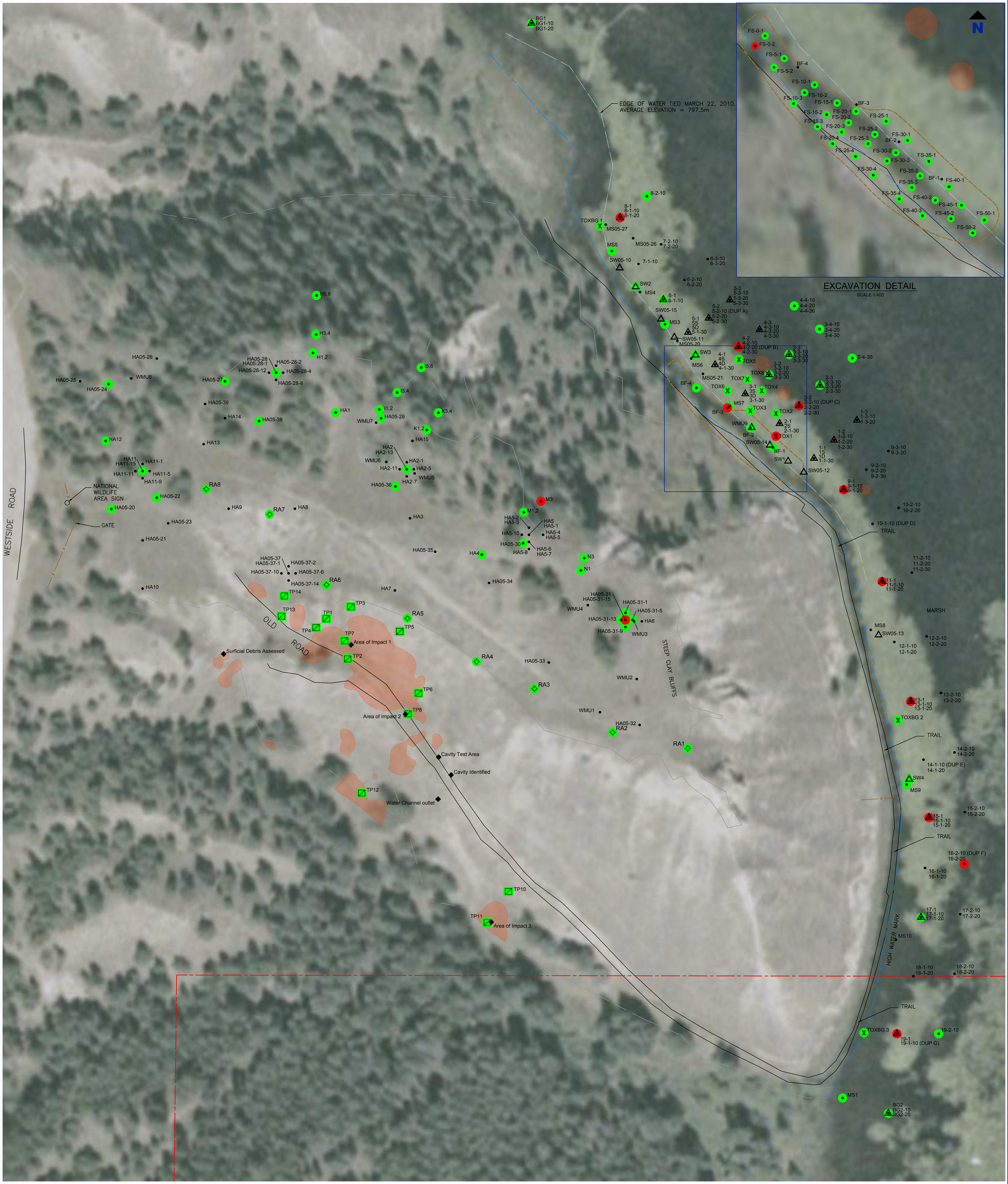
PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
SITE CHEMISTRY RESULTS - METALS

Date February 28, 2014	Scale AS SHOWN	Drawing No. 3
File Name S_219-05112-00008-D4-1	Project No. 219.05112.00008	

SLR



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NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

PROVINCIAL – FEDERAL BOUNDARY
TEST PIT LOCATION
SEDIMENT/SOIL SAMPLE LOCATION
X SEDIMENT SAMPLE LOCATION FOR TOXICITY TESTS
SURFACE WATER SAMPLE LOCATION
RISK ASSESSMENT SOIL SAMPLE LOCATION
LIMITS OF EXCAVATION
EDGE OF WATER
HIGH WATER MARK

SAMPLE LABELS

H1–6 I1–6 K1–4 M1–3 N1 +3	SEDIMENT/SOIL SAMPLES COLLECTED 2010
HA05–20 TO HA05–39	SEDIMENT/SOIL SAMPLES COLLECTED 2005
HA1–14	SEDIMENT/SOIL SAMPLES COLLECTED 2003
WMU	SEDIMENT/SOIL SAMPLE COLLECTED AUGUST 2002
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SW05–	SURFACE WATER SAMPLES COLLECTED 2005
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BG	BACKGROUND SAMPLE LOCATIONS AUGUST 2010 – SEDIMENT/SOIL AND SURFACE WATER
TOX	SEDIMENT SAMPLES FOR TOXICITY TESTING COLLECTED AUGUST 2011

LESS THAN OR EQUAL TO CCME GUIDELINES
GREATER THAN CCME GUIDELINES

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

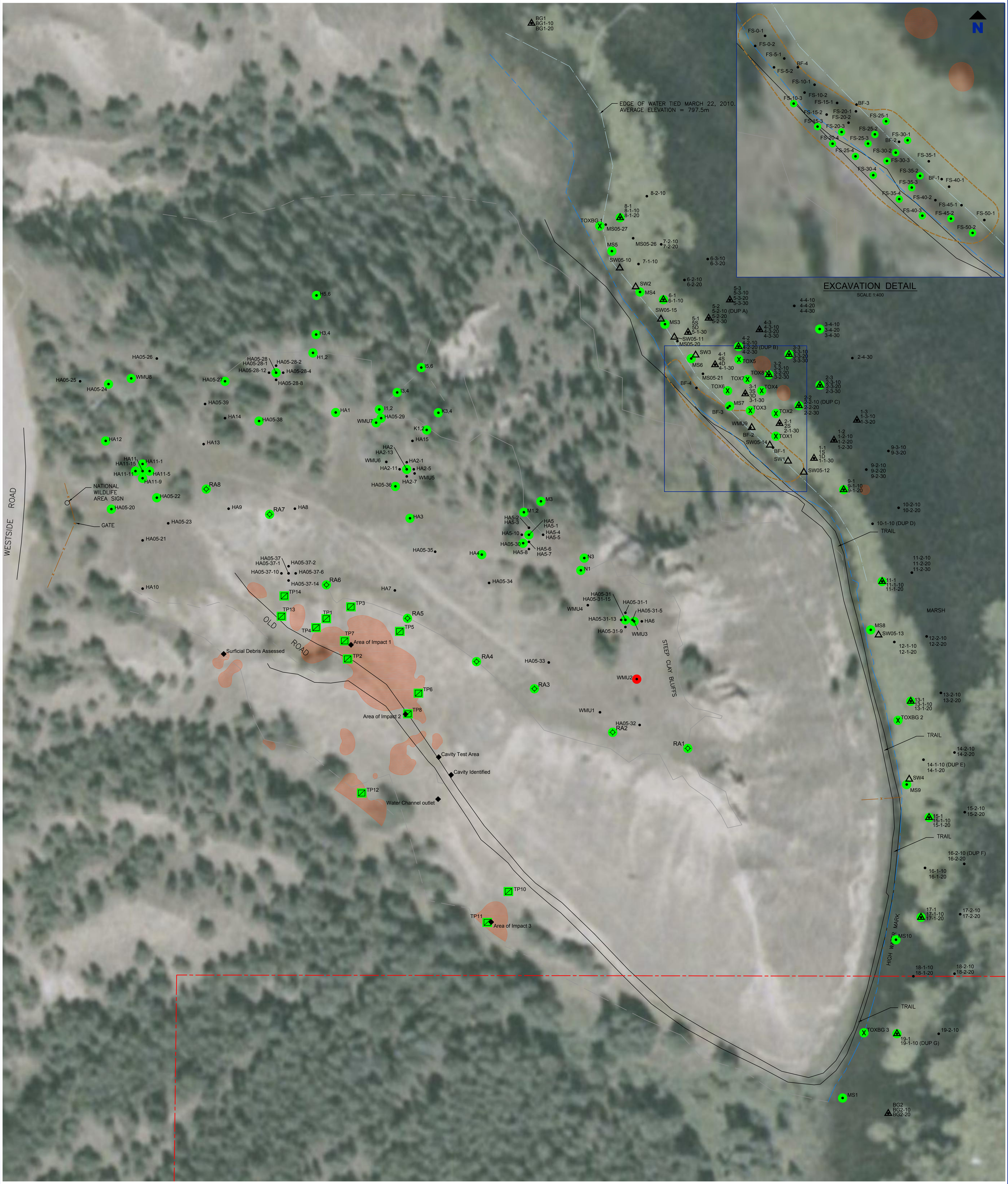
Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
SITE CHEMISTRY RESULTS - PAHS

Date	February 28, 2014	Scale	AS SHOWN
File Name	S_219-05112-00008-D4-2	Project No.	219.05112.00008

Drawing No. 4

SLR



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NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

	PROVINCIAL – FEDERAL BOUNDARY
	TEST PIT LOCATION
	SEDIMENT/SOIL SAMPLE LOCATION
X	SEDIMENT SAMPLE LOCATION FOR TOXICITY TESTS
	SURFACE WATER SAMPLE LOCATION
	RISK ASSESSMENT SOIL SAMPLE LOCATION
	LIMITS OF EXCAVATION
	EDGE OF WATER
	HIGH WATER MARK

SAMPLE LABELS

H1–6 I1–6 K1–4 M1–3 N1 +3	SEDIMENT/SOIL SAMPLES COLLECTED 2010
HA05–20 TO HA05–39	SEDIMENT/SOIL SAMPLES COLLECTED 2005
HA1–14	SEDIMENT/SOIL SAMPLES COLLECTED 2003
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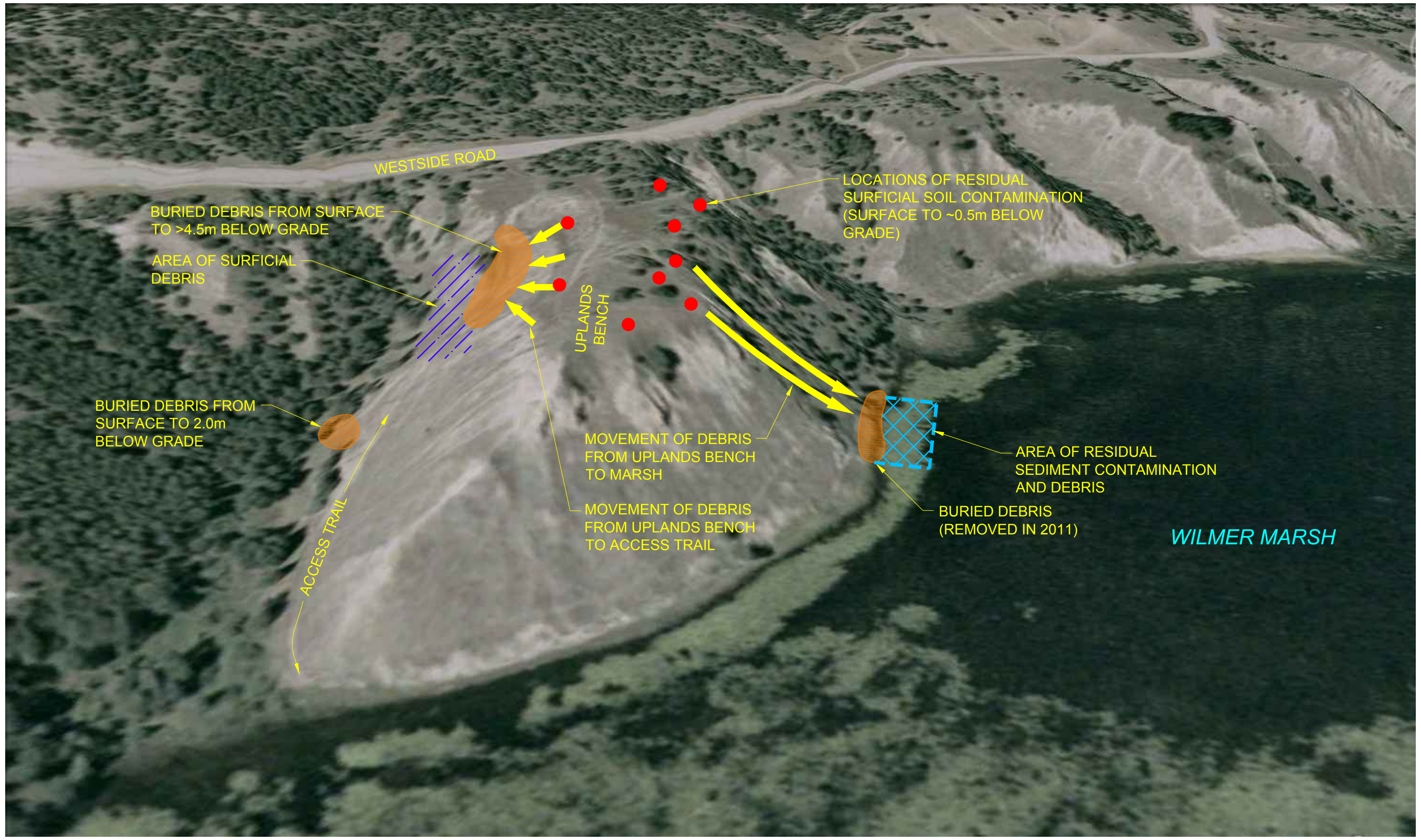
1–1	SURFACE WATER SAMPLES COLLECTED AUGUST 2010
BG	BACKGROUND SAMPLE LOCATIONS AUGUST 2010 – SEDIMENT/SOIL AND SURFACE WATER
TOX	SEDIMENT SAMPLES FOR TOXICITY TESTING COLLECTED AUGUST 2011
	LESS THAN OR EQUAL TO CCME GUIDELINES
	GREATER THAN CCME GUIDELINES

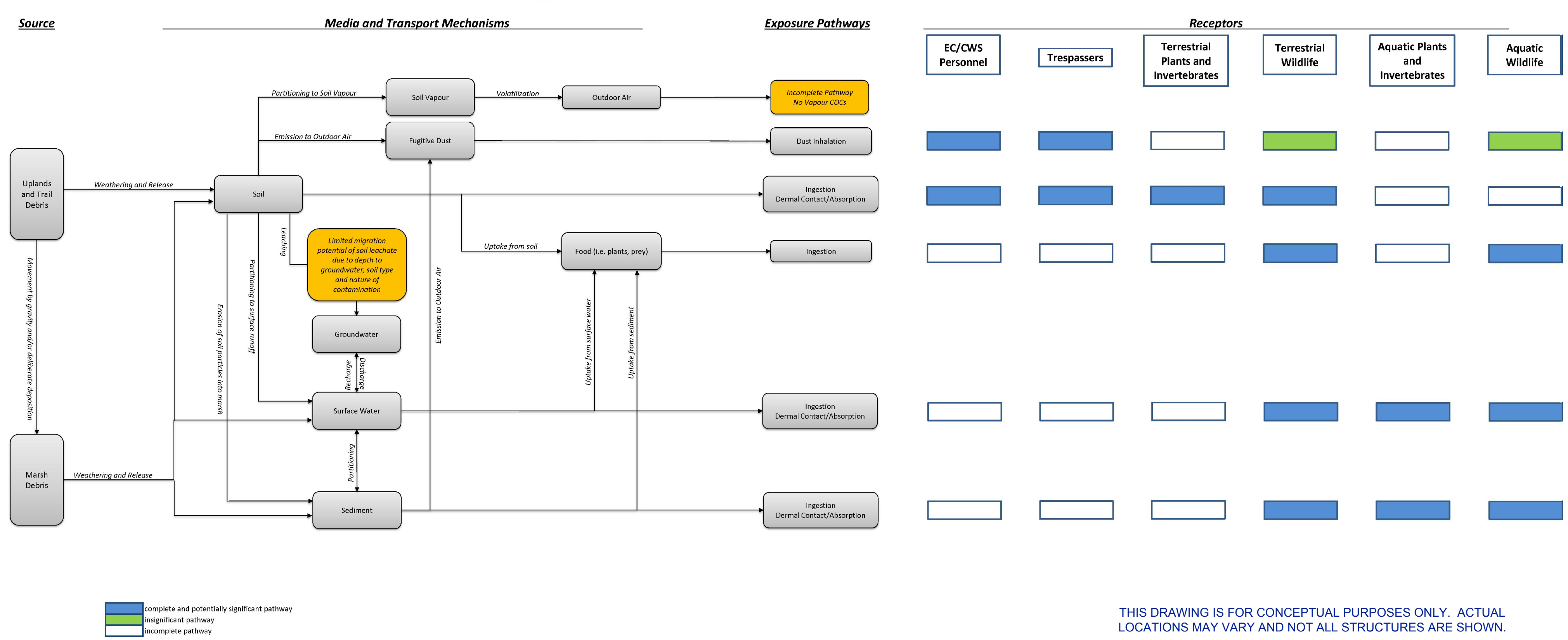
PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
SITE CHEMISTRY RESULTS - PHC

Date February 28, 2014	Scale AS SHOWN	Drawing No. 5
File Name S_219-05112-00008-D4-3	Project No. 219.05112.00008	





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

NOTES

DRAWING COMPILED FROM IMAGE PARKS CANADA © 2013 GOOGLE EARTH

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
CONCEPTUAL SITE MODEL

Date	March 6, 2014	Scale	NTS	Drawing No. 6
File Name	S_219-05112-00008-D5	Project No.	219.05112.00008	

SLR

PHOTOPLATES

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

Photo 1: Fence opened to allow for access of SPIDEX excavator.

Photo 2: Test Pit 1 (TP1) Location

Photo 3: TP1 – First scrape of surface material. Some minor debris observed.

Photo 4: TP1 – excavated to 3 m. No debris but soil is disturbed/fill material.

Photo 5: Test Pit 2 (TP2) - Location

Photo 6: TP2 – excavation through 2 m of cover material.

Photo 7: TP2 - Metal debris encountered at 2.5 m to 4.5 m.

Photo 8: TP2 – At 4 m metal debris still encountered.

Photo 9: Test Pit 3 (TP3) - Location

Photo 10: TP3 –Disturbed soil/fill noted to 1 m with native soil below. Minor debris to 1 m.

Photo 11: Test Pit 4 (TP4) - Location

Photo 12: TP4 – No debris noted in soil.

Photo 13: Test Pit 7 (TP7) – Location

Photo 14: TP7 – debris observed at 0.5 m.

Photo 15: TP7 - Metal debris observed throughout excavation.

Photo 16: TP 7 - Metal debris still present in excavation at 4 m.

Photo 17: Test Pit 5 (TP5) - Location

Photo 18: TP5 – No debris observed – native material.

Photo 19: Test Pits 6 and 8 (TP6 and TP8) – Locations

Photo 20: TP8 – Debris observed at 0.5 m.

Photo 21: TP8 – Debris encountered to 4 m.

Photo 22: Damaged portable toilet observed on morning of October 30, 2013.

Photo 23: Location along the trail where a cavity and sound of running water has been observed.

Photo 24: Excavation in area of cavity and water flow – found deep cavity in trail.

Photo 25: Excavation in area of cavity and water flow – found deep cavity in trail.

Photo 26: Located exit of cavity to south of trail flowing downslope .

Photo 27: Test Pit 10 (TP10) - Location

Photo 28: TP10 – Excavated test pit up to 3 m.

Photo 29: Test Pit 11 (TP11) - Location

Photo 30: TP11 – Debris removed from test pit.

Photo 31: Test Pit 12 (TP12) - Location

Photo 32: TP12 – Excavation revealed minimal debris.

Photo 33: TP12 – Looking upslope towards TP6 and TP8.

Photo 34: TP12 – Embedded metal debris in slope observed to have been used by wildlife in the past.

Photo 35: Gully Debris – metal surficial debris observed.

Photo 36: Test Pit 13 (TP13) - Location

Photo 37: Test Pit 14 (TP14) - Location

Photo 38: Re-contouring of disturbed test pit locations (TP1-7 in photograph).

Photo 39: Re-contouring of disturbed test pit locations (TP8-11 and cavity assessment).

Photo 40: Following re-contouring, flagging of test pits was conducted.

Photo 41: Site cleanup in 2011 - 0565811E 5600294N

Photo 42: Site condition in 2013.

Photo 43: Site cleanup in 2011 - 0565875E 5600301N

Photo 44: Site condition in 2013.

Photo 45: Site cleanup in 2011 - 0565018E 5601261N

Photo 46: Site condition 2013.

Photo 47 Area of car body removal downslope in 2011 - 0565876E 5600295N

Photo 48: Site condition in 2013.

Photo 49: Large gully cleanup in 2011 - 0565901E 5600278N

Photo 50: Site condition in 2013.

Photo 51: Small area of metal debris cleanup in 2011 - 0565809E 5600309N

Photo 52: Site condition in 2013.

Photo 53: Large gully cleanup in 2012 - 0565971E 5600234N

Photo 54: Site Condition in 2013.

Photo 55: Large gully cleanup in 2012 - 0565971E 5600234N

Photo 56: Site Condition in 2013.

Photo 57: Void outlet and saturated soil (March 2014)

Photo 58: Path of surface runoff from void, looking up lower trail (March 2014)

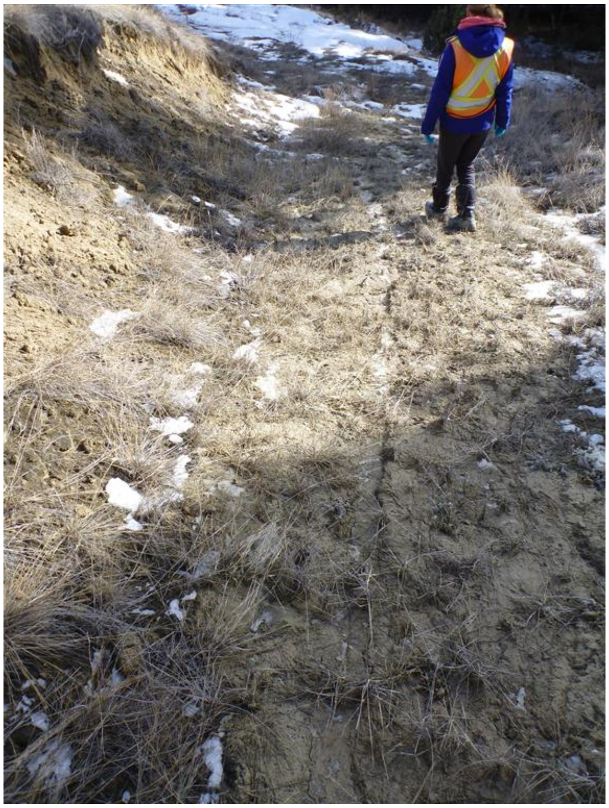


Photo 59: Surface runoff from void, looking down lower trail (March 2014)

Photo 60: Area of surface runoff pooling in gully (March 2014)

APPENDIX A

Project Permit- Canadian Wildlife Service

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

Environment Canada Environnement Canada

ENVIRONMENT CANADA - ENVIRONNEMENT CANADA
PERMIT – PERMIS

Digging of Test Pits	**BC-13-0041**
Permit for/Permis de pour	Permit no./ No. de permis
British Columbia / Colombie Britannique	**4**
province(s), territoires -la (les) provinces / territoires	Issued under section/Délivre en vertu de l'article

Name and address - Nom et adresse

Wildlife Area Regulations
Règlement sur les réserves de la faune

SLR Consulting (Canada) Ltd.
Lindsay ~~Petersen~~ PATERSON
200-1475 Ellis Street
Kelowna BC V1Y 2A3

Date of issue/ Date démission : **01 August 2013**
Date of expire /Date d'expiration; **31 March 2014**

For the minister/ Pour le ministre

Special Conditions / Conditions spéciales

Wilmer Marsh Unit Columbia National Wildlife Area
Test Pitting and Water Sampling
Project No.: 219.05112
Reference no: DFRP # 16096, ARMS # 00394, FCSI # 16096079

1. Permit must be signed to be valid.
2. This permit allows for work around migration in the area.
3. The purpose of the permit is to assess the extent of debris in the trail through the advancement of test pits and to evaluate the quality of any subsurface water that may be in contact with the debris through the installation of standpipe piezometers and/ or collection of surface runoff water samples.
4. SPIDEX All Terrain Excavating will dig approximately 40 test pits using the hoe. SPIDEX to visual inspect subsurface material in the trail are for the presence of debris. Test pits will be advanced to the maximum depth achievable based on geotechnical constraints where debris is observed to be extensive or the depth of the natural native soil all soil to be placed back into pits.
5. Any additional work to be carried out in accordance to permit application.
6. The issuance of this permit does not supersede the necessity to meet other legal requirements to acquire any federal, provincial or municipal licenses, permits or other authorizations required by law.
7. This permit is not transferable to any other person(s) or organisation(s).
8. Upon completion notify Courtney Albert so an inspection of site maybe conducted.

Sub-permit holder: Employee(s) of SLR Consulting, SPIDEX All Terrain Excavating Inc., 330-3104 30th Ave., Vernon, BC V1T 9M9

I declare that I have read and understand this Permit, including all the conditions attached.
Je déclare que j'ai lu et que je comprends le présent permis et toutes les conditions qui y sont prévues.

Signature of permit-holder(s)
Signature du détenteur du permis

Canada

APPENDIX B

Clarke Geoscience Ltd. Geotechnical Assessment and Monitoring Plan Report (September 2013)

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

clarke geoscience ltd.

September 12, 2013

SLR Consulting (Canada) Ltd.
1475 Ellis Street, Suite 200
Kelowna, B.C.
V1Y 2A3

Attention: Lindsay Paterson, Project Manager

Dear Ms. Paterson,

RE: Geotechnical Assessment and Monitoring Plan
Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC
(SLR Project No. 219.05112.01.0001)

Clarke Geoscience Ltd. (CGL) is pleased to submit the following geotechnical assessment and monitoring plan for a proposed test-pitting program to be completed by SLR Consulting (Canada) Ltd. (SLR). The work will be conducted along a steep slope within the Wilmer Marsh Unit of the Columbia National Wildlife Area (project site), located near Wilmer, BC.

The objectives of the geotechnical assessment are as follows:

a) assess slope stability along the access trail and adjacent slopes to update the 2010 geotechnical assessment;
b) assess the potential for slope instability resulting from the proposed test pitting investigation program;
c) provide recommendations regarding site access and site disturbance;
d) identify erosion and sediment control measures for the test pitting program; and,
e) prepare a geotechnical monitoring plan.

Background

As part of an on-going multi-year remediation program being completed on behalf of Public Works and Government Services Canada (PWGSC), SLR proposes additional investigation at the project site. Geophysical surveys indicate a potential for buried waste along the steep access trail at the site. To further define the nature and extent of the buried waste, SLR proposes a test-pitting program in the area. It is understood that approximately ten (10) test pits will be dug using a spider hoe excavator in the fall of 2013. Work is expected to be completed within 2 to 3 days.

5217 Benmore Ct.
Kelowna, British Columbia
V1W 4Z3
Phone/Cell: 250.826.4367
Email: clarke-geoscience@shaw.ca

Geotechnical Conditions

Stability conditions along the scarp slope and along the access trail were initially reported by Clarke Geoscience Ltd. (2010). In addition to these observations, a site inspection was conducted on August 12, 2013 by Ms. Clarke, accompanied by Ms. Paterson and Ms. Noel (SLR) and Mr. Frei (Spidex All Terrain Excavating). The site inspection, which focused on proposed test pit locations, provides updated information on site conditions with respect to slope stability.

The test pitting program will take place adjacent to a 15 to 20 m high silt bluff, which characterizes the area. It is understood that test pits will be located in three areas along the slope (see Figure 1), with the majority of test pits to be situated along the upper section of trail (Photo 1).

Where visible, soils comprising the bluff are stratified silts or clayey silt, with uniform grading, and few to no visible coarse clasts. The soils are compact and cemented enough to maintain near-vertical slopes while dry. However, these soils are prone to failure when wetted.

The rough access trail descends approximately 300 m from the level area adjacent to Westside Road down to the marsh at a grade of 16 to 20%. Along the upper section of trail, slopes are steep (60 to 75%) and are mantled with colluvium comprised of less consolidated silt, mixed organics, and waste debris. The colluvial slopes at the upper area of proposed test pitting are somewhat irregular in surface profile, reflective of previous soil slumping and/or buried waste (Photo 2). Nearby, there is evidence that the colluvial slopes at the project site are prone to shallow surface slides, rotational slumps, and surface erosion.

Near the top of the slope in an area previously identified as unstable there is fairly recent gully erosion stemming from surface runoff from the upper slopes and trail (see Figure 1). The gully erosion (Photo 3) is 0.75 m deep and extends from the slope crest into the adjacent valley. The erosion on the slope and along the trail is indicative of the extremely sensitive nature of the soils.

The two other test pit locations are situated further downslope along the trail (Figure 1; Photo 4). The sites are located just above the valley bottom and adjacent slopes are moderate (approx. 50%). Along the access trail nearby there is evidence of surface erosion and possibly sub-surface piping erosion indicated by a deep cavity (Photo 5). There is evidence that the areas upslope are subject to shallow landslides or rotational slumps but there is no evidence of instability in the immediate area of the proposed test pits.

Conclusions and Recommendations

It is concluded that the proposed test pit locations are situated within highly erodible soils in an area that is sensitive to shallow landslides, piping and shallow rotational slumping. Activities associated with the test pitting program, including repeated passage by heavy equipment has the potential to accelerate erosion and instability along the trail. Thus, considerations for safety and environmental protection are paramount.

Based on an inspection of the proposed test pit locations and based on an understanding that program timing and duration, it is concluded that the shallow excavations to determine nature and extent of buried waste are unlikely to compromise the stability of the slope.

To minimize the potential for impacts associated with slope instability or soil surface erosion during the test pitting program, the following recommendations are provided :

- Machine operator shall be familiar and experienced working on steep slopes and should inspect site conditions prior to accessing the site with heavy equipment;
- Test pitting shall take place during a period of dry weather at a time of year when soils are relatively dry (or frozen);
- The test pits shall not be left open for an extended period of time and shall be backfilled with native material and machine compacted;
- Disturbed soils along sloped areas, including the access trail, shall be graded in a manner that does not concentrate surface runoff;
- Upon completion, exposed soils shall be seeded using an appropriate dry-land native grass seed mixture; and,
- On-site monitoring is recommended during the test pitting program.

Geotechnical Monitoring Plan

On-site monitoring is recommended during the test pitting program. Monitoring, to be completed by a Qualified Professional, should include the following:

- Conduct a pre-work site inspection and tail-gate meeting with contractors to review site conditions;
- Provide on-site monitoring during the test pitting program. Work will include periodically inspecting the slope for indications of accelerated instability. Monitoring shall include providing guidance on excavation depths during the removal of waste and will include providing recommendations for backfill requirements; and,
- Address incidental stability or erosion control issues on-site and provide recommendations for impact mitigation. It is understood that work will be completed under the direction of the environmental consultant/monitor (SLR). The environmental consultant/monitor shall be responsible for the implementation of measures. However, where slope stability issues arise, or where collaborative efforts are required, the geotechnical monitor shall provide the necessary assistance.

We trust that this assessment meets your current requirements. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-826-4367.

Respectfully submitted,

CLARKE GEOSCIENCE LTD.

PROFESSIONAL
PROVINCE
OF
J.A. CLARKE
25319
BRITISH
COLUMBIA
GEOSCIENTIST

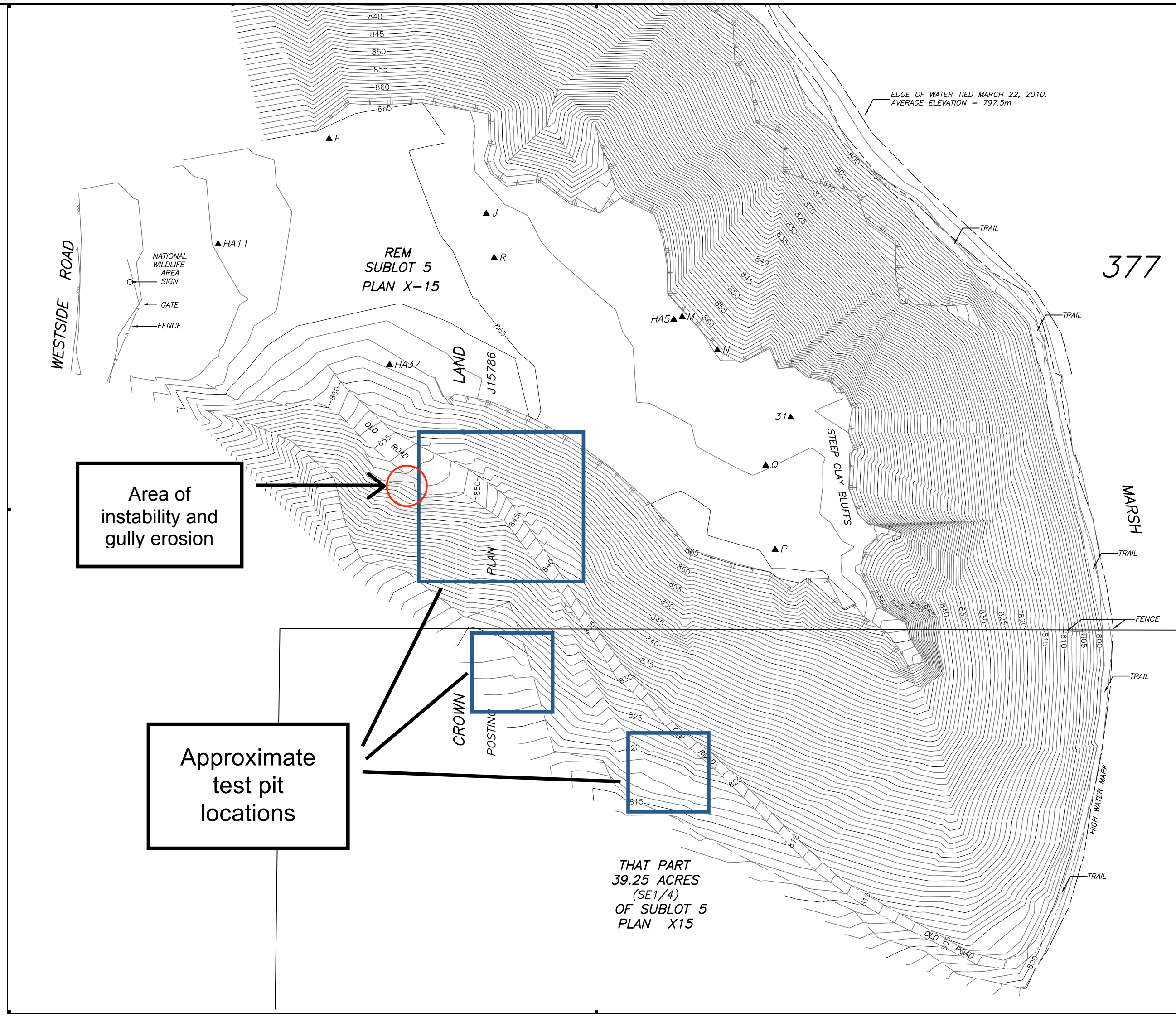
JAC
9/12/13

Jennifer Clarke, M.Sc., P.Geo.
Geomorphologist

Encl.
Figure 1 Site Plan
Photographs 1 to 5

Reference:

Clarke Geoscience Ltd. 2010. Slope Stability Assessment and Recommendations for Remedial Action, Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC (SLR Project No. 219.05112.01.0001). Report prepared for SLR (Canada) Consulting Ltd. Kelowna, BC.



Topographic base map obtained from SLR Consulting (Focus Corporation, 2010)

Project: Geotechnical Assessment and Monitoring Plan, Wilmer Marsh, Wilmer BC	
Date: September 12, 2013	Figure No.: 1
Title: Site Plan	
Clarke Geoscience Ltd.	

Photo 1: View of Access Trail from top of slope

Photo 2: View downslope showing upper area of proposed test pits

Photo 3: Gully Erosion (0.75 m deep) extending downslope from slope crest

Photo 4: View of another area of proposed test pits, further downslope

Photo 5: View downslope trail towards other area of test pitting. Note exposed soils along cutslope and erosion along surface of trail (in area of piping cavity).

APPENDIX C

Clarke Geoscience Ltd. Geotechnical Monitoring Report (November 2013)

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

Clarke Geoscience Ltd.

November 21, 2013

SLR Consulting (Canada) Ltd.
1475 Ellis Street, Suite 200
Kelowna, B.C.
V1Y 2A3

Attention: Lindsay Paterson, Project Manager

Dear Ms. Paterson,

RE: Geotechnical Monitoring Report
Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC
(SLR Project No. 219.05112.01.0001)

Clarke Geoscience Ltd. (CGL) is pleased to submit the following geotechnical monitoring report. The report documents site conditions during a test-pitting program completed by SLR Consulting (Canada) Ltd. (SLR). The test-pitting program took place over two days (October 29-30, 20103) within an upland area of the Wilmer Marsh Unit of the Columbia National Wildlife Area (project site), located near Wilmer, BC.

Test-pitting was completed using a rubber tired spider hoe (Spidex All-Terrain Excavating) during clear, dry weather conditions. Temperatures ranged from approximately -5^{o}C to +5^{o}C during the day.

Fourteen (14) test pits were excavated to a maximum depth of 4.5 m in an effort to characterize the nature and extent of buried waste. The approximate distribution of test pits is shown on Figure 1. Monitoring for slope stability was conducted during test pitting and recommendations for erosion and sediment control were provided. Photographs taken during the program are included in this report.

Geotechnical Conditions
The majority of the test pits were situated along, or adjacent to, an access trail that extends 300 m from the level area adjacent to Westside Road to the marsh along a silt slope (photo 1).

Soils encountered within the test pits have a clayey-silt to sandy-silt texture, and are uniformly graded with no coarse clasts. Soil consolidation varies depending on the level of past disturbance. Native soils are consolidated glaciolacustrine silts, but where soils have been disturbed by waste burial (material pushed from slopes above), the soils are less consolidated.

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jen@clarkegeoscience.com

The rough access trail has a grade of 16 to 20%. Slopes above the upper part of the trail are steep (60 to 75%) and somewhat irregular in surface profile (photo 2). A previously noted erosional gully extends from the edge of the trail near the top of the slope (photo 3) and is indicative of the sensitive nature of the soils.

As part of the test-pitting program, further investigation of a previously identified cavity was conducted along the trail. The investigation found that the cavity extends approximately 2 m below the surface where it opens up to a large void (approx. dimensions 2 m wide x 1 m high x 5 m long). The void extends downslope and daylights in the cut slope of a lower trail (photos 4 and 5). At the time of the inspection, the cavity was dry. However, water flow was audible during previous field visits conducted at different times of the year. Sinkholes, or voids, are caused by piping erosion along the joints and fractures of consolidated silt. Piping is a natural erosional process that, in this case, was likely exacerbated by surface water flowing down the trail.

Upon excavation, the silt-textured soils become loose and, without moisture, are difficult to consolidate. Test-pits were backfilled immediately and tamped down using the bucket of the excavator. The loose nature of the soils makes the disturbed areas, particularly those on sloping ground, susceptible to surface erosion. Test pits located on and above the upper part of the trail (TP#1 to 7) are considered more susceptible to erosion because of the slope.

Conclusions and Recommendations

Based on the geotechnical monitoring of the test-pitting program at Wilmer, it is concluded that no adverse effects associated with slope stability were experienced. Test-pitting was done efficiently and effectively during dry weather conditions using an appropriate type of excavator with an experienced operator.

From a stability perspective, there is a potential that the large void (approx. 10 m^3) located below the access trail may collapse. Future machine work, or machine access along the trail should take this into consideration.

There is a concern that soil disturbance on the steeper slopes and along the trail will lead to surface erosion and gullying along the sloping soil surfaces. It is unlikely that mobilized sediment will reach the Wilmer Marsh. However, undue gully erosion would be undesirable negative effect on the area.

Based on the assessment, erosion and sediment control recommendations were provided to SLR following the site visit by email. These recommendations are as follows:

- Test pits on the upper part of the slope are particularly sensitive and vulnerable to surface erosion from runoff and measures are recommended to prevent gully erosion that would affect undisturbed areas down slope.
- The affected areas are identified along the upper part of the access trail and area delineated on the attached photo 6. The total affected area is 135 m^2 and is comprised of the following areas:
    - Area A (Test pit 3) = 10 m^2 ; steep (70%) slope
    - Area B (Test pit 6) = 15 m^2 ; steep (70%) slope

- Area C (Test pit 5) = 10 m^2 ; steep (70%) slope
- Area D (Test pit 7) = 100 m^2 ; moderately steep (30%) slope

- To provide temporary cover to protect the slope from rain splash erosion and to check surface flow across the slope, a coconut fibre mat cover is recommended.
  - The matting would provide mulch and will protect surface soils under grasses establish.
  - The matting should be natural and biodegradable.
  - The mat should have good contact with the underlying surface (tamp down) and should be installed on the slope, top to bottom, with overlapping edges and pinned in place (install as per manufacturers recommendations). Due to the loose nature of the soils, the pins should be at least 50 cm long.
  - The uphill end of the mat should be buried in a trench at least 300 mm deep and the backfill should be compacted. This will help ensure that water flows over top of the mat and not underneath.
  - In addition, scatter coarse woody debris (CWD) over the surface. This will provide a rough surface to aid the establishment of vegetation cover, will reduce runoff velocity, increase surface infiltration and will trap sediment on the slope. CWD is not abundant at the site but there is some woody debris and some fallen branches in the nearby gully.

It is understood that the onset of winter conditions has prevented the immediate implementation of the above-listed measures. Installation in early spring (early March), prior to peak snow melt conditions will be suitable.

We trust that this assessment meets your current requirements. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-826-4367.

Respectfully submitted,

CLARKE GEOSCIENCE LTD.

Jennifer Clarke, M.Sc., P.Geo.
Geomorphologist

Encl.
Figure 1 Site Plan
Photographs 1 to 6

Reference:

Clarke Geoscience Ltd. 2010. Slope Stability Assessment and Recommendations for Remedial Action, Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC (SLR Project No. 219.05112.01.0001). Report prepared for SLR (Canada) Consulting Ltd. Kelowna, BC.

Photographs

Photo 1: View of work progressing along the upper part of the access trail

Photo 2: View of test pit locations at the upper end of the trail and on adjacent slope.

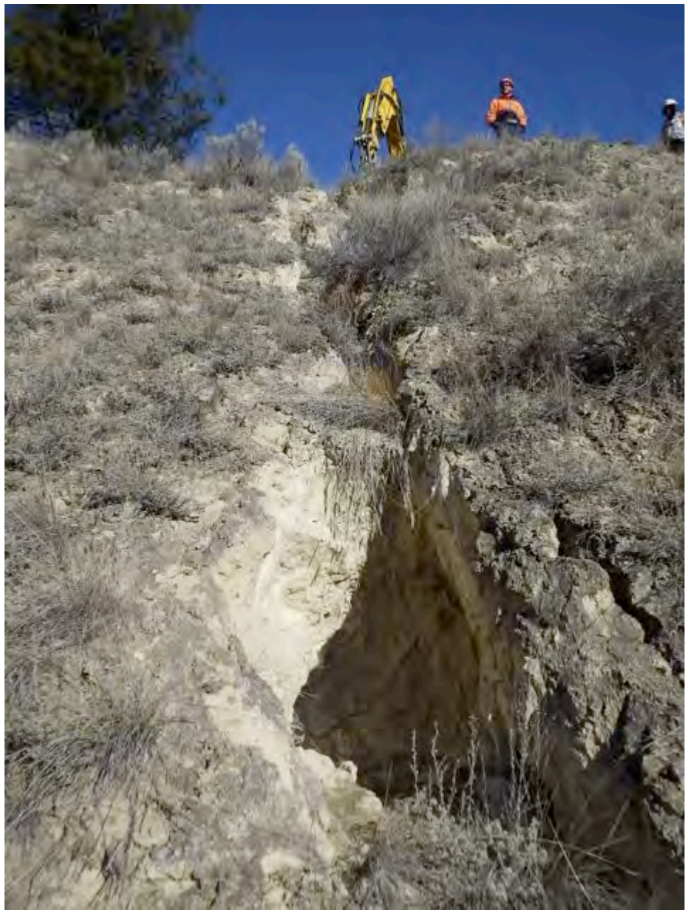


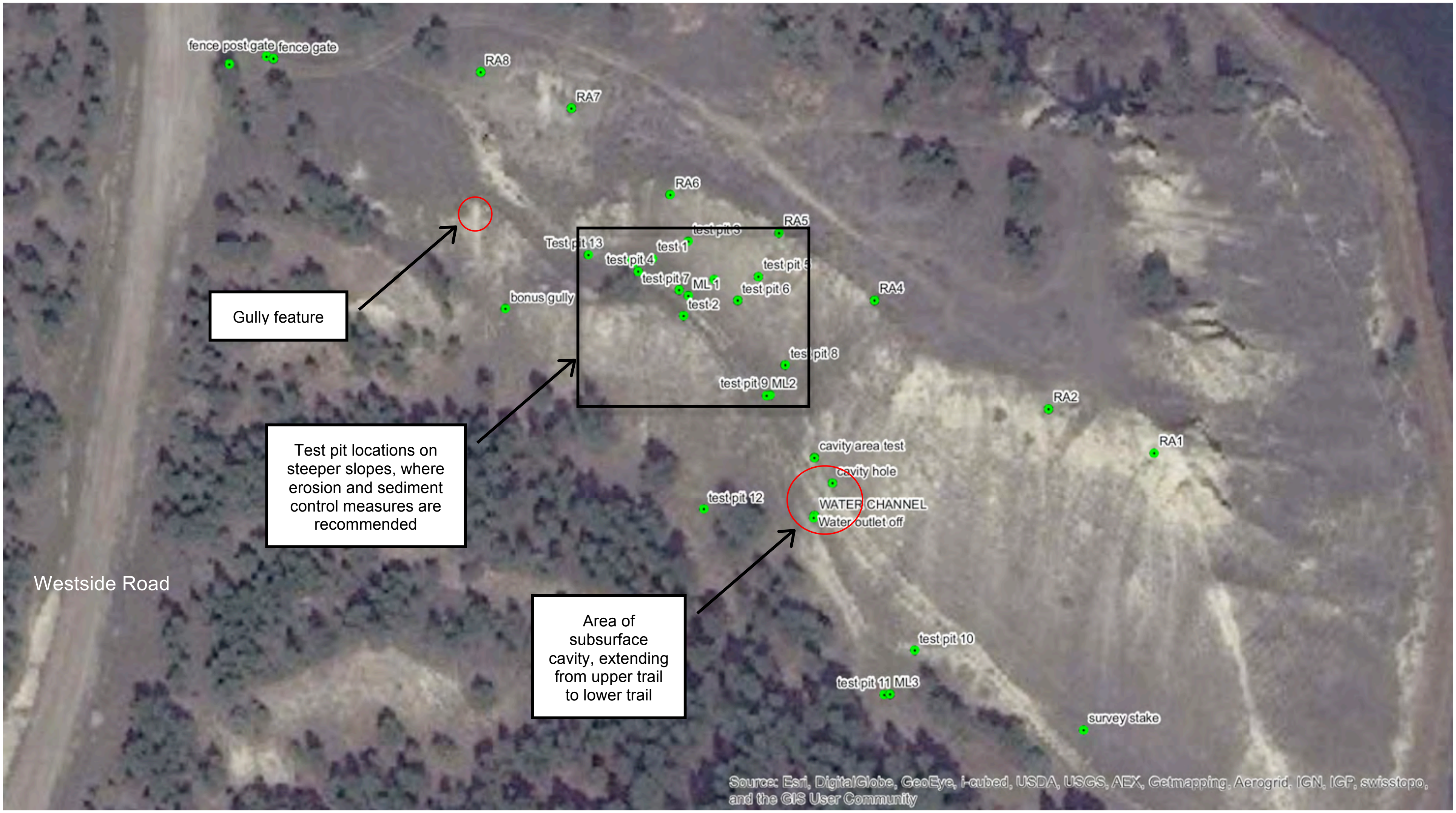
Photo 3: Gully (0.75 m deep) extending downslope from slope crest

Photo 4: Upper view of void encountered along access trail

Photo 5: Lower view of void encountered along cutslope of lower trail

Photo 6: View of areas requiring erosion and sediment control measures at the Wilmer Remediation Site (Oct 30, 2013)

Area A (Test pit 3) = 10 m^2 ; steep (70%) slope
Area B (Test pit 6) = 15 m^2 ; steep (70%) slope
Area C (Test pit 5) = 10 m^2 ; steep (70%) slope
Area D (Test pit 7) = 100 m^2 ; moderately steep (30%) slope



Base map and georeferenced test pit locations obtained from SLR Consulting (Canada) Ltd.

Project: Geotechnical Monitoring Report, Wilmer Marsh, Wilmer BC	
Date: November 21, 2013	Figure No.: 1
Title: Site Plan	
Clarke Geoscience Ltd.	

APPENDIX D

SLR Environmental Monitoring Report

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

15 November 2013

Lindsay Paterson, P.Ag.
200-1475 Ellis Street
Kelowna, BC V1Y 2A3

Project No.: 219.05112.00008

RE: ENVIRONMENTAL MONITORING NOTES – 2013 TEST PITTING

On October 29, 2013, two SLR Consulting (Canada) Ltd. (SLR) representatives (Ms. Kalina Noel, R.P.Bio. – Biologist, and Ms. Krystal Ashworth – Environmental Scientist), Ms. Jennifer Clarke, a Geomorphologist with Clarke Geoscience Ltd. (Clarke Geoscience), and Mr. Domenic Frei with Spidex All-Terrain Excavating (Spidex) met onsite at 8am. Following a health and safety meeting, SLR met with Mr. Eric Godlien of One Time Fencing, who was present onsite to open the fence to allow the Spidex excavator to pass through. SLR then met with Invermere Sales and Rentals for placement of a portable toilet at the gate. A sign was placed on the portable toilet indicating it was for use by workers on the site only.

Following these preliminary activities, the team along with the Spidex excavator moved down to the start of the trail leading down to the marsh. The excavator stayed on the previous disturbance areas and proceeded slowly to the first area of electro-magnetic response along the trail as determined by the EM31/38 survey conducted in February 2013.

SLR selected a number of test locations prior to leaving for the field work. These locations were accessed using the AKS Geoscience maps where suitable. At each test pit location the biologist and geomorphologist assessed the area for vegetation and slope disturbance.

Test pits (TP) 1-9 were completed on October 29. 2013. No loss of soil stability or disturbance of native vegetation occurred during the advancement of these test pits. Where disturbance was not possible to avoid (i.e. at TP3 and TP5 located along the slope above the trail), only disturbance vegetation such as crested wheatgrass was uprooted during the test pitting works. Test pits were kept small and deep and were filled in immediately following soil sampling and assessment. The geomorphologist determined if the slope was stable following descent of the excavator to the trail.

Observation of each test pit void was made to determine if any visible fluids were present around the metal debris such as oil staining. In addition, indications of groundwater were assessed. No fluids of any kind were observed at any of the test pits.

At the end of the day all test pits were ensured to be closed and stable.

On October 30, 2013, SLR, Clarke Geoscience and Spidex met at 8am onsite to continue test pitting. Upon arriving at the site it was noted that the portable toilet had been pushed over and moved towards the fence. Obvious damage was observed on the outside of the portable toilet. The SLR Project Manger and the owner of the portable toilet were informed of the incident.

Work was commenced with the expectation that a replacement portable toilet would be exchanged as soon as possible. No loss of toilet fluids were observed around the toilet on the ground.

Prior to continuation of test pitting, an area previously identified as having moving water under the ground and a large cavity present was excavated to determine the cause of the cavity. This cavity was found along a section of the trail but had not resulted in an area of EM31 response. The excavator removed soil at the location of the cavity until an obvious chamber was discovered on the south side of the trail. The chamber was further excavated and determined to flow north/south across the trail. The exit of the channel was located on downslope between the upper trail and the lower trail.

TP 10-14 were completed on October 30, 2013. These test pits were located near the bottom of the trail (TP10-11), on the south side of the trail, downslope (TP12), and finally at the top of the trail in an abnormal soil pile (TP 13-14).

Metal debris was observed on the slope north of TP12 up to the upper trail. Upon closer observation, it was noted that some of the large embedded debris in the slope had been used by wildlife in the past as dens. Bedding and tracks were observed in and around the debris cavities. No wildlife was noted before or during test pit works.

Following all excavations on October 30, 2014, soil excavated was replaced. Contouring of the disturbed soil was re-established and the geomorphologist assessed the disturbed areas for potential slumping or soil loss following rainfall and snow melt.

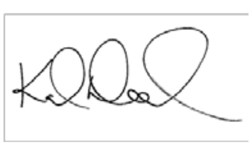
Upland Soil Sampling

Following test pitting, eight supplemental auger sites were established along the south upland edge of the bluff. Soil was collected on foot, by hand. The excavator was not permitted to enter this area due to sensitive vegetation that is present.

Review of Previous Work Areas

Where possible, areas of previous cleanup in 2011 and 2012 were located and photographed to determine re-establishment of vegetation and recovery following previous disturbance. In addition, activity by wildlife was incidentally assessed. As noted since 2011, a bald eagle nest located across the marsh was observed in 2013 for activity. A nesting pair and at least one fledgling was observed at the nest.

Yours sincerely,
SLR Consulting (Canada) Ltd.



Kalina Noel, B.Sc., M.E.Des., P.Biol. R.P.Bio.
Biologist

APPENDIX E

FCSI Input Form

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

Federal Contaminated Sites Inventory Input Form

CONTAMINATED SITE TOMBSTONE DATA	
Federal Site Identifier	FCSI# 16096079
Property Number	DFRP # 16096
Latitude (Assessor)	50º 33’ 0.78” N
Longitude (Assessor)	116º 4' 16.82” W
Estimated Cubic Meters Contaminated (Assessor)	Shoreline = 0 Marsh = 50 (debris) Uplands = 0 Trail = 9400 (5720 debris, 3680 soil) Total = 9450
Estimated Hectares Contaminated (Assessor)	Shoreline = 0 Marsh = 0.1 Uplands = 0 Trail = 0.4 Total = 0.5
Estimated Tons Contaminated (Assessor)	Shoreline = 0 Marsh = 100 (debris, assumed density of 2 t/cubic metre) Uplands = 0 Trail = 18800 (11440 debris, 7360 soil, assumed density of 2t/cubic metre) Total = 18900

CONTAMINATED SITE MANAGEMENT	
The approach used to manage the contaminated site project. Every site has one or more management types.	
Management Type (Assessor)	1) Remediation (debris and contamination removal) 2) Periodic monitoring (confirmatory sampling) 3) Additional assessment (risk assessment)

CONTAMINANT AND MEDIUM	
Contaminant Type (Assessor)	*The contaminant associated with a specific medium. A medium may have one or more contaminant types.* 11. PHCs (petroleum hydrocarbons) 13. PAHs (polycyclic aromatic hydrocarbons) 02. Heavy metals 21. Metal, metalloid, organometallic
Contaminant Medium Type (Assessor)	*The medium associated with a particular contaminant.* 1) Surface water (metals) 2) Sediment (metals, PAHs) 3) Surface soil (PHCs, PAHs, metals)

CONTAMINATED SITE FISCAL YEAR	
Fiscal Year	2013-2014
CCME Classification type (Assessor)	*The classification defined by the National Classification System of the Canadian Council of Ministers of the Environment.* Class type 1) Action required AEC 1 – Class 1 – High priority for action
CCME National Classification System Score (Assessor)	*The score of the site based on the version of the Federal Contaminated Sites Accelerated Action Plan (FCSAAP) program.* AEC 1 score 71.0, certainty 63% (not updated in 2013-2014)
FCSAAP National Classification System Score	*The score of the site based on the version of the CCME NCS protocol developed by the Environment Canada for the Federal Contaminated Sites Accelerated Action Plan (FCSAAP) program.*
Last Step Completed	01-Identify suspect sites 02-Historical review 03-Initial testing program 04-Classify contaminated site using the CCME NCS 05-Detailed testing program 06-Reclassify the site using the CCME NCS 07-Develop remediation/risk management strategy **08-Implement remediation/risk management strategy** 09-Confirmatory Sampling and Final Reporting 10-Long-term monitoring (optional)
Planned Completion Date for Step 7 (EC Officer)	The date planned for completion of step 7 of the ten step process.
Planned Completion Date for Step 8 (EC Officer)	The date planned for completion of step 8 of the ten step process.
Planned Completion Date for Step 9 (EC Officer)	The date planned for completion of step 9 of the ten step process.
Next Fiscal Year Budget (EC Officer)	The total expenditure planned for the site for the next fiscal year.
Estimate Quality (EC Officer)	I - Indicative S - Substantive
Opening Liability (EC Officer)	The opening liability for the site for the fiscal year being reported. This applies only to class 1 sites; class 2 sites; and also to class I sites if it is known that the government is likely obligated to remediate the site. This should always equal the closing liability of the previous year if a liability was booked for that year.

(Accounting) Liability (Assessor)	Based on complete excavation of trail area: Total $5,322,725 Based on partial excavation of trail area: Total $2,134,355 Based on debris removal at AEC 1B and surficial debris removal at AEC 1C Total $511,230 Based on surficial debris removal at AEC 1C only Total $326,480 Based on no debris removal/excavation Total $33,305
(Accounting) Contingent Liability (Assessor)	20% contingency included in above liabilities
Total Assessment Expenditure (EC Officer)	Total expenditure on assessment activities for the site during the fiscal year reported.
Total Remediation Expenditure (EC Officer)	Total expenditure on remediation activities for the site during the fiscal year reported.
Closing Liability (EC Officer)	The closing liability for the site for the fiscal year being reported. This applies only to class 1 sites; class 2 sites; and also to class 1 sites if it is known that the government is likely obligated to remediate the site.
Total Adjustment (EC Officer)	The total adjustment made to the closing liability (other than the expenditure reducing liability). The Total Adjustment may be a positive or negative number. NOTE (Closing Liability) = (Opening Liability) – (Total Expenditure Reducing Liability) + (Total Adjustment)
Reason For Adjustment Text (EC Officer)	If the opening liability less the total expenditure reducing liability is not equal to the closing liability, provide a brief description of the reason for the adjustment. NOTE: This field will not be published and may be supplied in either official language.
Actual Cubic Meters Remediated (Assessor)	729
Actual Hectares Remediated (Assessor)	*0.035*
Actual Tons Remediated (Assessor)	*1458 metric tonnes*

APPENDIX F

Site Closure Tool

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

APPENDIX G

Clarke Geoscience Ltd. Geotechnical Implications of Remedial Excavation Work (February 2014)

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

clarke geoscience ltd.

February 18, 2014

SLR Consulting (Canada) Ltd.
1475 Ellis Street, Suite 200
Kelowna, B.C.
V1Y 2A3

Attention: Lindsay Paterson, Project Manager

Dear Ms. Paterson,

RE: Geotechnical Implications of Remedial Excavation Work, Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC (SLR Project No. 219.05112.01.0001)

Clarke Geoscience Ltd. (CGL) is pleased to submit the following information regarding the geotechnical implications of remedial excavation work across the Wilmer study area. The Wilmer study area is a former dump site within the Wilmer Marsh Unit of the Columbia National Wildlife Area, located near Wilmer, BC.

In October 2013, a test-pitting program was completed to characterize the nature and extent of buried waste across an upland area adjacent to the marsh. The location of fourteen (14) test pits was guided by the results of a geophysical (EM) survey, which identified buried metal debris (Figure 1). The results of the test pitting program will be used to determine remedial options, one of which is to excavate the buried waste. CGL has considered the potential geotechnical implications of excavation for the study site.

Site Conditions

Buried, and near-surface, waste across the site is largely comprised of metal car parts interbedded with the native clayey-silt to sandy-silt textured soils. The buried waste, which was historically dumped off the top of the terrace, is situated on a steep (60 to 75% gradient) slope that is bisected by a rough access trail.

Previous investigations by CGL have noted that the likelihood for large-scale failure or deep-seated instability along the terrace is moderate and that the fine-textured glaciolacustrine soils on site are very sensitive to surface erosion, gully erosion, and surficial slumping. Erosional features on site that demonstrate the soil sensitivity to surface water flow include: erosional gullies, shallow slump failures and silt falls in the consolidated native silts along the scarp face, and at least one subsurface erosional cavity (void) located on along the access trail.

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www.clarkegeoscience.com

Soil sensitivity to erosion is largely dependant upon consolidation. Native glaciolacustrine silts are compact and weakly cemented and are able to maintain near vertical slopes when dry. It was noted during the test pitting program that some of the colluvial silts interbedded with debris are relatively consolidated. This suggests that, over a period of decades, the disturbed soils have regained some degree of consolidation. When wetted, or disturbed by vibration or excavation, the soils become loose and are then subject to erosional and gravitational forces.

The internal angle of friction (a parameter used to describe friction shear resistance of soil) for dense inorganic silt ranges from 30-35°, while loose inorganic silt has an internal angle of friction that ranges from 27-30°[1]. This reduction in frictional shear resistance demonstrates the sensitivity to disturbance.

Remedial Excavation Options

SLR has identified two area of interest, noted on Figure 1. Based on the preliminary results of the test pitting program, SLR has indicated that waste materials at Area 1 could be more than 4 m deep, while debris at Area 2 is approximately 2.5 m deep (L. Paterson, *personal communication*, 2014). For the purposes of this assignment, excavated depths up to 4 m were assumed in the mid-slope area within Area 1.

A profile of the slope, provided as Figure 2, shows the existing ground surface profile and an approximate excavation profile. Based on the excavation profile shown, the approximate volume of soil to be excavated, is estimated to be 80 to 120 m^3 per linear metre across the slope, which represents a volume of approximately 5600 to 8400 m^3..

Slope Stability and Soil Erosion Concerns

Based on shallow depth of debris and low slopes, there are no slope stability concerns associated with remedial activities within Area 2.

Slope stability and soil erosion concerns associated with the proposed excavation of buried debris within Area 1, and with general access activities for any machine work at the Wilmer site, include:

- Compaction, vibration and rutting caused by repeated access by heavy equipment will accelerate erosion and instability along the trail;
- Since waste is imbedded into the soils, some on-site sorting may be required, increasing the area of disturbance and resulting in unconsolidated soil spoil areas;
- When disturbed by machine access or excavation, the fine-textured soils become loose and are difficult to consolidate without moisture. The loose nature of the soils will make disturbed areas, particularly those on sloping ground, susceptible to surface erosion; and,
- Excavation to depths of 4 m will result in over-steepened slopes, removing the toe support along the slope. Over-steepened excavation cut slopes are more prone to surface erosion and slump failures. Consolidated native (undisturbed) silts can maintain near vertical (>1.5H:1V) grades on a short-term basis when dry. However, disturbed soils are more prone to erosion and instability and will require additional grading (3H:1V) or terracing to reduce the slope.

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[1] Geotechdata.info, Angle of Friction, http://geotechdata.info/parameter/angle-of-friction.html (as of September 14.12.2013).

Conclusions and Recommendations for Slope Stability and Erosion Control Mitigation
Based on an assessment of site conditions and proposed remedial options for excavation, it is concluded that proposed excavation activities will accelerate surface erosion, gullying and slump failure across the site. Based on the distance (approx. 200 m) and topography between the excavation sites and Wilmer Marsh, it is judged that the risk of sediment delivery is considered low to moderate.

Adverse effects associated with surface erosion and slope instability are dependant upon the finalized areas and depths of excavation. Reduced excavation areas and depths will reduce the total area of disturbance and the height of potentially unstable cut slopes.

It is concluded that excavation activities may be completed in a safe and effective manner provided the following recommendations for mitigation are followed:

- Protect access routes to the work site by installing a 300 mm thick layer of well-graded, crushed angular gravel. The gravel layer shall be installed on a layer of filter fabric to prevent the migration of fines into the gravel and to facilitate decommissioning upon completion;
- Excavation work must be completed during extended periods of dry, or frozen weather;
- Excavation shall use a rubber-tired or spider hoe-type excavator as these machine types have a reduced potential for ground disturbance. The operator should also have experience working on steep slopes;
- Particular caution should be exercised by the machine operator working in the vicinity of the identified void (approx. 10 m^3) located along the access trail;
- Recommended measures for erosion and sediment control, outlined below, should be implemented; and,
- At least part-time geotechnical monitoring is recommended during excavation activities.

Due to the high potential for surface erosion and gullying along the sloping soil surfaces, measures for erosion and sediment control are recommended. Erosion and control measures, previously outlined in the 2013 monitoring report, are partly reiterated and expanded upon. Erosion and sediment control approaches shall include the following:

- Divert surface flow from the work area, by constructing cross-ditches across the access trail at the top of the slope;
- Upon completion, excavated areas should be backfilled with native silts and regraded;
- Construct cross-slope terraces along long sections of steep uniform slopes to break the slope and slow surface runoff along the slope. A schematic diagram of slope terracing is provided as Figure 3;
- Create surface roughness and provide temporary cover along disturbed slopes to protect soils from rain splash erosion and slow surface runoff along the slope. Surface roughening may be accomplished in a few different ways, including:
    - Install coconut fibre mat covering, and/or
    - Scatter coarse woody debris (CWD) across the soil surface.

We trust that this assessment meets your current requirements. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-826-4367.

Respectfully submitted,

CLARKE GEOSCIENCE LTD.

Jennifer Clarke

PROFESSIONAL PROVINCE OF J.A. CLARKE 25319 BRITISH COLUMBIA GEOSCIENTIST

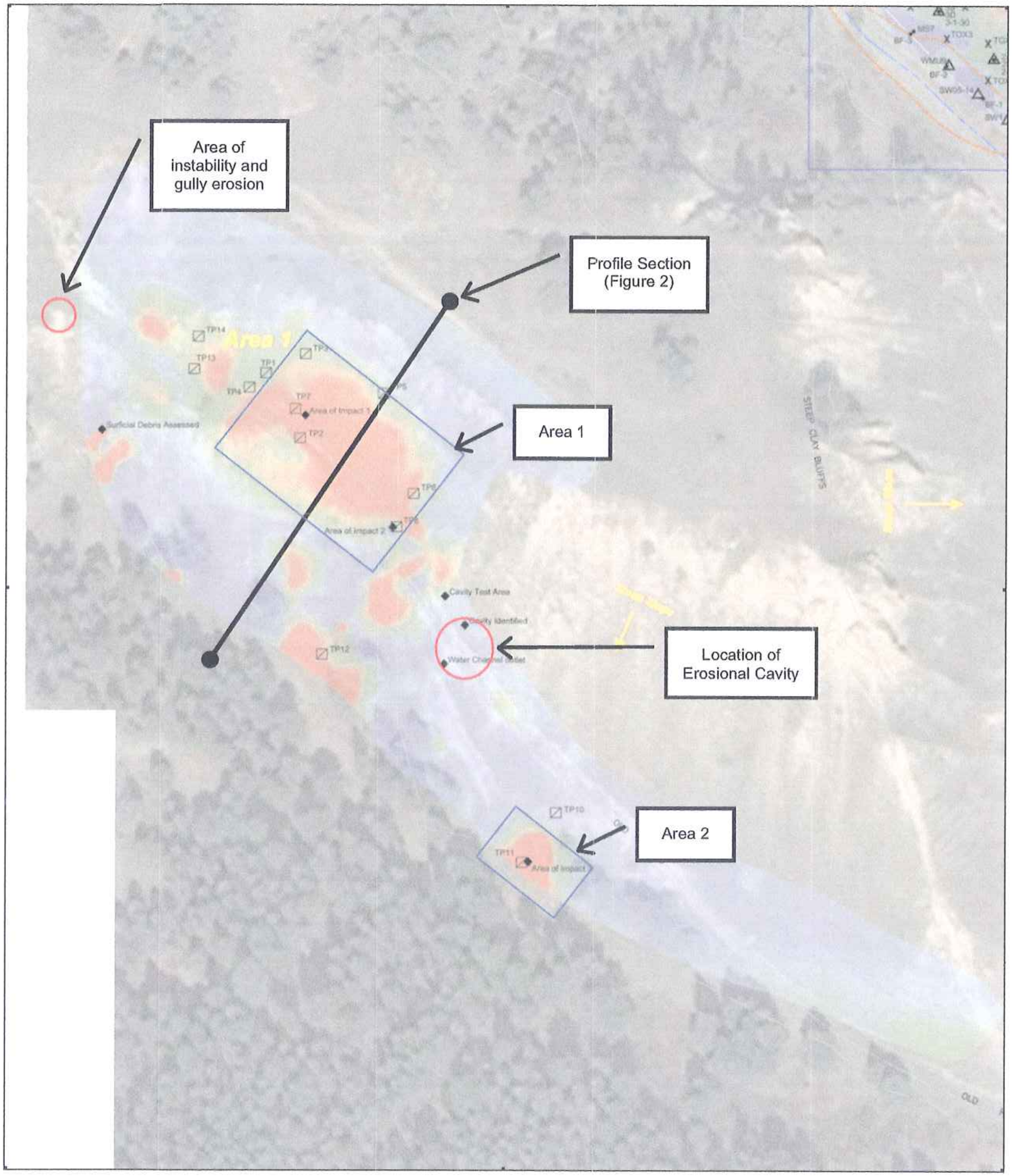
JAC 2/17/14

Jennifer Clarke, M.Sc., P.Geo.
Geomorphologist

Encl.
Figure 1 Site Plan
Figure 2 Slope Profile
Figure 3 Schematic of Terracing

Reference:

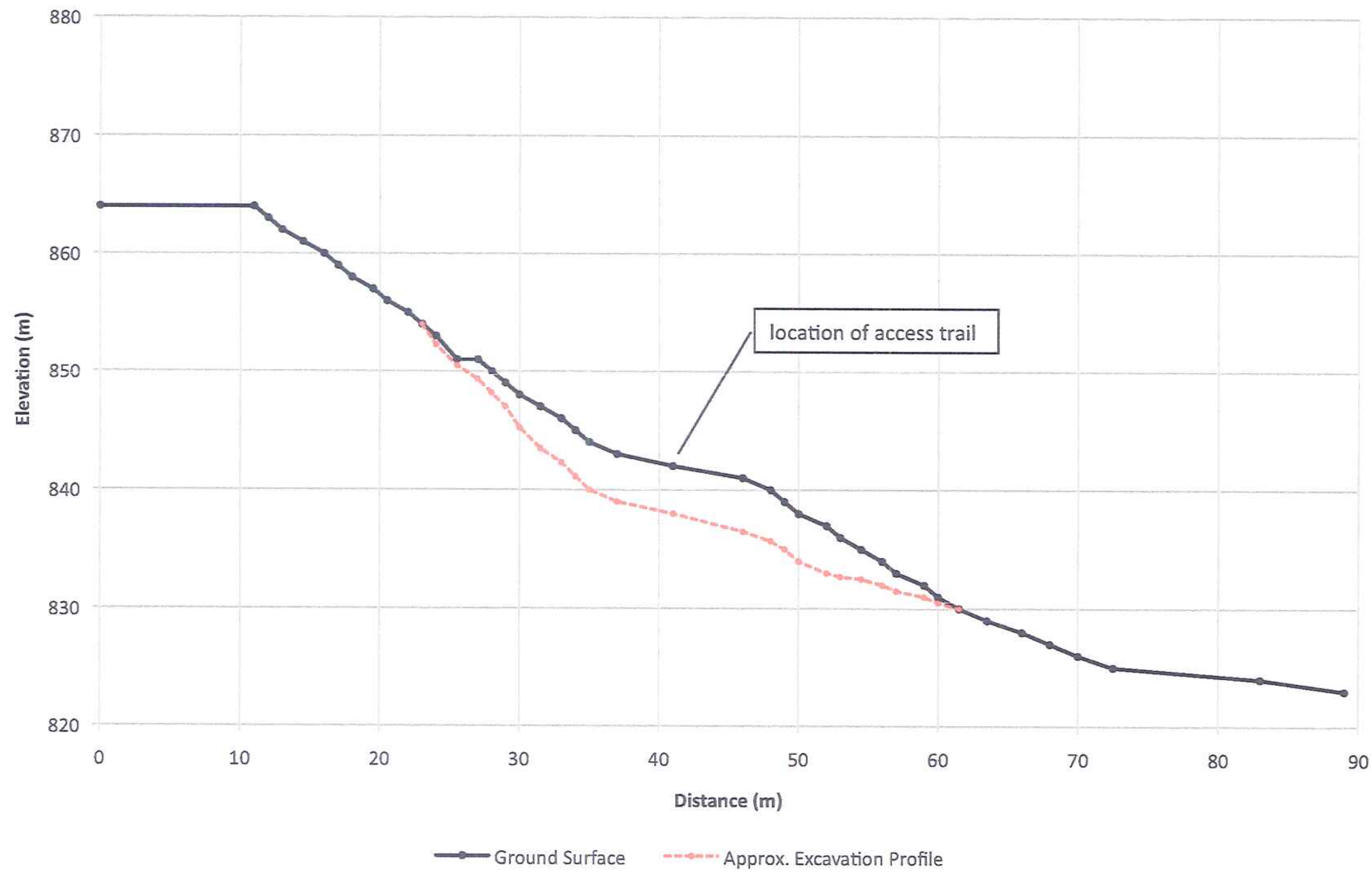
Clarke Geoscience Ltd. 2013. Geotechnical Monitoring Report, Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC (SLR Project No. 219.05112.01.0001). Report prepared for SLR (Canada) Consulting Ltd. Kelowna, BC.



EM survey and test pit locations provided as base map from SLR Consulting (Canada) Ltd.

Project: Geotechnical Monitoring Report (Addendum), Wilmer Marsh, Wilmer BC	
Date: February 18, 2014	Figure No.: 1
Title: Site Plan	
Clarke Geoscience Ltd.	

Figure 2: Schematic of Proposed Excavation along Wilmer Slopes



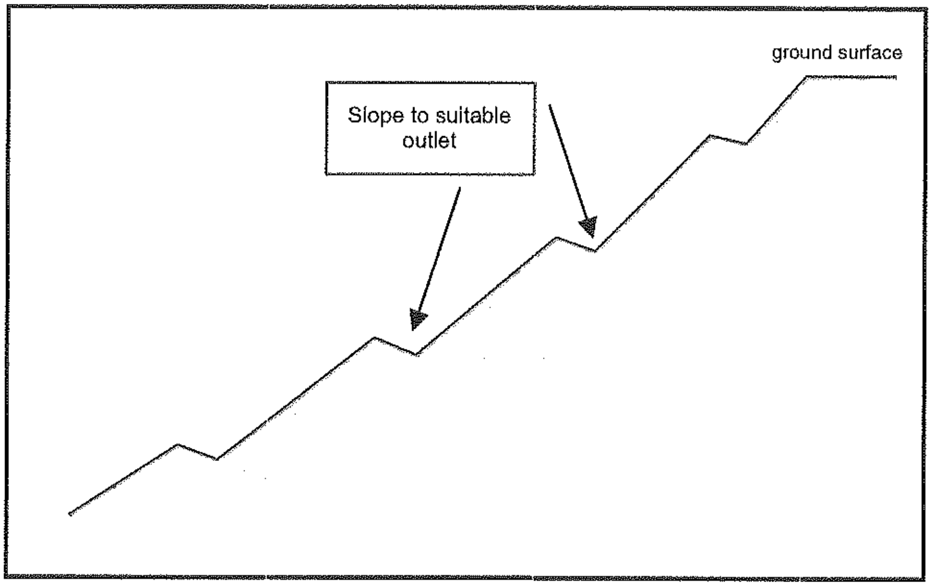


Figure 3: Schematic of slope terracing for surface erosion control

APPENDIX H

SLR Field Methodology and QA/QC Procedures

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area
SLR Project No.: 219.05112.00008

FIELD METHODOLOGY

SLR conducted a subsurface investigation at the unofficial refuse area located in the Wilmer Marsh Unit of the Columbia National Wildlife Area (the Site) in 2013-2014. The field procedures for all works are presented in the following sections.

LOCATION OF UTILITIES

Prior to commencing the investigation program, SLR placed a BC1 call to confirm the absence of underground services in the area of the Site. SLR also contacted CWS to confirm the absence of utilities at the Site

2013-2014 SITE ACTIVITES

SLR completed a test pitting program and surficial soil sampling program at the Site in October 2013. An assessment of seasonal runoff was subsequently conducted in March 2014. The field procedures are documented below.

Test Pitting Investigation

SLR was present at the Site on October 29 and 30, 2013 to oversee the advancement of fourteen test pits (TP1 through TP14) along the access trail on the southern portion of the Site. The test pits were advanced to a maximum depth of 4.5 mbg using a spider type excavator supplied and operated by SPIDEX All Terrain Excavating. The sample locations were documented by SLR field personnel in both note form and with photos and videos.

Samples of the soil matrix surrounding the buried debris were collected at the depths where deemed most appropriate. Soil was classified according to colour, texture, qualitative moisture content, and soil stratigraphy. Soil samples were obtained from the bucket of the excavator; soil at bucket edges was avoided to prevent cross-contamination.

All samples were field-screened for the presence of combustible hydrocarbon vapours using a fixed volume headspace technique with a RKI Eagle Photoionization Detector (PID), equipped with a methane-elimination feature and calibrated prior to field use. A plastic bag was half filled with soil and sealed for approximately ten minutes prior to puncturing the bag and analyzing for the headspace vapour levels. The test is dependent on temperature, soil type and equipment calibration, and is independent of field personnel. The explosimeter utilized displayed the concentration of combustible hydrocarbons in ppmv.

Soil samples were stored per laboratory requirements (i.e. ice-filled cooler with completed Chain-of-Custody documents) and submitted to ALS Environmental (ALS) in Burnaby for analysis of potential contaminants of concern within prescribed holding times.

Surficial Soil Sampling Program

On October 30, 2013, SLR advanced eight hand-auger samples (RA1 through RA8) along the southern edge of the uplands bench. The surface samples were advanced to a maximum depth of 0.5 mbg. The sample locations were documented by SLR field personnel in both note form and with photos.

Soil was classified according to colour, texture, qualitative moisture content, and soil stratigraphy. Discrete soil samples were obtained directly from the core of the hand auger. The hand auger was washed with Alconox detergent and rinsed with distilled water prior to each use. All samples were field-screened for the presence of combustible hydrocarbon vapours using the methodology described previously.

Soil samples were stored per laboratory requirements and submitted for analysis of potential contaminants of concern within prescribed holding times. SLR collected and analyzed one blind field duplicate.

Seasonal Water Assessment

SLR returned to the Site in March 2014 to assess seasonal runoff. As snowmelt had occurred immediately prior to SLR's arrival, no runoff samples were collected.

SLR QA/QC PROCEDURES

The following outlines the procedures and results of the quality assurance/quality control program implemented at the Site.

Soil Sampling

All soil samples obtained were split and half of the sample was retained in an airtight plastic bag for subsequent field screening, while the other half was retained in two clean, laboratory-prepared glass jars with Teflon-lined lids. Samples of soil retained for analysis on the basis of field screening were jarred in such a way as to ensure that a negligible headspace was present in the sample container. All samples were documented on a Chain-of-Custody document and placed in a cooler with ice.

To prevent cross-contamination all samples were collected using single-use disposable nitrile gloves. Sampling equipment, including the hand-auger, was cleaned between samples.

Blind field duplicates were collected at a minimum frequency of one for every ten samples to ensure laboratory quality control as well as reproducibility of field sampling techniques. The sample to be duplicated was split and placed into two sets of identical laboratory-prepared jars.

Laboratory Qualifications

Soil samples for the purpose of site characterization were submitted for analysis to ALS of Burnaby, BC. ALS is accredited with the Canadian Association of Laboratory Accreditation and is registered under the BC MoE Environmental Data Quality Assurance Regulation. For more detailed information of the analytical procedures followed, reference should be made to the analytical laboratory reports in Appendix J.

Analyses of Duplicate Samples

To verify the reproducibility of the laboratory analyses and to demonstrate that the field sampling techniques utilized by SLR personnel are capable of yielding reproducible results, four blind field duplicates collected, as described above, were submitted to ALS for analysis of selected parameters. When possible, the relative percent difference (RPD) of the sample and its duplicate was calculated. RPD is defined as the difference of the absolute value of the duplicate results divided by the average of the duplicate results, expressed as a percentage. Analytical error increases near the method detection limit (MDL); therefore the RPD calculation should not be performed unless the concentrations of both samples are greater than five times the MDL. The acceptable RPD values for various parameters in soil are presented in the following table.

Duplicate Acceptance Criteria

Parameter	Soil RPD (%)
Organics (including BETX and PHC)	+/- 80
PAH	+/- 100
Metals	+/- 60

Four duplicate soil samples were collected and submitted to ALS during the October 2013 test pitting program. The RPD results are presented in Tables 1 through 4. RPDs could not be calculated for BETX, PHCs or PAH as all results were less than the MDL. RPDs for one of the four duplicate-sample pairs submitted for metals analysis could not be calculated because the results were all less than the MDL. RPDs were calculated for the remaining three duplicate-sample pairs for various metals parameters and ranged from 0% to 53.1%; all calculated RPDs were within the acceptance criteria.

As an internal quality control lab procedure, samples submitted to ALS are subjected to laboratory QA/QC procedures (method blanks, surrogate recoveries, lab duplicates, reference materials, and lab control samples), which were documented on the laboratory certificates provided. A summary of the lab QA/QC and SLR QA/QC is included on the SLR QA/QC summary attached to the laboratory report included in Appendix J. The results of the laboratory and field QA/QC procedures were examined and deemed acceptable by SLR and as such, the entire set of data was deemed reliable by SLR.

APPENDIX I

Test Pit Logs

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE NO: TP1
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) (1, 10, 100, 1000, 10000)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					Fine-grained soil brown, dry					
		TP1-1				0				
1		TP1-2			debris observed between 1.0 m and 3.0 m	0			backfilled with excavated soil	1.0
2		TP1-3				0				2.0
3		TP1-4			End of borehole at 3.0 m	0				3.0
					No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP2

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					cover material over debris and natural soil from surface to 2.5 m					
		TP2-1				0				
1		TP2-2				0				1.0
2		TP2-3				0			backfilled with excavated soil	2.0
					Fine-grained soil debris from surface to 4.5 m, brown, dry					
3		TP2-4				0				3.0
4		TP2-5				0				4.0
					End of borehole at 4.5 m					
					No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: GRAB SAMPLE

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE NO: TP3
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
	■	TP3-1			**Fine-grained soil** fill material and debris observed from surface to 0.75 m, brown, dry	0			backfilled with excavated soil	
1	■	TP3-2				0				1.0
					End of borehole at 1.0 m					
					No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME:Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP4
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
	■	TP4-1			**Fine-grained soil** brown, dry	0			backfilled with excavated soil	
					End of borehole at 0.5 m No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP5
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
	■	TP5-1			**Fine-grained soil** brown, dry	10			backfilled with excavated soil	
					End of borehole at 0.5 m No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN
DRILLER NAME:Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP6
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
	■	TP6-1			**Fine-grained soil** some gravel, brown, very dry	0			backfilled with excavated soil	
					End of borehole at 0.5 m No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator
DRILL DATE: October 29, 2013
LOGGED BY: KA/KN
DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

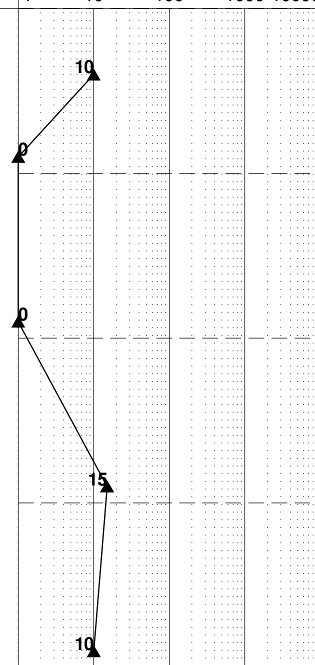
SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP7
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
		TP7-1			**Fine-grained soil** debris observed within top 0.5 m and visible at 4.0 m, brown, dry	10				
1		TP7-2				0				1.0
2		TP7-3				0			backfilled with excavated soil	2.0
3		TP7-4				15				3.0
4		TP7-5				10				4.0
					End of borehole at 4.0 m No well installed. Test pit dug to determine garbage extent on site.					



DRILLING METHOD: Excavator

DRILL DATE: October 29, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: GRAB SAMPLE

Sheet 1 of 1

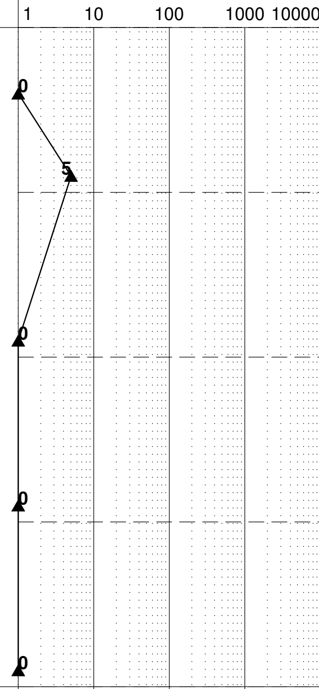
SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP8
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0–4					**Fine-grained soil** debris observed from surface to 4.0 m, brown, dry				backfilled with excavated soil	
	grab	TP8-1				0				
	grab	TP8-2				5				
1										1.0
	grab	TP8-3				0				
2										2.0
	grab	TP8-4				0				
3										3.0
	grab	TP8-5				0				
4					End of borehole at 4.0 m					4.0



No well installed. Test pit dug to determine garbage extent on site.

DRILLING METHOD: Excavator
DRILL DATE: October 29, 2013
LOGGED BY: KA/KN
DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP9

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					No analysis for TP9				backfilled with excavated soil	
					End of borehole at 0.5 m No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN

DRILLER NAME:Spidex All Terrain Excavating, Dominic

Notes:

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE NO: TP10
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0–3	Grab sample	TP10-1			**Fine-grained soil** brown, dry	0			backfilled with excavated soil	1.0, 2.0
3					End of borehole at 3.0 m No well installed. Test pit dug to determine garbage extent on site.					3.0

DRILLING METHOD: Excavator

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN
DRILLER NAME: Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

Sheet 1 of 1

SLR CANADA V5.2 OCTOBER 2013 TEST PITS.GPJ SLR_CAN V5.2.GDT 3/3/14

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP11
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
	■	TP11-1			**Fine-grained soil** debris observed from surface to 2.0 m, brown, dry	0				
1	■	TP11-2				0			backfilled with excavated soil	1.0
2	■	TP11-3				0				2.0
					End of borehole at 2.3 m					
					No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN

DRILLER NAME:Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.	CLIENT: **PWGSC** PROJECT: ADDRESS: **Wilmer, BC** SLR JOB NO: **219.05112.00008**	**BOREHOLE LOG** BOREHOLE NO: TP12 SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					Fine-grained soil debris visible at surface, brown, dry					
	grab	TP12-1				0			backfilled with excavated soil	
	grab	TP12-2				0				
1										1.0
2										2.0
3					End of borehole at 3.0 m No well installed. Test pit dug to determine garbage extent on site.					3.0

DRILLING METHOD: Excavator

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN

DRILLER NAME:Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP13

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
		TP13-1			**Fine-grained soil** debris observed from surface to 0.5 m, brown, dry	0			backfilled with excavated soil	
1					End of borehole at 1.0 m No well installed. Test pit dug to determine garbage extent on site.					1.0

DRILLING METHOD: Excavator

Notes: GRAB SAMPLE

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN

DRILLER NAME: Spidex All Terrain Excavating, Dominic

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT:
ADDRESS: **Wilmer, BC**
SLR JOB NO: **219.05112.00008**

BOREHOLE LOG

BOREHOLE NO: TP14
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
	■	TP14-1			**Fine-grained soil** upper area of the soil pile, brown, dry	0			backfilled with excavated soil	
					End of borehole at 0.5 m					
					No well installed. Test pit dug to determine garbage extent on site.					

DRILLING METHOD: Excavator

DRILL DATE: October 30, 2013

LOGGED BY: KA/KN

DRILLER NAME:Spidex All Terrain Excavating, Dominic

Notes: ■ GRAB SAMPLE

APPENDIX J

Detailed Analytical Chemistry Report and QAQC Summary Sheet

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

SLR Project No.: 219.05112.00008

SLR CONSULTING (CANADA) LTD.
ATTN: Lindsay Paterson
200 - 1475 Ellis Street
Kelowna BC V1Y 2A3

Date Received: 01-NOV-13
Report Date: 04-DEC-13 16:21 (MT)
Version: FINAL REV. 2

Client Phone: 250-762-7202

Certificate of Analysis

Lab Work Order #: L1386542

Project P.O. #: KEL1322
Job Reference: 219.05112.00008
C of C Numbers: 5, 6, 7, 8, 10-334338, 10-334339, 10-334341, 10-334342
Legal Site Desc:

Comments: 4-DEC-2013 Additional metals analysis added to some samples.

Erin Bolster
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

		L1386542-1	L1386542-2	L1386542-3	L1386542-4	L1386542-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13
	Sampled Time					
	Client ID	TP1-1	TP1-2	TP1-3	TP1-4	TP2-1
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	4.23				2.86
	Moisture (%)	1.90	2.60		1.29	2.66
	pH (1:2 soil:water) (pH)	8.84	8.33	8.46	8.90	8.57
Particle Size	MUST PSA % > 75um (%)	8.07				
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.55				
Metals	Antimony (Sb) (mg/kg)	0.47	0.97		0.29	0.44
	Arsenic (As) (mg/kg)	6.05	6.23		5.78	6.17
	Barium (Ba) (mg/kg)	122	128		94.7	111
	Beryllium (Be) (mg/kg)	0.27	0.28		0.21	0.31
	Cadmium (Cd) (mg/kg)	0.140	0.371	0.073	0.054	0.163
	Chromium (Cr) (mg/kg)	16.8	18.2		14.1	18.4
	Cobalt (Co) (mg/kg)	8.25	9.06		7.96	8.97
	Copper (Cu) (mg/kg)	15.4	18.4		13.9	16.1
	Lead (Pb) (mg/kg)	17.9	24.9	9.34	8.10	17.3
	Mercury (Hg) (mg/kg)	0.0196	0.0199		0.0090	0.0163
	Molybdenum (Mo) (mg/kg)	<0.50	0.54		<0.50	<0.50
	Nickel (Ni) (mg/kg)	20.1	22.0	18.6	18.4	25.0
	Selenium (Se) (mg/kg)	<0.20	<0.20		<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	<0.10		<0.10	<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050		<0.050	<0.050
	Tin (Sn) (mg/kg)	2.9	4.5	<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)	0.803	0.696		0.727	0.636
	Vanadium (V) (mg/kg)	10.9	11.6		9.35	12.3
	Zinc (Zn) (mg/kg)	65.2	111	42.7	37.7	70.5
Speciated Metals	Hexavalent Chromium (mg/kg)	<0.10				<0.10
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050		<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015		<0.015	<0.015
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20		<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050		<0.050	<0.050
	Toluene (mg/kg)	<0.050	<0.050		<0.050	<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050		<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050		<0.050	<0.050
	Xylenes (mg/kg)	<0.075	<0.075		<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	110.1	100.3		106.2	103.6
	Surrogate: 1,4-Difluorobenzene (SS) (%)	107.6	98.7		102.6	99.8
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10		<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1386542-6	L1386542-7	L1386542-8	L1386542-9	L1386542-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13
	Sampled Time					
	Client ID	TP2-2	TP2-3	TP2-4	TP2-5	TP3-1
SOIL						
Physical Tests	% Moisture (%)	3.00				2.10
	Moisture (%)	2.35	3.86	5.83	4.11	1.84
	pH (1:2 soil:water) (pH)	8.56	8.32	8.13	8.25	8.86
Particle Size	MUST PSA % > 75um (%)	7.28				
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.48				
Metals	Antimony (Sb) (mg/kg)	0.43	1.21	0.31	1.00	0.30
	Arsenic (As) (mg/kg)	5.88	6.58	5.85	6.96	5.56
	Barium (Ba) (mg/kg)	107	152	107	143	86.6
	Beryllium (Be) (mg/kg)	0.25	0.30	0.25	0.24	0.26
	Cadmium (Cd) (mg/kg)	0.175	1.01	0.114	0.920	0.071
	Chromium (Cr) (mg/kg)	16.3	21.5	14.7	19.2	17.3
	Cobalt (Co) (mg/kg)	8.43	9.07	8.12	8.61	8.70
	Copper (Cu) (mg/kg)	16.5	24.4	14.3	38.3	14.2
	Lead (Pb) (mg/kg)	18.3	40.2	9.39	47.1	10.3
	Mercury (Hg) (mg/kg)	0.0166	0.0190	0.0119	0.0208	0.0211
	Molybdenum (Mo) (mg/kg)	<0.50	0.74	<0.50	1.04	<0.50
	Nickel (Ni) (mg/kg)	19.9	21.7	18.2	21.9	21.4
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	0.11	<0.10	<0.10	<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	7.7	<2.0	69.4	<2.0
	Uranium (U) (mg/kg)	0.569	0.527	0.360	0.512	0.686
	Vanadium (V) (mg/kg)	10.3	11.3	10.9	11.0	11.1
	Zinc (Zn) (mg/kg)	69.5	168	43.6	179	46.6
Speciated Metals	Hexavalent Chromium (mg/kg)					<0.10
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	102.2	104.7	102.2	105.7	111.4
	Surrogate: 1,4-Difluorobenzene (SS) (%)	99.4	103.4	100.7	103.0	104.4
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-11	L1386542-12	L1386542-13	L1386542-14	L1386542-15
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13
	Sampled Time					
	Client ID	TP3-2	TP4-1	TP5-1	TP6-1	TP7-1
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	1.97				6.42
	Moisture (%)	1.68	3.47	3.98	2.44	3.46
	pH (1:2 soil:water) (pH)	8.64	9.01	9.16	8.67	8.88
Particle Size	MUST PSA % > 75um (%)	1.50	7.74	0.12		
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.40	0.68	0.32		
Metals	Antimony (Sb) (mg/kg)	0.30	0.40	0.37	0.74	0.39
	Arsenic (As) (mg/kg)	5.89	5.94	7.14	5.75	6.02
	Barium (Ba) (mg/kg)	86.5	107	145	110	101
	Beryllium (Be) (mg/kg)	0.26	0.26	0.25	0.24	0.28
	Cadmium (Cd) (mg/kg)	0.067	0.107	0.064	0.101	0.127
	Chromium (Cr) (mg/kg)	17.5	16.6	14.4	12.1	16.8
	Cobalt (Co) (mg/kg)	9.47	8.27	8.00	7.28	8.69
	Copper (Cu) (mg/kg)	14.3	14.8	15.4	14.3	15.2
	Lead (Pb) (mg/kg)	9.38	13.0	9.37	10.6	14.9
	Mercury (Hg) (mg/kg)	0.0133	0.0138	0.0198	0.0085	0.0162
	Molybdenum (Mo) (mg/kg)	0.52	<0.50	<0.50	<0.50	<0.50
	Nickel (Ni) (mg/kg)	21.5	19.8	18.7	16.6	20.9
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Uranium (U) (mg/kg)	0.696	0.649	0.739	0.641	0.610
	Vanadium (V) (mg/kg)	10.8	11.0	9.70	9.04	11.2
	Zinc (Zn) (mg/kg)	45.8	50.4	37.2	42.7	96.2
Speciated Metals	Hexavalent Chromium (mg/kg)					<0.10
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	102.0	100.1	100.5	101.0	99.2
	Surrogate: 1,4-Difluorobenzene (SS) (%)	97.2	95.9	95.6	98.4	95.1
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1386542-16	L1386542-17	L1386542-18	L1386542-19	L1386542-20
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13
	Sampled Time					
	Client ID	TP7-2	TP7-3	TP7-4	TP7-5	TP8-1
SOIL						
Physical Tests	% Moisture (%)					2.73
	Moisture (%)	3.39	3.03	3.34	3.14	2.10
	pH (1:2 soil:water) (pH)	8.21	8.09	7.75	8.45	8.26
Particle Size	MUST PSA % > 75um (%)		12.5			9.87
Organic / Inorganic Carbon	Total Organic Carbon (%)		1.54			0.69
Metals	Antimony (Sb) (mg/kg)	1.40	2.94	1.47	1.06	0.54
	Arsenic (As) (mg/kg)	6.49	6.97	7.10	6.13	6.16
	Barium (Ba) (mg/kg)	138	173	159	112	108
	Beryllium (Be) (mg/kg)	0.27	0.30	0.24	0.24	0.25
	Cadmium (Cd) (mg/kg)	0.783	0.973	15.6	0.614	0.283
	Chromium (Cr) (mg/kg)	18.5	18.9	18.8	17.2	17.0
	Cobalt (Co) (mg/kg)	9.06	8.69	8.67	8.53	8.42
	Copper (Cu) (mg/kg)	27.5	28.1	36.8	21.1	16.4
	Lead (Pb) (mg/kg)	45.5	81.4	127	42.0	14.9
	Mercury (Hg) (mg/kg)	0.0220	0.0302	0.0245	0.0435	0.0190
	Molybdenum (Mo) (mg/kg)	0.90	0.80	1.32	0.65	<0.50
	Nickel (Ni) (mg/kg)	70.4	21.2	22.3	21.9	20.1
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	0.16	0.11	<0.10	<0.10
	Thallium (Tl) (mg/kg)	0.053	<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	25.5	10.7	13.8	6.5	<2.0
	Uranium (U) (mg/kg)	0.641	0.598	0.452	0.559	0.604
	Vanadium (V) (mg/kg)	10.8	11.7	9.57	9.96	10.4
	Zinc (Zn) (mg/kg)	306	288	493	213	61.0
Speciated Metals	Hexavalent Chromium (mg/kg)					<0.10
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	104.7	100.1	102.4	100.9	98.9
	Surrogate: 1,4-Difluorobenzene (SS) (%)	100.1	96.2	98.5	95.8	95.0
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-21	L1386542-22	L1386542-23	L1386542-24	L1386542-25
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	30-OCT-13
	Sampled Time					
	Client ID	TP8-2	TP8-3	TP8-4	TP8-5	TP10-1
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)					4.13
	Moisture (%)	3.19	3.20	3.60	3.20	2.81
	pH (1:2 soil:water) (pH)	8.73	8.38	8.39	8.41	8.49
Particle Size	MUST PSA % > 75um (%)					4.41
Organic / Inorganic Carbon	Total Organic Carbon (%)					1.48
Metals	Antimony (Sb) (mg/kg)	0.48	0.90	0.50	0.56	0.36
	Arsenic (As) (mg/kg)	6.00	6.07	5.97	5.93	6.30
	Barium (Ba) (mg/kg)	105	138	121	112	85.7
	Beryllium (Be) (mg/kg)	0.27	0.26	0.25	0.24	0.29
	Cadmium (Cd) (mg/kg)	0.212	0.599	0.333	0.404	0.085
	Chromium (Cr) (mg/kg)	16.0	17.0	14.7	14.3	15.9
	Cobalt (Co) (mg/kg)	8.43	8.25	7.79	7.81	8.58
	Copper (Cu) (mg/kg)	16.7	24.3	16.9	17.2	14.9
	Lead (Pb) (mg/kg)	17.5	41.8	24.7	23.9	12.9
	Mercury (Hg) (mg/kg)	0.0149	0.0175	0.0238	0.0261	0.0129
	Molybdenum (Mo) (mg/kg)	<0.50	0.69	<0.50	<0.50	<0.50
	Nickel (Ni) (mg/kg)	19.7	20.2	18.9	18.3	20.9
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	9.7	2.1	3.8	<2.0
	Uranium (U) (mg/kg)	0.595	0.535	0.491	0.510	0.472
	Vanadium (V) (mg/kg)	10.5	10.4	9.60	9.74	10.7
	Zinc (Zn) (mg/kg)	70.9	177	86.9	158	46.4
Speciated Metals	Hexavalent Chromium (mg/kg)					
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	99.5	94.0	99.3	96.5	96.4
	Surrogate: 1,4-Difluorobenzene (SS) (%)	94.0	91.6	95.1	93.0	95.4
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-26	L1386542-27	L1386542-28	L1386542-29	L1386542-31
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13
	Sampled Time					
	Client ID	TP11-1	TP11-2	TP11-3	TP12-1	TP13-1
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	5.10			6.34	2.48
	Moisture (%)	6.66	5.99	2.07	7.00	2.38
	pH (1:2 soil:water) (pH)	9.01	8.50	9.36	8.46	8.76
Particle Size	MUST PSA % > 75um (%)					
Organic / Inorganic Carbon	Total Organic Carbon (%)					
Metals	Antimony (Sb) (mg/kg)	0.29	0.31	0.31	0.33	0.49
	Arsenic (As) (mg/kg)	5.70	5.76	6.15	5.79	5.88
	Barium (Ba) (mg/kg)	70.7	89.9	86.6	87.5	114
	Beryllium (Be) (mg/kg)	0.27	0.27	0.27	0.24	0.25
	Cadmium (Cd) (mg/kg)	0.075	0.064	0.070	0.071	0.184
	Chromium (Cr) (mg/kg)	16.3	17.3	17.5	14.7	15.8
	Cobalt (Co) (mg/kg)	8.09	8.52	8.47	7.44	8.16
	Copper (Cu) (mg/kg)	13.5	14.3	13.7	13.6	16.3
	Lead (Pb) (mg/kg)	9.03	9.92	9.84	11.2	19.6
	Mercury (Hg) (mg/kg)	0.0086	0.0098	0.0085	0.0156	0.0298
	Molybdenum (Mo) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Nickel (Ni) (mg/kg)	20.8	21.1	21.4	18.2	19.5
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	2.9
	Uranium (U) (mg/kg)	0.417	0.427	0.670	0.478	0.626
	Vanadium (V) (mg/kg)	10.4	11.2	11.2	10.3	10.7
	Zinc (Zn) (mg/kg)	42.7	46.5	44.9	43.6	72.5
Speciated Metals	Hexavalent Chromium (mg/kg)	<0.10			<0.10	<0.10
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	95.4	93.6	94.0	94.4	90.7
	Surrogate: 1,4-Difluorobenzene (SS) (%)	93.4	92.9	92.7	94.5	90.8
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-32	L1386542-33	L1386542-34	L1386542-35	L1386542-36
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-OCT-13	29-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13
	Sampled Time					
	Client ID	TP14-1	DUP A	DUP B	DUP C	DUP D
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	5.10			4.54	6.16
	Moisture (%)	5.00	7.70	5.61	4.44	4.54
	pH (1:2 soil:water) (pH)	8.94	8.25	8.50		8.96
Particle Size	MUST PSA % > 75um (%)	0.29				0.10
Organic / Inorganic Carbon	Total Organic Carbon (%)	0.28				0.12
Metals	Antimony (Sb) (mg/kg)	0.31	1.00	0.31		0.30
	Arsenic (As) (mg/kg)	6.13	6.04	5.69		5.91
	Barium (Ba) (mg/kg)	69.1	132	86.7		68.1
	Beryllium (Be) (mg/kg)	0.29	0.28	0.29		0.28
	Cadmium (Cd) (mg/kg)	0.077	1.11	0.095		0.066
	Chromium (Cr) (mg/kg)	20.6	18.5	17.3		19.8
	Cobalt (Co) (mg/kg)	9.91	8.76	8.67		9.54
	Copper (Cu) (mg/kg)	14.9	26.6	14.6		14.9
	Lead (Pb) (mg/kg)	12.8	76.0	12.8		11.1
	Mercury (Hg) (mg/kg)	0.0250	0.0243	0.0213		0.0159
	Molybdenum (Mo) (mg/kg)	<0.50	0.72	<0.50		<0.50
	Nickel (Ni) (mg/kg)	25.0	72.0	21.0		24.0
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20		<0.20
	Silver (Ag) (mg/kg)	<0.10	0.14	<0.10		<0.10
	Thallium (Tl) (mg/kg)	<0.050	<0.050	<0.050		<0.050
	Tin (Sn) (mg/kg)	<2.0	14.8	<2.0		<2.0
	Uranium (U) (mg/kg)	0.707	0.450	0.434		0.690
	Vanadium (V) (mg/kg)	12.4	10.0	11.0		11.7
	Zinc (Zn) (mg/kg)	58.5	251	54.6		52.2
Speciated Metals	Hexavalent Chromium (mg/kg)				<0.10	
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	97.3	102.7	95.7	100.4	99.0
	Surrogate: 1,4-Difluorobenzene (SS) (%)	97.6	99.3	93.7	100.3	99.6
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-37	L1386542-38	L1386542-39	L1386542-40	L1386542-41
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13
	Sampled Time					
	Client ID	RA1	RA2	RA3	RA4	RA5
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	4.73			4.50	5.91
	Moisture (%)	4.23	4.60	3.54	4.33	5.30
	pH (1:2 soil:water) (pH)			9.34	9.43	8.08
Particle Size	MUST PSA % > 75um (%)		26.2		55.0	
Organic / Inorganic Carbon	Total Organic Carbon (%)		1.26		0.33	
Metals	Antimony (Sb) (mg/kg)					1.13
	Arsenic (As) (mg/kg)					6.18
	Barium (Ba) (mg/kg)					200
	Beryllium (Be) (mg/kg)					0.28
	Cadmium (Cd) (mg/kg)				<0.050	1.94
	Chromium (Cr) (mg/kg)					27.6
	Cobalt (Co) (mg/kg)					7.54
	Copper (Cu) (mg/kg)					26.1
	Lead (Pb) (mg/kg)				7.46	72.8
	Mercury (Hg) (mg/kg)				0.0149	7.26
	Molybdenum (Mo) (mg/kg)					0.74
	Nickel (Ni) (mg/kg)					19.2
	Selenium (Se) (mg/kg)					<0.20
	Silver (Ag) (mg/kg)					4.02
	Thallium (Tl) (mg/kg)					<0.050
	Tin (Sn) (mg/kg)			<2.0	<2.0	3.9
	Uranium (U) (mg/kg)					0.391
	Vanadium (V) (mg/kg)					10.6
	Zinc (Zn) (mg/kg)				31.6	285
Speciated Metals	Hexavalent Chromium (mg/kg)	<0.10				0.23
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050		<0.0050		<0.0050
	Ethylbenzene (mg/kg)	<0.015		<0.015		<0.015
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20		<0.20		<0.20
	Styrene (mg/kg)	<0.050		<0.050		<0.050
	Toluene (mg/kg)	<0.050		<0.050		<0.050
	ortho-Xylene (mg/kg)	<0.050		<0.050		<0.050
	meta- & para-Xylene (mg/kg)	<0.050		<0.050		<0.050
	Xylenes (mg/kg)	<0.075		<0.075		<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	97.8		95.7		99.8
	Surrogate: 1,4-Difluorobenzene (SS) (%)	98.2		95.3		98.5
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10		<10		<10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-42	L1386542-43	L1386542-44		
	Description	Soil	Soil	Soil		
	Sampled Date	30-OCT-13	30-OCT-13	30-OCT-13		
	Sampled Time					
	Client ID	RA6	RA7	RA8		
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	2.71	13.9			
	Moisture (%)	2.51	12.7	5.90		
	pH (1:2 soil:water) (pH)	8.16	9.14			
Particle Size	MUST PSA % > 75um (%)		0.15			
Organic / Inorganic Carbon	Total Organic Carbon (%)		0.32			
Metals	Antimony (Sb) (mg/kg)	4.90				
	Arsenic (As) (mg/kg)	7.56				
	Barium (Ba) (mg/kg)	136				
	Beryllium (Be) (mg/kg)	0.21				
	Cadmium (Cd) (mg/kg)	0.796				
	Chromium (Cr) (mg/kg)	16.7				
	Cobalt (Co) (mg/kg)	8.31				
	Copper (Cu) (mg/kg)	46.0				
	Lead (Pb) (mg/kg)	30.4				
	Mercury (Hg) (mg/kg)	0.218				
	Molybdenum (Mo) (mg/kg)	1.25				
	Nickel (Ni) (mg/kg)	18.8				
	Selenium (Se) (mg/kg)	0.26				
	Silver (Ag) (mg/kg)	0.15				
	Thallium (Tl) (mg/kg)	<0.050				
	Tin (Sn) (mg/kg)	50.8	<2.0			
	Uranium (U) (mg/kg)	0.558				
	Vanadium (V) (mg/kg)	8.39				
	Zinc (Zn) (mg/kg)	1020	52.4			
Speciated Metals	Hexavalent Chromium (mg/kg)	0.10				
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050			
	Ethylbenzene (mg/kg)	<0.015	<0.015			
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20			
	Styrene (mg/kg)	<0.050	<0.050			
	Toluene (mg/kg)	<0.050	<0.050			
	ortho-Xylene (mg/kg)	<0.050	<0.050			
	meta- & para-Xylene (mg/kg)	<0.050	<0.050			
	Xylenes (mg/kg)	<0.075	<0.075			
	Surrogate: 4-Bromofluorobenzene (SS) (%)	94.5	92.2			
	Surrogate: 1,4-Difluorobenzene (SS) (%)	94.7	91.3			
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-1	L1386542-2	L1386542-3	L1386542-4	L1386542-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13
	Sampled Time					
	Client ID	TP1-1	TP1-2	TP1-3	TP1-4	TP2-1
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10		<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30		<30	<30
	F2-Naphth (mg/kg)	<30	<30		<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50		<50	<50
	F3-PAH (mg/kg)	<50	<50		<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50		<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES		YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	118.4	126.7		121.5	125.4
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050		<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050		<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040		<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	0.013		<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015		<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050		<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010		<0.010	<0.010
	Pyrene (mg/kg)	<0.010	0.011		<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	84.5	92.2		83.1	89.1
	Surrogate: Chrysene d12 (%)	92.7	104.1		97.8	98.3
	Surrogate: Naphthalene d8 (%)	82.4	89.3		83.6	86.7
	Surrogate: Phenanthrene d10 (%)	88.0	98.6		83.1	94.1
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020		<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	0.16		<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-6	L1386542-7	L1386542-8	L1386542-9	L1386542-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13
	Sampled Time					
	Client ID	TP2-2	TP2-3	TP2-4	TP2-5	TP3-1
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F3-PAH (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	100.2	121.8	120.4	123.2	126.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	87.8	87.1	88.3	94.7	86.8
	Surrogate: Chrysene d12 (%)	92.2	87.7	93.7	96.5	88.7
	Surrogate: Naphthalene d8 (%)	86.0	83.4	84.3	89.8	84.2
	Surrogate: Phenanthrene d10 (%)	91.4	92.0	94.9	98.7	87.6
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID / Description / Sampled Date / Sampled Time / Client ID		L1386542-11	L1386542-12	L1386542-13	L1386542-14	L1386542-15
Description		Soil	Soil	Soil	Soil	Soil
Sampled Date		29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13
Sampled Time						
Client ID		TP3-2	TP4-1	TP5-1	TP6-1	TP7-1
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F3-PAH (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	121.3	119.7	120.5	101.4	114.5
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	90.0	84.3	85.0	92.5	83.9
	Surrogate: Chrysene d12 (%)	93.4	82.0	87.8	93.8	97.5
	Surrogate: Naphthalene d8 (%)	88.1	81.4	83.1	90.2	78.8
	Surrogate: Phenanthrene d10 (%)	87.3	83.6	82.5	93.7	88.1
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-16	L1386542-17	L1386542-18	L1386542-19	L1386542-20
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13
	Sampled Time					
	Client ID	TP7-2	TP7-3	TP7-4	TP7-5	TP8-1
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	170	64	<50
	F3-PAH (mg/kg)	<50	<50	170	64	<50
	F4 (C34-C50) (mg/kg)	<50	<50	84	<50	<50
	F4G-SG (mg/kg)			<500		
	Chrom. to baseline at nC50	YES	YES	NO	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	121.7	115.4	113.5	124.3	117.9
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.020 DLA	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.020 DLA	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.020 DLA	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	0.028	<0.010	<0.010	<0.010	0.011
	Benzo(b)fluoranthene (mg/kg)	0.037	<0.010	0.015	<0.010	0.023
	Benzo(b+j+k)fluoranthene (mg/kg)	0.037	<0.015	0.015	<0.015	0.023
	Benzo(g,h,i)perylene (mg/kg)	0.031	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	0.025	<0.010	<0.010	<0.010	0.012
	Dibenz(a,h)anthracene (mg/kg)	<0.020 DLA	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.020 DLA	<0.010	0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	0.021	<0.010	<0.010	<0.010	0.011
	2-Methylnaphthalene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.020 DLA	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	0.023	<0.010	0.013	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	95.3	79.5	92.1	89.8	82.7
	Surrogate: Chrysene d12 (%)	89.0	88.7	89.0	112.0	102.7
	Surrogate: Naphthalene d8 (%)	83.3	75.7	81.3	91.5	80.1
	Surrogate: Phenanthrene d10 (%)	93.1	87.9	96.9	95.8	88.8
	B(a)P Total Potency Equivalent (mg/kg)	0.046	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	0.47	<0.15	0.17	<0.15	0.24

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID		L1386542-21	L1386542-22	L1386542-23	L1386542-24	L1386542-25
Description		Soil	Soil	Soil	Soil	Soil
Sampled Date		29-OCT-13	29-OCT-13	29-OCT-13	29-OCT-13	30-OCT-13
Sampled Time						
Client ID		TP8-2	TP8-3	TP8-4	TP8-5	TP10-1
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F3-PAH (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	121.8	117.0	116.6	119.2	99.4
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	87.9	75.2	74.8	73.6	81.1
	Surrogate: Chrysene d12 (%)	107.6	80.3	81.7	83.9	91.3
	Surrogate: Naphthalene d8 (%)	85.2	71.8	62.1	71.6	76.9
	Surrogate: Phenanthrene d10 (%)	95.1	81.5	79.7	78.7	84.5
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1386542-26	L1386542-27	L1386542-28	L1386542-29	L1386542-31
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13
	Sampled Time					
	Client ID	TP11-1	TP11-2	TP11-3	TP12-1	TP13-1
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F3-PAH (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	113.2	99.7	102.6	100.4	95.8
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	71.8	73.6	75.7	79.0	74.1
	Surrogate: Chrysene d12 (%)	85.1	85.6	85.7	90.7	80.4
	Surrogate: Naphthalene d8 (%)	68.3	66.9	73.8	77.3	71.0
	Surrogate: Phenanthrene d10 (%)	77.8	80.8	77.4	81.4	77.2
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	<0.15

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID		L1386542-32	L1386542-33	L1386542-34	L1386542-35	L1386542-36
Description		Soil	Soil	Soil	Soil	Soil
Sampled Date		30-OCT-13	29-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13
Sampled Time						
Client ID		TP14-1	DUP A	DUP B	DUP C	DUP D
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F3-PAH (mg/kg)	<50	<50	<50	<50	<50
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	112.3	115.9	81.3	102.3	101.4
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Surrogate: Acenaphthene d10 (%)	77.7	85.7	72.5	75.0	73.9
	Surrogate: Chrysene d12 (%)	86.0	97.6	84.3	81.8	82.2
	Surrogate: Naphthalene d8 (%)	68.5	82.2	70.1	72.0	70.4
	Surrogate: Phenanthrene d10 (%)	77.0	93.5	79.4	76.7	74.5
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-37	L1386542-38	L1386542-39	L1386542-40	L1386542-41
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13	30-OCT-13
	Sampled Time					
	Client ID	RA1	RA2	RA3	RA4	RA5
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10		<10		<10
	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F2-Naphth (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	68
	F3-PAH (mg/kg)	<50	<50	<50	<50	68
	F4 (C34-C50) (mg/kg)	<50	<50	<50	<50	<50
	F4G-SG (mg/kg)					
	Chrom. to baseline at nC50	YES	YES	YES	YES	YES
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	111.0		104.2		115.9
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.018
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	<0.015	0.018
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.014
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.019
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.025
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.020
	Surrogate: Acenaphthene d10 (%)	74.9	81.1	78.1	81.2	82.7
	Surrogate: Chrysene d12 (%)	84.6	118.3	89.4	92.0	85.0
	Surrogate: Naphthalene d8 (%)	57.1	79.5	56.2	85.2	63.2
	Surrogate: Phenanthrene d10 (%)	80.8	98.3	82.0	82.6	86.6
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15	<0.15	0.19

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1386542-42	L1386542-43	L1386542-44		
	Description	Soil	Soil	Soil		
	Sampled Date	30-OCT-13	30-OCT-13	30-OCT-13		
	Sampled Time					
	Client ID	RA6	RA7	RA8		
Grouping	**Analyte**					
SOIL						
Hydrocarbons	F1-BTEX (mg/kg)	<10	<10			
	F2 (C10-C16) (mg/kg)	<30	<30	<30		
	F2-Naphth (mg/kg)	<30	<30	<30		
	F3 (C16-C34) (mg/kg)	67	<50	<50		
	F3-PAH (mg/kg)	67	<50	<50		
	F4 (C34-C50) (mg/kg)	188	<50	<50		
	F4G-SG (mg/kg)	1250				
	Chrom. to baseline at nC50	NO	YES	YES		
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	102.6	114.2			
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050		
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050		
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040		
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010		
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010		
	Benzo(b)fluoranthene (mg/kg)	<0.010	<0.010	<0.010		
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015		
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010		
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010		
	Chrysene (mg/kg)	<0.010	<0.010	<0.010		
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050		
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010		
	Fluorene (mg/kg)	<0.010	<0.010	<0.010		
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010		
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010		
	Naphthalene (mg/kg)	<0.010	<0.010	<0.010		
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010		
	Pyrene (mg/kg)	<0.010	<0.010	<0.010		
	Surrogate: Acenaphthene d10 (%)	80.1	86.1	92.9		
	Surrogate: Chrysene d12 (%)	83.4	94.1	104.6		
	Surrogate: Naphthalene d8 (%)	75.3	82.3	91.4		
	Surrogate: Phenanthrene d10 (%)	84.9	84.7	87.9		
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020		
	IACR (CCME) (mg/kg)	<0.15	<0.15	<0.15		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Molybdenum (Mo)	DUP-H	L1386542-18, -19, -20, -21, -22, -23, -24, -33
Duplicate	Uranium (U)	DUP-H	L1386542-18, -19, -20, -21, -22, -23, -24, -33
Duplicate	Copper (Cu)	DUP-H	L1386542-18, -19, -20, -21, -22, -23, -24, -33
Duplicate	Lead (Pb)	DUP-H	L1386542-18, -19, -20, -21, -22, -23, -24, -33
Duplicate	Zinc (Zn)	DUP-H	L1386542-18, -19, -20, -21, -22, -23, -24, -33
Duplicate	Nickel (Ni)	DUP-H	L1386542-25, -26, -27, -28, -29, -31, -32, -34, -36, -41, -42

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LECO-SK	Soil	Organic Carbon by combustion method	SSSA (1996) p. 973

Total Organic Carbon (C-TOT-ORG-LECO-SK, C-TOT-ORG-SK)

Total C and inorganic C are determined on separate samples. The total C is determined by combustion and thermal conductivity detection, while inorganic C is determined by weight lass after addition of hydrochloric acid. Organic C is calculated by the difference between these two determinations.

Reference for Total C:
Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 961-1010 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

Reference for Inorganic C:
Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

ALS Test Code	Matrix	Test Description	Method Reference**
CR-CR6-3060-ED	Soil	Chromium, Hexavalent (Cr +6)	APHA 3500-CR C, EPA 3060A ALKALINE
F1-BTX-CALC-VA	Soil	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10) and F1-BTEX, a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID. The F1-BTEX result is then calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

ALS Test Code	Matrix	Test Description	Method Reference**
F1-HSFID-VA	Soil	CCME F1 by headspace GCMS	EPA SW846, CCME CWS PHC TIER 1

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. The F1 fraction concentration is measured using flame ionization detection.

ALS Test Code	Matrix	Test Description	Method Reference**
F2F3-PAH-CALC-VA	Soil	F2&F3-PAH	CCME CWS PHC TIER 1 (2001)

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F2 (C10-C16) and F3 (C16-C34), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds prior to analysis by on-column GC/FID. The F2-Napth and F3-PAH results are then calculated as follows:

1. F2-Napth: F2 (C10-C16) minus naphthalene.
2. F3-PAH: F3 (C16-C34) minus selected PAHs (phenanthrene, benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene and pyrene).

ALS Test Code	Matrix	Test Description	Method Reference**
F2F4-TUMB-H/A-FID-VA	Soil	Petroleum Hydrocarbon by Tumbler GCFID	CCME PETROLEUM HYDROCARBONS

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For C10 to C50 hydrocarbons (F2, F3, F4) and gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds. F2, F3 & F4 are analyzed by on-column GC/FID, and F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant

Reference Information

CCME standard for F4.
7. The gravimetric heavy hydrocarbon results (F4G-sg), cannot be added to the C6 to C50 hydrocarbon results.
8. This method is validated for use.
9. Data from analysis of quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram.

HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAFS	EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry(EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

OGG-F4G-TUMB-SG-VA	Soil	CWS F4G with Silica Gel	CCME PETROLEUM HYDROCARBONS-GRAVIMETRIC

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds prior to gravimetric analysis.

Notes:
1. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
3. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
4. The gravimetric heavy hydrocarbon (F4G-sg) result cannot be added to the C6 to C50 hydrocarbons results.
5. This method is validated for use.
6. Data from analysis of quality control samples is available upon request.
7. Reported results are expressed as milligrams per dry kilogram.

PAH-TMB-H/A-MS-VA	Soil	PAH - Rotary Extraction (Hexane/Acetone)	EPA 3570/8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

PREP-MOISTURE-ED	Soil	% Moisture	Oven dry 105C-Gravimetric
PSA-MUST-SK	Soil	% Particles > 75um (Coarse/Fine)	ASTM D422-63-SIEVE

An air-dried sample is reduced to < 2 mm size and mixed with a dispersing agent (Calgon solution). The sample is washed through a 200 mesh (75 µm) sieve. The retained mass of sample is used to determine % sand fraction.

Reference: ASTM D422-63

VH-SURR-FID-VA	Soil	VH Surrogates for Soils	BCMELP CSR ANALYTICAL METHOD 2

Reference Information

VOC7-L-HSMS-VA	Soil	VOCs in soil by Headspace GCMS	EPA8260B, 5021, 5035, BC MOE

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7/VOC-SURR-MS-VA	Soil	VOC7 and/or VOC Surrogates for Soils	EPA METHODS 8260B & 524.2
XYLENES-CALC-VA	Soil	Sum of Xylene Isomer Concentrations	EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

10-334338	10-334339	10-334341	10-334342	5
6	7	8		

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1386542 Report Date: 04-DEC-13

Client: SLR CONSULTING (CANADA) LTD.
200 - 1475 Ellis Street
Kelowna BC V1Y 2A3

Contact: Lindsay Paterson

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LECO-SK	**Soil**							
Batch R2736201								
WG1782879-13 DUP		**L1386542-40**						
Total Organic Carbon		0.33	0.35		%	7.3	30	06-NOV-13
WG1782879-11 IRM		**08-109_SOIL**						
Total Organic Carbon			1.04		%		0.77-1.43	06-NOV-13
WG1782879-14 IRM		**08-109_SOIL**						
Total Organic Carbon			0.99		%		0.77-1.43	06-NOV-13
WG1782879-17 IRM		**08-109_SOIL**						
Total Organic Carbon			0.94		%		0.77-1.43	06-NOV-13
WG1782879-2 IRM		**08-109_SOIL**						
Total Organic Carbon			1.03		%		0.77-1.43	06-NOV-13
WG1782879-5 IRM		**08-109_SOIL**						
Total Organic Carbon			1.00		%		0.77-1.43	06-NOV-13
WG1782879-8 IRM		**08-109_SOIL**						
Total Organic Carbon			1.04		%		0.77-1.43	06-NOV-13
WG1782879-12 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
WG1782879-15 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
WG1782879-18 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
WG1782879-3 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
WG1782879-6 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
WG1782879-9 MB								
Total Organic Carbon			<0.10		%		0.1	06-NOV-13
CR-CR6-3060-ED	**Soil**							
Batch R2740576								
WG1786632-4 DUP		**L1386542-42**						
Hexavalent Chromium		0.10	0.11		mg/kg	4.8	20	12-NOV-13
WG1786632-2 LCS								
Hexavalent Chromium			97.0		%		80-120	12-NOV-13
WG1786632-1 MB								
Hexavalent Chromium			<0.10		mg/kg		0.1	12-NOV-13
F1-HSFID-VA	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HSFID-VA	**Soil**							
Batch R2733028								
WG1781958-2 LCS								
F1 (C6-C10)			103.6		%		70-130	06-NOV-13
WG1782145-2 LCS								
F1 (C6-C10)			100.9		%		70-130	07-NOV-13
WG1782146-2 LCS								
F1 (C6-C10)			105.0		%		70-130	07-NOV-13
WG1782147-2 LCS								
F1 (C6-C10)			111.4		%		70-130	08-NOV-13
WG1781958-1 MB								
F1 (C6-C10)			<10		mg/kg		10	06-NOV-13
WG1782145-1 MB								
F1 (C6-C10)			<10		mg/kg		10	07-NOV-13
WG1782146-1 MB								
F1 (C6-C10)			<10		mg/kg		10	07-NOV-13
WG1782147-1 MB								
F1 (C6-C10)			<10		mg/kg		10	08-NOV-13
Batch R2733785								
WG1781958-3 DUP		**L1386542-20**						
F1 (C6-C10)		<10	<10	RPD-NA	mg/kg	N/A	40	06-NOV-13
WG1781954-1 MB								
F1 (C6-C10)			<10		mg/kg		10	07-NOV-13
Batch R2734275								
WG1782146-3 DUP		**L1386542-31**						
F1 (C6-C10)		<10	<10	RPD-NA	mg/kg	N/A	40	07-NOV-13
Batch R2735429								
WG1781954-2 LCS								
F1 (C6-C10)			111.9		%		70-130	07-NOV-13
F2F4-TUMB-H/A-FID-VA	**Soil**							
Batch R2737480								
WG1781968-8 DUP		**L1386542-10**						
F2 (C10-C16)		<30	<30	RPD-NA	mg/kg	N/A	40	08-NOV-13
F3 (C16-C34)		<50	<50	RPD-NA	mg/kg	N/A	40	08-NOV-13
F4 (C34-C50)		<50	<50	RPD-NA	mg/kg	N/A	40	08-NOV-13
WG1782140-4 DUP		**L1386542-41**						
F2 (C10-C16)		<30	<30	RPD-NA	mg/kg	N/A	40	08-NOV-13
F3 (C16-C34)		68	75		mg/kg	10	40	08-NOV-13

Quality Control Report

Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2F4-TUMB-H/A-FID-VA		**Soil**							
Batch	**R2737480**								
WG1782140-4	**DUP**		**L1386542-41**						
F4 (C34-C50)			<50	<50	RPD-NA	mg/kg	N/A	40	08-NOV-13
WG1781968-7	**IRM**		**ALS PHC2 RM**						
F2 (C10-C16)				98.5		%		70-130	08-NOV-13
F3 (C16-C34)				106.3		%		70-130	08-NOV-13
F4 (C34-C50)				90.0		%		70-130	08-NOV-13
WG1782140-3	**IRM**		**ALS PHC2 RM**						
F2 (C10-C16)				94.7		%		70-130	08-NOV-13
F3 (C16-C34)				98.9		%		70-130	08-NOV-13
F4 (C34-C50)				74.0		%		70-130	08-NOV-13
WG1784466-3	**IRM**		**ALS PHC2 RM**						
F2 (C10-C16)				91.4		%		70-130	10-NOV-13
F3 (C16-C34)				101.5		%		70-130	10-NOV-13
F4 (C34-C50)				84.7		%		70-130	10-NOV-13
WG1781968-6	**LCS**								
F2 (C10-C16)				87.3		%		80-120	08-NOV-13
F3 (C16-C34)				87.4		%		80-120	08-NOV-13
F4 (C34-C50)				80.3		%		80-120	08-NOV-13
WG1782140-2	**LCS**								
F2 (C10-C16)				87.3		%		80-120	08-NOV-13
F3 (C16-C34)				83.1		%		80-120	08-NOV-13
F4 (C34-C50)				80.9		%		80-120	08-NOV-13
WG1784466-2	**LCS**								
F2 (C10-C16)				105.8		%		80-120	10-NOV-13
F3 (C16-C34)				102.9		%		80-120	10-NOV-13
F4 (C34-C50)				97.2		%		80-120	10-NOV-13
WG1781968-5	**MB**								
F2 (C10-C16)				<30		mg/kg		30	08-NOV-13
F3 (C16-C34)				<50		mg/kg		50	08-NOV-13
F4 (C34-C50)				<50		mg/kg		50	08-NOV-13
WG1782140-1	**MB**								
F2 (C10-C16)				<30		mg/kg		30	08-NOV-13
F3 (C16-C34)				<50		mg/kg		50	08-NOV-13
F4 (C34-C50)				<50		mg/kg		50	08-NOV-13
WG1784466-1	**MB**								
F2 (C10-C16)				<30		mg/kg		30	10-NOV-13
F3 (C16-C34)				<50		mg/kg		50	10-NOV-13

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2F4-TUMB-H/A-FID-VA	**Soil**							
Batch R2737480								
WG1784466-1 MB								
F4 (C34-C50)			<50		mg/kg		50	10-NOV-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2735412								
WG1781851-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			88.1		%		70-130	05-NOV-13
WG1781851-4 CRM		**VA-NRC-STSD1**						
Mercury (Hg)			97.1		%		70-130	05-NOV-13
WG1782143-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			88.5		%		70-130	05-NOV-13
WG1782143-4 CRM		**VA-NRC-STSD1**						
Mercury (Hg)			90.4		%		70-130	05-NOV-13
WG1781851-2 DUP		**L1386542-1**						
Mercury (Hg)		0.0196	0.0137		mg/kg	35	40	05-NOV-13
WG1781851-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	05-NOV-13
WG1782143-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	05-NOV-13
Batch R2735471								
WG1782023-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			88.6		%		70-130	06-NOV-13
WG1782023-4 CRM		**VA-NRC-STSD1**						
Mercury (Hg)			87.1		%		70-130	06-NOV-13
WG1782023-2 DUP		**L1386542-33**						
Mercury (Hg)		0.0243	0.0234		mg/kg	3.5	40	06-NOV-13
WG1782023-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	06-NOV-13
Batch R2753129								
WG1797707-4 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			103.3		%		70-130	01-DEC-13
WG1797707-5 CRM		**VA-NRC-STSD1**						
Mercury (Hg)			106.3		%		70-130	01-DEC-13
WG1797707-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	01-DEC-13
WG1797707-2 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	01-DEC-13
MET-200.2-CCMS-VA	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2734370								
WG1781851-3 CRM		**VA-CANMET-TILL1**						
Antimony (Sb)			105.1		%		70-130	05-NOV-13
Arsenic (As)			105.2		%		70-130	05-NOV-13
Barium (Ba)			107.7		%		70-130	05-NOV-13
Beryllium (Be)			0.52		mg/kg		0.34-0.74	05-NOV-13
Cadmium (Cd)			89.4		%		70-130	05-NOV-13
Chromium (Cr)			108.5		%		70-130	05-NOV-13
Cobalt (Co)			102.8		%		70-130	05-NOV-13
Copper (Cu)			98.9		%		70-130	05-NOV-13
Lead (Pb)			92.4		%		70-130	05-NOV-13
Molybdenum (Mo)			0.71		mg/kg		0.24-1.24	05-NOV-13
Nickel (Ni)			104.1		%		70-130	05-NOV-13
Selenium (Se)			0.33		mg/kg		0.12-0.52	05-NOV-13
Silver (Ag)			0.23		mg/kg		0.12-0.32	05-NOV-13
Thallium (Tl)			0.125		mg/kg		0.075-0.175	05-NOV-13
Tin (Sn)			1.0		mg/kg		0-3	05-NOV-13
Uranium (U)			105.9		%		70-130	05-NOV-13
Vanadium (V)			109.5		%		70-130	05-NOV-13
Zinc (Zn)			99.8		%		70-130	05-NOV-13
WG1781851-4 CRM		**VA-NRC-STSD1**						
Antimony (Sb)			106.0		%		70-130	05-NOV-13
Arsenic (As)			99.3		%		70-130	05-NOV-13
Barium (Ba)			106.6		%		70-130	05-NOV-13
Beryllium (Be)			106.4		%		70-130	05-NOV-13
Cadmium (Cd)			100.2		%		70-130	05-NOV-13
Chromium (Cr)			104.1		%		70-130	05-NOV-13
Cobalt (Co)			100.5		%		70-130	05-NOV-13
Copper (Cu)			100.6		%		70-130	05-NOV-13
Lead (Pb)			101.8		%		70-130	05-NOV-13
Molybdenum (Mo)			108.2		%		70-130	05-NOV-13
Nickel (Ni)			101.9		%		70-130	05-NOV-13
Selenium (Se)			105.5		%		70-130	05-NOV-13
Silver (Ag)			103.4		%		70-130	05-NOV-13
Thallium (Tl)			106.8		%		70-130	05-NOV-13
Tin (Sn)			95.7		%		70-130	05-NOV-13

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2734370								
WG1781851-4 CRM		**VA-NRC-STSD1**						
Vanadium (V)			106.1		%		70-130	05-NOV-13
Zinc (Zn)			98.9		%		70-130	05-NOV-13
WG1781851-2 DUP		**L1386542-1**						
Antimony (Sb)		0.47	0.41		mg/kg	13	30	05-NOV-13
Arsenic (As)		6.05	5.99		mg/kg	1.0	30	05-NOV-13
Barium (Ba)		122	110		mg/kg	9.8	40	05-NOV-13
Beryllium (Be)		0.27	0.28		mg/kg	3.0	30	05-NOV-13
Cadmium (Cd)		0.140	0.153		mg/kg	9.4	30	05-NOV-13
Chromium (Cr)		16.8	16.1		mg/kg	4.1	30	05-NOV-13
Cobalt (Co)		8.25	8.15		mg/kg	1.3	30	05-NOV-13
Copper (Cu)		15.4	15.2		mg/kg	1.0	30	05-NOV-13
Lead (Pb)		17.9	14.7		mg/kg	19	40	05-NOV-13
Molybdenum (Mo)		<0.50	<0.50	RPD-NA	mg/kg	N/A	40	05-NOV-13
Nickel (Ni)		20.1	19.6		mg/kg	2.3	30	05-NOV-13
Selenium (Se)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	05-NOV-13
Silver (Ag)		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	05-NOV-13
Thallium (Tl)		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	05-NOV-13
Tin (Sn)		2.9	2.3		mg/kg	22	40	05-NOV-13
Uranium (U)		0.803	0.644		mg/kg	22	30	05-NOV-13
Vanadium (V)		10.9	10.9		mg/kg	0.3	30	05-NOV-13
Zinc (Zn)		65.2	59.6		mg/kg	9.0	30	05-NOV-13
WG1781851-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	05-NOV-13
Arsenic (As)			<0.050		mg/kg		0.05	05-NOV-13
Barium (Ba)			<0.50		mg/kg		0.5	05-NOV-13
Beryllium (Be)			<0.20		mg/kg		0.2	05-NOV-13
Cadmium (Cd)			<0.050		mg/kg		0.05	05-NOV-13
Chromium (Cr)			<0.50		mg/kg		0.5	05-NOV-13
Cobalt (Co)			<0.10		mg/kg		0.1	05-NOV-13
Copper (Cu)			<0.50		mg/kg		0.5	05-NOV-13
Lead (Pb)			<0.50		mg/kg		0.5	05-NOV-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	05-NOV-13
Nickel (Ni)			<0.50		mg/kg		0.5	05-NOV-13
Selenium (Se)			<0.20		mg/kg		0.2	05-NOV-13
Silver (Ag)			<0.10		mg/kg		0.1	05-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2734370								
WG1781851-1 MB								
Thallium (Tl)			<0.050		mg/kg		0.05	05-NOV-13
Tin (Sn)			<2.0		mg/kg		2	05-NOV-13
Uranium (U)			<0.050		mg/kg		0.05	05-NOV-13
Vanadium (V)			<0.20		mg/kg		0.2	05-NOV-13
Zinc (Zn)			<1.0		mg/kg		1	05-NOV-13
Batch R2735393								
WG1782023-3 CRM		**VA-CANMET-TILL1**						
Antimony (Sb)			98.1		%		70-130	06-NOV-13
Arsenic (As)			108.4		%		70-130	06-NOV-13
Barium (Ba)			100.2		%		70-130	06-NOV-13
Beryllium (Be)			0.53		mg/kg		0.34-0.74	06-NOV-13
Cadmium (Cd)			94.5		%		70-130	06-NOV-13
Chromium (Cr)			105.7		%		70-130	06-NOV-13
Cobalt (Co)			103.7		%		70-130	06-NOV-13
Copper (Cu)			99.8		%		70-130	06-NOV-13
Lead (Pb)			97.2		%		70-130	06-NOV-13
Molybdenum (Mo)			0.70		mg/kg		0.24-1.24	06-NOV-13
Nickel (Ni)			104.1		%		70-130	06-NOV-13
Selenium (Se)			0.31		mg/kg		0.12-0.52	06-NOV-13
Silver (Ag)			0.23		mg/kg		0.12-0.32	06-NOV-13
Thallium (Tl)			0.121		mg/kg		0.075-0.175	06-NOV-13
Tin (Sn)			1.1		mg/kg		0-3	06-NOV-13
Uranium (U)			105.1		%		70-130	06-NOV-13
Vanadium (V)			107.7		%		70-130	06-NOV-13
Zinc (Zn)			102.7		%		70-130	06-NOV-13
WG1782023-4 CRM		**VA-NRC-STSD1**						
Antimony (Sb)			107.0		%		70-130	06-NOV-13
Arsenic (As)			103.2		%		70-130	06-NOV-13
Barium (Ba)			103.1		%		70-130	06-NOV-13
Beryllium (Be)			113.1		%		70-130	06-NOV-13
Cadmium (Cd)			102.8		%		70-130	06-NOV-13
Chromium (Cr)			102.3		%		70-130	06-NOV-13
Cobalt (Co)			103.9		%		70-130	06-NOV-13
Copper (Cu)			102.3		%		70-130	06-NOV-13
Lead (Pb)			100.5		%		70-130	06-NOV-13

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2735393								
WG1782023-4 CRM		**VA-NRC-STSD1**						
Molybdenum (Mo)			105.1		%		70-130	06-NOV-13
Nickel (Ni)			101.0		%		70-130	06-NOV-13
Selenium (Se)			106.3		%		70-130	06-NOV-13
Silver (Ag)			104.8		%		70-130	06-NOV-13
Thallium (Tl)			98.0		%		70-130	06-NOV-13
Tin (Sn)			97.2		%		70-130	06-NOV-13
Vanadium (V)			105.3		%		70-130	06-NOV-13
Zinc (Zn)			104.9		%		70-130	06-NOV-13
WG1782023-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	06-NOV-13
Arsenic (As)			<0.050		mg/kg		0.05	06-NOV-13
Barium (Ba)			<0.50		mg/kg		0.5	06-NOV-13
Beryllium (Be)			<0.20		mg/kg		0.2	06-NOV-13
Cadmium (Cd)			<0.050		mg/kg		0.05	06-NOV-13
Chromium (Cr)			<0.50		mg/kg		0.5	06-NOV-13
Cobalt (Co)			<0.10		mg/kg		0.1	06-NOV-13
Copper (Cu)			<0.50		mg/kg		0.5	06-NOV-13
Lead (Pb)			<0.50		mg/kg		0.5	06-NOV-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	06-NOV-13
Nickel (Ni)			<0.50		mg/kg		0.5	06-NOV-13
Selenium (Se)			<0.20		mg/kg		0.2	06-NOV-13
Silver (Ag)			<0.10		mg/kg		0.1	06-NOV-13
Thallium (Tl)			<0.050		mg/kg		0.05	06-NOV-13
Tin (Sn)			<2.0		mg/kg		2	06-NOV-13
Uranium (U)			<0.050		mg/kg		0.05	06-NOV-13
Vanadium (V)			<0.20		mg/kg		0.2	06-NOV-13
Zinc (Zn)			<1.0		mg/kg		1	06-NOV-13
Batch R2735442								
WG1782143-3 CRM		**VA-CANMET-TILL1**						
Antimony (Sb)			112.0		%		70-130	05-NOV-13
Arsenic (As)			108.6		%		70-130	05-NOV-13
Barium (Ba)			102.0		%		70-130	05-NOV-13
Beryllium (Be)			0.53		mg/kg		0.34-0.74	05-NOV-13
Cadmium (Cd)			96.2		%		70-130	05-NOV-13
Chromium (Cr)			111.4		%		70-130	05-NOV-13

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2735442								
WG1782143-3 CRM		**VA-CANMET-TILL1**						
Cobalt (Co)			104.2		%		70-130	05-NOV-13
Copper (Cu)			99.4		%		70-130	05-NOV-13
Lead (Pb)			95.7		%		70-130	05-NOV-13
Molybdenum (Mo)			0.73		mg/kg		0.24-1.24	05-NOV-13
Nickel (Ni)			107.6		%		70-130	05-NOV-13
Selenium (Se)			0.34		mg/kg		0.12-0.52	05-NOV-13
Silver (Ag)			0.23		mg/kg		0.12-0.32	05-NOV-13
Thallium (Tl)			0.130		mg/kg		0.075-0.175	05-NOV-13
Tin (Sn)			1.1		mg/kg		0-3	05-NOV-13
Uranium (U)			115.4		%		70-130	05-NOV-13
Vanadium (V)			112.0		%		70-130	05-NOV-13
Zinc (Zn)			103.1		%		70-130	05-NOV-13
WG1782143-4 CRM		**VA-NRC-STSD1**						
Antimony (Sb)			102.9		%		70-130	05-NOV-13
Arsenic (As)			100.6		%		70-130	05-NOV-13
Barium (Ba)			105.0		%		70-130	05-NOV-13
Beryllium (Be)			100.3		%		70-130	05-NOV-13
Cadmium (Cd)			96.6		%		70-130	05-NOV-13
Chromium (Cr)			104.1		%		70-130	05-NOV-13
Cobalt (Co)			101.8		%		70-130	05-NOV-13
Copper (Cu)			101.2		%		70-130	05-NOV-13
Lead (Pb)			100.4		%		70-130	05-NOV-13
Molybdenum (Mo)			104.6		%		70-130	05-NOV-13
Nickel (Ni)			102.4		%		70-130	05-NOV-13
Selenium (Se)			103.3		%		70-130	05-NOV-13
Silver (Ag)			99.5		%		70-130	05-NOV-13
Thallium (Tl)			102.7		%		70-130	05-NOV-13
Tin (Sn)			102.3		%		70-130	05-NOV-13
Vanadium (V)			105.9		%		70-130	05-NOV-13
Zinc (Zn)			100.0		%		70-130	05-NOV-13
WG1782023-2 DUP		**L1386542-33**						
Antimony (Sb)		1.00	1.08		mg/kg	7.4	30	05-NOV-13
Arsenic (As)		6.04	6.49		mg/kg	7.1	30	05-NOV-13
Barium (Ba)		132	135		mg/kg	2.7	40	05-NOV-13
Beryllium (Be)		0.28	0.25		mg/kg	14	30	05-NOV-13

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2735442								
WG1782023-2 DUP		**L1386542-33**						
Cadmium (Cd)		1.11	0.941		mg/kg	17	30	05-NOV-13
Chromium (Cr)		18.5	16.2		mg/kg	13	30	05-NOV-13
Cobalt (Co)		8.76	8.50		mg/kg	2.9	30	05-NOV-13
Copper (Cu)		26.6	37.4	DUP-H	mg/kg	34	30	05-NOV-13
Lead (Pb)		76.0	39.8	DUP-H	mg/kg	63	40	05-NOV-13
Molybdenum (Mo)		0.72	0.60		mg/kg	19	40	05-NOV-13
Nickel (Ni)		72.0	63.4		mg/kg	13	30	05-NOV-13
Selenium (Se)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	05-NOV-13
Silver (Ag)		0.14	<0.10	RPD-NA	mg/kg	N/A	40	05-NOV-13
Thallium (Tl)		<0.050	<0.050	RPD-NA	mg/kg	N/A	30	05-NOV-13
Tin (Sn)		14.8	13.5		mg/kg	9.7	40	05-NOV-13
Uranium (U)		0.450	0.445		mg/kg	1.2	30	05-NOV-13
Vanadium (V)		10.0	9.54		mg/kg	4.9	30	05-NOV-13
Zinc (Zn)		251	403	DUP-H	mg/kg	47	30	05-NOV-13
WG1782143-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	05-NOV-13
Arsenic (As)			<0.050		mg/kg		0.05	05-NOV-13
Barium (Ba)			<0.50		mg/kg		0.5	05-NOV-13
Beryllium (Be)			<0.20		mg/kg		0.2	05-NOV-13
Cadmium (Cd)			<0.050		mg/kg		0.05	05-NOV-13
Chromium (Cr)			<0.50		mg/kg		0.5	05-NOV-13
Cobalt (Co)			<0.10		mg/kg		0.1	05-NOV-13
Copper (Cu)			<0.50		mg/kg		0.5	05-NOV-13
Lead (Pb)			<0.50		mg/kg		0.5	05-NOV-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	05-NOV-13
Nickel (Ni)			<0.50		mg/kg		0.5	05-NOV-13
Selenium (Se)			<0.20		mg/kg		0.2	05-NOV-13
Silver (Ag)			<0.10		mg/kg		0.1	05-NOV-13
Thallium (Tl)			<0.050		mg/kg		0.05	05-NOV-13
Tin (Sn)			<2.0		mg/kg		2	05-NOV-13
Uranium (U)			<0.050		mg/kg		0.05	05-NOV-13
Vanadium (V)			<0.20		mg/kg		0.2	05-NOV-13
Zinc (Zn)			<1.0		mg/kg		1	05-NOV-13

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Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA		**Soil**							
Batch	**R2753878**								
WG1797707-4	**CRM**		**VA-CANMET-TILL1**						
Cadmium (Cd)				87.7		%		70-130	02-DEC-13
Lead (Pb)				87.8		%		70-130	02-DEC-13
Nickel (Ni)				101.1		%		70-130	02-DEC-13
Tin (Sn)				1.0		mg/kg		0-3	02-DEC-13
Zinc (Zn)				98.2		%		70-130	02-DEC-13
WG1797707-5	**CRM**		**VA-NRC-STSD1**						
Cadmium (Cd)				95.7		%		70-130	02-DEC-13
Lead (Pb)				99.1		%		70-130	02-DEC-13
Nickel (Ni)				104.1		%		70-130	02-DEC-13
Tin (Sn)				99.9		%		70-130	02-DEC-13
Zinc (Zn)				101.6		%		70-130	02-DEC-13
WG1797707-2	**MB**								
Cadmium (Cd)				<0.050		mg/kg		0.05	02-DEC-13
Lead (Pb)				<0.50		mg/kg		0.5	02-DEC-13
Nickel (Ni)				<0.50		mg/kg		0.5	02-DEC-13
Tin (Sn)				<2.0		mg/kg		2	02-DEC-13
Zinc (Zn)				<1.0		mg/kg		1	02-DEC-13
Batch	**R2754508**								
WG1797707-1	**MB**								
Cadmium (Cd)				<0.050		mg/kg		0.05	03-DEC-13
Lead (Pb)				<0.50		mg/kg		0.5	03-DEC-13
Nickel (Ni)				<0.50		mg/kg		0.5	03-DEC-13
Tin (Sn)				<2.0		mg/kg		2	03-DEC-13
Zinc (Zn)				<1.0		mg/kg		1	03-DEC-13
MOISTURE-VA		**Soil**							
Batch	**R2733244**								
WG1781952-3	**DUP**		**L1386542-1**						
Moisture			1.90	1.95		%	2.6	20	04-NOV-13
WG1781952-4	**DUP**		**L1386542-11**						
Moisture			1.68	1.81		%	7.1	20	04-NOV-13
WG1781952-2	**LCS**								
Moisture				99.9		%		70-130	04-NOV-13
WG1781952-1	**MB**								
Moisture				<0.25		%		0.25	04-NOV-13

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Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-VA		**Soil**							
Batch	**R2733266**								
WG1782144-3	**DUP**		**L1386542-26**						
Moisture			6.66	5.69		%	16	20	04-NOV-13
WG1782144-2	**LCS**								
Moisture				100.1		%		70-130	04-NOV-13
WG1782144-1	**MB**								
Moisture				<0.25		%		0.25	04-NOV-13
Batch	**R2733268**								
WG1782024-2	**LCS**								
Moisture				100.4		%		70-130	04-NOV-13
WG1782024-1	**MB**								
Moisture				<0.25		%		0.25	04-NOV-13
Batch	**R2736582**								
WG1784379-2	**LCS**								
Moisture				99.2		%		70-130	07-NOV-13
WG1784379-1	**MB**								
Moisture				<0.25		%		0.25	07-NOV-13
OGG-F4G-TUMB-SG-VA		**Soil**							
Batch	**R2741514**								
WG1787474-2	**IRM**		**ALS PHC2 RM**						
F4G-SG				107.8		%		70-130	07-NOV-13
WG1787474-4	**IRM**		**ALS PHC2 RM**						
F4G-SG				91.8		%		70-130	07-NOV-13
WG1787474-1	**MB**								
F4G-SG				<500		mg/kg		500	07-NOV-13
WG1787474-3	**MB**								
F4G-SG				<500		mg/kg		500	07-NOV-13
PAH-TMB-H/A-MS-VA		**Soil**							
Batch	**R2736555**								
WG1782141-4	**IRM**		**ALS PAH1 RM**						
Acenaphthene				67.6		%		60-130	07-NOV-13
Acenaphthylene				118.8		%		60-130	07-NOV-13
Anthracene				94.1		%		60-130	07-NOV-13
Benz(a)anthracene				105.2		%		60-130	07-NOV-13
Benzo(a)pyrene				98.7		%		60-130	07-NOV-13
Benzo(b)fluoranthene				113.5		%		60-130	07-NOV-13
Benzo(g,h,i)perylene				98.3		%		60-130	07-NOV-13
Benzo(k)fluoranthene				103.8		%		60-130	07-NOV-13

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-VA	**Soil**							
Batch R2736555								
WG1782141-4 IRM		**ALS PAH1 RM**						
Chrysene			109.5		%		60-130	07-NOV-13
Dibenz(a,h)anthracene			116.2		%		60-130	07-NOV-13
Fluoranthene			111.2		%		60-130	07-NOV-13
Fluorene			71.7		%		60-130	07-NOV-13
Indeno(1,2,3-c,d)pyrene			100.0		%		60-130	07-NOV-13
2-Methylnaphthalene			91.3		%		60-130	07-NOV-13
Naphthalene			87.5		%		50-130	07-NOV-13
Phenanthrene			107.1		%		60-130	07-NOV-13
Pyrene			109.0		%		60-130	07-NOV-13
WG1782141-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	07-NOV-13
Acenaphthylene			<0.0050		mg/kg		0.005	07-NOV-13
Anthracene			<0.0040		mg/kg		0.004	07-NOV-13
Benz(a)anthracene			<0.010		mg/kg		0.01	07-NOV-13
Benzo(a)pyrene			<0.010		mg/kg		0.01	07-NOV-13
Benzo(b)fluoranthene			<0.010		mg/kg		0.01	07-NOV-13
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	07-NOV-13
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	07-NOV-13
Chrysene			<0.010		mg/kg		0.01	07-NOV-13
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	07-NOV-13
Fluoranthene			<0.010		mg/kg		0.01	07-NOV-13
Fluorene			<0.010		mg/kg		0.01	07-NOV-13
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	07-NOV-13
2-Methylnaphthalene			<0.010		mg/kg		0.01	07-NOV-13
Naphthalene			<0.010		mg/kg		0.01	07-NOV-13
Phenanthrene			<0.010		mg/kg		0.01	07-NOV-13
Pyrene			<0.010		mg/kg		0.01	07-NOV-13
Surrogate: Naphthalene d8			76.9		%		50-130	07-NOV-13
Surrogate: Acenaphthene d10			78.5		%		60-130	07-NOV-13
Surrogate: Phenanthrene d10			75.8		%		60-130	07-NOV-13
Surrogate: Chrysene d12			86.6		%		60-130	07-NOV-13
Batch R2737088								
WG1784467-4 IRM		**ALS PAH1 RM**						
Acenaphthene			79.2		%		60-130	08-NOV-13
Acenaphthylene			118.2		%		60-130	08-NOV-13

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-VA	**Soil**							
Batch R2737088								
WG1784467-4 IRM		**ALS PAH1 RM**						
Anthracene			99.7		%		60-130	08-NOV-13
Benz(a)anthracene			119.8		%		60-130	08-NOV-13
Benzo(a)pyrene			98.7		%		60-130	08-NOV-13
Benzo(b)fluoranthene			111.0		%		60-130	08-NOV-13
Benzo(g,h,i)perylene			100.1		%		60-130	08-NOV-13
Benzo(k)fluoranthene			107.7		%		60-130	08-NOV-13
Chrysene			121.3		%		60-130	08-NOV-13
Dibenz(a,h)anthracene			113.9		%		60-130	08-NOV-13
Fluoranthene			115.6		%		60-130	08-NOV-13
Fluorene			78.7		%		60-130	08-NOV-13
Indeno(1,2,3-c,d)pyrene			95.9		%		60-130	08-NOV-13
2-Methylnaphthalene			94.3		%		60-130	08-NOV-13
Naphthalene			91.3		%		50-130	08-NOV-13
Phenanthrene			113.8		%		60-130	08-NOV-13
Pyrene			115.6		%		60-130	08-NOV-13
WG1784467-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	08-NOV-13
Acenaphthylene			<0.0050		mg/kg		0.005	08-NOV-13
Anthracene			<0.0040		mg/kg		0.004	08-NOV-13
Benz(a)anthracene			<0.010		mg/kg		0.01	08-NOV-13
Benzo(a)pyrene			<0.010		mg/kg		0.01	08-NOV-13
Benzo(b)fluoranthene			<0.010		mg/kg		0.01	08-NOV-13
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	08-NOV-13
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	08-NOV-13
Chrysene			<0.010		mg/kg		0.01	08-NOV-13
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	08-NOV-13
Fluoranthene			<0.010		mg/kg		0.01	08-NOV-13
Fluorene			<0.010		mg/kg		0.01	08-NOV-13
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	08-NOV-13
2-Methylnaphthalene			<0.010		mg/kg		0.01	08-NOV-13
Naphthalene			<0.010		mg/kg		0.01	08-NOV-13
Phenanthrene			<0.010		mg/kg		0.01	08-NOV-13
Pyrene			<0.010		mg/kg		0.01	08-NOV-13
Surrogate: Naphthalene d8			93.7		%		50-130	08-NOV-13

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-VA	**Soil**							
Batch R2737088								
WG1784467-1 MB								
Surrogate: Acenaphthene d10			94.4		%		60-130	08-NOV-13
Surrogate: Phenanthrene d10			95.1		%		60-130	08-NOV-13
Surrogate: Chrysene d12			108.5		%		60-130	08-NOV-13
PH-1:2-VA	**Soil**							
Batch R2734147								
WG1781851-2 DUP		**L1386542-1**						
pH (1:2 soil:water)		8.84	8.95	J	pH	0.11	0.3	05-NOV-13
Batch R2734371								
WG1782023-2 DUP		**L1386542-33**						
pH (1:2 soil:water)		8.25	8.26	J	pH	0.01	0.3	05-NOV-13
PREP-MOISTURE-ED	**Soil**							
Batch R2734339								
WG1782592-3 DUP		**L1386542-20**						
% Moisture		2.73	2.66		%	2.8	20	05-NOV-13
WG1782592-2 LCS								
% Moisture			99.8		%		90-110	05-NOV-13
WG1782592-1 MB								
% Moisture			<0.10		%		0.1	05-NOV-13
PSA-MUST-SK	**Soil**							
Batch R2737012								
WG1782852-2 DUP		**L1386542-20**						
MUST PSA % > 75um		9.87	11.0	J	%	1.16	5	06-NOV-13
VOC7-L-HSMS-VA	**Soil**							
Batch R2731676								
WG1781958-2 LCS								
Benzene			98.6		%		70-130	07-NOV-13
Ethylbenzene			101.9		%		70-130	07-NOV-13
Methyl t-butyl ether (MTBE)			98.8		%		70-130	07-NOV-13
Styrene			100.2		%		70-130	07-NOV-13
Toluene			101.1		%		70-130	07-NOV-13
meta- & para-Xylene			104.4		%		70-130	07-NOV-13
ortho-Xylene			105.8		%		70-130	07-NOV-13
WG1782145-2 LCS								

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC7-L-HSMS-VA	**Soil**							
Batch R2731676								
WG1782145-2 LCS								
Benzene			94.5		%		70-130	06-NOV-13
Ethylbenzene			102.3		%		70-130	06-NOV-13
Methyl t-butyl ether (MTBE)			94.6		%		70-130	06-NOV-13
Styrene			91.9		%		70-130	06-NOV-13
Toluene			100.9		%		70-130	06-NOV-13
meta- & para-Xylene			104.9		%		70-130	06-NOV-13
ortho-Xylene			102.5		%		70-130	06-NOV-13
WG1782146-2 LCS								
Benzene			98.3		%		70-130	06-NOV-13
Ethylbenzene			104.0		%		70-130	06-NOV-13
Methyl t-butyl ether (MTBE)			96.6		%		70-130	06-NOV-13
Styrene			97.4		%		70-130	06-NOV-13
Toluene			100.7		%		70-130	06-NOV-13
meta- & para-Xylene			106.0		%		70-130	06-NOV-13
ortho-Xylene			103.9		%		70-130	06-NOV-13
WG1782147-2 LCS								
Benzene			96.8		%		70-130	08-NOV-13
Ethylbenzene			103.4		%		70-130	08-NOV-13
Methyl t-butyl ether (MTBE)			96.9		%		70-130	08-NOV-13
Styrene			101.0		%		70-130	08-NOV-13
Toluene			100.3		%		70-130	08-NOV-13
meta- & para-Xylene			104.5		%		70-130	08-NOV-13
ortho-Xylene			106.5		%		70-130	08-NOV-13
WG1781958-1 MB								
Benzene			<0.0050		mg/kg		0.005	07-NOV-13
Ethylbenzene			<0.015		mg/kg		0.015	07-NOV-13
Methyl t-butyl ether (MTBE)			<0.20		mg/kg		0.2	07-NOV-13
Styrene			<0.050		mg/kg		0.05	07-NOV-13
Toluene			<0.050		mg/kg		0.05	07-NOV-13
meta- & para-Xylene			<0.050		mg/kg		0.05	07-NOV-13
ortho-Xylene			<0.050		mg/kg		0.05	07-NOV-13
WG1782145-1 MB								
Benzene			<0.0050		mg/kg		0.005	06-NOV-13
Ethylbenzene			<0.015		mg/kg		0.015	06-NOV-13
Methyl t-butyl ether (MTBE)			<0.20		mg/kg		0.2	06-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC7-L-HSMS-VA	**Soil**							
Batch R2731676								
WG1782145-1 MB								
Styrene			<0.050		mg/kg		0.05	06-NOV-13
Toluene			<0.050		mg/kg		0.05	06-NOV-13
meta- & para-Xylene			<0.050		mg/kg		0.05	06-NOV-13
ortho-Xylene			<0.050		mg/kg		0.05	06-NOV-13
WG1782146-1 MB								
Benzene			<0.0050		mg/kg		0.005	06-NOV-13
Ethylbenzene			<0.015		mg/kg		0.015	06-NOV-13
Methyl t-butyl ether (MTBE)			<0.20		mg/kg		0.2	06-NOV-13
Styrene			<0.050		mg/kg		0.05	06-NOV-13
Toluene			<0.050		mg/kg		0.05	06-NOV-13
meta- & para-Xylene			<0.050		mg/kg		0.05	06-NOV-13
ortho-Xylene			<0.050		mg/kg		0.05	06-NOV-13
WG1782147-1 MB								
Benzene			<0.0050		mg/kg		0.005	08-NOV-13
Ethylbenzene			<0.015		mg/kg		0.015	08-NOV-13
Methyl t-butyl ether (MTBE)			<0.20		mg/kg		0.2	08-NOV-13
Styrene			<0.050		mg/kg		0.05	08-NOV-13
Toluene			<0.050		mg/kg		0.05	08-NOV-13
meta- & para-Xylene			<0.050		mg/kg		0.05	08-NOV-13
ortho-Xylene			<0.050		mg/kg		0.05	08-NOV-13
Batch R2734175								
WG1781958-3 DUP		**L1386542-20**						
Benzene		<0.0050	<0.0050	RPD-NA	mg/kg	N/A	40	06-NOV-13
Ethylbenzene		<0.015	<0.015	RPD-NA	mg/kg	N/A	40	06-NOV-13
Methyl t-butyl ether (MTBE)		<0.20	<0.20	RPD-NA	mg/kg	N/A	40	06-NOV-13
Styrene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	06-NOV-13
Toluene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	06-NOV-13
meta- & para-Xylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	06-NOV-13
ortho-Xylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	06-NOV-13
WG1781954-2 LCS								
Benzene			98.4		%		70-130	08-NOV-13
Ethylbenzene			89.4		%		70-130	08-NOV-13
Methyl t-butyl ether (MTBE)			98.8		%		70-130	08-NOV-13
Styrene			95.7		%		70-130	08-NOV-13
Toluene			95.5		%		70-130	08-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC7-L-HSMS-VA	**Soil**							
Batch R2734175								
WG1781954-2 LCS								
meta- & para-Xylene			89.8		%		70-130	08-NOV-13
ortho-Xylene			95.8		%		70-130	08-NOV-13
WG1781954-1 MB								
Benzene			<0.0050		mg/kg		0.005	08-NOV-13
Ethylbenzene			<0.015		mg/kg		0.015	08-NOV-13
Methyl t-butyl ether (MTBE)			<0.20		mg/kg		0.2	08-NOV-13
Styrene			<0.050		mg/kg		0.05	08-NOV-13
Toluene			<0.050		mg/kg		0.05	08-NOV-13
meta- & para-Xylene			<0.050		mg/kg		0.05	08-NOV-13
ortho-Xylene			<0.050		mg/kg		0.05	08-NOV-13
Batch R2734545								
WG1782146-3 DUP		**L1386542-31**						
Benzene		<0.0050	<0.0050	RPD-NA	mg/kg	N/A	40	07-NOV-13
Ethylbenzene		<0.015	<0.015	RPD-NA	mg/kg	N/A	40	07-NOV-13
Methyl t-butyl ether (MTBE)		<0.20	<0.20	RPD-NA	mg/kg	N/A	40	07-NOV-13
Styrene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	07-NOV-13
Toluene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	07-NOV-13
meta- & para-Xylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	07-NOV-13
ortho-Xylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	07-NOV-13

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Metals							
Mercury in Soil by CVAFS							
	40	30-OCT-13	29-NOV-13 00:07	28	30	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1386542 were received on 01-NOV-13 09:20.

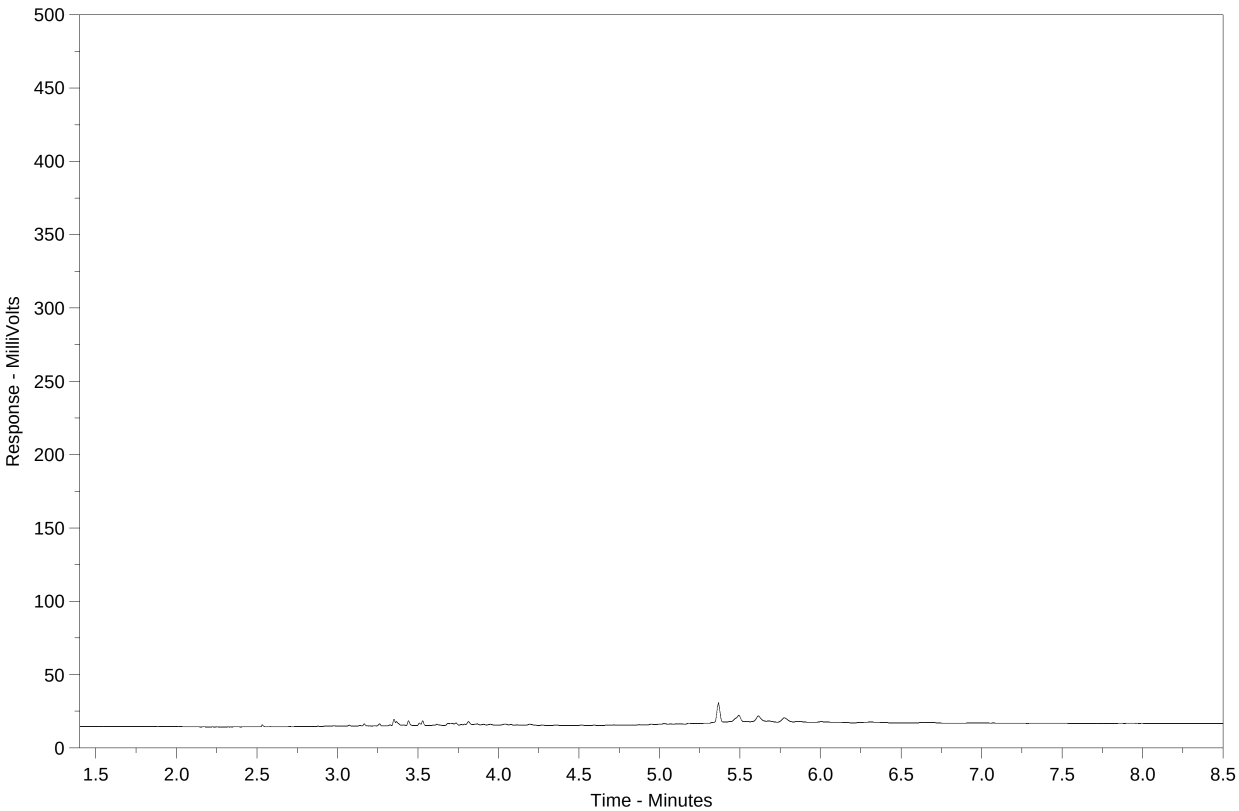
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-1
Client Sample ID: TP1-1



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

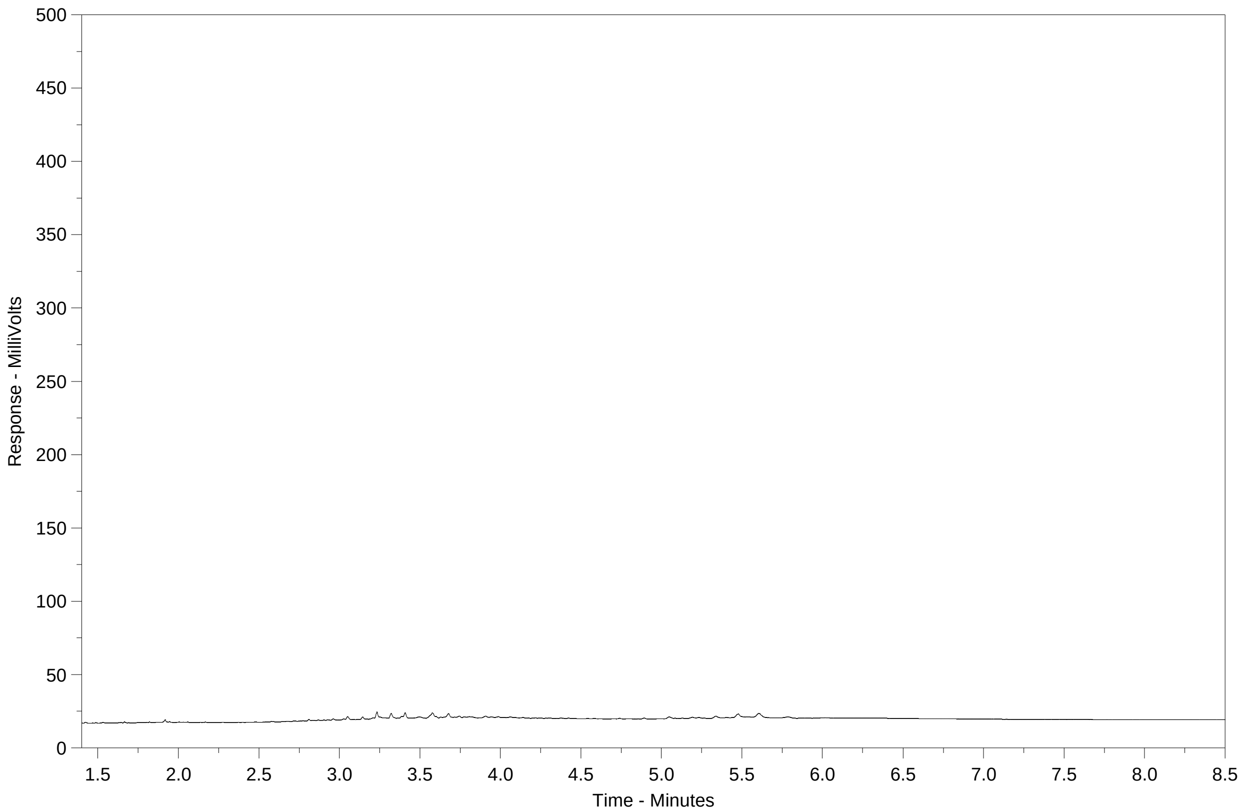
The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

ALS Sample ID: L1386542-C-2
Client Sample ID: TP1-2



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →   ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

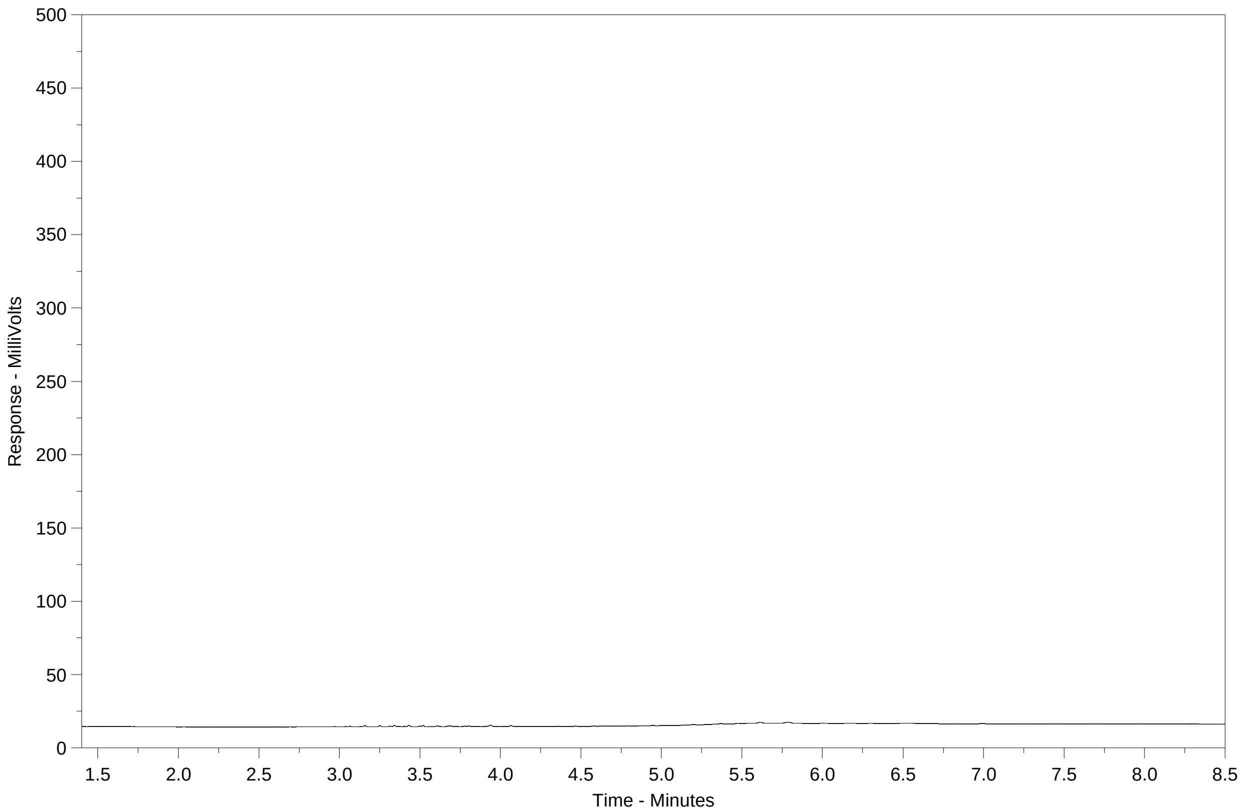
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-4
Client Sample ID: TP1-4



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

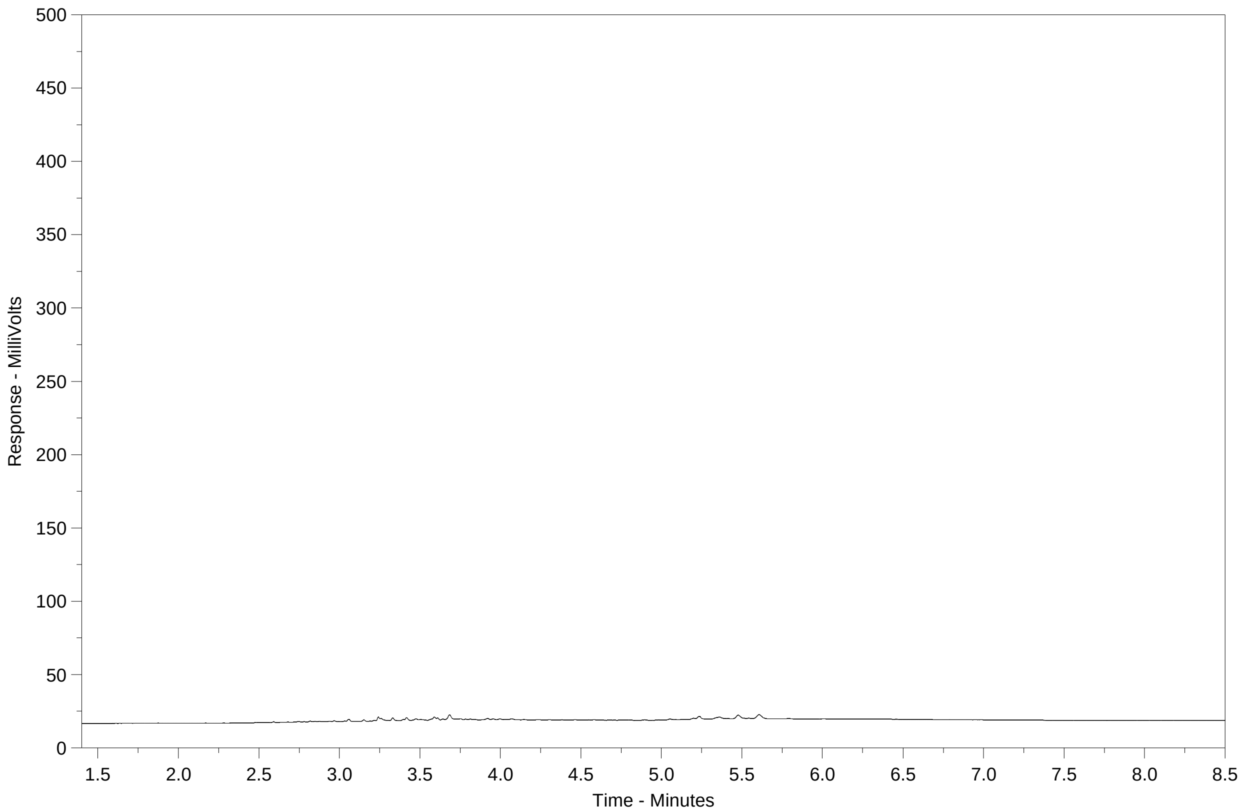
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-5
Client Sample ID: TP2-1



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

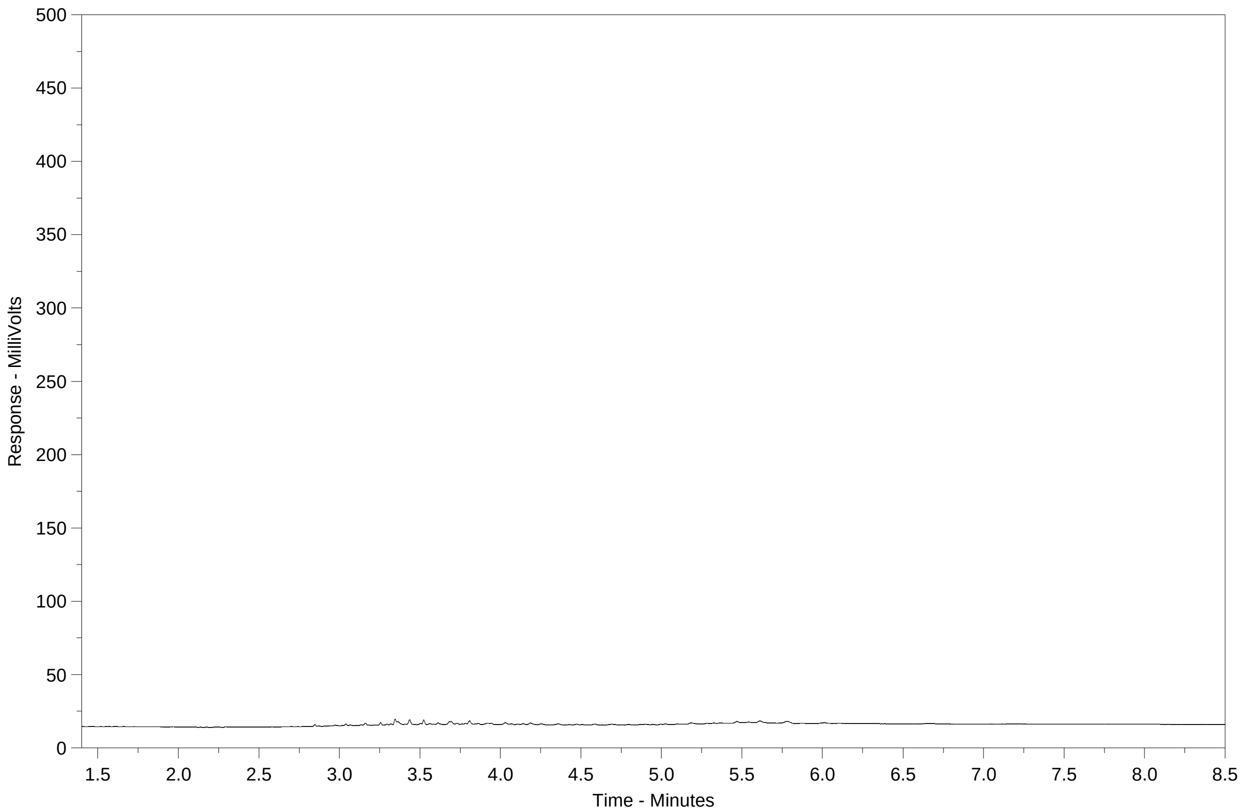
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-6
Client Sample ID: TP2-2



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

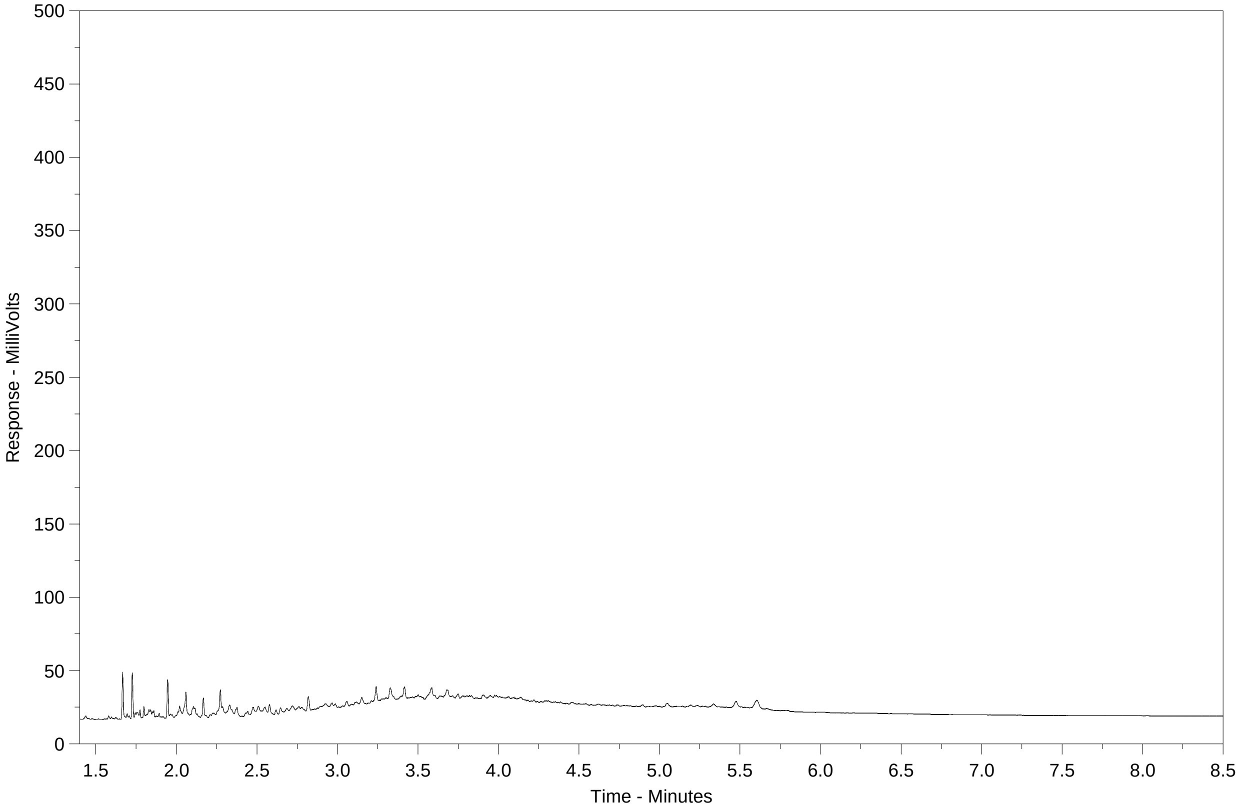
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-7
Client Sample ID: TP2-3



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

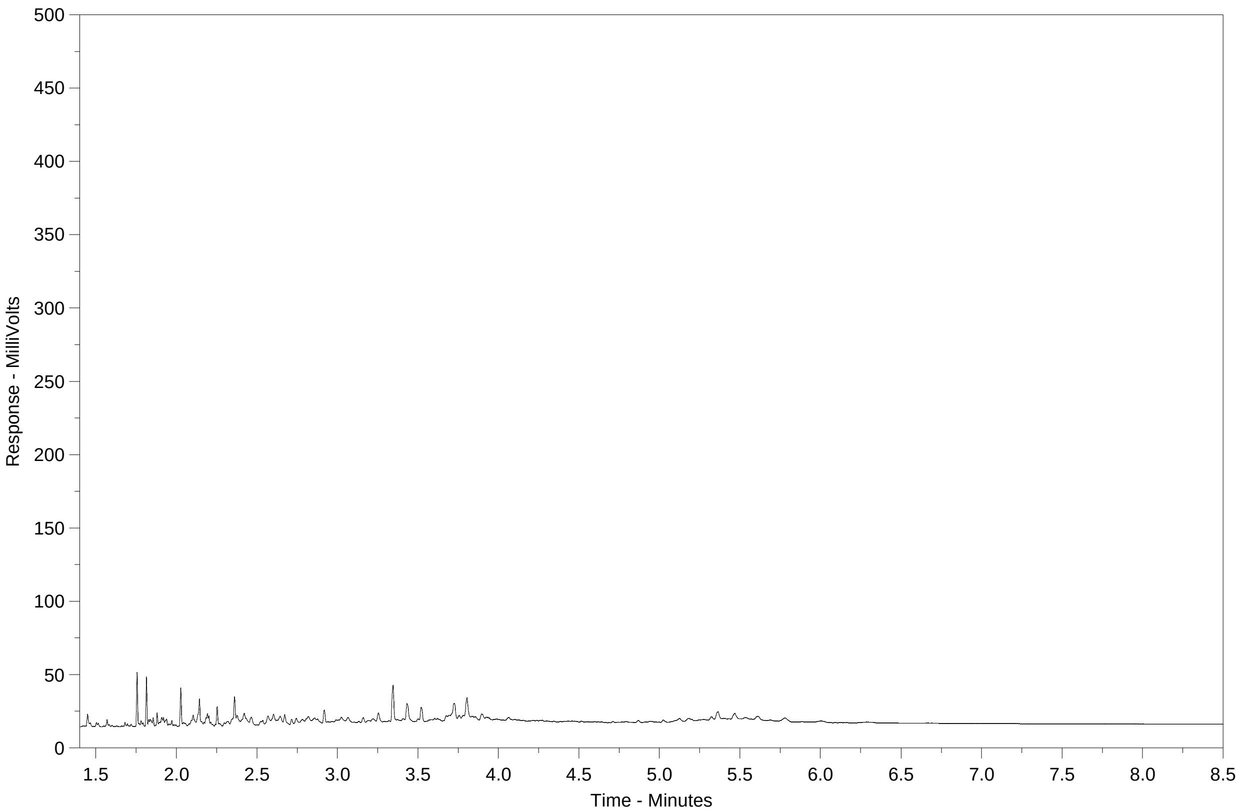
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-8
Client Sample ID: TP2-4



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

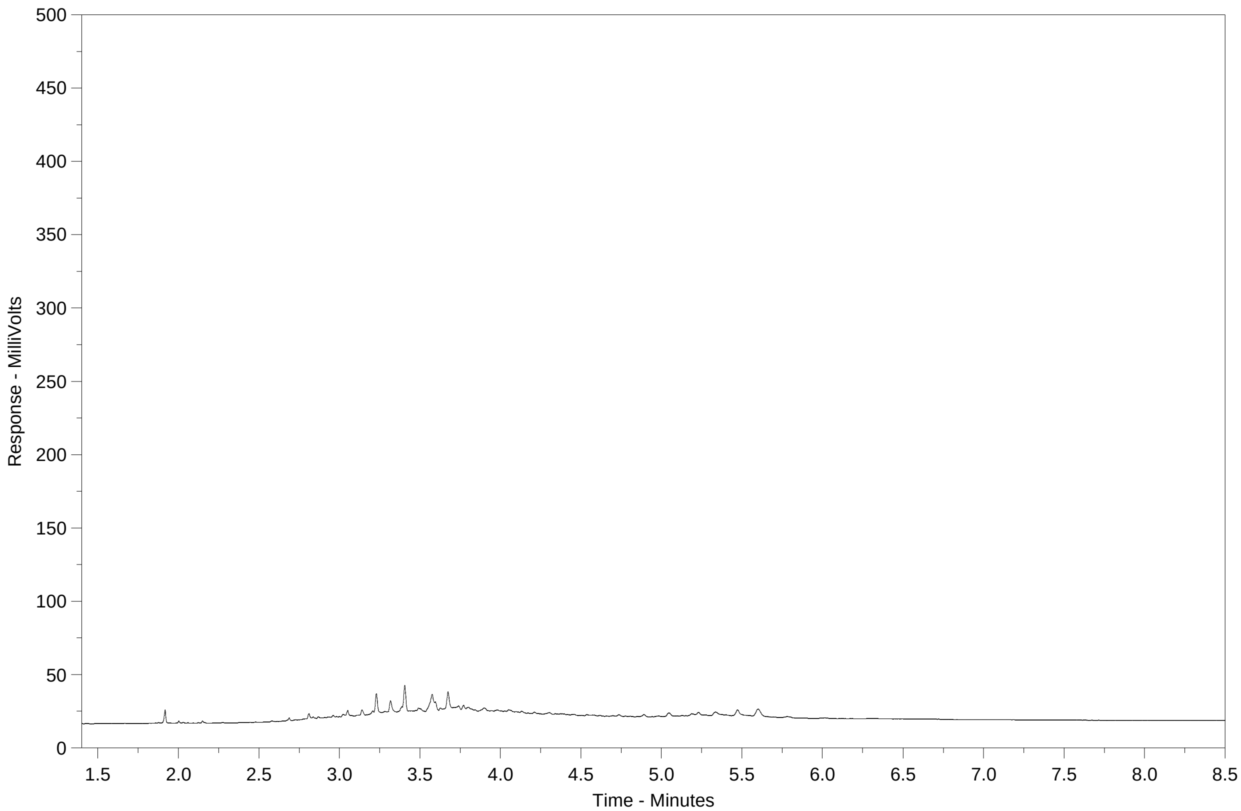
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-9
Client Sample ID: TP2-5



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →　　　　← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

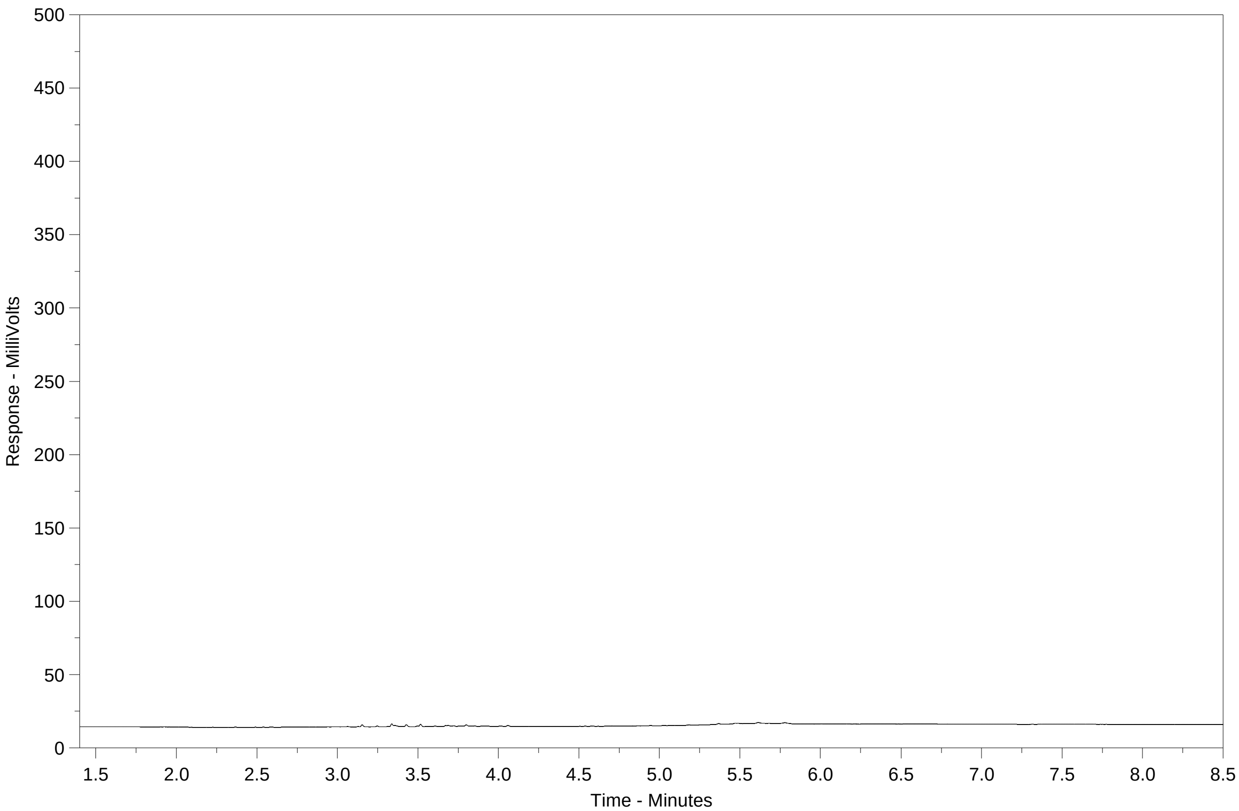
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-10
Client Sample ID: TP3-1



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

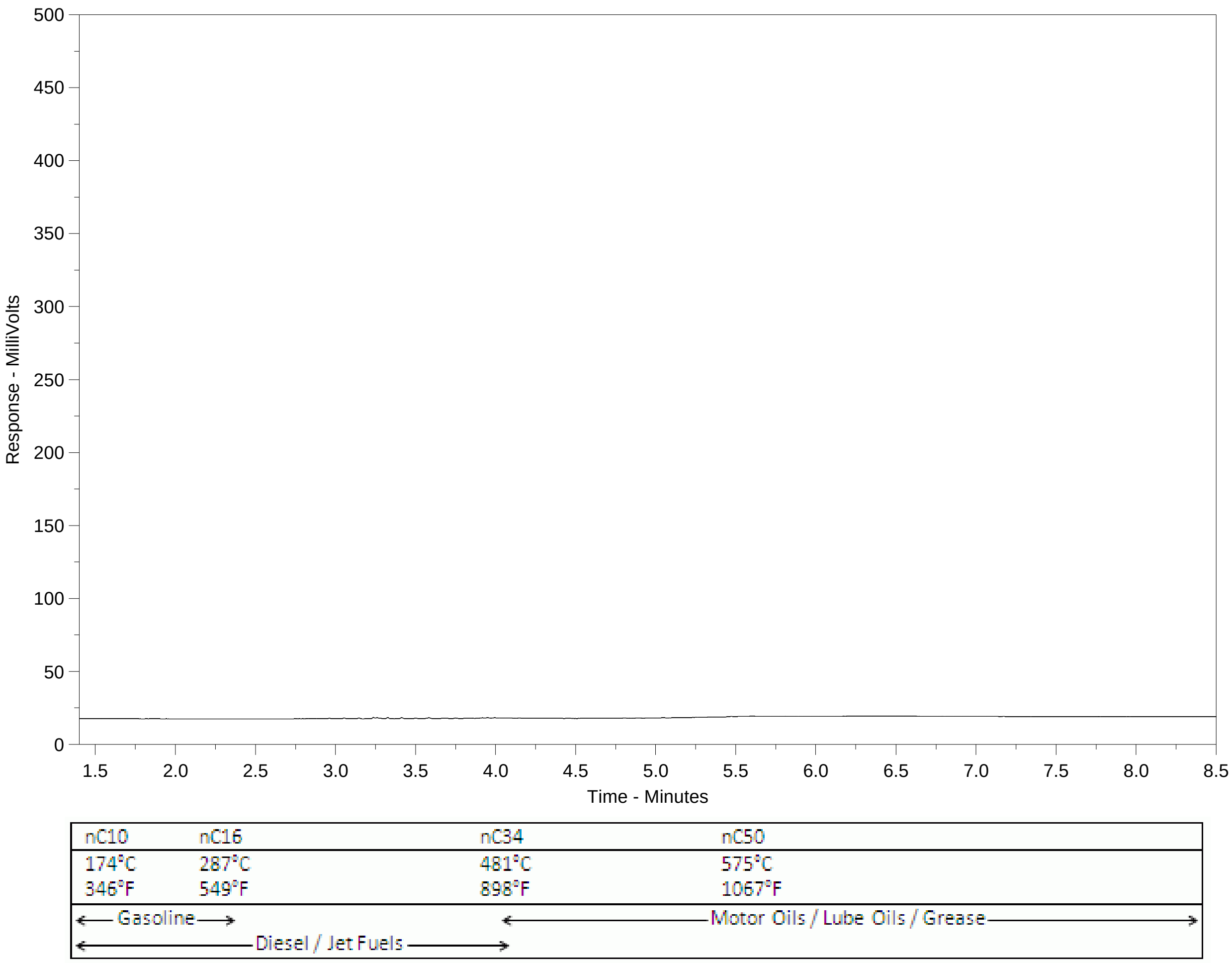
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: WG1781968-C-8#L1386542-C-10
Client Sample ID: TP3-1



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

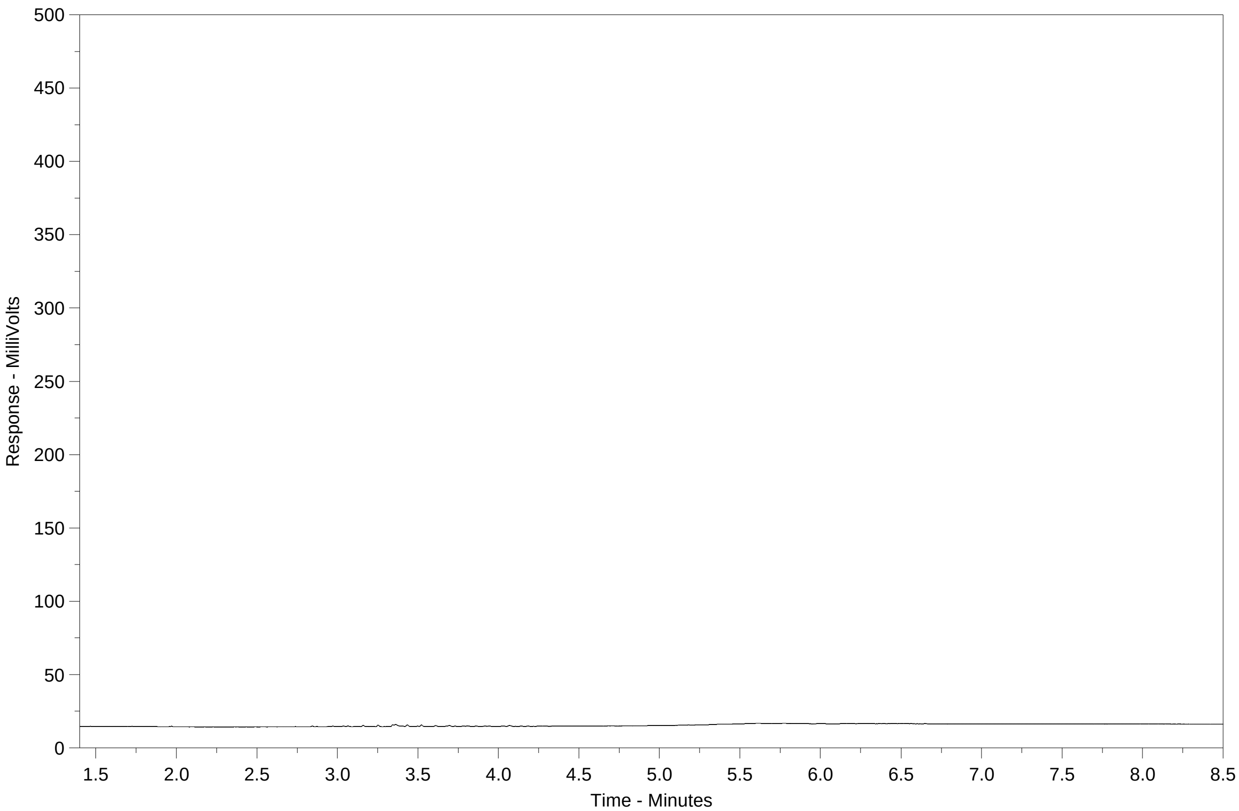
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-11
Client Sample ID: TP3-2



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

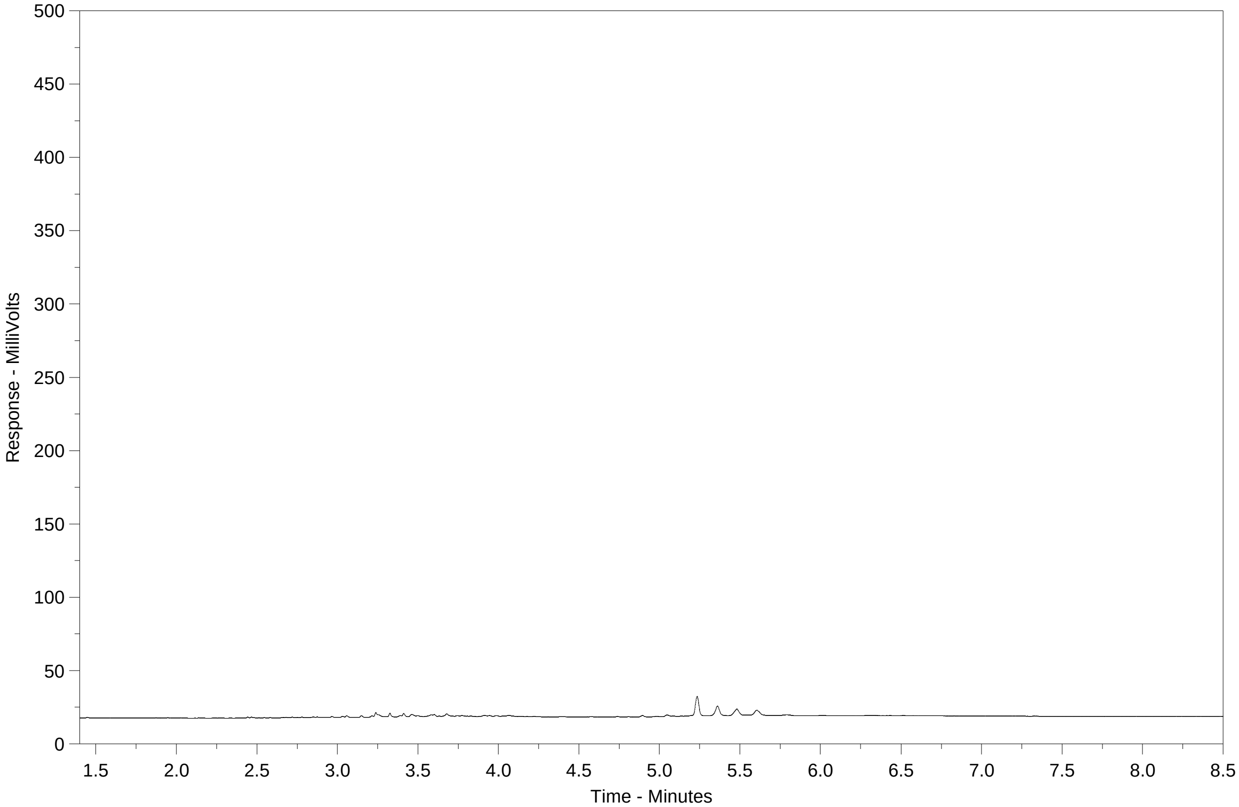
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-12
Client Sample ID: TP4-1



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline →　　← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

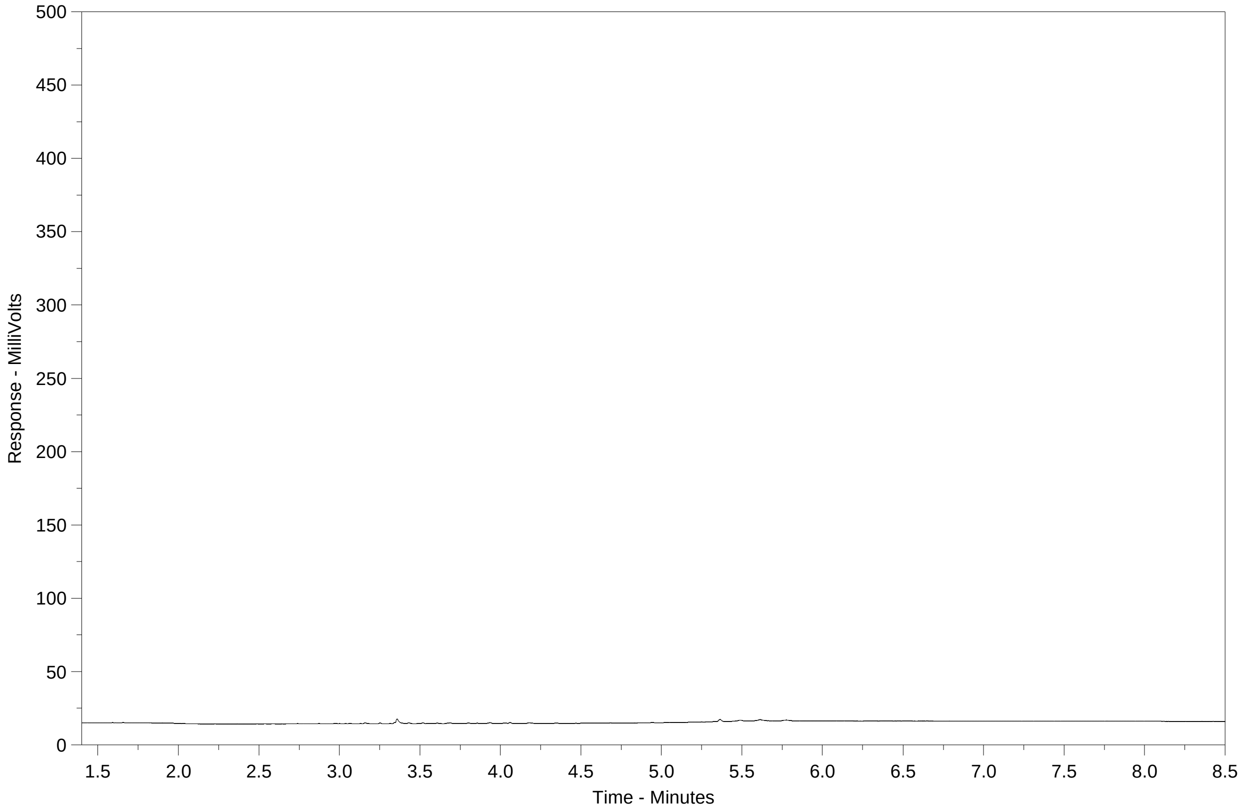
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-13
Client Sample ID: TP5-1



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

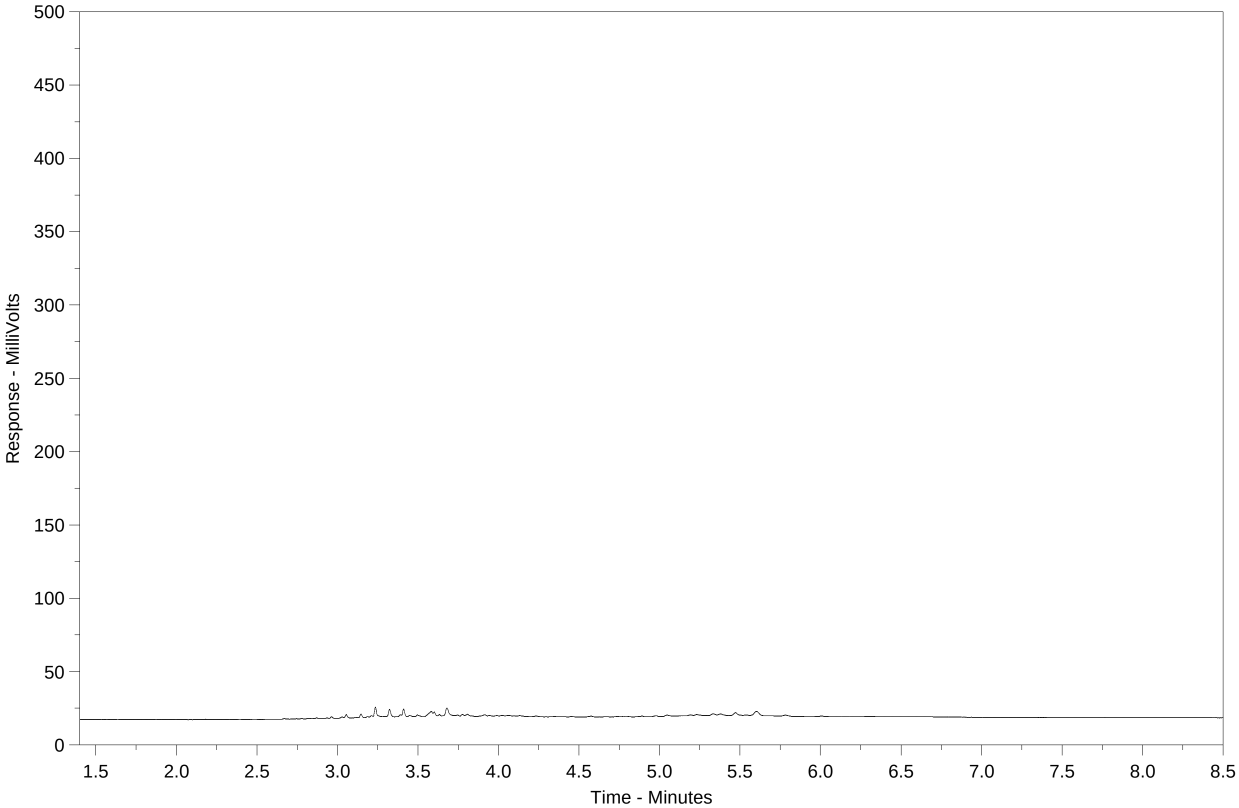
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-14
Client Sample ID: TP6-1



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →

← Diesel / Jet Fuels →

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

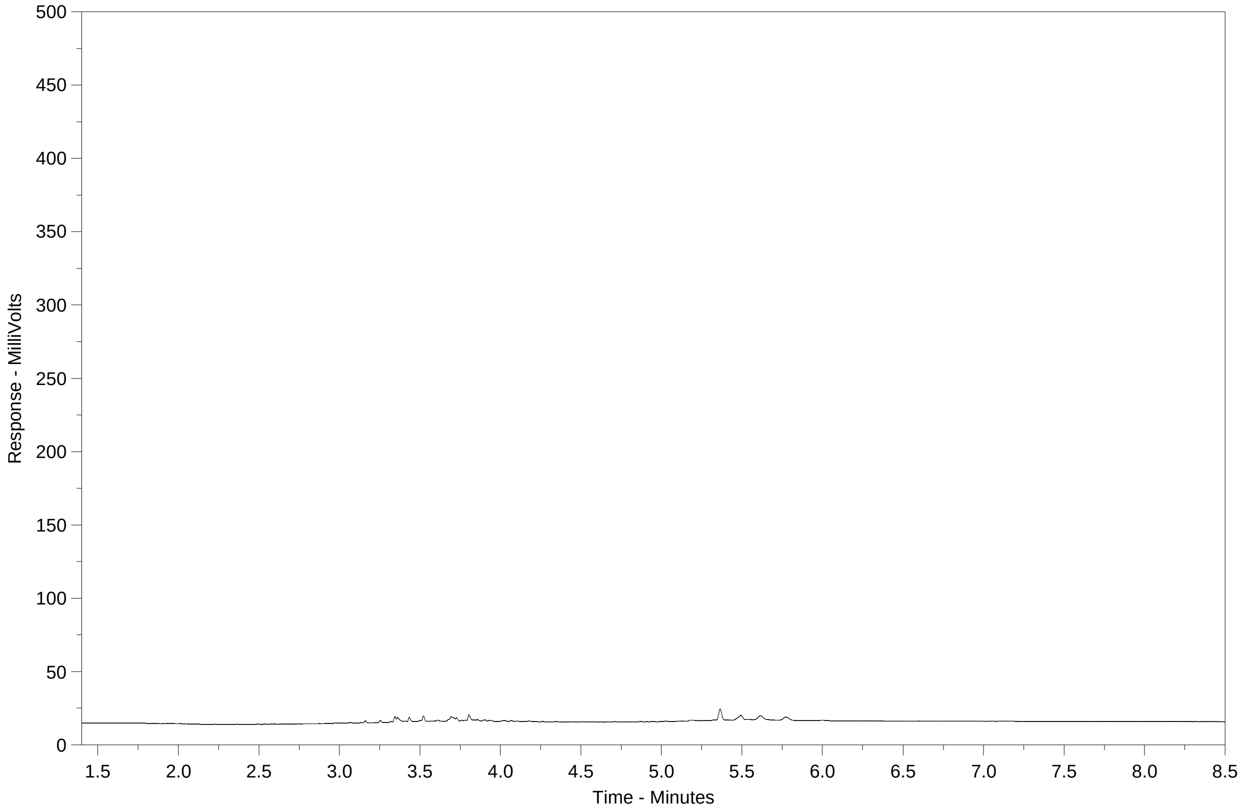
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-15
Client Sample ID: TP7-1



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

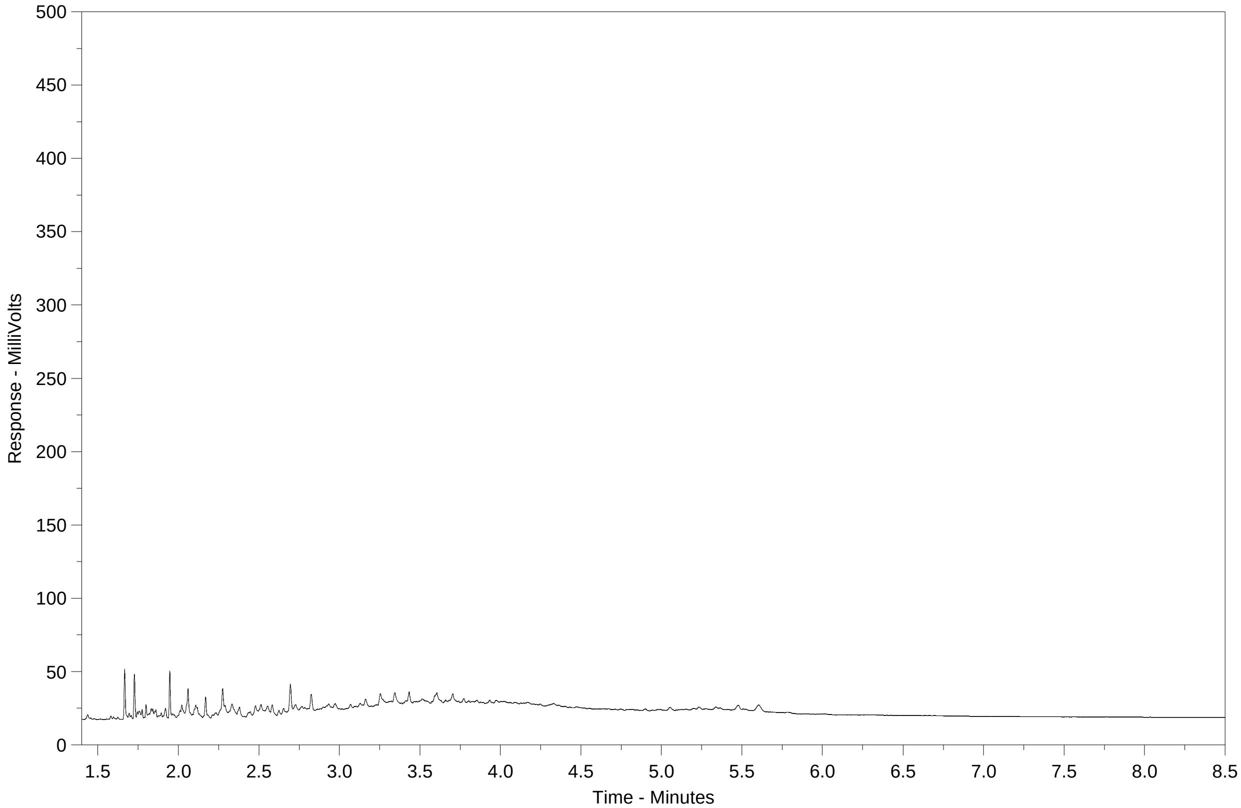
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-16
Client Sample ID: TP7-2



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

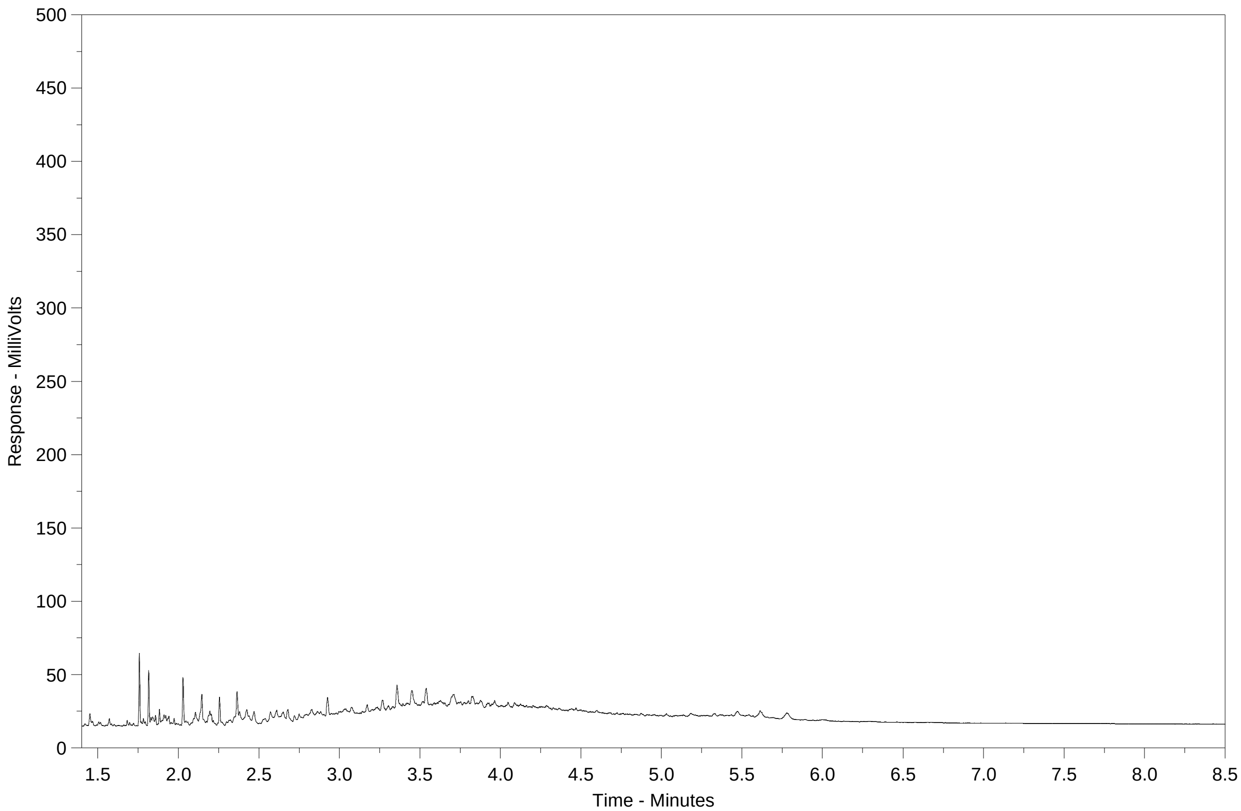
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-17
Client Sample ID: TP7-3



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

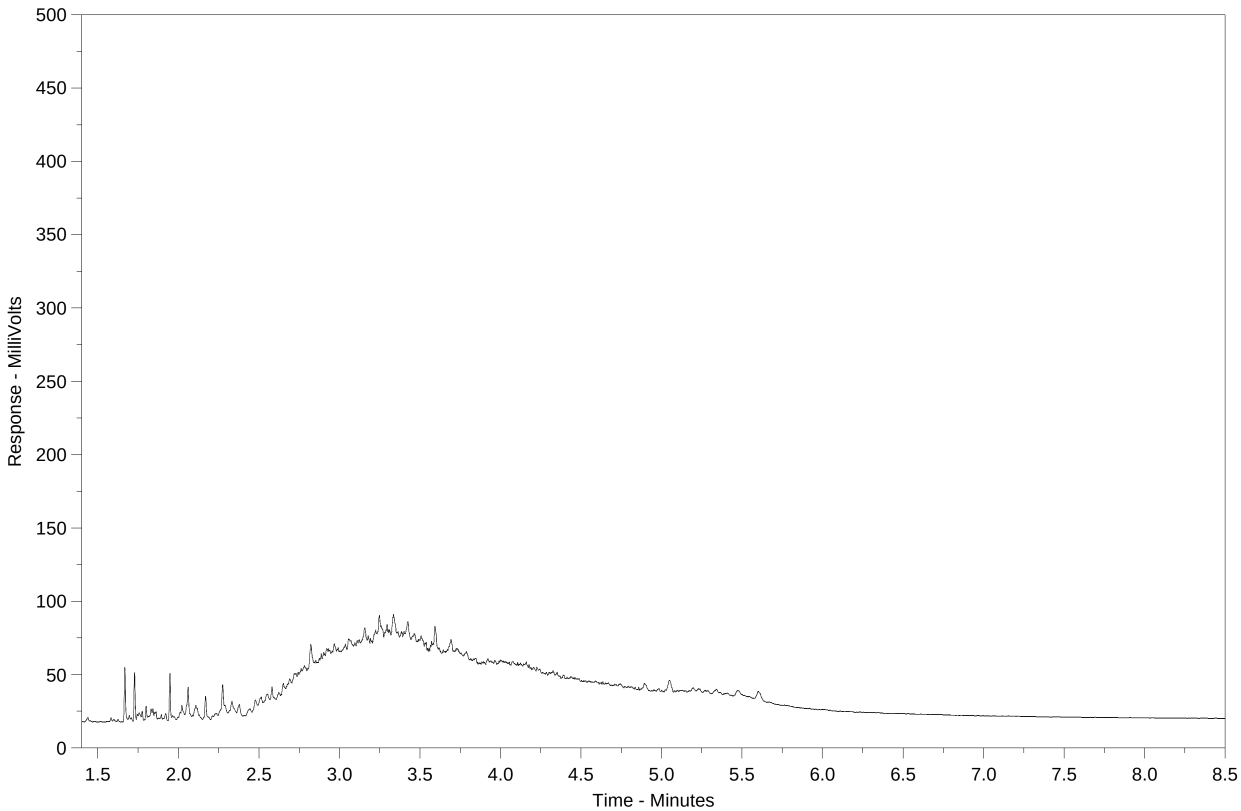
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-18
Client Sample ID: TP7-4



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

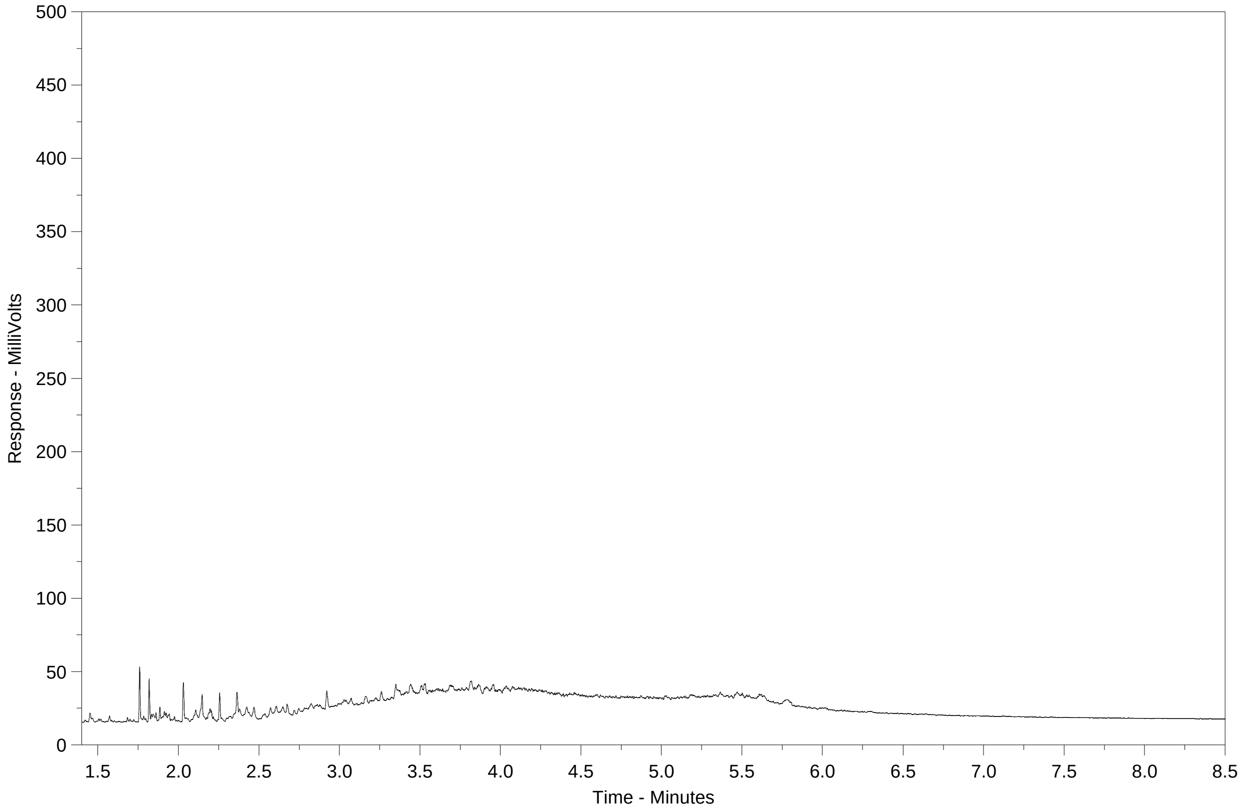
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-19
Client Sample ID: TP7-5



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

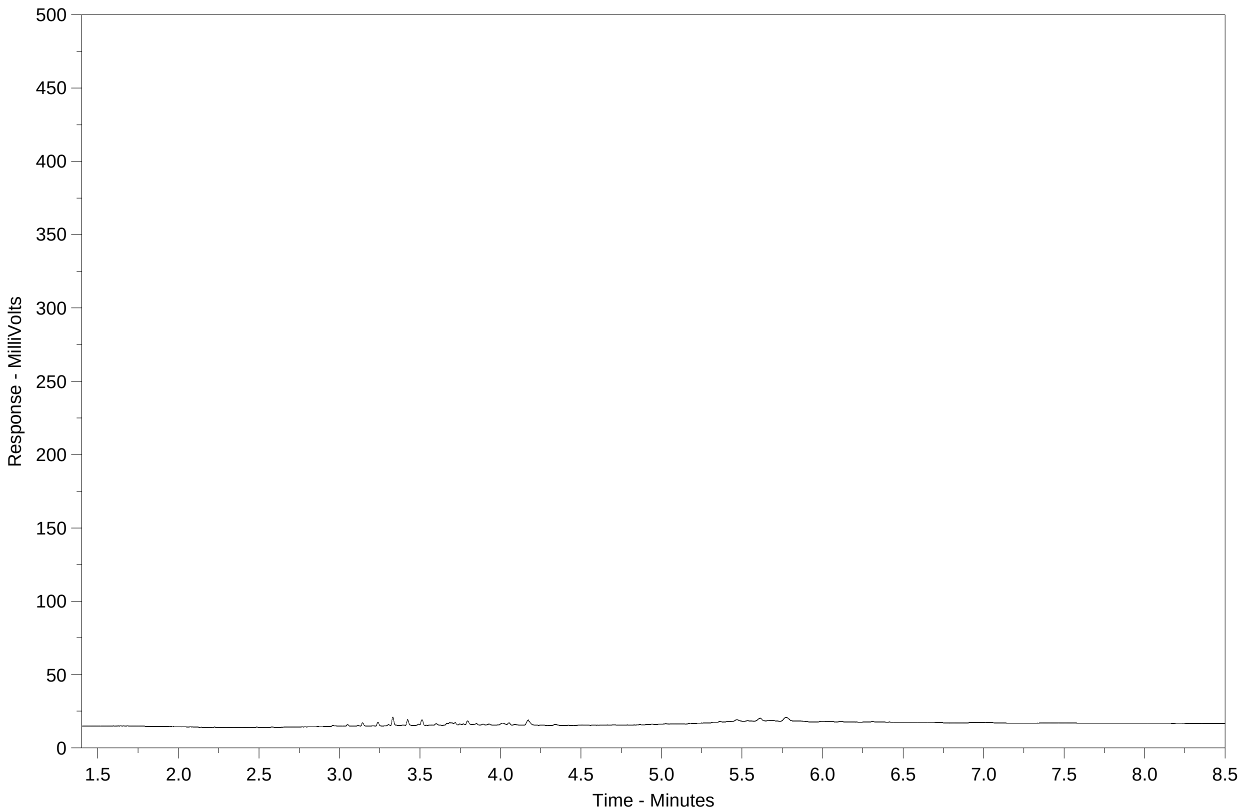
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-20
Client Sample ID: TP8-1



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

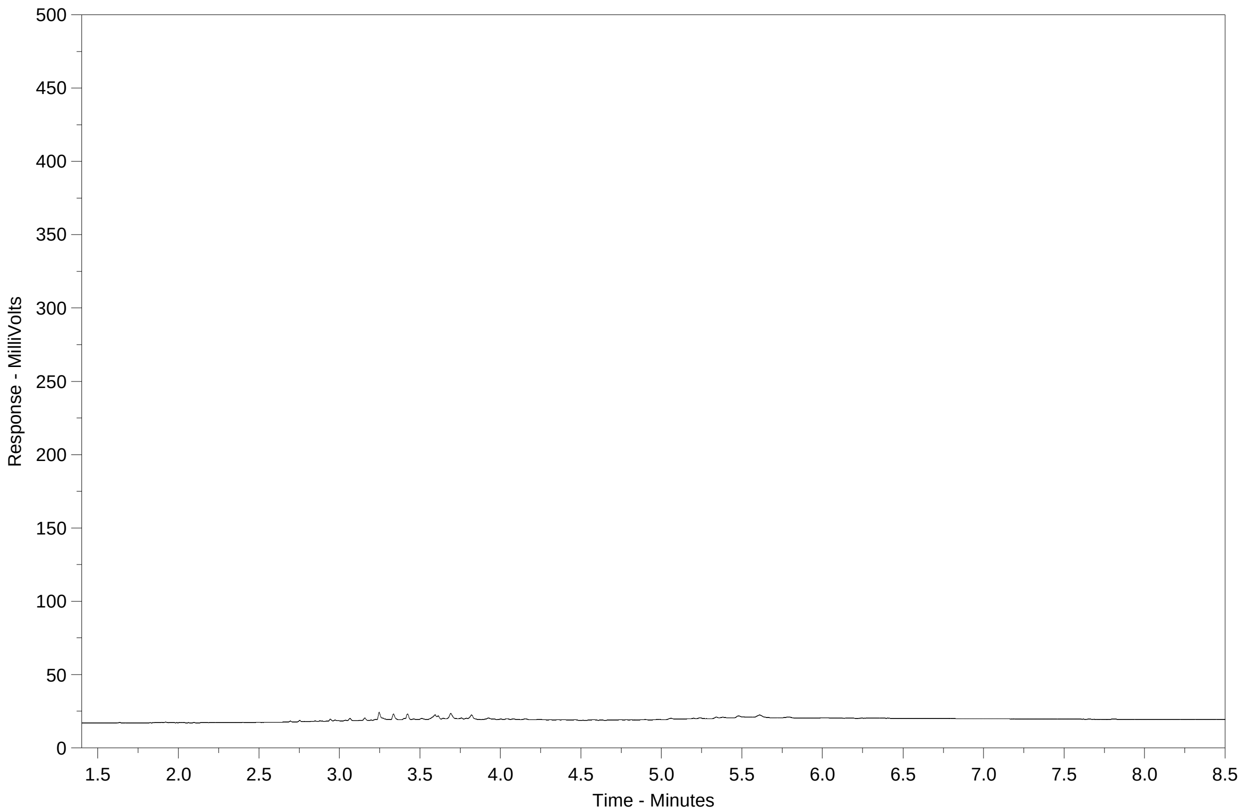
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-21
Client Sample ID: TP8-2



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

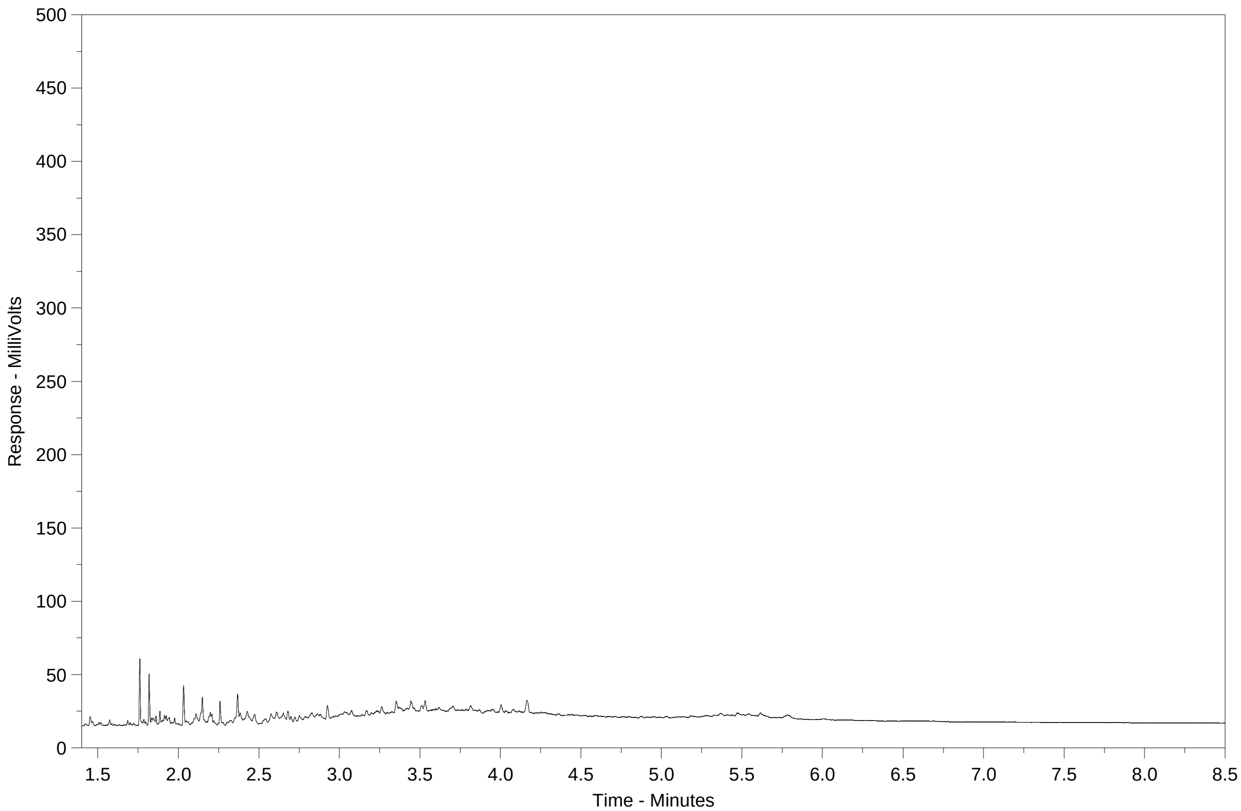
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-22
Client Sample ID: TP8-3



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

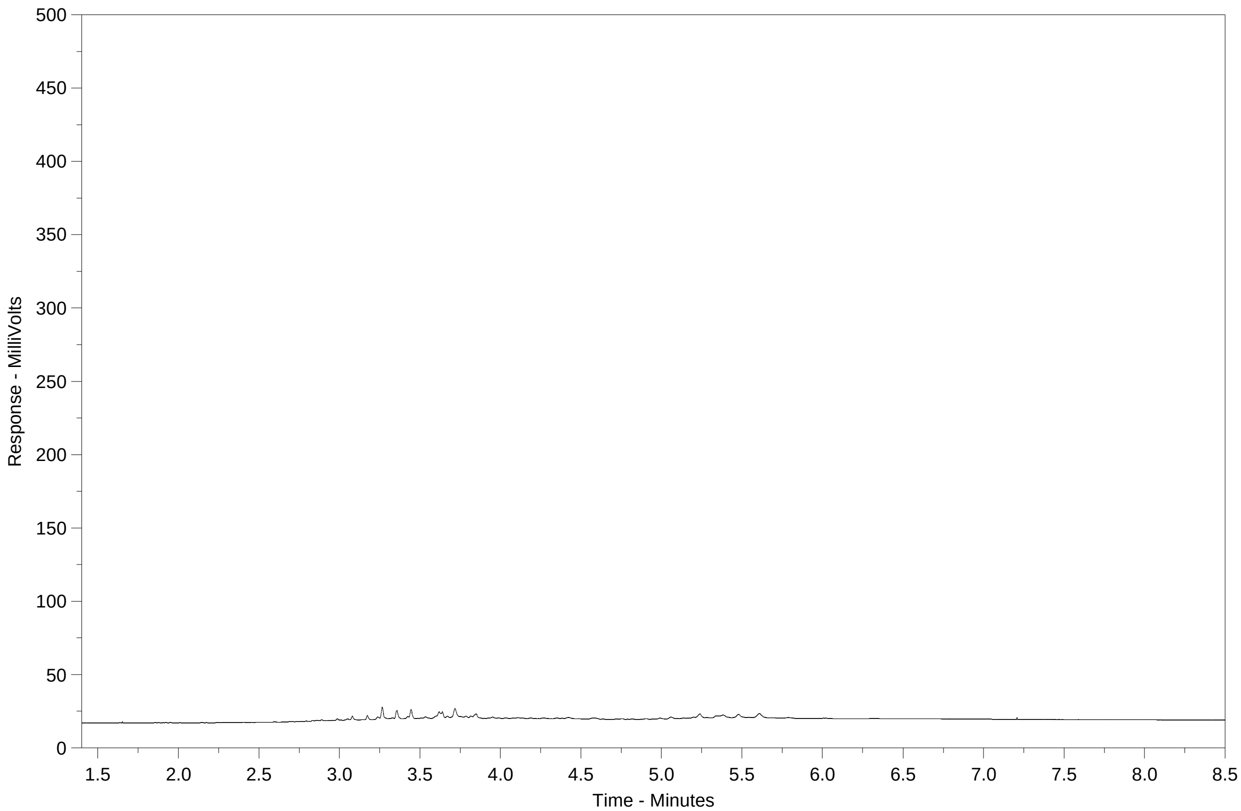
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-23
Client Sample ID: TP8-4



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →   ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

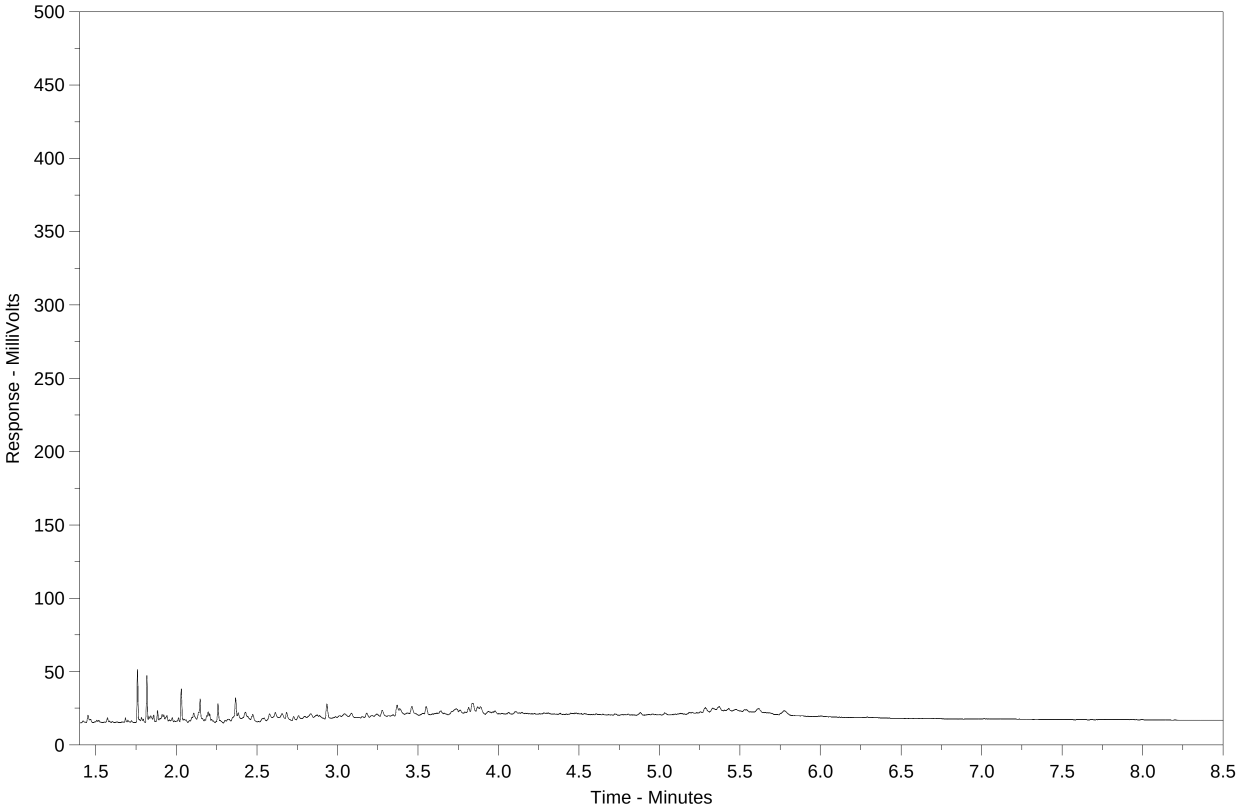
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-24
Client Sample ID: TP8-5



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

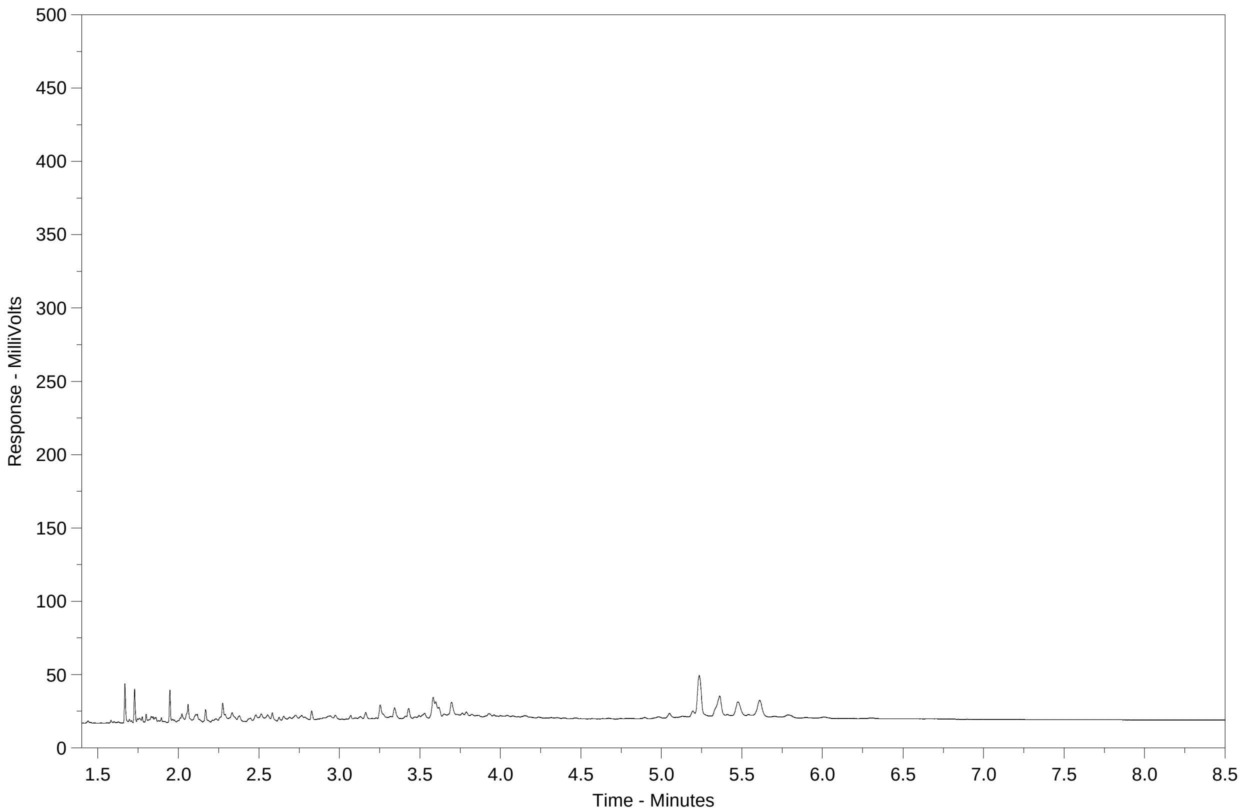
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-25
Client Sample ID: TP10-1



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

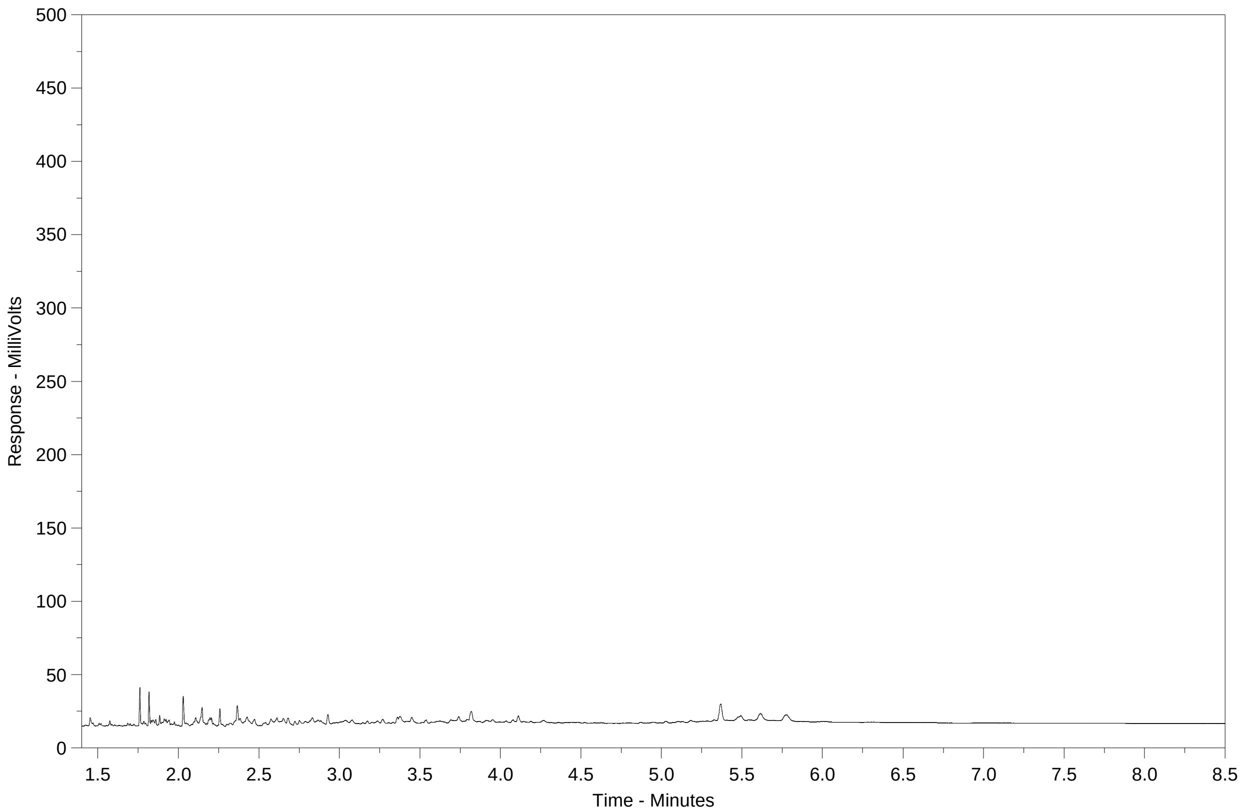
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-26
Client Sample ID: TP11-1



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils / Lube Oils / Grease →	
← Diesel / Jet Fuels →			

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

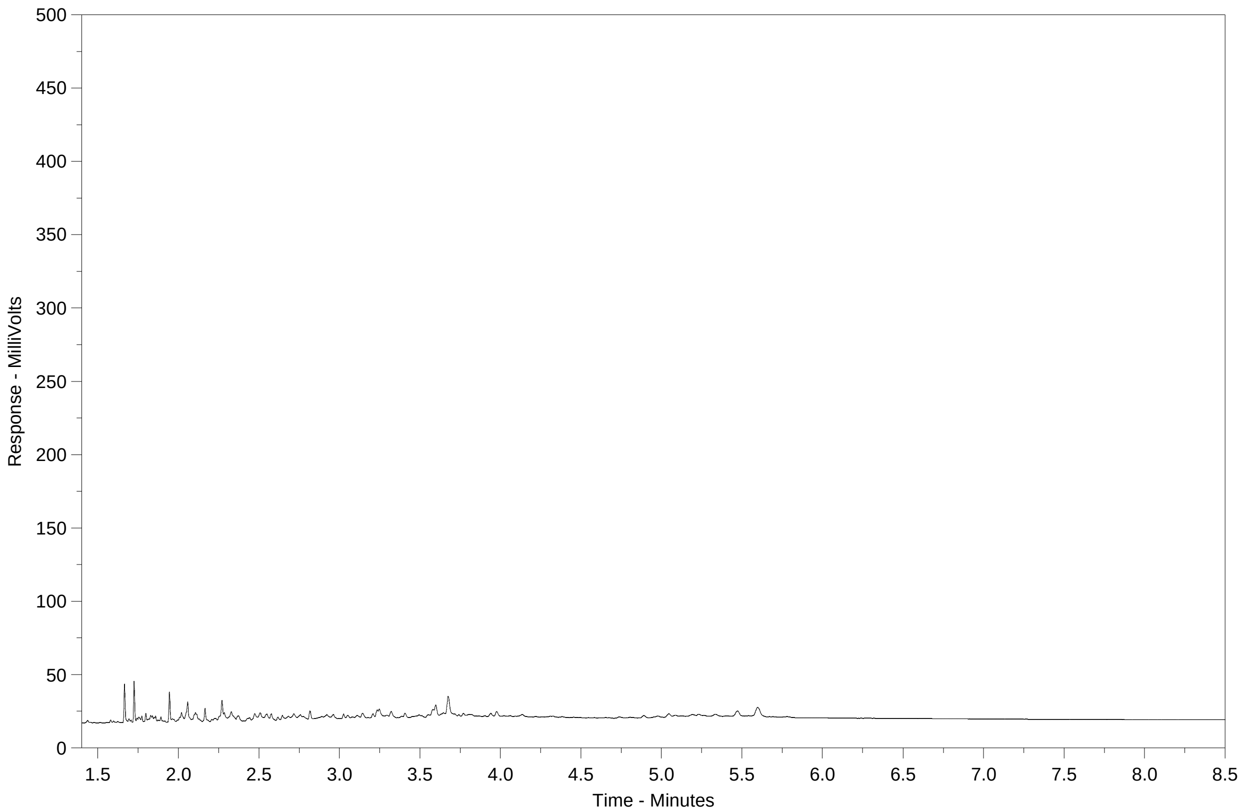
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-27
Client Sample ID: TP11-2



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

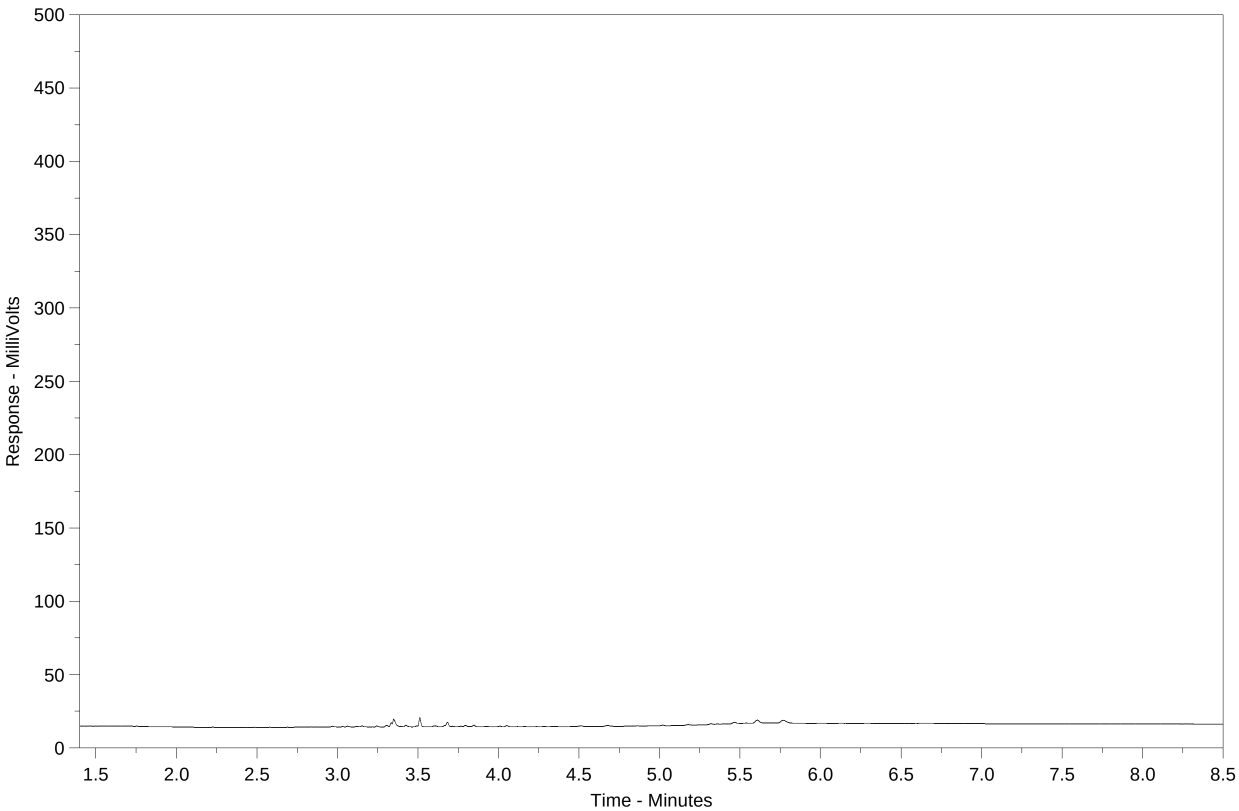
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-28
Client Sample ID: TP11-3



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →　　　　← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

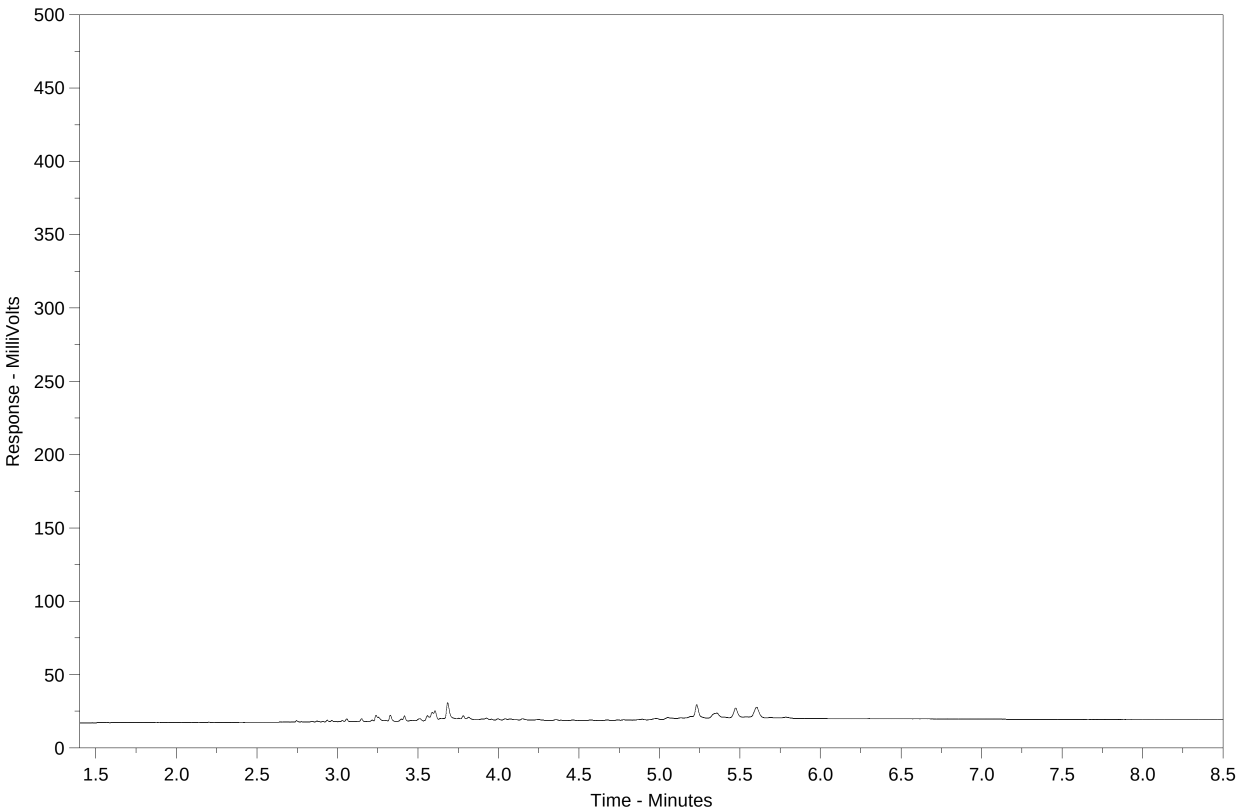
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-29
Client Sample ID: TP12-1



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

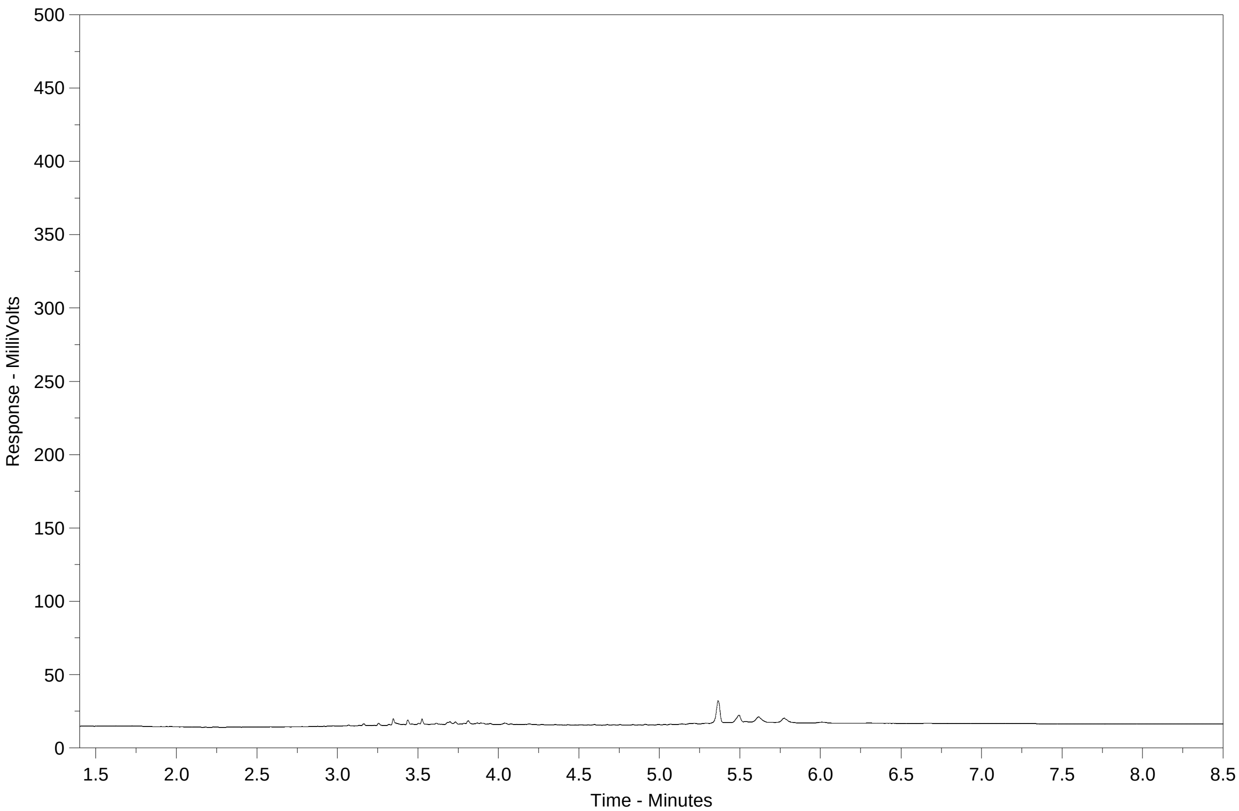
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-31
Client Sample ID: TP13-1



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

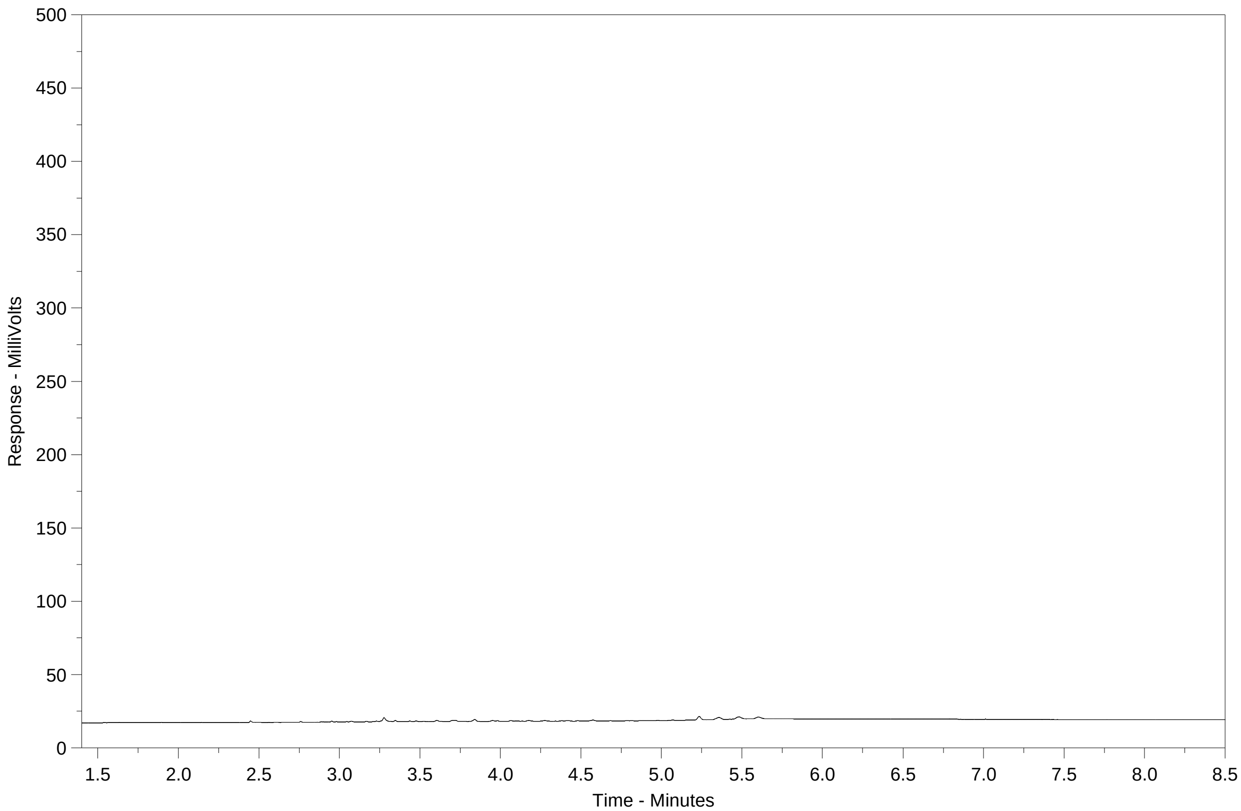
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-32
Client Sample ID: TP14-1



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

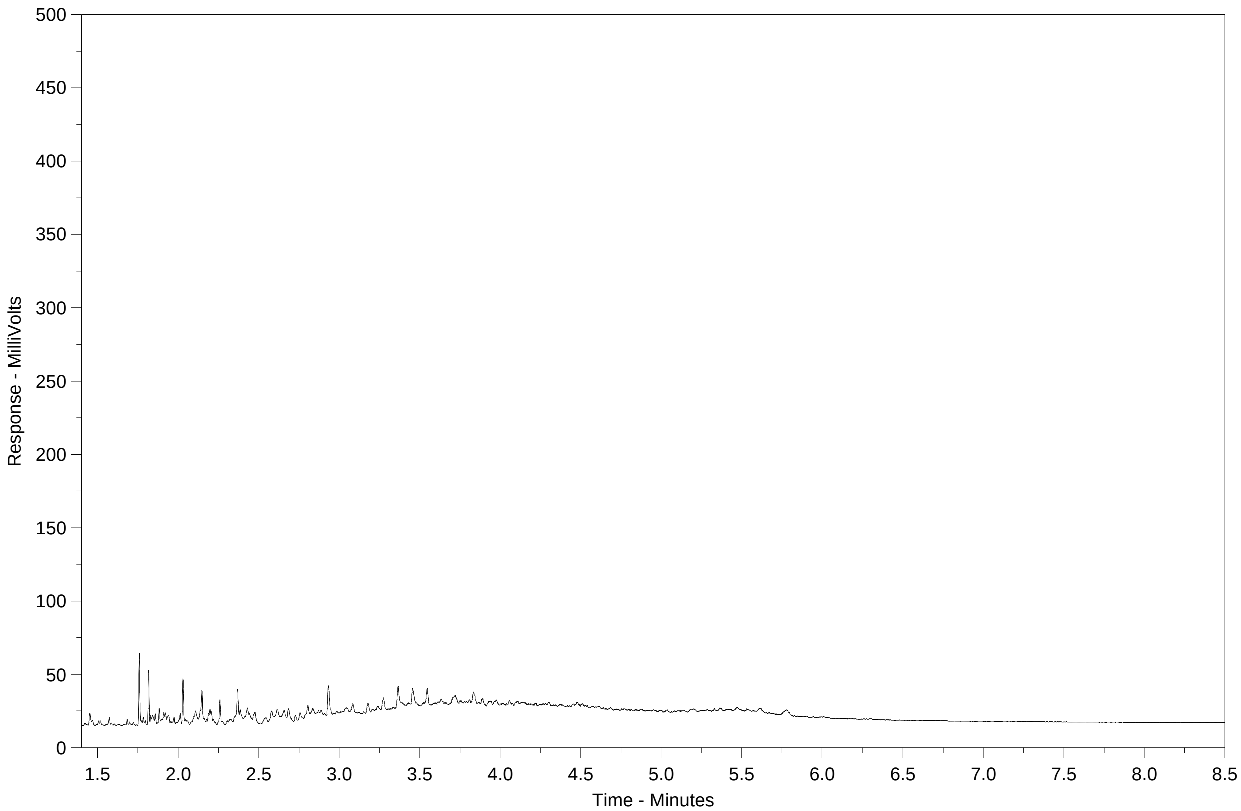
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-33
Client Sample ID: DUP A



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

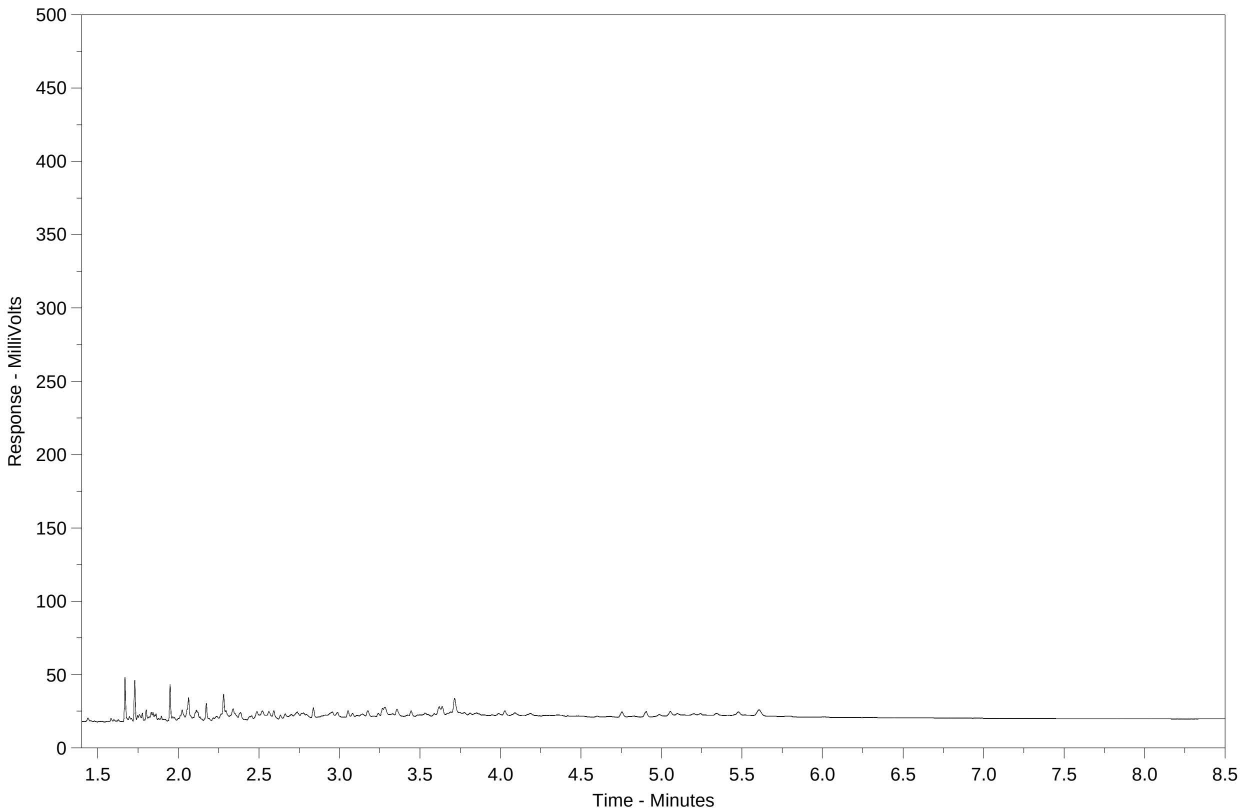
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-34
Client Sample ID: DUP B



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

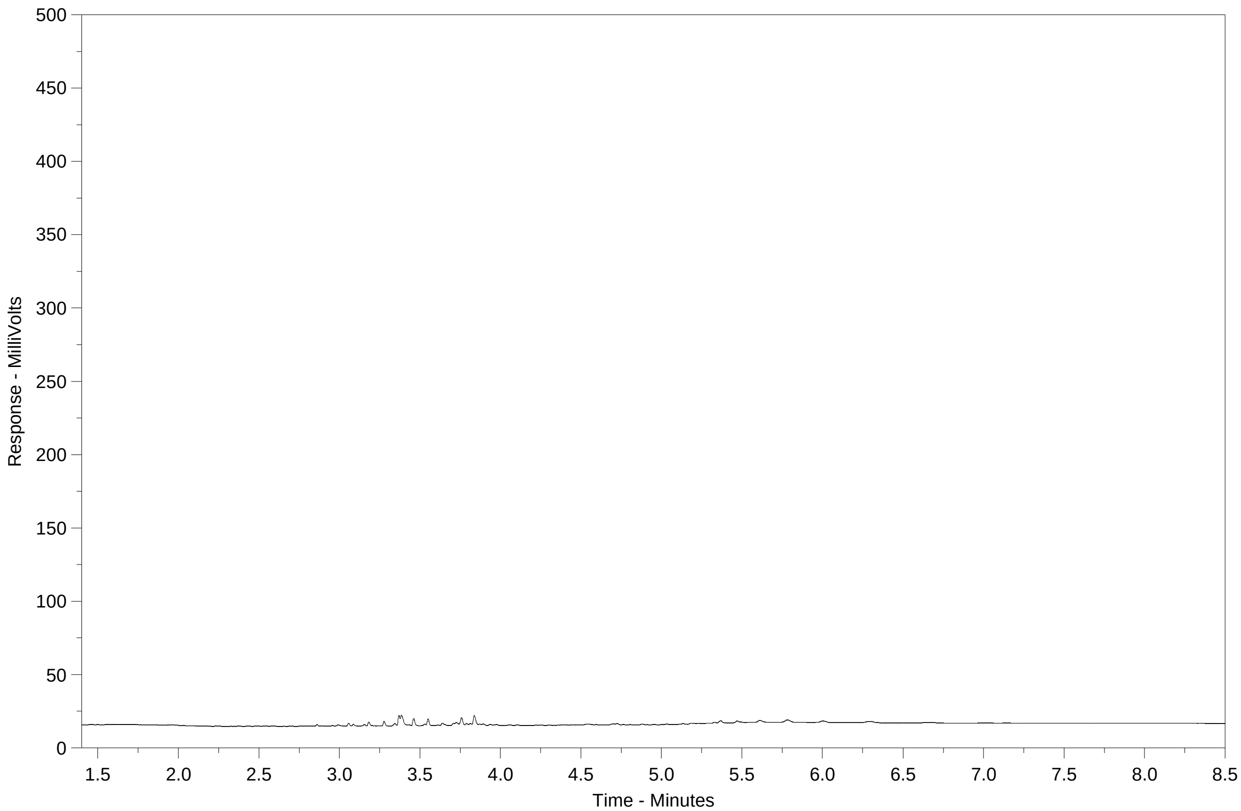
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-35
Client Sample ID: DUP C



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

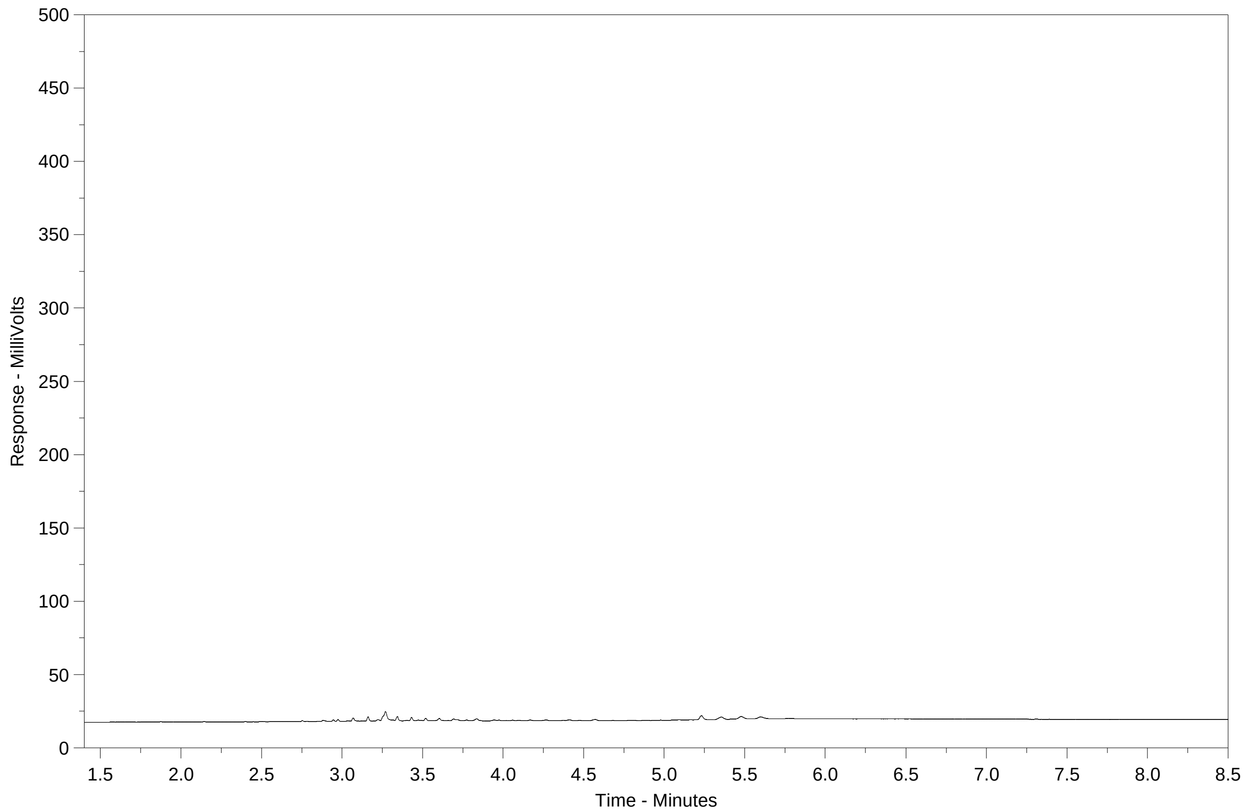
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-36
Client Sample ID: DUP D



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

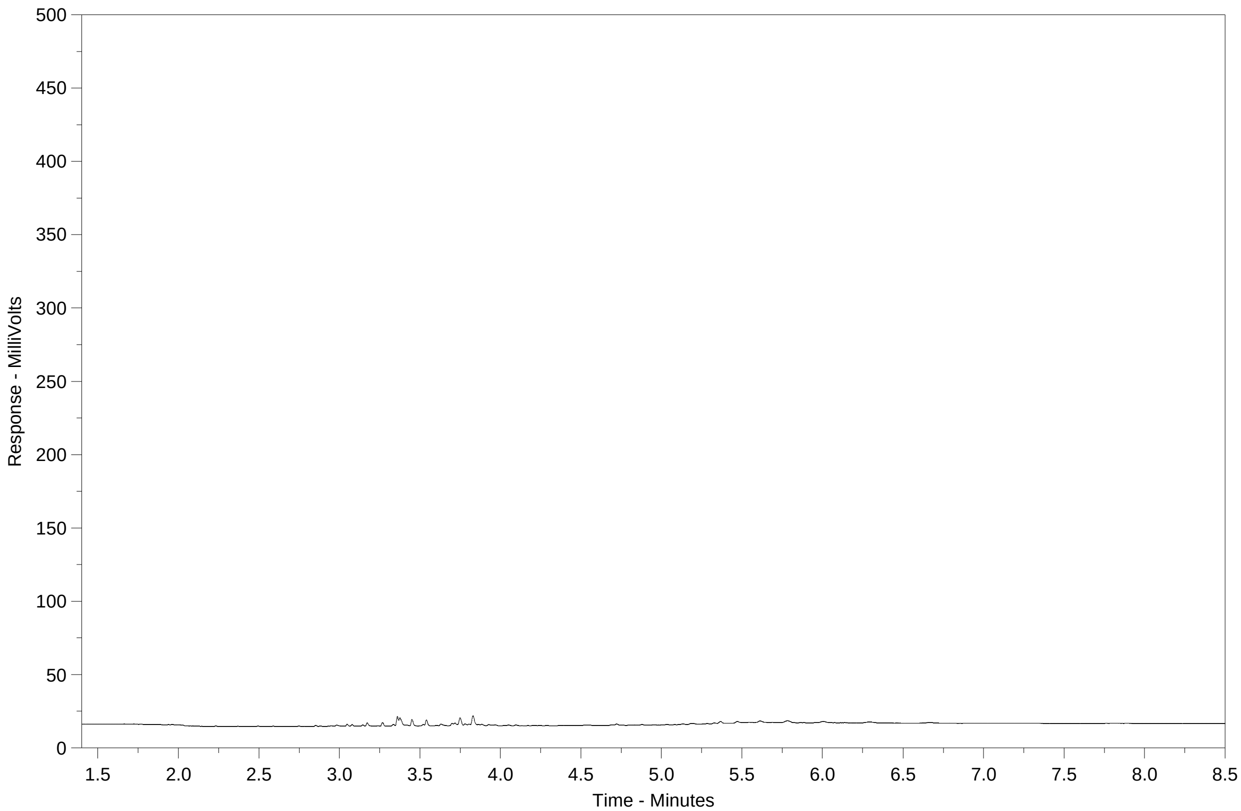
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-37
Client Sample ID: RA1



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

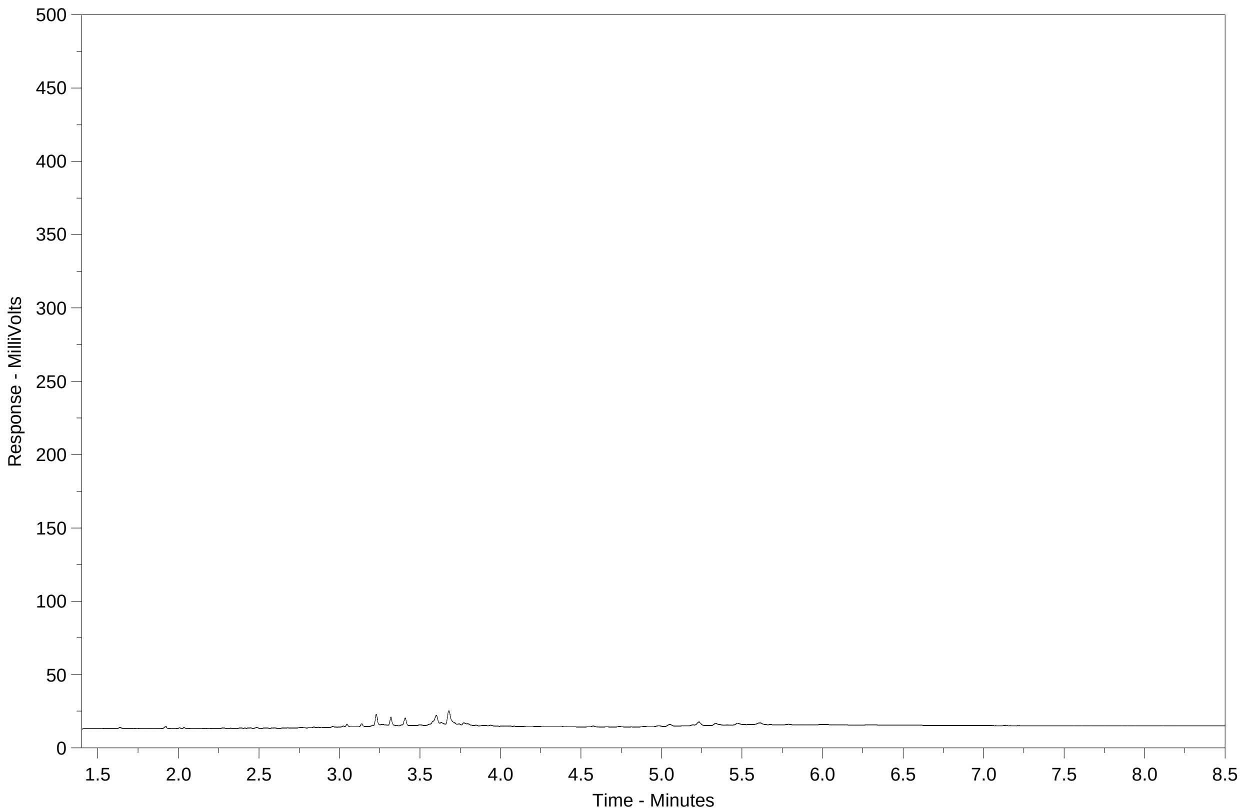
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-38
Client Sample ID: RA2



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

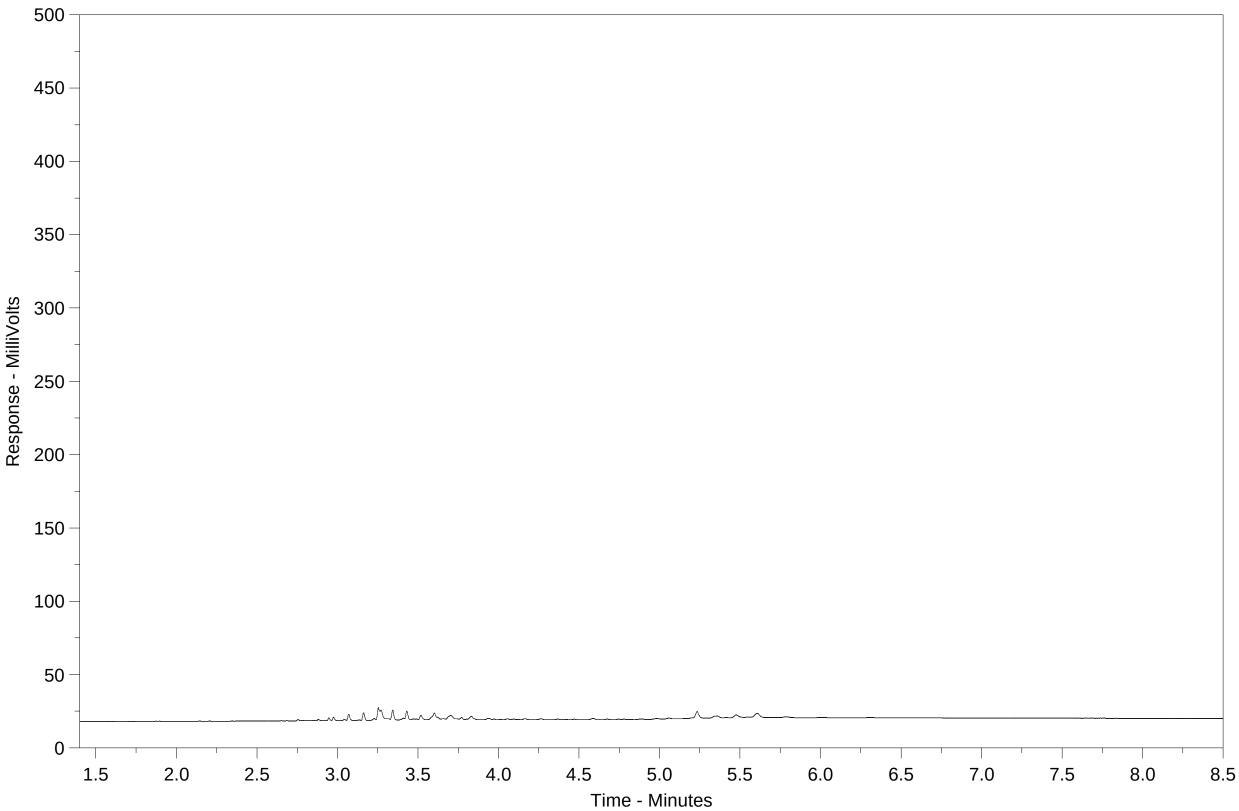
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-39
Client Sample ID: RA3



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

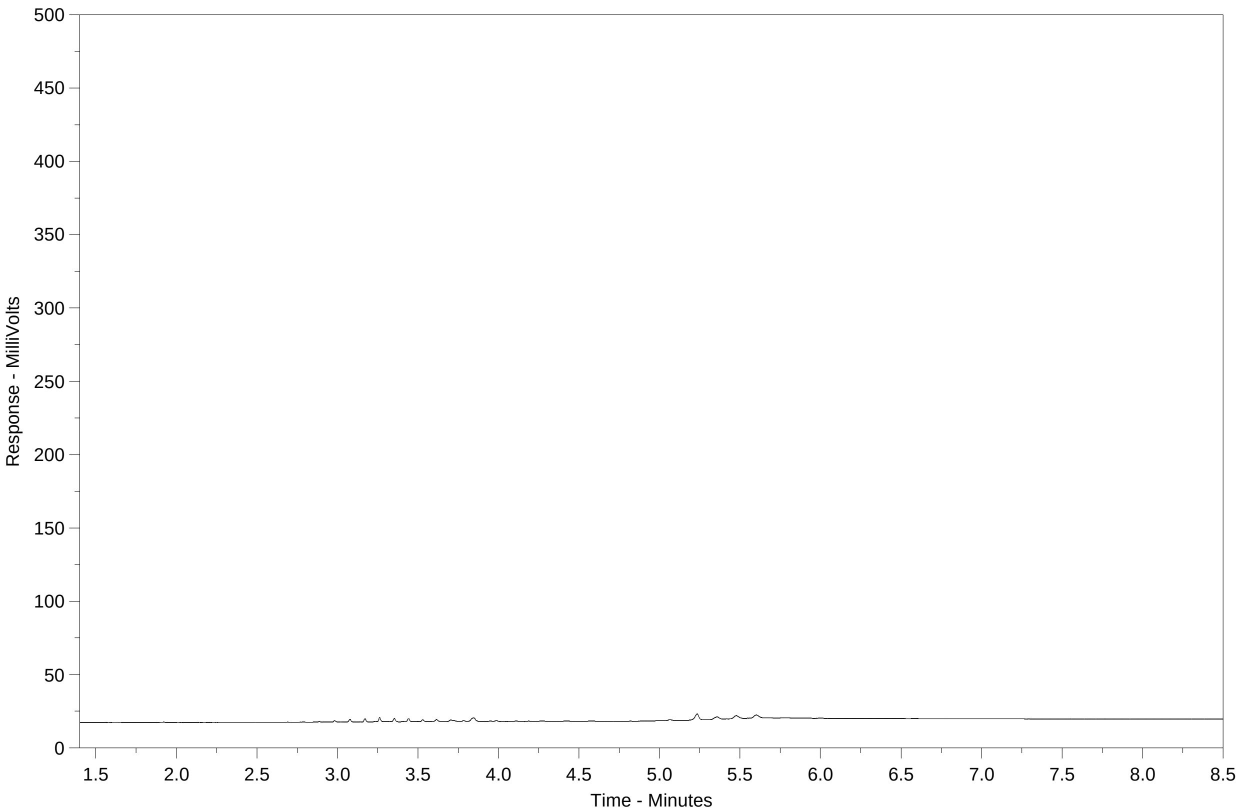
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-40
Client Sample ID: RA4



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

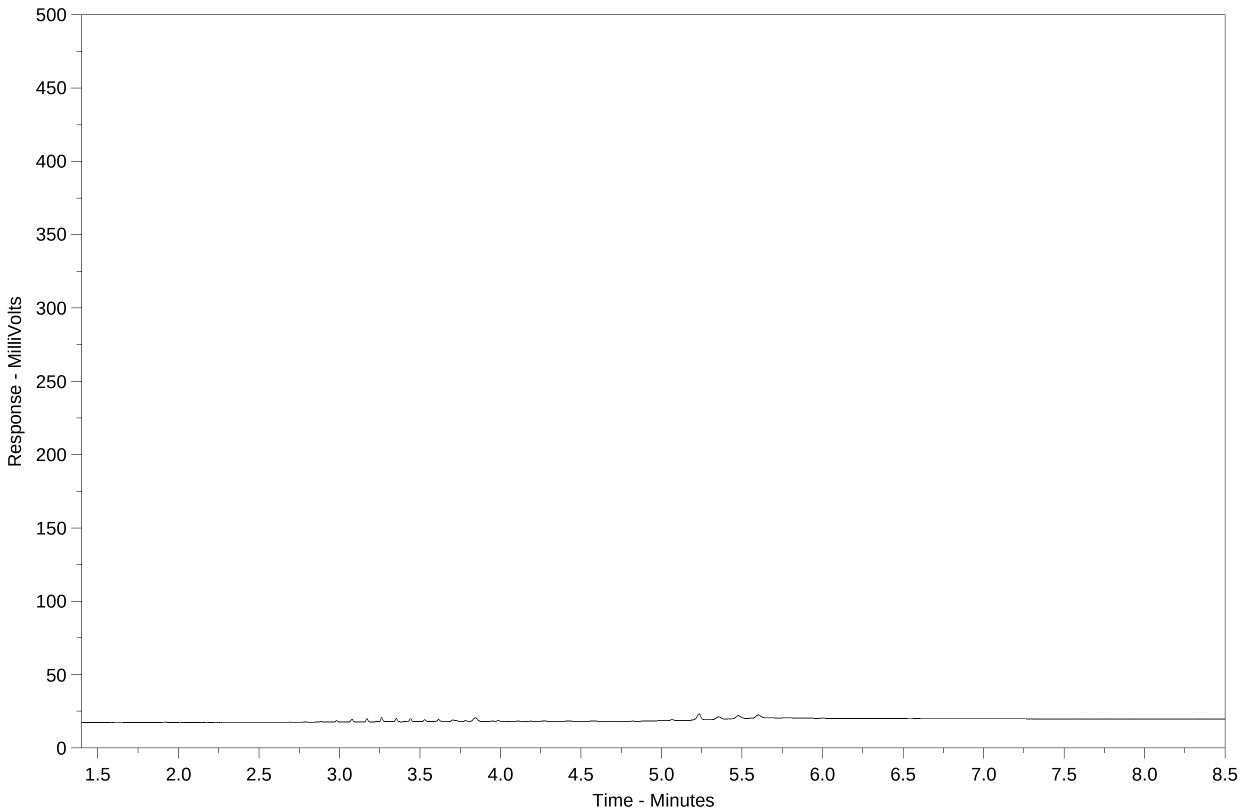
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-40
Client Sample ID: RA4



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

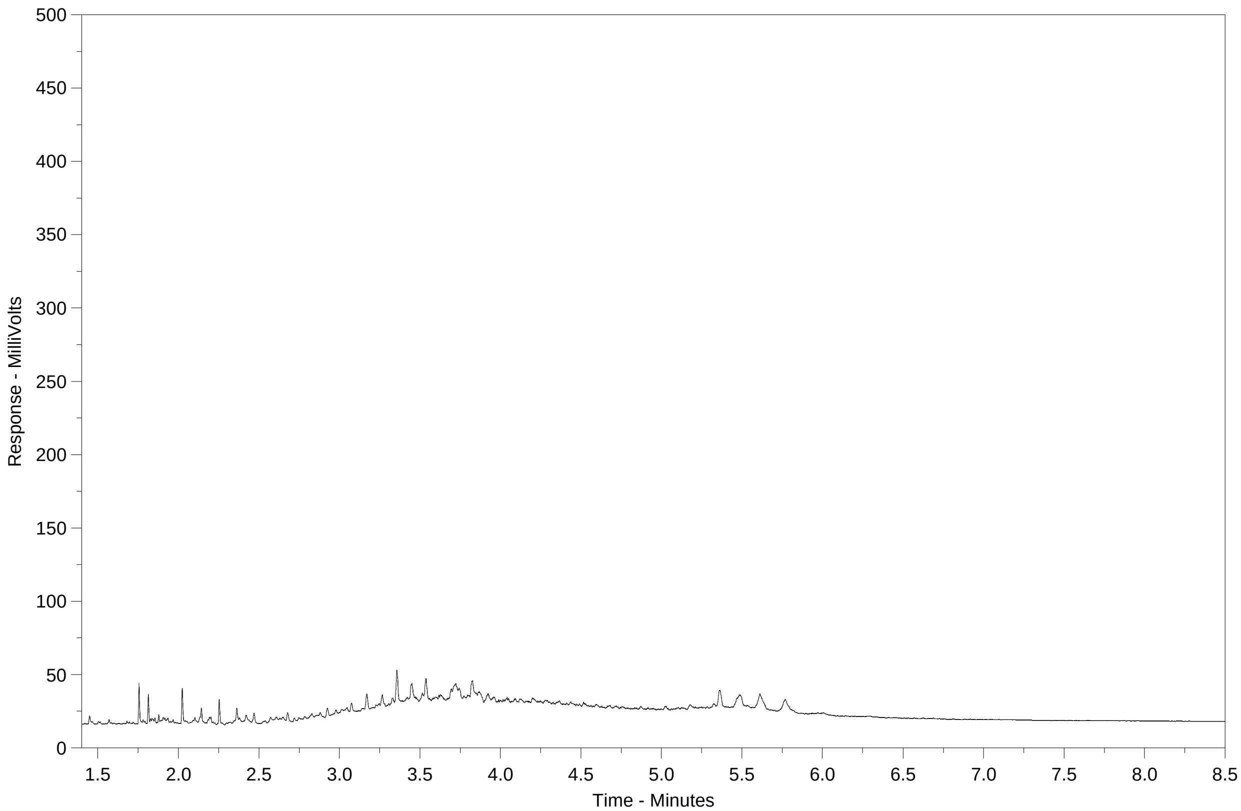
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-41
Client Sample ID: RA5



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

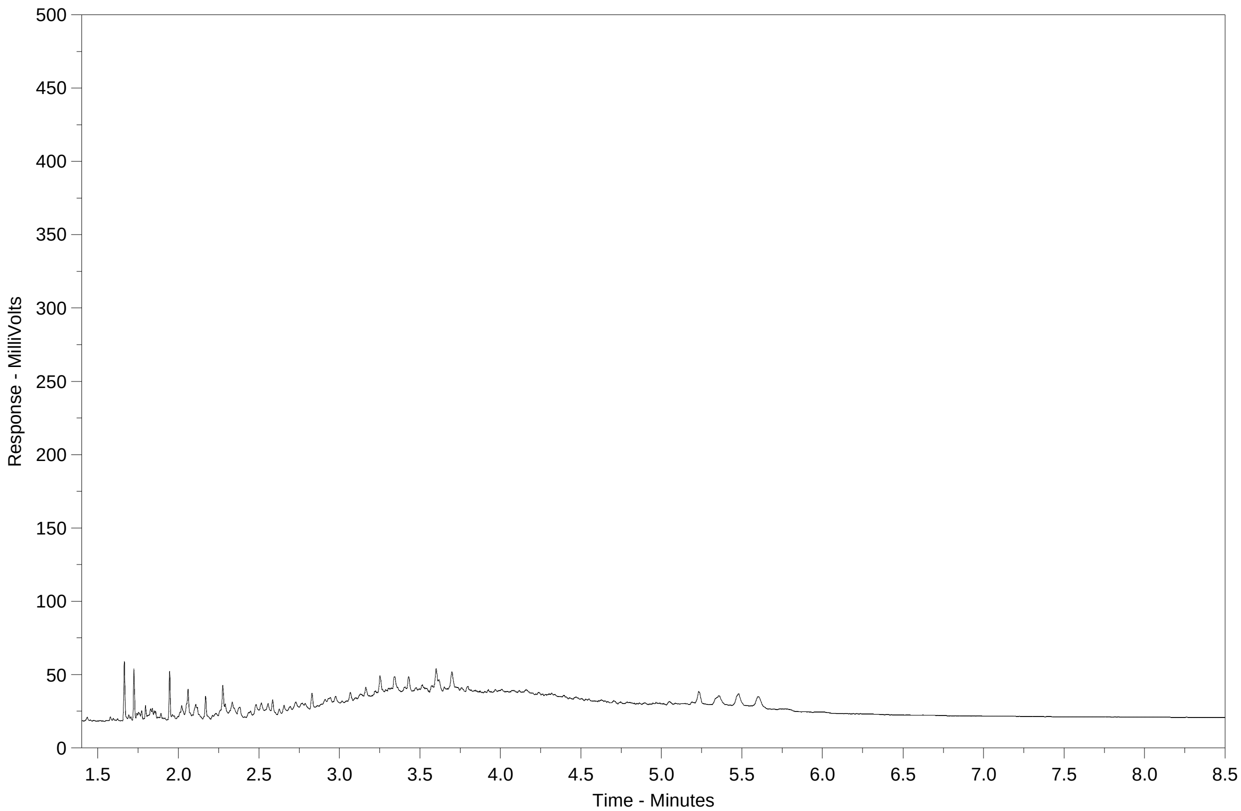
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: WG1782140-C-4#L1386542-C-41
Client Sample ID: RA5



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

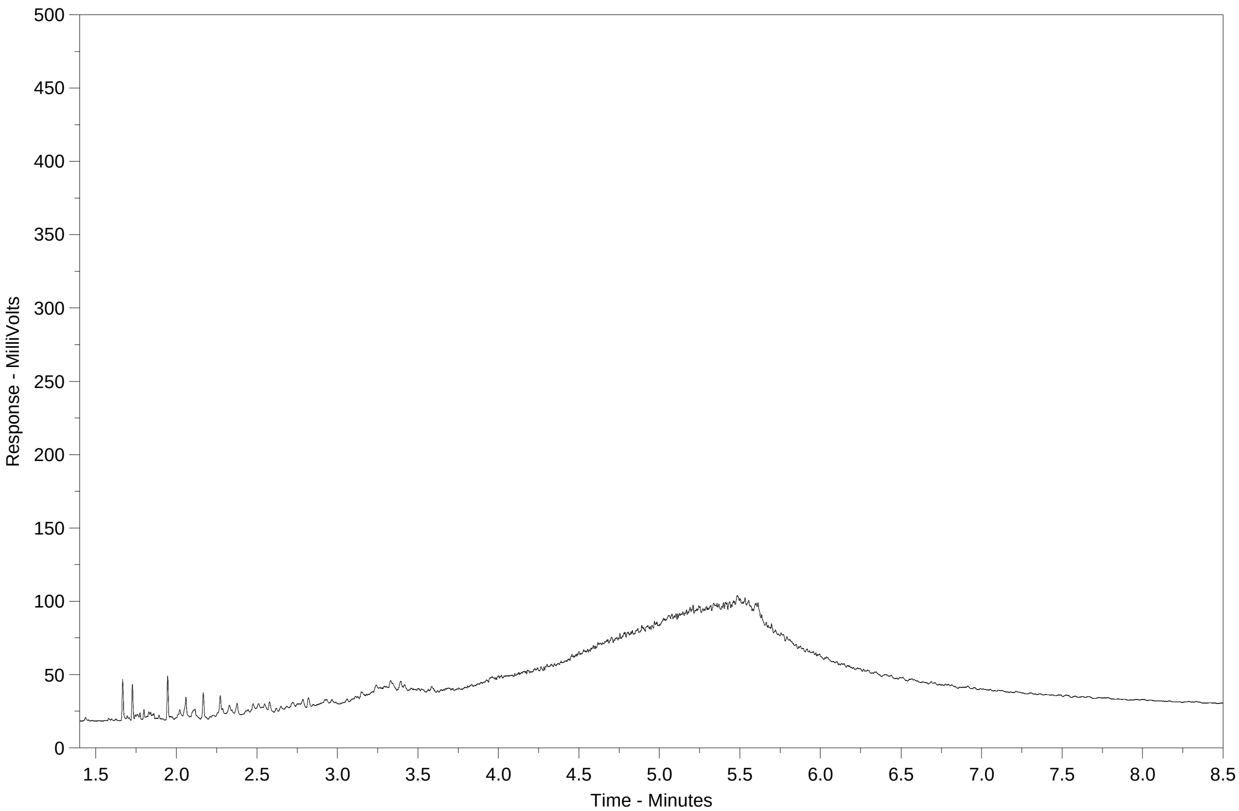
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-42
Client Sample ID: RA6



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →
← Diesel / Jet Fuels →
← Motor Oils / Lube Oils / Grease →

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

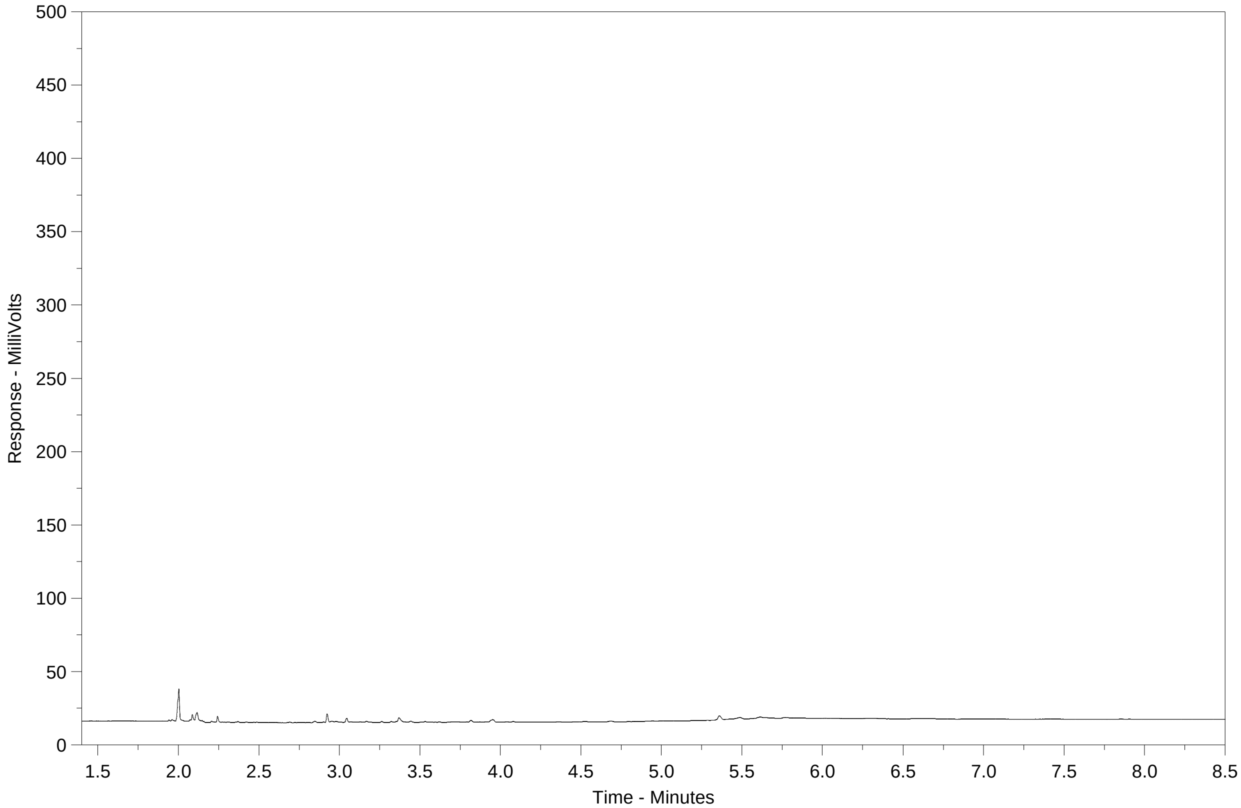
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-43
Client Sample ID: RA7



nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F

← Gasoline →   ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

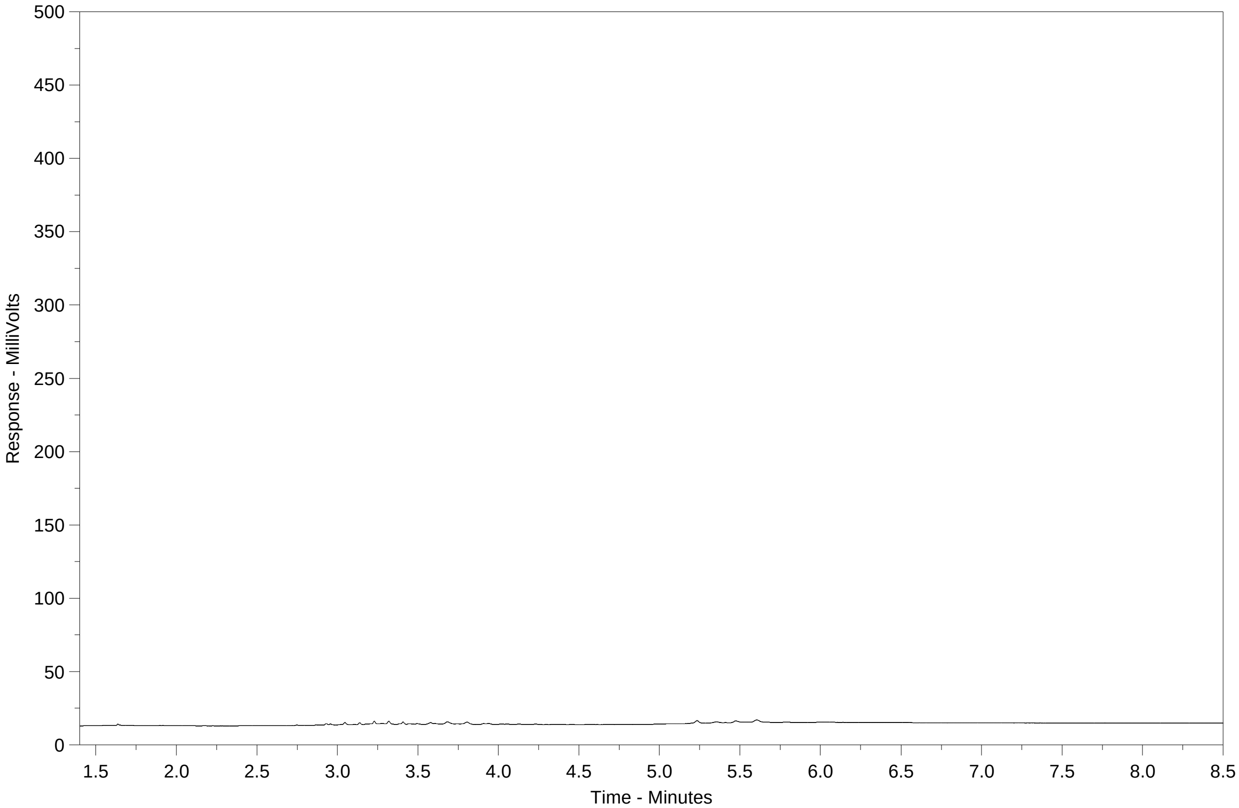
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

CCME F2F4 Hydrocarbon Distribution Report

ALS Sample ID: L1386542-C-44
Client Sample ID: RA8



nC10	nC16	nC34	nC50
174°C 346°F	287°C 549°F	481°C 898°F	575°C 1067°F

← Gasoline → ← Motor Oils / Lube Oils / Grease →
← Diesel / Jet Fuels →

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

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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

Note: This chromatogram was produced using GC conditions that are specific to the CCME F2-F4 method (December 2007 version). Chromatograms generated using this method will resemble those found in the ALS-Vancouver HDR library, though they will appear compressed as the F2-F4 analysis covers a broader range of boiling points. The HDR library can be found at www.alsglobal.com.

ALS Environmental

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

Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: SLR	Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: L Paterson	Select: PDF ✓ Excel Digital Fax	Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 200 - 1475 Ellis St., Kelowna BC	Email 1: lpaterson@slrconsulting.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Email 2:	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: 250-762-7202 Fax: 250-763-7303		Analysis Request
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No	Job #: 219.05112.00008	
Company:	PO / AFE: KEL 1322	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only) L1386542	ALS Contact: ERIN Sampler: KA	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR ANALYSIS	Number of Containers
	TP1-1	29-OCT-13		SOIL	X	3
	TP1-2				X	2
	TP1-3				X	2
	TP1-4				X	2
	TP2-1				X	2
	TP2-2				X	3
	TP2-3				X	2
	TP2-4				X	2
	TP2-5				X	2
	TP3-1				X	2
	TP3-2				X	3
	TP4-1				X	2

L1386542-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

HOLD.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: KA	Date: 31-OCT-13	Time: 3pm	Received by: B.H	Date: Nov. 1	Time: 9:20	Temperature: 2.5/2.8/3.5 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

10- 334341

ALS Environmental

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

Report To
Company: SLR Consulting (Canada) Ltd
Contact: L Paterson
Address: 200-1475 Ellis St., Kelowna
Phone: 250-762-7202 Fax: 250-763-7303

Invoice To Same as Report ? (circle) Yes or No (if No, provide details)
Copy of Invoice with Report? (circle) Yes or No
Company:
Contact:
Address:
Phone: Fax:

Report Format / Distribution
Standard: ✓ Other (specify):
Select: PDF ✓ Excel Digital Fax
Email 1: lpaterson@slrconsulting.com
Email 2:

Client / Project Information
Job #: 219.05112.00008
PO / AFE: KEL 1322
LSD:
Quote #:

Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
✓ Regular (Standard Turnaround Times - Business Days)
Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
Same Day or Weekend Emergency - Contact ALS to confirm TAT

Lab Work Order # (lab use only) L1386542

ALS Contact: ERIN **Sampler:** KA

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR ANALYSIS	Number of Containers
	TP5-1	29-OCT-13		SOIL	X	2
	TP6-1				X	2
	TP7-1				X	
	TP7-2				X	
	TP7-3				X	
	TP7-4				X	
	TP7-5				X	
	TP8-1				X	
	TP8-2				X	
	TP8-3				X	
	TP8-4				X	
	TP8-5				X	

L1386542-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ ... **Details**

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date: 31-OCT-13	Time: 3pm	Received by: B...	Date: Nov. 1	Time: 9:20	Temperature: 3.5 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

10- 334338

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

ALS Environmental

Report To	
Company:	SLR Consulting (Canada) Ltd.
Contact:	L. Paterson
Address:	100-1475 Ellis St., Kelowna BC
Phone:	250-762-7202 Fax: 250-763-7303
Invoice To	Same as Report? (circle) Yes or No (if No, provide details) — Yes circled
	Copy of Invoice with Report? (circle) Yes or No — Yes circled
Company:	
Contact:	
Address:	
Phone:	Fax:
Lab Work Order # (lab use only)	L1386542

Report Format / Distribution	
Standard:	✓ Other (specify):
Select: PDF ✓ Excel Digital Fax	
Email 1:	lpaterson@slrconsulting.com
Email 2:	
Client / Project Information	
Job #:	219.05112.00008
PO / AFE:	KEL 1322
LSD:	
Quote #:	
ALS Contact:	Erin
Sampler:	KA

Service Request: (Rush subject to availability - Contact ALS to confirm TAT)

- ✓ Regular (Standard Turnaround Times - Business Days)
- Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
- Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
- Same Day or Weekend Emergency - Contact ALS to confirm TAT

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR ANALYSIS	Number of Containers
	TP10-1	30-OCT-13		SOIL	X	3
	TP11-1				X	2
	TP11-2				X	
	TP11-3				X	
	TP12-1				X	
	TP12-2				X	
	TP13-1				X	
	TP14-1				X	3
	DUP A	29-OCT-13			X	X
	DUP B	30-OCT-13			X	X
	DUP C				X	X
	DUP D				X	X

L1386542-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/E... etails

HOLD

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: KA	Date: 31-OCT-13	Time: 3pm	Received by: B. H	Date: Nov. 1	Time: 9:20	Temperature: 3.5 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

10-334339

ALS Environmental

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

Report To		Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: SLR Consulting (Canada) Ltd		Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: L Paterson		Select: PDF ✓ Excel Digital Fax	Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 200-1475 Ellis St, Kelowna BC.		Email 1: lpaterson@slrconsulting.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
		Email 2:	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: 250-762-7202	Fax: 250-763-7303		Analysis Request
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	(Indicate Filtered or Preserved, F/P)
	Copy of Invoice with Report? (circle) Yes or No	Job #: 219.05112.00008	
Company:		PO / AFE: KGL 1322	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L1386542	ALS Contact: Erin / Sampler: KA	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR ANALYSIS												Number of Containers
	RA1	30-OCT-13		SOIL	X												2
	RA2	↓		↓	X												3
	RA3				X												2
	RA4				X												3
	RA5				X												2
	RA6				X												2
	RA7				X												3
	RA8				X												2

L1386542-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ET[...]ails

HOLD.

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: KA	Date: 31-OCT-13	Time: 3pm	Received by: B.H	Date: Nov 1	Time: 9:20	Temperature: 3.5 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

10- 334342

ALS Environmental

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

Report To		Report Format / Distribution	Service Request:(Rush subject to availability - Contact ALS to confirm TAT)
Company: SLR		Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: L Paterson		Select: PDF ✓ Excel Digital Fax	Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 200 - 1475 Ellis St, Kelowna BC		Email 1: lpaterson@slrconsulting.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
		Email 2:	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: 250-762-7202	Fax: 250-763-7303		Analysis Request
Invoice To: Same as Report ? (circle) Yes or No (If No, provide details)		Client / Project Information	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No		Job #: 219.05112.00002	
Company:		PO / AFE: KCL 1.02	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L1386542	ALS Contact: ERIN	Sampler: KA

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR ANALYSIS	CCME low level PAH	CCME BTEX/F1	CCME F2-F4	CCME Metals - AL	CCME Hex Chromium Cr6+	sieve - fine/course	total organic carbon				Number of Containers
	TP1-1	29-OCT-13		SOIL	X	✓	X	X	X	X	X	X				3
	TP1-2	|		|	X	✓	X	X	X							2
	TP1-3	|		|	X	ignore										2
	TP1-4	|		|	X	X	X	X	X							2
	TP2-1	|		|	X	X	X	X	X	X						2
	TP2-2	|		|	X	X	X	X	X		X	X				3
	TP2-3	|		|	X	X	X	X	X							2
	TP2-4	|		|	X	X	X	X	X							2
	TP2-5	|		|	X	X	X	X	X							2
	TP3-1	|		|	X	X	X	X	X	X						2
	TP3-2	|		|	X	X	X	X	X		X	X				3
	TP4-1	|		|	X	X	X	X	X							2

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

~~HOLD~~ ~~CCME Agricultural land use~~ standards.

Failure to complete all portions of this form may delay analysis. Please fill in this forr

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L1386542-COFC

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)							
Released by: KA	Date: 31-OCT-13	Time: 3pm	Received by:	Date:	Time:	Temperature: °C	Ve...	Date:	Time:	Observations: Yes / No ? If Yes add SIF

ALS Environmental

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

Report To
Company: SLR Consulting (Canada) Ltd.
Contact: L Paterson
Address: 200-1475 Ellis St., Kelowna
Phone: 250-762-7202 Fax: 250-763-7303

Report Format / Distribution
Standard: ✓ Other (specify):
Select: PDF ✓ Excel Digital Fax
Email 1: lpaterson@slrconsulting.com
Email 2:

Service Request (Rush subject to availability - Contact ALS to confirm TAT)
- L Regular (Standard Turnaround Times - Business Days)
- Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
- Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
- Same Day or Weekend Emergency - Contact ALS to confirm TAT

Invoice To Same as Report ? (circle) Yes or No (if No, provide details)
Copy of Invoice with Report? (circle) Yes or No
Company:
Contact:
Address:
Phone: Fax:

Client / Project Information
Job #: 219.05112.00008
PO / AFE: KEL 1322
LSD:
Quote #:

Lab Work Order # (lab use only)
ALS Contact: ERIN
Sampler: KA

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR	ANALYSIS	CCME low level PAH	CCME BTEX(F1)	CCME F2-F4	CCME metals-AL	CCME Hex chromium Cr6+	Sieve-fine/coarse	Total organic carbon				Number of Containers
	TP5-1	29-OCT-13		SOIL	X		X	X	X	X							2
	TP6-1	|		|	X		X	X	X	X							2
	TP7-1	|		|	X		X	X	X	X	X						|
	TP7-2	|		|	X		X	X	X	X							|
	TP7-3	|		|	X		X	X	X	X							|
	TP7-4	|		|	X		X	X	X	X							|
	TP7-5	|		|	X		X	X	X	X							|
	TP8-1	|		|	X		X	X	X	X	X						|
	TP8-2	|		|	X		X	X	X	X							|
	TP8-3	|		|	X		X	X	X	X							|
	TP8-4	|		|	X		X	X	X	X							|
	TP8-5	|		|	X		X	X	X	X							|

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

~~CCME Agricultural land use standards~~

Failure to complete all portions of this form may delay analysis. Please fill in th

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L1386542-COFC

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)							
Released by: [signature]	Date: 31-OCT-13	Time: 3pm	Received by:	Date:	Time:	Temperature: °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

10- 334338

ALS Environmental

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

Report To	**Report Format / Distribution**
Company: SLR Consulting (Canada) Ltd.	Standard: ✓ Other (specify):
Contact: L Paterson	Select: PDF ✓ Excel Digital Fax
Address: 200-1475 Ellis St, Kelowna BC	Email 1: lpaterson@slrconsulting.com
	Email 2:
Phone: 250-762-7202 Fax: 250-763-7303	
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**
Copy of Invoice with Report? (circle) Yes or No	Job #: 217.05112.00008
Company:	PO / AFE: KEL 1222
Contact:	LSD:
Address:	
Phone: Fax:	Quote #:
Lab Work Order # (lab use only)	**ALS Contact:** Erin **Sampler:** KA

Service Request: (Rush subject to availability - Contact ALS to confirm TAT)

- ✓ Regular (Standard Turnaround Times - Business Days)
- Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
- Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
- Same Day or Weekend Emergency - Contact ALS to confirm TAT

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR	ANALYSIS	CCME low level PAH	CCME BTEX/F1	CCME F2-F4	CCME Metals-AL	CCME Hex. chromium Cr6+	sieve - fine/coarse	total organic carbon				Number of Containers
	TP10-1	30 OCT 13		SOIL	X		X	X	X	X		X	X				3
	TP11-1	|		|	X		X	X	X	X	X						2
	TP11-2	|		|	X		X	X	X	X							1
	TP11-3	|		|	X		X	X	X	X							1
	TP12-1	|		|	X		X	X	X	X	X						1
	TP12-2	|		|	X												1
	TP13-1	|		|	X		X	X	X	X	X						1
	TP14-1	|		|	X		X	X	X	X		X	X				3
	DUP A	29-OCT-13		|	X		X	X	X	X							X
	DUP B	30-OCT-13		|	X		X	X	X	X							X
	DUP C	|		|	X		X	X	X		X						X
	DUP D	|		|	X		X	X	X	X		X	X				X

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

~~HOLD CCME Agricultural land use standards~~

L1386542-COFC

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By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: KA	Date: 31-10-13	Time: 3 pm	Received by:	Date:	Time:	Temperature: °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To		Report Format / Distribution		Service Request:(Rush subject to availability - Contact ALS to confirm TAT)
Company:	SLR Consulting (Canada) Ltd	Standard: ✓	Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact:	L Paterson	Select: PDF ✓ Excel Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	200 1475 Ellis St, Kelowna BC	Email 1:	lpaterson@slrconsulting.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
		Email 2:		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: 250-762-7202	Fax: 250-763-7303			

Invoice To	Same as Report ? (circle) Yes or No (If No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	217.05112.00008
Company:		PO / AFE:	KGL 1232
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		ALS Contact: Erin	Sampler: KA

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	HOLD FOR	ANALYSIS	CCME low level PAH	CCME BTEX/F1	CCME F2-F4	CCME metals-AL	CCME Hexavalent chromium	sieve-fine/course	total organic carbon				Number of Containers
	RA1	30-OCT-13		SOIL	X		X	X	X		X						2
	RA2	↓		↓	X		X		X			X	X				3
	RA3	↓		↓	X		X	X	X								2
	RA4	↓		↓	X		X		X			X	X				3
	RA5	↓		↓	X		X	X	X	X	X						2
	RA6	↓		↓	X		X	X	X	X	X						2
	RA7	↓		↓	X		X	X	X			X	X				2
	RA8	↓		↓	X		X		X								2

L1386542-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commer

~~Hold CCME Agricultural land use standards~~

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: KA	Date: 31 Oct 13	Time: 3pm	Received by:	Date:	Time:	Temperature: °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

SLR CONSULTING (CANADA) LTD.

Review of Field and Lab Quality Assurance / Quality Control Data (QA/QC)

Laboratory **ALS Laboratory Group**
SLR Project No. **219.05112.00008**

Analytical Certificate No. L1386542 Date Certificate Issued 2013/12/04

Medium	Soil	Water	Air	Other:
No. of Samples	43	0	0	0

SLR CONSULTING (CANADA) LTD. Field QA/QC

Arrival temperature 2.2/2.8/3.5 °C

Travel blank (Y/N) N Contaminant detected? (Y/N) N/A

Total number of blind field duplicates analyzed: 4

Sample ID	Duplicate ID	RPD Acceptable (Y/N)
TP7-2	DUP A	Y
TP11-2	DUP B	Y
RA1	DUP C	N/A
TP14-1	DUP D	Y

Laboratory QA/QC

	Completed (Y/N)	Acceptable (Y/N)
Method Blank	Y	Y
Lab Duplicates	Y	Y
Lab Control Sample	Y	Y
Surrogate Recovery	Y	Y
Reference Materials	Y	Y

Laboratory data acceptable (Y/N) Y
If no, has a data quality waiver been supplied? (Y/N) N/A
Date of waiver: N/A

Notes
One of the lab's duplicate samples, which was taken from SLR sample DUP A (blind field duplicate of TP7-2), had RPDs outside of the lab's acceptable limits. The lab verified that this was due to sample heterogeneity. SLR's blind field duplicate RPDs for DUPA and TP7-2 were generally the highest of the duplicates analyzed and confirm the likely heterogeneity of the sample.

Date: 03 March 2014
Reviewed by: Krystal Ashworth

APPENDIX K

FOCUS Surveys

2013/2014 Site Works Summary and Remedial Action Plan Report

Wilmer Marsh Unit, Columbia National Wildlife Area

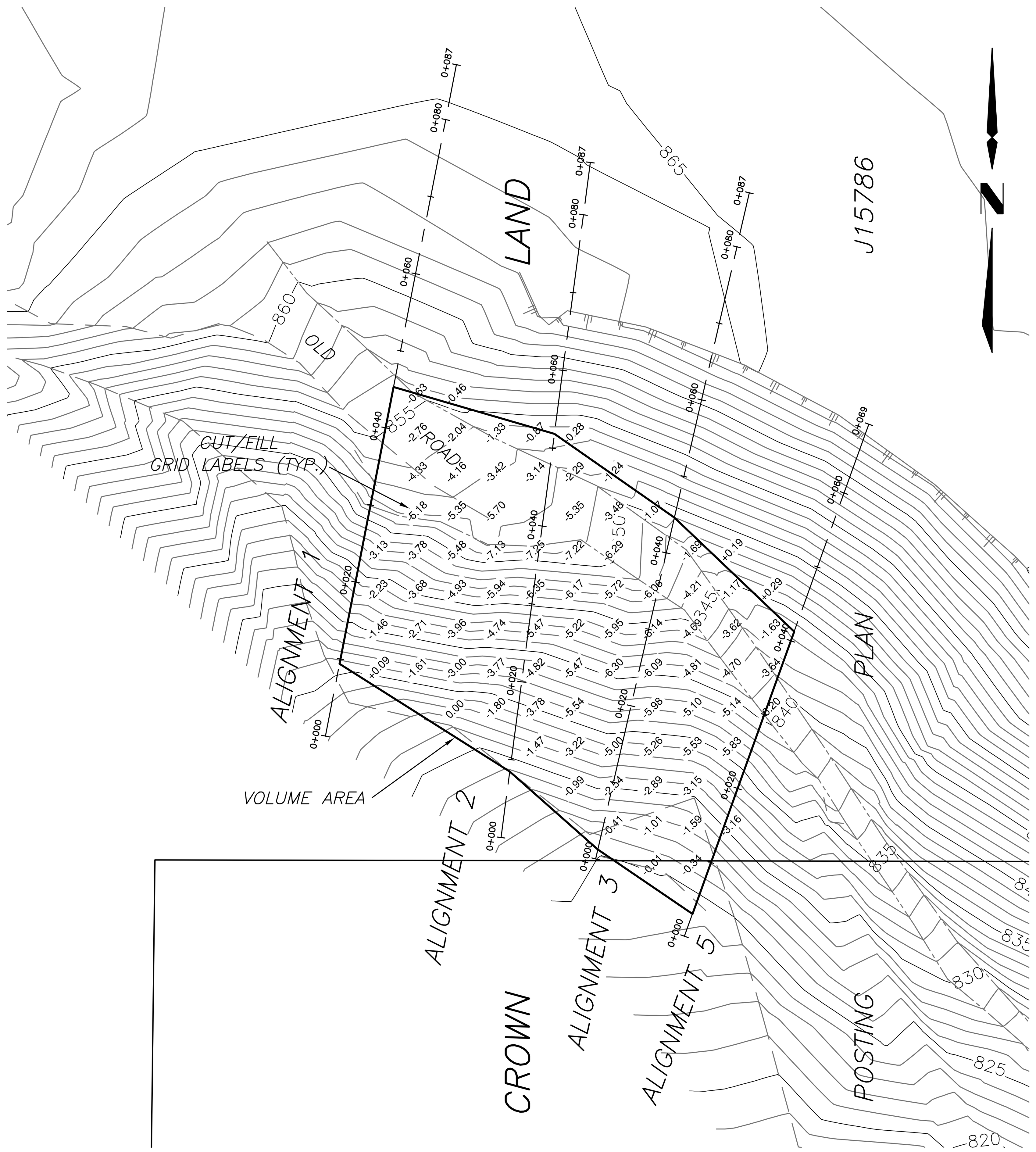
SLR Project No.: 219.05112.00008

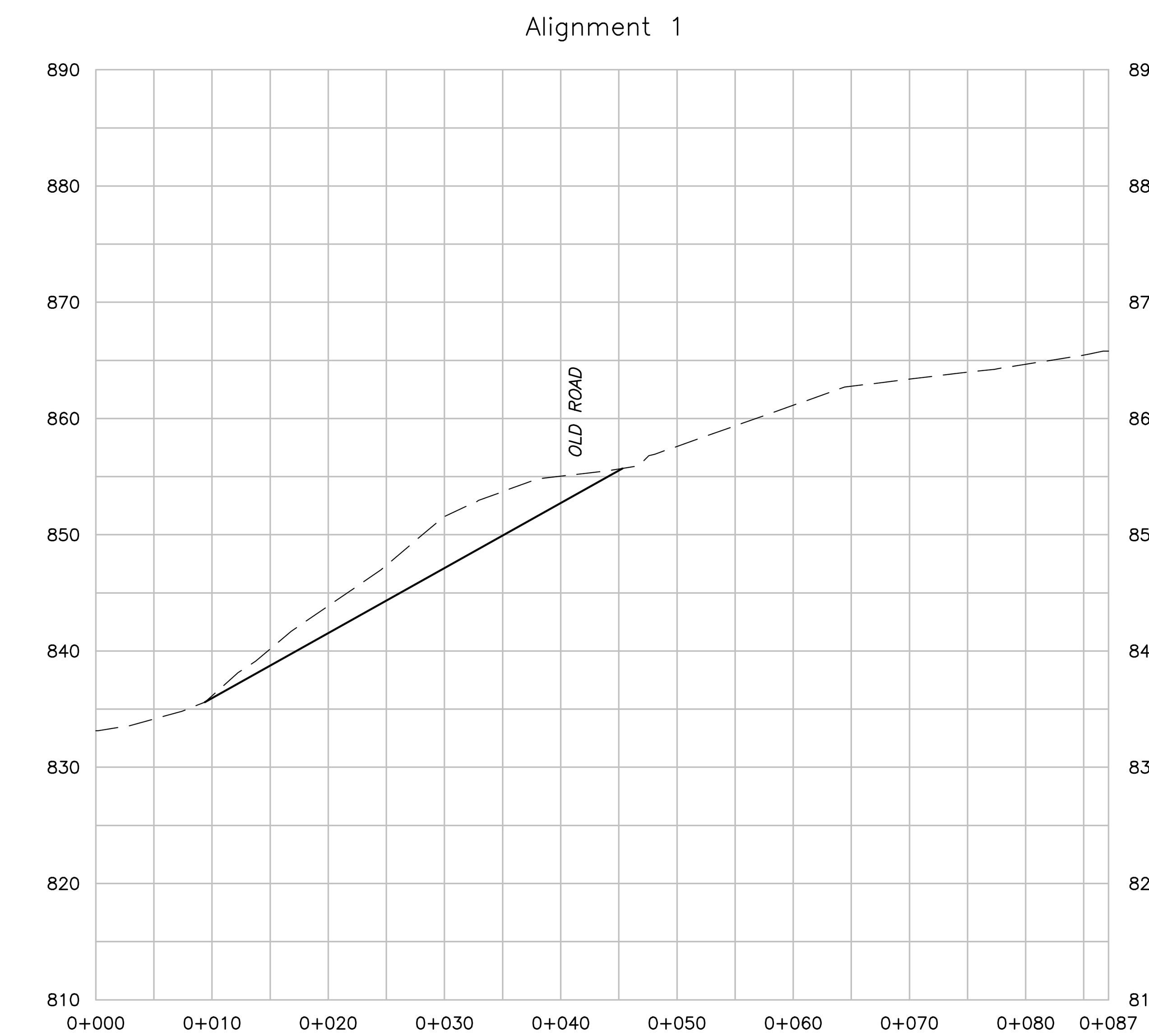
Scale = 1:500

10 5 0 10 20 30 40

Metres

1:500 Horizontal 1:500 Vertical





LEGEND

Date of field survey: March 22 & 23, 2010

Elevations are derived from GPS observations on Invermere ACP 16448, Elevation = 843.962M

Parcel boundaries shown heron are derived from Land Title office records. Boundaries are approximate.

Contours shown are existing ground surface March 23, 2010

Contour Interval = 1.0 meter

All distances are in metres and decimals thereof unless otherwise noted.

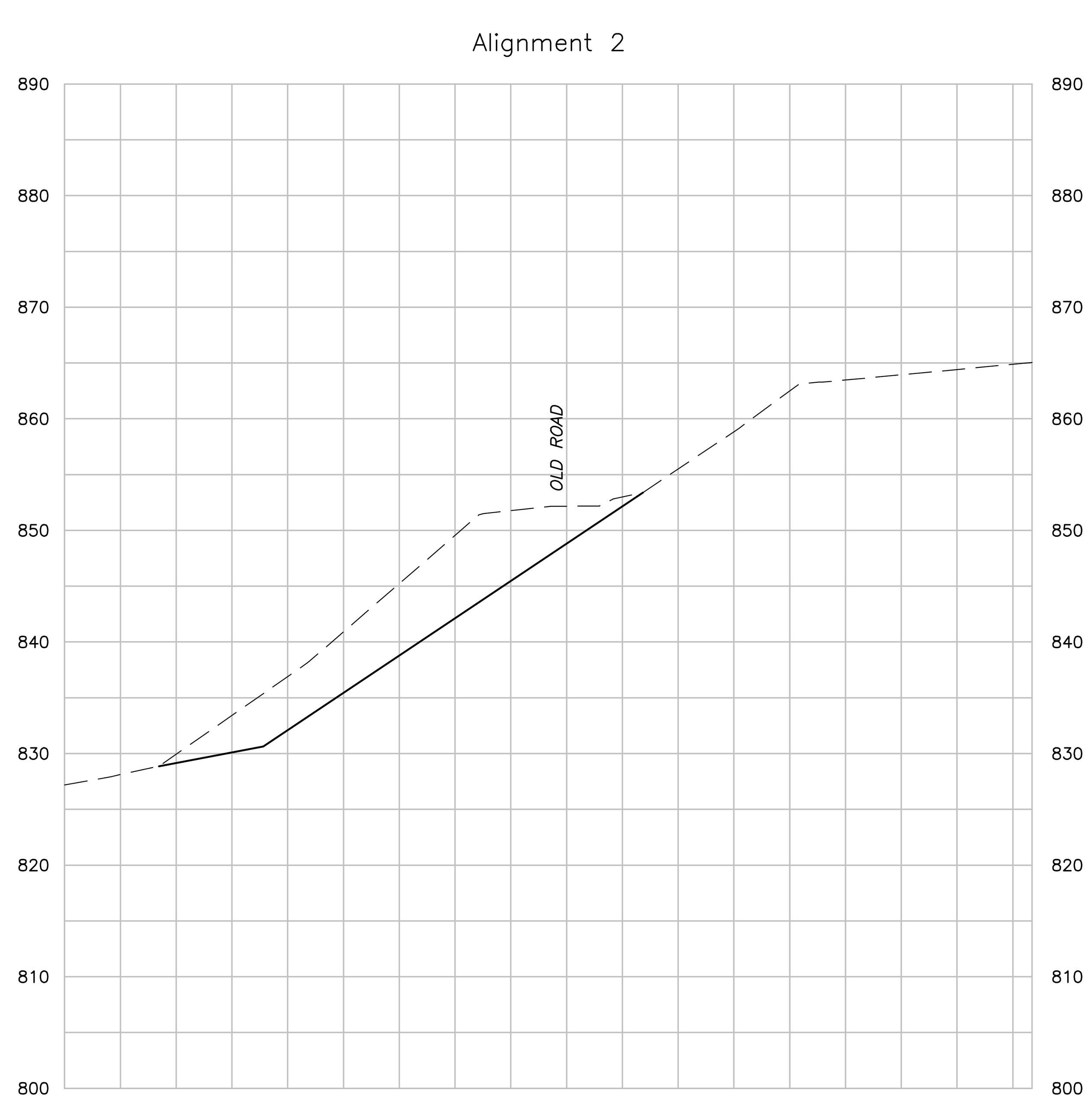
denotes Bottom of Slope

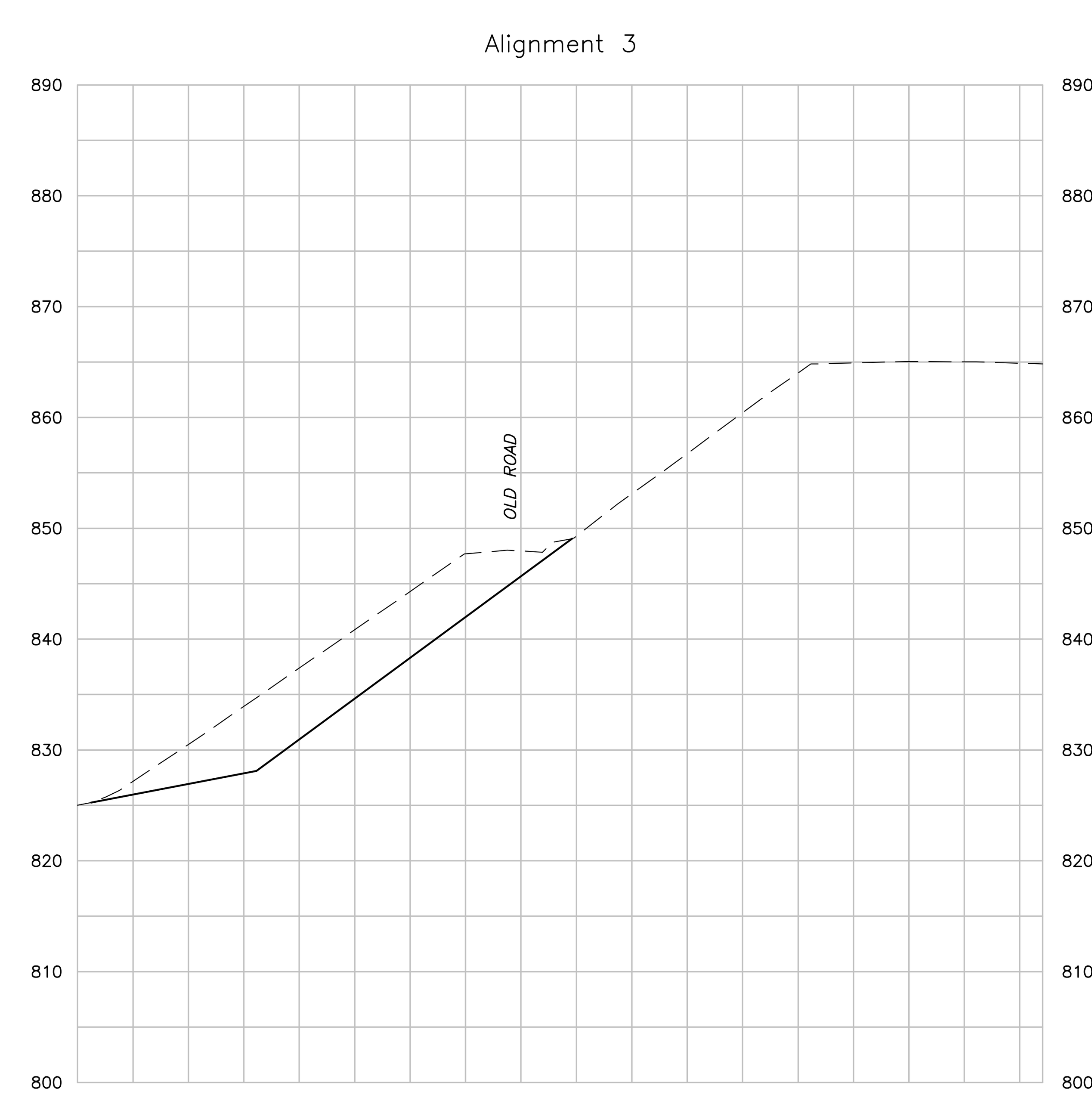
denotes Top of Slope

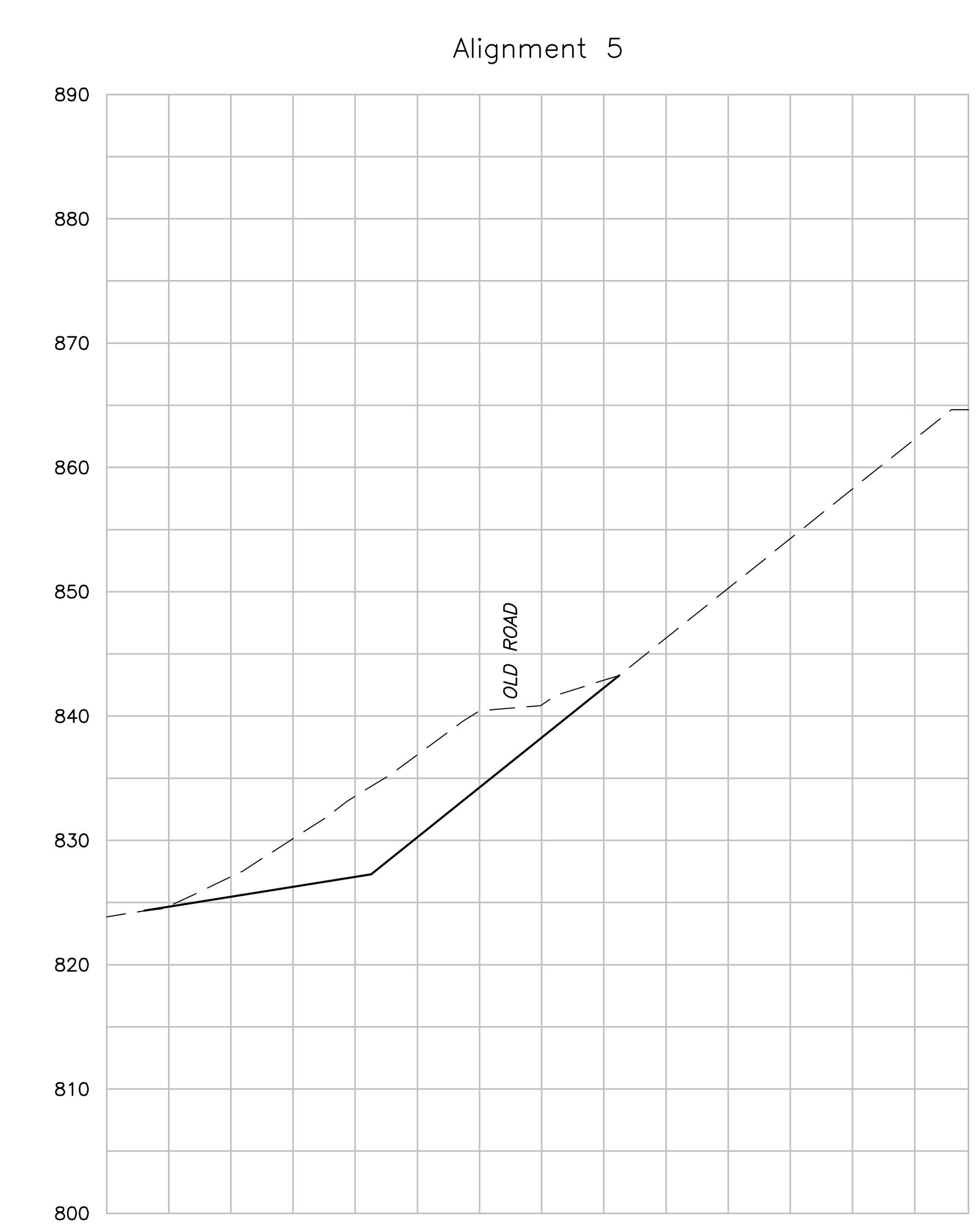
denotes existing ground surface March 23, 2010

denotes surface for volume calculations (normal slope angle as per SLR pdf markup received February 14, 2014)

Volume = 8200m3 cut







FOCUS

Focus Surveys (BC) Limited Partnership
7120 – 10th Street, Invermere, BC
t: 250–342–9767 www.focus.ca

PROJECT
SLR CONSULTING

PROJECT REF. 010047749

SHEET TITLE
VOLUME CALCULATION AREA BETWEEN ALIGNMENT 1 AND ALIGNMENT 5

DRAWN	DATE	CHECKED	SCALE
BKS	2014.02.18	VL	1:500

SHEET No. **010047749-MCSI01-R02**

global environmental solutions

Calgary, AB
134, 12143 40 Street SE
Calgary, AB T2Z 4E6
Canada
Tel: (403) 266-2030
Fax: (403) 263-7906

Calgary, AB (Downtown)
2600, 144 4 Avenue SW
Calgary, AB T2P 3N4
Canada
Tel: (403) 514-8222
Fax: (403) 263-7906

Edmonton, AB
6940 Roper Road
Edmonton, AB T6B 3H9
Canada
Tel: (780) 490-7893
Fax: (780) 490-7819

Fort St. John, BC
9943 100 Avenue
Fort St. John, BC V1J 1Y4
Canada
Tel: (250) 785-0969
Fax: (250) 785-0928

Grande Prairie, AB
10015 102 Street.
Grande Prairie, AB T8V 2V5
Canada
Tel: (780) 513-6819
Fax: (780) 513-6821

Halifax, NS
115 Joseph Zatzman Drive
Dartmouth, NS B3B 1N3
Canada
Tel: (902) 420-0040
Fax: (902) 420-9703

Kamloops, BC
8 West St. Paul Street
Kamloops, BC V2C 1G1
Canada
Tel: (250) 374-8749
Fax: (250) 374-8656

Kelowna, BC
200 1475 Ellis Street,
Kelowna, BC V1Y 2A3
Canada
Tel: (250) 762-7202
Fax: (250) 763-7303

Markham, ON
101, 260 Town Centre Blvd
Markham, ON L3R 8H8
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Fax: (905) 415-1019

Nanaimo, BC
9 - 6421 Applecross Road
Nanaimo, BC V9V 1N1
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Prince George, BC V2N 1W9
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Regina, SK
1054 Winnipeg Street
Regina, SK S4R 8P8
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Tel: (306) 525-4690
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Sydney, NS
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Sydney, NS B1P 6J1
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Vancouver, BC (Head Office)
200, 1620 West 8 Avenue
Vancouver, BC V6J 1V4
Canada
Tel: (604) 738-2500
Fax: (604) 738-2508

Victoria, BC
6 - 40 Cadillac Avenue
Victoria, BC V8Z 1T2
Canada
Tel: (250) 475-9595
Fax: (250) 475-9596

Winnipeg, MB
Unit D, 1420 Clarence Avenue
Winnipeg, MB R3T 1T6
Canada
Tel: (204) 477-1848
Fax: (204) 475-1649

Whitehorse, YT
6131 6 Avenue
Whitehorse, YT Y1A 1N2
Canada
Tel: (867) 689-2021

Yellowknife, NT
Unit 44, 5022 49 Street
Yellowknife, NT X1A 3R8
Canada
Tel: (867) 765-5695

global environmental solutions

Former Refuse Site – Wilmer Marsh Unit
Columbia National Wildlife Area
Near Wilmer, British Columbia

DFRP# 16096, ARMS #00394, FCSI# 16096079

2014/2015 Site Works Summary

March 2015
SLR Project No.: 219.05112.00010

2014/2015 SITE WORKS SUMMARY
FORMER REFUSE SITE – WILMER MARSH UNIT
COLUMBIA NATIONAL WILDLIFE AREA
NEAR WILMER, BRITISH COLUMBIA

SLR Project No.: 219.05112.00010

Prepared by
SLR Consulting (Canada) Ltd.
200 – 1475 Ellis Street
Kelowna, BC V1Y 2A3

for

Public Works and Government Services Canada
219-800 Burrard Street
Vancouver, BC V6Z 0B9

31 March 2015

Prepared by:

Marci Martin, B.Sc., A. Ag.
Environmental Scientist

Krystal Ashworth, B.Sc., A. Ag.
Environmental Scientist

Kalina Noel, B.Sc., M.E.Des., R.P.Bio.
Professional Biologist

Reviewed by:

BRITISH COLUMBIA 1598 Lindsay Paterson INSTITUTE OF AGROLOGISTS

08/13/2015

Lindsay Paterson, M.Sc., P.Ag.
Project Manager

David McKeown, B.Sc., R.P.Bio.
Project Manager

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EXECUTIVE SUMMARY

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Works and Government Services Canada (PWGSC) on behalf of Environment Canada (EC) to provide environmental field supervision and monitoring services prior to and during a site remediation and restoration program for the unofficial refuse area within the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA) (the Site). Unauthorized disposal of refuse has historically occurred at the Site and has resulted in the contamination of soil, sediment and surface water. The remediation and restoration program was conducted between January and March 2015 by the Remediation Contractor (King Hoe Excavating Ltd. (KHE)).

The remediation and restoration program involved the removal of debris and associated contaminated soil from four general areas:

- Marsh Area: removal of debris from the marsh adjacent to 2011 marsh foreshore excavation (no sediment removal);
- Surficial Debris Field in the Trail Area: removal of surficial debris from the trail, adjacent slope and gully (no soil removal);
- Area of Impact 3 (AI3) in the Trail Area: removal of non-contaminated soil and debris from an identified debris area at the base of the south slope of the Site; and
- Main Debris Zone (MDZ) in the Trail Area: removal of contaminated soil and debris from an extensive area along the southern slope of the Site.

The Site is located in the Columbia NWA which is a federally protected area designated to conserve wildlife and their habitat and is not intended for recreational uses. Due to the potential presence of sensitive species and habitat in the proposed work areas at the Site, the remediation and restoration activities were completed within the migratory bird window for the Site. The remediation and restoration work was completed between January 20 and March 13, 2015. An SLR Environmental Monitor was present at the Site for the duration of the remediation and restoration program to ensure that remedial activities did not negatively impact sensitive species or their habitat.

The soils at the Site are comprised of fine-textured glaciolacustrine materials that are susceptible to surface erosion and instability once disturbed. Geotechnical assessment of the Main Debris Zone in 2013-2014 concluded that remedial excavation activities in the area may accelerate surface erosion, gullying and slump failure. Due to the terrain and sensitive soils at the Site, the remediation and restoration work in the Main Debris Zone was monitored by Geotechnical Monitors provided by SLR's subcontractor, Clarke Geoscience Ltd. (CGL).

Field activities to support remedial planning were conducted in October and November 2014 and included wildlife surveys, installation of a sediment curtain in the marsh with subsequent fish salvage, identification of historic American badger (*Taxidea taxus*) burrows, wildlife trees and areas of undisturbed native vegetation for mapping of exclusion zones and collection of baseline water samples from the marsh for analysis of turbidity parameters. Additional remedial planning activities included the preparation of permit/approval applications for the remediation project for submission to various regulatory agencies, the development of site-specific soil remedial targets (SSRTs) and the preparation of National Master Specification (NMS) tender documents for the remediation and restoration project.

SLR and KHE were present at the Site from January 20 to March 13, 2015 for the remediation and restoration program. Prior to the intrusive works, SLR's Environmental Monitor reviewed the site conditions, inspected mobile equipment for invasive species and contamination, reviewed the construction of the soil and debris management facility (SDMF) and demarcated the vegetation and wildlife exclusion zones. Throughout the remediation project, SLR's Environmental Monitor monitored the contractor's adherence to their Environmental Protection Plan (EPP) as well as the project permits and tender specification.

Prior to debris removal in the marsh area, an ice assessment to determine the weight-bearing capacity of the ice and an electromagnetic (EM) survey to pinpoint debris were completed. A spider hoe (agile excavator) was used to remove debris from the pre-cut chainsaw holes in the ice. The debris was then transported to the SDMF by helicopter. In total, 5.42 tonnes of metal debris was removed from the marsh area and was taken off-site as salvageable material. Sediment was not removed from the marsh during the remediation and no subsequent restoration activities were conducted.

A total of 5.865 tonnes of surficial debris was removed from the trail area using the spider hoe. The debris was transported to the SDMF using morookas for eventual transport offsite as salvageable material.

A total of 200.215 tonnes of soil and salvageable metal debris was excavated from AI3 and transported to the SDMF using morookas. Confirmatory wall and base samples were collected from the AI3 excavation footprint prior to restoration activities (re-contouring, seeding, coco-matting, placing woody debris and constructing cross ditches). AI3 excavation limit samples contained concentrations of benzene, ethylbenzene and/or toluene in soil exceeding the Canadian Council of Ministers of the Environment (CCME) Agricultural land (AL) guidelines. It is anticipated that the exceedances in AI3 can be addressed during future risk assessment activities; although some additional investigation and/or hydrogeological modelling may be required to support the risk assessment.

A total of 3352.575 tonnes of mixed soil and debris was removed from the MDZ and transported to three pre-approved disposal facilities. Confirmatory wall and base samples were collected from the MDZ excavation footprint prior to restoration activities (described previously). However, debris still remains embedded in the north wall and along the base of the MDZ excavation. Several confirmatory samples contained concentrations of metals exceeding the CCME AL guidelines but not the SSRTs, with the exception of two samples that exceeded the CCME AL guidelines and SSRTs for lead and zinc. Select limit samples contained concentrations of toluene and phenanthrene exceeding the CCME AL guidelines; it is anticipated that these exceedances can be addressed during future risk assessment activities.

All the debris and associated soil within the MDZ could not be removed during the current remediation and restoration program due to geotechnical considerations and project constraints (budget and schedule). In order to access the remaining debris in the north wall of the MDZ, the north slope would need to be excavated back an additional 3.0 to 4.0 m from the existing edge in order to create a geotechnically stable slope or benches to access the remaining debris embedded in the north wall. This would result in the probable loss of native vegetation along the top of the slope as well as a significant loss of native soil. For reference purposes, it has been estimated that approximately 3,750 m^3 of upslope material (including native soil) would need to be excavated in order to access and remove the debris remaining in the north slope in a safe manner. It is anticipated that the majority of this material would need to be disposed off-site once excavated due to the difficulty in consolidating and stabilizing these materials once disturbed.

Alternatively, it may be desirable not to conduct additional excavation of the MDZ but rather conduct long-term restoration works which could include backfilling the MDZ to provide a protective cap and planting native juvenile plants (e.g., grasses) in the area. Due to the difficulty associated with consolidating and stabilizing the disturbed native soil since it is assumed that only native soils would be approved for use as a protective cap by Canadian Wildlife Service (CWS), it may be desirable to conduct toxicity testing on shallow soil in the MDZ (i.e. 0-1 m depth) to evaluate whether adverse effects to ecological receptors from the residual soil contamination are likely. If the latter approach is undertaken, it is recommended that the ecological protection goals be determined in advance of the toxicity testing in consultation with EC and CWS.

SLR recommends the following activities to facilitate future remediation and/or restoration works at the Site:

- Completion of a site visit with PWGSC, EC and CWS to discuss the long-term vision for the Site and obtain confirmation on long-term geotechnical and restoration measures to be implemented at the Site;
- Preparation of a geotechnically engineered excavation design for the MDZ and/or long-term restoration plan for the trail. The professionally certified/stamped designs would be included in any subsequent tender specification developed for the future remediation project;
- Review of the excavation and/or long-term restoration designs by CWS to confirm the desired approach; and
- Preparation of project tender specification based on the desired approach indicated by CWS for posting on the PWGSC Buy and Sell service.

The costs associated with the future site closure activities are estimated to range from $520,659 (soil toxicity testing and restoration only) to $1,857,891 (excavation of remaining MDZ debris and restoration).

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DRAWINGS

APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

AI3	Area of Impact 3
AKS	AKS Geoscience Inc.
AL	Agricultural Land
AEC	Area of Environmental Concern
APEC	Area of Potential Environmental Concern
AVS	Acid Volatile Sulfides
AW	Aquatic Life
BC	British Columbia
BCMOE	BC Ministry of Environment
BFD	Blind Field Duplicate
Braun	Braun Geotechnical Ltd.
BTEX	Benzene, Toluene, Ethylbenzene, Total Xylenes
CADD	Computer Aided Design and Drafting
CCME	Canadian Council of Ministers of the Environment
CEAA	Canadian Environmental Assessment Act
CEQG	Canadian Environmental Quality Guidelines
CLG	Clarke Geoscience Limited
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
CSR	Contaminated Sites Regulation
CWS	Canadian Wildlife Service
°C	Degrees Celcius
DFO	Fisheries and Oceans Canada
DQERA	Detailed Quantitative Ecological Risk Assessment
EC	Environment Canada
EKES	East Kootenay Environmental Society
EM	Electromagnetic
EMP	Environmental Management Plan
EPH	Extractable Petroleum Hydrocarbons
EPP	Environmental Protection Plan
ESA	Environmental Site Assessment
ERSD	Alberta Ministry of Environment and Sustainable Resource Development

FCSI	Federal Contaminated Sites Inventory
GPS	Global Positioning System
Greely	Greely Rock Ltd.
H&S	Health and Safety
HASP	Health and Safety Plan
HEPH	Heavy Extractable Petroleum Hydrocarbons
HHERA	Human Health and Ecological Risk Assessment
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
HWR	Hazardous Waste Regulation
ILCR	Incremental Lifetime Cancer Risk
ISGQ	Interim Sediment Quality Guidelines
KHE	King Hoe Excavating Ltd.
km	Kilometres
LEL	Lower Explosive Limit
LEPH	Light Extractable Petroleum Hydrocarbons
Lotic	Lotic Environmental Ltd.
m	Metres
m asl	Metres above sea level
m bgs	Metres below ground surface
m^3	Cubic Metres
mg/kg	Milligrams per kilogram
MDZ	Main Debris Zone
MFLNRO	Ministry of Forests, Lands and Natural Resource Operations
mL	Millilitre
NL	Non-Agricultural Land
NMS	National Master Specification
NWA	National Wildlife Area
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PCOC	Potential Contaminant of Concern
PEL	Probable Effect Levels
PHC	Petroleum Hydrocarbon
ppmv	Parts Per Million by Volume
PWGSC	Public Works and Government Services Canada

QA/QC	Quality Assurance/Quality Control
QMLP	Quantum Murray LP
RA	Risk Assessment
RAP	Remedial Action Plan
RDEK	Regional District of the East Kootenays
ROC	Receptor of Concern
RPD	Relative Percentage Difference
SARA	Species at Risk Act
SCT	Site Closure Tool
SDMF	Soil and Debris Management Facility
SEACOR	SEACOR Environmental Inc.
SEM	Simultaneously Extractable Metals
SLERA	Screening Level Ecological Risk Assessment
SPIDEX	SPIDEX All Terrain Excavating
SSHHERA	Site-Specific Human Health and Ecological Risk Assessment
SSRT	Site-Specific Remedial Target
SWOG	Special Waste Oil and Grease
TOR	Terms of Reference
Trimble	Trimble GeoXH GPS
TRV	Toxicity Reference Values
UTM	Universal Transverse Mercator
Vast	Vast Resource Solutions Inc.
VOC	Volatile Organic Compound
VPH	Volatile Petroleum Hydrocarbons

1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Works and Government Services Canada (PWGSC), on behalf of Environment Canada (EC), under Task Authorization 700301769 and Standing Offer Agreement number E0276-110680/001/XSB to provide environmental field supervision and monitoring services prior to and during a site remediation and restoration program for the unofficial refuse area within the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA) (hereafter referred to as the Site). Unauthorized disposal of refuse has historically occurred at the Site and has resulted in the contamination of soil, sediment and surface water. The remediation and restoration program was conducted between January and March 2015 by the Remediation Contractor (King Hoe Excavating Ltd. (KHE)). The location of the Site is depicted on Drawing 1.

1.1 Project Objective

The objective of the 2014-2015 site works was to facilitate and complete the remediation and restoration of select areas at the Site, specifically the marsh and trail areas of the Site, in accordance with the Remedial Action Plan (RAP), developed by SLR in 2013-2014 (SLR, 2014).

1.2 Scope of Work

As per SLR's work plans submitted to PWGSC in July/August 2014 and November 2014, SLR's scope of work in 2014-2015 included six tasks: permitting support, tender specification development, pre-remediation field activities, site-specific soil remedial target (SSRT) development, remediation monitoring and reporting.

Task 1 – Permitting Support: SLR was responsible for preparing and submitting all required regulatory/permit applications for the proposed remediation project and supporting field activities and liaising with Canadian Wildlife Service (CWS), Fisheries and Oceans Canada (DFO), BC Ministry of Environment (BCMOE), BC Ministry of Forests, Lands and Natural Resource Operations (BC MFLNRO), Environment Canada (EC) and PWGSC as required.

Task 2 – Tender Specification Preparation: SLR was responsible for preparing and finalizing National Master Specification (NMS) tender specification for the proposed remediation and restoration project.

Task 3 – Pre-Remediation Field Activities: SLR completed field activities in support of the proposed remediation project in 2014, including: wildlife surveys; installation of a sediment curtain in the marsh; fish salvage; identification of historic American badger burrows, wildlife trees and areas of undisturbed native vegetation for mapping exclusion zones; and collection of baseline water samples.

Task 4 – SSRT Development: SLR developed risk-based soil remedial targets for the remediation work areas for incorporation into the tender specification.

Task 5 – Remediation Monitoring: The activities under this task included field supervision of the remediation project and the provision of geotechnical and environmental monitoring services related to sensitive aspects at the Site (i.e., soils and species/habitat, respectively). Project management duties were also completed under this task.

SLR's Field Supervisors and Environmental Monitors were on-site for the duration of the project. Field supervision and environmental monitoring duties performed by SLR during the remediation project included:

- Preparing a project-specific Health and Safety Plan (HASP);
- Coordinating activities with sub-contractors and KHE;
- Attending meetings (health and safety (H&S), project progress, etc);
- Reviewing site preparation activities;
- Identifying excavation limits and exclusion zones;
- Collecting excavation limit samples;
- Monitoring excavation volumes;
- Monitoring site reinstatement (grading, contouring, erosion control features);
- Reviewing KHE's compliance with the Environmental Protection Plan (EPP);
- Monitoring KHE's compliance with the project permits as well as other conditions outlined in the tender specification documents;
- Monitoring KHE's traffic control;
- Monitoring KHE's cleaning and decontamination activities;
- Notifying the Departmental Representative of any observed or anticipated adverse impacts to sensitive species and/or habitat;
- Advising KHE of any modifications required to ensure protection of sensitive habitat and/or wildlife (i.e., to access/egress routes, placement of equipment, erosion and sediment control, etc.);
- Providing daily project updates to the SLR project managers; and
- Completing closeout inspections.

In addition, SLR retained Clarke Geoscience Ltd. (CGL) to provide geotechnical monitoring services during the remediation project. CGL retained Vast Resource Solutions Inc. (Vast) to assist in provision of geotechnical monitoring services. Geotechnical services provided by CGL/Vast during the remediation project included the following:

- Conducting a pre-work site inspection and tail-gate meeting with KHE to review site conditions;
- On-site monitoring during the remedial excavation program, including spotting slopes for equipment operators and periodically inspecting the slope for indications of accelerated instability; and
- Providing recommendations for impact mitigation of incidental stability or erosion control issues.

The SLR Field Supervisors, Environmental Monitors and Geotechnical Monitors recorded the day's site activities in daily reports, which were emailed to SLR project managers at the end of each day. The reports included details of the work performed, health and safety issues, samples collected, on-site and off-site soil movement, backfill import, unit price table quantities accrued daily, erosion and sediment control activities and/or concerns, geotechnical observations and environmental monitoring observations. A copy of SLR's daily reports is included in Appendix A.

Project management activities completed by SLR for the task included:

- Reviewing Contractor pre-work submittals;

- Coordinating activities with Geotechnical Monitors, Environmental Monitors and Field Supervisors;
- Liaising with the Contractor and PWGSC to schedule project activities;
- Attending meetings (H&S, pre-construction kickoff, project progress, etc);
- Providing daily project updates to PWGSC;
- Providing regular budget updates to PWGSC;
- Reviewing analytical data and quality assurance/quality control (QA/QC) metrics; and
- Completing project invoicing.

Task 6 – Reporting: This report satisfies the project reporting requirements and includes a summary of previous environmental works at the Site (Section 3.0), documents works which occurred at the Site in 2014 and 2015 in support of remedial planning (Section 4.0), outlines the remediation and restoration program conducted in 2015 (Section 5.0), presents soil chemistry results from the remediation project (Section 6.0) and provides recommendations for future site activities (Section 7.0).

2.0 SITE DESCRIPTION

2.1 Site History

The Site is situated within the Wilmer Marsh Unit of the Columbia NWA and is located approximately 1.2 kilometres (km) north of the village of Wilmer, British Columbia (BC) (50°33'00.78"N, 116°04'16.82"W). The Columbia NWA is managed by the CWS of EC. The Wilmer Marsh Unit is the southernmost of four units that make up the Columbia NWA. It is SLR's understanding that the Wilmer Marsh Unit and by extension the Site, is owned by CWS. CWS has indicated that the Wilmer Wildlife Area, as it is also known, was first established in 1973 when CWS acquired privately owned lands that were to be developed into recreational and residential subdivisions. The area was officially designated as a wildlife area under the Canada Wildlife Act, Wildlife Area Regulation in 1978.

The Columbia NWA is a federally protected area designated to conserve wildlife and their habitat and is not intended for recreational uses. It is an important segment of a bird migratory corridor within the Pacific Flyway. Staff from EC and other federal departments also use these lands to conduct research. Human activities by the general public are limited and regulated under the Federal Wildlife Area Regulations (C.R.C., c. 1609), under the Canada Wildlife Act. Under the Wildlife Area Regulations, prohibited human uses include hunting; fishing; grazing livestock; allowing domestic animals to run at large; swimming; picnicking; camping; lighting a fire; operating a conveyance; disturbing or removing plants, soils or any other materials; or dumping or depositing any other materials. These uses are prohibited unless a permit is obtained from an authorized federal authority or a federal authority has posted a notice indicating specific activities are permitted in specific locations.

Past non-permitted human uses of the Wilmer Marsh Unit of the Columbia NWA have included livestock grazing and recreational pursuits such as fishing, hang-gliding, hunting, canoeing, hiking and all-terrain and off-road vehicle use. However, the most prevalent non-permitted use of the Site has been the unauthorized historical disposal of refuse. Previous reports and site visits have indicated that this has occurred at the Site over the past several decades. Refuse deposited at the Site included, but was not limited to, automobile bodies and parts, cans, glass, building debris, scrap metal, used oil containers and filters, automotive batteries, drums, etc. on both the uplands bench and the shoreline/marsh below. The East Kootenay Environmental Society (EKES) reportedly conducted a clean-up of the Site (uplands, shoreline and marshlands) in 1997 which included the removal of approximately 150 car bodies.

2.2 Physical Setting and Soils

The Site is located within the Columbia River Valley in southeastern BC. The Columbia River Valley is part of the Rocky Mountain Trench which separates the Rocky Mountains to the east from the Purcell Mountains to the west. The Site is located on the western side of the valley and consists of remnant river bench upland with an adjacent shoreline and marsh below. The benchland is relatively flat, with steep slopes and gullies on the south, east and north boundaries; Wilmer Marsh borders the Site at the bottom of the steep slopes to the east. The average elevation across the benchland is 870 metres above sea level (m asl) and the elevation of Wilmer Marsh below is 810.5 m asl, an elevation change of approximately 60 m. A steep trail leads down to the marsh along the southern edge of the uplands bench. A fence borders the Site along the western boundary (along Westside Road); prior to 2012, the fence included a narrow person gate (no vehicle access), but this was removed in 2012 to deter human access to the Site. There are no buildings, utilities or any other structures on the Site.

Soils on the uplands bench are well-drained glacio-lacustrine silts, with minor amounts of clay and fine sands, likely overlying till. The southern and eastern portions of the Site are sparsely vegetated; the vegetative regime includes Sagebrush (*Artemisia cana*), Pasture Sage (*Artemisia frigida*), Sandberg's Bluegrass (*Poa secunda*), Bluebunch Wheatgrass (*Agropyron spicatum*) and various fescues (*Festuca* sp.). The northern portion of the Site is well vegetated; the vegetation regime includes Douglas Fir (*Pseudotsuga menziesii*), Rocky Mountain Juniper (*Juniperus scopulorum*) and Bluebunch Wheatgrass (*Agropyron spicatum*). On the wetter northern aspects, including the gullies leading down to the marsh, the vegetation grades to include Douglas Fir (*Pseudotsuga menziesii*), Pinegrass (*Calamagrostis rubescens*) and Stepmoss (*Hylocomium splendens*).

Soils on the higher areas of the shoreline consist of moderately-drained glacio-lacustrine silts, with minor amounts of clay and fine sands, likely overlying till at depth. Vegetation includes sedges (*Carex* sp.) in areas subject to seasonal flooding, cattails (*Typha latifolia*), bulrushes (*Scripus* sp.) and horsetails (*Equisetum* sp.). Vegetation in the marsh includes bladderwort (*Utricularia vulgaris*), yellow pond lily (*Nuphar variegatum*) and pondweed (*Potamogeton* sp.).

The marsh area is shallow and seasonally fluctuating water levels result in marsh shoreline areas expanding and contracting as determined by elevation and regional climatic influences. Consequently, areas of marsh sediment are under water during higher water levels and exposed as surface soil during lower water levels. The sediments contain visible organic matter and were observed to have a dark appearance and viscous consistency.

2.3 Climatology

Climate normals for the region were reviewed using meteorological data for the Kootenay National Park West Gate Station (ID 1154410), which is the closest station to the Site. Data used were compiled for the years of 1981 to 2010 from the Canadian Climate Normals (website address-http://climate.weatheroffice.ec.gc.ca/climate_normals). The average annual precipitation for this station was 341.9 mm of rain and 99.2 cm of snowfall, totalling 441.1 mm of precipitation. The highest average monthly rainfall occurs during the months of May to August and ranges from 40.7 mm to 69.0 mm. The highest average monthly snowfall occurs in the months of December and January and ranges from 25.5 cm to 27.2 cm. The daily maximum temperature occurs in July at 25.6^{o}C and the daily minimum temperature occurs in December and January at -9.7^{o}C. Extreme maximum and minimum temperatures were measured in August 1998 (37.5^{o}C) and December 1968 (-37.8^{o}C), respectively.

2.4 Hydrogeology

As stated previously, the Site is located within the Columbia River Valley which is part of the Rocky Mountain Trench. The Columbia River flows northwest through this valley until it reaches the northern end of the Selkirk Mountain Range (Big Bend Country), where it turns sharply and then flows south through the Arrow Lakes and into the United States. The Wilmer Marsh Unit is located in the Columbia Wetlands and is comprised of approximately seventy percent riverine marshlands and approximately thirty percent uplands bench areas.

The topography of the Site is fairly flat across the centre of the uplands bench, sloping steeply downwards on the south, east and northern edges of the bench. The shoreline is narrow and slopes towards the marshlands; it is bounded by steep slopes leading to the uplands bench to the west. There is evidence across the Site of rilling and erosion due to surface water runoff.

It is anticipated that groundwater in the area of the Site is consistent with the elevation of the marsh; consequently, groundwater is assumed to be approximately 60 m below grade in the area of the uplands bench at the Site. No groundwater wells have been advanced on the Site and consequently groundwater flow direction cannot be inferred from measured groundwater elevations. Based on local and regional topography, local groundwater beneath the bench is expected to flow in an eastern to northeastern direction towards Wilmer Marsh and the Columbia River beyond.

No water wells were identified on the BC Water Resources Atlas within a 500 m radius of the Site; water wells were identified southeast of the Site in the village of Wilmer, approximately 1.0 km away. Well records for these wells indicated that the depth to water-bearing gravels was generally more than 30 m below grade in that area.

2.5 Current and Future Land Use

It is anticipated that ownership and future land use at the Site, will be the same as the current use as a federally owned NWA. To the best of SLR's knowledge, there is no plan currently, or in the future, to allow the Site to be used for recreational activities.

2.6 Adjacent Land Use

The adjacent lands to the north, east and west are also part of the Columbia NWA. Similar to the Site, it is anticipated that these lands would continue to be federally protected wildlife areas in the future with no allowance for human recreational use.

Westside Road borders the Site to the west and it is anticipated that it will continue to provide vehicle access between the village of Wilmer and lands further north into the future.

The parcel adjacent to the south boundary of the Site (SE ¼ Lot 5, DL 377, Plan X-15) was forfeited to the Provincial Crown in 1989. The adjacent lands to the south are currently undeveloped.

2.7 Applicable Regulatory Guidelines

The Columbia NWA is crown-owned land under the custodianship of CWS and, therefore, falls under federal regulatory jurisdiction. The prime regulatory framework considered is that of the Canadian Council of Ministers of the Environment (CCME). Provincial regulatory standards, guidelines and protocols were also referenced during the project. A detailed discussion of the regulatory context is included in Appendix B.

2.7.1 Land Use

Applicable regulatory guidelines and/or standards are often based on the current and/or potential land use at a site. In the absence of a wildlands land use designation within the federal guidelines, the Site has been classified as Agricultural (AL), for the following reasons:

- The CCME definition for Agricultural land use "includes agricultural lands that provide habitat for resident and transitory wildlife and native flora";
- The CCME definition for Residential/Parkland land use "excludes wildlands such as national or provincial parks"; and

- Agricultural land use guidelines tend to be the most sensitive guidelines and thus are considered appropriate in settings such as national parks or conservation areas, where conservatism is warranted.

2.7.2 CCME Guidelines

On the basis of the land use considerations discussed in the preceding section, as well as the proximity of Wilmer Marsh to the Site, the following federal guidelines are considered to apply to the Site:

- CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (Agricultural land use, fine-grained soil type, 10^{-5} incremental lifetime cancer risk (ILCR) level);

- CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (Freshwater);

- CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (interim sediment quality guidelines (ISQG) and probable effect levels (PEL)); and

- CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (Agricultural land use, fine-grained soil type).

Please note that the CCME soil quality guidelines have been considered applicable to soils that are located above the natural boundary or high water mark of Wilmer Marsh as well as to sediments that are seasonally exposed during periods of low water.

Exposure pathways considered applicable at the Site with respect to the soil guidelines listed above include:

- Direct contact (ingestion, dermal and/or particulate inhalation) by humans;
- Soil contact by ecological receptors;
- Soil and/or food ingestion by ecological receptors;
- Nutrient cycling;
- Protection of groundwater for aquatic life; and
- Management Limit (to prevent formation of non-aqueous phase liquids, fire/explosion hazards, etc).

Although groundwater in the vicinity of the Site is not used as drinking water currently (i.e. there are no registered water wells or surface water intakes within 500 m of the Site), soil quality guidelines protective of human consumption of groundwater have also been referenced in the event that groundwater in the vicinity of the Site is used as a potable water resource in the future in accordance with guidance from Health Canada to federal custodians.

2.7.3 BC Ministry of Environment

The BCMOE is the provincial environmental regulatory agency responsible for the administration of contaminated sites policy and management. Although the Site does not fall under provincial regulatory jurisdiction, the following provincial regulatory documents were referenced during the remediation project to facilitate soil disposal:

- Contaminated Sites Regulation (CSR, with amendments to 2014); and
- Hazardous Waste Regulation (HWR).

Numerous policies, procedures, protocols and guidance documents related to contaminated sites assessment, management and remediation have been published by BCMOE and are available on-line. Specifically, the CSR Schedule 7 standards for soil relocation to non-agricultural land (CSR NL) and the HWR Schedule 4 leachate quality standards were used for screening soil from the Site for disposal at permitted facilities in BC (i.e. Regional District of East Kootenay (RDEK) Columbia Valley landfill). In addition, the BCMOE Protocol 4 document was relied upon to determine the background soil concentrations of metals parameters at the Site.

2.7.4 Alberta Ministry of Environment and Sustainable Resource Development

The Alberta Ministry of Environment and Sustainable Resource Development (ESRD) is the provincial environmental regulatory agency responsible for the administration of waste control policy and management. Although the Site does not fall under Alberta regulatory jurisdiction, two of the disposal facilities that received excavated material from the Site are located in Alberta and, therefore, the following regulatory guidance applied to soil disposal:

- Alberta Environmental Protection: Alberta User Guide for Waste Managers (March 1996) for Class II Landfills.

3.0 PREVIOUS ENVIRONMENTAL WORKS SUMMARY

Numerous environmental works have been conducted at the Site including investigations of soil, sediment and surface water quality and remedial excavation and debris removal programs. The previous environmental investigations are summarized in the sections below. Please note that interpretation of the analytical results from the previous investigations has been completed with respect to current standards/guidelines rather than the guidelines applicable at the time of the original reports.

3.1 Phase 1 Environmental Site Assessment (ESA) and Soil, Sediment and Surface Water Sampling (PWGSC, dated January 2003)

A Phase 1 ESA was completed by PWGSC in 2002/2003 to determine if historical or current land use practices had resulted in any significant environmental impacts at the Wilmer Marsh Unit of the Columbia NWA (larger area including the Site). Based on the information gathered, the entire extent of the Site was identified as an Area of Potential Environmental Concern (APEC) due to the nature and extent of debris evident across the uplands, on the shoreline and in the marsh. A significant amount of waste material (including car bodies, old drums, cans, batteries, scrap metal, broken glass and asbestos-containing materials) was noted.

PWGSC conducted an investigation of the APEC (i.e. refuse disposal area) in August 2002. Fifteen soil samples were collected at eight locations and select samples analysed for metals, PHC fractions F2 - F4, polychlorinated biphenyls (PCBs) and hazardous materials (asbestos). The analytical results indicated the following:

- Asbestos was found in one bulk sample of building materials at the Site (30-50% chrysotile asbestos by volume);
- PHC F3 concentrations in soil sample WMU2 (0.05-0.2 m below ground surface [m bgs]) exceeded the CCME agricultural land use (CCME AL) PHC standards. A sample from WMU2 at 0.55-0.85 m bgs did not exceed the standards; and
- Concentrations of metals (specifically: cadmium, hexavalent chromium, copper, lead, tin and zinc) in four soil samples (WMU2, WMU4, WMU5 and WMU7) exceeded the CCME AL guidelines.

PWGSC also collected one sediment sample and one surface water sample during the investigation. The sediment sample was analysed for metals, PHC F2 - F4, PCBs and polycyclic aromatic hydrocarbons (PAH). The surface water sample was analysed for total metals, PAHs and extractable petroleum hydrocarbons (EPH). The analytical results indicated the following:

- Concentrations of arsenic, lead and zinc in the sediment sample exceeded the CCME ISGQ and/or PEL; and
- Concentrations of cadmium in the surface water sample exceeded the CCME water quality guideline for protection of aquatic life (CCME AW).

3.2 Phase 2 ESA (SEACOR, dated January 2004)

A Phase 2 ESA was completed by SEACOR Environmental Inc. (SEACOR), now part of SLR, in 2003/2004 to provide additional characterization of identified contamination areas in the uplands refuse disposal area and to assess additional areas where refuse was visible. Sampling was also conducted to further assess sediment and surface water contamination in the marsh immediately below the refuse area. A geophysical survey was conducted by Frontier

Geosciences Inc. on the uplands bench in November 2003 to assess the potential for buried objects at the Site. Several anomalies were detected during the geophysical survey; one anomaly near the western side of the bench was inferred to be a drum or small tank while other anomalies located across the bench were likely due to miscellaneous metallic surface debris consistent with previous observations of car parts and other metal debris. The Site reconnaissance indicated that despite snow cover of approximately 10 to 15 cm, metal debris was visible on the uplands bench in areas coincident with the geophysical survey results. It was observed that the asbestos debris previously noted on the Site had been removed.

In November 2003, SLR collected a total of twenty-seven soil samples at fifteen locations (HA1 to HA15), eighteen sediment samples at ten locations (MS1 to MS10) and four surface water samples at four locations (SW1 to SW4). Select soil, sediment and surface water samples were analysed for Benzene, Toluene, Ethylbenzene, Total Xylenes (BTEX), PHC F1 - F4, PAHs, metals and pH, Volatile Organic Compounds (VOCs), PCBs, glycols and/or select pesticides/herbicides. The analytical results indicated the following:

- Lead and thallium in two soil samples (HA5 and HA11) exceeded the CCME AL guidelines; tin in one sample (HA2) exceeded the CCME AL guideline;
- Arsenic, cadmium, copper, lead and zinc in one or more of five sediment samples (MS2, MS5, MS7, MS8 and MS9) exceeded the CCME ISQG and/or CCME PEL;
- Selenium concentrations in one sediment sample (MS9) exceeded the CCME AL guidelines for soil (compared to soil guidelines due to seasonal fluctuations in water levels); and
- Total aluminum, arsenic, cadmium, copper, iron (also dissolved), lead and zinc concentrations in one or more of three surface water samples (SW1, SW2 and SW3) exceeded the CCME AW guidelines.

The analytical results from the remaining soil, sediment and surface water samples submitted for laboratory analysis were less than the applicable CCME guidelines.

3.3 Supplemental Phase 2 Environmental Site Assessment (SLR, dated March 2009)

Supplemental Phase 2 ESA works were conducted at the Site by SEACOR in October 2005. The works were conducted to provide additional characterization of contamination at the Site and to further assess sediment and surface water contamination in the marsh immediately below the refuse area. An expanded geophysical survey relative to the one performed in November 2003 was completed at the Site by AKS Geoscience Inc. in January 2009. The results of this survey indicated responses that were consistent with piles of debris noted on the surface of the Site. The fence along Westside Road was also repaired to limit access to the Site.

SLR collected a total of nineteen surficial soil samples (HA05-20 to HA05-38), eight sediment samples (MS05-20 to MS05-27) and six surface water samples (SW05-10 to SW05-15) in October 2005. Select soil, sediment and surface water samples were analysed for BTEX, PHC F1 - F4, PAHs, metals and pH, VOCs, PCBs and/or acid volatile sulfides/simultaneous extractable metals (AVS/SEM, completed in sediment only). The analytical results indicated the following:

- Concentrations of PAH in soil exceeded the CCME AL guidelines at one location (HA05-31);

- Concentrations of tin and lead in soil exceeded the CCME AL guidelines at one location each (HA05-28 and HA05-37, respectively);
- Concentrations of arsenic, cadmium, copper, lead and zinc exceeded the CCME ISQG and/or CCME PEL in five sediment samples (MS05-21, MS05-22, MS05-23, MS05-24 and MS05-25); and
- Total aluminum, cadmium and/or iron concentrations exceeded the CCME AW guidelines in two surface water samples (SW05-12 and SW05-14).

The analytical results from the remaining soil, sediment and surface water samples submitted for analysis were less than the applicable CCME guidelines.

3.4 2009/2010 Supplemental Investigations and Site Works (SLR, dated March 2010)

3.4.1 2009/2010 Soil and Sediment Sampling Summary

In late 2009 and early 2010, SLR conducted supplemental soil, sediment and surface water sampling as well as other works at the Site. The purpose of the supplemental investigation was to delineate previously noted exceedances on the uplands and in the marsh, as well as to collect soil samples from the steep gullies that had not previously been investigated.

SLR visited the Site in November 2009 to attempt to collect delineation soil, sediment and surface water samples from the uplands and marsh. Due to unsafe weather conditions on the marsh (i.e., high winds), SLR was unable to collect the sediment or surface water samples during the November site visit. A total of thirty-four delineation soil samples were collected and submitted for one or more laboratory analyses including metals, PAHs, BTEX and Volatile Petroleum Hydrocarbons (VPH). Laboratory results for all soil samples submitted were less than the applicable CCME guidelines for the parameters analysed.

SLR returned to the Site in February 2010 to collect soil samples from five of the steep uplands gullies to assess the soils in these areas where significant debris accumulations were noted. An attempt was made to collect samples from the top of the slope and at two locations downslope. Twenty-one soil samples were collected and submitted for laboratory analysis of BTEX, PHC F1, EPH, PAHs and metals. The analytical results indicated the following:

- Concentrations of PAHs in one soil sample exceeded the CCME AL guidelines (M-3); and
- Concentrations of copper and lead in one soil sample exceeded the CCME AL guidelines (I-1).

During the February 2010 site visit, SLR again attempted to collect delineation sediment and surface water samples from the marsh. Due to the presence of ice on the marsh, surface water samples were not collected and, as the ice was unsafe in certain areas, only limited sediment sampling was conducted. Nine sediment samples were collected and submitted for laboratory analysis of metals. The analytical results indicated the following:

- Concentrations of arsenic, cadmium, copper, lead and zinc in several sediment samples exceeded the CCME ISQG and/or CCME PEL (1S, 1D, 2S, 3S, 3D, 4S, 4D and 5S).

The analytical results from the remaining soil and sediment samples submitted for laboratory analysis were less than the applicable CCME guidelines.

3.4.2 2010 Geotechnical Assessment

AMEC Earth and Environmental provided preliminary geotechnical recommendations for proposed remedial works at the Site in January 2010. CGL was subsequently contracted to provide a more detailed assessment of slope stability conditions in the area of the trail down to the marsh and the proposed debris removal area along the shoreline, as well as provide recommendations for erosion and sediment control measures to be implemented during and after remedial activities. CGL provided the following conclusions and recommendations:

- The slopes at the Site are inherently unstable and prone to slumping, sloughing and failures;
- A cavity (0.3 m wide by 1.5 m deep by approximately 20 to 30 m in length) is present in the central portion of the trail down to the marsh which may be an issue for equipment;
- The movement of equipment up and down the trail to and from the marsh will likely cause further instability in this area as it is prone to sloughing, piping and slumping; the trail must be improved prior to being used for equipment;
- Work during rainy or wet periods is not recommended as it could exacerbate slope stability issues and could be a H&S concern;
- A slot approach (3 to 4 m wide) would limit slope instability during removal of debris from the shoreline; and
- A geotechnical monitor should be on-site for the duration of remedial activities involving the trail, shoreline and marsh works.

3.4.3 2010 Debris Removal – Gullies

Greely Rock Ltd. (Greely) was contracted to remove debris from the steep gullies adjacent to the uplands portion of the Site in February 2010. Debris was removed by hand and transported to the western site fence using rubber tire wheelbarrows; no equipment was brought onto the Site. The debris was sorted where possible (wood, metal, mixed) into large disposal bins placed between the Site fence and Westside Road. Seventeen bins of debris, totaling 111 m^3, were removed from the Site and disposed off-site by Waste Management Corporation.

3.5 2010 Uplands and Marsh Draft Risk Assessments (SLR, dated March 2010)

In 2010, SLR completed a draft Site-Specific Human Health and Ecological Risk Assessment (SSHHERA) for the uplands area, as well as a draft Screening Level Risk Assessment (SLERA) for the marsh area. Both risk assessments were undertaken to determine data gaps and potential ecological and human health risks at the Site in an effort to determine the most appropriate and least invasive remediation and/or risk management options. The results of the draft SSHHERA for the uplands indicated that source removal of the remaining debris would result in a low potential risk for human and ecological receptors, with no further remedial work required in this area. The results of the marsh SLERA indicated sediment and toxicological data gaps; a supplemental work program was proposed to address these gaps.

The SSHHERA for the uplands area and the SLERA for the marsh area were subsequently updated in 2012 and 2013, respectively, and are discussed in further detail in Sections 3.12 and 3.13.

3.6 2010/2011 Supplemental Site Investigations and Remedial Works (SLR, dated September 2011)

3.6.1 2010/2011 Supplemental Site Investigations

SLR conducted a sediment sampling program at the Site in August 2010 to delineate previously identified sediment contamination at the Site, to address data gaps identified in the draft SLERA for the marsh and to support future risk assessment work. Sediment and surface water samples were collected from forty five locations along the marsh (including two background locations). A total of fifty seven sediment samples (including six blind field duplicates (BFDs)) were submitted for analysis of metals, PAHs, BTEX, PHC F1 - F4 and/or AVS/SEM. A total of thirty surface water samples (including four BFDs and one field blank) were submitted for analysis of total and dissolved metals, BTEX and/or PHC F1 - F4.

In March 2011, additional sediment samples were obtained in areas where the depth of water had previously limited sample collection. A total of thirteen sediment samples were collected from five locations and submitted for analysis of metals, PAHs and/or PHC F2 - F4. No surface water samples were collected as the marsh was frozen.

The results of the August 2010 and March 2011 sediment and August 2010 surface water sampling programs indicated the following:

- Concentrations of metals and PAHs in numerous sediment samples exceeded the CCME ISQG and/or CCME PEL; and
- Concentrations of arsenic in two background sediment samples exceeded the CCME ISQG (BG2-10 and BG2-20).

3.6.2 2011 Marsh Foreshore Remediation Program

Based on the results of the sediment and surface water investigations in the marsh area and the observed presence of significant debris along an approximate 60 m length of the marsh shoreline which was eroding into the marsh, SLR recommended the completion of a remedial excavation to remove the debris. Quantum Remediation, a division of Quantum Murray LP (QMLP), conducted the excavation of the marsh foreshore in February and March of 2011. The objective of the remedial works was to:

- Remove approximately 300 m^3 of debris and impacted foreshore soils from a 60 m section of foreshore along the marsh;

- Remove approximately 35 m^3 of exposed impacted sediment directly adjacent to the foreshore along the marsh; and

- Remove approximately 20 m^3 of debris and impacted sediment and debris from four previously identified areas within the marsh adjacent to the foreshore. These four areas consisted of three known areas of large debris accumulation (i.e., portions of car bodies) and one location where a suspected petroleum storage tank was visible.

Prior to the remedial work commencing on the Site, a detailed wildlife survey was conducted in accordance with the CWS permit for the project. No wildlife issues were identified. Per the CWS permit conditions, SLR also provided a Geotechnical Contractor to monitor slope stability and an Environmental Monitor for the duration of the remedial work program.

The remedial excavation was carried out using specialized low-impact excavators (spider hoes) to excavate the material and helicopters to transport materials between the foreshore area and the staging area adjacent to Westside Road. All debris and materials excavated were transported to the RDEK Columbia Valley Landfill for disposal.

Following the excavation and removal of all debris, soil samples were collected from the excavation limits. A total of thirty-seven soil samples were collected from the excavation limits and were submitted for analysis of metals, PAHs and/or PHC F2 - F4. One soil sample (FS15-1) collected from the limits of the excavation exceeded the applicable guidelines for tin. All other analytical results were below applicable CCME guidelines.

Upon completion of the foreshore excavation, fill materials consisting of a mixture of silt, sand and gravel were transported to the foreshore area via helicopter and the excavation was backfilled and compacted to ensure a stable base for the upper slope. Jute/coir was interwoven with willow stakes which were used for stabilization, and the area was then overlain with topsoil from a nearby supply area (outside the NWA) and jute. The upper slopes were re-seeded with a mix of annual stabilizing species and native perennials; the lower slopes were left to naturally re-vegetate with riparian species.

3.7 2011/2012 Supplemental Site Investigations and Project Works (SLR, dated December 2012)

SLR conducted a sediment sampling program at the Site in August 2011. The purpose of the sediment sampling was to obtain samples from the marsh area for toxicity testing to evaluate the potential for adverse effects to aquatic life in the marsh. SLR collected eight sediment samples at locations where residual refuse was present and where contamination was previously identified; three background samples were also collected. Sample locations were selected to provide a range of contaminant concentrations representative of conditions in the marsh. The samples were submitted to Nautilus Environmental for toxicity tests using *Hyallela azteca*, *Chironimus tentans* and *Tubifex tubifex*; which were selected to provide a range of chronic and acute toxicological endpoints. Sub-samples were submitted to ALS Environmental for the analysis of chemical and physical parameters. The results of the August 2011 soil sampling indicated the following:

- Concentrations of tin in two samples (BF-03 and BF-04) exceeded the CCME AL soil guideline (compared to soil guidelines due to seasonal fluctuations in water levels);
- Concentrations of PAHs in two samples (TOX1 and BF-03) exceeded the CCME ISQG; and
- Concentrations of arsenic, cadmium, copper, lead and zinc in sediment exceeded the CCME ISQG and/or CCME PEL in numerous samples.

The results of the sediment toxicity tests did not identify any clear relationships between contaminant concentrations in sediment and adverse effects to toxicity test organisms.

The 2011/2012 project works at the Site included the completion of debris removal activities on the uplands bench. The draft SSHHERA completed for the uplands bench in March 2010 indicated that source removal of the remaining debris would result in a low potential risk for human and ecological receptors. Removal of debris from the uplands would also deter future dumping in this location and remove physical hazards to ecological receptors. SLR was retained to oversee the removal of remaining debris from the uplands bench in support of the uplands SSHHERA. Debris removal works were conducted in November 2011 by KHE and consisted of removing the majority of the large debris piles, picking up scattered debris by hand and hauling five car bodies and a partial car body up from a gully. Debris removed from the uplands included: car bodies; partial car bodies; car pieces (e.g., doors, fenders, engine blocks, engine pieces) and other metal debris that appeared to have been associated with automobiles; numerous tin cans of varying sizes (most too rusted to be able to discern what they previously contained, though some were the size and shape of historical oil cans); carpeting; bed frames; metal plumbing piping; asphalt shingles; treated (construction) wood; glass and plastic bottles/jars; pieces of glass; pieces of plastic (use indiscernible); wire (type used for fencing); rubber tires; empty metal barrels; and other unidentifiable pieces of non-natural materials. As well, two pipes covered with suspected asbestos were identified and bagged for appropriate disposal. Two bins of miscellaneous debris totalling approximately 15 m^3 were removed from the uplands bench (not including the car bodies that were also removed).

Additional debris was also removed from a location just north of the Site on the opposite side of Westside Road. Several large piles of garbage/debris were removed from this area; one bin (approximately 8 m^3) of debris was transported from this area for disposal. The types of materials encountered included: empty plastic pails; the remnants of a pickup truck bed topper; carpeting; pallets; treated wood; drywall; bed frames; a damaged flat screen television; and general household garbage.

All materials removed from the Site and the additional area was sent to the RDEK Columbia Valley Landfill for recycling and/or disposal where appropriate.

Upon completion of all works at the Site, the fence was repaired, the man-gate access to the Site was blocked using large pieces of wood that were screwed across the entrance and signs were installed indicating access to the Site is prohibited.

During debris removal activities at the Site, a mound of previously unidentified debris, approximately 2.5 m down a steep slope immediately above the marsh, was located on the eastern part of the uplands bench. This material was not removed due to instability of the area. No mitigation strategy was readily available to prevent disturbed materials from falling down the slope into the marsh at that time. Furthermore, equipment capable of removing the material in a safe manner (i.e. large excavator with a reach greater than 8 m) was not present at the Site in November 2011. As such, it was recommended that this material be removed prior to any further works proposed for the marsh.

3.8 2012/2013 Project Works (SLR, dated March 2013)

Due to on-going concerns regarding unauthorized human access to the Site, the fence bordering Westside Road was replaced in Fall 2012 by One Time Fencing of Briscoe, BC. A number of the original fence posts were salvaged, therefore limiting the number of new posts required. The fence was constructed as a seven strand, smooth wire fence to allow for the passage of wildlife. In addition, new signage was placed along the fence, in particular at the historical access gate.

KHE returned to the Site in November 2012 to remove the additional debris identified during the November 2011 site works. Soil and debris was excavated as far down slope as safely possible; where out of reach of the excavator arm and bucket, debris was handpicked and thrown upslope. Some debris that couldn’t be reached safely by hand, or would result in loss of stability of the slope, was left in place. Silt fencing was installed below the excavated area to mitigate any movement of soil and remaining debris. As part of the November 2012 site works, KHE returned to the area north of the Site to collect additional garbage that had been dumped following clean up in November 2011. Approximately 240 m^3 (13 loads) of debris were transported from the gully area and from the area across Westside Road for disposal. The types of materials encountered included: glass bottles, cans, metal debris, wood debris, roofing material, plastics, bricks and other miscellaneous household garbage.

SLR reviewed the restoration progress along the marsh shoreline in November 2012. A number of pieces of metal and debris were observed during the site visit as there was no ice or snow present to obscure the view. No slumping was observed following disturbance at the toe of the slope. Matting had retained soil and vegetation growth was noted as good in this area.

In early December 2012, Focus Corporation conducted staking of the provincial/federal boundary at the Site. In February 2013, AKS Geoscience Inc. (AKS) conducted a geophysical survey (EM 31/38 survey) of the marsh adjacent to the previously excavated foreshore area and along the trail to the marsh area. The EM survey was started at the federal/provincial boundary marker at the south end of the marsh and completed just north of the previously remediated shore area. Anomalous readings indicative of metallic debris were identified in discrete areas of the marsh and in several areas along the trail, including one very extensive area. Based on the staked location of the federal/provincial boundary, it was confirmed that the majority of the anomalous EM readings noted along the trail fell within the boundaries of the federal land.

During the February 2013 site visit, running water was heard below the ground surface at one section of the trail. The location was noted for future assessment.

3.9 2012 Update to Site Specific Human Health and Ecological Risk Assessment (SLR, dated December 2012)

The SSHHERA for the uplands area of the Site was updated following the debris removal works in November 2012. The updated SSHHERA indicated the following:

Human Health Risk Assessment (HHRA)

- Human receptors of concern (ROC) included adult and teenaged trespassers and EC/CWS personnel. The teenaged trespasser was considered to be the surrogate receptor for the human ROC;
- Contaminants of potential concern (COPCs) retained with respect to the HHRA included:
    - Cadmium;
    - Hexavalent Chromium;
    - Lead;
    - Thallium;
    - Tin;
    - Zinc; and
    - Pyrene.
- Potentially complete exposure pathways for the human ROC included incidental ingestion of soil, dermal contact with soil and inhalation of fugitive dust; and
- Hazard quotients (HQs) and ILCRs, as well as cumulative exposure to non-carcinogenic and carcinogenic COPCs, were less than the risk based standards (i.e., 0.2 for non-carcinogenic risks and 1E-05 for carcinogenic risks).

Ecological Risk Assessment (ERA)

- Ecological ROCs evaluated in the ERA included:
    - Invertebrates;
    - Plants/trees;
    - Granivorous, invertivorous and omnivorous birds;
    - Herbivorous, invertivorous and omnivorous mammals; and
    - Carnivorous reptiles;
- COPCs retained with respect to the ERA included:
    - Hexavalent chromium;
    - Copper;
    - Lead;
    - Thallium;
    - Tin;
    - Zinc;
    - PHC F3;
    - Benzo[a]pyrene;
    - Dibenz[a,h]anthracene; and
    - Indeno[1,2,3-c,d]pyrene.
- Potentially complete exposure pathways for the ecological ROCs included direct contact with soil (all ROCs) and ingestion of food items (wildlife ROC); and
- Potentially unacceptable risks to soil invertebrates from exposure to PHC F3 and hexavalent chromium were identified. However, based on the spatial extent of the PHC F3 contamination and the low magnitude of the hexavalent chromium exceedances relative to the soil invertebrate toxicity reference value (TRV), these parameters were determined to pose a low risk to soil invertebrates at a population level.

Based on the results of the HHRA and ERA discussed above, no additional remedial works were recommended for the uplands area.

3.10 2013 Detailed Quantitative Ecological Risk Assessment (SLR, dated October 2013)

Following the remediation of the marsh in 2011 and the supplemental sediment investigation (sediment sampling and sediment toxicity testing), SLR updated the SLERA for the marsh portion of the Site through the completion of a detailed quantitative ecological risk assessment (DQERA). The DQERA was submitted to DFO and EC Expert Support for review and comment in March 2013. Following receipt of the DFO and EC review comments, the DQERA was finalized in October 2013. The DQERA indicated the following:

- Ecological ROCs identified for the marsh area included:
    - Phytoplankton, periphyton and macrophytes;
    - Benthic invertebrates;
    - Pelagic invertebrates;
    - Benthivorous, planktivorous and piscivorous fish;
    - Carnivorous amphibians;
    - Omnivorous reptiles;
    - Herbivorous, omnivorous, invertivorous, piscivorous and carnivorous birds; and
    - Herbivorous, omnivorous, piscivorous and carnivorous mammals;
- The following surrogate ROCs were selected for evaluation in the DQERA:
    - Benthic invertebrates, Green Frog, Painted Turtle and Muskrat;
- COPCs retained with respect to the DQERA included:
    - Sediment: PHC F4 (aromatic subfraction), barium and tin;
    - Soil: no COPCs retained; and

  - Surface Water: no COPCs retained;
- Potentially complete exposure pathways included direct contact with sediment (all ROCs) and ingestion of food items (wildlife ROCs);
- The results of the DQERA did not identify unacceptable risks to ecological receptors as a result of residual contamination within the marsh; and
- The DQERA indicated that further debris removal within areas identified by the EM survey may improve marsh conditions and reduce uncertainties surrounding the presence of metals in the marsh.

3.11 2013-2014 Site Works and Remedial Action Plan (SLR, dated March 2014)

3.11.1 2013-2014 Supplemental Site Investigation

SLR completed a test pitting program on October 28 and 29, 2013 to confirm the presence of debris in areas of anomalous response measured during the AKS geophysical survey in February 2013. Fourteen test pits were advanced to a maximum investigated depth of 4.5 m bgs. An Environmental Monitor and Geotechnical Monitor were on-site to monitor impacts of test pitting activities.

Based on the test pit observations, SLR identified three areas of highest debris density along the trail and south of the trail (referred to as Areas of Impact 1 through 3). Areas of Impact 1 and 2 were anticipated to be related to the same debris field (identified as the Main Debris Zone (MDZ)). Area of Impact 3 (AI3) appeared to be a spatially separated pocket of debris. Debris encountered was predominantly metal (vehicle parts, vehicle frames, mattress frames, appliances, etc.); but tires, glass and some plastic were also encountered. Soil excavated from each test pit was placed back in the test pit and contouring of the disturbed soil was conducted.

Soil samples were submitted for analytical testing of chemical and physical parameters. Soil chemistry results from the test pitting program indicated the following:

- BTEX and PAH concentrations were below the CCME AL guidelines for all samples submitted;
- PHC F1 - F4 concentrations were below the CCME PHC standards for all samples submitted;
- pH values were generally above CCME AL guidelines but were considered to reflect background concentrations;
- Concentrations of cadmium, lead, nickel, tin and/or zinc exceeded the CCME AL guidelines in test pits advanced in the MDZ (TP2, TP7 and TP8); and
- The debris and soil metals contamination in the MDZ extended past the maximum investigated depth of 4.5 m bgs.

In addition to the above activities, SLR collected surficial soil samples along the southern edge of the uplands bench to supplement data for the uplands SSHHERA. The surficial soil sampling program indicated the following:

- BTEX and PAH concentrations were below the CCME AL guidelines for all samples submitted;
- PHC F1 - F4 concentrations were below the CCME PHC standards for all samples submitted;
- pH values were above CCME AL guidelines for the samples analysed but were considered to reflect background concentrations; and

- Cadmium, lead, mercury, tin and/or zinc exceeded the CCME AL guidelines in two soil samples located immediately above the MDZ in the trail (i.e., samples RA5 and RA6).

SLR returned to the Site on March 10 and 11, 2014, to collect water samples from the trail area during periods of significant snowmelt to assess presence of potential contaminants of concern (PCOCs) in surface runoff or groundwater. Due to limited snow cover on-site, no viable surface runoff samples could be collected.

3.11.2 2013-2014 Remedial Action Plan

Per the Terms of Reference (TOR) prepared by EC in May 2013, SLR developed a Remedial Action Plan (RAP) for the trail and marsh areas of the Site based on the previously recommended remedial excavation option (SLR, 2013). For comparison purposes, SLR detailed five alternative strategies that incorporated differing levels of excavation and/or debris removal. Within the Site, there are three sub-areas that reflect differences in refuse deposition and degradation over time. The sub-areas include Area of Environmental Concern (AEC) 1A (contamination on the uplands bench related to surficially deposited debris), AEC 1B (marsh area contamination related to debris deposition) and AEC 1C (including buried debris and/or soil contamination observed at AI3 and the MDZ as well as surficially deposited debris noted throughout the trail and adjacent south bench slope). The five strategies provided by SLR are summarized below:

- **Complete Excavation:** this strategy entailed remedial planning activities (i.e., wildlife and tree surveys, baseline water sample collection, silt curtain installation, permit/approval support, SSRT development and tender specification preparation); remediation activities comprising the removal of remaining debris at AEC 1B and removal of debris from AEC 1C (including AI3, trail surficial debris and the complete excavation and removal of debris from the MDZ to native soil); post-remediation restoration works; completion of a final HHERA for the trail and uplands bench; and post-remediation environmental and geotechnical monitoring;
- **Partial Excavation:** this strategy entailed remedial planning activities (same as described previously); remediation activities comprising the removal of remaining debris at AEC 1B and partial removal of debris from AEC 1C (including AI3, trail surficial debris, the excavation and removal of debris from the MDZ to a maximum depth of 1.5 m bgs and import and placement of a soil cap over the remaining debris); post-remediation restoration works; completion of a final HHERA for the trail and uplands bench; and post-remediation environmental and geotechnical monitoring;
- **Surficial Debris Removal at AEC 1C and Debris Removal at AEC 1B:** this strategy entailed remedial planning activities (same as described previously); remediation activities comprising the removal of remaining debris at AEC 1B and the removal of surficial debris only at AEC 1C; post-remediation restoration works; completion of a final HHERA for the trail and uplands bench; and post-remediation environmental and geotechnical monitoring;
- **Surficial Debris Removal at AEC 1C Only:** this strategy entailed limited remedial planning activities (permit applications and tender specification); limited remediation activities (removal of the trail surficial debris only); post-remediation restoration works; completion of a final HHERA for the trail and uplands bench; and post-remediation environmental and geotechnical monitoring; and
- **HHERA Preparation Only:** this strategy was limited to the preparation of a final HHERA for the trail and uplands bench.

Subsequent discussions with PWGSC and EC indicated that the second strategy (partial excavation) would be implemented in 2014-2015.

4.0 2014/2015 SITE WORKS AND REMEDIAL PLANNING ACTIVITIES

The following sections detail the pre-remediation activities completed by SLR for the project. SLR prepared and submitted permit applications to various regulatory agencies for the proposed remediation works and supporting field activities at the Site, developed SSRTs for the remediation project, prepared and finalized tender-ready documents for the remediation project and provided support during the tendering process.

To facilitate these activities, SLR prepared site- and task-specific HASPs and coordinated with subcontractors (Lotic Environmental Ltd. (Lotic) and One Time Fencing) to schedule field activities and procure soil stabilization and erosion control materials.

4.1 Permitting Assistance

SLR coordinated the issuance of regulatory permits and approvals for the 2014-2015 site works. Specifically, SLR contacted CWS, DFO, EC, BCMOE and the BC MFLNRO to discuss the project activities and supplied supporting documentation to facilitate the issuance of permits and approvals from these regulatory agencies. Copies of the permit/approval-related correspondence are included in Appendix C.

Please note that a Canadian Environmental Assessment Act (CEAA) 2012 Section 67 assessment was not considered to be necessary for the remediation works as the proposed works did not fall under the activities listed in the Regulations Designating Physical Activities. It is noted that federal departments must still perform due diligence to ensure that projects on federal lands are not likely to cause significant adverse environmental effects.

As noted in the RAP prepared by SLR in 2013-2014, all intrusive works conducted at the Site require a permit from CWS prior to being completed. In May 2014, SLR applied for an extension to the permit issued during the 2013-2014 test pitting program and to amend the permit to include hand-seeding of previously disturbed areas with native seed mix; CWS subsequently issued an amended permit to SLR.

In August 2014, SLR submitted a permit request to CWS to complete pre-remediation field activities. SLR's previous correspondence with CWS/EC (letter dated November 25, 2010) indicated that a Species at Risk Act (SARA) permit would likely not be required for the remediation project; however, wildlife (specifically Western Toad, Painted Turtle and American Badger) and wildlife tree (including migratory bird nest) surveys would be necessary prior to completion of any remediation activities. To that end, SLR applied to CWS for a permit to conduct the necessary survey activities as well as to collect baseline water samples from the marsh, install a sediment curtain in the proposed marsh remediation area, record universal transverse Mercator (UTM) coordinates of debris at the Site, complete site reconnaissance for a potential backfill source and conduct a site visit with EC and DFO. CWS issued the permit in September 2014.

In October 2014, SLR submitted a request to CWS for the completion of the remediation project, including a site visit to hold an on-site bidders meeting with potential contractors, debris removal from the marsh, surficial debris removal from the trail, debris and soil removal from AI3 and MDZ and collection of soil and water samples. SLR's discussions with CWS indicated that a permit would not be issued until the Contractor's name and summary of equipment and procedures was provided to CWS. In November 2014, SLR submitted a letter to CWS confirming the permit conditions for the project as the information was necessary for inclusion in the tender specification for the remediation project; CWS confirmed the conditions (electronic correspondence dated December 4, 2014) and also provided approval for the on-site bidder's meeting. SLR also contacted CWS in November 2014 to discuss the use of soil from a potential borrow area located within the NWA, north of the Site along Westside Road; subsequent discussions between PWGSC, SLR and CWS indicated that use of the soil at the potential borrow location was acceptable. An updated permit request (dated January 13, 2015) was submitted to CWS following Contract Award with the Remediation Contractor's name (KHE) and their equipment and procedures information; SLR's correspondence also indicated that backfill would likely not be required during the project (other than from areas adjacent to the excavations for geotechnical contouring purposes) and that a staging area would be established along Westside Road outside the boundaries of the Site. CWS subsequently issued the permit for the remediation project. A permit amendment request was submitted to CWS in February 2015 indicating that backfill would likely be required from the potential borrow source north of the Site; an amended permit was issued by CWS in February 2015.

SLR also contacted DFO to determine whether a review of the pre-remediation and remediation activities was required under the fisheries protection provisions of the *Fisheries Act* (Section 35(1)). SLR submitted a review request to DFO in August 2014 for the installation of a sediment curtain in the proposed marsh work area. Discussions with DFO indicated that fish salvage following sediment curtain installation would be required unless otherwise demonstrated as not necessary. SLR responded that fish salvage would be completed upon installation of the curtain. DFO subsequently issued a letter stating that a *Fisheries Act* authorization was not required for the pre-remediation sediment curtain installation. SLR submitted a review request to DFO in October 2014 for the remediation project. DFO issued a letter stating that a *Fisheries Act* authorization was not required for the remediation project based on the installation of the sediment curtain and completion of fish salvage.

SLR submitted a request for a fish collection permit to BC MFLNRO in September 2014 to facilitate the fish salvage activities requested by DFO. BC MFLNRO issued a permit authorizing SLR to collect fish in conjunction with fish salvage within the sediment curtain between September 29 and October 31, 2014. SLR requested an amendment to the permit to extend the permit period and to allow for the use of gill nets. Species including the longnose sucker, minnows and redside shiner were to be captured and released outside of the sediment curtain area. Discussions with BC MFLNRO indicated that invasive species (largemouth and smallmouth bass) were to be euthanized. SLR confirmed acceptance of the destruction of the invasive species with DFO; DFO indicated that management of these species fell under provincial jurisdiction. SLR sought guidance from BC MFLNRO during the completion of the fish salvage activities in November 2014. BC MFLNRO indicated that given negligible recovery of native species was occurring and that the province required the destruction of the invasive species remaining in the sediment curtain, fish salvage could be ceased.

SLR contacted the BCMOE to determine whether a Water Act (Section 9) Notification or Approval was required from the BCMOE Water Stewardship Division for the pre-remediation or remediation works in the marsh. BCMOE deferred to guidance provided by BC MFLNRO (telephone conversation with Peter Holmes on August 15, 2014) which indicated that a Water Act Notification was not required for the project as the Water Act does not apply to federal lands.

SLR also contacted BC MFLNRO to obtain access to adjacent provincial lands to conduct pre-remediation and remediation activities. In October 2014, SLR received permission from MFLNRO to access provincially owned lands to install the sediment curtain and complete subsequent fish salvage activities. In November 2014, SLR submitted a request to BC MFLNRO to access provincially owned lands to complete remediation works within the marsh. Permission was granted to access the provincial lands during the period of the remediation project (January 1 to March 31, 2015).

4.2 April/May 2014 Restoration Activities

On April 28 and 29 and May 29, 2014, restoration activities were completed on-site in areas previously disturbed during the 2013 test pitting program (trail area) and the November 2012 excavation program (gully on the uplands bench).

During the April 2014 restoration activities, Lotic applied coconut fibre matting (KoirMat 700) to the gully area and select test pit locations to stabilize soil and provide surface roughness. A portion of non-functioning sediment fencing was also removed from the gully area. Lotic also collected and placed coarse woody debris (sourced on-site and under supervision of the SLR Environmental Monitor) over select areas in the trail and in the gully area to increase surface roughness and reduce surface runoff velocity.

During the May 2014 restoration activities, Lotic completed hand-seeding of the trail and gully areas with a native grass seed mix.

The April and May 2014 restoration activities are discussed in the Environmental Monitoring report included in Appendix D.

4.3 Pre-Remedial Field Work

SLR returned to the Site in October 2014 to conduct field activities in support of remedial planning; specifically the completion of wildlife and wildlife tree surveys, collection of UTM coordinates of native vegetation zones and identified debris, installation of a sediment curtain in the marsh work area and completion of a site visit with EC and DFO Expert Support. Between October 6 and 9, 2014, SLR's Environmental Monitors conducted surveys to document the presence of any species at risk or sensitive species that may be impacted by the project works. American badger burrows (not in use), turtles (species not confirmed) and fish were observed in the project work areas. Native flora was identified and a vegetation exclusion zone where minimal disturbance was to be permitted during remediation was mapped. Coordinates for debris locations along the trail and in the marsh were also recorded. SLR also collected water samples from the marsh to establish baseline turbidity levels (as indicated by total dissolved solid and total suspended solid concentrations); the baseline water results are summarized in the tender specification tables attached in Appendix E. EC and DFO Expert Support (Al Hodaly and Eric Chiang, respectively) were on-site in October 2014 to discuss remediation plans and review the potential backfill source located north of the Site along Westside Road.

SLR's Environmental Monitors returned to the Site in November 2014 to review the installation of a sediment curtain in the proposed marsh work area by Lotic. The sediment curtain was installed between November 3 and 4, 2014, and an underwater camera was used to confirm the sealing of the curtain against the marsh floor. Due to the low water levels in the marsh, the curtain was noted to gap in limited locations (i.e. where curtain lengths overlapped); repairs were made to the curtain to close the gaps.

Following installation of the sediment curtain, SLR completed fish salvage over three days (November 4 through 6, 2014). Twenty-one minnow traps and one hoop net were installed within the sediment curtain isolation area. Five minnows (juveniles) and thirteen redside shiners were captured and released outside of the isolation area; a decrease in catch of native species was noted over the salvage period. A total of 132 bass (small and large mouth juveniles) were captured and euthanized as per regulatory guidance.

The pre-remediation activities are also discussed in the Environmental Monitoring report attached in Appendix D.

4.4 Site-Specific Soil Remedial Target Development

SSRTs were developed for metals that were identified as COCs in the Uplands HHERA and for metals that exceeded applicable standards in the trail area during the 2013 test pitting program. SSRTs were developed for cadmium, hexavalent chromium, copper, lead, nickel, thallium, tin and zinc. A memo outlining the derivation of the SSRTs (including supporting tables and calculations) are included in Appendix F.

SSRTs were developed to be protective of all human and ecological receptors that may be potentially exposed to soil remaining following remediation. The SSRTs developed used exposure characteristics specific to potential receptors combined with toxicity information for the specific metals.

Due to the location of the Site and the restrictions placed on access, it was assumed that the primary human ROC (i.e., surrogate receptor) was a trespassing teenager. Threshold and non-threshold (carcinogenic) human health SSRTs were based on exposure to surface soil by incidental ingestion, dermal contact or inhalation of particulates

Ecological SSRTs were calculated separately for plants, invertebrates and wildlife based on TRVs and intake characteristics presented in the Uplands HHERA (SLR, 2012) and an assumed target HQ of 1.

SSRTs were calculated for each ROC and compared to applicable guidelines and regional background concentrations. An overall SSRT was then recommended for each metal parameter to be protective of both human and ecological receptors assuming future use as a NWA.

4.5 Tender Specification

SLR prepared and finalized NMS tender specification for the 2015 remediation project. Activities related to the development of the tender specification also included attendance by SLR's project managers, lead Environmental Monitor and geotechnical contractor at an on-site bidder's meeting in December 2014 and support during the tendering process.

The tender specification for the remedial work was submitted to PWGSC in early December 2014. Among other project information, the tender specification provided detail for contractors regarding the method and sequence of remedial excavations, wildlife and native vegetation considerations and restoration activities. A copy of the tender specification is included in Appendix E. The tender specification was posted on Buy and Sell (https://buyandsell.gc.ca/) on December 8, 2014. A mandatory site bidder's meeting was held on December 17, 2014. SLR provided assistance answering questions submitted to PWGSC regarding the tender specification following the bidder's meeting.

4.6 Contract Award

The remediation project was awarded to KHE on January 7, 2015.

4.7 Project Submittals

Per the tender specification, KHE submitted to PWGSC the following:

- A Master Plan/Project Schedule – detailing the various project tasks and the estimated start dates and completion dates;
- H&S documentation – including a site-specific HASP identifying anticipated hazards and emergency contact numbers, emergency procedures and emergency action plan, material safety data sheet information, WorksafeBC Notice of Project, utility locate information (i.e. BC One Call), etc;
- An EPP – a review of the known or potential environmental issues that must be addressed and how they will be mitigated/eliminated in accordance with applicable permits and tender specification;
- A Site Layout Plan – drawings showing the locations of all project-related facilities including the site office (off-site), equipment inspection and decontamination areas (off-site), SDMF (off-site), equipment and temporary material handling areas (off-site), sanitary facilities, parking, exclusion areas and means of ingress and egress to the Site;
- Equipment and Procedures Plan – details on the equipment and procedures to be utilized during the remediation activities in the marsh and trail areas; and
- Names and locations of the facilities to be used for the disposal of materials generated during the project.

On behalf of PWGSC, SLR reviewed the above submittals and made comments with respect to completeness and whether each submittal met the requirements of the tender specification and contract documents.

The project schedule was updated on a weekly basis by KHE. All changes to the project schedule were discussed between KHE, PWGSC and SLR during weekly progress meetings.

5.0 2015 MARSH AND TRAIL REMEDIATION PROJECT

5.1 General Approach

The field portion of the marsh and trail remediation project was conducted between January 20 and March 13, 2015. All field work was conducted in accordance with the tender specification, project permits, SLR's Standard Field Procedures (discussed in Appendix G) and KHE's Equipment and Procedures Plan. All work was reviewed under the supervision of SLR's Environmental Monitors and/or Geotechnical Monitors.

The remediation in the marsh area involved the removal of debris exclusively. Debris from the marsh area was transferred to the SDMF along Westside Road via helicopter. Due to the sensitive ecological nature of this area, the sediment curtain was left in place following debris removal and will be removed after the ice recedes. Soil and debris excavated from the trail work area were transported by 2013 Komatsu CD110 morookas (morookas) to the SDMF along Westside Road and temporarily stockpiled. Materials entering the SDMF were segregated according to both the material type (i.e., soil versus debris) and origin of the material (i.e., marsh versus AI3 versus MDZ). Volumes of all materials entering the SDMF were estimated based on morooka counts; the estimated volumes were recorded for tracking purposes only. Manifests (i.e., trip tickets) were issued for each truck leaving the Site and scale records documented the tonnages of the disposed soil and refuse/debris to verify unit price table quantities related to both excavation/removal and waste disposal activities.

Following removal of debris and soil at AI3 and the MDZ, confirmatory samples were collected at the limits of the excavation and submitted for laboratory analyses. The confirmatory sample locations were recorded using a hand-held Trimble GeoXH GPS (Trimble) for mapping purposes. Excavated areas were re-contoured using adjacent materials to address short-term geotechnical slope stability concerns. An on-site fill mound was used in the western portion of the MDZ to stabilize the MDZ excavation adjacent to live trees.

Following the re-contouring of the excavated areas, the disturbed excavation footprints at AI3 and the MDZ and the disturbed soil along the access trail was seeded with native grass species and a biodegradable protective covering composed of coconut fibres and straw (coco-mat) was secured over the areas. In addition, cross-ditches were constructed across the access trail and MDZ to capture, retard and redirect run-off to the natural gully below. A narrow bench was constructed along the northern wall of the MDZ to act as a wildlife trail across the excavation.

5.2 Health and Safety

KHE was the prime contractor for this project and was, therefore, responsible for overall H&S at the site. As the prime contractor, KHE prepared a project HASP, completed a BC One Call notification, conducted daily H&S tailgate meetings and reported all incidents to PWGSC.

SLR also prepared a site- and job-specific HASP, which covered the scope of work and anticipated hazards relating to SLR specific tasks. Those subcontracted directly to SLR were required to review and sign the HASP and participate in SLR-led daily H&S tailgate meetings.

A fuel release occurred on February 22, 2015, when a piece of debris became lodged into the base of the excavator fuel tank ripping off the fuel shut off valve. A loss of approximately 160 L of diesel was released within the MDZ. Fuel was collected as much and as quickly as possible with spill pads and spill containers during the leak (see photos 85 through 87 in Appendix D).

The excavator was equipped with an emergency spill kit that was utilized immediately and additional materials (respirators, pads, containment vessels and bags) were transported to the spill area. All pads were collected and placed in plastic bags for disposal at an approved facility. A small area of impacted soil (8.29 tonnes) was removed from the Site and stored separately in the SDMF for disposal at an approved facility. KHE adhered to the procedures outlined in the Spill Control Plan section of the EPP. The fuel release was reported by KHE to PWGSC and the BCMOE.

5.3 Site Preparation Activities

Site preparation activities were conducted between January 20 and January 22, 2015. The site preparation included tasks to meet the terms of the tender specification, the contractor submittals and the project permits.

The site kick-off meeting for the remediation project was completed on January 21, 2015. Representatives from PWGSC, KHE and SLR were in attendance and discussed the main tasks for the project, the requirements of each task and the plans for completing each task.

5.3.1 Demarcation of Vegetation and Wildlife Exclusion Areas

On January 20, 2015, the SLR Environmental Monitor and Field Supervisor were on-site to establish vegetation and wildlife exclusion areas that contained undisturbed native flora, historic badger burrows and important wildlife trees. The boundary of the vegetation exclusion areas were marked with yellow survey flags and all wildlife trees and badger burrows were marked with pink flagging; locations were also recorded with the GPS unit. Remediation and restoration activities were prohibited within these exclusion zones.

5.3.2 Equipment Mobilization and Site Set-Up

On January 21, 2015, site preparation activities commenced. KHE first removed a section of the NWA fence to provide access to the Site. The staging area, located in the gravel pull-out on the east side of Westside Road, was then secured with 1.8 m high temporary panel fencing (refer to Drawing 2 for staging area location). The staging area contained the SDMF, the site office trailer, equipment and material storage area and a parking area.

On January 22, 2015, the staging area was cleared of snow and the SDMF was lined with a 15 mil polyethylene liner to ensure that excavated materials did not come into contact with underlying soils. In addition, a silt fence was placed along the perimeter of the SDMF to ensure that contaminated soil was contained. The site office trailer was also delivered and a parking area was prepared south of the site trailer. Swamp pads were then installed on the access route from the opening in the fence to the top of the trail leading down to the MDZ. All construction materials and equipment were inspected for invasive plant species and contamination prior to entering the Site.

5.3.3 Ice Assessment in Marsh Area

On January 21, 2015, Northwest Hydraulic Consultants was on-site to conduct an ice assessment in the proposed marsh remediation area. In general, the ice survey concluded that the ice was thinner than the normal seasonal thickness and that a predicted warming trend could further compromise its ability to bear the weight of the spider hoe. It was thus proposed that the marsh remediation commence immediately. The results of the ice survey are provided in Appendix H.

5.3.4 Electromagnetic Survey in Marsh Area

Following the ice assessment, AKS conducted an EM survey in the marsh area to pinpoint the debris for removal. A copy of the EM survey is provided in Appendix I. In total, 48 anomalies indicative of debris were identified and marked with survey flags inside of the proposed marsh remediation area.

5.4 Site Remediation Program

The remediation activities were separated into four work areas: the marsh remediation area, the surficial debris areas (along the trail, adjacent southern slope and gully), the AI3 remediation area and the MDZ remediation area. The separate remediation work areas can be seen on Drawing 3. Test pitting programs were also conducted during the remediation activities to collect *in situ* soil data to facilitate disposal, evaluate the extent of the debris in the MDZ and assess the quality of materials to be used as potential backfill.

Details on SLR's field sampling procedures are included in Appendix G. Confirmatory sample locations are shown on Drawings 5 and 6. A copy of SLR's Master Sample Tracker with confirmatory, test pit and interim excavation sample information is included in Appendix J.

5.4.1 Environmental Monitoring

SLR conducted daily environmental monitoring during the remediation project to ensure that work was conducted in accordance with the tender specification, project permits and KHE's EPP. Environmental monitoring observations are included in SLR's Daily Reports attached in Appendix A. A summary Environmental Monitoring report is included in Appendix D.

5.4.2 Geotechnical Monitoring

The soils at the Site are comprised of fine-textured glaciolacustrine materials that are susceptible to surface erosion and instability once disturbed. Geotechnical assessment of the MDZ in the trail area in 2013-2014 concluded that remedial excavation activities in the area may accelerate surface erosion, gullying and slump failure.

The original planned excavation depth for the MDZ was 1.5 m bgs. However, due to the presence of limited quantities of debris in the marsh and AI3 areas, PWGSC requested that KHE provide a summary of options on proceeding with additional MDZ excavation and any supplementary geotechnical controls that may be required. Recommendations were made to KHE to retain a geotechnical consultant to advise on the MDZ excavation plan. In response, KHE prepared an Excavation Work Plan which was then reviewed by Braun Geotechnical Ltd. (Braun) on February 4, 2015. In the review, Braun recommended that a minimum 1(H):1(V) slope be maintained on the cut-slopes of the excavation. KHE also retained Braun to complete site inspections upon commencement of the MDZ excavation and following the completion of the excavation to review and professionally sign-off on short-term slope stability. A copy of the Excavation Work Plan Review is provided in Appendix K.

CGL's geotechnical observations are summarized in CGL's On-Site Geotechnical Monitoring Report dated March 27, 2015 included in Appendix K. Key points from the report are detailed below:

- The slopes of the MDZ excavation were consistently maintained at a 1(H):1(V) slope during excavation activities;
- The excavation commenced at the east (downslope) and moved westward in 1 to 2 m lifts;
- Debris observed beneath the live trees on the south excavation wall indicated that the debris pre-dates the trees;
- Tension cracks indicating slope instability were observed on the north wall on March 5, 2015, after the excavation was completed;
- Excavated slopes were re-contoured and compacted to at least a 1(H):1(V) slope using adjacent soils and locally sourced backfill along the toe of the north slope and the area near the live trees;
- Cross-ditches were constructed along the bottom of the MDZ excavation and across the trail leading to the MDZ to direct water downslope;
- A biodegradable Erosion Control Blanket (coco-mat) was installed across bare soil surfaces under the direction of the SLR Environmental Monitor; and
- Debris still remains buried in the northern slope, the toe of the southern slope and along the base of the excavation. If this debris is to be removed in the future it will require significant geotechnical and safety considerations.

5.4.3 Marsh Remediation

The purpose of the marsh remediation was to exclusively remove debris from an area adjacent to the 2011 marsh foreshore remediation; removal of debris from the marsh could not be completed at that time due to project constraints. On January 23 and 24, 2015, KHE cut access holes in the ice at the 48 marked locations of debris identified in the EM survey using a chain saw. The spider hoe (provided and operated by SPIDEX All Terrain Excavating (SPIDEX)) was then used to remove the debris from these locations. All debris was placed in either bags or metal bins which were transported to the SDMF using a Bell 407 helicopter on January 27, 2015. In total, 5.42 tonnes of debris (predominately metal) were removed from the marsh area and transported to the RDEK Columbia Valley Landfill in Invermere, BC for disposal.

The marsh remediation area is presented in Drawing 3, following the text.

5.4.4 Surficial Trail Debris Removal

On January 28 and 29, 2015, the spider hoe operated by SPIDEX was used to remove larger pieces of surficial debris in the trail area and adjacent slope and gully. SLR assisted SPIDEX in locating the surficial debris using the GPS unit to locate previously identified areas of debris. The spider hoe was able to access the majority of the surficial debris in the gully area south of the main trail and along the trail itself. Smaller debris, such as cans, glass and wire, were removed by hand throughout the remainder of the remediation program. All surficial debris was transported to the SDMF using morookas where it was segregated for tracking purposes. The metal debris and tires removed from the work area were disposed at the RDEK Columbia Valley Landfill. In total, 5.865 tonnes of surficial debris was removed from the trail area.

The top of the south slope, adjacent to the eastern portion of the MDZ area, contained abundant surficial and subsurface debris which was later removed during the MDZ excavation. Some areas, in particular the lower portion of the south slope, sustained vegetation damage during the removal of the surficial debris and were therefore seeded and covered with coco-mat during the restoration phase of the program.

5.4.5 Test Pitting Programs

Test pitting programs were conducted during the remediation activities to collect *in situ* soil data to facilitate disposal, to evaluate the extent of the debris in the MDZ and to assess the quality of materials to be used as potential backfill.

Copies of the test pit logs are provided in Appendix L.

In-Situ Test Pits

A test pitting program was initiated on January 27, 2015, to characterize soil within the AI3 and MDZ excavation areas for soil disposal purposes. Seven test pits were advanced (TP15-01 to TP15-07), five within the MDZ (TP15-01 to TP15-05) to a maximum depth of 2.0 m bgs and two within AI3 (TP15-06 and TP15-07) to a maximum depth of 3.0 m bgs. All test pit locations were recorded using the GPS unit and are presented in Drawing 4.

Extent of MDZ Test Pits

On February 1, 2015, prior to the MDZ excavation, a test pitting/trenching program was completed to confirm the western and eastern extent of the MDZ excavation. During the trenching exercise, an excavator operated by KHE was used to dig a bucket wide trench starting from the estimated middle portion of the proposed MDZ excavation along the main trail moving first eastward and then westward. The trench was immediately backfilled with excavated material and compacted using the excavator bucket. Soil mixed with smaller pieces of household debris (glass, plastic, brick and metal) was observed from surface to approximately 1.5 m bgs with larger pieces of metal debris (automobile bodies and parts) from 1.5 to greater than 3.0 m bgs (maximum depth of investigation). The majority of the deeper debris appeared to be concentrated in the central and eastern portion of the proposed MDZ excavation footprint becoming shallower moving westward. Two sets of soil samples which had originally been intended to serve as excavation limit samples (MDZ-WA, the eastern limit wall sample; and MDZ-WB, the western limit wall sample) were collected during the trenching program.

On February 15, 2015, SLR reviewed the advancement of a series of test pits to visually assess the extent of the debris remaining mid-way through the excavation of the MDZ. In total, eleven test pits were advanced (DTP-A to DTP-K) across the MDZ. The maximum depth of investigation was 5.0 m bgs at test pit location DTP-H located in the centre of the MDZ excavation. Test pits advanced in the eastern and southern portion of the MDZ (DTP-D and DTP-E) indicated that debris in this area extended deeper than 3.75 m bgs (maximum depth of investigation at these locations). In addition, test pit DTP-G, located in the northern slope of MDZ, contained large pieces of metal debris to 2.75 m bgs. Due to geotechnical considerations, no additional test pits were advanced in the northern slope. The extent of the remaining debris area was mapped using the GPS. The areal information collected, as well as the estimated depth of debris observed during the test pitting program, was submitted to SLR's Computer Aided Design and Drafting (CADD) department to determine the volume of debris and associated soil remaining in the MDZ. In addition, topographic information collected prior to the

MDZ excavation compared to topographic information collected on February 15, 2015, was used to estimate the volume of material removed from the MDZ as of February 15, 2015, to assist in the estimation of project quantities. The location of the DTP test pits are shown in Drawing 4 and the topographic information is included in Appendix M.

Potential Backfill Test Pits

On February 9, 2015, two potential backfill source areas (on-site and off-site) were test pitted to characterize the quality of the material for use as potential backfill in the MDZ excavation area. Test pits TP15-8 and TP15-9 were advanced to a maximum depth of 3.0 m bgs in the on-site source area (Drawing 4), close to the location of TP14 advanced in 2013 on the northern trail slope. Test pits TP15-10 and TP15-11 were advanced to a maximum depth of 2.0 m bgs in the off-site source area located north of the Site on the east side of Westside Road (shown on Drawing 2). Ultimately, only the on-site backfill source was used to backfill a portion of the MDZ (discussed in subsequent sections); the off-site source was not utilized in 2014-2015.

5.4.6 Area of Impact 3 Remediation

The remedial excavation of AI3 occurred from January 28 to 31, 2015. The spider hoe began the AI3 excavation at the eastern inferred extent of debris (based on previous EM surveys), adjacent to the provincial property line. The topography of the AI3 excavation area consisted of a sloped area adjacent to the lower trail that extended southward to a flat treed area below. The eastern portion of AI3 extended close to the provincial property line to the southeast and to a sloped area of trees to the west. The stratigraphy of AI3 generally consisted of silt with small pieces of metal debris (tin cans, wire, springs), with the exception of larger metal debris consisting of automobile bodies and parts in the southern portion of the excavation. The excavation area contained a lower southern bench approximately 15 m by 5 m in an area that was excavated to approximately 2.5 m below the top of slope to inferred native material and an upper northern bench approximately 17 m by 3 m in an area which was excavated to approximately 1.0 m below the lower trail elevation (refer to Drawing 7). In total, 200.215 tonnes of soil (characterized *in situ* as non-contaminated per CSR Schedule 7 standards) and debris were removed from AI3; specifically, 6.925 tonnes of scrap metal and 193.29 tonnes of non-contaminated soil mixed with debris were excavated. The material was transported by morookas to the SDMF and eventually transported by trucks and side dump trailers provided by KHE to the RDEK Columbia Valley Landfill for disposal. SLR collected confirmatory soil samples on January 31, 2015, from the walls and base of the excavation footprint. An additional set of surficial soil samples were collected for BETX/F1 on February 16, 2015 after the AI3 excavation was re-contoured but prior to coco-matting. A discussion of soil chemistry results at AI3 is provided in Section 6.0 of this report.

5.4.7 Main Debris Zone Remediation

Excavation in the MDZ was started on February 7, 2015, after the restoration of the AI3 excavation. The MDZ excavation was initiated in the eastern portion of the MDZ along the southern slope where abundant surficial metal debris was previously observed and removed. KHE removed material in 1.0 to 2.0 m deep lifts moving from east to west across the MDZ. This was done multiple times until either native material was encountered or until geotechnical concerns precluded further excavation. A Geotechnical Monitor from CGL/Vast was on-site for the duration of the MDZ excavation.

In general, the thickest layer of debris was located along the south slope of the MDZ. Debris consisting of multiple automobile bodies and parts was encountered to a maximum depth of 7.0 m bgs. The majority of this area was excavated to undisturbed native silt soils with the exception of the east wall which contained small fragments of glass debris. The western portion of the MDZ, near the wildlife tree on the southern wall, contained debris to approximately 2.0 m bgs. The western portion was excavated to undisturbed native soil. Soil containing large pieces of metal debris was observed in the centre portion of the excavation extending to approximately 5.0 m bgs. The centre portion of the excavation was wedged between two steep slopes to the north and south and therefore less material could be removed from this area due to geotechnical constraints. Debris still remains buried in the north wall, portions of the south wall and in the base of the excavation between the north and south wall to a depth of approximately 1.5 m bgs. This material could not be removed during the remediation program due to geotechnical considerations and project constraints (time and budget). Future considerations and options to remove the remaining debris in the MDZ are discussed in Section 7.0 of this report.

All excavated material from the MDZ and the trail was transported to the SDMF using morookas. Excavated material was then loaded and transported by KHE in transport trucks to one of the three pre-approved disposal facilities for the Site. A total of 3,352.575 tonnes of mixed contaminated soil and debris from the MDZ was removed and disposed. Of this, 706.04 tonnes of material was transported and disposed at the Secure Energy Services landfill in Drayton Valley, Alberta; 1,521.54 tonnes were disposed at the Tervita landfill in Pincher Creek, Alberta; and 1,124.995 tonnes were disposed at the RDEK Columbia Valley Landfill.

During the excavation, excavation limit soil samples were collected from the MDZ excavation walls and floor prior to re-contouring activities. A discussion of soil chemistry results in the MDZ is provided in Section 6.0 in this report.

5.5 Tracking Soil Volumes

During excavation, KHE and SLR tracked the number of morooka loads of soil transported to the SDMF to monitor remediation progress; however, soil volumes were not relied upon to determine unit price table quantities. It was originally estimated each morooka load constituted approximately 3.0 m^3 of soil with a corresponding assumed weight of 5.7 tonnes. On February 26, 2015, following the identification of discrepancies between predicted excavation tonnages and observed tonnages recorded at the disposal facilities, KHE excavated a volume of soil from the MDZ (2.0 m by 4.0 m by 0.5 m deep) to be weighed off-site at the RDEK Columbia Valley Landfill to estimate the *in situ* density of materials in the MDZ. The material removed from MDZ weighed 3.96 tonnes, which corresponded to an *in situ* density of approximately 1 tonne per cubic metre. Soil volume tracking data were thus adjusted to conform to the new density information.

5.6 Soil Stockpiling

Metal debris removed from the marsh was segregated in the SDMF from stockpiles of excavated AI3 and MDZ area soils. Salvageable material from trail surficial debris and metal debris from AI3 were segregated and shipped off separately from the soil excavated from AI3. All material from the MDZ (both metal debris and associated excavated soil) was shipped collectively as mixed soil containing debris, with the exception of the removal of very large pieces of debris.

All stockpiles were covered by a 6 mil polyethylene liner to protect against runoff and leaching in the event of precipitation, as well as to prevent wind-borne distribution of fine-grained contaminated soils. Stockpiles were monitored and photographed daily by the SLR Environmental Monitor

5.7 Soil Disposal

Table 5-1 below summarizes the type and amount of soil disposed at each facility during the remediation program as classified according to the categories outlined in the tender specification (refer to Table 5 of the tender specification in Appendix E). Material excavated from AI3 was shipped to the RDEK Columbia Valley Landfill as Class A soil or salvageable materials. Material from the MDZ was shipped to all three landfill facilities as Class B soil.

Table 5-1
Amount of Material Disposed of from Site to Disposal Facilities

Soil Classification	Receiving Disposal Facility (amount of material in tonnes)		
	RDEK	Secure Energy	Tervita
Salvageable Materials*	18.21		
Class A (not contaminated, < CSR NL)	193.29		
Class B (<HWR for metals/PAHs/PHCs)	1,124.995	706.04	1,521.54

* Salvageable Material consisted of metal debris

The soil classified for disposal was characterized using soil chemistry results from the 2013 test pitting investigation, the 2015 test pitting investigation conducted at the beginning of the remediation program (TP15-01 to TP15-07) and from the interim soil samples collected during the MDZ excavation. Soil chemistry results from the 2013 test pitting program are presented in Tables 1 to 3 of the tender specification provided in Appendix E. Soil chemistry results for test pits TP15-01 to 15-07 and the MDZ interim samples are discussed in Section 6.0.

5.8 Site Restoration Activities

5.8.1 Physical Restoration Activities

The AI3 and MDZ areas were re-contoured in conjunction with and following excavation activities using the surrounding material. Slopes were re-contoured to a 2(H):1(V) slope in the AI3 and a 1(H):1(V) slope in the MDZ to reflect the natural slopes in these two areas. The re-contouring involved the construction of benches and the roughing of slope surfaces to assist in slowing the flow of surface run-off. In addition, the benches constructed will act as wildlife trails on the steep northern slope of the MDZ.

Approximately 175 m^3 of backfill material was removed from the mound on the northern slope (in the area of 2013 test pit TP14) and was used to re-grade the area below the live trees and in the trench area between the trees and the northern slope. The backfill used from the on-site source contained minor amounts of debris (glass and plastic) mixed with silt. The fill was placed in a lift approximately 0.5 – 1.0 m thick and was then bucket and track-packed into place.

Several cross ditches were placed across the trail leading to the MDZ and AI3 to re-direct surface run-off from entering the excavated areas. A ditch was constructed at the bottom of the MDZ excavation to promote drainage from this area. Wattles constructed of rolled up coco-matting were secured using wooden stakes in the bottom of the cross-ditches leading to the MDZ excavation. The location of the cross ditches are presented on the Vast survey in Appendix M.

5.8.2 Erosion and Sediment Control Measures

Following re-contouring activities, a native grass seed blend (containing 60% Bluebunch Wheatgrass, 15% Sandberg Grass, 15% Idaho Fescue and 10% Indian Ricegrass) was hand-broadcasted over the disturbed areas. After seeding, an erosion control blanket (Nilex SC32BD) composed of straw and coconut fibres inside of a biodegradable mesh (coco-mat) was placed over the disturbed area. The coco-mat was keyed in by digging a trench along the top of slope and burying the top edge of the coco-mat. The coco-mat was then unrolled to the bottom of the disturbed slope. The edges of the coco-mat were overlapped to provide a continuous cover and held in place by wooden stakes. Approximately 4,750 m^3 of coco-matting was placed during the restoration activities including the AI3 and MDZ excavation footprints, the trail leading to the MDZ and the AI3 and areas disturbed during the surficial debris removal. Photographs of the installed coco-matting are included in the Environmental Monitoring report in Appendix D.

Woody debris was placed along the restored areas to provide surface roughness to slow the flow of surface run-off. The woody debris consisted of branches and logs collected from the Site (under the supervision of the SLR Environmental Monitor) during the remediation project. The woody debris was placed at an angle to re-direct water flow to the southern gully below.

6.0 SOIL CHEMISTRY RESULTS

The results for the soil samples collected during the remediation project can be categorized into one of two groups, either results representative of current site conditions or results representative of soil removed from the Site. The former is discussed in Section 6.1 while the latter is presented in Section 6.2. SLR's Master Sample Tracker for the remediation project is included in Appendix J. Copies of the analytical reports are included in Appendix N.

6.1 Results Representative of Current Site Conditions

The following sections summarize the results of soil samples considered representative of current site conditions (i.e., excavation limit samples collected from the AI3 and MDZ excavations and from test pits advanced in potential backfill sources).

6.1.1 AI3 Excavation Limit Results

Soil samples collected from the final excavation limits of AI3 were submitted to Maxxam Analytics Inc. (Maxxam) for analysis of one or more of the following parameters: metals, PAHs, BTEX, MTBE, PHC fractions F1 - F4 and grain size as summarized in Table 6-1.

Table 6-1
Summary of Analyses for AI3 Excavation Limit Samples

Parameter	# Samples Analysed	# BFDs Analysed
Metals	12(1)*	1(1)*
BTEX/MTBE/PHC F1	12	0
PHC F2 - F4	7	1
PAH	6	1
Grain Size	6	1

* # of samples requested for re-analysis indicated in brackets due to exceedances and/or discrepancy of results between the sample and its BFD

Analytical results for confirmatory soil samples collected from the limits of AI3 were compared to the applicable CCME AL guidelines and/or SSRTs for the Site; results are presented in Tables 1 through 3 as well as 13 and summarized on Drawing 5.

Metals

All AI3 limit samples exceeded the CCME AL guideline for pH (>6<8); however, based on the pH results noted at the off-site backfill source (TPs 15-10 and TP 15-11) as well as the climate and surficial geology at the Site, it is expected that the elevated pH reflects natural background conditions.

One sample (A3-NW-B-0.5-1) was originally reported to contain concentrations of zinc (247 mg/kg) that exceeded the applicable CCME AL guideline and SSRT (200 mg/kg); the BFD for the sample was reported to be much lower (62.2 mg/kg). Laboratory rework analysis of this sample (A3-NW-B-0.5-1 Rework 1) and its BFD (A3-DUP1) returned zinc concentrations less than the CCME AL guideline and SSRT. Significant variability was subsequently observed during the remediation project, presumably due to the heterogeneity of the materials in the excavation areas.

All other metals parameters analysed were less than the applicable CCME AL guidelines and/or SSRTs.

BTEX, MTBE and PHC F1

Exceedances of BTEX, MTBE and/or PHC F1 are summarized in Table 6-2.

Table 6-2
Summary of BTEX/MTBE/PHC F1 Exceedances in AI3 Excavation Limit Samples

Parameter	Number of Exceedances	Maximum Concentration (mg/kg)	CCME AL Guideline (mg/kg)
Benzene	5	0.032	0.0068
Ethylbenzene	2	0.019	0.018
Toluene	8	4.5	0.08

Four of the six samples collected on January 31, 2015, from the AI3 excavation limits contained concentrations of one or more of benzene, ethylbenzene and toluene that exceeded the applicable CCME AL guidelines. Upon receipt of the samples, Maxxam informed SLR that methanol used to preserve the samples had leaked from some of the vials during transport and, therefore, some of the samples could not be analysed. The BFD collected for A3-NW-B-0.5-1 (A3-DUP1) could not be analysed for BTEX and MTBE parameters for this reason. In addition, the sample used for the BTEX and MTBE analysis for A3-F1 was extracted from an unpreserved soil jar. Due to the observed loss of methanol preservative in some of the samples, there was a possibility of potential methanol loss in all of the shipment vials which could be introducing a bias to the results. Previous investigations of AI3 did not identify BTEX, MTBE or PHC F1 as COCs in soil.

Due to the potentially compromised sample results, additional samples were subsequently collected. On February 16, 2015, SLR collected an additional six surface samples (A3-SS1 to 6) from the re-contoured excavation limits. Although collected following re-contouring, the samples are expected to reflect local residual soil conditions. Four of these six additional samples contained concentrations of benzene, ethylbenzene and/or toluene that exceeded the applicable CCME AL guidelines; however, concentrations were generally lower than the concentrations reported previously (particularly for toluene), suggesting that the previous dataset was likely biased due to the methanol leakage issue. The detection of BTEX in soil at AI3 in 2015, but not previously in 2013, may be due to the implementation of a new sampling methodology for volatile organic parameters in soil (i.e., sample field preservation with methanol). It is noted that all the exceedances pertain to guidelines based on protection of drinking water. Concentrations measured in all of the samples were less than guidelines derived for all other human and ecological exposures (e.g., direct soil contact by plants and invertebrates). Given the lack of use of groundwater as a drinking water supply currently and the anticipated depth to groundwater in the area, no adverse effects of immediate concern are expected; however, future risk assessment may require additional investigation or hydrogeological modelling to demonstrate the absence of risks with respect to future drinking water use.

PHC F2 - F4

All samples submitted for analysis of PHC fractions F2 - F4 had concentrations less than the applicable CCME AL guidelines.

PAHs

Samples submitted for PAH analysis were all less than the laboratory detection limits and were below CCME AL guidelines.

Grain Size

Grain size analyses completed on samples collected from the AI3 excavation limits indicated that the soil in the area was classified as fine grained soil, consisting of 96.6 % or greater of material less than 0.075 mm in diameter.

6.1.2 MDZ Excavation Limit Results

Soil samples collected from the final excavation limits of the MDZ were submitted to Maxxam for analysis of one or more of the following parameters: metals, leachable metals, BTEX, MTBE, PHC fractions F1 - F4, PAHs and grain size as summarized in Table 6-3.

Table 6-3
Summary of Analyses for MDZ Excavation Limit Samples

Parameter	# Samples Analysed	# BFDs Analysed
Metals	46	5
BTEX/MTBE/PHC F1	17	2
PHC F2 - F4	22	2
PAH	22	2
Leachable Metals	3	0
Grain Size	17	1

Analytical results for confirmatory soil samples collected from the limits of MDZ were compared to the applicable CCME AL guidelines and/or SSRTs for the Site; results are presented in Tables 1 through 4 as well as 12 and summarized on Drawing 6.

Metals

Metals parameters exceeding the applicable guidelines and/or SSRTs are summarized in Table6-4.

Table 6-4
Summary of Metals Exceedances in MDZ Excavation Limit Samples

Parameter	Number of Exceedances	Maximum Concentration (mg/kg)	CCME AL Guideline (mg/kg)	SSRT (mg/kg)
Copper	1	64.3	63	79
Lead	3	333	70	120
Tin	9	24.4	5	50
Zinc	1	1360	200	200

* The original sample and/or its BFD sample exceeded accounting for a single exceedance

All MDZ excavation limit samples exceeded the CCME AL guideline for pH; as discussed previously, the results are anticipated to reflect natural background conditions. Below is a summary of the metals exceedances:

- Sample MDZ-NW5-B6-3.0 contained concentrations of copper (64.3 mg/kg) that exceeded the CCME AL guideline but not the SSRT;
- Samples MDZ-EW1-0.3-0.8 and MDZ-SW2-0.3-0.8 contained concentrations of lead (72.0 mg/kg and 75.5 mg/kg, respectively) that exceeded the CCME AL guideline but not the SSRT;
- Sample MDZ-EW1-1.0-2.0 contained concentrations of lead (333 mg/kg) that exceeded the CCME AL guideline and the SSRT;
- Samples MDZ-NW2-4.0-5.0, MDZ-NW2-B3-6.5, MDZ-NW3-B4-6.0, MDZ-NW4-2.0-3.0, MDZ-NW4-B5-5.0, MDZ-NW5-0.3-0.8, MDZ-EW1-1.0-2.0, MDZ-SW2-0.3-0.8 and MDZ-SW4-0.3-0.8 contained concentrations of tin that exceeded the CCME AL guideline but not the SSRT; and
- Sample MDZ-NW6-B7-5.0 contained concentrations of zinc (1,360 mg/kg) that exceeded the CCME AL guideline and SSRT.

All other metals parameters analysed were less than the applicable CCME AL guidelines and/or SSRTs.

BTEX, MTBE and PHC F1

MDZ excavation limit samples were analysed for BTEX, MTBE and/or PHC F1. One sample, MDZ-NW1-B1-8.0, contained concentrations of toluene (0.15 mg/kg) that exceeded the CCME AL guideline. The toluene concentration in the sample exceeded the drinking water protective soil guideline only and was below guidelines protective of other human and ecological exposures.

All other PHCs analysed were less than the applicable CCME AL guidelines.

PHC F2 - F4

MDZ excavation limit samples were analysed for PHC fractions F2 - F4. All samples were less than the applicable CCME AL guidelines.

PAHs

Two samples MDZ-DUP-D (the BFD of MDZ-NWA-B2-7.0) and MDZ-NW5-B6-3.0 contained concentrations of phenanthrene (0.049 mg/kg and 0.079 mg/kg, respectively) that exceeded the CCME AL guideline. It is noted that MDZ-NWA-B2-7.0 contained phenanthrene concentrations below the laboratory detection limit. The phenanthrene concentrations are noted to exceed only the aquatic life protection soil guideline; it is expected that future risk assessment could address the phenanthrene exceedances, although additional investigation or hydrogeological modelling may be required to support the risk assessment.

All other PAH parameters analysed were less than the applicable CCME AL guidelines.

Leachable Metals

Three MDZ excavation limit samples were analysed for leachable metals for future remedial planning purposes. All three samples contained concentrations of leachable metals less than the BC HWR.

Grain Size

Grain size analyses completed on samples collected from the MDZ excavation limits indicated that the soil in the area was classified as fine grained soil, consisting of 73.3% or greater of material less than 0.075 mm in diameter.

6.1.3 Backfill Source Results

Soil samples collected from the on-site and off-site test pits advanced to evaluate the potential backfill sources were submitted to Maxxam for analysis of one or more of the following parameters: metals, PAHs, BTEX, MTBE, PHC fractions F1 - F4 and Saturated Paste Sodium and Chloride as summarized in Table 6-5.

Table 6-5
Summary of Analyses for On-Site and Off-Site Backfill Source Areas

Parameter	# Samples Analysed	# BFDs Analysed
	On-Site Source Area	
Metals	6	0
BTEX/MTBE/PHC F1	3	0
PHC F2 - F4	3	0
PAH	3	0
	Off-Site Source Area	
Metals	4	0
BTEX/MTBE/PHC F1	2	0
PHC F2 - F4	2	0
PAH	2	0
Na and Cl Saturated Paste	2	0

Analytical results for test pits advanced in the potential backfill source areas were compared to the applicable CCME AL guidelines and/or SSRTs for the Site. Saturated Paste Sodium and Chloride results were compared to BC CSR AL standards as no CCME guidelines presently exist for these parameters.

The potential backfill soil sample results, compared to the applicable soil guidelines, are presented in Tables 1 through 4.

Metals

All pH concentrations in soil samples collected from the on-site and off-site borrow areas exceeded the CCME AL guideline; however, it is expected that the concentrations observed reflect natural background conditions.

One sample, TP15-9-1-2 from the on-site backfill borrow area, contained tin (5.27 mg/kg) that marginally exceeded the CCME AL guideline (5 mg/kg) but was less than the SSRT (50 mg/kg).

All other metals parameters analysed from the on-site and off-site source areas for backfill were less than the applicable CCME AL guidelines and/or SSRTs.

BTEX, MTBE and PHC F1

All samples analysed were less than the laboratory detection limits and were below the CCME AL guidelines.

PHC F2 - F4

All samples from the on-site and off-site backfill source areas had concentrations of PHC F2 - F4 which were less than the CCME AL guidelines.

PAHs

All samples analysed were less than the laboratory detection limits and the CCME AL guidelines for all PAH parameters.

Sodium and Chloride Saturated Paste

Two samples from the off-site backfill source area were analysed for Saturated Paste Sodium and Chloride due to the potential for impacts related to winter road salt use. Both samples analysed were less than the BC CSR AL standards.

Grain Size

Samples submitted from the on-site and off-site borrow source areas for grain size analysis indicated that the soils in these areas were classified as fine grained soil, consisting of 82.2% and 97.7% or greater, respectively, of material less than 0.075 mm in diameter.

6.2 Results Representative of Soil Removed from the Site

The following sections summarize the results of soil samples considered representative of soil removed from the Site (i.e., soil in test pits advanced prior to excavation to facilitate soil disposal and interim samples collected from the MDZ during the excavation program).

6.2.1 In Situ Soil Characterization Results

Seven test pits were advanced prior to remedial activities in the MDZ (TP15-01 to 15-05) and AI3 (TP15-06 and 15-07) to characterize the soil for disposal purposes. Soil samples collected from these two areas were submitted to Maxxam for analysis of one or more of the following parameters: metals, BTEX/VPH, MTBE, EPHs, LEPH/HEPH, PAHs, leachable metals, leachable BTEX, leachable PAHs, total elemental sulfur, special waste oil and grease (SWOG), flashpoint and paint filter as summarized in Table 6-6, below.

Table 6-6
Summary of Analyses for *In Situ* Soil Characterization Test Pit Samples

Parameter	# Samples Analysed	# BFDs Analysed
	MDZ	
Metals	6	1

BTEX and MTBE	6	1
VPH, LEPH/HEPH, EPHs	8	2
PHC F1 - F4	6	1
PAH	6	1
Leachable Metals	9	2
Leachable BTEX	8	2
Leachable PAH	9	2
Total Elemental Sulfur	9	2
SWOG	9	2
Flashpoint	9	2
Paint Filter (Free liquid)	9	2
	AI3	
VPH	1	0
EPHs	1	0
Leachable Metals	8	0
Leachable BTEX	8	0
Leachable PAH	8	0
Total Elemental Sulfur	8	0
SWOG	8	0
Flashpoint	8	0
Paint Filter (Free liquid)	8	0

Analytical results for the test pits advanced for soil disposal were compared to the applicable CCME AL guidelines and/or SSRTs for the Site. In addition, the test pit soil chemistry results were also compared against the following standards, guidelines and/or criteria for soil disposal purposes:

- Metals, PHCs and PAHs were compared against the BC CSR Schedule 7 for relocation to non-agricultural land (CSR NL);
- PAH Toxicity Equivalency Values were compared to the BC HWR definition for waste containing PAH;
- Leachable Metals, BTEX and PAHs were compared against the Alberta Environmental Protection Class II Landfill Criteria (Class II) and the BC HWR standards; and
- Total Elemental sulfur, SWOG, Flashpoint and Paint Filter were compared against the Alberta Environmental Protection Class II Landfill Criteria (Class II) and the BC HWR standards.

The test pit soil samples, compared to the guidelines/standards/criteria described above, are presented in Tables 5 through 11. The locations of the test pits are depicted on Drawing 4.

Metals

Metals parameters exceeding the applicable guidelines are summarized in Table 6-7.

Table 6-7
Summary of Metals Exceedances in Samples Collected for *In Situ* Soil Characterization

Parameter	Number of Exceedances	Maximum Concentration (mg/kg)	CCME AL Guidelines (mg/kg)	SSRTs (mg/kg)	CSR NL Standards (mg/kg)
Tin	2	9.46	5	50	20
Zinc	2	525	200	200	150

All samples had pH above the CCME guideline; the elevated pH is anticipated to reflect natural background conditions. Below is a summary of the metals exceedances:

- Samples TP15-A (BFD of TP15-2-1-2) and TP15-3-1-2 contained concentrations of tin (9.46 mg/kg and 9.29 mg/kg, respectively) that exceeded the CCME AL guideline but not the SSRT or the CSR NL standard; and
- Samples TP15-A (BFD of TP15-2-1-2) and TP15-3-1-2 also contained concentrations of zinc (234 mg/kg and 525 mg/kg, respectively) that exceeded the CCME AL guideline, the SSRT and the CSR NL standard.

It is noted that BFD pair TP15-A and TP15-2-1-2 showed poor agreement; it is unclear whether the discrepancy is due to the heterogeneity of the materials in the MDZ or is potentially related to a sampling labelling issue.

All other metals parameters analysed were less than the applicable CCME AL guidelines, SSRTs and/or CSR NL standards.

BTEX, MTBE, VPH and PHC F1

Samples from the test pits were analysed for BTEX, MTBE, VPH and PHC F1. Parameters exceeding the applicable guidelines are summarized in Table 6-8.

Table 6-8
Summary of BTEX/MTBE/VPH/PHC F1 Exceedances in Samples collected for *In Situ* Soil Characterization

Parameter	Number of Exceedances	Maximum Concentration (mg/kg)	CCME AL Guidelines (mg/kg)	BC CSR NL Standards (mg/kg)
Benzene	2	0.021	0.0068	0.04
Toluene	4	1.5	0.08	1.5

Please note that PHC F1 was compared to the CSR NL standard for VPH; concentrations of PHC F1 were below the CSR NL standard for VPH.

Below is a summary of the exceedances noted:

- Samples TP15-2-1-2 and TP15-4-0.5-1 contained concentrations of benzene (0.021 mg/kg and 0.016 mg/kg, respectively) that exceeded the CCME AL guideline but not the CSR NL standard; and
- Samples TP15-2-0.5-1, TP15-2-1-2, TP15-3-1-2 and TP15-4-0.5-1 contained concentrations of toluene that exceeded the CCME AL guideline but not the CSR NL standard.

PHC F2 - F4, EPH, LEPH and HEPH

Samples from test pits advanced in the MDZ and AI3 were analysed for PHC F2 - F4. Concentrations in all samples analysed were less the CCME AL guidelines. Please note that PHC F2 and F3 were compared to the CSR NL standards for LEPH and HEPH, respectively; concentrations of PHC F2 and F3 were below the CSR NL standards for LEPH and HEPH.

PAHs

MDZ test pit soil samples submitted for analysis of PAHs were less than the laboratory detection limits and below the guidelines/standards.

Leachable Metals

Samples from test pits advanced in the MDZ and AI3 were analysed for leachable metals. All samples analysed were less than the Alberta Class II Landfill criteria and BC HWR standards.

Leachable BTEX

Samples from test pits advanced in the MDZ and AI3 were analysed for leachable BTEX. All samples analysed were less than the Alberta Class II Landfill criteria and BC HWR standards.

Leachable PAHs

Samples from test pits advanced in the MDZ and AI3 were analysed for leachable PAHs. All samples analysed were less than the Alberta Class II Landfill criteria and BC HWR standards.

Total Elemental Sulfur, SWOG, Flashpoint and Paint Filter

Samples collected from the MDZ and AI3 were submitted for Total Elemental Sulfur, SWOG, Flashpoint and Paint Filter analysis. All samples analysed were less than the Alberta Class II Landfill criteria and BC HWR standards.

6.2.2 MDZ Interim Limit Results

Soil samples collected from interim limits during the MDZ excavation were submitted to Maxxam for analysis of one or more of the following parameters: metals, BTEX, MTBE, PHC F1 - F4, PAHs and grain size as summarized in Table 6-9.

Table 6-9
Summary of Analyses for MDZ Interim Limit Samples

Parameter	# Samples Analysed	# BFDs Analysed
Metals	10 (2)*	2 (2)*
BTEX/MTBE/PHC F1	6 (1)*	1*
PHC F2 - F4	6	1
PAH	6	1
Grain Size	6	1

* # of samples requested for re-analysis indicated in brackets due to exceedances and/or discrepancy of results between the sample and its BFD

A re-analysis of metals and BTEX was requested on MDZ-WA-1.0-2.0 and its BFD (MDZ-WA2-1.0-2.0). In addition, MDZ-EW-2-3 and its BFD (MDZ-DUP-A) were re-analysed for metals parameters. Both sets of re-analysed samples are denoted by the suffix “Rework 1” in the sample name.

Analytical results for interim soil samples collected from MDZ were compared to the applicable CCME AL guidelines and/or SSRTs for the Site. It should be noted that all interim samples have since been excavated and do not reflect the *in situ* soil chemistry results in the MDZ.

Therefore, MDZ interim soil samples were also compared against the BC CSR NL standards to facilitate off-site disposal at the permitted facilities.

The interim soil samples are presented in Tables 5 through 7 as well as 12.

Metals

Metals exceedances are summarized in Table 6-10.

Table 6-10
Summary of Metals Exceedances in MDZ Interim Limit Samples

Parameter	Number of Exceedances	Maximum Concentration (mg/kg)	CCME AL Guidelines (mg/kg)	SSRTs (mg/kg)	CSR NL Standards (mg/kg)
Cadmium	2	4.80	1.4	3.8	1.5
Copper	1	589	63	79	90
Lead	2*	158	70	120	100
Molybdenum	1	9.22	5	-	10
Tin	4(2)*	19.7	5	50	20
Zinc	2	255	200	200	150

* The original sample, its BFD and/or its re-analysed sample exceeded accounting for a single exceedance

All interim limit samples exceeded the applicable CCME AL guideline for pH; pH values measured are anticipated to represent background conditions. Metals exceedances were identified in four sample locations:

- MDZ-WA-1.0-2.0 (including re-work) and BFD sample MDZ-WA2-1.0-2.0: concentrations of cadmium, lead, molybdenum, tin and zinc exceeded the CCME AL guidelines, SSRTs and/or CSR NL standards;
- MDZ-WA-2.0-3.0: concentrations of tin and zinc exceeded the CCME AL guidelines and/or CSR NL standards;
- MDZ-EW-2-3 (including re-work) and BFD sample MDZ-DUPA (including re-work): concentrations of cadmium, copper, lead, tin and zinc exceeded the CCME AL guidelines, SSRTs and/or CSR NL standards; and
- MDZ-F1-5.5: concentrations of tin exceeded the CCME AL guideline but not the SSRT or the CSR NL standard.

All other metals parameters analysed were less than the applicable CCME AL guidelines, SSRTs and/or CSR NL standards.

BTEX, MTBE and PHC F1

Parameters exceeding the applicable guidelines are summarized in Table 6-11.

Table 6-11
Summary of BTEX/MTBE/PHC F1 Exceedances in MDZ Interim Limit Samples

Parameter	Number of Exceedances	Maximum Concentration (mg/kg)	CCME AL Guidelines (mg/kg)	BC CSR NL Standards (mg/kg)

Benzene	2	0.020	0.0068	0.04
Toluene	3	2.3	0.08	1.5

Sample MDZ-WA2-1.0-2.0 (BFD of MDZ-WA-1.0-2.0) and sample MDZ-WA-2.0-3.0 contained concentrations of benzene that exceeded the CCME AL guidelines but not the CSR NL standard. In addition, these samples contained concentrations of toluene that exceeded the CCME AL guideline and the CSR NL standard. Sample MDZ-WB-0.3-0.8 contained concentrations of toluene that exceeded the CCME AL guideline but not the CSR NL standard.

All other PHC constituents analysed were less than the applicable CCME AL guidelines and the CSR NL standards.

PHC F2 - F4

MDZ interim limit samples were analysed for PHC F2 - F4. All samples were less than the applicable CCME AL guidelines. Concentration of PHC F2 and F3 were below the CSR NL standards for LEPH and HEPH, respectively.

PAHs

Concentrations of PAHs in all MDZ interim limit samples analysed were less than the laboratory detection limits and below the CCME AL guidelines and CSR NL standards.

Grain Size

MDZ interim limit samples submitted for grain size analysis were classified as fine grained soil, consisting of 79.7% or greater of material less than 0.075 mm in diameter.

7.0 CONCLUSION AND RECOMMENDATIONS FOR FUTURE WORK

Approximately 1,230 m^3 of debris and associated soil remains in the MDZ. This material could not be removed during the 2015 remediation project due to geotechnical considerations and project constraints (time and budget). Debris remains embedded in the toe of the north wall to a depth of approximately 1.5 m bgs, in the toe of the south wall to a depth of approximately 0.75 m bgs and in the base of the MDZ (between the north and south walls) to a depth of approximately 1.5 m bgs. The horizontal extent of the debris could not be investigated due to the slope instability in this area, but it is estimated to be approximately 1.0 to 2.0 m into both toes of the north and south walls (refer to Appendix M).

On March 5, 2015, tension cracks, indicative of slope instability, were observed by CGL along a 20 m wide section of the north wall. The timing of this event coincided with the conclusion of excavation activities and, therefore, no stabilization work was required. The north wall of the MDZ was deemed by CGL to be marginally stable and subject to shallow slumps and slides. CGL has provided the following comments with respect to future remediation of the material remaining in the MDZ:

- A slope analysis of the north wall should be conducted due to the potential instability of the slope as indicated by tension cracks observed;
- To access buried debris along the north wall, the excavation would likely entail working from the top-down in benches. In order to access the material at the toe, the benches would extend into the top of the slope, resulting in a partial loss of the upper plateau;
- A detailed engineered plan would be required prior to additional removal of debris that would include details regarding methodology and approach to provide limits for safety and for slope stability; and
- Excavation along the north wall of the MDZ would disturb native vegetation and remove a significant amount of overburden composed of native soil. This would result in either an over steepened slope that is geotechnically unstable or the requirement of a significant amount of backfill to be used to return the slope to a 1(H):1(V) grade.

As noted above in the comments provided by CGL, the excavation of the remaining material in the MDZ would likely require taking the north slope back an additional 3.0 to 4.0 m from the existing edge in order to create a geotechnically stable slope or benches to access the remaining debris embedded in the north wall. This would result in the probable loss of native vegetation along the top of the slope as well as a significant loss of native soil. For reference purposes, it has been estimated that approximately 3,750 m^3 of upslope material (including native soil) would need to be excavated in order to access and remove the debris remaining in the north slope in a safe manner. It is anticipated that the majority of this material would need to be disposed off-site once excavated due to the difficulty in consolidating and stabilizing these materials once disturbed.

Alternatively, it may be desirable not to conduct additional excavation of the MDZ but rather conduct long-term restoration works which could include backfilling the MDZ to provide a protective cap and planting native juvenile plants in the area. Due to the difficulty associated with consolidating and stabilizing the disturbed native soil since it is assumed that only native soils would be approved for use as a protective cap by CWS, it may be desirable to conduct toxicity testing on shallow soil in the MDZ (i.e., 0-1 m depth) to evaluate whether adverse effects to ecological receptors from the residual soil contamination are likely. If the latter approach is undertaken, it is recommended that the ecological protection goals be determined in advance of the toxicity testing in consultation with EC and CWS.

7.1 Future Planning and Costs – MDZ Excavation

If excavation of the debris remaining in the MDZ is undertaken in the future, SLR recommends the following activities to facilitate the remediation:

- Completion of a site visit with PWGSC, EC and CWS to discuss the long-term vision for the Site and obtain confirmation on long-term geotechnical and restoration measures to be implemented at the Site. The site visit should be conducted in 2015 or Spring 2016 in preparation of remediation in Winter 2016-2017;
- Preparation of a geotechnically engineered excavation and long-term restoration plan for the remaining material in the MDZ in Spring or Early Summer 2016. The professionally certified/stamped designs would be included in any subsequent tender specification developed for the remediation project;
- Review of the excavation and long-term restoration designs by CWS to confirm the desired approach in Summer 2016; and
- Preparation of remediation tender specification for posting on Buy and Sell in Fall 2016 so that the remediation and restoration works can be conducted in Winter 2016-2017 and Spring 2017.

As indicated in Table 14, the estimated cost to complete the excavation and restoration of the MDZ, conduct long-term environmental and geotechnical monitoring at the Site and complete the uplands HHERA and federal Site Closure Tool is $1,857,891.

7.2 Future Planning and Costs – Cap Installation and Restoration

Alternatively, if future remediation will be limited to the importation of a protective, native soil cap over the remaining debris and contaminated soil, SLR recommends the following activities:

- Completion of a site visit with PWGSC, EC and CWS to discuss the long-term vision for the Site and obtain confirmation on long-term geotechnical and restoration measures to be implemented at the Site. The site visit should be conducted in 2015 or Spring 2016 in preparation of cap installation in Winter 2016-2017;
- Preparation of a geotechnically engineered design for the imported cap and long-term restoration plan for the MDZ. The professionally certified/stamped designs would be included in any subsequent tender specification developed for the project;
- Review of the cap installation and long-term restoration designs by CWS to confirm the desired approach in Summer 2016; and
- Preparation of project tender specification for posting on Buy and Sell in Fall 2016 so that the cap installation and restoration works can be conducted in Winter 2016-2017 and Spring 2017.

The estimated cost to install a protective cap in the MDZ, complete restoration of the MDZ, conduct long-term environmental and geotechnical monitoring and complete the uplands HHERA and federal Site Closure Tool is $686,610 (Table 15).

7.3 Future Planning and Costs – Toxicity Testing and Restoration

Soil toxicity testing completed in the MDZ may conclude that the installation of a protective cap is not necessary. Consequently, only long-term restoration of the MDZ may be required. However, the completion of the following activities is recommended to facilitate the long-term restoration of the trail area:

- Completion of a site visit with PWGSC, EC and CWS to discuss the long-term vision for the Site and obtain confirmation on long-term geotechnical and restoration measures to be implemented at the Site. The site visit should be conducted in 2015 or Spring 2016 in preparation of restoration activities in Winter 2016-2017 and Spring 2017;
- Preparation of a detailed long-term restoration plan for the trail area. The professionally certified/stamped designs would be included in any subsequent tender specification developed for the project;
- Review of the long-term restoration designs by CWS to confirm the desired approach in Summer 2016; and
- Preparation of project tender specification for posting on Buy and Sell in Fall 2016 so that the restoration works can be conducted in Winter 2016-2017 and Spring 2017.

The estimated cost to conduct soil toxicity testing in the MDZ (plant and invertebrate testing), complete restoration of the MDZ, conduct long-term environmental and geotechnical monitoring and complete the uplands HHERA and federal Site Closure Tool is $520,659 (Table 16). Please note that the results of the toxicity testing may conclude that additional remediation or installation of a protective soil cap is necessary.

8.0 ADDITIONAL ENVIRONMENT CANADA POLICY REQUIREMENTS

As part of the 2013-2014 site works, SLR completed the Federal Contaminated Sites Inventory (FCSI) input form. The FCSI input form is included in Appendix O.

9.0 PROFESSIONAL STATEMENT

This report was prepared by Krystal Ashworth, B.Sc., A.Ag., Marci Martin, B.Sc., A.Ag. and Kalina Noel, B.Sc., M.E.Des., R.P.Bio. and reviewed by Lindsay Paterson, M.Sc., P.Ag. and David McKeown, B.Sc., R.P.Bio. The authors/reviewers have over 40 years of combined experience in the assessment of similar sites and are familiar with the works carried out at the Site.

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11.0 CLOSURE

SLR's liability is specified in the contract with PWGSC. Copyright in the Material shall vest in Canada.

This report has been prepared and the work referred to in this report has been undertaken by SLR for PWGSC. It is intended for the sole and exclusive use of PWGSC and its authorized agents for the purpose(s) set out in this report. Any use of, reliance on or decision made based on this report by any person other than PWGSC for any purpose, or by PWGSC for a purpose other than the purpose(s) set out in this report, is the sole responsibility of such other person or PWGSC. PWGSC and SLR make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

This report has been prepared for specific application to this site and is based on the interpretation of data collected from field investigations and the results of laboratory analyses, which were limited to the quantification in select samples of those substances specifically identified in the report. Unless otherwise stated, the findings set out in this report cannot be extended to previous or future site conditions; portions of the Site which were unavailable for direct investigation; subsurface locations which were not investigated directly; or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the Site; substances addressed by the investigation may exist in areas of the Site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken. SLR expresses no warranty with respect to the accuracy of the laboratory analyses, methodologies used, or presentation of analytical results by the laboratory. Actual concentrations of the substances identified in the samples submitted may vary according to the extraction and testing procedures used.

As the evaluation and conclusions reported herein do not preclude the existence of other chemical compounds and/or that variations of conditions within the site may be possible, this report should be used for informational purposes only and should absolutely not be construed as a comprehensive hydrogeological or chemical characterization of the site. If site conditions change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

Nothing in this report is intended to constitute or provide a legal opinion. SLR makes no representation as to the requirements of or compliance with environmental laws, rules, regulations or policies established by federal, provincial or local government bodies. Revisions to the regulatory standards referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary.

TABLES

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

TABLE 1: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF CURRENT SITE CONDITIONS - METALS PARAMETERS (mg/kg)

Sample ID	Date	Depth (m)	pH	Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Cadmium	Chromium (total)	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Uranium	Vanadium	Zinc
Area of Impact 3																														
A3-EW-A-0.5-1	31-Jan-2015	0.5 - 1.0	**8.79**	8480	0.26	5.25	73.6	< 0.40	0.11	0.134	16.2	8.24	14.3	21500	8.91	21.3	16900	447	< 0.050	0.32	20.0	< 0.50	< 0.050	192	< 0.050	< 0.10	61.2	0.446	10.0	45.6
A3-NW-A-0.5-1	31-Jan-2015	0.5 - 1.0	**8.78**	8410	0.29	5.32	71.2	< 0.40	0.11	0.264	15.7	7.90	14.0	21000	9.62	21.5	17000	440	< 0.050	0.35	19.5	< 0.50	< 0.050	191	< 0.050	0.13	63.5	0.421	10.1	47.9
A3-NW-A-1-2	31-Jan-2015	1.0 - 2.0	**9.25**	7910	0.28	5.15	74.0	< 0.40	0.11	0.123	15.3	7.85	13.6	20500	8.87	21.1	18300	432	< 0.050	0.37	19.8	< 0.50	< 0.050	206	< 0.050	< 0.10	56.6	0.488	9.2	41.5
A3-NW-B-0.5-1	31-Jan-2015	0.5 - 1.0	**8.55**	8280	0.29	5.40	79.5	< 0.40	0.11	0.343	15.8	8.11	15.2	22400	12.3	20.2	17500	453	< 0.050	0.43	23.2	< 0.50	< 0.050	181	< 0.050	0.18	60.6	0.492	9.9	**247**
A3-NW-B-0.5-1 REWORK 1*	31-Jan-2015	0.5 - 1.0	---	9200	0.33	5.75	80.5	< 0.40	0.11	0.231	16.3	8.18	15.4	23100	18.6	20.1	16900	455	< 0.050	0.50	22.6	< 0.50	< 0.050	180	< 0.050	0.37	62.6	0.491	10.1	62.1
A3-DUP1 (BFD of A3-NW-B-0.5-1.0)	31-Jan-2015	0.5 - 1.0	**8.60**	8380	0.30	5.39	81.8	< 0.40	0.12	0.310	16.0	8.19	14.7	21400	10.2	20.6	17600	461	< 0.050	0.39	22.6	< 0.50	< 0.050	181	< 0.050	0.15	61.0	0.504	10.4	62.2
A3-DUP1 REWORK 1* (BFD of A3-NW-B-0.5-1 REWORK 1)	31-Jan-2015	0.5 - 1.0	---	8890	0.32	5.73	79.8	< 0.40	0.11	0.339	16.1	8.08	15.3	22700	11.0	21.1	17100	453	< 0.050	0.40	23.4	< 0.50	< 0.050	186	< 0.050	0.23	64.2	0.523	10.0	70.4
A3-NW-B-1-2	31-Jan-2015	1.0 - 2.0	**9.43**	8250	0.29	5.23	99.1	< 0.40	0.10	0.172	15.9	8.32	11.7	21300	8.77	20.7	19500	456	< 0.050	0.37	19.7	< 0.50	< 0.050	202	< 0.050	< 0.10	71.7	0.508	9.9	40.8
A3-SW-A-0.5-1	31-Jan-2015	0.5 - 1.0	**9.28**	7810	0.30	5.13	55.7	< 0.40	0.11	0.113	15.3	8.10	13.8	19900	8.43	20.3	18400	428	< 0.050	0.34	20.0	< 0.50	< 0.050	198	< 0.050	< 0.10	59.1	0.446	9.7	39.8
A3-SW-B-0.5-1	31-Jan-2015	0.5 - 1.0	**8.52**	8070	0.26	5.29	72.6	< 0.40	0.10	0.131	14.7	7.66	14.7	19800	8.74	19.7	15800	431	< 0.050	0.34	18.8	< 0.50	< 0.050	191	< 0.050	< 0.10	58.1	0.427	9.4	42.2
A3-WW-A-0.5-1	31-Jan-2015	0.5 - 1.0	**9.18**	8080	0.31	5.19	67.5	< 0.40	< 0.10	0.117	15.2	7.98	14.0	20500	8.63	20.5	18800	414	< 0.050	0.35	19.7	< 0.50	< 0.050	191	< 0.050	< 0.10	63.1	0.549	9.5	41.1
A3-F1	31-Jan-2015	1.0	**8.54**	8620	0.31	5.64	83.8	< 0.40	0.12	0.205	16.4	8.28	15.4	22700	9.90	20.4	17300	460	< 0.050	0.45	22.4	< 0.50	< 0.050	178	< 0.050	0.20	65.6	0.477	10.3	61.0
A3-F2	31-Jan-2015	1.0	**8.68**	8870	0.35	5.66	81.4	< 0.40	0.12	0.150	16.1	8.50	14.7	21300	10.2	20.8	17800	458	< 0.050	0.37	20.7	< 0.50	< 0.050	178	< 0.050	0.13	66.9	0.521	10.8	51.5
A3-F3	31-Jan-2015	2.5	**8.89**	8370	0.30	5.52	56.7	< 0.40	< 0.10	0.131	15.7	8.39	13.8	21500	9.10	20.6	18500	459	< 0.050	0.38	19.9	< 0.50	< 0.050	187	< 0.050	0.13	67.6	0.458	10.4	43.4
A3-F4	31-Jan-2015	2.5	**8.78**	8240	0.40	5.26	86.9	< 0.40	0.11	0.469	15.8	7.98	15.4	22200	18.3	20.0	17400	447	< 0.050	0.47	20.7	< 0.50	< 0.050	180	< 0.050	0.35	62.7	0.472	10.1	71.8
Main Debris Zone																														
MDZ-EW1-0.3-0.8	4-Mar-2015	0.3 - 0.8	**8.60**	8460	0.53	5.40	94.7	< 0.40	0.12	0.255	23.7	8.49	16.5	21300	**72.0**	19.1	17500	450	< 0.050	0.54	20.0	< 0.50	< 0.050	187	< 0.050	2.52	65.5	0.538	10.1	71.5
MDZ-EW1-1.0-2.0	4-Mar-2015	1.0 - 2.0	**8.47**	8360	0.54	6.19	109	< 0.40	0.13	0.306	16.6	8.49	20.2	25000	25.0	18.4	18700	464	0.050	0.64	21.2	< 0.50	0.053	190	< 0.050	**11.1**	61.0	0.548	9.5	95.4
MDZ-EW1-2.0-3.0	4-Mar-2015	2.0 - 3.0	**8.63**	7410	3.12	6.26	112	< 0.40	0.14	0.282	16.3	8.34	24.5	24700	**333**	17.5	19600	459	0.050	0.55	20.8	< 0.50	4.97	183	0.057	3.32	66.3	0.514	9.6	127
MDZ-EW1-3.0-4.0	4-Mar-2015	3.0 - 4.0	**8.55**	7800	0.45	5.39	107	< 0.40	0.11	0.269	14.7	8.19	17.3	21900	24.8	18.1	16700	456	< 0.050	0.58	19.8	< 0.50	0.077	180	< 0.050	1.82	55.0	0.537	9.7	82.2
MDZ-EW1-4.0-5.0	4-Mar-2015	4.0 - 5.0	**8.64**	7830	0.44	5.92	102	< 0.40	0.12	0.205	15.8	8.64	16.3	19500	16.9	19.2	20100	447	< 0.050	0.45	19.8	< 0.50	0.077	210	< 0.050	2.83	63.0	0.584	9.5	64.8
MDZ-EW1-5.0	4-Mar-2015	5.0	**9.09**	6430	0.32	5.55	97.6	< 0.40	< 0.10	0.067	13.4	7.46	14.2	16900	8.23	15.7	19700	405	< 0.050	0.31	18.1	< 0.50	< 0.050	186	< 0.050	0.13	49.7	0.570	8.4	35.4
MDZ-EW2-0.3-0.8	4-Mar-2015	0.3 - 0.8	**8.52**	8270	0.51	7.07	112	< 0.40	0.12	0.334	19.0	10.1	22.4	22600	22.7	20.3	23400	535	0.075	0.51	23.2	< 0.50	0.059	208	< 0.050	1.60	70.4	0.569	11.4	115
MDZ-EW2-1.0-2.0	4-Mar-2015	1.0 - 2.0	**8.22**	8060	0.27	5.04	79.3	< 0.40	0.11	0.108	14.1	7.70	14.3	19600	9.77	17.6	15600	438	< 0.050	0.32	18.3	< 0.50	< 0.050	154	< 0.050	0.15	57.5	0.396	10.0	38.9
MDZ-EW2-2.0	4-Mar-2015	2.0	**8.93**	7540	0.31	6.04	95.7	< 0.40	0.11	0.073	15.2	8.72	14.8	18900	9.36	18.3	19000	432	< 0.050	0.37	19.6	< 0.50	< 0.050	202	< 0.050	0.13	52.9	0.484	9.2	38.8
MDZ-NWA-0.3-0.8	8-Feb-2015	0.3 - 0.8	**9.35**	7380	0.37	5.60	102	< 0.40	0.12	0.121	12.6	7.46	14.7	19100	9.72	15.7	17000	406	< 0.050	0.35	16.6	< 0.50	< 0.050	167	< 0.050	0.17	68.6	0.493	9.0	38.5
MDZ-NWA-1-2	8-Feb-2015	1.0 - 2.0	**8.78**	7140	0.35	5.33	103	< 0.40	0.11	0.276	12.1	6.89	14.1	18300	10.9	15.8	16700	397	< 0.050	0.40	16.6	< 0.50	< 0.050	162	< 0.050	0.33	64.3	0.454	8.3	40.9
MDZ-NWA-2-3	8-Feb-2015	2.0 - 3.0	**8.89**	7220	0.35	5.34	104	< 0.40	0.10	0.152	12.4	6.89	14.0	18000	10.2	15.5	16100	384	< 0.050	0.37	16.4	< 0.50	< 0.050	165	< 0.050	0.31	68.3	0.493	8.5	42.8
MDZ-NWA-3-4	8-Feb-2015	3.0 - 4.0	**8.85**	7400	0.36	5.60	102	< 0.40	0.11	0.172	12.5	7.19	14.8	18500	10.7	15.9	16200	396	< 0.050	0.37	16.4	< 0.50	< 0.050	163	< 0.050	1.38	72.8	0.439	9.1	42.5
MDZ-NWA-4-5	8-Feb-2015	4.0 - 5.0	**8.43**	8660	0.85	6.18	146	< 0.40	0.16	1.00	17.6	8.17	24.9	25100	**74.0**	18.8	16300	469	< 0.050	0.96	21.0	< 0.50	0.071	179	< 0.050	**7.05**	77.7	0.566	10.1	**237**
MDZ-NWA-B2-7.0	5-Mar-2015	7.0	**8.59**	8280	0.64	4.96	99.9	< 0.40	0.13	0.431	15.5	7.92	24.9	20700	26.5	18.7	16600	437	< 0.050	0.65	20.7	< 0.50	< 0.050	188	< 0.050	4.23	79.2	0.580	9.4	122
MDZ-DUP-D (BFD of MDZ-NWA-B2-7.0)	5-Mar-2015	7.0	**8.57**	7580	0.52	5.07	97.2	< 0.40	0.11	0.454	15.1	7.92	23.7	21700	24.8	18.4	15600	430	< 0.050	0.96	20.5	< 0.50	0.060	190	< 0.050	3.72	67.7	0.543	10.3	120
MDZ-NW1-0.3-0.8	5-Mar-2015	0.3 - 0.8	**9.00**	7050	0.29	4.51	99.3	< 0.40	0.10	0.113	11.5	6.79	13.3	16800	8.68	15.1	16400	383	< 0.050	0.48	16.2	< 0.50	< 0.050	162	< 0.050	0.26	65.7	0.470	8.7	36.0
MDZ-NW1-4.0-5.0	5-Mar-2015	4.0 - 5.0	**8.85**	8090	0.44	5.67	118	< 0.40	0.43	0.201	16.4	8.18	15.7	19900	18.0	18.8	20000	415	0.065	0.43	20.5	< 0.50	< 0.050	187	< 0.050	1.17	80.2	0.538	10.0	76.0
MDZ-NW1-5.5-6.5	5-Mar-2015	5.5 - 6.5	**8.99**	8770	0.33	5.62	82.6	< 0.40	0.11	0.102	15.8	8.90	14.4	21100	9.00	21.2	20000	453	< 0.050	0.50	20.5	< 0.50	< 0.050	233	< 0.050	< 0.10	90.6	0.696	11.4	39.8
MDZ-NW1-B1-8.0	5-Mar-2015	8.0	**8.58**	8110	0.92	5.70	98.1	< 0.40	0.12	0.447	15.4	7.83	21.1	22600	22.9	18.6	16300	418	< 0.050	0.73	20.6	< 0.50	< 0.050	184	< 0.050	3.96	73.0	0.543	9.9	198
MDZ-NW2-0.3-0.8	5-Mar-2015	0.3 - 0.8	**9.09**	6840	0.47	5.09	99.7	< 0.40	0.11	0.167	11.4	6.71	14.0	16900	12.5	16.0	16300	355	< 0.050	0.53	16.5	< 0.50	< 0.050	160	< 0.050	0.29	61.9	0.537	9.7	41.1
MDZ-NW2-4.0-5.0	5-Mar-2015	4.0 - 5.0	**8.57**	8800	0.59	5.40	108	< 0.40	0.14	0.544	17.6	8.55	23.3	23500	43.6	20.2	17500	473	< 0.050	0.92	22.8	< 0.50	0.104	204	< 0.050	**6.50**	83.3	0.582	10.7	139
MDZ-NW2-B3-6.5	5-Mar-2015	6.5	**8.50**	8090	0.77	6.38	116	< 0.40	0.13	1.39	18.0	9.02	24.2	25900	38.3	19.6	18700	471	0.055	0.71	31.7	< 0.50	0.082	190	< 0.050	**7.43**	75.7	0.563	10.5	180
MDZ-NW3-0.3-0.8	5-Mar-2015	0.3 - 0.8	**8.64**	7540	0.96	5.18	139	< 0.40	0.12	0.455	14.3	7.95	17.9	18900	34.6	17.2	16400	431	< 0.050	0.58	18.7	< 0.50	0.081	175	< 0.050	3.14	81.0	0.493	10.1	117
MDZ-NW3-4.0-5.0	5-Mar-2015	4.0 - 5.0	**9.21**	7280	0.39	5.83	111	< 0.40	0.11	0.129	13.4	7.46	14.9	16500	9.90	15.4	19600	375	< 0.050	0.40	17.2	< 0.50	< 0.050	165	< 0.050	0.26	75.5	0.533	9.3	54.4
MDZ-NW3-B4-6.0	5-Mar-2015	6.0	**8.49**	7920	0.95	5.63	126	< 0.40	0.12	1.34	15.3	7.88	25.2	22800	31.4	17.7	15700	455	< 0.050	0.97	21.2	< 0.50	0.090	168	< 0.050	**6.08**	76.8	0.524	9.9	187
MDZ-NW4-0.3-0.8	5-Mar-2015	0.3 - 0.8	**8.99**	7210	0.35	4.95	110	< 0.40	0.11	0.166	12.7	7.35	15.0	17600	11.3	16.4	14900	408	< 0.050	0.49	17.5	< 0.50	< 0.050	153	< 0.050	0.17	69.9	0.473	9.9	44.7
MDZ-DUP-E (BFD of MDZ-NW4-0.3-0.8)	5-Mar-2015	0.3 - 0.8	**8.89**	6260	0.35	4.62	101	< 0.40	0.10	0.152	11.4	6.74	13.8	16000	10.9	14.5	13500	378	< 0.050	0.50	16.0	< 0.50	< 0.050	145	< 0.050	0.17	57.3	0.442	9.0	41.1
MDZ-NW4-2.0-3.0	5-Mar-2015	2.0 - 3.0	**8.56**	8440	0.62	6.27	113	< 0.40	0.13	0.390	17.7	9.38	19.3	21100	32.0	18.9	19600	471	< 0.050	0.55	21.0	< 0.50	< 0.050	200	< 0.050	**5.25**	90.4	0.555	10.8	100
MDZ-NW4-B5-5.0	5-Mar-2015	5.0	**8.64**	8070	0.71	5.42	108	< 0.40	0.12	0.370	16.2	8.27	20.7	24000	23.1	18.9	16700	457	< 0.050	1.00	21.9	< 0.50	0.062	194	< 0.050	**5.09**	71.5	0.566	10.0	100
MDZ-NW5-0.3-0.8	5-Mar-2015	0.3 - 0.8	**8.72**	6370	0.70	6.73	115	< 0.40	0.10	0.331	12.7	7.47	19.3	23000	22.4	14.6	14700	410	< 0.050	0.79	18.5	< 0.50	< 0.050	159	< 0.050	**24.4**	56.5	0.475	8.5	107
MDZ-NW5-1.0-2.0	5-Mar-2015	1.0 - 2.0	**9.16**	7640	0.34	5.23	99.5	< 0.40	0.11	0.115	15.1	7.90	29.5	21500	11.3	18.2	18900	405	< 0.050	0.42	18.3	< 0.50	< 0.050	192	< 0.050	0.59	77.9	0.569	9.4	46.0
MDZ-NW5-B6-3.0	5-Mar-2015	3.0	**8.53**	8270	0.72	5.25	111	< 0.40	0.13	0.456	15.4	8.06	**64.3**	20200	29.0	19.0	16000	461	0.059	0.69	21.2	< 0.50	0.057	198	< 0.050	4.55	74.4	0.581	10.6	138
MDZ-NW6-0.3-0.8	7-Mar-2015	0.3 - 0.8	**8.43**	7000	0.30	4.97	87.2	< 0.40	0.12	0.103	12.8	7.40	14.2	17500	8.48	16.8	14900	387	< 0.050	0.47	18.1	< 0.50	< 0.050	193	< 0.050	0.20	56.2	0.435	9.6	36.5
MDZ-NW6-2.0-3.0	7-Mar-2015	2.0 - 3.0	**8.97**	6770	0.36	4.62	89.5	< 0.40	0.11	0.166	13.1	7.06	14.2	17800	11.1	16.5	16500	388	< 0.050	0.53	17.8	< 0.50	< 0.050	198	< 0.050	1.44	65.4	0.569	8.9	57.5
MDZ-NW6-B7-5.0	7-Mar-2015	5.0	**8.75**	8030	0.40	5.47	99.6	< 0.40	0.12	0.178	15.4	8.14	37.9	19400	13.7	17.3	19400	412	< 0.050	0.40	19.3	< 0.50	< 0.050	187	< 0.050	0.83	80.8	0.560	9.7	**1360**
MDZ-DUP-F (BFD of MDZ-NW6-B7-5.0)	7-Mar-2015	5.0	**8.71**	8090	0.44	5.52	108	< 0.40	0.12	0.180	15.3	7.99	19.5	21000	14.3	18.5	19400	410	0.051	0.44	18.9	< 0.50	< 0.050	196	< 0.050	1.34	69.4	0.571	9.7	68.2
MDZ-NW7-0.3-0.8	5-Mar-2015	0.3 - 0.8	**9.02**	6850	0.35	5.14	105	< 0.40	0.10	0.136	11.6	7.02	14.0	16400	8.36	15.3	16200	368	< 0.050	0.51	16.7	< 0.50	< 0.050	170	< 0.050	0.14	74.8	0.512	9.3	36.0
MDZ-SW1-0.3-0.8	4-Mar-2015	0.3 - 0.8	**8.58**	8790	0.46	5.28	109	< 0.40	0.12	0.277	15.9	8.32	18.6	21800	18.9	19.6	18300	453	< 0.050	0.50	20.8	< 0.50	0.055	207	< 0.050	1.95	74.5	0.668	10.0	83.9
MDZ-SW2-0.3-0.8	4-Mar-2015	0.3 - 0.8	**8.89**	8070	1.15	4.99	95.2	< 0.40	0.11	0.209	14.5	7.80	16.5	20900	**75.5**	18.1	17200	427	< 0.050	0.49	19.8	< 0.50	0.052	207	< 0.050	**6.79**	71.4	0.604	10.3	68.7
MDZ-SW2-1.0-2.0	4-Mar-2015	1.0 - 2.0	**9.16**	8310	0.32	5.60	84.4	< 0.40	0.12	0.061	15.6	8.52	14.1	22200	9.57	19.7	20400	431	< 0.050	0.47	19.7	< 0.50	< 0.050	215	< 0.050	0.12	61.9	0.668	9.4	37.6
MDZ-DUP-B (BFD of MDZ-SW2-1.0-2.0)	4-Mar-2015	1.0 - 2.0	**9.06**	8060	0.31	5.76	85.3	< 0.40	0.11	0.059	16.5	8.73	14.5	20500	9.17	20.6	20200	442	< 0.050	0.43	20.8	< 0.50	< 0.050	213	< 0.050	0.12	65.7	0.657	9.6	39.3
MDZ-SW3-0.3-0.8	4-Mar-2015	0.3 - 0.8	**8.64**	8410	0.38	4.88	93.8	< 0.40	0.11	0.157	15.2	8.24	15.4	21200	11.6	20.2	18000	437	< 0.050	0.42	19.9	< 0.50	< 0.050	212	< 0.050	0.23	76.3	0.649	10.3	49.3
MDZ-SW3-1.0-2.0	4-Mar-2015	1.0 - 2.0	**8.81**	7470	0.49	5.89	105	< 0.40	0.11	0.311	15.3	8.67	17.3	21100	18.2	17.9	20300	447	< 0.050	0.47	21.4	< 0.50	< 0.050	200	< 0.050	1.96	64.6	0.516	9.3	95.3
MDZ-SW3-2.0-3.0	4-Mar-2015	2.0 - 3.0	**8.43**	9050	0.76	5.61	108	< 0.40	0.13	0.555	16.9	8.76	20.7	24500	21.9	21.7	17000	489	< 0.050	0.63	22.9	< 0.50	< 0.050	201	< 0.050	2.13	74.1	0.586	10.5	109
MDZ-SW4-0.3-0.8	4-Mar-2015	0.3 - 0.8	**8.60**	8210	0.53	5.46	107	< 0.40	0.13	0.490	15.1	8.22	18.4	22600	25.5	18.4	16800	467	< 0.050	0.52	20.9	< 0.50	< 0.050	201	< 0.050	**9.76**	67.1	0.553	10.1	88.4
MDZ-SW4-1.0-2.0	4-Mar-2015	1.0 - 2.0	**8.63**	8170	0.47	6.39	102	< 0.40	0.13	0.189	17.1	9.13	17.5	24400	16.8	19.1	21200	479	< 0.050	0.43	21.3	< 0.50	< 0.050	202	< 0.050	1.01	74.8	0.547	10.8	73.6
MDZ-SW4-2.0-3.0	4-Mar-2015	2.0 - 3.0	**8.01**	6930	0.34	5.55	109	< 0.40	0.14	0.266	11.6	8.54	18.0	19000	12.7	14.6	13500	552	< 0.050	0.40	17.7	< 0.50	< 0.050	136	< 0.050	0.21	49.7	0.369	8.5	44.8
MDZ-DUP-C (BFD of MDZ-SW4-2.0-3.0)	4-Mar-2015	2.0 - 3.0	7.99	6740	0.31	5.70	106	< 0.40	0.13	0.206	11.3	8.30	17.5	18700	12.6	14.0	13100	538	< 0.050	0.37	17.1	< 0.50	0.050	132	< 0.050	0.19	46.8	0.373	8.3	45.0
MDZ-SW5-0.3-0.8	4-Mar-2015	0.3 - 0.8	**9.05**	7260	0.35	5.54	93.7	< 0.40	< 0.10	0.101	14.8	8.04	14.2	19000	10.5	17.5	19500	415	< 0.050	0.34	19.0	< 0.50	< 0.050	201	< 0.050	0.34	64.8	0.484	8.9	42.3
MDZ-SW5-1.0-2.0	4-Mar-2015	1.0 - 2.0	**8.96**	8010	0.41	5.68	114	< 0.40	0.14	0.214	14.1	8.30	17.2	20900	22.0	17.5	13600	534	< 0.050	0.49	19.6	< 0.50	< 0.050	128	< 0.050	1.23	61.3	0.410	9.9	57.0
MDZ-SW5-2.0-3.0	4-Mar-2015	2.0 - 3.0	**8.93**	7830	0.36	5.62	102	< 0.40	0.10	0.117	16.6	9.40	15.2	21000	11.2	20.1	21600	458	< 0.050	0.42	20.9	< 0.50	< 0.050	213	< 0.050	2.03	64.7	0.786	9.7	50.6
On-Site Backfill Source																														
TP15-8-0.3-0.8	9-Feb-2015	0.3 - 0.8	**8.78**	8090	0.51	5.98	95.0	< 0.40	0.12	0.223	15.5	7.80	15.7	21500	16.0	19.6	16500	409	< 0.050	0.44	19.5	< 0.50	< 0.050	194	< 0.050	1.37	66.4	0.553	9.6	65.2
TP15-8-1-2	9-Feb-2015	1.0 - 2.0	**8.89**	7370	0.30	5.56	88.3	< 0.40	< 0.10	0.126	13.8	7.21	13.6	20800	7.91	18.3	18000	400	< 0.050	0.38	18.1	< 0.50	< 0.050	191	< 0.050	< 0.10	79.1	0.666	9.0	39.9
TP15-8-2-3	9-Feb-2015	2.0 - 3.0	**8.64**	8080	0.37	5.87	90.9	< 0.40	0.10	0.222	15.0	7.68	15.5	21500	14.6	19.9	17800	416	< 0.050	0.47	19.4	< 0.50	< 0.050	203	< 0.050	1.56	66.9	0.628	9.5	64.7
TP15-9-0.3-0.8	9-Feb-2015	0.3 - 0.8	**9.18**	7250	0.30	5.65	87.8	< 0.40	< 0.10	0.114	13.4	7.14	13.9	19400	8.40	18.4	17700	394	< 0.050	0.37	17.3	< 0.50	< 0.050	205	< 0.050	< 0.10	68.2	0.690	8.7	40.3
TP15-9-1-2	9-Feb-2015	1.0 - 2.0	**8.33**	7310	0.47	6.06	116	< 0.40	0.11	0.351	13.6	7.37	16.9	20500	21.4	16.1	16300	410	< 0.050	0.52	18.1	< 0.50	< 0.050	159	< 0.050	**5.27**	63.6	0.475	9.2	85.0
TP15-9-2-3	9-Feb-2015	2.0 - 3.0	**8.43**	7880	0.59	5.77	97.8	< 0.40	0.13	0.209	14.8	7.49	14.8	22300	11.8	19.4	17300	396	< 0.050	0.47	18.9	< 0.50	< 0.050	183	< 0.050	0.75	68.1	0.581	9.3	61.2
Off-Site Backfill Source**																														
TP15-10-0.3-0.8	9-Feb-2015	0.3 - 0.8	**8.60**	7300	0.33	5.67	80.6	< 0.40	0.11	0.133	12.2	7.46	13.9	18800	8.33	16.4	16600	373	< 0.050	0.37	17.1	< 0.50	< 0.050	179	< 0.050	0.11	68.8	0.424	9.0	35.8
TP15-10-1-2	9-Feb-2015	1.0 - 2.0	**9.38**	7600	0.32	6.04	84.0	< 0.40	< 0.10	0.108	12.9	7.50	14.1	20100	8.23	17.9	19400	389	< 0.050	0.40	17.1	< 0.50	< 0.050	193	< 0.050	0.10	73.2	0.574	9.6	39.7
TP15-11-0.3-0.8	9-Feb-2015	0.3 - 0.8	**8.87**	6820	0.26	5.45	101	< 0.40	< 0.10	0.167	10.9	6.89	14.9	17300	8.05	14.5	16600	369	< 0.050	0.32	15.5	< 0.50	< 0.050	194	< 0.050	< 0.10	76.1	0.398	8.5	33.6
TP15-11-1-2	9-Feb-2015	1.0 - 2.0	**9.46**	7490	0.33	5.84	144	< 0.40	0.11	0.067	12.8	7.37	13.5	19500	8.29	17.8	18800	378	< 0.050	0.41	18.1	< 0.50	< 0.050	246	< 0.050	< 0.10	66.0	0.627	9.3	38.2
CCME AL			>6<8	ng	20	12	750	4	ng	1.4	64	40	63	ng	70	ng	ng	ng	6.6	5	50	1	20	ng	1	5	ng	23	130	200
SSRTs			>6<8	ng	20	12	750	4	ng	3.8	64	40	79	ng	120	ng	ng	ng	6.6	5	50	1	20	ng	1	50	ng	23	130	200
RPD (%)																														
5 X MDL			**na**	**500**	**0.5**	**2.5**	**0.5**	**2**	**0.5**	**0.25**	**5**	**1.5**	**2.5**	**500**	**0.5**	**25**	**500**	**1**	**0.25**	**0.5**	**4**	**2.5**	**0.25**	**0.5**	**0.25**	**0.5**	**5**	**0.25**	**10**	**5**
A3-DUP1 (BFD of A3-NW-B-0.5-1.0)			0.6	1.2	3.4	0.2	2.9	NC	8.7	10.1	1.3	1.0	3.3	4.6	18.7	2.0	0.6	1.8	NC	9.8	2.6	NC	NC	0.0	NC	18.2	0.7	2.4	4.9	**119.5**
A3-DUP1 REWORK 1* (BFD of A3-NW-B-0.5-1 REWORK 1)			NC	3.4	3.1	0.3	0.9	NC	0.0	37.9	1.2	1.2	0.7	1.7	51.4	4.9	1.2	0.4	NC	22.2	3.5	NC	NC	3.3	NC	46.7	2.5	6.3	1.0	12.5
MDZ-DUP-B (BFD of MDZ-SW2-1.0-2.0)			1.1	3.1	NC	2.8	1.1	NC	NC	NC	5.6	2.4	2.8	8.0	4.3	NC	1.0	2.5	NC	NC	5.4	NC	NC	0.9	NC	NC	6.0	1.7	NC	4.4
MDZ-DUP-C (BFD of MDZ-SW4-2.0-3.0)			0.2	2.8	NC	2.7	2.8	NC	NC	NC	2.6	2.9	2.8	1.6	0.8	NC	3.0	2.6	NC	NC	3.4	NC	NC	3.0	NC	NC	6.0	1.1	NC	0.4
MDZ-DUP-D (BFD of MDZ-NWA-B2-7.0)			0.2	8.8	20.7	2.2	2.7	NC	NC	5.2	2.6	0.0	4.9	4.7	6.6	NC	6.2	1.6	NC	38.5	1.0	NC	NC	1.1	NC	12.8	15.7	6.6	NC	1.7
MDZ-DUP-E (BFD of MDZ-NW4-0.3-0.8)			1.1	14.1	NC	6.9	8.5	NC	NC	NC	10.8	8.7	8.3	9.5	3.6	NC	9.9	7.6	NC	NC	9.0	NC	NC	5.4	NC	NC	19.8	6.8	NC	8.4
MDZ-DUP-F (BFD of MDZ-NW6-B7-5.0)			0.5	0.7	NC	0.9	8.1	NC	NC	NC	0.7	1.9	**64.1**	7.9	4.3	NC	0.0	0.5	NC	NC	2.1	NC	NC	4.7	NC	47.0	15.2	1.9	NC	**180.9**

Notes:
m - metres
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
ng - no guideline listed
BFD - Blind Field Duplicate
** Off-Site backfill test pits are representative of soil within the NWA but this data is not considered to be representative of Site soil conditions
Exceeds CCME AL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Agricultural
Exceeds Site-Specific Soil Remediation Targets (SSRTs) and CCME AL
NC - RPDs not calculated for non-detect results or for results within 5X of detection limit
RPD - relative percentage difference
MDL - method detection limit
Exceeds recommended RPD targets for Metals (≤ 60%)

TABLE 2: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF CURRENT SITE CONDITIONS - PETROLEUM HYDROCARBON CONSTITUENTS AND MTBE (mg/kg)

Sample ID	Date	Depth (m)	HSVL (ppmv)	Grain Size	Benzene	Ethylbenzene	Toluene	Xylenes	MTBE	F1 (C6-10)	F2 (C10-16)	F3 (C16-34)	F4 (C34-50+)
Area of Impact 3													
A3-NW-B-0.5-1	31-Jan-2015	0.5 - 1.0	LTDL	Fine-grained	**0.0092**	< 0.010	**1.8**	< 0.040	< 0.10	< 10	< 10	15	< 10
A3-DUP1 (A3-NW-B-0.5-1.0)	31-Jan-2015	0.5 - 1.0	LTDL	Fine-grained	---	---	---	---	---	---	< 10	< 10	< 10
A3-NW-B-1-2	31-Jan-2015	1.0 - 2.0	5	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
A3-SW-B-0.5-1	31-Jan-2015	0.5 - 1.0	160	Fine-grained	**0.032**	**0.019**	**4.5**	0.046	< 0.10	< 10	< 10	< 10	< 10
A3-WW-A-0.5-1	31-Jan-2015	0.5 - 1.0	140	Fine-grained	**0.016**	0.011	**1.9**	< 0.040	< 0.10	< 10	< 10	< 10	< 10
A3-F1	31-Jan-2015	1.0	100	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
A3-F3	31-Jan-2015	2.5	LTDL	Fine-grained	**0.018**	< 0.010	**2.5**	< 0.040	< 0.10	< 10	< 10	< 10	< 10
A3-SS1	16-Feb-2015	0.3 - 0.5	LTDL	---	**0.019**	0.012	**0.56**	< 0.040	< 0.10	< 10	---	---	---
A3-SS2	16-Feb-2015	0.3 - 0.5	LTDL	---	< 0.010	**0.019**	**0.59**	< 0.040	< 0.10	< 10	---	---	---
A3-SS3	16-Feb-2015	0.3 - 0.5	LTDL	---	< 0.010	< 0.020*	**0.10**	< 0.080	< 0.20	< 20	---	---	---
A3-SS4	16-Feb-2015	0.3 - 0.5	LTDL	---	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	---	---	---
A3-SS5	16-Feb-2015	0.3 - 0.5	LTDL	---	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	---	---	---
A3-SS6	16-Feb-2015	0.3 - 0.5	LTDL	---	< 0.0050	< 0.010	**0.27**	< 0.040	< 0.10	< 10	---	---	---
Main Debris Zone													
MDZ-EW1-3.0-4.0	4-Mar-2015	3.0 - 4.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	18	< 10
MDZ-EW2-1.0-2.0	4-Mar-2015	1.0 - 2.0	LTDL	Fine-grained	---	---	---	---	---	---	< 10	17	13
MDZ-NWA-1-2	8-Feb-2015	1.0 - 2.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
MDZ-NWA-B2-7.0	5-Mar-2015	7.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	23	14
MDZ-DUP-D (BFD of MDZ-NWA-B2-7.0)	5-Mar-2015	7.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
MDZ-NW1-0.3-0.8	5-Mar-2015	0.3 - 0.8	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
MDZ-NW1-5.5-6.5	5-Mar-2015	5.5 - 6.5	LTDL	Fine-grained	---	---	---	---	---	---	< 10	< 10	< 10
MDZ-NW1-B1-8.0	5-Mar-2015	8.0	LTDL	Fine-grained	< 0.0050	< 0.010	**0.15**	< 0.040	< 0.10	< 10	< 10	< 10	< 10
MDZ-NW2-0.3-0.8	5-Mar-2015	0.3 - 0.8	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
MDZ-NW2-4.0-5.0	5-Mar-2015	4.0 - 5.0	LTDL	Fine-grained	---	---	---	---	---	---	< 10	16	< 10
MDZ-NW3-0.3-0.8	5-Mar-2015	0.3 - 0.8	LTDL	Fine-grained	---	---	---	---	---	---	< 10	14	11
MDZ-NW4-0.3-0.8	5-Mar-2015	0.3 - 0.8	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
MDZ-DUP-E (BFD of MDZ-NW4-0.3-0.8)	5-Mar-2015	0.3 - 0.8	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
MDZ-NW4-B5-5.0	5-Mar-2015	5.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	18	< 10
MDZ-NW5-0.3-0.8	5-Mar-2015	0.3 - 0.8	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	15
MDZ-NW5-B6-3.0	5-Mar-2015	3.0	LTDL	Fine-grained	< 0.0050	< 0.010	0.047	< 0.040	< 0.10	< 10	< 10	25	< 10
MDZ-NW6-2.0-3.0	7-Mar-2015	2.0 - 3.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
MDZ-NW7-0.3-0.8	5-Mar-2015	0.3 - 0.8	LTDL	Fine-grained	< 0.0050	< 0.010	0.056	< 0.040	< 0.10	< 10	< 10	< 10	< 10
MDZ-SW1-0.3-0.8	4-Mar-2015	0.3 - 0.8	LTDL	Fine-grained	< 0.0050	< 0.010	0.027	< 0.040	< 0.10	< 10	< 10	32	26
MDZ-SW2-0.3-0.8	4-Mar-2015	0.3 - 0.8	LTDL	Fine-grained	---	---	---	---	---	---	< 10	< 10	< 10
MDZ-SW3-2.0-3.0	4-Mar-2015	2.0 - 3.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	20	< 10
MDZ-SW4-0.3-0.8	4-Mar-2015	0.3 - 0.8	LTDL	Fine-grained	< 0.0050	< 0.010	0.023	< 0.040	< 0.10	< 10	< 10	20	14
MDZ-SW4-2.0-3.0	4-Mar-2015	2.0 - 3.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	12	11
MDZ-SW5-1.0-2.0	4-Mar-2015	1.0 - 2.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
On-Site Backfill Source													
TP15-8-1-2	9-Feb-2015	1.0 - 2.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
TP15-8-2-3	9-Feb-2015	2.0 - 3.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	10
TP15-9-1-2	9-Feb-2015	1.0 - 2.0	LTDL	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	20	< 10
Off-Site Backfill Source**													
TP15-10-0.3-0.8	9-Feb-2015	0.3 - 0.8	---	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
TP15-11-1-2	9-Feb-2015	1.0 - 2.0	---	Fine-grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 10	< 10	< 10
CCME AL					0.0068[1]	0.018[1]	0.08[1]	2.4[1]	ng	170[2]	150[4]	1300[4]	5600[4]
RPD (%)													
5 X MDL					**0.025**	**0.05**	**0.1**	**0.2**	**0.5**	**50**	**50**	**50**	**50**
MDZ-DUP-D (BFD of MDZ-NWA-B2-7.0)					NC	NC	NC	NC	NC	NC	NC	NC	NC
MDZ-DUP-E (BFD of MDZ-NW4-0.3-0.8)					NC	NC	NC	NC	NC	NC	NC	NC	NC
A3-DUP1 (A3-NW-B-0.5-1.0)					NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
m - metres
mg/kg - milligrams per kilogram
HSVL (ppmv) - headspace vapour level (parts per million by volume)
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
** Off-Site backfill test pits are representative of soil within the NWA but this data is not considered to be representative of Site soil conditions
* - MDL used is greater than the applicable guideline
LTDL - less than the detection limit of the instrument
BFD - blind field duplicate
MTBE - methyl tert-butyl ether
ng - no guideline listed
PHCs - Petroleum Hydrocarbons
AL - Agricultural Land
fg - fine-grained
CSQG - Canadian Soil Quality Guidelines
CWS- Canada-Wide Standards
CCME AL: CCME CSQG for BETX or CWS for PHCs, Agricultural Fine-grained surface soil
[1] - CCME ALfg: CCME CSQG for BTEX, AL fg Surface (10^{-5} incremental risk guideline)
[2] - CCME ALgwf: CCME CWS for PHCs, Tier 1 Levels for PHC fractions (F1-F4), AL fg surface soil, Protection of Potable GW
[3] - CCME ALml: CCME CWS for PHCs, Tier 1 Levels for PHC fractions (F1-F4), AL fg surface soil, Management Limit
[4] - CCME ALescf: CCME CWS for PHCs, Tier 1 Levels for PHC fractions (F1-F4), AL fg surface soil, Eco Soil Contact
[5] -CCME ALdcf: CCME CWS for PHCs, Tier 1 Levels for PHC fractions (F1-F4), AL fg surface soil , Direct Contact
Exceeds CCME AL
NC - RPDs not calculated for non-detect results or for results within 5X of detection limit
RPD - relative percentage difference
MDL - method detection limit
RPD targets for PHCs (≤ 80%)

TABLE 3: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF CURRENT SITE CONDITIONS - PAH PARAMETERS (mg/kg)

Sample ID	Date	Depth (m)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene Equivalency*	PAHs, Total	IACR
											Area of Impact 3											
A3-NW-B-0.5-1	31-Jan-2015	0.5 - 1.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
A3-DUP1 (BFD of A3-NW-B-0.5-1.0)	31-Jan-2015	0.5 - 1.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
A3-NW-B-1-2	31-Jan-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
A3-SW-B-0.5-1	31-Jan-2015	0.5 - 1.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
A3-WW-A-0.5-1	31-Jan-2015	0.5 - 1.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
A3-F1	31-Jan-2015	1.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	0.040	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.32
A3-F3	31-Jan-2015	2.5	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
											Main Debris Zone											
MDZ-EW1-3.0-4.0	4-Mar-2015	3.0 - 4.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-EW2-1.0-2.0	4-Mar-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-NWA-1-2	8-Feb-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-NWA-B2-7.0	5-Mar-2015	7.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-DUP-D (BFD of MDZ-NWA-B2-7.0)	5-Mar-2015	7.0	< 0.0050	< 0.0050	0.011	0.021	< 0.020	< 0.020	< 0.050	< 0.020	0.024	< 0.050	0.052	< 0.020	< 0.050	< 0.020	< 0.010	**0.049**	0.053	< 0.10	0.23	0.43
MDZ-NW1-0.3-0.8	5-Mar-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	0.093	0.31
MDZ-NW1-5.5-6.5	5-Mar-2015	5.5 - 6.5	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-NW1-B1-8.0	5-Mar-2015	8.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-NW2-0.3-0.8	5-Mar-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-NW2-4.0-5.0	5-Mar-2015	4.0 - 5.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-NW3-0.3-0.8	5-Mar-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-NW4-0.3-0.8	5-Mar-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-DUP-E (BFD of MDZ-NW4-0.3-0.8)	5-Mar-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-NW4-B5-5.0	5-Mar-2015	5.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-NW5-0.3-0.8	5-Mar-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-NW5-B6-3.0	5-Mar-2015	3.0	0.0098	< 0.0050	0.020	0.058	0.060	0.036	< 0.050	< 0.020	0.066	< 0.050	0.078	< 0.020	< 0.050	< 0.020	< 0.010	**0.079**	0.089	0.10	0.52	0.95
MDZ-NW6-2.0-3.0	7-Mar-2015	2.0 - 3.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-NW7-0.3-0.8	5-Mar-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-SW1-0.3-0.8	4-Mar-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-SW2-0.3-0.8	4-Mar-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-SW3-2.0-3.0	4-Mar-2015	2.0 - 3.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-SW4-0.3-0.8	4-Mar-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-SW4-2.0-3.0	4-Mar-2015	2.0 - 3.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
MDZ-SW5-1.0-2.0	4-Mar-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
											On-Site Backfill Source											
TP15-8-1-2	9-Feb-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
TP15-8-2-3	9-Feb-2015	2.0 - 3.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
TP15-9-1-2	9-Feb-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
											Off-Site Backfill Source**											
TP15-10-0.3-0.8	9-Feb-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
TP15-11-1-2	9-Feb-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31
CCME AL			$0.28^{(5)}$	$320^{(5)}$	$2.5^{(3,7)}$	$0.1^{(6)}$	$0.6^{(4)}$	$0.1^{(6)}$	ng	$0.1^{(6)}$	$6.2^{(4)}$	$0.1^{(6)}$	$0.1^{(6)}$	$0.1^{(6)}$	$0.1^{(6)}$	ng	$0.013^{(5)}$	$0.046^{(5)}$	$0.1^{(6)}$	$5.3^{(2)}$	ng	$1^{(1)}$
											RPD (%)											
5 X MDL			**0.025**	**0.025**	**0.02**	**0.1**	**0.1**	**0.1**	**0.25**	**0.1**	**0.1**	**0.25**	**0.1**	**0.1**	**0.25**	**0.1**	**0.05**	**0.1**	**0.1**	**0.5**	**0.25**	**0.5**
MDZ-DUP-D (BFD of MDZ-NWA-B2-7.0)			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
MDZ-DUP-E (BFD of MDZ-NW4-0.3-0.8)			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
A3-DUP1 (BFD of A3-NW-B-0.5-1.0)			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
BFD - blind field duplicate
ng - no guideline listed
B(a)P - Benzo(a)pyrene
* B(a)P Equivalency calculated using the laboratory detection limit when results were < less than the laboratory detection limits
** Off-Site backfill test pits are representative of soil within the NWA but this data is not considered to be representative of Site soil conditions
CCME AL: CCME Canadian Soil Quality Guidelines for PAH, Agricultural
TPE: Total Potency Equivalents
IACR: Index of Additive Cancer Risk
(1) - CCME ALpw: Human Health guidelines, Protection of Potable Water - IACR Calculation
(2) - CCME ALdh: Human Health guidelines, Direct Contact - B(a)P equivalency Calculation
(3) - CCME ALsc: Environmental Health guidelines, Soil Contact
(4) - CCME ALi: Environmental Health guidelines, Soil and Food Ingestion
(5) - CCME ALfl: Environmental Health guidelines, Protection of Freshwater Life
(6) - CCME ALi: Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
(7) - CCME ALe: Environmental Health guidelines, Environmental Health
Exceeds CCME AL
NC - RPDs not calculated for non-detect results or for results within 5X of detection limit
RPD - relative percentage difference
MDL - method detection limit
RPD targets for PAHs (≤ 100%)

TABLE 4: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF CURRENT SITE CONDITIONS - SATURATED PASTE (mg/kg)

Sample ID	Date	Soluble Chloride	Soluble Sodium
Off-Site Backfill Source**			
TP15-10-0.3-0.8	9-Feb-2015	17.6	13.8
TP15-11-1-2	9-Feb-2015	34.1	40.3
CSR AL		90 (2)	200 (1,2)

Notes:
mg/kg - milligrams per kilogram
** Off-Site backfill test pits are representative of soil within the NWA but this data is not considered to be representative of Site soil conditions
CSR AL - BC Contaminated Site Regulation Schedule 5 Agricultural
(1) - CSR ALfw: CSR AL, groundwater flow to surface water used by Freshwater Aquatic Life, includes mandatory site-specific factors

(2) - CSR ALdw: CSR AL, groundwater used for drinking water, includes mandatory site-specific factors

TABLE 5: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF CURRENT SITE CONDITIONS - LEACHABLE CHEMISTRY RESULTS - METALS PARAMETERS (mg/L)

Sample ID	Date	Depth (m)	pH	Antimony Leachable	Arsenic Leachable	Barium Leachable	Beryllium Leachable	Boron Leachable	Cadmium Leachable	Chromium Leachable	Cobalt Leachable	Copper Leachable	Iron Leachable	Lead Leachable	Mercury Leachable	Molybdenum Leachable	Nickel Leachable	Selenium Leachable	Silver Leachable	Thallium Leachable	Uranium Leachable	Vanadium Leachable	Zinc Leachable
Main Debris Zone																							
MDZ-EW2-0.3-0.8	4-Mar-2015	0.3 - 0.8	8.52	< 0.10	< 0.10	0.70	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.50	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.18
MDZ-NW5-B6-3.0	5-Mar-2015	3.0	8.53	< 0.10	< 0.10	1.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.50	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.76
MDZ-SW2-0.3-0.8	4-Mar-2015	0.3 - 0.8	8.89	< 0.10	< 0.10	1.26	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.50	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
HWR		ns	ns	ns	2.5	100	ns	500	0.5	5	ns	100	ns	5	0.1	ns	ns	1	5	ns	10	ns	500

Notes:
m - metres
mg/L - milligrams per liter
< - less than analytical detection limit indicated
ns - no standard/guideline listed
HWR - BC Hazardous Waste Regulation
HWR: Table 1: Leachate Quality Standards for the New Hazardous Waste Regulation

TABLE 6: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF EXCAVATED SOIL - METALS PARAMETERS (mg/kg)

Sample ID	Date	Depth (m)	pH	Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Cadmium	Chromium (total)	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Uranium	Vanadium	Zinc
MDZ Test Pit Samples for Soil Characterization																														
TP15-2-0.5-1	27-Jan-2015	0.5 - 1.0	**8.96**	8120	0.41	5.32	95.8	< 0.40	0.11	0.154	15.2	7.93	15.5	20600	13.5	18.0	17600	419	< 0.050	0.44	18.7	< 0.50	< 0.050	196	< 0.050	1.32	80.5	0.648	9.7	52.5
TP15-2-1-2	27-Jan-2015	1.0 - 2.0	**8.83**	8670	0.59	5.64	119	< 0.40	0.13	0.452	15.9	8.24	18.8	21700	26.5	18.9	17500	439	< 0.050	0.58	19.6	< 0.50	0.069	196	< 0.050	2.36	88.4	0.562	10.0	105
TP15-A (BFD of TP15-2-1-2)	27-Jan-2015	1.0 - 2.0	**8.12**	8940	1.13	5.87	138	< 0.40	0.26	0.918	17.9	8.72	28.4	24800	47.7	18.7	15300	520	< 0.050	0.80	21.0	< 0.50	0.086	159	< 0.050	**9.46**	80.3	0.517	10.6	***234***
TP15-3-0.5-1	27-Jan-2015	0.5 - 1.0	**9.34**	8120	0.36	5.42	149	< 0.40	0.10	0.260	14.9	7.99	16.9	20500	13.3	17.8	17500	417	< 0.050	0.45	23.6	< 0.50	< 0.050	193	< 0.050	0.85	84.4	0.609	9.8	60.6
TP15-3-1-2	27-Jan-2015	1.0 - 2.0	**8.60**	8400	0.96	5.55	126	< 0.40	0.15	1.02	16.6	8.22	24.3	21000	59.6	18.4	16800	447	< 0.050	0.71	20.5	< 0.50	0.108	186	< 0.050	**9.29**	81.9	0.594	10.1	***525***
TP15-4-0.5-1	27-Jan-2015	0.5 - 1.0	**9.16**	8090	0.55	5.51	105	< 0.40	0.12	0.246	15.6	8.22	18.1	21800	19.3	17.7	17500	424	< 0.050	0.48	18.3	< 0.50	< 0.050	188	< 0.050	1.67	75.5	0.618	9.9	82.4
TP15-4-1-2	27-Jan-2015	1.0 - 2.0	**8.66**	8380	0.50	5.29	108	< 0.40	0.12	0.290	15.4	8.12	17.8	20500	18.4	18.4	18100	432	< 0.050	0.45	20.0	< 0.50	< 0.050	198	< 0.050	1.25	71.2	0.638	9.8	68.8
MDZ Interim Soil Samples																														
MDZ-WA-0.3-0.8	1-Feb-2015	0.3 - 0.8	**8.55**	7710	0.45	5.78	127	< 0.40	0.13	0.353	14.2	7.78	17.5	19900	27.1	17.9	17100	441	< 0.050	0.52	18.2	< 0.50	0.066	164	< 0.050	1.91	69.1	0.522	9.6	79.7
MDZ-WA-1.0-2.0	1-Feb-2015	1.0 - 2.0	**8.35**	8800	1.16	6.45	154	< 0.40	0.14	0.798	17.8	8.46	28.1	24500	61.7	19.1	17500	488	0.053	1.04	21.3	< 0.50	0.092	179	< 0.050	**8.66**	79.4	0.593	10.8	***210***
MDZ-WA-1.0-2.0 REWORK 1	1-Feb-2015	1.0 - 2.0	---	9250	0.84	6.17	145	< 0.40	0.14	0.809	17.1	8.23	25.0	25000	**96.2**	---	17800	483	< 0.050	**9.22**	20.5	< 0.50	0.099	191	< 0.050	**9.37**	83.3	---	10.0	*169*
MDZ-WA2-1.0-2.0 (BFD of MDZ-WA-1.0-2.0)	1-Feb-2015	1.0 - 2.0	**8.30**	8180	0.98	6.03	210	< 0.40	0.13	***3.31***	17.3	8.21	26.0	23100	46.4	18.0	17400	470	< 0.050	2.15	20.0	< 0.50	0.087	183	< 0.050	**9.07**	75.7	0.547	10.4	*196*
MDZ-WA2-1.0-2.0 REWORK 1	1-Feb-2015	1.0 - 2.0	---	8470	0.90	6.17	132	< 0.40	0.13	0.583	15.6	7.54	22.5	22000	44.0	---	16800	441	< 0.050	0.81	20.3	< 0.50	0.088	181	< 0.050	4.88	77.3	---	9.9	130
MDZ-WA-2.0-3.0	1-Feb-2015	2.0 - 3.0	**8.39**	7780	0.87	6.11	126	< 0.40	0.12	0.766	17.1	8.21	25.8	25200	65.8	19.2	16900	477	< 0.050	4.07	20.6	< 0.50	0.078	181	< 0.050	**16.2**	66.8	0.523	9.9	*158*
MDZ-WB-0.3-0.8	1-Feb-2015	0.3 - 0.8	**8.58**	7100	0.38	5.50	98.1	< 0.40	0.11	0.188	13.2	7.66	14.5	18700	12.2	17.7	17400	404	< 0.050	0.42	17.8	< 0.50	< 0.050	182	< 0.050	0.56	64.6	0.681	9.4	47.9
MDZ-WB-1.0-2.0	1-Feb-2015	1.0 - 2.0	**8.85**	7800	0.32	5.43	88.2	< 0.40	0.10	0.109	14.7	7.88	14.3	20500	8.78	19.4	18800	428	< 0.050	0.46	18.6	< 0.50	< 0.050	201	< 0.050	< 0.10	74.6	0.644	10.2	40.6
MDZ-EW-0.3-0.8	8-Feb-2015	0.3 - 0.8	**8.70**	8080	0.43	5.66	108	< 0.40	0.11	0.291	14.4	7.33	15.8	20400	15.8	17.3	16600	409	< 0.050	0.46	17.6	< 0.50	< 0.050	180	< 0.050	1.28	72.0	0.555	9.3	66.1
MDZ-EW-1-2	8-Feb-2015	1.0 - 2.0	**8.75**	8270	0.49	5.60	112	< 0.40	0.12	0.248	15.2	7.86	17.1	21100	17.5	19.6	17400	420	< 0.050	0.48	18.9	< 0.50	< 0.050	190	< 0.050	2.74	65.0	0.609	9.3	71.1
MDZ-EW-2-3	8-Feb-2015	2.0 - 3.0	**8.47**	8650	1.40	6.46	145	< 0.40	0.13	0.987	18.3	8.39	61.3	24400	**93.0**	19.4	16700	476	0.057	0.91	21.5	< 0.50	0.098	188	< 0.050	**11.4**	72.6	0.589	10.0	***255***
MDZ-EW-2-3 REWORK 1	8-Feb-2015	2.0 - 3.0	---	8130	6.48	6.18	153	< 0.40	0.15	***4.80***	21.5	8.32	38.3	25900	***158***	---	16900	472	< 0.050	1.08	20.5	< 0.50	0.099	184	< 0.050	**18.7**	79.9	---	11.0	*195*
MDZ-DUP-A (BDF of MDZ-EW-2-3)	8-Feb-2015	2.0 - 3.0	**8.47**	9140	1.19	6.83	154	< 0.40	0.14	1.30	20.3	8.59	***589***	29900	**82.7**	20.0	16700	513	< 0.050	1.30	22.4	< 0.50	0.115	194	< 0.050	**19.7**	83.8	0.595	11.1	***217***
MDZ-DUP-A REWORK 1	8-Feb-2015	2.0 - 3.0	---	8140	0.96	6.14	175	< 0.40	0.14	1.28	18.5	8.96	39.3	25300	61.2	---	17000	484	< 0.050	0.82	22.1	< 0.50	0.116	190	< 0.050	**16.5**	94.8	---	11.3	***214***
MDZ-F1-5.5	8-Feb-2015	5.5	**8.72**	8410	0.56	5.91	105	< 0.40	0.11	0.381	16.5	7.83	19.7	25500	36.1	20.7	17200	449	< 0.050	0.68	27.8	< 0.50	< 0.050	193	< 0.050	**8.85**	79.6	0.578	10.0	115
MDZ-F2-5	8-Feb-2015	5.0	**8.64**	8370	0.81	5.72	118	< 0.40	0.13	0.452	15.7	7.82	20.5	23200	29.6	18.6	16700	437	< 0.050	0.56	20.0	< 0.50	0.079	189	< 0.050	2.67	71.3	0.608	9.3	116
CCME AL		ng	>6<8	ng	20	12	750	4	ng	1.4	64	40	63	ng	70	ng	ng	ng	6.6	5	50	1	20	ng	1	5	ng	23	130	200
SSRTs		ng	>6<8	ng	20	12	750	4	ng	3.8	64	40	79	ng	120	ng	ng	ng	6.6	5	50	1	20	ng	1	50	ng	23	130	200
CSR NL		ns	ns	ns	20	15	400	4	ns	1.5	60	50	90	ns	100	ns	ns	ns	15	10	100	3	20	ns	ns	50	ns	ns	200	150
RPD (%)																														
5 X MDL			na	500	0.5	2.5	0.5	2	0.5	0.25	5	1.5	2.5	500	0.5	25	500	1	0.25	0.5	4	2.5	0.25	0.5	0.25	0.5	5	0.25	10	5
TP15-A (BFD of TP15-2-1-2)	27-Jan-2015	NC	8	3	**63**	4	15	NC	NC	**68**	12	6	41	13	57	NC	13	17	NC	32	7	NC	NC	21	NC	**120**	10	8	6	**76**
MDZ-WA2-1.0-2.0 (BFD of MDZ-WA-1.0-2.0)	1-Feb-2015	NC	1	7	17	7	31	NC	NC	**122**	3	3	8	6	28	NC	1	4	NC	**70**	6	NC	NC	2	NC	5	5	8	4	7
MDZ-DUP-A (BDF of MDZ-EW-2-3)	8-Feb-2015	NC	0	6	16	6	6	NC	NC	27	10	2	**162**	20	12	NC	0	7	NC	35	4	NC	NC	3	NC	53	14	1	10	16

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 AL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Agricultural
Exceeds SSRTs: Site-Specific Soil Remediation Targets
Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
NC - RPDs not calculated for non-detect results or for results within 5X of detection limit
RPD - relative percentage difference
MDL - method detection limit
Exceeds recommended RPD targets for Metals (≤ 60%)

TABLE 7: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF EXCAVATED SOIL - PETROLEUM HYDROCARBON CONSTITUENTS AND MTBE (mg/kg)

Sample ID	Date	Depth (m)	HSVL (ppmv)	Grain Size	Benzene	Ethylbenzene	Toluene	Xylenes	MTBE	VPHs	EPHs (C10-19)	EPHs (C19-32)	LEPHs	HEPHs	F1 (C6-10)	F2 (C10-16)	F3 (C16-34)	F4 (C34-50+)
MDZ Test Pit Samples for Soil Characterization																		
TP15-1-1-2	27-Jan-2015	1.0 - 2.0	115	---	---	---	---	---	---	< 10	< 100	< 100	---	---	---	---	---	---
TP15-2-0.5-1	27-Jan-2015	0.5 - 1.0	LTDL	---	< 0.0058	< 0.010	**0.50**	< 0.040	< 0.10	< 10	< 100	< 100	< 100	< 100	< 10	< 10	< 10	< 10
TP15-2-1-2	27-Jan-2015	1.0 - 2.0	15	---	**0.021**	< 0.010	**1.2**	< 0.040	< 0.10	< 10	< 100	< 100	< 100	< 100	< 10	< 10	20	11
TP15-A (BFD of TP15-2-1-2)	27-Jan-2015	1.0 - 2.0	15	---	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 100	587	< 100	587	< 10	< 10	900	1600
TP15-3-0.5-1	27-Jan-2015	0.5 - 1.0	5	---	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 100	< 100	< 100	< 100	< 10	< 10	< 10	< 10
TP15-3-1-2	27-Jan-2015	1.0 - 2.0	5	---	0.0088	0.013	**1.2**	< 0.040	< 0.10	< 10	< 100	< 100	< 100	< 100	< 10	< 10	< 10	< 10
TP15-4-0.5-1	27-Jan-2015	0.5 - 1.0	20	---	**0.016**	0.012	**1.5**	< 0.040	< 0.10	< 10	< 100	< 100	< 100	< 100	< 10	< 10	< 10	< 10
TP15-4-1-2	27-Jan-2015	1.0 - 2.0	30	---	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	< 10	< 100	< 100	< 100	< 100	< 10	< 10	< 10	< 10
TP15-5-1-2	27-Jan-2015	1.0 - 2.0	15	---	---	---	---	---	---	< 10	< 100	< 100	---	---				
TP15-B (BFD of TP15-5-1-2)	27-Jan-2015	1.0 - 2.0	15	---	---	---	---	---	---	< 10	< 100	< 100	---	---	---	---	---	---
AI3 Test Pit Samples for Soil Characterization																		
TP15-6-1-2	27-Jan-2015	1.0 - 2.0	10	---	---	---	---	---	---	< 10	< 100	< 100	---	---				
MDZ Interim Soil Samples																		
MDZ-WA-1.0-2.0	1-Feb-2015	1.0 - 2.0	LTDL	Fine-Grained	< 0.0050	< 0.010	0.046	< 0.040	< 0.10	---	---	---	---	---	< 10	< 10	16	< 10
MDZ-WA-1.0-2.0 REWORK 1	1-Feb-2015	1.0 - 2.0	LTDL	---	< 0.0060	0.014	0.064	< 0.040	< 0.10	---	---	---	---	---	---	---	---	---
MDZ-WA2-1.0-2.0 (BFD of MDZ-WA-1.0-2.0)	1-Feb-2015	1.0 - 2.0	LTDL	Fine-Grained	**0.015**	0.013	**1.8**	< 0.040	< 0.10	---	---	---	---	---	< 10	< 10	22	21
MDZ-WA-2.0-3.0	1-Feb-2015	2.0 - 3.0	LTDL	Fine-Grained	**0.020**	0.017	**2.3**	0.041	< 0.10	---	---	---	---	---	< 10	< 10	19	18
MDZ-WB-0.3-0.8	1-Feb-2015	0.3 - 0.8	LTDL	Fine-Grained	< 0.0050	< 0.010	**0.088**	< 0.040	< 0.10	---	---	---	---	---	< 10	< 10	< 10	< 10
MDZ-EW-0.3-0.8	8-Feb-2015	0.3 - 0.8	LTDL	Fine-Grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	---	---	---	---	---	< 10	< 10	< 10	< 10
MDZ-F1-5.5	8-Feb-2015	5.5	15	Fine-Grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	---	---	---	---	---	< 10	< 10	< 10	< 10
MDZ-F2-5	8-Feb-2015	5.0	15	Fine-Grained	< 0.0050	< 0.010	< 0.020	< 0.040	< 0.10	---	---	---	---	---	< 10	< 10	14	< 10
CCME AL					0.0068[(1)]	0.018[(1)]	0.08[(1)]	2.4[(1)]	ng	ng	ng	ng	ng	ng	170[(2)]	150[(4)]	1300[(4)]	5600[(4)]
CSR NL					0.04	1	1.5	5	ns	200	1000	1000	1000	1000	200[(6)]	1000[(7)]	1000[(8)]	ns
RPD (%)																		
5 X MDL					0.025	0.05	0.1	0.2	0.5	50	500	500	500	500	50	50	50	50
TP15-A (BFD of TP15-2-1-2)					NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TP15-B (BFD of TP15-5-1-2)					NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
MDZ-WA2-1.0-2.0 (BFD of MDZ-WA-1.0-2.0)					NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
m - metres
mg/kg - milligrams per kilogram
HSVL (ppmv) - headspace vapour level (parts per million by volume)
LTDL - less than detectable limit
Fine Grained - > 50% of the soil particles < 0.075 mm in diameter
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
BFD - blind field duplicate
EPH(C10-19) standard is the CSR standard for LEPH. MOE advised (June 06, 10) that EPH(C10-19) and LEPH are equivalent for screening purposes but EPH cannot be used to demonstrate legal compliance with CSR standards
EPH(C19-32) standard is the CSR standard for HEPH. MOE advised (June 06, 10) that EPH(C19-32) and HEPH are equivalent for screening purposes but EPH cannot be used to demonstrate legal compliance with CSR standards
MTBE - methyl tert-butyl ether
VPHs - volatile petroleum hydrocarbons (C6-10), excluding benzene, ethylbenzene, toluene, xylenes
EPHs - extractable petroleum hydrocarbons
LEPHs - light extractable petroleum hydrocarbons (C10-19), excluding specific polycyclic aromatic hydrocarbon parameters
HEPHs - heavy extractable petroleum hydrocarbons (C19-32), excluding specific polycyclic aromatic hydrocarbon parameters
PHCs - Petroleum Hydrocarbons
ns - no standard listed
ng - no guideline listed
AL - Agricultural Land
fg - fine-grained
CSQG - Canadian Soil Quality Guidelines
CWS- Canada-Wide Standards
CCME AL: CCME CSQG for BETX or CWS for PHCs, Agricultural Fine-grained surface soil
[(1)] - CCME ALfg: CCME CSQG for BTEX, AL fg Surface (10-5 incremental risk guideline)
[(2)] - CCME ALgwf: CCME CWS for PHCs, Tier 1 Levels for PHC fractions (F1-F4), AL fg surface soil, Protection of Potable GW
[(3)] - CCME ALml: CCME CWS for PHCs, Tier 1 Levels for PHC fractions (F1-F4), AL fg surface soil, Management Limit
[(4)] - CCME ALescf: CCME CWS for PHCs, Tier 1 Levels for PHC fractions (F1-F4), AL fg surface soil, Eco Soil Contact
[(5)] -CCME ALdcf: CCME CWS for PHCs, Tier 1 Levels for PHC fractions (F1-F4), AL fg surface soil , Direct Contact
[(6)] - CSR NL VPH standards use for comparison against PHC fraction F1
[(7)] - CSR NL LEPH standards use for comparison against PHC fraction F2
[(8)] - CSR NL HEPH standards use for comparison against PHC fraction F3
Exceeds CCME AL
Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
NC - RPDs not calculated for non-detect results or for results within 5X of detection limit
RPD - relative percentage difference
MDL - method detection limit
RPD targets for PHCs (≤ 80%)

TABLE 8: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF EXCAVATED SOIL - PAH PARAMETERS (mg/kg)

Sample ID	Date	Depth (m)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene Equivalency*	PAHs, Total	IACR	PAH TEQ*
MDZ Test Pit Samples for Soil Characterization																							
TP15-2-0.5-1	27-Jan-2015	0.5 - 1.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
TP15-2-1-2	27-Jan-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
TP15-A (BFD of TP15-2-1-2)	27-Jan-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	0.031	0.041	0.061	0.083	< 0.020	0.12	< 0.050	0.025	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	0.039	< 0.12	0.42	0.94	0.1172
TP15-3-0.5-1	27-Jan-2015	0.5 - 1.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
TP15-3-1-2	27-Jan-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
TP15-4-0.5-1	27-Jan-2015	0.5 - 1.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
TP15-4-1-2	27-Jan-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
MDZ Interim Soil Samples																							
MDZ-WA-1.0-2.0	1-Feb-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
MDZ-WA2-1.0-2.0 (BFD of MDZ-WA-1.0-2.0)	1-Feb-2015	1.0 - 2.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
MDZ-WA-2.0-3.0	1-Feb-2015	2.0 - 3.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
MDZ-WB-0.3-0.8	1-Feb-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
MDZ-EW-0.3-0.8	8-Feb-2015	0.3 - 0.8	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
MDZ-F1-5.5	8-Feb-2015	5.5	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
MDZ-F2-5	8-Feb-2015	5.0	< 0.0050	< 0.0050	< 0.0040	< 0.020	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.020	< 0.050	< 0.020	< 0.010	< 0.020	< 0.020	< 0.10	< 0.050	0.31	<0.091
CCME AL			0.28(5)	320(5)	2.5(3,7)	0.1(6)	0.6(4)	0.1(6)	ng	0.1(6)	6.2(4)	0.1(6)	0.1(6)	0.1(6)	0.1(6)	ng	0.013(5)	0.046(5)	0.1(6)	5.3(2)	ng	1(1)	ng
CSR NL			ns	ns	ns	1	1	1	ns	1	ns	1	ns	ns	1	ns	5	5	10	ns	ns	ns	ns
HWR			ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	100	ns	ns	100
RPD (%)																							
5 X MDL			0.025	0.025	0.02	0.1	0.1	0.1	0.25	0.1	0.1	0.25	0.1	0.1	0.25	0.1	0.05	0.1	0.1	0.5	0.25	0.31	na
TP15-A (BFD of TP15-2-1-2)			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
MDZ-WA2-1.0-2.0 (BFD of MDZ-WA-1.0-2.0)			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

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
BFD - blind field duplicate
ns - no standard listed
ng - no guideline listed
B(a)P - Benzo(a)pyrene
PAH TEQ - PAH toxicity equivalent value relative to benzo(a)pyrene
* B(a)P equivalency and PAH TEQ calculated using the laboratory detection limit when results were < less than the laboratory detection limits
CCME AL: CCME Canadian Soil Quality Guidelines for PAH, Agricultural
TPE: Total Potency Equivalents
IACR: Index of Additive Cancer Risk
HWR - BC Hazardous Waste Regulation
(1) - CCME ALpw: Human Health guidelines, Protection of Potable Water - IACR Calculation
(2) - CCME ALdh: Human Health guidelines, Direct Contact - B(a)P equivalency Calculation
(3) - CCME ALsc: Environmental Health guidelines, Soil Contact
(4) - CCME ALi: Environmental Health guidelines, Soil and Food Ingestion
(5) - CCME ALfl: Environmental Health guidelines, Protection of Freshwater Life
(6) - CCME ALi: Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
(7) - CCME ALe: Environmental Health guidelines, Environmental Health
Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
HWR: Table 1: Leachate Quality Standards for the New Hazardous Waste Regulation
NC - RPDs not calculated for non-detect results or for results within 5X of detection limit
RPD - relative percentage difference
MDL - method detection limit
RPD targets for PAHs (≤ 100%)

TABLE 9: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF EXCAVATED SOIL - LEACHABLE CHEMISTRY RESULTS - METALS PARAMETERS (mg/L)

Sample ID	Date	Depth (m)	pH	Antimony Leachable	Arsenic Leachable	Barium Leachable	Beryllium Leachable	Boron Leachable	Cadmium Leachable	Chromium Leachable	Cobalt Leachable	Copper Leachable	Iron Leachable	Lead Leachable	Mercury Leachable	Molybdenum Leachable	Nickel Leachable	Selenium Leachable	Silver Leachable	Thallium Leachable	Uranium Leachable	Vanadium Leachable	Zinc Leachable
MDZ Test Pits for Soil Characterization																							
TP15-1-0.5-1	27-Jan-2015	0.5 - 1.0	8.35	< 0.10	< 0.10	0.69	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.32	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.40
TP15-1-1-2	27-Jan-2015	1.0 - 2.0	7.93	< 0.10	< 0.10	0.74	< 0.10	0.17	< 0.10	< 0.10	< 0.10	0.17	2.52	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.83
TP15-2-0.5-1	27-Jan-2015	0.5 - 1.0	8.96	< 0.10	< 0.10	1.24	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.52	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TP15-2-1-2	27-Jan-2015	1.0 - 2.0	8.83	< 0.10	< 0.10	0.65	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.63	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TP15-A (BFD of TP15-2-1-2)	27-Jan-2015	1.0 - 2.0	8.12	< 0.10	< 0.10	0.68	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	3.31	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.17
TP15-3-0.5-1	27-Jan-2015	0.5 - 1.0	9.34	< 0.10	< 0.10	1.21	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.57	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TP15-3-1-2	27-Jan-2015	1.0 - 2.0	8.60	< 0.10	< 0.10	1.05	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.37	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.12
TP15-4-0.5-1	27-Jan-2015	0.5 - 1.0	9.16	< 0.10	< 0.10	1.47	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	6.38	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.20
TP15-4-1-2	27-Jan-2015	1.0 - 2.0	8.66	< 0.10	< 0.10	1.05	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	6.51	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TP15-5-1-2	27-Jan-2015	1.0 - 2.0	8.79	< 0.10	< 0.10	0.82	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	6.36	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.24
TP15-B (BFD of TP15-5-1-2)	27-Jan-2015	1.0 - 2.0	8.60	< 0.10	< 0.10	0.54	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.06	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
AI3 Test Pits for Soil Characterization																							
TP15-6-0-0.5	27-Jan-2015	0 - 0.5	8.72	< 0.10	< 0.10	0.79	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.89	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TP15-6-0.5-1	27-Jan-2015	0.5 - 1.0	8.93	< 0.10	< 0.10	0.78	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.52	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TP15-6-1-2	27-Jan-2015	1.0 - 2.0	9.03	< 0.10	< 0.10	0.86	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.73	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TP15-6-2-3	27-Jan-2015	2.0 - 3.0	9.42	< 0.10	< 0.10	1.39	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.96	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TP15-7-0-0.5	27-Jan-2015	0 - 0.5	8.72	< 0.10	< 0.10	0.83	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.27	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TP15-7-0.5-1	27-Jan-2015	0.5 - 1.0	8.14	< 0.10	< 0.10	0.42	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.27	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TP15-7-1-2	27-Jan-2015	1.0 - 2.0	9.47	< 0.10	< 0.10	1.70	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.21	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TP15-7-2-3	27-Jan-2015	2.0 - 3.0	9.26	< 0.10	< 0.10	1.63	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.12	< 0.10	< 0.0020	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Class II			<2.0	<500	<5	<100	<5	<500	<1	<5	<100	<100	<1000	<5	<0.2	ng	<5	<1	<5	<5	<2	<100	<500
HWR			ns	ns	2.5	100	ns	500	0.5	5	ns	100	ns	5	0.1	ns	ns	1	5	ns	10	ns	500
RPD (%)																							
5 X MDL				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.5	0.5	0.01	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
TP15-A (BFD of TP15-2-1-2)			8	NC	NC	NC	NC	NC	NC	NC	NC	NC	23	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TP15-B (BFD of TP15-5-1-2)			2	NC	NC	NC	NC	NC	NC	NC	NC	NC	**70**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
m - metres
mg/L - milligrams per liter
< - less than analytical detection limit indicated
BFD - blind field duplicate
ns - no standard listed
ng - no guideline listed
Class II - Class II Landfill Acceptance Criteria from Alberta Environmental Protection; Alberta User Guide for Waste Managers (March 1996)
HWR - BC Hazardous Waste Regulation
HWR: Table 1: Leachate Quality Standards for the New Hazardous Waste Regulation
NC - RPDs not calculated for non-detect results or for results within 5X of detection limit
RPD - relative percentage difference
MDL - method detection limit
RPD targets for Metals (≤ 60%)

TABLE 10: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF EXCAVATED SOIL - LEACHABLE CHEMISTRY RESULTS - PETROLEUM HYDROCARBON CONSTITUENTS AND MTBE (mg/L)

Sample ID	Date	Benzene Leachable	Ethylbenzene Leachable	Toluene Leachable	m,p-Xylene Leachable	o-Xylene Leachable	Xylene Leachable	MTBE
MDZ Test Pits for Soil Characterization								
TP15-1-1-2	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	---
TP15-2-0.5-1	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	< 0.10
TP15-2-1-2	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	< 0.10
TP15-A (BFD of TP15-2-1-2)	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	< 0.10
TP15-3-0.5-1	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	< 0.10
TP15-3-1-2	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	< 0.10
TP15-4-0.5-1	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	< 0.10
TP15-4-1-2	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	< 0.10
TP15-5-1-2	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	---
TP15-B (BFD of TP15-5-1-2)	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	---
AI3 Test Pits for Soil Characterization								
TP15-6-0-0.5	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	---
TP15-6-0.5-1	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	---
TP15-6-1-2	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	---
TP15-6-2-3	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	---
TP15-7-0-0.5	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	---
TP15-7-0.5-1	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	---
TP15-7-1-2	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	---
TP15-7-2-3	27-Jan-2015	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.020	---
Class II		<0.5	<0.5	<0.5	ng	ng	<0.5	ng
HWR		0.5	0.24	2.4	ns	ns	30	ns
RPD (%)								
5 X MDL		0.05	0.05	0.05	0.1	0.05	0.1	0.5
TP15-A (BFD of TP15-2-1-2)	27-Jan-2015	NC	NC	NC	NC	NC	NC	NC
TP15-B (BFD of TP15-5-1-2)	27-Jan-2015	NC	NC	NC	NC	NC	NC	NC

Notes:
mg/L - milligrams per litre
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
BFD - blind field duplicate
MTBE - methyl tertiary-butyl ether
ns - no standard listed
ng - no guideline listed
Class II - Class II Landfill Acceptance Criteria from Alberta Environmental Protection; Alberta User Guide for Waste Managers (March 1996)
HWR - BC Hazardous Waste Regulation
HWR: Table 1: Leachate Quality Standards for the New Hazardous Waste Regulation
NC - RPDs not calculated for non-detect results or for results within 5X of detection limit
RPD - relative percentage difference
MDL - method detection limit
RPD targets for PHCs (≤ 80%)

TABLE 11: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF EXCAVATED SOIL - LEACHABLE CHEMISTRY RESULTS - PAH PARAMETERS (mg/L)

Sample ID	Date	Acenaphthene Leachable	Acenaphthylene Leachable	Acridine Leachable	Anthracene Leachable	Benzo(a)anthracene Leachable	Benzo(a)pyrene Leachable	Benzo(b&j)fluoranthene Leachable	Benzo(g,h,i)perylene Leachable	Benzo(k)fluoranthene Leachable	Chrysene Leachable	Dibenzo(a,h)anthracene Leachable	Fluoranthene Leachable	Fluorene Leachable	Indeno(1,2,3-c,d)pyrene Leachable	2-Methylnaphthalene Leachable	Naphthalene Leachable	Phenanthrene Leachable	Pyrene Leachable	Quinoline Leachable	Total PAH Leachable
MDZ Test Pits for Soil Characterization																					
TP15-1-0.5-1	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-1-1-2	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-2-0.5-1	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-2-1-2	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-A (BFD of TP15-2-1-2)	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-3-0.5-1	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-3-1-2	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-4-0.5-1	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-4-1-2	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-5-1-2	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-B (BFD of TP15-5-1-2)	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
AI3 Test Pits for Soil Characterization																					
TP15-6-0-0.5	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-6-0.5-1	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-6-1-2	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-6-2-3	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-7-0-0.5	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-7-0.5-1	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-7-1-2	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
TP15-7-2-3	27-Jan-2015	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
Class II		ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng
HWR		ns	ns	ns	ns	ns	0.001	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
RPD (%)																					
5 X MDL		0.0005	0.0005	0.0025	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.001	0.0005	0.0005	0.001	0.0005	0.0005	0.0005	0.0005	0.0025	0.0025
TP15-A (BFD of TP15-2-1-2)	27-Jan-2015	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TP15-B (BFD of TP15-5-1-2)	27-Jan-2015	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
mg/L - milligrams per litre
PAH - polycyclic aromatic hydrocarbons
< - less than analytical detection limit indicated
BFD - blind field duplicate
'---' - sample not analyzed for parameter indicated
ns - no standard listed
Class II - Class II Landfill Acceptance Criteria from Alberta Environmental Protection; Alberta User Guide for Waste Managers (March 1996)
HWR - BC Hazardous Waste Regulation
HWR: Table 1: Leachate Quality Standards for the New Hazardous Waste Regulation
NC - RPDs not calculated for non-detect results or for results within 5X of detection limit
RPD - relative percentage difference
MDL - method detection limit
RPD targets for PAHs (≤ 100%)

TABLE 12: SOIL CHEMISTRY RESULTS REPRESENTATIVE OF EXCAVATED SOIL - ELEMENTAL SULFUR, SWOG, FLASH POINT AND PAINT FILTER

Sample ID	Date	Sulphur (mg/kg)	SWOG (%)	Flashpoint (°C)	Free Liquid*
MDZ Test Pits for Soil Characterization					
TP15-1-0.5-1	27-Jan-2015	110	< 0.50	>61	nil
TP15-1-1-2	27-Jan-2015	170	< 0.50	>61	nil
TP15-2-0.5-1	27-Jan-2015	< 100	< 0.50	>61	nil
TP15-2-1-2	27-Jan-2015	310	< 0.50	>61	nil
TP15-A (BFD of TP15-2-1-2)	27-Jan-2015	< 100	< 0.50	>61	nil
TP15-3-0.5-1	27-Jan-2015	250	< 0.50	>61	nil
TP15-3-1-2	27-Jan-2015	110	< 0.50	>61	nil
TP15-4-0.5-1	27-Jan-2015	410	< 0.50	>61	nil
TP15-4-1-2	27-Jan-2015	< 100	< 0.50	>61	nil
TP15-5-1-2	27-Jan-2015	150	< 0.50	>61	nil
TP15-B (BFD of TP15-5-1-2)	27-Jan-2015	< 100	< 0.50	>61	nil
AI3 Test Pits for Soil Characterization					
TP15-6-0-0.5	27-Jan-2015	210	< 0.50	>61	nil
TP15-6-0.5-1	27-Jan-2015	270	< 0.50	>61	nil
TP15-6-1-2	27-Jan-2015	< 100	< 0.50	>61	nil
TP15-6-2-3	27-Jan-2015	140	< 0.50	>61	nil
TP15-7-0-0.5	27-Jan-2015	130	< 0.50	>61	nil
TP15-7-0.5-1	27-Jan-2015	< 100	< 0.50	>61	nil
TP15-7-1-2	27-Jan-2015	< 100	< 0.50	>61	nil
TP15-7-2-3	27-Jan-2015	< 100	< 0.50	>61	nil
Class II		<500**	ns	>61	nil
HWR		< 500***	3	> 60	nil
RPD (%)					
5 X MDL		500	2.5	61	na
TP15-A (BFD of TP15-2-1-2)	27-Jan-2015	NC	NC	NC	NC
TP15-B (BFD of TP15-5-1-2)	27-Jan-2015	NC	NC	NC	NC

Notes:
mg/kg - milligrams per kilograms
SWOG - Special Waste Oil and Grease
°C - degrees celcius
* - refers to paint filter results
** - Guidelines for landfill disposal of sulphur waste and remediation of suphur containing soils (September 2011)
*** - Standard listed is not from HWR but is from Contaminated Sites Regulation Schedule 7 (as applied by RDEK at Columbia Valley Landfill)
nil - no measurable free liquid
< - less than analytical detection limit indicated
BFD - blind field duplicate
na - not applicable
Class II - Class II Landfill Acceptance Criteria from Alberta Environmental Protection; Alberta User Guide for Waste Managers (March 1996)
HWR - BC Hazardous Waste Regulation
HWR: Table 1: Leachate Quality Standards for the New Hazardous Waste Regulation
NC - RPDs not calculated for non-detect results or for results within 5X of detection limit
RPD - relative percentage difference
MDL - method detection limit
RPD targets for Inorganic Substances (≤ 60%)

TABLE 13: SOIL CHEMISTRY RESULTS - GRAIN SIZE (%)

Sample ID	Date	% Coarse Grained (> 0.075 mm)	% Fine Grained (< 0.075 mm)
AI3 Confirmatory Samples			
A3-F1	31-Jan-2015	2.86	97.1
A3-F3	31-Jan-2015	1.83	98.2
A3-NW-B-0.5-1	31-Jan-2015	3.46	96.5
A3-DUP1 (BFD of A3-NW-B-0.5-1.0)	31-Jan-2015	3.41	96.6
A3-NW-B-1-2	31-Jan-2015	0.46	99.5
A3-SW-B-0.5-1	31-Jan-2015	1.19	98.8
A3-WW-A-0.5-1	31-Jan-2015	0.97	99
MDZ Confirmatory Samples			
MDZ-EW1-3.0-4.0	4-Mar-15	12.8	87.2
MDZ-NWA-1-2	8-Feb-15	17.0	83.1
MDZ-NWA-B2-7.0	5-Mar-15	16.1	83.9
MDZ-DUP-D (BFD of MDZ-NWA-B2-7.0)	5-Mar-15	12.3	87.7
MDZ-NW1-0.3-0.8	5-Mar-15	18.1	82
MDZ-NW1-B1-8.0	5-Mar-15	8.6	91.4
MDZ-NW2-0.3-0.8	5-Mar-15	18.9	81.1
MDZ-NW4-0.3-0.8	5-Mar-15	26.7	73.3
MDZ-DUP-E (BFD of MDZ-NW4-0.3-0.8)	5-Mar-15	25.9	74.1
MDZ-NW4-B5-5.0	5-Mar-15	11.5	88.5
MDZ-NW5-0.3-0.8	5-Mar-15	31.2	68.8
MDZ-NW5-B6-3.0	7-Mar-15	12.1	87.9
MDZ-NW6-2.0-3.0	7-Mar-15	14.3	85.7
MDZ-NW7-0.3-0.8	5-Mar-15	26.4	73.6
MDZ-SW1-0.3-0.8	4-Mar-15	7.40	92.6
MDZ-SW3-2.0-3.0	4-Mar-15	9.00	91
MDZ-SW4-0.3-0.8	4-Mar-15	10.7	89.3
MDZ-SW4-2.0-3.0	4-Mar-15	3.2	96.8
MDZ-SW5-1.0-2.0	4-Mar-15	1.9	98.1
On-Site Backfill Source			
TP15-8-1-2	9-Feb-2015	0.77	99.20
TP15-8-2-3	9-Feb-2015	3.65	96.40
TP15-9-1-2	9-Feb-2015	17.80	82.20
Off-Site Backfill Source			
TP15-10-0.3-0.8	9-Feb-2015	7.32	92.70
TP15-11-1-2	9-Feb-2015	2.27	97.70
MDZ Interim Samples			
MDZ-WA-1.0-2.0	1-Feb-2015	12.4	87.6
MDZ-WA2-1.0-2.0 (BFD of MDZ-WA-1.0-2.0)	1-Feb-2015	18.10	82.0
MDZ-WA-2.0-3.0	1-Feb-2015	20.30	79.7
MDZ-WB-0.3-0.8	1-Feb-2015	15.0	85.0
MDZ-EW-0.3-0.8	8-Feb-2015	12.1	87.9
MDZ-F1-5.5	8-Feb-2015	4.5	95.5
MDZ-F2-5	8-Feb-2015	9.8	90.2
RPD * (%)			
A3-DUP1 (BFD of A3-NW-B-0.5-1.0)	31-Jan-2015	1.5	0.1
MDZ-DUP-E (BFD of MDZ-NW4-0.3-0.8)	5-Mar-15	3.0	1.1
MDZ-WA2-1.0-2.0 (BFD of MDZ-WA-1.0-2.0)	1-Feb-2015	37.4	6.6

Notes:
mg/kg - milligrams per kilogram
< - less than analytical detection limit indicated
BFD - blind field duplicate
RPD - relative percentage difference
* RPD was calculated for comparison only, there is no RPD target limit for grain size

TABLE 14: COST ESTIMATE FOR MDZ EXCAVATION AND RESTORATION

BUDGET ASSUMPTIONS:

Task 1: Site visit with CWS, EC and PWGSC to discuss proposed remediation strategy.
Task 2: Engineered design of excavation and long term restoration plan.
Task 3: Obtain permits, liaise with stakeholders (provincial/federal).
Task 4: Develop and finalize tender specifications, attend bidder's meeting, provide support during tendering process.
Task 5: Excavate remaining debris and contaminated soil in MDZ and complete restoration.
Task 6: Post remedial monitoring for eco/geotech over period of 3 years.
Task 7: Prepare remediation summary report.
Task 8: Complete risk assessment for uplands bench and trail. Complete SCT.
Work conducted under Remediation Consultant TAC E0276-110680/001/XSB.

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8			Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8	
ITEM	On site Stakeholder Meeting	Remediation Excavation Engineering and Design	Permiting & Approvals & CWS Discussions	Develop and Finalize Tender Specifications and Attend Bidder's Meeting	Remediation	Post-remedial monitoring	Reporting	Risk Assessment and SCT	Total Units	Rates	On site Stakeholder Meeting	Remediation Excavation Engineering and Design	Permiting & Approvals & CWS Discussions	Develop and Finalize Tender Specifications and Attend Bidder's Meeting	Remediation	Post-remedial monitoring	Reporting	Risk Assessment and SCT	**TOTAL**
Labour																			
Senior Program Coordinator (Nyman)		4		4					8	$ 125.00	$ -	$ 500.00	$ -	$ 500.00	$ -	$ -	$ -	$ -	$ 1,000.00
Senior Environmental Scientist (Paterson/McKeown/Reimer)	30	45	80	125	300	50	52	57	739	$ 125.00	$ 3,750.00	$ 5,625.00	$ 10,000.00	$ 15,625.00	$ 37,500.00	$ 6,250.00	$ 6,500.00	$ 7,125.00	$ 92,375.00
Intermediate Environmental Scientist (Noel/Webster/Coady/Martin)				24	1680	360	46	140	2250	$ 95.00	$ -	$ -	$ -	$ 2,280.00	$ 159,600.00	$ 34,200.00	$ 4,370.00	$ 13,300.00	$ 213,750.00
Junior Environmental Scientist (Couture/Ashworth)					360	360	120		840	$ 78.00	$ -	$ -	$ -	$ -	$ 28,080.00	$ 28,080.00	$ 9,360.00	$ -	$ 65,520.00
CADD (Wittenberg)					10		16	10	36	$ 78.00	$ -	$ -	$ -	$ -	$ 780.00	$ -	$ 1,248.00	$ 780.00	$ 2,808.00
										Labour Subtotal	**$ 3,750.00**	**$ 6,125.00**	**$ 10,000.00**	**$ 18,405.00**	**$ 225,960.00**	**$ 68,530.00**	**$ 21,478.00**	**$ 21,205.00**	**$ 375,453.00**
Travel and Living Expenses																			
meals (Travel Directive, Apr 1, 2015, $75.40 incl. taxes)	2			9	224	72			307	$ 71.81	$ 143.62	$ -	$ -	$ 646.29	$ 16,085.33	$ 5,170.29	$ -	$ -	$ 22,045.52
incidentals (Travel Directive, Apr 1, 2015, $17.30 incl. taxes)	2			9	224	72			307	$ 16.48	$ 32.95	$ -	$ -	$ 148.29	$ 3,690.67	$ 1,186.29	$ -	$ -	$ 5,058.19
accommodation (PWGSC 2015 Accomodation Search, Invermere)	1			6	224	48			279	$ 124.99	$ 124.99	$ -	$ -	$ 749.94	$ 27,997.76	$ 5,999.52	$ -	$ -	$ 34,872.21
mileage (Travel Directive, Oct 1, 2014, BC, $0.465/km incl. taxes)									0	$ 0.44	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Flights (Grande Prairie/Victoria/Nanaimo/Winnipeg/Whitehorse to Calgary, return)				2	14	12			28	$ 600.00	$ -	$ -	$ -	$ 1,200.00	$ 8,400.00	$ 7,200.00	$ -	$ -	$ 16,800.00
Flights (Kelowna to Cranbrook, return)	1			1	7	12			21	$ 450.00	$ 450.00	$ -	$ -	$ 450.00	$ 3,150.00	$ 5,400.00	$ -	$ -	$ 9,450.00
taxis (one way to airport) or parking	2			6	42	48			98	$ 60.00	$ 120.00	$ -	$ -	$ 360.00	$ 2,520.00	$ 2,880.00	$ -	$ -	$ 5,880.00
rental vehicle (SUV/4WD, Calgary/Cranbrook Airport)	1			6	190	12			209	$ 77.93	$ 77.93	$ -	$ -	$ 467.58	$ 14,806.70	$ 935.16	$ -	$ -	$ 16,287.37
fuel	1			2	30	12			45	$ 100.00	$ 100.00	$ -	$ -	$ 200.00	$ 3,000.00	$ 1,200.00	$ -	$ -	$ 4,500.00
										Travel and Living Subtotal	**$ 1,049.49**	**$ -**	**$ -**	**$ 4,222.09**	**$ 79,650.46**	**$ 29,971.25**	**$ -**	**$ -**	**$ 114,893.29**
Direct Expenses																			
Geotechnical Consultant (Meetings)	1	1		1					3	$ 2,625.00	$ 2,625.00	$ 2,625.00	$ -	$ 2,625.00	$ -	$ -	$ -	$ -	$ 7,875.00
Geotechnical Consultant (Excavation Plan/Remediation Design)		1							1	$ 25,000.00	$ -	$ 25,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,000.00
Geotechnical Monitor (Remediation)					70				70	$ 1,350.00	$ -	$ -	$ -	$ -	$ 94,500.00	$ -	$ -	$ -	$ 94,500.00
Geotechnical Monitor (Post Remedial Monitoring)						9			9	$ 1,350.00	$ -	$ -	$ -	$ -	$ -	$ 12,150.00	$ -	$ -	$ 12,150.00
Geoexplorer unit rental (specialized field equipment)					3				3	$ 2,100.00	$ -	$ -	$ -	$ -	$ 6,300.00	$ -	$ -	$ -	$ 6,300.00
Courier			1		70			1	72	$ 50.00	$ -	$ -	$ 50.00	$ -	$ 3,500.00	$ -	$ -	$ 50.00	$ 3,600.00
Remediation Contractor					1				1	$ 1,146,780.00	$ -	$ -	$ -	$ -	$ 1,146,780.00	$ -	$ -	$ -	$ 1,146,780.00
EM Surveyor (Remediation Confirmation)					1				1	$ 5,000.00	$ -	$ -	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ 5,000.00
Laboratory Analysis																			
Soil (Assume Maxxam Direct Billed to PWGSC) (100% surcharge for short TAT)																			
CCME PAH					70				70	$ 220.00	$ -	$ -	$ -	$ -	$ 15,400.00	$ -	$ -	$ -	$ 15,400.00
CCME Metals					70				70	$ 142.00	$ -	$ -	$ -	$ -	$ 9,940.00	$ -	$ -	$ -	$ 9,940.00
CCME BTEX and F1					70				70	$ 118.00	$ -	$ -	$ -	$ -	$ 8,260.00	$ -	$ -	$ -	$ 8,260.00
CCME F2-F4					70				70	$ 135.00	$ -	$ -	$ -	$ -	$ 9,450.00	$ -	$ -	$ -	$ 9,450.00
Grain size distribution					70				70	$ 45.00	$ -	$ -	$ -	$ -	$ 3,150.00	$ -	$ -	$ -	$ 3,150.00
Alberta Landfill Package					20				20	$ 524.00	$ -	$ -	$ -	$ -	$ 10,480.00	$ -	$ -	$ -	$ 10,480.00
Elemental Sulfur					20				20	$ 60.00	$ -	$ -	$ -	$ -	$ 1,200.00	$ -	$ -	$ -	$ 1,200.00
SWOG					20				20	$ 143.00	$ -	$ -	$ -	$ -	$ 2,860.00	$ -	$ -	$ -	$ 2,860.00
Leachable PAH					20				20	$ 280.00	$ -	$ -	$ -	$ -	$ 5,600.00	$ -	$ -	$ -	$ 5,600.00
										Lab Subtotal	**$ -**	**$ -**	**$ -**	**$ -**	**$ 66,340.00**	**$ -**	**$ -**	**$ -**	**$ 66,340.00**
										Direct Expenses Subtotal	**$ 2,625.00**	**$ 27,625.00**	**$ 50.00**	**$ 2,625.00**	**$ 1,322,420.00**	**$ 12,150.00**	**$ -**	**$ 50.00**	**$ 1,367,545.00**
SUMMARY										**Task Total**	**$ 7,424.49**	**$ 33,750.00**	**$ 10,050.00**	**$ 25,252.09**	**$ 1,628,030.46**	**$ 110,651.25**	**$ 21,478.00**	**$ 21,255.00**	**$ 1,857,891.29**
TOTAL COST																			**$ 1,857,891.29**

TABLE 15: COST ESTIMATE FOR INSTALLATION OF PROTECTIVE CAP AND RESTORATION

BUDGET ASSUMPTIONS:

Task 1: Site visit with CWS, EC and PWGSC to discuss proposed cap installation and restoration work.
Task 2: Engineered design of cap and long term restoration plan.
Task 3: Obtain permits, liaise with stakeholders (provincial/federal).
Task 4: Develop and finalize tender specifications, attend bidder's meeting, provide support during tendering process.
Task 5: Install protective native soil cap in MDZ and complete site restoration.
Task 6: Collect supplementary data (shallow soil data and delineation data) for risk assessment purposes.
Task 7: Post remedial monitoring for eco/geotech over period of 3 years.
Task 8: Complete risk assessment for uplands bench and trail. Complete SCT.
Work conducted under Remediation Consultant TAC E0276-110680/001/XSB.

ITEM	Task 1 On site Stakeholder Meeting	Task 2 Restoration/ Cap Engineering and Design	Task 3 Permiting & Approvals & CWS Discussions	Task 4 Develop and Finalize Tender Specifications and Attend Bidder's Meeting	Task 5 Import of cap and Site restoration	Task 6 Supplementary Data Collection	Task 7 Post-remedial monitoring	Task 8 Risk Assessment and SCT	Total Units	Rates	Task 1 On site Stakeholder Meeting	Task 2 Restoration/ Cap Engineering and Design	Task 3 Permiting & Approvals & CWS Discussions	Task 4 Develop and Finalize Tender Specifications and Attend Bidder's Meeting	Task 5 Import of cap and Site restoration	Task 6 Supplementary Data Collection	Task 7 Post-remedial monitoring	Task 8 Risk Assessment and SCT	TOTAL
Labour																			
Senior Program Coordinator (Nyman)		4		4					8	$ 125.00	$ -	$ 500.00	$ -	$ 500.00	$ -	$ -	$ -	$ -	$ 1,000.00
Senior Environmental Scientist (Paterson/McKeown/Reimer)	30	25	54	96	120	32	50	57	464	$ 125.00	$ 3,750.00	$ 3,125.00	$ 6,750.00	$ 12,000.00	$ 15,000.00	$ 4,000.00	$ 6,250.00	$ 7,125.00	$ 58,000.00
Intermediate Environmental Scientist (Noel/Webster/Coady/Martin)				24	720	50	360	140	1294	$ 95.00	$ -	$ -	$ -	$ 2,280.00	$ 68,400.00	$ 4,750.00	$ 34,200.00	$ 13,300.00	$ 122,930.00
Junior Environmental Scientist (Couture/Ashworth)						50	360		410	$ 78.00	$ -	$ -	$ -	$ -	$ -	$ 3,900.00	$ 28,080.00	$ -	$ 31,980.00
CADD (Wittenberg)								10	10	$ 78.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 780.00	$ 780.00
										Labour Subtotal	**$ 3,750.00**	**$ 3,625.00**	**$ 6,750.00**	**$ 14,780.00**	**$ 83,400.00**	**$ 12,650.00**	**$ 68,530.00**	**$ 21,205.00**	**$ 214,690.00**
Travel and Living Expenses																			
meals (Travel Directive, Apr 1, 2015, $75.40 incl. taxes)	2			9	76	10	72		169	$ 71.81	$ 143.62	$ -	$ -	$ 646.29	$ 5,457.52	$ 718.10	$ 5,170.29	$ -	$ 12,135.81
incidentals (Travel Directive, Apr 1, 2015, $17.30 incl. taxes)	2			9	76	10	72		169	$ 16.48	$ 32.95	$ -	$ -	$ 148.29	$ 1,252.19	$ 164.76	$ 1,186.29	$ -	$ 2,784.48
accommodation (PWGSC 2015 Accomodation Search, Invermere)	1			6	76	10	48		141	$ 124.99	$ 124.99	$ -	$ -	$ 749.94	$ 9,499.24	$ 1,249.90	$ 5,999.52	$ -	$ 17,623.59
mileage (Travel Directive, Oct 1, 2014, BC, $0.465/km incl. taxes)									0	$ 0.44	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Flights (Grande Prairie/Victoria/Nanaimo/Winnipeg/Whitehorse to Calgary, return)				2	5	1	12		20	$ 600.00	$ -	$ -	$ -	$ 1,200.00	$ 3,000.00	$ 600.00	$ 7,200.00	$ -	$ 12,000.00
Flights (Kelowna to Cranbrook, return)	1			1	1	1	12		16	$ 450.00	$ 450.00	$ -	$ -	$ 450.00	$ 450.00	$ 450.00	$ 5,400.00	$ -	$ 7,200.00
taxis (one way to airport) or parking	2			6	12	4	48		72	$ 60.00	$ 120.00	$ -	$ -	$ 360.00	$ 720.00	$ 240.00	$ 2,880.00	$ -	$ 4,320.00
rental vehicle (SUV/4WD, Calgary/Cranbrook Airport)	1			6	64	1	12		84	$ 77.93	$ 77.93	$ -	$ -	$ 467.58	$ 4,987.52	$ 77.93	$ 935.16	$ -	$ 6,546.12
fuel	1			2	10	1	12		26	$ 100.00	$ 100.00	$ -	$ -	$ 200.00	$ 1,000.00	$ 100.00	$ 1,200.00	$ -	$ 2,600.00
										Travel and Living Subtotal	**$ 1,049.49**	**$ -**	**$ -**	**$ 4,222.09**	**$ 26,366.47**	**$ 3,600.69**	**$ 29,971.25**	**$ -**	**$ 65,210.00**
Direct Expenses																			
Geotechnical Monitor (Meetings)	1			1					2	$ 2,625.00	$ 2,625.00	$ -	$ -	$ 2,625.00	$ -	$ -	$ -	$ -	$ 5,250.00
Geotechnical Consultant (Cap/Restoration Design)		1							1	$ 15,000.00	$ -	$ 15,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,000.00
Geotechnical Monitor (Importing Cap and Restoration)					30				30	$ 1,350.00	$ -	$ -	$ -	$ -	$ 40,500.00	$ -	$ -	$ -	$ 40,500.00
Geotechnical Monitor (Post Remedial Monitoring)							9		9	$ 1,350.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,150.00	$ -	$ 12,150.00
Geoexplorer unit rental (specialized field equipment)					1	0.5			1.5	$ 2,100.00	$ -	$ -	$ -	$ -	$ 2,100.00	$ 1,050.00	$ -	$ -	$ 3,150.00
Contractor - Cap Installation and Restoration					1				1	$ 309,500.00	$ -	$ -	$ -	$ -	$ 309,500.00	$ -	$ -	$ -	$ 309,500.00
Courier			1			2		1	4	$ 50.00	$ -	$ -	$ 50.00	$ -	$ -	$ 100.00	$ -	$ 50.00	$ 200.00
Laboratory Analysis																			
Soil (Assume Maxxam Direct Billed to PWGSC) (100% surcharge for short TAT)																			
CCME PAH					44	20			64	$ 110.00	$ -	$ -	$ -	$ -	$ 4,840.00	$ 2,200.00	$ -	$ -	$ 7,040.00
CCME Metals					44	20			64	$ 71.00	$ -	$ -	$ -	$ -	$ 3,124.00	$ 1,420.00	$ -	$ -	$ 4,544.00
CCME BTEX and F1					44	20			64	$ 56.50	$ -	$ -	$ -	$ -	$ 2,486.00	$ 1,130.00	$ -	$ -	$ 3,616.00
CCME F2-F4					44	20			64	$ 67.50	$ -	$ -	$ -	$ -	$ 2,970.00	$ 1,350.00	$ -	$ -	$ 4,320.00
Grain size distribution					44	20			64	$ 22.50	$ -	$ -	$ -	$ -	$ 990.00	$ 450.00	$ -	$ -	$ 1,440.00
										Lab Subtotal	**$ -**	**$ -**	**$ -**	**$ -**	**$ 14,410.00**	**$ 6,550.00**	**$ -**	**$ -**	**$ 20,960.00**
										Direct Expenses Subtotal	**$ 2,625.00**	**$ 15,000.00**	**$ 50.00**	**$ 2,625.00**	**$ 366,510.00**	**$ 7,700.00**	**$ 12,150.00**	**$ 50.00**	**$ 406,710.00**
SUMMARY										**Task Total**	**$ 7,424.49**	**$ 18,625.00**	**$ 6,800.00**	**$ 21,627.09**	**$ 476,276.47**	**$ 23,950.69**	**$ 110,651.25**	**$ 21,255.00**	**$ 686,610.00**
TOTAL COST																			**$ 686,610.00**

TABLE 16: COST ESTIMATE FOR TOXICITY TESTING AND RESTORATION

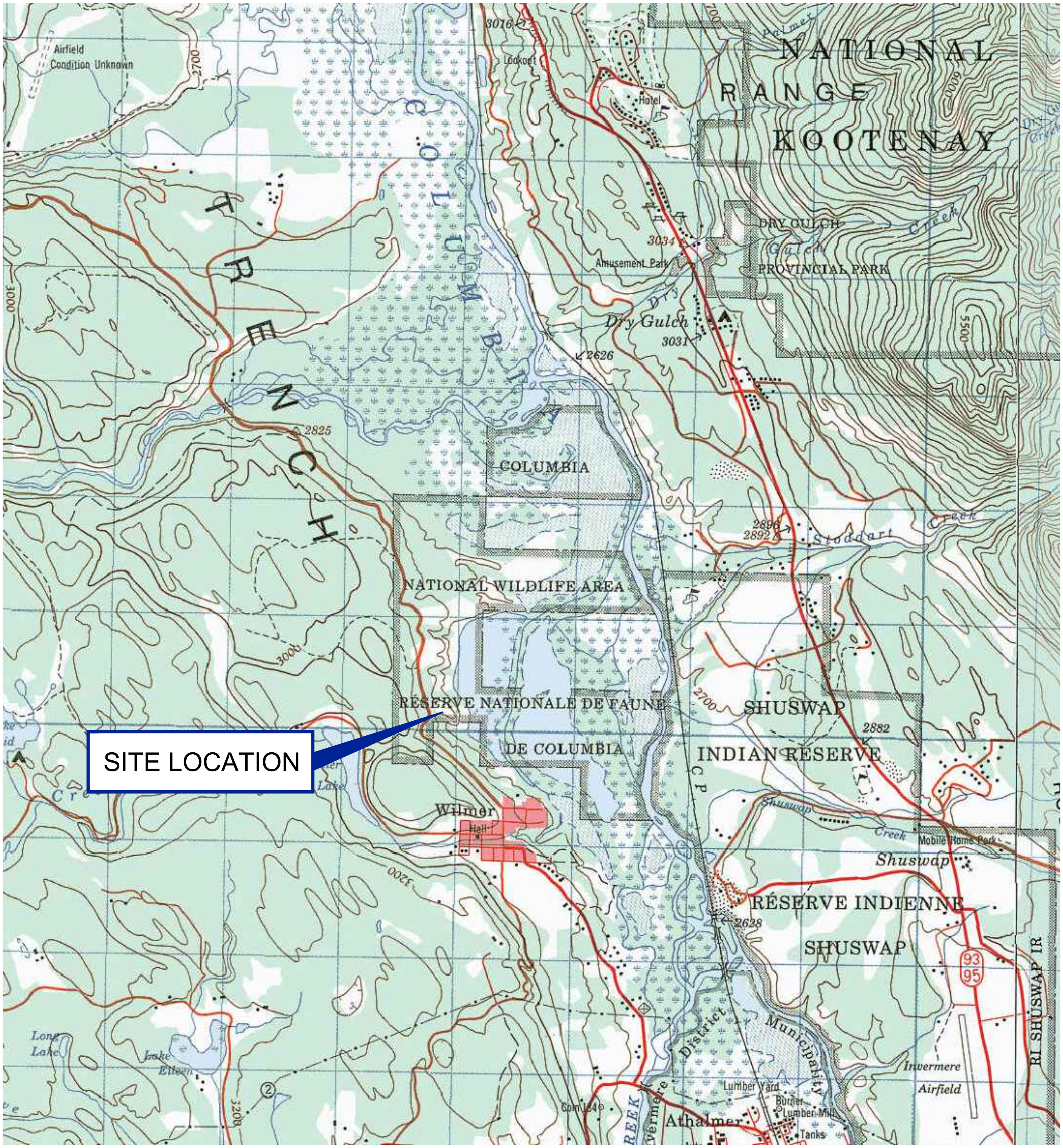
BUDGET ASSUMPTIONS:

Task 1: Site visit with CWS, EC and PWGSC to discuss restoration work.
Task 2: Development of long term restoration plan.
Task 3: Obtain permits, liaise with stakeholders (provincial/federal).
Task 4: Develop and finalize tender specifications, attend bidder's meeting, provide support during tendering process.
Task 5: Complete site restoration.
Task 6: Collect supplementary data for risk assessment purposes.
Task 7: Post remedial monitoring for eco/geotech over period of 3 years.
Task 8: Complete risk assessment for uplands bench and trail. Complete SCT.
Work conducted under Remediation Consultant TAC E0276-110680/001/XSB.

ITEM	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8	Total Units	Rates	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8	TOTAL
	On site Stakeholder Meeting	Restoration Design	Permiting & Approvals & CWS Discussions	Develop and Finalize Tender Specifications and Attend Bidder's Meeting	Site restoration	Supplementary Data Collection	Post-remedial monitoring	Risk Assessment and SCT			On site Stakeholder Meeting	Restoration Design	Permiting & Approvals & CWS Discussions	Develop and Finalize Tender Specifications and Attend Bidder's Meeting	Site restoration	Supplementary Data Collection	Post-remedial monitoring	Risk Assessment and SCT	
Labour																			
Senior Program Coordinator (Nyman)		4		4					8	$ 125.00	$ -	$ 500.00	$ -	$ 500.00	$ -	$ -	$ -	$ -	$ 1,000.00
Senior Environmental Scientist (Paterson/McKeown/Reimer)	30	15	54	86	60	32	50	57	384	$ 125.00	$ 3,750.00	$ 1,875.00	$ 6,750.00	$ 10,750.00	$ 7,500.00	$ 4,000.00	$ 6,250.00	$ 7,125.00	$ 48,000.00
Intermediate Environmental Scientist (Noel/Webster/Coady/Martin)				24	360	50	360	140	934	$ 95.00	$ -	$ -	$ -	$ 2,280.00	$ 34,200.00	$ 4,750.00	$ 34,200.00	$ 13,300.00	$ 88,730.00
Junior Environmental Scientist (Couture/Ashworth)						50	360		410	$ 78.00	$ -	$ -	$ -	$ -	$ -	$ 3,900.00	$ 28,080.00	$ -	$ 31,980.00
CADD (Wittenberg)								10	10	$ 78.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 780.00	$ 780.00
										Labour Subtotal	**$ 3,750.00**	**$ 2,375.00**	**$ 6,750.00**	**$ 13,530.00**	**$ 41,700.00**	**$ 12,650.00**	**$ 68,530.00**	**$ 21,205.00**	**$ 170,490.00**
Travel and Living Expenses																			
meals (Travel Directive, Apr 1, 2015, $75.40 incl. taxes)	2			9	40	10	72		133	$ 71.81	$ 143.62	$ -	$ -	$ 646.29	$ 2,872.38	$ 718.10	$ 5,170.29	$ -	$ 9,550.67
incidentals (Travel Directive, Apr 1, 2015, $17.30 incl. taxes)	2			9	40	10	72		133	$ 16.48	$ 32.95	$ -	$ -	$ 148.29	$ 659.05	$ 164.76	$ 1,186.29	$ -	$ 2,191.33
accommodation (PWGSC 2015 Accomodation Search, Invermere)	1			6	40	10	48		105	$ 124.99	$ 124.99	$ -	$ -	$ 749.94	$ 4,999.60	$ 1,249.90	$ 5,999.52	$ -	$ 13,123.95
mileage (Travel Directive, Oct 1, 2014, BC, $0.465/km incl. taxes)									0	$ 0.44	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Flights (Grande Prairie/Victoria/Nanaimo/Winnipeg/Whitehorse to Calgary, return)				2	3	1	12		18	$ 600.00	$ -	$ -	$ -	$ 1,200.00	$ 1,800.00	$ 600.00	$ 7,200.00	$ -	$ 10,800.00
Flights (Kelowna to Cranbrook, return)	1			1	1	1	12		16	$ 450.00	$ 450.00	$ -	$ -	$ 450.00	$ 450.00	$ 450.00	$ 5,400.00	$ -	$ 7,200.00
taxis (one way to airport) or parking	2			6	8	4	48		68	$ 60.00	$ 120.00	$ -	$ -	$ 360.00	$ 480.00	$ 240.00	$ 2,880.00	$ -	$ 4,080.00
rental vehicle (SUV/4WD, Calgary/Cranbrook Airport)	1			6	34	1	12		54	$ 77.93	$ 77.93	$ -	$ -	$ 467.58	$ 2,649.62	$ 77.93	$ 935.16	$ -	$ 4,208.22
fuel	1			2	6	1	12		22	$ 100.00	$ 100.00	$ -	$ -	$ 200.00	$ 600.00	$ 100.00	$ 1,200.00	$ -	$ 2,200.00
										Travel and Living Subtotal	**$ 1,049.49**	**$ -**	**$ -**	**$ 4,222.09**	**$ 14,510.65**	**$ 3,600.69**	**$ 29,971.25**	**$ -**	**$ 53,354.17**
Direct Expenses																			
Geotechnical Monitor (Meetings)	1			1					2	$ 2,625.00	$ 2,625.00	$ -	$ -	$ 2,625.00	$ -	$ -	$ -	$ -	$ 5,250.00
Geotechnical Consultant (Restoration Design)		1							1	$ 7,500.00	$ -	$ 7,500.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,500.00
Geotechnical Monitor (Restoration)					15				15	$ 1,350.00	$ -	$ -	$ -	$ -	$ 20,250.00	$ -	$ -	$ -	$ 20,250.00
Geotechnical Monitor (Post Remedial Monitoring)							9		9	$ 1,350.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,150.00	$ -	$ 12,150.00
Geoexplorer unit rental (specialized field equipment)					0.5	0.5			1	$ 2,100.00	$ -	$ -	$ -	$ -	$ 1,050.00	$ 1,050.00	$ -	$ -	$ 2,100.00
Contractor - Restoration					1				1	$ 197,575.00	$ -	$ -	$ -	$ -	$ 197,575.00	$ -	$ -	$ -	$ 197,575.00
Courier			1			2		1	4	$ 50.00	$ -	$ -	$ 50.00	$ -	$ -	$ 100.00	$ -	$ 50.00	$ 200.00
Laboratory Analysis																			
Soil (Assume Maxxam Direct Billed to PWGSC) (100% surcharge for short TAT)																			
CCME PAH						36			36	$ 110.00	$ -	$ -	$ -	$ -	$ -	$ 3,960.00	$ -	$ -	$ 3,960.00
CCME Metals						36			36	$ 71.00	$ -	$ -	$ -	$ -	$ -	$ 2,556.00	$ -	$ -	$ 2,556.00
CCME BTEX and F1						36			36	$ 56.50	$ -	$ -	$ -	$ -	$ -	$ 2,034.00	$ -	$ -	$ 2,034.00
CCME F2-F4						36			36	$ 67.50	$ -	$ -	$ -	$ -	$ -	$ 2,430.00	$ -	$ -	$ 2,430.00
Grain size distribution						36			36	$ 22.50	$ -	$ -	$ -	$ -	$ -	$ 810.00	$ -	$ -	$ 810.00
Toxicity Testing																			
Soil terrestrial - earthworm, plantx2						10			10	$ 4,000.00	$ -	$ -	$ -	$ -	$ -	$ 40,000.00	$ -	$ -	$ 40,000.00
										Lab Subtotal	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 51,790.00**	**$ -**	**$ -**	**$ 51,790.00**
										Direct Expenses Subtotal	**$ 2,625.00**	**$ 7,500.00**	**$ 50.00**	**$ 2,625.00**	**$ 218,875.00**	**$ 52,940.00**	**$ 12,150.00**	**$ 50.00**	**$ 296,815.00**
SUMMARY										**Task Total**	**$ 7,424.49**	**$ 9,875.00**	**$ 6,800.00**	**$ 20,377.09**	**$ 275,085.65**	**$ 69,190.69**	**$ 110,651.25**	**$ 21,255.00**	**$ 520,659.17**
TOTAL COST																			**$ 520,659.17**

DRAWINGS

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010



REFERENCED FROM : ETOPO MAP SYSTEM
NTS MAP 82 K/09

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PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2014/2015 SITE WORKS SUMMARY

Drawing
SITE LOCATION MAP

Date	March 24, 2015
File Name	S_219-05112-00010-D1-1
Scale	AS SHOWN
Project No.	219.05112.00010
Drawing No.	1

SLR

SCALE 1:1250
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NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS 010047749–MCS101–R02.DWG AND (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

- PROVINCIAL – FEDERAL BOUNDARY
- FENCE
- SEDIMENT CURTAIN
- VEGETATION EXCLUSION AREA
- SOIL AND/OR DEBRIS REMOVAL AREAS
- PROPOSED BACKFILL BORROW LOCATION
- ON–SITE BACKFILL BORROW LOCATION

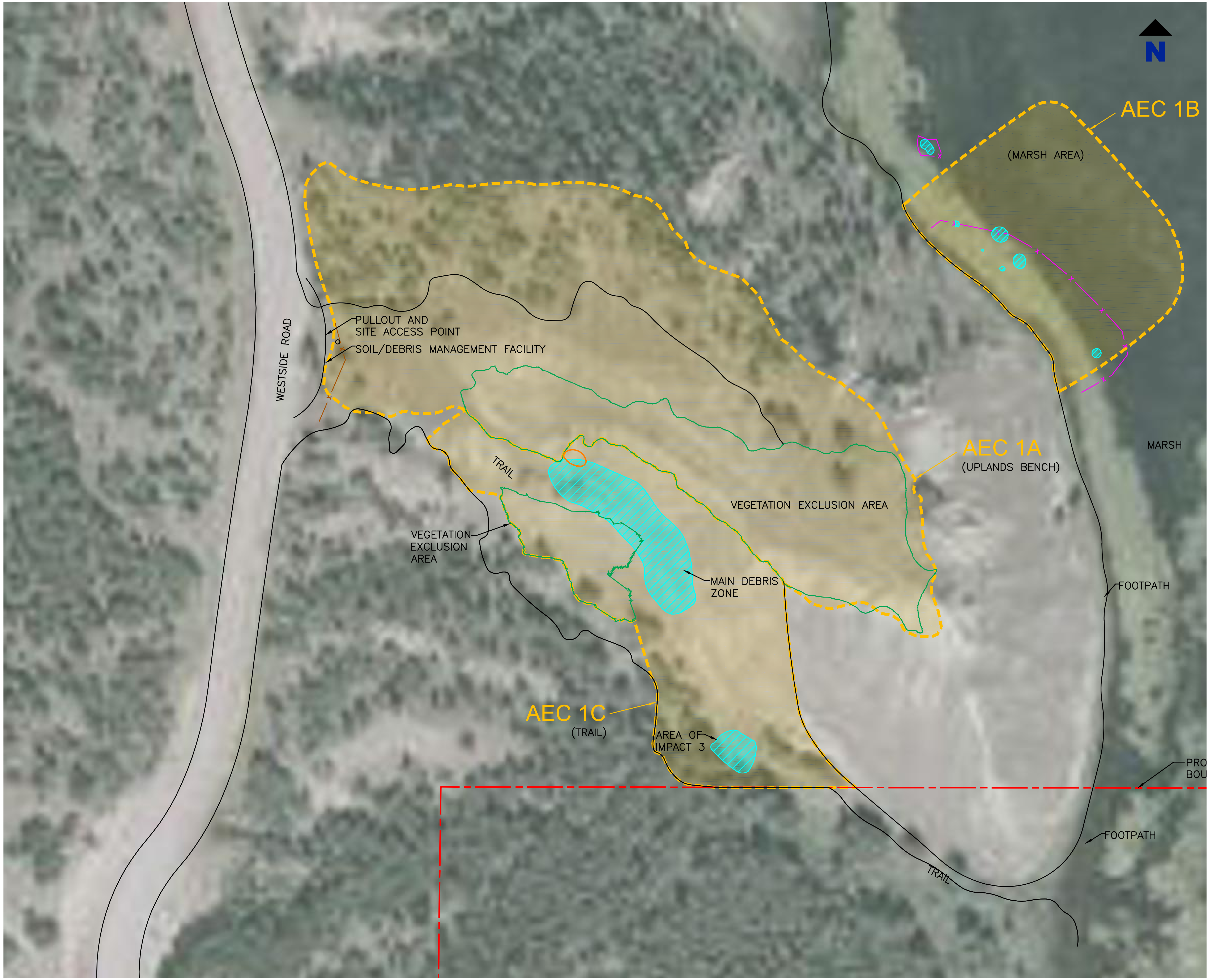
PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2014/2015 SITE WORKS SUMMARY

Drawing
SITE PLAN

Date March 24, 2015	Scale AS SHOWN	Drawing No. 2
File Name S_219-05112-00010-D1-2	Project No. 219.05112.00010	

SLR



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NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS 010047749–MCS101–R02.DWG AND (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

- PROVINCIAL – FEDERAL BOUNDARY
- FENCE
- SEDIMENT CURTAIN
- VEGETATION EXCLUSION AREA
- SOIL AND/OR DEBRIS REMOVAL AREAS
- ON–SITE BACKFILL BORROW LOCATION
- AREA OF ENVIRONMENTAL CONCERN (AEC)

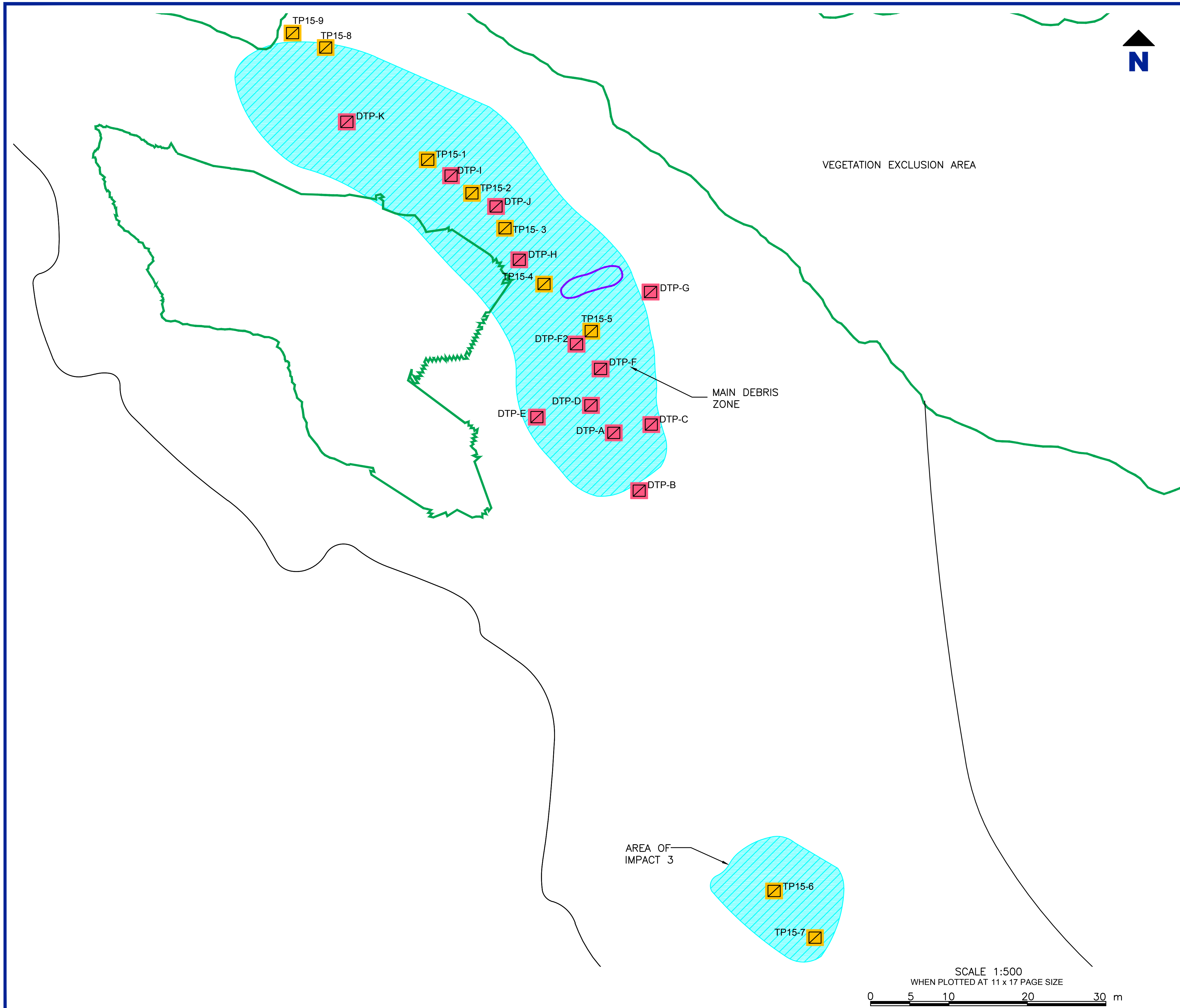
PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2014/2015 SITE WORKS SUMMARY

Drawing
AREAS OF ENVIRONMENTAL CONCERN

Date March 24, 2015	Scale AS SHOWN	Drawing No. 3
File Name S_219-05112-00010-D1-3	Project No. 219.05112.00010	

SLR



NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS 010047749–MCS101–R02.DWG AND (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

- VEGETATION EXCLUSION AREA
- SOIL AND/OR DEBRIS REMOVAL AREAS
- TEST PIT LOCATION
- IN–SITU CHARACTERIZATION TEST PITS
- VISUAL OBSERVATION TEST PITS
- VISUAL OBSERVATION TRENCH

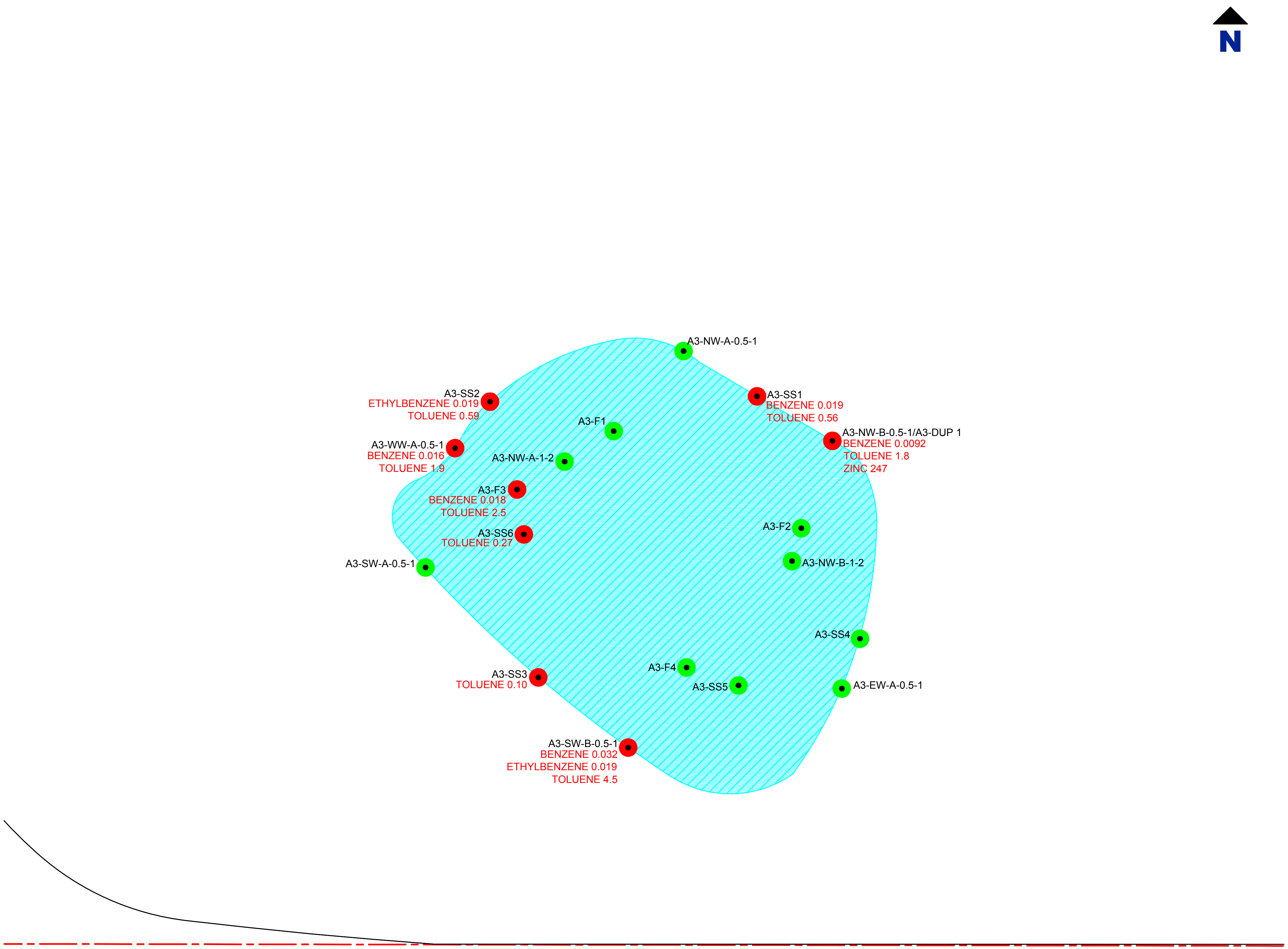
PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2014/2015 SITE WORKS SUMMARY

Drawing
TEST PIT LOCATIONS (2015)

Date	March 24, 2015	Scale	AS SHOWN	Drawing No.	4
File Name	S_219-05112-00010-D1-4	Project No.	219.05112.00010		

SLR



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

SCALE 1:150
WHEN PLOTTED AT 11 x 17 PAGE SIZE
0 2.5 5 10 m

NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS 010047749–MCS101–R02.DWG AND (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

- PROVINCIAL – FEDERAL BOUNDARY
- SOIL AND/OR DEBRIS REMOVAL AREAS
- SAMPLE LOCATIONS
- CONCENTRATIONS LESS THAN OR EQUAL TO APPLICABLE GUIDELINES AND SSRTs
- CONCENTRATIONS GREATER THAN APPLICABLE GUIDELINES AND SSRTs

* ALL VALUES IN mg/kg

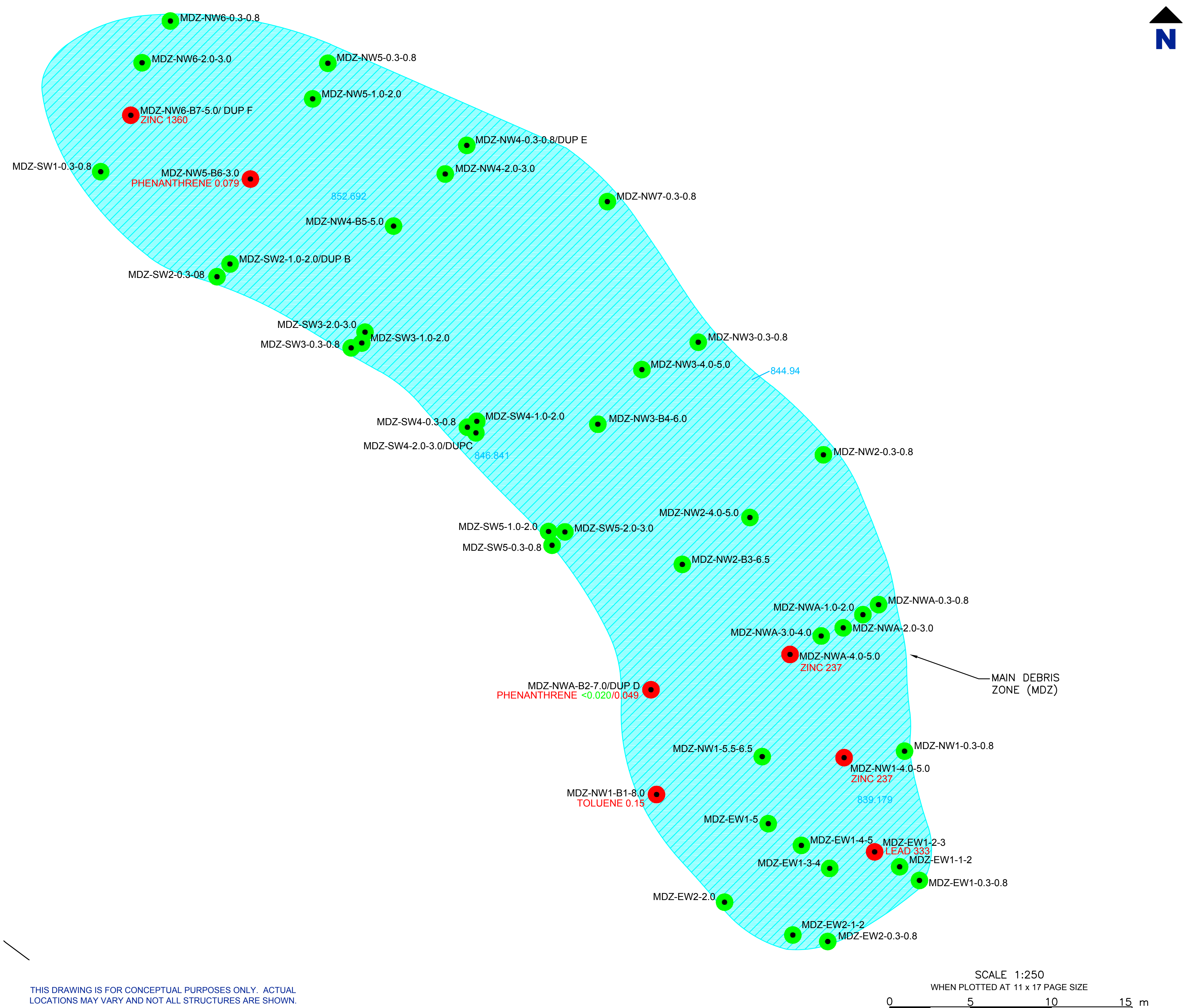
PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2014/2015 SITE WORKS SUMMARY

Drawing
SOIL CHEMISTRY RESULTS - AREA OF IMPACT 3

Date	March 24, 2015	Scale	AS SHOWN	Drawing No. 5
File Name	S_219-05112-00010-D1-5	Project No.	219.05112.00010	

SLR



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

NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS 010047749–MCS101–R02.DWG AND (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

NW6 SAMPLES, GPS POINTS NOT COLLECTED AS POOR DIFF. CORRECTION AT TIME OF SAMPLING

LEGEND

- MAIN DEBRIS ZONE (MDZ)
- 844.94 MAIN DEBRIS ZONE ELEVATION (m)
- SAMPLE LOCATIONS
- CONCENTRATIONS LESS THAN OR EQUAL TO APPLICABLE GUIDELINES AND SSRTs
- CONCENTRATIONS GREATER THAN APPLICABLE GUIDELINES AND SSRTs
- * ALL VALUES IN mg/kg

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2014/2015 SITE WORKS SUMMARY

Drawing
SOIL CHEMISTRY RESULTS -
MAIN DEBRIS ZONE

Date March 24, 2015	Scale AS SHOWN	Drawing No. 6
File Name S_219-05112-00010-D1-6	Project No. 219.05112.00010	

SLR

SCALE 1:1500
WHEN PLOTTED AT 11 x 17 PAGE SIZE
0 25 50 100 m

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

NOTES

DRAWING COMPILED FROM VAST RESOURCE SOLUTIONS FILE: 15.0026.00_TOPO_SURVEY.S01

LEGEND

- TRAIL EDGE
- TRAIL EDGE (EXCAVATED)
- EDGE OF EXCAVATION
- TOE OF CUT
- TOP OF CROSS DITCH
- BOTTOM OF CROSS DITCH
- BM BENCHMARK
- 1.0m INTERVAL CONTOUR
- 0.5m INTERVAL CONTOUR
- MEDIUM TO LARGE METAL DEBRIS REMAINING, APPROXIMATELY 1–2mbgs (DOWN AND NORTH)
- LARGE METAL DEBRIS REMAINING TO APPROXIMATELY 1–2mbgs
- LOW TO MEDIUM AMOUNTS OF DEBRIS REMAINING IN BANK BETWEEN 0.5–1mbgs

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
2014/2015 SITE WORKS SUMMARY

Drawing
CURRENT SITE CONDITIONS

Date March 24, 2015	Scale AS SHOWN	Drawing No. 7
File Name S_219-05112-00010-D1-7	Project No. 219.05112.00010	

SLR

APPENDIX A
SLR Daily Reports

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

Daily Report Wilmer Marsh - April 28, 2014

Health & Safety

- H&S review by SLR personnel.
- PJO (planned job observation) and LMRA (last minute risk assessment) completed by SLR on Lotic Environmental.

Environmental Protection

- Three active bald eagle nests observed in marsh. No other species observations.
- Main areas of soil settlement/runoff in trail are in vicinity of TP 7 and TP 8/TP9 (main debris area).

Daily Activities

- One Time Fencing opened fence to provide access. Will close fence upon completion of work.
- Portable toilet delivered to site.   Not vandalized overnight.
- Reviewed locations for erosion control measures with Lotic.
- Began hand digging trench along top of gully for installation of Koir matting (see attached photo).

-Remove excess curtain no longer functioning/required.

- Sourcing of woody debris including wood to be used to stake matting in lieu of metal staples.
- Photographed debris present in marsh (see attached photo). Numerous small pieces and tires.

Sustainability

- No idling of vehicles.

Daily Report Wilmer Marsh - April 29, 2014

Health & Safety

- H&S tailgate

Environmental Protection

- Nothing to report.

Daily Activities

- Lotic completed work along gully and trail.
- Koir matting placed along gully and staked with wooden stakes sourced from onsite materials.
- Koir matting placed down at TP 7 and at TP8/9 (wood stakes).
- Placed coarse woody debris at TP 3, TP 5 and TP 6 on trail (staked in also).
- Portable toilet left outside fence for pick-up.
- One Time Fencing to close fence tomorrow.
- SLR and Lotic recommend review of installed measures within month following heavy rainfalls to evaluate efficacy.

- Lotic recommends seeding of gully and trail area with fescue blend (30 % Idaho Fescue, 30 % Rocky Mnt. Fescue, 25 % Rough Fescue and 15 % sheep Fescue). SLR recommends discussion with CWS for approval to apply and then seed gully and trail areas when on-site following heavy rainfall.

Sustainability

- No idling of vehicles.

Daily Report Wilmer Marsh - May 29, 2014

Health & Safety

- H&S plan reviewed with Lotic personnel
- lots of wildlife encountered during mobilization to site on May 28 and demobilization on May 29. No incidents.

Environmental Protection

- Permit from CWS was amended and received prior to the work.
- Seed mix ordered and received from Sagebrush Nurseries prior to work.

Daily Activities

-Site fencing intact. No signs of vandalism.

- Lotic completed hand seeding along gully and trail. Areas of matting were seeded as well as select test pits on trail slope.
- Matting was in excellent condition. No evidence of vandalism. Some vegetation noted to be growing underneath the matting.
- SLR inspected fencing along Westside Road. A gap in the fencing was noted along a small road. UTM coordinates taken to verify against maps.

Sustainability

- No issues to report.

Daily Report Wilmer Marsh - Oct 6, 2014

Health & Safety

- H&S plan reviewed by SLR personnel
- No incidents to report.

Environmental Protection

- Permit from CWS received prior to the work.
- Matting in excellent condition. No evidence of vandalism.
- Reviewed marsh restoration progress.
- Reviewed seeded areas in gully and along trail. Some plant establishment but limited. Will likely need to address during post-remediation activities.

Daily Activities

- Mobilization to site

-Site fencing intact. No signs of vandalism. However, a breach in the NWA fence was noted further south along Westside Road. Fence cut and boulder appears to have been moved to allow for ATV/dirt bike passage.

- Noted historic/inactive badger burrow (three entries) on the northeast portion of the site.
- Noted turtle in marsh. Unable to identify by markings.

Sustainability

- Carpooling between Calgary and Invermere.

<u>Daily Report Wilmer Marsh - Oct 7, 2014</u>

<u>Health & Safety</u>

- H&S tailgate by SLR personnel
- No incidents to report.

<u>Environmental Protection</u>

- Permit from CWS received prior to the work.

<u>Daily Activities</u>

- GPS debris locations in marsh
- Identified turtle in marsh. Markings do not appear to be consistent with slider. Head has green and yellow stripe. Still inconclusive identification. Will continue to monitor.
- Identified fish in marsh during survey activities (potentially two species).
- Reconnaissance for potential backfill source. Identified dumping area further north of the site along Westside Rd (may be on provincial land).

-Documented breach in fence.

<u>Sustainability</u>

- Carpooling between Invermere and site.

Daily Report Wilmer Marsh - Oct 8, 2014

Health & Safety

- H&S tailgate by SLR personnel
- No incidents to report.

Environmental Protection

- Permit from CWS received prior to the work.

Daily Activities

- GPS debris locations in trail.
- Continued wildlife and wildlife tree surveys.
- Continued to monitor turtle. Still inconclusive but does not appear to be a red-eared slider.

Sustainability

- Carpooling between Invermere and site.

Daily Report Wilmer Marsh - Oct 9, 2014

Health & Safety

- H&S tailgate by SLR personnel

- No incidents to report.

Environmental Protection

- Permit from CWS received prior to the work.

Daily Activities

- GPS debris locations in trail

- GPS exclusion zones for future remediation work (i.e. native grass/vegetation areas that should not be disturbed).

- Identified turtle in marsh. Still inconclusive identification.

- Reconnaissance for potential backfill source. Located on east side of Westside Rd, approximately 200 m north of site within NWA.

-Identified severed moose head in ditch along east side of Westside Rd, north of site. Will report to local Conservation Officer.

-Conducted site visit with EC and FOC personnel (Al Hodaly and Eric Chiang). Reviewed historical work areas in uplands bench and marsh as well as new debris areas in the trail. Discussed remediation plans for winter 2014-2015. Reviewed potential backfill source.

-Identified potential ATV access trail to marsh south of the site through town of Wilmer for sediment curtain/fish salvage work.

Sustainability

- Carpooling between Invermere and site.

Daily Report Wilmer Marsh - Oct 10, 2014
Health & Safety

- No incidents to report.

Environmental Protection

- No issues to report.

Daily Activities

-Demobilization to Calgary/Cranbrook.

Sustainability
- Carpooling between Invermere and Calgary.

Daily Report Wilmer Marsh - Nov 3, 2014
Health & Safety

- H&S plan reviewed with Lotic personnel
- Discussed water safety including PFDs, boat safety kit, on shore kit
- Discussed transport of silt curtain in boat to site
- Discussed wildlife concerns with respect to work on water

Environmental Protection

- CWS permit and FOC approval for work has been obtained. Fish collection permit obtained. Email approval to access provincial lands obtained.
- area Conservation Office notified prior to fish salvage activities
- Assessed shoreline prior to boat works to ensure no turtles present in the work area.

- Access to site conducted by boat from a pre-approved launch area south of site. Other access to site by foot only.
- Environmental monitors on site during all works.

Daily Activities

-SLR mobilized to Invermere on November 2nd from Calgary.
- Met with Lotic onsite at 8am on November 3rd.
- Used UTM coordinates provided by AKS for centroids of known conductivity responses from EM31 and EM38 surveys conducted in 2013.
- Determined depth of water around known debris locations to ensure that silt curtain adequate to isolate debris.
- Determined north and south extents of debris to ensure most efficient use of curtain material.
-Installed sediment curtain around main debris areas noted in EM 31 survey.

Sustainability

- Carpooling between Invermere and Calgary.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic only or by boat powered by oars.

Daily Report Wilmer Marsh - Nov 4, 2014

Health & Safety

- H&S plan reviewed with Lotic personnel
- Discussed water safety including PFDs, boat safety kit, on shore kit
- Discussed transport of last section of silt curtain in boat to site
- Discussed wildlife concerns with respect to work on water
- Discussed presence of bear scat at fence at Westside Road. Work together and make noise when travelling to and from vehicles.

Environmental Protection

- Assessed shoreline prior to boat works to ensure no turtles present in the work area.
- Environmental monitors on site during all works.

Daily Activities

- Lotic onsite at 8am.
- Accessed marsh, ensured no wildlife present prior to commencement of work.
- Lotic brought in last roll of silt curtain to site. Established curtain around most north debris location.
- Lotic set up underwater camera and assessed full length of both curtains for placement on the marsh floor. Confirmed that silt curtain well placed.
- SLR monitored shoreline following site works to ensure no wildlife concerns.
- SLR reviewed isolated areas and prepared a plan for placement of traps and nets for fish salvage to commence on November 5.

Sustainability

- Carpooling between Invermere and Calgary.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic only or by boat powered by oars.

Daily Report Wilmer Marsh - Nov 5, 2014

Health & Safety

- H&S tailgate (SLR personnel)
- Discussed water safety including PFDs, boat safety kit, on shore kit, FLOAT plan.
- Discussed wildlife concerns with respect to work on water
- Discussed presence of bear scat at fence at Westside Road. Work together and make noise when travelling to and from vehicles.
- Discussed working with boat to set and check traps. Boat safety kit on board including PFDs on workers.
- Discussed walking traps and nets down to site by trail. Take time, safe footing.

Environmental Protection

- CWS permit and FOC approval for work has been obtained. Fish collection permit obtained. Email approval to access provincial lands obtained.
- area Conservation Office notified prior to fish salvage activities
- Assessed shoreline prior to boat works to ensure no turtles present in the work area.
- Environmental monitors on site during all works.

Daily Activities

-SLR planned and set up traps and nets within isolated area. 15 minnow traps and a hoop net set up.
- Traps left for 4 hours to allow for fish to access without disturbance.
- SLR checked traps in afternoon. 60 bass caught (small and large mouth - juveniles), 5 minnows - juveniles
- As per requirement under the permit, we removed the bass from the system and released the minnows outside of the isolation area.
- Observed areas of silt curtain where sections overlapped gaping where not secured. Noted only top and bottom secured with rope. Secured one section. Discussed with Lotic who indicated not a concern for fish passage but SLR personnel will seal gaps on November 6 during trap checks.
- Will set up additional minnow traps due to numbers of bass caught.
- Emailed Eric Chiang of Fisheries and Oceans Canada of daily findings as per request.

Sustainability

- Carpooling between Invermere and Calgary.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic only or by boat powered by oars.

Daily Report Wilmer Marsh - Nov 6, 2014
Health & Safety

- H&S tailgate (SLR personnel)
- Discussed water safety including PFDs, boat safety kit, on shore kit, FLOAT plan.
- Discussed wildlife concerns with respect to work on water
- Discussed presence of bear scat at fence at Westside Road. Work together and make noise when travelling to and from vehicles.

Environmental Protection

- CWS permit and FOC approval for work has been obtained. Fish collection permit obtained. Email approval to access provincial lands obtained.
- Area Conservation Office notified prior to fish salvage activities
- Assessed shoreline prior to boat works to ensure no turtles present in the work area.
- Environmental monitors on site during all works.

Daily Activities

- Checked all traps left overnight - 32 Bass caught and 6 redside shiners
- Set an additional 5 minnow traps in larger isolation area and 1 trap in smaller north isolation area
- Repaired additional gaps found in silt curtain
- Assessed borrow area for soil along Westside Road for potential for badger presence. Noted three dug areas which were photographed and coordinates collected. All burrows were not large enough for badger and some were incomplete. Likely fox diggings.
- Checked traps again in pm after 6 hours - 40 Bass caught and 7 redside shiners
- Pulled traps along shoreline due to 0 returns in traps.
- Left remainining traps in overnight.
- PM contacted Eric Chiang of Fisheries and Oceans Canada at EOD to discuss finding. Eric referred us to guidance in original letter from FOC.

Sustainability

- Carpooling between Invermere and Calgary.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic only or by boat powered by oars.

Daily Report Wilmer Marsh - Jan 20, 2015
Health & Safety

- SLR personnel H&S review

Environmental Protection

- CWS authorization to conduct non-intrusive site walkover and observation activities obtained via email
- SLR personnel reviewed proposed work areas to identify any wildlife, vegetation concerns not previously noted. None identified.

Daily Activities

- Mobilization to site from Calgary and Cranbrook.
- Site walkover to conduct pre-work inspection for wildlife.

Sustainability

-Carpooling during project.
- Take recyclables to SLR rental house for recycling.

Daily Report Wilmer Marsh - Jan 21, 2015
Health & Safety

- Project kickoff meeting (King Hoe)

- Discussed hazards, H&S for work in the immediate time frame. Will discuss additional H&S as work progresses.

Environmental Protection

- CWS permit for remediation project received via email.
- Environmental monitor on site to review work and inspect equipment arriving on-site.

Daily Activities

- Project kickoff meeting.
- Ice engineering assessment by Northwest Hydraulics. Ice thickness not sufficient to support weight of Spider Hoe.
-EM survey of marsh debris by AKS Geoscience. Debris flagged and painted.
-Delivery of King Hoe supplies and equipment.
- Removal of snow from marsh ice at recommendation of NW Hydraulics.
- Flagging of exclusion zones and discussion of access/egress route.
- Snow clearing of staging area/facility locations.
- Installation of panel/security fencing.
-Traffic control present for unloading of equipment and supplies.

Sustainability

- Carpooling between accomodations and site.

Daily Report Wilmer Marsh - Jan 22, 2015

Health & Safety

- SLR and King Hoe attended H&S meeting directed by Mark (King Hoe).

-All site personnel signed H&S meeting and also site orientation form.

Environmental Protection

- EM and Field Supervisor present for staging area setup and positioning swamp mats on upper bench.
- EM assessed mats for seeds/debris and confirmed steam cleaning of mats by the contractor.
- EM provided input on placement of mats to King Hoe personnel to minimize disturbance to native vegetation (route had minimal native vegetation present). Approximately 8 mats laid down.

-EM reviewed minor snow clearing of access route.

- EM discussed with Travis and King Hoe operators the importance of minimizing excavator activity along shoreline. Reiterated spec section which indicates that footpath can't be used by equipment.
- EM discussed with Travis and King Hoe operators the importance reducing disturbance along upper path; in particular, that a road-esque feature down to marsh is not authorized/allowed/appropriate.
- EM discussed change of work sequencing to address forecasted weather patterns.
- EM reviewed placement of PVC liner for temporary soil/debris laydown area.

Daily Activities

-Attended H&S and planning meeting.

- Supervised additional setup activities in staging area, including:

• Setup of Atco Trailer

• Expanding parking area

• Setting up additional fencing

- Supervised clearing of snow and placement of swamp mats in upper bench;
- Picked up field supplies and began preparing for sample collection.

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Jan 23, 2015

Health & Safety

- SLR, KMZ, Spidex and King Hoe attended H&S meeting directed by Mark (King Hoe).

-All site personnel signed H&S meeting and also site orientation form.

Environmental Protection

- Assessed spyder hoe for debris or vegetation. Spoke with operator and found out that the machine had been cleaned prior to arrival.

-Assessed site at entrance for continued adherence to EPP. Noted use of secondary containment around generator.

-Walked down to marsh with spyder hoe operator to discuss route to marsh. Determine that access on the ice would be attempted prior to any other method.

-Was asked by spidex operator if they could leave their pontoons and other bucket inside fence for potential future use. Noted all equipment clean and no grease loss potential.

-Walked behind spyder hoe on way to marsh. Accessed at base of "trail" as discussed.

-Noted heavily falling through ice into sediments near access point to ice. Noted a smell of organics suggesting that this area is influenced by upwellings and water entry at base of gully.

-Stopped movement and discussed access with King Hoe and Spidex. Determined that spyder hoe had to keep moving so not be trapped in sediment.

-Found that ice past this location was much firmer. Extent of damage likely 10m.

-Discussed plan for exit of spyder hoe when marsh work completed understanding that weather is warming up. Discussed three options of returning way the spyder hoe came and trying to smooth out disturbed sediments, bringing in matting, or using the trail to leave. King Hoe will discuss options and return answer prior to end of marsh work.

-Commenced ice work at south end of marsh working north. Assessed all debris coming from the marsh for marsh wildlife such as turtles. No wildlife observed.

-Continued to monitor debris removed from ice until end of day.

Daily Activities

-Attended H&S and planning meeting.

- Marsh excavation activities:
• walking spider-hoe to marsh;
• setup delineators around ice excavation; flagging;
• excavated approx. 13 zones of debris with spider-hoe through ice surface.
• debris included car parts, kitchen debris, industrial debris (barrels, boards, etc.).
• debris placed in canvas super-sacs (approx. 8 bags);
• debris stockpiles on plastic sheeting on ice surface, as running out of super-sacs;

- Obtained gas-tech and additional field supplies from Purolator Invermere;
- Finished pre-labelling of sample containers;

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Jan 24, 2015

Health & Safety

- SLR, KMZ, Spidex and King Hoe attended H&S meeting directed by Mark (King Hoe).
-All site personnel signed H&S meeting and also site orientation form.

Environmental Protection

-Onsite at marsh for second day of debris removal.

-A snow slide fell over trail near site following warm weather overnight. Able to walk over.

-Filled fabric sacs where possible with debris and placed on poly sheeting for overnight storage.

-Remaining debris left onshore to be placed into metal bins brought down by helicopter on Monday.

-Assessed all debris for wildlife. None observed.

-Discussed travel route by spyder hoe on Monday following debris removal by helicopter. Due to continued warming, travel by orignal route on ice is not possible. Discused options with PWGSC and PM and decided that spyder hoe will travel very slowly and carefully along trail back to areas of excavations.

-Discussed with King Hoe options for work on Sunday. KH requested use of conventional wheeled excavator for test pit work. Discussed that due to warming, conventional excavator will likely cause more damage than by spyder hoe. Will attempt test pitting at main area of debris but will need to monitor closely given conditions.

-Discussed travel by morooka down trail to lower area of debris. Will wait until ready to collect debris at lower part of trail prior to developing access conditions along trail (i.e., snow removal).

-Noted that sand placed on laydown area outside of fence area. Will monitor for movement of sand onto site.

Daily Activities

-Attended H&S and planning meeting.
- Marsh excavation activities:
• excavated additional **35** zones of debris with spider-hoe through ice surface.
• debris included car parts, kitchen debris, industrial debris (barrels, boards, etc.).
• debris condensed in one area along shoreline, in super-sacs and on tarping;
• debris stockpiles on plastic sheeting on ice surface;
• Dominic weighed debris in sacs, totaling approx: **4** tonnes, estimated mass of all debris on ice is **6** tonnes.
- Flagged 7 test pits, and conducted walkover of approx excavation limits.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Jan 25, 2015

Health & Safety

- SLR, and King Hoe attended H&S meeting directed by Mark (King Hoe).

-All site personnel signed H&S meeting and also site orientation form.

Environmental Protection

- SLR FS and EM onsite to review test pitting of main debris zone.

-SLR identified concerns with movement of conventional excavator due to icy ground surface. Excavator was skidding sideways on area of trail with more shallow slope (access over more steeply sloped terrain required to reach main debris zone). Noted limited room to accommodate accidental movement of equipment off of the planned route due to the presence of native vegetation on one side and steep slopes on other side.
-spoke with KH operating the excavator and explained that there is minimal room for error should the excavator fall off the designated route into areas of exclusion zones or other features such as the marked badger burrows and the wildlife trees.

-KH proposed roughing up access route with toothed bucket to provide traction and continuing with work. SLR EM noted that soil will likely turn to slurry with warmed expected temperatures. Also, no temporary sediment and erosion control mitigative measures are in place.

-SLR PM discussed situation with EM/FS and GM via telephone. Best option is to continue with work with spider hoe while warmer temperatures are anticipated. Roughing of access route is second less desirable option but KH should implement temporary mitigative sediment and erosion control measures prior to use of conventional equipment. Effective S&E control measures will require spider hoe to put in place prior to entry by conventional equipment. Spider hoe is confined to marsh work area until helicopter loading completed on Monday.

-SLR PM contacted PWGSC DR to discuss situation. DR contacted KH to discuss shutdown.

Daily Activities

-Attended H&S and planning meeting.

- Reviewed attempted access to main debris zone by conventional excavator.

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.

- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Jan 26, 2015

Health & Safety

- SLR and King Hoe attended H&S meeting directed by Mark (King Hoe).

-All site personnel signed H&S meeting and also site orientation form.

Environmental Protection

-Discussed debris haul with helicopter pilot including number of flights anticipated to understand duration of noise disturbance.

-Accessed site and noted that heavy fog would delay flights.

-Walked trail down to marsh to assess condition following 24hrs of plus temperatures. Noted melting on upper surface of trail; however, heavy frost still set into trail.

-assessed condition of footpath to marsh for ability to support spyder hoe movement out of marsh. Due to limited sun, trail still covered in snow. Will likely still remain for another day if limited sun at site.

-Waited with spyder hoe at marsh for possible movement of debris off of marsh. Due to fog no flights occurred.
-SLR reviewed work sequence/eqpt details provided by KH. Requested additional info on preventative mitigative measures. KH supplied additional information which was reviewed by SLR. Discussed use of Nilex wattles. EM and GM approve use.

Daily Activities

-Attended H&S and planning meeting at Tim Hortons at 8 am.

- At 9 am KH and SLR met at Invermere Airport to discuss logistics of moving debris and H&S with pilot from Big Horn Helicopters.

- pilot was kept on standby until 14:00 due to weather (dense fog, poor visability); at 14:15 aircraft was over the site, but due to heavy fog could not perform debris relocation. He set his helicopter down in a nearby field and waited for fog to clear. At 16:00 a decision was made to cease waiting, and try again for tomorrow (Jan 27, 2014). If conditions are better tomorrow the pilot will leave Invermere Airport at 8:30 am to begin relocating debris.
- Left site at 16:45.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Jan 27, 2015

Health & Safety

- SLR and King Hoe attended H&S meeting directed by Mark (King Hoe).

-All site personnel signed H&S meeting and also site orientation form.

Environmental Protection

-Due to early morning fog, continuation of roughing up of access and snow removal was monitored.
-Helicopter was then okay'd to fly. Debris removal was monitored at marsh. Ensured any remaining debris from debris pile was hand picked and placed in bins.
-EM monitored movement of spyder hoe out of marsh along existing footpath. Minimal damage was noted and recorded. Will monitor recovery of footpath over course of project.
-Monitored completion of roughing of access to fork in trail. Discussed with KH operator that continued access work should occur with geotech who will be present on Jan 28.

-Monitored advancement of test pits in Area of Impact 3 and Main Debris Zone.

Daily Activities

-Attended H&S and planning meeting with KH on-site at 8 am.

- Dense fog was present in valley until 10 am. Following notification from Travis (KH), pilot left airport and was at site at **10:30**. Nine bags and four bins of debris were flown from 10:45 to 12:10.

- Weight of debris transported from marsh is approximately **6.3** metric tonnes (9 bags = 3.9 tonnes and 4 bins of steel totalled 5290 pds or 2.4 tonnes (8410 pnds - 4x780pds); each steel bin weighed 780 pounds empty; = 6.3 metric tonnes all together).

- Following debris relocation from marsh, Spider-Hoe was walked out of marsh under the supervision of Kalina Noel to debris Area #3.

- Dominic began creating test pits with Mathew Coady in debris Area #3 with MC at 1:40 pm, beginning with TP15-7, then TP15-6.

- Kalina Noel then supervised the clearing of snow, and roughing of soil surface of the access trail with the Link-Belt 160. At Kalina's request clearing / roughing ceased at the fork joining upper and lower access trails. This was done to get Jenn Clarke's input on most appropriate approach, including sediment and erosion control measures.

- TP's TP15-1, 2, 3, 4 and 5 were completed from 14:40 to 17:00.

- Left site at 17:15.

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.

- Majority of manpower onsite foot traffic,

<u>Daily Report Wilmer Marsh - Jan 28, 2015</u>

<u>Health & Safety</u>

- SLR, Clarke Geoscience and King Hoe attended H&S meeting directed by Mark (King Hoe).

-All site personnel signed H&S meeting and also site orientation form.

<u>Environmental Protection</u>

- SLR EM and GM (Clarke Geoscience) monitored the roughing of remaining portions of access road.

-Walked down to marsh with Clarke Geoscience to review exit of spyder hoe.

-Present for commencement of excavation of lower excavation area. Discussed route of travel of spyder hoe down to excavation area.

-Due to unsafe conditions of trail, work on removing debris from slope with spyder hoe was commenced. Monitored work and discussed avoidance of wildlife trees and vegetation.

<u>Daily Activities</u>

-GM inspected access route along the marsh, found no issues with respect to erosion or slope stability. Areas of seepage were noted along the edge of the marsh. Several small snow slides were apparent, occuring when warm weather started melting the snow pack on upper slopes.

- Soils along steeper sections of the access route became compacted and slick due to warmer air temperatures and machine compaction. Traction was a problem for marooka access, to the point of becoming potentially unsafe. Contractor is moving to a winch-assisted system.

- Extent and limits of soil disturbance along the trail are as expected. Mitigation measures for erosion will be required if it warms or rains.

- During removal of surface debris that was embedded into the slope below the trail, a steep excavation was developed. The spyder hoe pulled out metal debris and then backfilled with soil, pulling back the oversteepened and over-hanging cutslopes. Because the marookas will be travelling along the trail above this area, GM recommends **monitoring the trail and slope for signs of instability, such as the development of cracks in the trail surface** or along the slope below the trail. The trail is located approximately 5 m upslope of the concavity and the risk of complete failure is considered to be low, particularly if temperatures stay below freezing.

- SLR FS and EM delivered samples to Purolator for delivery to Vancouver and Calgary.

- SLR EM and Jenn Clarke performed inspection of access road to assess how trail would hold up to wear from Morookas.

-KH roughed up remaining portions of access route with Link-Belt 160 with toothed bucket to provide traction. SLR EM and Jennifer Clarke monitored process.

- FS and EM then monitored excavation activities in Area #3 with Spider-Hoe.

- Approximately 4 morooka loads were transported to the stockpile management area before Morooka's encountered issues with slope. Morooka's were unable to climb steeper portions of trail above trail fork. KH is currently attempting to acquire a back-hoe with a winch system to assist Morooka's overcome this obstacle.

- As Morooka's could not climb slope, the Spider-Hoe under SLR supervision began to pickup debris between the flagged vegetation on the slope and Area 3. A number of large metal debris pieces were collected, primarily car parts. Approximately 5 m down gradient of the upper access trail and lower access trail fork, three eroded cars were removed from the bank. While there was still debris noted to be sticking out of the excavation, a decision was made between the SLR PM and Clarke Geoscience to recommend to KH to hold off on excavating further, as it was starting to undermine the bank below the access trail. As a safety measure the excavation was temporarily filled in and flagged, should a decision be made to return to this location.

- Spider-hoe returned to collecting debris in low lying areas, and stockpiling it to the west of Area 3.

(Daily Report Wilmer Marsh - Jan 28, 2015 continued)

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.

- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Jan 29, 2015

Health & Safety

- SLR (Mat Coady, Marci Martin), Jennifer Clarke and King Hoe attended H&S meeting directed by Mark (King Hoe).

-All site personnel signed H&S meeting and also site orientation form.

Daily Activities

- SLR FS, EM and Jenn Clarke performed inspection of access road to assess how trail would hold up to wear from
- Jenn Clarke advised KH and SLR to keep an eye on the con-cavity created on January 10th, 2015 located 5 m downgradient of fork in access trails. JC suggested that if the filled in con-cavity starts to slough soils, and cause bank instability upgradient of the con-cavity, then a discussion regarding the possibility of cutting the access trail further north to avoid having the morooka's too close to the bank may be a cautious approach to ensure safe travel conditions.

- FS and EM monitored the movement of the spider-hoe around the site, and ensured that the spider-hoe had indeed collected all of the surface debris captured with GPS unit in the fall. FS and EM ensured that spider-hoe was avoiding sensitive plants, and was minimizing surface soil disturbance. Majority of surface debris has been condensed in a few key areas of the site, for loading on morooka's.

- KH did not use morooka's on access trail due to H&S concerns with machines slipping in mud. KH brought a bulldozer complete with winch. KH intends to pull the morooka's up steeper portions of the trail with winch system. The bulldozer will be positioned to the north of the wildlife tree in the vicinity of TP4.

- KH created a cross-ditch running NE-SW across the access trail in the main debris zone to control seepage coming out the bank upgradient of the access trail. Seep water was starting to pool on the access trail. KH intends to lay a waddle in the vicinity of the seepage at some point on Jan 30th, 2014.

Environmental Protection

- FS and EM monitored the progress of Spider-Hoe collecting surface debris in low lying areas of the site, below main debris area and to the north-west of A3; debris along the banks of access trail; and upgradient access trail.

- Large quantities of surface debris were condensed around TP-12. A conversation was had between SLR field staff and Spider-Hoe operator regarding the best way to re-locate debris to a location where it could be placed in morooka's. Eventually it was decided that using the Spider-Hoe to push the debris to Area 3 was the lowest impact method. This method was employed and worked efficiently, with minimal disturbance to soils and plants.

-In the early afternoon a bulldozer with a winch system was brought on-site to assist morooka's climb access trail. The bulldozer was inspected for signs of leaking hydraulic fluid, and seeds/plant matter gathered on surface/undersurface.

-Present for commencement of excavation of lower excavation area. Discussed route of travel of spyder hoe down to excavation area.

-Due to unsafe conditions of trail, work on removing debris from slope with spyder hoe was commenced. Monitored work and discussed avoidance of wildlife trees and vegetation.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Jan 30, 2015

Health & Safety

- SLR (Mat Coady, Marci Martin, Kalina Noel) and King Hoe attended H&S meeting directed by Mark (King Hoe).
- Darryl (KH) on site at 8:00 as well as Jessie (labourer/maruka operator).
- Traffic control on-site
- Two Max Helmer employees on site. Fritz (bull dozer) and additional maruka driver

-All site personnel signed H&S meeting and also site orientation form.

Environmental Protection

-Onsite and noted KHE had commenced movement down to excavation area #3. Spoke with KHE and explained that EM must be onsite prior to movement.

-Morookas commenced movement up from excavation #3 and started losing traction. Observed use of dozer winch system to aid morookas up the hill. Following this, spoke with KHE that the trail will require additional roughing up and the dozer system should only be used if no other alternative.

-Monitored excavation of debris from excavation #3. Was consulted with by Spidex and SLR that debris may be present directly adjacent to a large mature conifer. Spoke with KHE. This work was monitored and the tree was salvaged.

-Due to debris present at the top of the excavation area, a mature juniper bush needed to be removed to accommodate this work. Spoke with Spidex and coordinated the removal of the root ball with the juniper bush to allow for replanting following recontouring.

-Monitored condition of trail for sediment control and consulted with Clarke Geoscience throughout the day. No sediment control was needed due to low temperatures all day.

-Observed fluid coming from a gas tank from the auto debris being removed from the excavation area. Stopped Spidex and spoke to KHE. The fluid was looked at for possibily of being remnant gasoline. Noted as only water trapped in tank.

-Observed all work conducted yesterday for environmental concerns as debris was pulled out of area by spyder hoe. Most remaining exposed areas can be fixed by hand. The larger area along the slope will require coconut matting. Spoke with KHE about this.

Daily Activities

- Transported 20 marooka loads of surficial debris to stockpile management area using marukas

- Excavated 40 marooka loads from Area of Impact 3 (AI3) - almost finished excavating all the debris out of AI3. Transported soil to SMA.

- EM and FS monitored excavation activities and loading of marookas by spider hoe. Debris in AI3 consisted predominately of car bodies and metal debris. Will complete AI3 excavation tomorrow and collect confirmatory samples.

- KH used marooka in the morning to load debris and soil from surficial debris pile and AI3. At 10:15 the marookas started to slide so used the dozer to rough up the trail. No problems with the marookas sliding afterwards. Temperatures stayed cold and there was no melting of snow layer and therefore no surfical run off.

- KH used excavator to load surficial wood debris from upper trail above AI3. Track came off the excavator. Used a chain to pull the track back on.

- WCB stopped by the site today. Concerned about workers coming into contact with asbestos containing debris and other hazardous materials. Assured him that we haven't encountered much construction debris but if we did there is a protocol in place to handle and dispose of it.

(Daily Report Wilmer Marsh - Jan 30, 2015 continued)

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.

- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Jan 31, 2015

Health & Safety

- SLR (Marci Martin, Kalina Noel) and King Hoe attended H&S meeting directed by Mark (King Hoe).
- Darryl (KH) on site at 8:00 as well as Jessie (labourer/maruka operator).
- Traffic control on-site
- Two Max Helmer employees on site. Fritz (bull dozer) and additional marooka driver (Alan)

-All site personnel signed H&S meeting and also site orientation form.

- Offsite at 3:45

Daily Activities

- Excavated 19 marooka loads from Area of Impact 3 AI3 - almost finished excavating all the debris out of AI3. Transported soil to SMA.
- EM and FS monitored excavation activities and loading of marookas by spider hoe. Collected confirmatory samples from walls and base of AI3 excavation. Excavation consisted of two areas. An upper bench 17 X 3 m and approximately 1 m in depth = 51 m^3 and the lower bench 15 X 5 m and approximately 1.5 m deep. Total area = approximately 330 m^3.
- KH shipped out 3 truck of AI3 metal debris and 3 trucks of surfical debris metal to salvage yard. Total of 6 trucks. Will get tonnage tomorrow from KH.
- EM showed KH woody debris to be used during restoration and discussed the plan to move the woody debris for storage.
- Spider hoe to remove woody debris into storage area. EM and FS to map out sample locations and excavation extent with GPS.

Environmental Protection

-Monitored surficial debris excavation at top of slope. Minor removed and taken away.

-Present during final clean up of excavation of AI3. Additional debris removed from base of large, mature conifer. Noted that may need to excavate very near base of tree. Required only minor clean up. Tree remained in place.

-Assisted with sample collection.

-Assessed access trail to lower excavation mid-afternoon due to sunny conditions and warmer temperature. Noted some pooling of water at top of soil on trail but due to constant morooka movement, no run off was observed.

-Guided placement of diversion berms and waddles along lower trail during time waiting for results of analytical.

-Discussed and assessed location of woody debris at upper area of site. Determined that use of morooka for one or two runs would be possible due to heavy ice and snow layer at old access trail. Discussed that the spyder hoe should be used to access debris rather than conventional excavator.

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 1, 2015

Health & Safety

- SLR (Marci Martin, Kalina Noel) and King Hoe attended H&S meeting directed by Mark (King Hoe).
- Jessie (labourer/marooka operator).
- Traffic control on-site
- Spider hoe on site - Dominic left at 10:00
- All site personnel signed H&S meeting and also site orientation form.
- Offsite at 2:45

Daily Activities

- MM took GPS coordinates of AI3 sample locations and excavation limits
- Talked with DM about potentially doing recontouring in AI3 area - waiting for PWGSC approval. Didn't receive it before the end of the day. Will likely do recontouring tomorrow.
- Dug trench in the trail in main debris zone to find western and eastern extent. Encountered large debris (car bodies) and abundant household debris at 1.5 to 3.0 m depth up to the eastern extent of the MDZ along trail. Took confirmatory wall samples (MDZ-WA). Location approximately 9 m east of TP6 location. Debris in middle of MDZ extents past 4.0 m. Collected western extent wall sample (MDZ-WB). Location on trail in-line with TP13. Debris observed to approximately 2.0 m in the eastern extent.
- KH expressed concern digging to 4.5 m along trail. Need to come up with an excavation plan. Concerned that it won't be possible to recontour area without destablizing toe of slope. Additional geotechnical controls may be needed if excavation is planned to extend to deeper depths.
- Took AI3 and MDZ confirmatory samples to Greyhound. Should arrive at Maxxam tomorrow morning.
- KN collected woody debris with the spider hoe for excavation recontouring AI3.

Environmental Protection

- Walked with spyder hoe operator and morooka operator into area of available woody debris to discuss access and minimal tracking of equipment.
- Monitored woody debris collection and ensured tracking on single track well away from exclusion zone. Assessed tracks in snow and noted only within ice layer and not into soil.
- Woody debris placed at start of trail adjacent to wood matting.
- Walked down to marsh to assess condition of debris removal area and tracks where spyder hoe left marsh. No change due to continued cold temperatures.
- Noted staining at fork in trails in area where dozer stationed during morooka runs. Notified KHE and the stained soil was removed and disposed of.
- Assisted in soil sampling at extents of main area debris. Monitored excavation on behalf of Clarke Geoscience. Communicated with Jen Clarke throughout the day and the evening to provide information on the test excavation.

Sustainability

- Carpooling to site and back.
- Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 2, 2015

Health & Safety

- SLR (Marci Martin, Kalina Noel) and King Hoe attended H&S meeting directed by Mark (King Hoe).

Daily Activities

- MM and KN took GPS coordinates of suspected MDZ excavation limits

- Talked with DM got approval to start shipping soil from AI3 today (approximately 63 marookas = 360 tonnes) . To ship off AI3 soil based on TP11 analytical results. Will send remaining analytical from TP15-6 and TP15-7 to landfill once we have received results.

-Talked with Dave Mckeown (DM). Got approval to recontour AI3 excavation prior to receiving limits analytical because soil in the area was deemed < CCME. Will start to recontour once trucks have shipped off the remaining AI3 soil in stockpile management area (SMA).

-Derick (Environment Canada representative) on site in the am. KN and MM took him on a tour of the site. He will return tommorrow for the weekly check in meeting at 9:00.

-Talked with DM to provide information for Travis (Project Manager for KH) in regards to MDZ excavation based on limits trench yesterday. Sent DM a cross section with estimated debris depths.

- Based on cross section calculations with an estimated depth of 3.25 m (averaged) and an estimated length of 60 meters (based on trenching for limit samples) and an average width of 5 m (to toe of upper and lower slope) I calculated the volume to be around 1,000 cubic meters for the excavation along the trail portion of the MDZ. No testpits were advanced in the toe of the upper or lower slope due to geotechnical concern. Therefore, this estimate does not include soil that may need to be excavated on the upper and lower slopes of the trail.

- Will need to advance testpits on the northern and southern portion of the trail to estimate true width of MDZ excavation. Will do this once we have a geotechicial person on-site.

Environmental Protection

-Met with Derick of EC. Gave tour and history of site. Provided information as requested. Showed him the marsh area excavation, lower excavation and historical clean up areas.

-Assessed access for any runoff and assessed placed waddles for any water movement.

-No onsite work. Soil moved from laydown area most of the day.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 3, 2015

Health & Safety

- SLR (Marci Martin, Kalina Noel) and King Hoe attended H&S meeting directed by Mark (King Hoe).
- Jessie (labourer/maruka operator).
- Traffic control on-site - Skylar
- Derick Poirier on-site at 9:00 am offsite at 15:00

-All site personnel signed H&S meeting and also site orientation form.

- Offsite at 16:30 for SLR and KH

Daily Activities

- SLR observed and KH recontouring in AI3. KN was in conversation with Jen Clarke about the geotech expectations. Finished AI3 area with a 2:1 slope. Constructed minor terraces along slope. Recountoured trail leading down to AI3 up to the trail junction. Removed wattles from the ditch.
- At 11:00 had our weekly meeting lead by Travis and Patrick of KH. In attendance: Marci Martin and Kalina Noel (SLR field staff), Dave Mckeown (SLR PM), Derick Poirier (EC representative) and Jen Clarke (Clarke Geotechnical)

-After contouring brought coco-mat down to AI3 excavation area. KN noticed that the coco-mat had a plastic outer mesh and was concerned about its ability to biodegrade. Held off on putting out coco-mat. See EM notes for details.

-Updated sample tracking sheet as was informed from Maxxam that sample collected at AI3-F1 and AI3-DUP1 lost methonol in transport therefore couldn't run BETX/F1 analysis. MM talked with DM and we decided to run BETX/F1 from soil jar sample (will have disclaimer on lab report) and cancelled BETX/F1 analysis for AI3-DUP1.

Environmental Protection

-EM present during recontouring work at excavation #3.

-Monitored and consulted with KHE on recontouring work for comparable slopes with the surrounding area, geotechnically approved slopes with consultation of Clarke Geoscience, removal of any remaining debris, avoidance of wildlife tree and other vegetation, and replacement of a previously removed juniper shrub.

-Provided EC representative with any information requested while onsite.

-Noted use of one morooka to bring down coconut/straw erosion control blanket.

-Assessed first roll of erosion control blanket placed onsite. Noted immediately that the netting holding the coconut fibres and straw material was plastic. Looked at both sides of blanket and consulted the instructions accompanying the roll. No information was present so the Nilex website was consulted for the product number provided by the label.

-Due to very little information on the specs for the product on the composition and breakdown of the plastic netting, Nilex was called directly for more information. No answer. Left message.

-Consulted with PM and KHE on concern. EC representative onsite was also concerned about the plastic netting and absence of information on the netting.

-Nilex website was consulted again and it was determined that the product was photodegradable and biodegradable. A fully biodegradable product was also available. As the site is very dry and there is minimal sunlight in the area of excavation #3, concern about the breakdown of the netting remained. Nilex in Edmonton was then called for more information. The representative there did not have any spec information on the time of breakdown of the plastic netting.

-EC representative contacted EC and CWS for their concerns. Timing of degredation and possible chemical release into the marsh were brought up as primary concerns.

-KHE was contacted to see if it would be possible to replace the current blanket with the biodegradable version from Nilex.

(Daily Report Wilmer Marsh - Feb 3, 2015 continued)

-SLR was contacted later by Nilex about the product. They did not know how this product would degrade on a shady, very dry area. Will contact next day with any additional information.

The PM was consulted during all discussions as was Clarke Geoscience and KHE. PM contacted PWGSC to discuss course of action and to have direction put forth to KHE for potential replacement of the erosion control blanket. PWGSC requested KHE to provide estimate and timeline for replacement of blankets to a fully biodegradable product.

-SLR requested that KHE bring up the unopened rolls and collect the opened roll to be brought back to top of site.

-It is proposed that the recontoured excavation site be monitored for any sediment erosion until the replacement erosion control blanket is brought to site. Existing erosion control blanket material could be placed as a temporary measure to control erosion during anticipated wet weather until replacement material is available.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 4, 2015
No Activity - Stand By Day

Daily Report Wilmer Marsh - Feb 5, 2015

Health & Safety

- SLR (Kalina Noel) and King Hoe attended H&S meeting directed by Mark (King Hoe).
- Jessie (labourer/maruka operator).
- Traffic control on-site - Skylar

-All site personnel signed H&S meeting and also site orientation form.

- Offsite at 10:15 am for SLR and KH

Daily Activities

-Onsite with KHE to install temporary erosion control blankets in area of impact #3 and slope where larger debris was removed by spyder hoe.

Environmental Protection

-Onsite to direct placement of temporary erosion control blankets. Blankets temporary due to upcoming inclement weather and that they will be replaced with more suitable biodegradable product.

-Ensured blankets overlapped, staked in, and following contours of terrain. Where possible, small shrubs were allowed through the blanket.

-Blankets placed at area of impact #3.

-Blankets also laid down in areas along lower slope where spyder hoe removed larger debris. These areas were noted to be exposed and may potentially erode during rainfall periods. These blankets were loosely laid as they may need to be moved during excavation acitivities on Saturday.

-Observed trail for signs of erosion from surface water flow. Some channels observed but not large in size and not posing a risk.

-Assessed area of lower slope during erosion blanket installation. Noted debris throughout the area and into slope.

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 6, 2015
Health & Safety
-No site activities.

Daily Activities
-No site activities.

Environmental Protection

-No site activities.

Sustainability
-No site activities.

Daily Report Wilmer Marsh - Feb 7, 2015

Health & Safety

- SLR (Kalina Noel, Corrine Couture, Mathew Coady), Jenn Clarke (Clarke Geosciences) and King Hoe attended H&S meeting directed by Mark (King Hoe).

-All site personnel signed H&S meeting and also site orientation form. Corinne completed full orientation.

Daily Activities

- SLR and KH observed recontouring trail with bull-dozer first thing in the morning, following a review of trail conditions. Deep runnels were observed in the trail due to the rapid thaw event and precipitation.

- KH began MDZ excavation starting at the eastern perimeter of the MDZ boundary. Presently, the east wall of the MDZ excavation is 3.0 m west of test-pit location MDZ-WA.

- The excavator removed soils from the southern perimeter down to 3.0 to 4.0 mbgs. It was noted by SLR and Jenn Clarke that small bits of metal debris were still present in the base of the excavation and the east wall. It was decided that given the ever growing dimensions of the excavation and the amount of recontouring required to improve slope stability, that present dimensions of the excavation are appropriate.

-SLR and Jenn Clarke suggested installing waddles along the upper and middle portions of the trail. Three waddles, installed running north and south, were installed upgradient, at, and downgradient the wildlife trees along the trail.

- **108** Marooka loads of soil and minor quantities of soil were carried to the soil management area. The soil management area is quickly reaching capacity.

Environmental Protection

-Assessed condition of trail with Clarke Geoscience for previous days erosion and potential for blading.

-Discussed blading with KHE to remove top saturated soil down to dry. In cases where still ice present, continue to blade down. All material moved to south side of road to keep any seeds from trail away from native vegetation.

-Due to snow melt previous day, all flagging delineating native vegetation exclusion zone and badger burrow had fallen over. Re-established flagging and added additional flagging to highlight these areas.

-Present onsite as EM for excavation works. Provided information to EM taking over for the week.

-Noted that a large amount of sediment has accumulated on the matting present at the entrance to the site. Should remove and place in stockpile when possible.

-Worked with Clarke Geoscience on locations to establish wattles to reduce water access to open excavation overnight should precipitation occur.

Geotechnical - Clarke Geosciences.

- Inspected trail in morning after a rapid 24 hr period of rain and snow melt. Erosion gullies up to 6 inches deep were noted along the trail surface. ESC measures effectively controlled runoff and conveyed sediment-laden water onto the grassy slope below the trail and into the downslope gully. Blading of the upper 6-8 inches of the trail surface provided a relatively dry and stable running surface for the marookas. There was only an occassional need for winch assisted hauling.
- Recommended some additional grading along the trail downslope of MDZ prior to starting excavation.
- Monitored excavation of MDZ including delineation of downslope extents, and excavated slope grades
- Observed a stable 1H:1V completed slope along east and north boundary of current MDZ

-Temporary ESC measures installed along the trail including 3 wattles to detain runoff should it rain overnight.

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.

- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 8, 2015

Health & Safety

- SLR (Corrine Couture, Mathew Coady), Jenn Clarke (Clarke Geosciences) and King Hoe attended H&S meeting directed by Mark (King Hoe).

-All site personnel signed H&S meeting and also site orientation form.

Daily Activities

- SLR and Jenn Clarke observed recontouring trail with bull-dozer first thing in the morning, following a review of trail conditions. Minor grading was required in upper portions of the trail.
- KH began MDZ excavation at 08:10 am; starting at the eastern perimeter of the MDZ boundary. Debris was noted to be found 5.5 mbgs in the centre of the excavation. Following discussions with SLR PM, Jenn Clarke and SLR field staff, it was decided that chasing small - medium size debris to greater depths would lead to geotechnical challenges and would possibly prevent the excavation reaching its horizontal extents given volume issues. As such, it was decided to start tapering the angle of the floor of the excavation upwards as the excavation expanded to the west.

- The MDZ excavation was carried further east as part of regrading activities, and test pit location MDZ-WA was captured as part of debris-soils hauled to soil management area. The new eastern perimeter of the MDZ excavation is approximately 2.5 m east of test pit location MDZ-WA.

-With input from SLR and Jenn Clarke the banks of the excavation was regraded to reduce steepness. While relatviely minor amounts of material are located to the north of the trail in the MDZ area, there are large quantities of debris buried under the trail (to depths at and beyond 5.5 mbgs).

-Present dimensions of the excavation are 20 m (east west) by 14 m (north south) varying with depth, to a maximum depth located in the centre of the excavation at 5.5 m.

- **65** Marooka loads of soil and moderate-heavy quantities of debris (vehicles, general refuse, etc) were carried to the soil management area. Soils in the soil management area were piled higher with bull-dozer.

Environmental Protection

-Observed that a large amount of sediment has accumulated on the matting present at the entrance to the site. Mentioned to KHE, who removed it and placed in stockpile prior to commencing MDZ excavation.

-Reassessed condition of trail with Clarke Geoscience for previous days wear and tear, and potential to re-grade wet areas.

-Discussed re-blading with KHE to remove top saturated soil down to dry in areas where further ice melt/seep water had occured. In cases where it disabled travel, continue to blade down. All material moved to south side of road to keep any seeds from trail away from native vegetation.

-Re-checked flagging, and replaced flagging around exclusion areas that had fallen due to frost layer melting.

-Present onsite as EM for excavation works.

-Worked with Clarke Geoscience on locations to re-establish wattles to reduce water access to open excavation overnight should precipitation occur.

-Checked that KHE had covered stockpiles at end of day.

Geotechnical - Clarke Geoscience Ltd.

- monitored continued excavation of MDZ
- encountered deeper than expected debris to 5.5 m depth and decided to stop excavating deeper as it was determined infeasible, resulting in steeper than desired cutslopes. Deep area was backfilled using soil from adjacent side slopes to approx. 3.5 m. Compaction was achieved by machine track and bucket.
- excavation of MDZ has achieved stable east slope (1H:1V) and stable north slope (1H:1V) that blends with the natural slope above the trail.

(Daily Report Wilmer Marsh - Feb 8, 2015 continued)

- hauling with marooka was effective today, no winch-assist required and the trail remained in good condition with very little mud.
- 3 straw wattles were placed along the trail upon conclusion of work. Forecast is for flurries overnight.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 9, 2015

Health & Safety

- SLR (Krystal Ashworth, Corrine Couture, Mathew Coady), Jenn Clarke (Clarke Geosciences) and King Hoe attended H&S meeting directed by Mark (King Hoe).

-All site personnel signed H&S meeting and also site orientation form.

- Site orientation with Krystal Ashworth and King Hoe truck drivers at 7:50 am.

Daily Activities

- KH loaded two trucks, with both trucks maintaining two bins (B-train side dumps) with approximately 38 tonnes for each truck. As KH had yet to obtain approval to dispose of material from the MDZ at the Secure Energy Pembina facility in Drayton Valley, AB, the two trucks travelled as far at the Super 8 in Invermere, and waited for word that approval had been obtained from King Hoe.

- Approval to dispose obtained in afternoon on Feb 9th, 2015.

- Mark (KH) informed SLR staff in the mid afternoon that the trucks had to return to the site first thing tomorrow (Tuesday, 10th) to unload some material as the trucks were too heavy. It is assumed that the trucks travelled to a weigh scale (SLR to confirm with KH tomorrow).

- In addition to unloading material from the overloaded trucks, KH indicated that three additional trucks (completely empty) will be on site at 8 am for loading.

- KH began MDZ excavation at 09:35 am; beginning works in the central-east portion of the MDZ excavation. On the recommendation of Jenn Clarke, the excavator operator cut benches in the trail in 1 metre increments to access debris buried at depths greater than 2.5 metres in the present western wall of the MDZ excavation. Due to this method of excavating, new clean floor and wall areas were not created. As such, no confirmatory samples were collected.

- The present dimensions of the excavation are: 47 m east-west (longest axis), 13 m wide running north-south at the eastern extent of the excavation, 15 m wide running north-south at the centre of the excavation; and 9.5 m wide running north-south in the western limit of the excavation. Following regrading the excavation depths are as follows: up to 2 m in the eastern extents of the excavation, up to 3 m in the centre portion of the excavation, up to 2 m in the western extent of the excavation.

- **70** Marooka loads of soil and moderate-heavy quantities of debris (vehicles, general refuse, etc) were carried to the soil management area.

- At 14:00 the stockpile management area had reached capacity and additonal excavation ceased.

-At 14:30 test pit sampling was conducted at potential borrow site located at TP14 located to the north of wildlife trees along access trail. Two test pits were created: TP15-8 and TP15-9, both taken down to a depth of 3 m.

-At 15:30 test pit sampling was conducted at potential borrow site located north of the site, on the east side of Westside Road. Two test pits were created: TP15-10 and TP15-11, both taken down to a depth of 2 m.

Environmental Protection

-Trail was inspected in am and throughout day. Separation of mats was noted at entrance to site, and mentioned to KH, will adjust tomorrow am. KH also graded a small section of the upper Trail towards the matting to creat a dirt ramp as the Marookas were having a hard time getting onto the mats, which created a potential for spillage.

-Noted the truck covers weren't sealing on the drivers side, creating a dusting hazard on the road. SLR followed the trucks after they left site to assess blow-out hazard. No dust was noted blowing out of the B trains.

-Digging in MDZ zone approached vegetation exclusion zone, and debris continued into the downslope wall. 1-1.5 m of the top of the exclusion wall will most likely be lost when grading occurs. Discussed with KN, and though minimal amounts should be removed, it is understood that some will be lost to reduce erosion and risks of creating an island like appearance.

(Daily Report Wilmer Marsh - Feb 9, 2015 continued)

-Trees in vegetation exclusion zone have most likely been buried during garbage deposition, as made evident by branches emerging from soil at base. Discussed trying to maintain the location of the most downslope one, while possibly removing a small amount of soil to help achieve grading goals as long as it does not affect the badger digs nearby.

-SLR staff collected some surficial debris noticed in gully area that had been missed.

-Jen Clarke discussed the use of a spider-hoe for final grading / texturing, and for replacement of the ECB matting below/collection of surficial debris (in bags) that was handpicked by SLR in the gully.
-Checked potential material borrow area ~350m north of site for any active or recent wildlife or denning evidence - none was observed.
-Noted bulging of soil from SMA out of fences. Discussed with KH and will monitor closely in future.
Onsite borrow area had anthropogenic debris throughout though more concentrated near surface.
-Re-installed 2 wattles on MDZ trail area prior to leaving area.
-Walked with excavator north of site to potential borrow area. Pointed out possible den across the road, and ensured test pitting did not occur directly across from the potential den to minimize noise and disturbance.
-Monitored test pitting and potential dens in the offsite location during digs. KH filled in test pits after SLR sampled and Clarke Geoscience had inspected. KH then smoothed out road where excavator tracks had caused some pitting.

Geotechnical - Clarke Geoscience Ltd.

- trail conditions good, no need for grading today
- discussed excavation plan with KH this morning and formulated plan to excavate in 1-2 m lifts along section to allow adaptation to ground conditions and to facilitate machine access.
- excavation of MDZ continued westward towards the wildlife trees. Observed that there is approx. 2 m debris over native silts within 6 m of tree so there is a concern about proximity. It is likely that debris is contained within a very steeply slope buried gully between the trees and the adjacent slope. Feasibility of excavating to 4 m depth in this area was discussed.
- 47 m of MDZ is now exposed and partly benched to a max depth of approx. 3 m. Work will continue along trail and then excavator will return to remove debris from benched areas.
- identified two potential fill material borrow areas. One on site adjacent to trail and one along the Westside Road north of the project site. Observed test pitting at both locations.

Sustainability

- Carpooling to site and back.
- Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 10, 2015

Health & Safety

- SLR (Krystal Ashworth, Corinne Couture, Mathew Coady), Jen Clarke (Clarke Geosciences) and King Hoe attended H&S meeting directed by Mark (King Hoe).

-All site personnel signed H&S meeting and also site orientation form.

Daily Activities

- Approval to dispose soil/debris at the Secure Energy disposal facility on Feb 9th, 2015.
- Day commenced with the unloading of a few tonnes of MDZ material from both trucks (side dumps) loaded on Feb 9th, 2015 (trucks were overweight). Link Belt 160 also loaded three empty trucks (two side dumps, and one truck and pup).
- Following the loading of trucks, KH began modifying the capacity of the stockpile management area (SMA). Modifications involved installing sediment control fencing along the wildlife fencing that surrounds the eastern extent of the staging area; and relocating rental fences closer to the perimeter of the road and laying down additional liner (poly) up to the edge of the road. Once the marsh debris was removed from the north side of the SMA, KH then began pushing MDZ material further north to increase capacity of SMA for receiving MDZ material.

- All field staff attended teleconference call

-Helmer dump truck was loaded with marsh debris from staging area. The truck then travelled to the Invermere landfill for disposal of materials.

- No MDZ excavation activities were conducted.
- Braun Geotechnical toured the site with SLR field staff, KH and Clarke Geoscience to discuss a number of possible remediation scenarios. Topics discussed (to be drafted in a technical memo by Braun) include:

• Present slope stability (Braun suggested there are no geotechnical issues at present, though sediment and erosion control measures would obviously need to be in place if things were left as is;
• Final grading thresholds (max 2:1);
• Best means of approaching excavation if we do/don't decide to access debris in eastern region of MDZ;
• Potential fill requirements, and appropriateness of fill sources;
• Appropriate indicator fabric to lay down if we are going to backfill, and possibly come back.

- SLR hand picked small debris in valley bottom and packed material in durable garbage bags.
- Obtained GPS data to attempt to generate 3D models of a number of scenarios to estimate volumes of soil + debris pulled out of MDZ, and estimate volumes of backfill.
- The present dimensions (last changed Feb 9th, 2015) of the excavation are: 47 m east-west (longest axis), 13 m wide running north-south at the eastern extent of the excavation, 15 m wide running north-south at the center of the excavation; and 9.5 m wide running north-south in the western limit of the excavation. Following regarding the excavation depths are as follows: up to 2 m in the eastern extents of the excavation, up to 3 m in the center portion of the excavation, up to 2 m in the western extent of the excavation.

- As per discussions with SLR PMs, it has been suggested that we should advance the excavation to the horizontal and vertical extents proposed in the original remedial specification. Once this is done, we can then determine available resources for expanding the excavation, etc.

Environmental Protection

- site inspected for erosion and sediment evidence during previous nights precipitation; none noted.

- mats at top of site still noted as separating, will remind KHE about it prior to work commencing on Feb 11, and ask that they be pushed together to prevent blow out.

- minimal overspill noted at start of day into NWA at top of site.

- some material spilled over trucks as they were being loaded. KHE scooped up debris and tossed back into stockpile management area.

(Daily Report Wilmer Marsh - Feb 10, 2015 continued)

- Clarke Geoscience and SLR discussed interm and final ESC plans, and discussed potential for coco mat wattles in lower valley to act as check dams to slow flow of water to prevent silty water from making it to marsh during potential upcoming weather. It was deternmined that coco matting used rolled up into wattles could be left in place (bio-degradeable) and would potentially take seed well. Erosion has not increased since melt, but if there is more snow, and a further quick melt, there is potential for this to be a concern. Silt fencing was also discussed, however it would have to be removed at the end of the contract (causing more disturbance), would plug easily (increasing risk of blowout) and would require ongoing maintenance. Woody debris could also be used along with coco mat wattles or on its own to help reduce the erosion.
- SLR and Clarke Geoscience picked small debris in gully and on slopes during down times.
- Poly liner was placed under where marsh debris was after it was removed, and along western edge of SMA to increase soil holding potential.

- engine block fell onto fence while KHE was adjusting SMA, and broke ~3 fenceposts. KHE replaced fenceposts.

- flagged potential den site across from potential borrow location ~350 N of site. Will ask KN advice on how to deal with excavation / den conflicts (how to minimize noise disturbance etc.)
- soil started bulging into newly installed sediment fenced area between SMA and NWA fenceline. Discussed hazards of contaminated water entering upper site from SMA if this is not removed ASAP. KHE scooped some of the debris/dirt away prior to darkness falling, and will deal with it on Feb 11. Also had KHE cover SMA over NWA fenceline to reduce potential of precipitation from entering into SMA soils, potentially seeping through sediment fencing into NWA.
-liner in SMA on west side, nearest the road to be folded up to create a more contained soil area. Ran out of light prior to completing this task this evening.

Geotechnical - Clarke Geoscience Ltd.

- no excavation activities were conducted within the MDZ today. Current excavation and exposed slopes are stable in current condition. Unprotected exposed soil surfaces remain vulnerable to surface erosion. However, there is no rain in forecast.

- met with Stewart Hrysio, Braun Geotechnical Ltd. to discuss excavation approaches and backfill requirements.

- discussion included feasibility of excavating deeper to 5.5+ m in MDZ to remove additional debris. BG indicated that excavated slopes could be oversteepended to slightly steeper than 1H:1V but that it would be beneficial in the long term to back fill to 2H:1V, or flatter.
- KHE inquired about possibility of regrading the slope between the two trails (below the MDZ) and although beneficial to restore to natural grade, this needs to be discussed with Environmental Monitor.
- Backfill will be required where excavation is deep and where slopes are oversteepened. This could include backfilling only select areas, or could be applied across the entire length of trail.
- Reviewed backfill source along the road with BG. Estimated that there is 1000-1500 m3 of backfill available in this location.
- Surveyed transects completed post-excavation would be benefitial to estimate required backfill volumes.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 11, 2015

Health and Safety

- SLR/Clarke Geoscience/KMZ/PWGSC completed daily H&S overview with KH

-Clarke Geoscience subcontractor/partner (Vast Resource Solutions) given site orientation by KH.

Topics discussed:

- Ensure we work in pairs when walking / working around site (eg. in lower valley gathering small debris).
- Wear cut proof gloves and appropriate PPE when handling small debris, and assembling small pieces of woody debris (as part of restoration activities).
- Don't become complacent around heavy machinery, and keep lines of communication open between you and operators.
- Keep respirators on person as dust conditions vary depending on weather conditions and remedial activities.

Daily Activities

- Day commenced with the loading of two empty trucks (end dump, and one truck and pup).
- Link Belt 160 scraped down swamp mats and tidied up the upper staging area.
- Link Belt 160 continued with the plan of cutting lifts (presently 2m lifts) in the western extent of MDZ excavation. **29** marooka loads were transported to the SMA.
- A single marooka was used, which accesses the north end of the SMA via Westside Rd. The tracks of the marooka were monitored to ensure potentially contaminated soils weren't tracked onto roadway. At 12:30 the morooka ceased to carry MDZ material to north side of SMA, and started depositing debris in southern region of SMA due to moderate roughing of Westside Rd. road surface.
- Excavation of MDZ continued until 12:30 pm; after which it tracked back to upper staging area.
- Mapped polygons of disturbance areas requiring restoration to confirm surface area estimates for KH.

-Clarke Geoscience/Vast Resource Solutions reviewed activities completed to date, present challenges and the evolving end vision for the site.

- SLR hand picked small debris in valley bottom and packed material in durable garbage bags and gathered woody debris and assembled wood in the vicinity of coco matting.

- KH went to Invermere landfill to remove canvas sacks from the marsh debris.

- KH staff began shifting material around in SMA to make way for additional MDZ material.

- KH informed SLR staff the material in the trucks was freezing into a solid mass by the time it reached the Secure Energy facility. To address this, KH proposed lining the beds of the dump truck bins with poly.

Environmental Protection

-inspected trail in morning, was in good shape, slightly soft near the mat area. Recommended the mats be scraped prior to marookas travelling onto Westside road to help prevent potentially contaminated soil from being tracked onto the road, which KHE did after loading trucks.

- SLR and KHE discussed light loading the marookas during the trips along Westside Road to ensure the potential for spills is reduced.
- additional poly liner was suggested to be installed to overlap with liner on ground, and up edges of fencing on both the NWA and Westside road sides of the SMA. Portions were installed along the NWA border and remainder added on Westside Road portion of SMA later in afternoon after excavation was finished and after removing bags from debris at landfill. Liner was secured to the fencing with zapstraps and wire.
- Noted some embedded debris in the slope downslope of the wildlife tree. Discussed iwith Clarke Geoscience, SLR, and PWGSC; it will be removed as it is confirmed to be on Federal land. Excavator will have to sit on the trail and reach down to grab it.
- KHE repaired road from Marooka tracks using a shovel. They then tracked back and forth over it with a truck to pack the roadbase down more.
- Noted that the excavator was just touching the ends of a few of the tree branches. Asked KH if they could swing the bucket towards the hill when near the tree to avoid potential damage to the branches.

(Daily Report Wilmer Marsh - Feb 11, 2015 continued)

- Asked KHE to arrange outhouse servicing in the near future.
- Discussed final 'vision' of site with PWGSC, and mentioned using coco matting to make wattles to install in strategic locations during grading, which could be left in place as it would biodegrade.
- reinstalled 1 wattle at top of MDZ at end of day to help minimize potential erosion if precipitation were to occur during the night.
- covered stockpiles completely prior to leaving site at end of day.

Geotechnical

- no observed erosion concerns along trail and MDZ
- monitored continuing excavation of MDZ along western side, slower progress today due to use of one marooka.
- oriented GM Alternate (Evan) to site and introduced project personnel on site.
- discussed excavation objectives and backfill needs. Backfill volume estimates will depend on final excavation but agreed that backfill will be required in MDZ to attain objective 2H:1V graded slopes.
- discussed restoration approaches including surface water management and erosion and sediment control and inquired about the potential to use angular/sub-angular rock armour along cross-ditches for erosion control.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 12, 2015

Health and Safety

- SLR/Vast Resource (Clarke Geoscience Sub)/KMZ completed daily H&S overview with KH
- Person with dogs was observed walking across site (accessed from marsh area). Directed person off site, and indicated the site is off limits to foot traffic.
- King Hoe has placed a request to service the outhouse.
- SLR and Vast staff utilized respirators when working in excavation today.

Daily Activities

- Link Belt 160 back in excavation cutting lifts in the western extent of the MDZ excavation. Excavation is now approaching a region of the trail that is adjacent to living tree to the east of wildlife tree. Large metal debris is still being encountered, presently to a 2.0 mbgs depth.
- A Max Helmer truck was loaded at 8:25 am (truck and pony). Truck was partially loaded (front bin first) and returned later to have pony filled once issue with pony door was fixed. Four additional trucks accessed site to be loaded. All trucks had their bins loaded with poly sheets to prevent material from sticking to bins.
- Transport truck carrying new coco matting arrived. Three pallets of the new product were unloaded, and two pallets of Nilex coco matting were reloaded back onto truck for transport back to seller.
- LB 160 tracked back down to MDZ excavation to continue excavating. Work was observed by SLR field staff and Vast Resources. SLR monitored marooka loads and ensured material was being properly placed in SMA.

- Link Belt 160 continued with the plan of cutting lifts (presently 2m lifts) in the western extent of MDZ excavation. **50** marooka loads were transported to the SMA.

- KH field staff shifted material around in SMA throughout the course of the day to make room for ongoing MDZ excavating, and to reduce the amount of material bordering wildlife fencing on the east side of the SMA.

- Truckers returned their slips from the first trip to the Secure Energy facility in AB. However, some manifests - weigh bills appear to be missing. KH will be resolving this issue first thing in the morning.

Environmental Protection

- Inspected mats and trail at start of day, no scraping required, in good shape.
- began removing top ~2m from MDZ heading west upslope, nearing the most downslope tree, SLR closely observed the excavation for tree roots, no substantial roots encountered.
- SLR field staff discussed borrow area, and then den across the road with KN (SLR lead biologist). It is suspected that the den is a maternal fox den and that it is most likely vacant until spring. No new animal sign was noted in the den/vicinity of the den. KN suggested taping cell phone to a pole and recording while inserting the pole into the den prior to borrow site being excavated.
    - also discussed with KN the discussion about knocking the vegetation between the 2 road sections further east down the trail (between most east section of MDZ and Area 3).
- New coco mat arrived and was inspected to ensure it was biodegradable material. Spec sheet was photographed and sent to Jen Clarke, and Kalina Noel to confirm it was the correct product.
- SLR noted some small grease drips (from greasing the machines at the end of the day) had ended up on the soil in the machine thoroughfare of the SMA. SLR scooped it up to ensure it wouldn't be tracked onto road or trail areas, or caught on employees boots.
- Began MDZ excavation and continued advancing back at 2mbg. SLR continued to monitor closely for tree roots and vegetation exclusion zone breaches.
- EK and CC discussed the need to knock in the wedge-wall of the vegetation exclusion zone in the near future. Some soil was noted collapsing in this area throughout the excavation. SLR removed the delineation flags from the affected section in preparation of soil removal.
- stopped to load trucks and trailers with stockpiled soil and then returned to excavation in the MDZ. Again SLR closely monitored the excavation for potential tree roots and debris. Debris mostly consisted of vehicles and some glass bottles.
- Minimal small roots encountered, and none noted as damaged.

(Daily Report Wilmer Marsh - Feb 12, 2015 continued)

- re-installed top wattle in case any precipitation occurs over the evening.
- KHE hand scooped soil that had overtopped the sediment fencing into the NWA site back into the stockpile and away from sediment fencing at that edge.
- SLR observed KHE cover stockpiles in poly prior to leaving the site for the evening.

Geotechnical

-inspected access route to MDZ prior to excavator and marooka moving to site in the morning
-discussed excavation plan with KH prior to starting in the morning. Plan was to continue the +/- 2 metre lift and shift the trail center line slighly towards the north away from the two trees to avoid potential root damage. Excavation ended north of eastern tree.

-all cutslopes were excavated to less than 1H:1V except for upper (1.0 m) elevations of the cut along the wedge-wall which was >1H:1V. Small clumps of soil (<0.3m wide, <0.3m high, <0.1m deep) collapsed and mobilized less than 1m vertical to more gentle slopes and broke apart. This <5 m long cut was left at this angle until the next excavation lift occurs. This is not a safety concern for the excavator but caution to anyone walking above this cut.

-Discussed the need to potentially remove some of the upper elevation of the wedge wall in the veg exclusion zone. Will know once excavation occurs on the next lift. Excavation cut slope angle will determine how much material should be removed.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 13, 2015

Health and Safety

- SLR/Vast Resource (Clarke Geoscience Sub)/KMZ completed daily H&S overview with KH
- SLR and Vast staff utilized respirators when working in excavation today; dusty conditions.

Daily Activities

- Link Belt 160 back in excavation cutting lifts in the western extent of the MDZ excavation. Supervised by SLR field staff and Vast Resource. Excavation has extended beyond the region of the trail that is adjacent to living tree to the east of wildlife tree. Large metal debris is still being encountered, presently to approximately 4.0 mbgs depth.

- Link Belt 160 continued with the plan of cutting lifts (presently 2m lifts) in the western extent of MDZ excavation. Work continued operating until 15:30 pm. **67** marooka loads were transported to the SMA.

- KH field staff shifted material around in SMA throughout the course of the day to make room for ongoing MDZ excavating, and to reduce the amount of material bordering wildlife fencing on the east side of the SMA.

- Walked the entire MDZ excavation and collected approximately 60 points that can be used to depict 3D representation of excavation and for estimating volume of backfill for multiple scenarios.

Environmental Protection

- Inspected mats and trail at start of day, no scraping required, in good shape.

- Noted that wattle had been disturbed (stakes removed), and appeared to have been done by a human overnight.
- began removing top ~2m from MDZ heading west upslope, nearing the most downslope tree, SLR closely observed the excavation for tree roots, no substantial roots encountered.
- North edge of excavation, against slope may be to native, Vast Resources reviewed.
- An engine block with its transmission full of oil, was pulled carefully out of the excavation, ~7m NW of most upslope live tree, and ~2.5mbg. It was placed aside carefully by KHE, brought up to the top of the site and placed on poly near another engine block.
- excavation was stopped discuss further works and plan. Running out of room up top for impacted soil storage. 5 Trucks should arrive to be loaded around noon Saturday.

- Outhouse was serviced. SLR checked at end of day, and human excrement had been spilled all over floor during servicing, and not cleaned up. KHE was notified, and tried to get ahold of Invermere Rentals, but no answer.

- upper excavation was sloped for overnight safety.

-SLR, Vast, and KHE measured out excavation, drew it up, and took coordinates of upper, middle and lower perimeters of excavation to project fill volumes.

- re-installed uppermost wattle incase precipitation occurs overnight.

- KHE covered stockpiles for the evening.

Geotechnical

-inspected access route to MDZ prior to excavator and marooka moving to site in the morning. No overnight instability or erosion occurred.
-discussed excavation plan with KH prior to starting in the morning. Plan was to continue the +/- 2 metre lift and continue to western extent of MDZ. Started exposing native soil on north and south sides of excavation. Native slope appears to be at approximately 1H:1V slope, sloping towards the south from the north side and towards the north away from the wildlife trees, creating a gully feature. Additional excavation will be required to determine extent of native soil.
-all cutslopes were excavated to less than 1H:1V and were stable.
-excavation around the two wildlife trees exposed no roots. Slopes remained stable after excavation and left at less than 1H:1V.

(Daily Report Wilmer Marsh - Feb 13, 2015 continued)

-Discussed what the finished backfill grade could potentially look like. Natural gully features exist adjancent to the work zone, which drain to the larger gully below. Based on the observed excavation to date, the MDZ appears to be a gully prior to all the debris being dumped in this area. Will require direction on what the final grade should look like, which will determine how much backfill is required.

-discussed erosion and water management strategies if the MDZ was mitigated back to what appears to be a gully. The use of bioswales, sediment catch basins and/or cobble filled soakaways, and coarse wood debris to slow the velocity and reduce the concentration of surface runnoff could be implemented if required within the gully.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 14, 2015

Health and Safety

- SLR/Vast Resource (Clarke Geoscience Sub)/KMZ completed daily H&S overview with KH
- Minor quantities of precipitation fell; but made some surfaces slippery.
- Dust concentrations in air quite high, so respirators were worn entire day.

Daily Activities

- Link Belt 160 back in excavation cutting lifts in the western extent of the MDZ excavation. Supervised by SLR field staff and Vast Resources. Excavating activties were restricted to cutting second lift in trail area approx. 5 m of living trees back to the western extent of the MDZ. A large quantity of metal debris (primarily vehicle parts) were pulled from the south perimeter of the MDZ, immediately adjacent to the living trees. Due to the quantity of material adjacent to the trees, cutting the remaining lift did not occur.
- **58** marookas loads were carried to MDZ. Loads had high metal content.
-To ensure bank stability around the trees KH packed fill from trail against the south wall. This was supervised by SLR EM and Vast.
- KH field staff shifted material around in SMA throughout the course of the day to make room for ongoing MDZ excavating.
- **6** trucks were loaded with material from SMA for disposal.
- Walked the MDZ and collected an additional 30 points for 3D model purposes.

Environmental Protection

- Inspected mats and trail at start of day, no scraping required, in good shape; approach to mats from SMA may need some fill and compaction in the future.
- Coyote was observed crossing marsh on ice during morning trail inspection.
- SLR took some GPS points of the natural erosion rill in the vegetation management zone, as it might be a useful feature if armouring with cobble (or potentially a pole drain out of coco matting) is endorsed by CWS/PWGSC.
- slight drizzle occurred in morning, not significant amounts, however it made the staging area slippery.
- Daylighted some small roots near the live trees in morning; SLR and EK of Vast (an RPF) inspected. Debris was thick in the area, and SLR PMs were sent photos. Discussion occurred, and debris was carefully picked at in the vicinity.
- consolidated debris pile late morning, stopped MDZ excavation.
- Early afternoon - cleanup of debris pile, pulled from base of tree area in MDZ, occurred, and was mostly taken to SMA.
- Vast recommended for optic reasons, to backfill almost vertical wall near base of trees, with a buttress or slope with soil until decisions are made regarding additional soil volumes/backfilling etc. KHE completed the backfill, compaction and final grading for the day in early afternoon.
- SLR EM looked at marsh area for sedimentation from the marsh works. Water that has collected where spyderho travelled has settled and cleared.
- 6 trucks were loaded with SMA debris/soils. Some spill over occurred while KHE was loading, however they cleaned it up as soon as possible.
-SLR measured out upper MDZ excavation, drew it up, and took coordinates of upper, middle and lower perimeters of excavation for future CAD requirements.
- re-installed uppermost wattle in case precipitation occurs overnight.
- KHE covered stockpiles for the evening. SLR noted that the sediment fencing is bulging again along the NWA.

(Daily Report Wilmer Marsh - Feb 14, 2015 continued)

Geotechnical

-inspected access route to MDZ prior to excavator and marooka moving to site in the morning. No overnight instability or erosion occurred.

-discussed excavation plan with ML prior to starting in the morning. Plan was to continue the +/- 2 metre lift and continue to western extent of MDZ. Exposed native soil within 5m (horizontal) of western extent of MDZ at 1-2m depth. Native soil was exposed closer to surface at the western extent.

-excavation around the two wildlife trees exposed cut slopes >1H:1V. Slopes were stable until backfilled and resloped to approximately 2H:1V. All other slopes remained stable after excavation and left at less than 1H:1V.

-walked around MDZ conducting hand dug test pits looking for native soil to better understand what the native terrain looked like prior to being backfilled with debris and soil. Best estimate at this point is still a gully feature flowing towards the larger main gully to the south. Exact depth of the bottom of the gully is unknown and will require additional machine dug test pits.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 15, 2015

Health and Safety

- SLR/Vast Resource (Clarke Geoscience Sub)/KMZ completed daily H&S overview with KH

Topics discussed:

- When working around TPs, stay well clear of walls due to cave in potential.
- Large metal debris is frequently removed from excavation and temporarily stored on excavation floor. When walking floor stay well clear of material due to many sharp edges.
- Dust concentrations in air VERY high today, so respirators were worn entire day.

Daily Activities

- Link Belt 160 back in excavation cutting remaining portion of second lift in the western extent of the MDZ excavation. Lift was finished being cut at 12:45. Supervised by SLR field staff and Vast Resource.
- **46** marookas loads were carried to SMA.

- **11** test pits (Debris Test Pits, DTP-A to DTP-K) were created throughout the MDZ, concentrated in the eastern portion of the MDZ. TPs were advanced to native silts when possible. Depths (from floor - walls of present excavation) of debris were greatest in eastern extent (DTP-D @ >3.75 m) and central portion (DTP-H @ 5.0 m).
- Based on debris test pits and general topography of land, Vast Resources and SLR field staff walked an estimated debris-fill boundary. It is hoped that this boundary can be overlaid on top of the 3D excavation plan created by SLR.
- Debris is primarily comprised of vehicles, and appliances.

Environmental Protection

- Inspected mats and trail at start of day, no scraping required, in good shape.

- Started removing piled debris in the trail area left from prior days works; also started compacting and cutting next lift .
- removed debris from remaining hump east of most downslope live tree. Some minor roots daylighted. KHE backfilled and compacted for stability using trail dirt.
- Marooka ran out of diesel; KHE placed sorbent pads all around the fill spout and underneath the marooka, and carefully refilled the tank with enough to get the marooka to the top of the SMA. Finished filling it after some troubleshooting at the SMA.
- 12:45 stopped digging debris / loading marooka, and started test pitting to find debris bottom. Vegetation exclusion zone had small amount near eastern boundary knocked down for safety reasons.

- shots heard from 13:15 to end of day, sounded like they originated north of site. As all SLR/KHE/Vast staff were downslope testpitting, SLR texted the flagger on road to ensure she wasn't feeling threatened and was safe.

- Jessie (KHE) removed ECB's in AI#3 while the rest testpitted. SLR EM recommended leaving new ECB's / seeding off until Kalina N. could be present. Checked weather and no precipitation was expected according to Weather (Gov. Canada) for >3days. Erosion / sediment risk to marsh appears minimal.
- SLR EM inspected AI#3 after mats were removed for E / S during melt. 1 small rill noted near eastern boundary, which appeared to originate from TP9.
- Finished testpitting at 16:30 - debris in lower MDZ goes to extent of excavators capabilities, and into north slope beyond Vast's comfort for stability.

- KHE covered stockpiles for the evening.

Geotechnical

-inspected access route to MDZ prior to excavator and marooka moving to site in the morning. No overnight instability or erosion occurred.

-observed the excavation of the final 2m lift, no stability concerns, all excavated cut slopes were left at less than 1H:1V slope.

(Daily Report Wilmer Marsh - Feb 15, 2015 continued)

-Test pitting was conducted in MDZ, especially along eastern side. Test pit depths ranged from 1 m to 5 m depth until native soil was observed. It is inferred at this point based on the depth to native soil and the surrounding adjacent terrain that a gully feature is/was the natural topography. Overlaying the new potential horizontal extents of the MDZ onto the existing topographic information, in addition to the depth to native soil noted during test pitting, will assist in the visualization of the potential final product. All test pits were backfilled and compacted with the excavator bucket in 0.5m lifts.

-Based on the test pits, the northern excavation area of the MDZ has debris at depths greater than 1.5m from the existing surface. Removal of this debris will require higher cutslopes on the north side in order to have a finished grade of 1H:1V.

-Had a discussion with KH regarding how to get this additional material. Two excavators may be required, one lower to bail material to higher excavator which would load the marooka. Getting the Marooka down to the lower excavation would be difficult based on the grade of the native soil exposed during test pitting and the depth of debris to be removed.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 16, 2015

Health and Safety

- Moving woody debris onto cocomatting using proper lifting technique, wearing proper gloves and glasses. Slips and trips on cocomatting due to outer mess.

- Large metal debris is frequently removed from excavation and temporarily stored on excavation floor. When walking floor stay well clear of material sue to many sharp edges.
- Dust concentrations in air high in truck loading area when shipping material. Wear respirators or stay clear of the area. Use caution when around trucks. Make eye contact and do not walk behind trucks or near trucks when loading.

Daily Activities

-Collected BETX/F1 samples in AI3 from walls and base of excavation footprint. Took GPS coordinates and KA will drop samples at Cranbrook Greyhound through Maxxam on 5 day TAT.
- Placed new coco-mat and wood debris on AI3 excavation and along trail leading to AI3. Prior to cocomatting, seed was broadcasted over area.
- Shipped off Class B soil from MDZ SMA area. Soil will be dropped off to Secure Energy tomorrow.
- Sent Jennifer Cooper Mat Coady's testpit information and potential fill area prepared by MC and Evan (geotech) on Feb 15
- Drop samples off at Greyhound in Radium.

Environmental Protection

-Assessed site following night of below zero temperature. Trail solid but slightly soft in areas of previous days test pits.
-Monitored and guided installation of erosion control matting in AI3 area. Keyed in top of matting except for a portion where ground was too frozen. Will complete later in week.
-Guided and aided in installation of woody debris over erosion control matting as stabilizers, guiding water and to allow for sediment and seed catchments.
-Assessed seed mix and guided hand-broadcasting of seed over area of AI3 under matting.
-Assesed marsh area and trail following a week of warmer, sunny weather for settling out of sediment and ice. Areas where spider hoe broke through ice have settled.
-Assesed gully for recovery following debris removal. Observed two additional historical bagder burrows in area of previously identified burrow. Flagged and a UTM coordinate was collected for mapping.
-Spoke with KHE excavator operator for future vision of recontouring.

Geotechnical

No Geotech onsite today. Did not dig soil from MDZ today due to the SMA area being full.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 17, 2015

Health and Safety Topics

- SLR/KMZ completed daily H&S overview with KH

-Mark Land conducted Tool Box tailgate meeting about proper use of power tools.

- Did not work arround excavator or heavy equipment today.
- Used care and attention when walking down steep slopes with easily erodible soil. Walk a safe distance from the top of cliff.

Daily Activities

- Provided additional information to complete soil volume estimate based on 3D Cadd drawing. Total volume estimated of debris remaining is 2,750 cubic meters. Will excavate out 1200 tonne in total according to KH and PWGSC excavation plan based on contractor budget remaining. MDZ excavation to commence on Feb 21 once SMA is free of soil.
- One truck was out of service in the morning so didn't ship soil until afternoon. Waited to load two truck in the afternoon. Mark Land called truck drivers at 14:45 and shipping got postponed until tomorrow Morning. SLR offsite at 15:00.

- Participated in weekly project meeting with PWGSC, EC, KH, SLR, Clarke/Vast (GMs). Discussed excavation plan in MDZ going forward. Will take out 1200 tonnes more material then recontour and backfill where needed.

Environmental Protection

-Assessed silt fencing along fenceline where debris and sediment stored. Noted additional sediment on NWA side of fencing. Discussed clean up with KHE once sediment thawed and easier to remove.

-Walked down to marsh with Field Supervisor to show state of marsh and trail to date. Noted additional sediment loss from slopes along trail. Not related to any work in area, but likely a result of rapid snow melt.

-Discussed amount of erosion control blanket available onsite with respect to needed amount for recontouring. Determined enough present onsite to complete work.

-Assessed curent status of previous gully work (on upland bench) to determine if additional matting necessary.

Geotechnical

No Geotech onsite today. Did not dig soil from MDZ today due to the SMA area being full.

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.

- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 18, 2015

Health and Safety

- SLR/KMZ completed daily H&S overview with KH
- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.
- Make eye contact with truck driver when approaching and some sort of verbal and/or gesture communication that you are approaching.

Daily Activities

- Loaded up two truck and side dumps with MDZ B class soil for shipment to Tervita Landfill in Pincher Creek.
- Arranged coolers and supplies in trailer. Purchased batteries for gastech which stopped working on Feb 16, 2014.
- KH separated out large debris from MDZ soil and KH cleaned out marooka.
- Trucks arranged for the afternoon shipment were not available and will haul tomorrow morning instead.

Environmental Protection

- EM onsite monitoring trucking activities. No on-site excavation work occuring today. Weather was clear and dry and therefore no erosion concerns present for today.

Geotechnical

No Geotech onsite today. Did not dig soil from MDZ today due to the SMA area being full.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 19, 2015

Health and Safety

- SLR/KMZ completed daily H&S overview with KH
- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.
- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching.

Daily Activities

- Loaded up five trucks and side dumps/ponies with MDZ B class soil for shipment to Tervita Landfill in Pincher Creek.

Environmental Protection

-Present onsite for loading of trucks and trailers with debris/soil.
-Assessed trail for stability or any changes as area has been inactive since February 14, 2015 for soil hauling. No changes noted. Below zero temperatures every night. Freezing maintained well into mid-day.
-Assessed newly laid coco/straw erosion control blankets in excavation area #3. No changes. Stable.

Geotechnical

No Geotech onsite today. Did not dig soil from MDZ today due to the SMA area being full.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 20, 2015

Health and Safety

- SLR/KMZ completed daily H&S overview with KH
- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.
- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching.

Daily Activities

- Loaded up four trucks and side dumps/ponies with MDZ B class soil for shipment to Tervita Landfill in Pincher Creek.
- Mark Land to pick up poly in town for tomorrow

Environmental Protection

-Light snowfall today. Assessed site. Determined that due to freezing every night this week, ground stable and frozen. Unlikely that more than 1cm to fall. Temperatures to remain freezing into tomorrow with -2 C forecast for Saturday.

-Two trees at top of main debris zone stable - no change.

-Noted debris/soil pile has been reduced by 1/2 after Friday morning haul with four trucks. KHE excavator operator noted to collect any soil that had fallen onto the road. I walked the length of the fencing to collect any debris that had fallen from trucks onto the road. Placed back into stockpile area.

-Noted that generator for ATCO trailer had exhaust facing towards outhouse. Exhaust entering outhouse as a result. Notified KHE that generator should be turned away from outhouse.

Geotechnical

No Geotech onsite today. Did not dig soil from MDZ today. Due to arrive tonight to be present for commencement of excavation on Saturday February 21, 2015.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 21, 2015

Health and Safety

- SLR/KMZ/CGL/MaxHelmer completed daily H&S overview with KH
- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.
- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching.
- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

Daily Activities

- Loaded up four trucks and side dumps/ponies with MDZ B class soil for shipment to Tervita Landfill in Pincher Creek.
- Excavating an extra 1 m in depth along the base of the MDZ excavation area starting on the far eastern end and working westward towards the top of the trail near the wildlife trees and burrows.

- Hauled 82 marookas of MDZ class B soil to SMA area.
- Contacted SLR PM about the estimated tonnage amount of 5.7 per marooka load. The estimate seems high based on reported weigh scale amounts for material removed from the SMA.

Environmental Protection

-Assessed trail condition with geotech prior to access by excavator.

-Walked gully to assess need for coco/straw matting. Sourced some additional woody debris as requested by geotech for use during recontouring.

-Assessed area south of trail where debris present in slope. Discussed with geotech and excavator operator. Collected woody debris at this location.

-Onsite monitoring during excavation. Worked with excavator operator and geotech to guide soil/debris removed from excavation with respect to future vision of site.

-Hand picking of debris from north slope where feasible.

-no wildlife or vegetation concerns.

Geotechnical

- inspected trail and MDZ prior to machine access. No signs of surface erosion or instability
- discussed plan to excavate in 1 m lifts in a uniform manner across the excavation area
- monitored excavation. No concerns regarding slopes. Final grade on east end of site had 1H:1V slopes on east and north slopes.
- excavation work finished just below the wildlife trees, leaving a 1.5 m steep bench. Exercise caution in this area due to steep, loose soils. This area will be graded tomorrow.
- dry weather conditions forecast overnight and for the next few days.

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 22, 2015

Health and Safety

- SLR/KMZ/CGL/MaxHelmer completed daily H&S overview with KH
- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.
- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching.
- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

Daily Activities

- Excavating soil and debris from MDZ area.
- at 9:45 a piece of metal from the MDZ area ripped off shut-off value to the excavator fuel tank resulting in a fuel spill. See EM notes for details.
- at 15:00 KH finished fixing damaged shut off valve to the fuel tank.
- Hauled 26 marookas of MDZ class B soil to SMA area.
- Reviewed quantities of soil shipped out of the SMA area with SLR PM. Based on quantities shipped, likely that SMA holds about 900 tonnes. Also estimated that each marooka holds 3 tonnes of soil and debris and not the 5.7 tonnes indicated by KH.

- measured remaining MDZ soil removed from area prior to Feb 15th. Approximately 150 cubic meters of MDZ soil left from prior excavation (i.e. excavation up to Feb 15). Based on ex situ density of 1.3-1.6 t/cubic metre, amount of pre-Feb15 material is 195-240 tonnes. Suggests that only 1400 tonnes approximately have been excavated from MDZ prior to Feb 15 (1200 tonnes shipped plus 200 tonnes of material still within SMA).

Environmental Protection

-Present during diesel spill at excavator. Caused by damage to fuel shutoff valve by debris caught in tracks.
-Contacted PM and discussed with excavator operator the need for a 24 report of spill - Reported by KHE - #BGIR143539

-Ensured a fire exinguisher present during cleanup activities.

-Worked with KHE immediately to apply absorbent material present at excavator. Morooka operator went to get spill kits. Applied additional pads and rolls to fuel lost through underside of fuel tank. Approximately 160L of fuel in tank as was filled first thing in the morning.
-Requested secondary containment containers available in equipment trailer. To be used to contain fuel and absorbent pads without having this sit directly on the soil.

-Applied absorbent material "kitty litter" to free product to contain and reduce from moving overland or infiltrating.
-Attended spill while KHE repaired fuel shutoff valve. Contained fuel to area around excavator. Due to volume some fuel lost on soil. Soil in area of excavation.
-Used absorbent material to contain fuel lost onto ground.

-Collected all absorbent material soaked with diesel and placed into plastic bags.

-Noted diesel mixed soil within track near fuel tank. Requested soil removed and placed in bags.

-Following removal of absorbent material and secondary containments, an area of impacted soil observed approximately 1m x 1m and 30cm deep.

-Excavator restarted and used to remove impacted soil from area. Brought to SMA and stored on poly separately from other soils removed from the MDZ.

-Bags containing absorbent materials with diesel brought to SMA by morooka and stored separately from debris piles.

-Mule deer observed on north slope above MDZ. Deer moved on own from site without incident.

-Finished day with additional soil removal from MDZ.

(Daily Report Wilmer Marsh - Feb 22, 2015 continued)

Geotechnical

- inspected trail and MDZ prior to work and there were no signs of erosion or instability.

- discussed excavation approach with Mark and started excavation at west end of MDZ, working towards the trees

- work interrupted by equipment damage, fuel spill, cleanup and repair
- excavation continued at the end of the day at east end of site. This area is getting narrow, contrained by over-steepened slopes on the north and south side. Debris is still present at the toe of the slope on both sides. Due to slope constraints not all debris will be accessible for removal.

- loosened silt is very mobile, spilling across the site during excavation activities. As a result, there has been some spillage down slope into the gully. Slope grading on the next lift will help limit this soil movement.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 23, 2015

Health and Safety

- SLR/KMZ/CGL/MaxHelmer completed daily H&S overview with KH
- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.
- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching.
- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

Daily Activities

- Shipped 5 T&ED of MDZ class B soil from the SMA to Tervita LF at 7:30 to 9:30 am
- Excavated 55 marooka load of material from MDZ from 9:30 to 4:30 pm.
- at 19:00 Mark from KH contacted SLR bc they plan to load MDZ Class B soil at night into trucks to ship
- Excavated a 1 m lift from the MDZ excavation footprint. Excavated until native in most western portion of excavation near the two live trees in the vegetation exclusion zone.
- Started to remove more material from the most eastern extent of MDZ where the debris is up to 7 m deep and extends down the southern slope of the trail. Material contained numerous car parts and large metal debris.

Environmental Protection

-Onsite for excavation at MDZ. No environmental concerns.

-Excavator operational following previous day's loss of diesel. No further concerns.

- checked on area of possible fill material north of site on Westside Road. Looked at identified historical burrows for recent activity by badgers or other species. No new activity. Obsevered that test pits with exposed soil may require seeding. Discussed with PM. If seeds available following site restoration will apply.

-Discussed restoration plan with Clarke Geosciences and with KHE. Due to possibility of inclement weather in the future, and having a large area of disturbance through the MDZ, commencement of re-contouring and installation of cross ditches etc. will occur in the lower trail.

-A local passerby walked onto site. Had dogs with him. Was told that dogs were not allowed onsite nor were people and that any questions they had could be discussed outside of the fence. Person left without any trouble.

- Observed loss of fuel from generator near ATCO trailer. Fuel contained in secondary containment. Collected absorbent material and notified KHE of issue.

Geotechnical

- inspected trail and MDZ prior to excavation work. No signs of erosion or instablity.

- finished west end of excavation near the trees and reached a native silt base. North and south side slopes are oversteepened but relatively stable for short term. May require some grading for longer term stabilization.

- returned to continue excavation at the east end of the MDZ, extending a bit further down the lower trail to maintain grades and access buried debris. Footprint of MDZ is moving away from the north slope to maintain grades and has extended slightly downslope. The excavation has now removed the overhanging cut associated with the past removal of debris from the slope, thus improving the slope stability for long term restoration. There is still buried debris on the slope and is visible at the base of the cutslope of the lower trail.

- MDZ slopes were roughly graded at the end of the day to reduce steeply sloped areas for the night.
- plan to return to the lower trail tomorrow to grade for final restoration and to install 3-4 cross-ditches for drainage. This is being done in a effort to minimize machine disturbance across the area for restoration activities. Excavation of MDZ will resume tomorrow.

(Daily Report Wilmer Marsh - Feb 23, 2015 continued)
- discussed the overall restoration vision for the slope with the project team. Moving towards a gently graded swale, sloped broadly across the MDZ and narrowing upslope into the gully area between the trees and the north slope.

Sustainability
- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 24, 2015

Health and Safety

- SLR/KMZ/CGL/MaxHelmer completed daily H&S overview with KH
- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.
- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching. SLR has radio to contact excavator when we need to approach him.
- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

Daily Activities

- Graded and added cross ditches every 10 - 15 m on lower access trail to AI3
- Excavated 32 marooka load of material from MDZ.
- KH worked in SMA to get it ready for shipping tomorrow
- Excavated in the eastern portion of the MDZ area down to 2 meters along the southern slope. Encountered large debris in the south slope hillside (buses, car parts etc). Re-graded area to a 1:1 slope before the end of the day for stability.
- Had a weekly conference call with KH, PWGSC, EC and SLR in regards to the plan going forward.
- Got a text message from KH in evening. KH will load trucks tonight instead of tomorrow morning so we can get an earlier start on excavating tomorrow.

Environmental Protection

-Observed grease from excavator on ground at entrance to site. Brought to attention of KHE. Cleaned up.

-Problem with generator again leaking fuel from breather hose. KHE attended and will determine issue.

-Present during weekly call.

-Onsite with geotech to guide installation of cross ditches along lower trail.

-Present onsite during continued excavation at east end of excavation.

-Excavator operator restored east end of excavation. Will continue lifts to west of excavation. First thing in morning, will develop parallel diversion ditches at upper trail.

-Assess weather for week. Continued dry, cold weather.

-Discussed recontouring with geotech. Walked gully at site to understand natural water regime to ensure placement of cross ditches and evaluate need for additional armoured areas during recontouring.

Geotechnical

- inspected trail and MDZ prior to excavation work. No signs of erosion or instability.
- guided regrading and cross-ditch construction along lower trail between AI3 and MDZ. Installed 3 cross-ditches along 35 m long section, locations chosen to match upslope drainage paths.
- teleconference call to discuss restoration plan and whether or not to include backfill. KHE will consult the geotechnical engineer and this will be discussed further.
- excavation of MDZ continued at the east end. Native soils found at toe of slope on the east side, excavation working inwards to the west to remove deep accumulations of debris. Excavation extends downslope to remove fill material at and above the previously installed ECB.
- excavation of MDZ will continue tomorrow, working on a 1-2 m lift in a westward manner.

Sustainability

- Carpooling to site and back.

-Sharing a house in Invermere.

- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 25, 2015
Health and Safety
- SLR/KMZ/CGL/MaxHelmer completed daily H&S overview with KH
- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.

- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching. SLR has radio to contact excavator when we need to approach him.
- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

Daily Activities
- Graded and added cross ditches on upper trail to marsh above AI3 from 8:00 to 9:00 am. KN took GPS points of cross ditches.
- LP requested that MM take a new set of GPS data point elevations to send to Jennifer Cooper (CADD) to confirm the amount of material removed since Feb 15th. Took GPS points at the end of the day after Mark has compacted the soil across the excavation footprint. Sent file to Jen Cooper and uploaded it onto N Drive.
- Excavated 58 marooka load of material from MDZ from 9:00 to 4:30 pm. KH compacted area at 4:30 so SLR could collect GPS coordinates
- KH worked in SMA from 5:00 to 5:30. MOT had security vehicle come out to site to check to see if we were shipping soil from the SMA at 5:10.
- Excavated in the middle portion of the MDZ area down to 1 meter to the western extent of the excavation where we encountered native soil at base. Encountered more crushed car debris in the centre of the MDZ area to approximately 5.5 mbg. Did not encounter native material in this area at the excavation floor. Debris remains in the northern wall of the MDZ area.

Environmental Protection

-Monitored installation of diversion ditches on upper trail with geotech. Requested roughing up of upper trail to allow for seed placement.

-Collected coordinates on locations of all diversion ditches on upper and lower slopes.

-Onsite for continuation of excavation of debris in MDZ.

-Collected additional woody debris for recontouring work at MDZ.

-Assessed with geotech the potential for loss of sediment down to marsh from any work conducted at site in future. Determined that the distance and the density of vegetation (shrubs) and leaf litter in area likely to slow down and take up any water and sediment should a heavy rainfall event or rapid snowmelt event occur.

-weather to continue to be cold at night. Possibility for less than 1cm of snow overnight. Will assess in morning.

-ensured area of excavation soil packed for overnight.

Geotechnical

-inspected trail and MDZ prior to excavation. No signs of erosion or instability.

-supervised the pull back of a portion of the fillslope along the upper trail, above the marsh towards the MDZ such that the trail is now gently outsloped and the erosional gully in the center is now gone. Directed construction of 4 cross-ditches for surface water management and to connect potential runoff with the cross-ditches constructed along the lower trail.

-excavation continued in center portion of the MDZ. Deep accumulations of metal debris were encountered. Excavator removed a 2 m lift in a westward direction to the south-west wall (tree ridge). Native soils were encountered along the south-west wall.

-emailed an annotated photo to SLR showing current excavation areas. Communicated this with on-site personnel.

(Daily Report Wilmer Marsh - Feb 25, 2015 continued)
Sustainability
- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 26, 2015

Health and Safety

- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.

- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching. SLR has radio to contact excavator when we need to approach him.

- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

- Wearing hardhat and respirator all day is giving MM a headache due to neck pain - Took Advil in the afternoon.

Daily Activities

- Removed more material from the eastern portion of MDZ to make a flat area to do the in-situ volume calculation exercise. Removed top 0.5 m of surface material that was previously disturbed and not characteristic of in situ packed soils.

- MM (SLR) and ML (KH) measured out an area of 2 m X 4 m X 0.5 m deep and removed with material carefully using the excavator and placing it into the marooka. Only filled marooka with 1/2 load of soil to prevent material from spilling out during the ascent to the SMA area. Material was then unloaded onto separate area with poly liner in the SMA area. Moved 3 marooka loads of approximately 4 cubic meters of soil into stockpile which was then loaded into KH truck and was re-weighed at Max Helmer Scale. Pre load weight = 11.61 tonnes. Weight with material is 15.57 tonnes. Total weight of material estimated for 4 cubic meters is 3.96 tonnes. MM and ML laid out excavation area with flags prior to excavating soil. MM checked depth as ML dug to ensure the depth was 0.5 meters across the footprint. MM observed to make sure material was not lost between the transfer of material from in-situ to the marooka. KN was stationed in the SMA area to ensure the marooka material was placed with minimal disturbance and loss onto the designated poly area. KA present during the loading of the trucks and followed truck to the landfill to be weighed.

- Excavated 41 marooka loads of material from MDZ from 9:00 to 15:00 pm. At 15:00 KH started to load trucks.

- KH loaded 5 trucks and side dumps at 15:00 to 17:00. MOT on-site to weigh trucks to ensure they are carrying 70% of load capacity. MOT to bring portable scale.

- Excavated in eastern moving to western portion of the excavation. Took out more material from south slope and along north wall adjacent to the upper trail access. North wall still contains debris.

- Took samples of diesel containing material (STP-1). Approximately volume of soil = 3 m^3. Analysed for TCLP BETX, metals, PAH, SWOG, elemental sulfur and Free liquid (paint filter). Will drop them off at Radium tomorrow during the day as bus has already left to Calgary. Will be billed to KH. Made a note on the COC with Travis email and requested 7 day TAT.

- SMA area 90 % full at the end of the day prior to trucks being loaded. KH to rearrange SMA area to make space for more material from MDZ.

Environmental Protection

-Onsite for continuation of excavation of MDZ.

-Present for testing of weight of 3 morooka loads. Followed Max Helmer truck to Columbia Valley Landfill for weighing of truck with excavated material. Obtained pre and post weights.

-Continued to monitor marsh following remedial cleanup. Marsh recovering well. Sediments settling out with melt. Trail showing minimal damage.

-Present during weighing of truck by MOT to confirm allowable weights for transport of material during road ban (70%).

(Daily Report Wilmer Marsh - Feb 26, 2015 continued)
-Assessed a small fuel spill in the seacan onsite. Noted spill pads used. No movement of fuel outside of seacan onto ground.

- Possible snowfall overnight (<1cm) - cold and dry. Monitor on Friday.

Geotechnical

- Excavation continued in the lower elevations, on the eastern side of the MDZ. The cutslope of this new excavation is planned to be blended in with the existing cutslope located on the north slope. Excavation stopped around 2pm. All slopes were left in a stable condition at a slope less than 1H:1V.

-No instability was observed throughout the day;

-Safety concern. People observing the excavation (ie. Geotech, EM, biologist, etc) must not sit/stand directly above the area being excavated. The non-native soil that is located within this area could become unstable if the toe support becomes excavated.

Sustainability
- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 27, 2015

Health and Safety Topics

- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.

- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching. SLR has radio to contact excavator when we need to approach him.

- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

Daily Activities

- KH reorganized SMA area to create more space for additional materail from 8:00 am to 14:30

- SLR measured out SMA area after KH finished rearranging material. Estimated the SMA area capacity to hold 1000 cubic meters of material. Amount of material currently in SMA area prior to trucks loading at 15:00 is approx 620 cubic meters.

- Submitted H&S updates for the project - Potential for ticks in the tall grasses and sore necks/head aches from wearing heavy equipment - hard hat and respirator all day. In addition difficult body positioning on steep uneven hill slopes causing hip, back and neck pain.

- Dropped STP-1 samples (diesel spill soil samples) at Greyhound in Radium at 11:45. Will arrive in Calgary at 15:00. Requested door to door delivery and if necessary Saturday delivery.

- 5 Trucks and side dumps came to site at 14:30 to be loaded with material from MDZ - KH lining trucks with poly prior to filling. Last night's trucks were loaded with 23 tonnes of material each for a total of approximately 115 tonnes for 5 trucks. The total tonnage for all five trucks at the Tervita land fill when unloading was 91.84 which is a difference of approximately 23 tonnes. Potentially due to inaccuracy of MOT measurements/conversions from tire PSI to estimated truck weight. KH indicated they may have loaded on the lighter side when MOT was onsite.

Environmental Protection

-Observed SMA following clean up by excavator. No soil on road.

-Walked site down to marsh to ensure stability and no changes overnight.

-Expected snowfall overnight but none fell. Expected more during day but did not arrive. No moisture on site has resulted in very dusty conditions of loosened soil.

-Marsh appears to be stable. Observed area of spyder hoe travel and no additional losses of sediment. Noted natural loosening and falling of sediment onto trail.

-Spoke to local dog walker near marsh. Explained status of NWA and that people and dogs were not allowed. Walker left without confrontation.

- Onsite during truck loading. No issues. Discussed with KHE that boxes/containers of diesel fuel treatment should either be stored properly or removed following use by truckers. Noted that some boxes/containers had fallen over and some product could end up on ground. KHE to speak to truckers to remove from site after use.

Geotechnical

- no Geotechnical representative today because no excavating occuring in MDZ.

- Evan from Vast will be on site for 8:00 for MDZ excavating

(Daily Report Wilmer Marsh - Feb 27, 2015 continued)

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Feb 28, 2015

Health and Safety Topics

- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.

- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching. SLR has radio to contact excavator when we need to approach him.

- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

Daily Activities

- Excavating in the MDZ eastern portion of the excavation along the north wall. Still lots of large metal debris remaining in north wall (car parts). The floor of the eastern portion of the excavation contains mostly small pieces of debris - glass, plastic, etc. and contains less metal debris and large car parts. Appear to have reached native in some areas of eastern portion floor. Southern slope still contains significant large metal debris.

- Will continue to take out 1 m lifts across excavation starting in the eastern portion and moving western and working south to the north wall. There are geotechnical concerns about undercutting the toe of the north wall so only minimal material is being removed from there.

- North slope still contains significant size and quanity of large metal debris. Will need to come up with an excavation plan if we want to excavate further into the north slope.

- Excavated 62 marooka loads from MDZ today.

- Loaded 5 trucks and side dumps to 70% capacity in the afternoon (approximately 23 tonnes each). Will ship soil to Tervita Pincher Creek Landfill on March 2nd as LF is not open on Sundays (March 1). We are loading trucks in PM to make more room in the SMA so we can continue to excavate more material from MDZ.

Environmental Protection

-Present onsite as EM during excavation.

-Assessed upper area of site for any environmental concerns. Noted sediment (dust) over vegetation along access trail to MDZ. No precipitation for a very long time. Hand picked debris and placed in SMA.

-Discussed thoughts for restoration of MDZ following excavation with Evan from Vast environmental.

-observed marsh condition. Noted some open water east of the marsh. Tundra swans and Canada geese present. No waterfowl observed in the excavated marsh area.

Geotechnical

-no overnight instability occurred

-excavation continued along north slope within the east side of MDZ. Excavated below trail approximately 4m leaving excavated cut at <1H:1V, continued north for approximately 10m and stopped prior to excavating directly under historic surficial landslide scars. Excavation can continue on north slope opposite of trees per Jen Clarke's pano picture.

-more debris is located along the south east side of MDZ and will explore there tomorrow, stepping out 4-5m away from toe of north slope.

- recommend no more excavation within north slope on east side of MDZ without a detailed geotechnical plan outlining how to safely access the remaining debris (if required) and a final as-built plan (ie how much backfill will be brought on site).

-Need to determine the remaining volume of material to be excavated. This remaining volume will determine the final geotechnical plan of how to safely excavate remaining required volume.

(Daily Report Wilmer Marsh - Feb 28, 2015 continued)
Sustainability
- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 1, 2015
Health and Safety Topics
- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.

- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching. SLR has radio to contact excavator when we need to approach him.

- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

Daily Activities
- Excavated more materail from MDZ in the eastern portion of the excavation moving eastward. Only excavated surface material from middle portion of MDZ excation (area between the north slope and the south slope island containing the live trees. Excavated surface material on the trail leading up to the SMA until 15:00.

- At 15:00 to 16:00 KH rearranging material in SMA area to make space. Have approximately 150 more cubic meters we can excavate from the middle portion of the MDZ without underminding the north and south slope.

- KH smoothed out the slopes and floor of the excavation in preparation of potential snow fall tonight and tomorrow.

- Excavated 58 marooka loads from MDZ today.

- Did not load trucks today however trucks will ship soil early in the morning to Tervita and come back to load another round in the afternoon.

Environmental Protection
-Present onsite as EM during excavation.

-Due to removal of soil/debris to maximum prior to having a geotechnical plan, KHE removed loose surface sediment in MDZ and up to top of trail. Removal of loose soil to ensure that should the snowfall of 5-10cm that is predicted fall, that no loss of sediment will occur if there is another rapid snow melt. Applied wattles at top of slope. Existing diversion ditches along both upper and lower trails.

-Continued to hand pick debris from upper part of site.

-Noted that no new spill kits on site following use when diesel spill occurred. Talked with KH - they replaced spill kit on contents.

-No environmental concerns.

-Waiting to hear about plan on Monday to determine what will occur onsite.

Geotechnical
- No overnight instability occurred

- No excavation occurred on north slope. Additional excavation on this slope, other than the the approximately 150 m3 identified on Jen Clarke's photos, will require additional geotechnical considerations.The final required excavation volume combined with the amount of backfill being brought onsite should be communicated to onsite field staff, which will assist in determining the final course of action.

- A one meter lift was excavated on the southeast side of the MDZ, starting at the existing coco mats, moving west towards knife shaped ridge. Metal debris was removed from this location.

- Cleaned up and bucket/track packed entire excavation area all the way back to the wood mats.

- Discussed with SLR staff not to walk within the main gully between the north slope and the tree island/knife ridge until final grading/backfill is complete. Fill material is oversteepened on the south slope and is potentially unstable

- Excavation is not planned for March 2, 2015.

(Daily Report Wilmer Marsh - Mar 1, 2015 continued)

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 2, 2015

Health and Safety Topics

- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.

- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching. SLR has radio to contact excavator when we need to approach him.

- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

- EK from Vast advised field staff not to walk into between the area between the steep south slope and north face in the middle of MDZ due to potential slumping due to over-steepening of south slope.

- Tim Birkett on site from worksafe BC at 14:30 to do inspection of the site. We mentioned we already had Howard Wu onsite for inspection on Feb 19, 2015. KH did H&S tailgate with him and explained our scope of work. KN took him on a walk of the site.

Daily Activities

- KH trucks left for Tervita in Pincher Creek at 5:00 am so they can return to site to be filled around noon.

- KH cleaning excavator and organizing on-site facilities - taking garbage to depot, cleaning C can, cleaning mobile equipment (excavators, marookas etc.)

- SLR attempted to collect confirmatory limit samples in MDZ in eastern portion of excavation; however, upon inspection of area noticed debris along the base and in the northeastern wall. Will remove another 1 m lift from this area before sampling if we are approved to remove more material - need to wait for KH and Braun to come up with excavation plan before we proceed.

- Trucks called at 11:00 to say they would be on site around 2:00 due to slippery conditions on the highway due to snow accumulation. Trucks arrived at 14:30 and were lined with poly prior to being loaded. 5 trucks and side dumps loaded today to be shipped out tomorrow.

- WCB representative onsite from 14:30 to 15:30. KH did a H&S orientation with him and Kalina walked him down to the MDZ excavation for inspection.

Environmental Protection

-Snowfall today with possible accummulation to 10cm. Walked down with excavator to MDZ. No issues with travel. Will determine passage tomorrow with morooka when excavating resumes.

-Wattles in place upslope of MDZ should snowmelt occur prior to returning to site tomorrow. However, lows of -17C predicted for tonight so unlikely to melt unattended.

-Onsite most of day until trucking completed. Have discussed safety in travel due to road conditions.

-WCB asked to walk the excavation. Supplied any information he requested and escorted the WCB representative to the MDZ. Able to assess site condition in afternoon. Snow on top of silt. No melting observed.

Geotechnical

No Geotech onsite today as no excavating planned.

- Jen Clarke is coming tomorrow morning and Evan K will be here to do a cross over with her. Braun will be onsite for Wednesday. Jen Clarke mentioned there is a bit of material that can be scrapped off the north wall tomorrow and in the southeastern part of the excavation but we are limited in the amount of material that can be removed (estimated approximately 150 cubic meters maximum) until Braun has presented a revised excavation plan for MDZ.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 3, 2015

Health and Safety Topics

- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.

- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching. SLR has radio to contact excavator when we need to approach him.

- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

- EK from Vast advised field staff not to walk into between the area between the steep south slope and north face in the middle of MDZ due to potential slumping due to over-steepening of south slope.

Daily Activities

- KH trucks left for Tervita in Pincher Creek with yesterday's load (March 2) at 7:00 am so they can return to site to be filled in the afternooon.

-KH excavated 46 marooka loads from the southeastern portion of the MDZ excavation under the geotechnical guidance of Jen Clarke and Evan K. Lots of large debris still present in the southern slope. Will continue to excavate tomorrow in the same area.

- SLR FS observed excavation from the top of the north slope. The eastern portion of the excavation still has debris remaining in south slope and north slope wall. Will need to do additional pass tomorrow to excavate to native at the base. Did not collect confirmatory samples today. Will collect samples once we know the Braun geotechnical plan for the excavation. Have only reached native material in the most western portion of the excavation at the base and the wall adjacent to the wildlife tree.

- Trucks on-site to be loaded at 15:00. SMA area was almost full prior to loading the trucks. Finished loading trucks at 16:45.

- Attending weekly meeting conference call with PWGSC, EC, SLR, KH, Jen Clarke and Evan K. Discussed schedule moving forward. Plan is to finish the excavation on the 5th and then recontour, backfill, seed and coco-mat until the 13th.

-Worked with KHE to repair generator that wasn't working onsite. Replaced sparkplug and re-started.

Environmental Protection

-Assessed site following snowfall previous day. No signs of melt. In morning it was -19C. Warming through day. No signs of runoff. KHE cleaned trail to MDZ prior to commencement of work and movement by morooka.

-Present for weekly update call.

-Present for day during excavation. No environmental concerns. Toilet was cleaned as requested.

-Assessed condition of marsh from top of upper part of site to see if any significant melt would possibly allow for removal of sediment curtains. No change. Marsh is still frozen. Noted a few open water areas but these are east of the marsh.

-KHE will be coconut/straw matting remainder of lower trail next day. Will be present for this. Will discuss need for matting at upper slope with geotech.

-Monitored snowmelt over day. Trail is dry and will be unlikely that any runoff of snow will occur overnight. Will replace wattles along upper trail.

(Daily Report Wilmer Marsh - Mar 3, 2015 continued)

Geotechnical

- Discussed site conditions and excavation status with Evan K to provide proper cross-over and peer review.

- Inspected trail and MDZ. No signs of erosion or instability.

- Discussed excavation plan with Mark (KHE). Continued excavation at the east end of MDZ, along the south side towards the outside slope. Directed work away from north slope and advised that no more material should be removed from the north side of the MDZ until directed by Braun Engineering.

- Noticed that there is a 1-2 m (approx.) vertical cut at the base of the north side of access trail into the MDZ. There is a risk of shallow sloughing from the north slope into the MDZ. Reiterated that no personnel should walk through the zone between the trees and the north slope at this time. Machine access is ok.

- Excavator still finding metal debris in the south-west corner of the MDZ.

- At end of day, the south end of the MDZ was graded and track-packed with all adjacent slopes less than 1H:1V grade.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 4, 2015

Health and Safety Topics

- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.

- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching. SLR has radio to contact excavator when we need to approach him.

- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

- EK from Vast advised field staff not to walk into between the area between the steep south slope and north face in the middle of MDZ due to potential slumping due to over-steepening of south slope.

- Additional safety procedures provided by CGL and forwarded to field staff for work in and around MDZ excavation provided due to potential slope instability. To be discussed in morning tailgates.

Daily Activities

- KH trucks left for Tervita in Pincher Creek with yesterday's load (March 3) at 07:00 am so they can return to site to be filled in the afternooon.

-KH excavated 50 marooka loads from the southeastern portion of the MDZ excavation under the geotechnical guidance of Jen Clarke. Lots of large debris still present in the southern slope.

- SLR FS observed excavation from the eastern portion of the MDZ. In late afternoon (16:00), Mark returned to north slope, opposite of the the trees. Four marooka loads of debris were pulled from north wall in this area, debris still remains.
- Debris and fill still present in north wall; and in the trail bottom, from the western extent to a zone a few metres to the east of the trees in the trail.

- Trucks returned to site at 14:30, five trucks loaded. SMA area was almost full prior to loading the trucks. Finished loading trucks at 16:00.

- SLR FS collected 21 confirmatory samples. Samples were collected at the eastern extent (MDZ-EW1, and MDZ-EW2) and the south extent, in the vicinity or the living trees (MDZ-SW1, SW2, SW3, SW4, SW5)

- Stewart with Braun Geotechnical was on site at 13:30 to comment on fill requirements for site.

Environmental Protection

-No erosion occurred to trail or any portion of site following snowfall and melt.

-Present onsite during final excavation of MDZ.

-Guided installation of erosion control blankets at lower trail. Installed seed by hand broadcasting under matting. Placed additional seed in areas where debris removed along trail.

-Placed additional seed along upper trail should erosion control matting not be available following use on site.

-Present onsite during site visit by Braun Environmental to discuss use of backfill for recontouring of site. Provided guidance in areas of use by wildlife including addition of benches where willdife trails are present and to ensure that recontouring will include water management. Discussed bringing in of fill material and the recontouring of the fill area following removal. This included grading and use of erosion control matting.

-Discussed with KHE the need to remove any remaining impacted soils such as the sediment pushed to the east side of the trail following earlier snow melt. This can be included in the SMA and fill will replenish the grade of the historical trail. In addition, I discussed the need to remove the matting at the entrance to the site including the contaminated sediment dropped and moved by the morookas and the excavator prior to stockpilling and moving clean fill. This will be conducted tomorrow and cleaned up as no more excavation activity will occur.

(Daily Report Wilmer Marsh - Mar 4, 2015 continued)

-Discussed the possibility if time permits to source more woody debris to be collected. No branches are to be cut or broken. Only deadfall and smaller broken branches to be collected by KHE to be used during recontouring.

-Discussed with Mat issues to be monitored during my absence. Will return on Tuesday March 10 to guide final recontouring of fill and coconut/straw matting. He can contact me with any questions or concerns during my absence.

Geotechnical

- inspected trail, MDZ, and north slope prior to access. No erosion or instability noted.
- discussed excavation plan with KHE. Excavation to continue along outer (south) edge of MDZ, staying away from north slope. Work was to continue here until Braun Engineering arrived.
- advised personnel to avoid walking through gully in MDZ. Monitored north slope for any signs of instability during excavation. None noted.
- Braun Engineering arrived at 14:00 and discussed potential to remove more material from the north slope, and the backfill plans. It was recommended that Braun Eng stay for the north slope excavation to monitor progress. It was also recommended that rationale for backfill volumes and placement be prepared with primary consideration for slope stability and erosion control.
- excavation along north slope progressed with no issues but was prematurely stopped by KHE.
- excavator track and bucket packed the lower part of the excavation and walked out, clearing out pockets of debris along the way.

Sustainability

- Carpooling to site and back.
- Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 5, 2015

Health and Safety Topics

- Remain very wary of slope failure and working above and below zones idenified by Geotech as moderate to high risk.
- Wear PPE including dust mask when in and around truck being loaded. Use TC when trucks are being loaded and do not walk behind the trucks or between the truck and trailer.
- Make eye contact with truck driver when approaching and some sort of verbal and/or gestural communication that you are approaching. SLR has radio to contact excavator when we need to approach him.

- Wear PPE including respirator and glasses while excavating MDZ. Be aware of swing radius of excavator. Do not approach on blind side. Good communication with operator before approaching. Do not stand near steep excavated banks or enter excavation greater than 4' in depth.

- EK from Vast advised field staff not to walk into between the area between the steep south slope and north face in the middle of MDZ due to potential slumping due to over-steepening of south slope.

Daily Activities

- KH trucks left for Invermere landfill with yesterday's load (March 4) at 08:30 am so they can return to site to for early morn.

- KH trucks arrived on site at 09:45. There were 9 runs of five trucks (for the 9th run, only 3 trucks were loaded) to the Invermere landfill today (including the run that was loaded yesterday (March 4th, 2015). A total of 753.16 tonnes were sent to the Invermere landfill. Based on measurements of remaining MDZ stockpile, there is ~500m3 of material left in SMA.

- SLR FS with the assistance / supervision of Jenn Clarke and Scott, collected samples in eastern portion of MDZ, along the north wall. There was a portion of the north wall, opposite the live trees, 20 m in length where it was unsafe to grab a floor samples (lots of debris in floor as well) and a mid wall sample.

- SLR FS collected 21 samples (+ 3 dups) confirmatory samples. Samples were collected from north wall (NW1 -- NW7-0.3-0.8) and base of the MDZ excavation using a continuous slope approach. This approach was used to limit the amount of time spent in the excavation.

Environmental Protection

-Assessed site following snowfall previous day. No signs of melt. In morning it was -13C. Warming through day, to high of 3C. No signs of runoff. KHE cleaned trail to MDZ prior to commencement of work and movement by morooka.
-Watched KH scrap soil collected on swamp mats, and locate soil to SMA.
- As material was loaded on trucks, and material was removed from the SMA from south to north, KH removed road fencing and as they did so they scrapped the road and SMA floor down to pre-SMA material.

- Material was removed from the opposite side of the CWS fencing with shovels and located back to SMA area.

-Monitored snowmelt over day. Trail is dry and will be unlikely that any runoff of snow will occur overnight. Will replace wattles upper trail.

Geotechnical

- inspected trail, MDZ and north slope this morning. Identified a 3 m long, crescent-shaped tension crack at the top end of the slope cut on the north slope, across from the treed ridge.

- the tension crack was spotted yesterday but appeared to increase in size over night. The affected area is 10-12 m wide, 15-20 m long, and potentially 2-3 m deep. The toe of the area is a 2 m high vertical cut within the tight gully area. Therefore, based on the potential for a fairly deep slope failure, the risk is considered high.

(Daily Report Wilmer Marsh - Mar 5, 2015 continued)

- hazard was inspected and flagged with orange-coloured metal stakes. Area was pointed out to on-site personnel.

- another possible small tension crack was identified at the east end of the MDZ at the top of the slope cut. This represents a shallow (20 cm) tension crack along a 3 m wide section. The top of the area was flagged with blue-coloured metal stakes.
- JC emailed SLR with photo of area and some safety concerns to be relayed to KHE.
- personnel to avoid high hazard area today and full-time monitoring of personnel accessing the area was completed. Mat conducted soil sampling and Vast conducted a site survey in the area today with no idnication of increased slope movement.
- Conference call at 3 pm to discuss backfill plan with KHE. Clarified that objective is for short-term (2 year) stability and that KHE (Braun Eng) is resposnible for putting together the backfill plan. CGL (via Vast) to provide on site monitoring during initial backfill placement tomorrow.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 6, 2015

Health and Safety Topics

- Remain very wary of slope failure and working above and below zones idenified by Geotech as moderate to high risk.

Daily Activities

- Walked site with Jenn Clarke and Mark to inspect north slope and discuss fill and regrading options @ 8:15.

- Participated in conf. call at 10:30.
- Re-measured stockpile of MDZ material in SMA. ~ approx. 500 m3.
- Measured dimensions of potential borrow source; hump located across from wildlife tree. ~ 140 m3.
- Participated in follow up conference call at 13:30.
- Performed a QA off all truck weigh bills to verify totals.

Environmental Protection

-Assessed site following snowfall previous day. No signs of melt. In morning it was -9C. Warming through day, to high of 4C. No signs of runoff. KHE cleaned trail to MDZ prior to commencement of work and movement by morooka.
- monitored Mark and Max Helmar crew perform maintenance on heavy equipment. Ensure no product was spilt on ground, etc.

Geotechnical

- No geotechnical monitor present as there was no work conducted within the MDZ.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 7, 2015

Health and Safety Topics

- Remain very wary of slope failure and working above and below zones idenified by Geotech as moderate to high risk.

Daily Activities

- Began recontouring and compacting material in eastern half of MDZ excavation from 0800 to 13:30.

- At 13:30 began dragging material from hump into the MDZ excavation and compacting with bucket and tracks. The hump was relatively void of debris. Material from hump was used to obtain 1:1 slope in western half of MDZ.

- As per Braun's instructions, wall slopes of 1:1 were constucted. Contouring finished at 16:30.

- Re-sampled MDZ-NW6 sample series, as these samples have been removed and piled into the MDZ excavation as fill.

- Supervised the gathering of additional woody debris from valley.

Environmental Protection

In morning it was -1C. Warming through day, to high of 10C. No signs of runoff.

- Installed cross ditch through eastern portion of MDZ. Four additional cross-ditches to be installed west of trees.

Geotechnical

No overnight instability was observed. The previously identified tension cracks did not increase in size overnight;

- Discussed with Mark about shaping the lower east MDZ area, compacting the soil with the bucket and/or tracks, putting any extra material on the toe of the north slope. The soil material was quite difficult to compact due to the low moisture content. Placed material became mobilized and would travel/flow downslope, similar to a snow avalanche, onto the area that was just previously compacted. The excavator worked its way upslope and out, but material continued to flow downslope beyond the reach of the excavator. Currently there is 5-20cm of loose silt sitting on top of bucket compacted soil. This loose material is located more in the center where it flowed along the path of least resistance. Good indication of where surface water would flow. This material will compact naturally overtime under its own weight with rain and snow loads, but may also erode under the coco mats;
- A shallow cross ditch was constructed at the bottom of the MDZ, most of this is now covered with loose silt material;
- Bucket packed as best as possible the north and south slopes;
- Excavated approximately 150-200m3 of material that was used for backfill. This material came from the designated area on the north west side of the MDZ. Excavated slopes were 2H:1V. Backfill material was placed along the oversteepened south slope directly north of the trees, with the rest placed within the gully. Approximately 0.5-1.0m (compacted) material was bucket and track packed. This material had a slightly higher moisture content than the material that had been exposed for a period of time, so it compacted more effectively. This lift covered the lower 1.0m of the north and south slopes within the gully that was oversteepened;
- Laid out four cross ditches between the top (west side) of the MDZ and the wood matts located at the gate. The lower two cross ditches will connect to the slope break below and to south, while the upper two will be constructed just off the trail to the south and blended into the natural ground. These will be constructed tomorrow. Also tomorrow, the trail will be pulled back and blended back into the pre disturbance ground profile;
- All excavated slopes were left at 1H:1V or less at the end of today.

Recommendations

- Wait to hear what Braun Geotechnical recommends after their inspection on Tuesday;
- Place as much coarse wood debris as possible after placing the coco matts within the lowest part of the MDZ (where the cross ditch is constructed) and up through the gully. This will assist in slowing any surface water and minimize concentration.

(Daily Report Wilmer Marsh - Mar 7, 2015 continued)
- Overall, we were able to efficiently utilize the backfill that was provided. It is likely not worth going back down with the excavator to try and compact the loose material that flowed downslope throughout the day as it will accumulate again as the machines walks back out. This material is not very easy to work with especially when it is so dry.

Sustainability
- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 8, 2015

Health and Safety Topics

- As site cleanup progresses, use safe lifting techniques, wear appropriate PPE and keep an eye on LB160, especially in tight areas of the staging area.

Daily Activities

- Began loading trucks at 0745 am. Three full runs of trucks, and a fourth run (only two trucks did fourth run) collecting bins, and construction materials. Last run was at 11:30 am.
- Total tonnage of 363.7 mts was sent to Invermere landfill.
- Diesel impacted soil is still on site awaiting chemistry results.
- With the exception of heavy equipment, containers and swamp mats, the upper staging area has been cleared of material. KH scraped down the floor of the former SMA to ensure no potentially contaminated dirt was left on site.

- KH bucket packed soils in upper staging area and re-contoured the road's edge, and cleaned up minor quantities of soil that spilled onto roadway.
- Gathered additional woody debris around site for use in sediment and erosion control measures.

Environmental Protection

In morning it was -1C. Warming through day, to high of 15C. Snow has slowly melted, resulting in soils absorbing moisture as opposed to a quick thaw and surface run-off being generated.
- Supervised movement of machinery around upper staging area, and ensured there was no hydraulic oil or fuel deposited.
- Supervised KH scrape down SMA floor to ensure all potentially impacted soils were removed, and there were no signs of staining on ground surface.

Geotechnical

-N/A, monitor not on site today.

Sustainability

- Carpooling to site and back.
-Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 9, 2015

Health and Safety Topics

- As we are beginning to cleanup the site, use safe lifting techniques, wear appropriate PPE and keep an eye on LB160, especially in tight areas of the staging area.

Daily Activities

- KH started day repairing CWS fencing. Fence has been improved all along former SMA area.
- Partook in conference call with Clarke GeoSci, PWGSC (Brad), SLR staff and KH regarding matting and restoration planning.
- Analytical results for diesel impacted soil indicated material is below HWR thresholds. As such, material loaded on KH side dump for disposal at Invermere landfill (bin 1), along with diesel impacted absorbant pads (5 bags) loaded into the second bin. The tonnage of the diesel impacted soil was **8.290** kg (disposed of at Invermere landfill). The diesel impacted adsorbant pads are going to the M&R waste facility in Abbotsford (KH to send along proof of acceptance).
- Collected GPS points for new MDZ-NW6 sample locations. Sent to SLR's CAD department for updates.
- KH positioned cocomat bundles at the top (western extent of the MDZ) in preparation for matting activities tomorrow / Wednesday.
- Created an additional cross-ditch 30 m east of swamp mats. Will wait until Kalina is on site to discuss the necessity of additional cross-ditches. Also sent images of the two cross-ditches currently constructed to Evan, Jen and Kalina should there be consensus on modifications that should be made.

Environmental Protection

In morning it was -1C. Warming through day, to high of 15C. No snow on site.

- Supervised movement of machinery around upper staging area, and ensured there was no hydraulic oil or fuel deposited.
- Supervised KH generate an additional cross ditch. Ensured disturbance to vegatation was limited.

Geotechnical

-N/A, monitor not on site today.

Sustainability

- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 10, 2015

Health and Safety Topics

- When lifting coco mats use safe lifting techniques and when hammering in stakes be careful not to hit hands or other limbs.
- As we are beginning to cleanup the site, use safe lifting techniques, wear appropriate PPE and keep an eye on LB160, especially in tight areas of the staging area.

Daily Activities

- King Hoe gathered more woody debris from around the site for laying on top of coco matting.
- KH laid out stakes and matting around site in preparation for coco matting installation.
- At 0915 Vast surveyors arrived on site and performed survey of MDZ and Area 3 excavations. They also shot the former hump of fill area. Survey completed at 1330.
- Kalina Noel on site at 1430, and performed general inspection of recontouring and works completed to date in the MDZ.
- Steward (Braun) arrived on site at 1500, and performed general inspection of the slopes and excavation re-contouring. Stewart approved of the works completed to date, and he indicated that the slopes were adequate for
- Approximately 9 rolls of coco matting were layed down in the eastern portion of the MDZ. Kalina Noel boradcasted seed prior to mats being layed. Mats were staked and trenched in at northern extent of mats.

Environmental Protection

-Onsite in afternoon to oversee and direct laying of coco/straw matting.

-Assessed locations of diversion ditches placed under direction of Vast Environmental.

-Placed seeds as needed under and on top of matting and in areas where no matting will be placed but some disturbance present due to debris removal.

-Discussed with KHE the overall plan for placement of matting with respect to likelihood of water movement following changes to site.

-Discussed the use of the excavation area by wildlife. Minor benches created using shovels and to key in matting along south slope.

-To continue east to west up the trail with matting and seeding.

Geotechnical

-N/A, monitor not on site today.

Sustainability

- Carpooling to site and back.
- Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 11, 2015

Health and Safety Topics

- When lifting coco mats use safe lifting techniques and when hammering in stakes be careful not to hit hands or other limbs.
- As we are beginning to cleanup the site, use safe lifting techniques, wear appropriate PPE and keep an eye on LB160, especially in tight areas of the staging area.

Daily Activities

- King Hoe started the day loading the two marookas on a flatbed truck and gathering swamp mats for loading on the 13th.
- KH and SLR continued seeding and laying out coco matting. Good progress was made. Approximately 20 coco matts were laid down (there are numberous ends still left to be used in patching up).
- Woody material which was piled at various locations along the trail was then dispersed across the coco matting by SLR and KH staff.
- Conference call with Brad, EC, KH and SLR @ 11 MST regarding progress with coco matting. Having all works completed by Thursday afternoon is anticipated. Gate to be closed following tour of site with Lindsay Paterson on Friday (March 13th) morning.

Environmental Protection

-Onsite EM to guide erosion control blanket installation in excavation area and along trail.

-Placed native seed mix in areas to be matted.

-Noted that potential for erosion/scour at north end of diversion ditch established within lower east end of MDZ. Consulted with Clarke Geosciences and placed a scour pad at north end of ditch with cobble and woody debris obtained from the site.

-Guided placement of woody debris on top of matted excavaton area and locations for staking.

-Provided guidance on best areas for trenching matting at top of slopes. Allowed for continuation of existing wildlife trails and to provide new trails through matted excavation area.

-Attended weekly update conference call and provided EM update.

-Started to collect flagging around exclusion zones. Will collect flagging of wildlife trees and burrows next day.

Geotechnical

- Kalina Noel communicated with Jen Clarke throughout day on woody debris placement, diversion ditches and scour pad. Also provided a view of the erosion blanket placement to date via Facetime in afternoon. Jen was pleased with progress to date.

Sustainability

- Carpooling to site and back.
- Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 12, 2015

Health and Safety Topics

- Its easy to trip on coco matting, so watch your step.
- When lifting coco mats use safe lifting techniques and when hammering in stakes be careful not to hit hands or other limbs.
- As we continue to cleanup the site, use safe lifting techniques, wear appropriate PPE and keep an eye on LB160, especially in tight areas of the staging area.

Daily Activities

- King Hoe started the day loading swamp mats on a flatbed truck. Loading completed by 10:30 am.
- KH and SLR continued seeding and laying out coco matting. Finished seeding and coco matting upper trail and lower trail. Seeding and matting complete.
- Woody material which was piled at various locations along the trail was then dispersed across the coco matting by SLR and KH staff.

Environmental Protection

-Present onsite to guide finalization of coco/straw matting to entrance of site.

-Seeded remainder of site restored with coco/straw matting.

-Applied extra seed to previously restored gully area on upper area of site.

-Applied seed to area at fence disturbed by cleanup of SMA.

-Applied coarse woody debris where available to remainder of trail and where matted on upper trail at east end of site.

-Assessed state of marsh following warm weather - noted at foreshore area where spyder hoe fell through ice when accessing marsh cleanup area in January recovering well.

-Assessed marsh shoreline where cleanup occurred. Ice receding but still present around silt curtain. Observed previous restoration area. Still recovering well.

Geotechnical

No geotechnical onsite today. Consulted with Clarke Geosciences as needed.

Sustainability

- Carpooling to site and back.
- Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

Daily Report Wilmer Marsh - Mar 13, 2015

Health and Safety Topics

- Be cautious of tripping hazards where coco matting has been placed.
- As cleanup and demobilization of the site is completed, use safe lifting techniques, wear appropriate PPE and keep an eye on LB160, especially in tight areas of the staging area.

Daily Activities

- King Hoe finished site cleanup activities and loaded out all equipment except for site trailer and excavator.
- KH will remove site trailer and excavator tomorrow (Mar 14).
- KH closed and secured fence and graded the road and SMA area.
- SLR staff on site to observe final cleanup activities and inspect restoration work. Restoration condition was deemed acceptable for final completion of project.

Environmental Protection

-Present onsite to observe final cleanup and restoration work.
-Observed equipment load out and final grading of SMA and surrounding areas.

Geotechnical

No geotechnical onsite today.

Sustainability

- Carpooling to site and back.
- Sharing a house in Invermere.
- Minimal distance to travel to site from Invermere.
- Majority of manpower onsite foot traffic,

APPENDIX B
Regulatory Context

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

APPENDIX B: REGULATORY CONTEXT

The Site is crown-owned land under the custodianship of CWS and therefore falls under federal regulatory jurisdiction. The prime regulatory framework considered is that of the CCME. The primary federal documents considered to pertain to the remediation project at the Site include the following:

- CCME Canadian Environmental Quality Guidelines (1999, updated to 2014): this document contains guidelines for contaminant concentrations in soil, sediment and surface water for the protection of environmental and/or human health; and
- CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2001, updated 2008).

The origin of the CCME Environmental Quality Guidelines (EQGs) began in 1987 with the release of the Canadian Water Quality Guidelines by the Canadian Council of Resource and Environment Ministers (later known as CCME). In 1990, the role of the CCME was defined to act as the principal vehicle for inter-jurisdictional cooperation on environmental issues of national and international concern[1]. After that time, CCME task groups were established to coordinate and develop nationally consistent guidelines for water, sediment, tissue and soil quality. In 1999, the work of the various task groups was formalized within the CCME EQG. The CCME EQG represent “nationally endorsed, science-based goals for the quality of atmospheric, aquatic, and terrestrial ecosystems” and are “defined as numerical concentrations or narrative statements that are recommended as levels that should result in negligible risk to biota, their functions, or any interactions that are integral to sustaining the health of ecosystems and the designated resource uses they support” (CCME, 1999). The CCME EQG are continuously updated as new chemical and toxicological information becomes available.

In addition to the CCME EQG discussed above, the CCME has produced standards for petroleum hydrocarbons in soil. The Canada-Wide Standards for Petroleum Hydrocarbons in Soil (PHC CWS) establish the levels to which petroleum hydrocarbon-contaminated soil and sub-soil are to be remediated for four applicable land uses (Agricultural, Residential/Parkland, Commercial and Industrial land use). The PHC CWS sets out generic limits protective of human and ecological health, as well as a process for generating site-specific numbers based on the science of risk assessment.

Provincial regulatory levels for soil were relied upon to classify soil generated during the remediation project for contract classification purposes and to facilitate off-site disposal at provincially permitted facilities.

The Contaminated Sites Regulation (CSR) under the *Environmental Management Act* (EMA) is the principal regulatory document defining requirements for contaminated sites management in British Columbia. The CSR came into effect on April 1, 1997 and was amended most recently on January 31, 2014 via the Stage 9 amendments. The Hazardous Waste Regulation (HWR) may also apply at some provincial sites. Director’s interim standards pursuant to section 63.1 of EMA and protocols pursuant to section 64 of EMA are also legally binding on provincial lands.

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[1] CCME, 1990. Statement of Interjurisdictional Cooperation on Environmental Matters.

The EMA and CSR have provisions for both numerical standards and risk-based standards approaches to managing site contamination. The legislation outlines the procedures for site assessment, remediation and application for environmental closure for a property. Numerical standards are a key component of the requirements in the CSR, as they define whether a site is contaminated or has been satisfactorily remediated when the numerical standards approach has been used.

Technical Guidance, Administrative Guidance, Procedure and Policy documents, and website Questions and Answers[2] issued by the BC Ministry of Environment (BCMOE) clarify interpretation of regulatory standards and requirements and provide information regarding their application. Provisions in these documents are not legally binding but indicate the expectations of the BCMOE.

Provision exists in the CSR (Section 11(3)) for considering background concentration standards for soils and requirements have been specified in a Protocol for using local and regional background soils concentrations as an alternate to numerical standards prescribed in the CSR.[3]

The presence of hazardous waste is included in the definitions for "contamination" and "contaminated site" in section 39 of the EMA. The presence / absence of hazardous waste soil at a site is determined by reference to standards in the HWR. Hazardous waste soils are defined by criteria for Federal Transportation of Dangerous Goods Regulation (TDGR) Classes 2, 3, 4, 5, 6, 8 or 9 and HWR definitions for: polychlorinated biphenyl (PCB) waste; wastes containing dioxin; waste oil; leachable toxic waste (HWR Schedule 4, Table 1); waste containing tetrachloroethylene; and, waste containing polycyclic aromatic hydrocarbon.

A discussion of the specific federal and provincial guidelines/standards referenced during the remediation project is provided in Section 2.7 of the report.

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[2] See the BCMOE website at: http://www.env.gov.bc.ca/epd/remediation/q-a/index.htm

[3] *Determining Background Soil Quality*. Protocol 4 for Contaminated Sites. October 12, 2010. Ministry of Environment

APPENDIX C
Project Permit Correspondence

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

15 May 2014

Gloria White
Environment Canada – Canadian Wildlife Service
5241 Robertson Road
RR#1
Delta, BC V4K 3N2

Project No.: 219.05112
Client Reference No.: DFRP # 16096, ARMS # 00394, FCSI # 16096079

Dear Ms. White,

RE: REQUEST TO AMEND PERMIT BC-13-0041
ADDITIONAL SCIENTIFIC APPLICATION INFORMATION
UPLANDS GULLY AND TRAIL AREA
WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA
NEAR WILMER, BC

SLR Consulting (Canada) Ltd. (SLR) is submitting additional scientific permit application information in support of an amendment of SLR's current permit (BC-13-0041) for the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA), near Wilmer, BC (the Site).

While it is understood that an application for a permit to kill and/or capture migratory birds is not required as a part of this project, information required in a portion of that application is required for a permit to conduct the proposed works. SLR has provided the information below for each applicable section of the scientific application.

REQUEST FOR MULTI-YEAR PERMIT?

No.

PROJECT START AND END DATES

SLR proposes to conduct the additional work soon after receiving the permit, but likely no earlier than **May 21, 2014**. SLR proposes to have the project completed no later than **June 15, 2014**. It is likely that the project will be completed earlier than this date, and SLR will advise CWS upon completion.

ORIGINAL PROJECT TITLE (maximum 50 letters)

Test Pitting and Water Sampling Program in NWA.

PROJECT DESCRIPTION (condensed version of proposal, two paragraphs)

The additional work involves hand-seeding of some areas that were disturbed during previous environmental investigation activities (one uplands gully and the trail area). Seed would be obtained from Sagebrush Nurseries, considered to be a reputable seed supplier by CWS, in the following blend: Bluebunch Wheatgrass (60% by weight), Sandberg's bluegrass (15% by weight), Idaho fescue (15% by weight), and Indian Ricegrass (10% by weight). The seed would be applied manually (i.e. by hand) by a contractor who has worked previously at the site (Lotic Environmental Ltd. from Cranbrook, BC) and no machinery would be involved. SLR's environmental monitor would be present during the seeding.

PROJECT LOCATION(S)

The Site is located within the Wilmer Marsh Unit of the Columbia National Wildlife Area, approximately 1.2 kilometres north of Wilmer, BC. The latitude and longitude for the gate at the entrance to the Site off of Westside Road is 50˚33'00.78"N, 116˚04'16.82"W.

PROJECT COMPONENT(S)

Hand seeding previously disturbed areas (one uplands gully and the trail area).

DESCRIPTION OF BIOPHYSICAL EFFECT

None.

CUMULATIVE EFFECTS

None.

DESCRIPTION OF MITIGATION MEASURES

The proposed works will be located away from the marsh/shoreline up the trail and on the uplands bench. An environmental monitor will conduct a pre-site inspection for species at risk/sensitive species previously noted in an Environmental Assessment conducted for the site; should any be encountered, CWS will be contacted and the work plan revised to avoid impacts to species noted. Seed would be obtained from a supplier considered to be reputable by CWS.

RESIDUAL EFFECTS ADVERSE

None.

EFFECTS LIKELY SIGNIFICANT

The overall objective for the proposed work is intended to result in a net benefit to the Site in the long-term as disturbed soils will be revegetated and stabilized.

A copy of the permit amendment request, dated May 15, 2014, has been submitted separately to CWS.

If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours sincerely,
SLR Consulting (Canada) Ltd.

By Email

Lindsay Paterson, MSc, PAg
Soil Scientist

LP/lp

2014 May 15 Wilmer Permit Request Seeding Sci App Info.docx

Environment Canada / Environnement Canada

ENVIRONMENT CANADA - ENVIRONNEMENT CANADA
PERMIT – PERMIS

Digging of Test Pits	**BC-13-0041#2**
Permit for/Permis de pour	Permit no./ No. de permis
British Columbia / Colombie Britannique	**4**
province(s), territoires -la (les) provinces / territoires	Issued under section/Délivre en vertu de l'article

Name and address - Nom et adresse

Wildlife Area Regulations
Règlement sur les réserves de la faune

SLR Consulting (Canada) Ltd.
Lindsay Petersen
200-1475 Ellis Street
Kelowna BC V1Y 2A3

Date of issue/ Date démission : **01 April 2014**
Date of expire /Date d'expiration; **30 June 2014**

For the minister/ Pour le ministre

Special Conditions / Conditions spéciales

Wilmer Marsh Unit Columbia National Wildlife Area
Test Pitting and Water Sampling
Supersedes BC-13-0041 an BC-13-0041#1
Project No.: 219.05112
Reference no: DFRP # 16096, ARMS # 00394, FCSI # 16096079
Amendment to end day additional work seeding of grass

1. Permit must be signed to be valid.

2. This permit allows for work around migration in the area.

3. The purpose of the permit is to assess the extent of debris in the trail through the advancement of test pits and to evaluate the quality of any subsurface water that may be in contact with the debris through the installation of standpipe piezometers and/ or collection of surface runoff water samples.

4. This work to be completed by May 31, 2014 - SPIDEX All Terrain Excavating will dig approximately 40 test pits using the hoe. SPIDEX to visual inspect subsurface material in the trail are for the presence of debris. Test pits will be advanced to the maximum depth achievable based on geotechnical constraints where debris is observed to be extensive or the depth of the natural native soil all soil to be placed back into pits.

5. Any additional work to be carried out in accordance to permit application this would be as follows. The additional work involves hand-seeding of some areas that were disturbed during previous environmental investigation activities (one uplands gully and the trail area). Seed would be obtained from Sagebrush Nurseries, considered to be a reputable seed supplier by CWS, in the following blend: Bluebunch Wheatgrass (60% by weight), Sandberg's bluegrass (15% by weight), Idaho fescue (15% by weight), and Indian Ricegrass (10% by weight). The seed would be applied manually (i.e. by hand) by a contractor who has worked previously at the site (Lotic Environmental Ltd. from Cranbrook, BC) and no machinery would be involved. SLR's environmental monitor would be present during the seeding.

6. The issuance of this permit does not supersede the necessity to meet other legal requirements to acquire any federal, provincial or municipal licenses, permits or other authorizations required by law.

. . 2

Canada

7. This permit is not transferable to any other person(s) or organisation(s).

8. Upon completion notify Courtney Albert so an inspection of site maybe conducted.

Sub-permit holder: Employee(s) of SLR Consulting, Lotic Environmental Ltd.,
SPIDEX All Terrain Excavating Inc., 330-3104 30th Ave., Vernon, BC V1T 9M9

I declare that I have read and understand this Permit, including all the conditions attached.
Je déclare que j'ai lu et que je comprends le présent permis et toutes les conditions qui y sont prévues.

Signature of permit-holder(s)
Signature du détenteur du permis

19 August 2014

Gloria White
Environment Canada – Canadian Wildlife Service
5241 Robertson Road
RR #1
Delta, BC V4K 3N2

Project No.: 219.05112
Client Reference No.: DFRP # 16096, ARMS # 00394, FCSI # 16096079

Dear Ms. White,

RE: REQUEST FOR PERMIT
REMEDIATION PLANNING ACTIVITIES
WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA
NEAR WILMER, BC

SLR Consulting (Canada) Ltd. (SLR) is submitting this request for a permit to conduct remediation planning activities in the marsh and in the vicinity of the trail connecting the uplands and marsh at the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA), near Wilmer, BC (the Site).

1.0 PROPOSED WORKS

Based on work completed in 2013-2014, Environment Canada (EC) is planning to undertake remediation activities at the Site to remove residual debris present in the marsh and to remove debris and associated contaminated soil located in the trail area between the uplands and the marsh (please refer to SLR draft report *2013/2014 Site Works Summary and Remedial Action Plan Report, Former Refuse Site – Wilmer Marsh Unit, Columbia National Wildlife Area, Near Wilmer, British Columbia,* dated March 31, 2014*).*

This permit request is in regards to the following proposed works which are necessary to conduct the remediation activities (please note a separate permit application will be submitted specifically for the remediation activities which are proposed to occur in January-February 2015):

- Completion of wildlife (including Western Toad, Painted Turtle and American Badger) surveys and wildlife tree surveys. The wildlife tree surveys would be conducted to identify potential wildlife trees in the vicinity of the remediation works which may be impacted by the site activities and to identify “no-work” buffer zones around the affected wildlife trees. No intrusive activities would be conducted during the surveying;
- Identification of the remaining debris in the marsh (i.e. recording UTM coordinates and field-flagging with plastic or wooden stakes). Stakes would be installed manually using a hammer and may involve the use of an inflatable raft;

- Identification of the limits of the buried and surficial debris areas in the trail (recording UTM coordinates and field-flagging with plastic or wooden stakes). Stakes would be installed manually using a hammer;
- Identification and testing of a potential backfill source (located off-site) for the remediation activities in consultation with Canadian Wildlife Service (CWS). The potential backfill will be tested for potential contaminants, specifically benzene, ethylbenzene, toluene and xylenes (BTEX), petroleum hydrocarbon fractions (F1-F4), polycyclic aromatic hydrocarbons (PAH), total metals and salt parameters (saturated paste sodium and chloride). Please note that the backfill will be located off-site (location determined in consultation with CWS) and no intrusive sampling will be conducted at the Site;
- Collection of baseline surface water turbidity parameters (total suspended solids and total dissolved solids) in the marsh. The surface water samples (two) would be collected manually using a extendable sampling tool or from an inflatable raft;
- Installation of a sediment curtain in the marsh. The sediment curtain would be installed from the shoreline in an arc extending to approximately 30 m offshore around the residual debris in the marsh (total length of approximately 120 m, curtain depth of approximately 3 m). SLR will be forwarding equipment and methodology information on the installation of the sediment curtain from Lotic Environmental Ltd. in the near future. It is anticipated that the sediment curtain would remain in place until Spring 2015;
- Completion of a site visit with EC, Fisheries and Oceans Canada and Health Canada Expert Support to discuss remediation planning. No intrusive activities would be associated with the site visit.

2.0 GENERAL WORK PLAN CONSIDERATIONS

All project works will be carried out in such a manner so as to avoid any adverse impacts on fish or wildlife, or any harmful alteration of fish or wildlife habitat. It is noted that the installation of sediment curtains is considered by Fisheries and Oceans Canada to be a measure to avoid causing harm to fish and fish habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html).

Prior to the commencement of works at the Site, a qualified professional(s) will be present to conduct investigations to ensure that any wildlife present in the work area have been documented. If any unanticipated species of concern are encountered, this will be immediately documented and communicated to CWS prior to any works being undertaken.

A specialized contractor will install the sediment curtain in the marsh. The contractor (Lotic Environmental Ltd.) has been selected based on knowledge and experience in working: in sensitive environments and based on previous knowledge and experience at the Site.

Please note that based on previous correspondence with Environment Canada (letter dated November 25, 2010), a Species at Risk permit was not required for previous works completed in the marsh (refer to page 3 of the attached document). The proposed project works described in Section 1.0 of this letter include the activities requested by Environment Canada in November 2010, specifically:

- Western Toad and Painted Turtle surveys;
- American Badger den surveys;
- Wildlife tree surveys.

On this basis, it is SLR's expectation that a Species at Risk permit would not be required for the proposed pre-remediation activities.

3.0 TIMING

SLR is proposing to conduct the remediation planning activities the week of September 15, 2014.

If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours sincerely,
SLR Consulting (Canada) Ltd.

By Email

Lindsay Paterson, MSc, PAg
Soil Scientist

LP/lp

Attachments: Environment Canada Letter dated October 25, 2010
Photos 1 through 4
Site Plan
Google Earth Image

2014 August 19 Wilmer Permit Request Pre-Remediation Program.docx

Environment Canada / Environnement Canada

Environmental Protection Operations
Environmental Stewardship Branch
Pacific and Yukon
201 - 401 Burrard Street
Vancouver, BC V6C 3S5

November 25, 2010

CEAR: 10-01-59103
ECPT: 10-1007
PWGSC: R.032919.005

Mr. Kevin Inouye
Environmental Specialist
Environmental Sciences
Public Works and Government Services Canada
401 – 1230 Government St.
Victoria, BC V8W 3X4

Dear Mr. Inouye:

Re: Environment Canada Determination on Environmental Assessment Role and Advice for Marsh and Shoreline Remediation Works in the Wilmer Marsh Unit, Columbia National Wildlife Area, Wilmer, BC

I am writing in response to your letter dated October 15, 2010 in which you request Environment Canada's comments on the above-mentioned project proposal. Please be advised that Environment Canada has determined that it is obliged to conduct a screening-level environmental assessment of the proposed project under the *Canadian Environmental Assessment Act* (CEAA), and is therefore a Responsible Authority. In accordance with section 5 of CEAA, an environmental assessment is required because Environment Canada:

- is the proponent;
- may provide funding under the Federal Contaminated Sites Action Plan to enable the project to be carried out; and
- may issue a permit pursuant to section 4 of the *Wildlife Area Regulations* under the *Canada Wildlife Act.*

Environment Canada understands that Public Works and Government Services Canada (PWGSC) is acting as the Federal Environmental Assessment Coordinator. The following advice relating to the project proposal is therefore provided to assist PWGSC with completing the required environmental assessment on Environment Canada's behalf.

Environment Canada's Environmental Assessment Unit in the Pacific and Yukon Region has reviewed the following documents relating to the project proposal:

- preliminary project referral (received from PWGSC on October 15, 2010);
- Ecological Risk Assessment documentation (received November 4, 2010);
- *Environmental Assessment Screening Draft Report for Wilmer Marsh and Shoreline Remediation* ('Draft Report'), dated November 2010, prepared by Hemmera (received November 12, 2010);

and hereby offers the following comments and recommendations relating to water quality, species at risk, contaminated sites and wetlands, as well as other CEAA requirements.

PROJECT OVERVIEW

The proposed project site, located 1.2 km north of the Town of Wilmer, BC, is located within the Columbia National Wildlife Area which is managed by the Canadian Wildlife Service of Environment Canada. The site in question has historically been used as an unauthorized dump for garbage and other debris. The project is planned in two phases:

- Phase I: removal of debris/garbage and contaminated sediment from the marsh
- Phase II: removal of debris and contaminated soils from the shoreline

Both phases are expected to be carried out during winter 2010.

DRAFT SCREENING REPORT

Page iii of the Draft Report provides details concerning the environmental assessment. Under "Lead RA Sect.5 Trigger," in addition to "proponent," the "funding" and "permit" triggers should also be checked.

Under section 2.2.1.1 "Site Clean-up and Remediation," it is indicated that helicopters will be used to carry out some of the activities. This is in contradiction to the preferred alternatives section where helicopter activity was not recommended.

The project schedule (section 2.3) indicates that the physical work will be taking place during fall/winter of 2010/2011. It is important to note that if Phase I of the project cannot be finished in fall 2010, then it may need to be completed in fall 2011. If marsh remediation work is undertaken at a different time of year (for example, during spring 2011) there may be additional review or mitigation required.

Air quality is addressed on pages 21-22 of the report. Given that metals are understood to be the key contaminants at the site, air quality is not expected to be a useful indicator of environmental effects, since metals in general are not volatile and therefore are not expected to be present in the air compartment.

Under section 2.4.1.2 "Socio-Economic," the report needs to include a discussion of the current use of land and resources for traditional purposes by Aboriginal persons at the site, in accordance with the definition of environmental effects under CEAA. As well, this section should include information to support the conclusion that the site has low potential for archeological resources.

Under section 2.5, traditional use should be included in the list of valued components.

We cannot comment on Section 3 (including tables 4 and 5) because this part of the report has not been completed.

In Table 6 "Effects Analysis and Mitigation Measures: Biophysical Components", in relation to:

- the Valued Ecosystem Component (VEC) titled Soil and Marsh Sediment, it is stated that work will not be conducted during heavy rainfall. Please define heavy (ex. > x mm of rainfall).

- the VEC titled Vegetation, the residual effects and significance fields have not been completed.
- various VECs (including Vegetation, Fish and Fish Habitat, Wildlife and Birds and Federal Listed Species) there is a mitigation measure that states that a qualified professional will document species at risk found prior to commencement of works. These sections should indicate the mitigation planned if the species are found.
- the VEC titled Surface Water, please find attached the updated document titled *Interim Guidance for Addressing Water Quality for Work In and Around Water.*

Table 7 "Effects Analysis and Mitigation Measures: Socio-Economic Components" lists Native Lands as a Valued Social Component, but the following cells (effects, mitigation, significance etc.) are blank. Table 7 also seems the logical place to include the required assessment of potential impacts to current use of lands and resources for traditional purposes by Aboriginal persons.

Under section 4.2.1 "Spills," note that Environment Canada recommends that all spills be reported to the Provincial Emergency Program (not just spills to land).

Section 4.3 states that there are no cumulative effects because there are no other current activities at the site. However, cumulative effects assessment includes past, current and future projects, and is related to whether the project's residual impacts overlap with the impacts of other (past, present and future) projects. This section should confirm that none of the project residual effects have the potential to interact with effects from other past, present or future projects.

WILDLIFE AND SPECIES AT RISK

The attached guidance document titled *Wildlife Advice for Environmental Assessments* includes basic wildlife and species at risk information, which is provided in addition to the following project-specific advice.

Based on information provided to date, the Canadian Wildlife Service of Environment Canada has determined that a permit under the *Species at Risk Act* (SARA) is not required in relation to the proposed project.

The Canadian Wildlife Service recognizes that the purpose of the project is to remediate existing contamination on the site. It is further acknowledged that alternatives have been considered, including a 'No Action' alternative, and that the proposed option has been selected based on consideration of several factors, including minimizing adverse impacts to species at risk, migratory birds and wetlands. Based on information provided to date, it is likely that the project will improve ecological conditions on the site, including habitat conditions for wildlife. Notwithstanding these considerations, the following specific concerns and recommendations relating to wildlife and species at risk are noted.

<u>Concern (1): *Species at risk surveys*</u>

There is the potential for species at risk (SAR) as defined under SARA to occur at the site, however their presence cannot be confirmed because dedicated field surveys specific to the project area have not been completed. Based on the desktop search and reconnaissance-level information collected to date, the Canadian Wildlife Service agrees that the likelihood for SAR species to occur at the project site can be characterized generally as 'low'. However, for SARA-listed species that have a higher potential to interact with the project, namely, American Badger,

Canada

Western Toad, and Painted Turtle, several additional measures should be taken prior to commencement of project activities.

Recommendations:
Generally, the mitigation measures for species at risk identified in Table 6 of the Draft Report are acceptable; however, we recommend that they be amended to include the following:

- In addition to being conducted by a qualified professional, Painted Turtle and Western Toad site surveys should be conducted following Resources Inventory Committee (RIC) standards. Despite the reduced habitat quality on the site caused by contamination, Western Toad and Painted Turtles may be present on the site. Painted Turtles are known to breed in the area (Vanessa Kilburn, Painted Turtle Recovery Team, pers.comm., November 19, 2010) and the site holds habitat characteristics (albeit degraded) for Painted Turtle and Western Toad. Although the late fall is not an ideal time to survey for either species, there is still a reasonable potential that they may be detected if surveys are conducted as soon as possible. If either of these species are identified on the site (during surveys or during the course of the project), the Canadian Wildlife Service should be contacted immediately for advice; this advice should be implemented prior to project commencement/continuation.
- A site survey for active American Badger (jeffersoni subspecies) dens should be conducted prior to project commencement. The survey should follow RIC standards and be conducted by a qualified professional. The survey should be completed as soon as possible since badgers enter a period of inactivity sometime between December and March. If an active den is identified on the project site, the Canadian Wildlife Service and the American Badger recovery team chair should be contacted immediately for advice; this advice should be implemented prior to project commencement, or in the case of active dens indentified during the course of the project, prior to continuation of project activities.
- Based on outcomes of the above and other wildlife surveys conducted prior to commencement of project works, a provincial permit may be required for handling/salvaging/relocating wildlife species. Please contact the British Columbia Ministry of Environment Permit Authorization Service Bureau at 1-866-433-7272 for further information.

Concern (2): *Wildlife trees*
Currently it is unclear whether the project has the potential to impact wildlife trees. These trees serve as important habitat for migratory birds and/or SARA-listed birds and impacts to them should be avoided.

Recommendation:
Reconnaissance surveys should be completed prior to commencement of project activities to identify the wildlife trees on or adjacent to the project site. If wildlife trees with the potential to be impacted by the project are identified, impacts to them should be avoided though the use of appropriate 'no work' buffers. If wildlife trees are identified, the Canadian Wildlife Service should be contacted for advice, and the advice should be implemented prior to project commencement.

Concern (3): *Migratory and SARA-listed bird nest surveys*
It is somewhat unclear whether project activities have the potential to overlap with the breeding bird season (i.e. if there are delays etc.).

Recommendation:
For clarity, we recommend avoiding project-related activities during times that have the potential to harm migratory birds or their active nests. The migratory bird breeding season varies between regions across British Columbia. The period from March 15th to August 15th will generally include breeding activity for most, though not all, avian species across the province. In the event that project activities will unavoidably overlap with the breeding bird season, due diligence must be exercised to avoid harm to migratory birds, and it is recommended that an Active Migratory Bird Nest Survey (AMBNS) program be employed to reduce the likelihood of disturbing or destroying active nests. Please refer to the attached guidance document titled *Active Migratory Bird Nest Surveys* for additional information.

Concern (4): *Masked Sensitive Occurrence*
We note that a BC Conservation Data Centre 'masked sensitive occurrence' is mapped in the area of the project site. Our reviewers have not been able to track down information pertaining to this occurrence.

Recommendation:
We recommend that information in relation to the masked sensitive occurrence be provided directly to Canadian Wildlife Service prior to commencing any project activities. We may offer further comments and recommendations based on the information provided.

Concern (5): *Federally Listed SAR Appendix E*
The information provided in Appendix E appears to be somewhat outdated.

Recommendation:
Appendix E should be updated to include recent assessments by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as well as recent updates to Schedule 1 of SARA. In particular, Lewis' Woodpecker is now listed as Threatened by COSEWIC (not special concern, as the Appendix indicates) and the table should be amended to reflect this. It is noted that several at-risk species are missing from the table at the end of the Appendix, including Western Toad and Painted Turtle. A title and brief explanation should be provided for the table at the end of the Appendix; this should clarify the table contents (i.e. is it meant to be a comprehensive list of species at risk with the potential to occur on the project site? – if so, why are Western Toad and Painted Turtle missing?), the meaning of the 'Identified Wildlife' column in the table, and how the likelihood values (far right column) were determined.

Concern (6): *Backfilling of shoreline area*
The Draft Report indicates that the shoreline area will be backfilled with locally source materials. The Canadian Wildlife Service is concerned that the backfill materials may generate invasive plant issues.

Recommendation:
Measures should be taken to avoid using backfill material containing seeds of invasive plant species.

MANAGEMENT OF CONTAMINANTS

The following comments relate only to the scope of project as defined in section 2.2 of the Draft Report. Please be advised that storing sediment and debris along the shoreline is only appropriate provided that adequate containment is in place to ensure no solid, liquid, or potential run-off associated with the stored sediment/debris enters the marsh. That said, based on the scope of project components as described on pages 8-9, it is unclear how debris will be stored on site; if the intention is for debris to be stored within impermeable on-site storage sacs (as is the case for sediment), it should be noted that this could compromise the impermeability of these storage sacs. The Draft Report should identify how excavated debris will be handled and stored on-site.

Consistent with standard recommendations outlined in the attached *General Guidelines for Contaminated Sites*, best management practices (i.e., mitigation measures) should be employed such that no contaminated media (e.g., sediment, run-off) be permitted to flow down gradient of the work area during excavation, storage, and/or transport of sediment and debris from the marsh.

CLOSING

Please be aware that Section 36(3) of the federal *Fisheries Act*, administered by Environment Canada, prohibits the discharge of deleterious substances to waters frequented by fish, or to a place where those substances might enter such waters. Therefore, the proponent (in this case the department and/or any contractors employed to deliver the project) must ensure that, at all times during the project, deleterious substances are prevented from entering into fish-bearing waters or any tributaries. Due diligence is required at all times to prevent such discharges, and adherence to the proposed courses of action suggested in this letter does not relieve any proponent of the requirement to comply with the *Fisheries Act.* All work associated with the project is also required to comply with the requirements of the *Canadian Environmental Protection Act, 1999*, the *Migratory Birds Convention Act*, the *Species at Risk Act* and all other applicable laws, legislation, and best management practices.

Please consider this advice as constituting fulfillment of Environment Canada's obligations under section 12(3) of CEAA. In order for us to evaluate the effectiveness of our advice under CEAA, we would appreciate receiving a copy of the final decision statement. If you have any questions, please do not hesitate to contact me at 604-666-7715.

Yours sincerely,

[*original signed by*]

Adriana Glos
Environmental Assessment Officer

Att. Environment Canada Interim Guidance for Addressing Water Quality for Work In and Around
Environment Canada Wildlife Advice for Environmental Assessments
Environment Canada Active Migratory Bird Nest Survey Programs
Environment Canada General Guidelines for Contaminated Sites

cc. Nicole Casault, Finance and Corporate Branch, Environment Canada

ACTIVE MIGRATORY BIRD NEST SURVEYS
ENVIRONMENT CANADA - CANADIAN WILDLIFE SERVICE
PACIFIC AND YUKON REGION
ADVICE TO INDUSTRY

Introduction

Incidental take refers to the killing of migratory birds, and/or the disturbance or destruction of their nests or eggs resulting directly or indirectly from human activities[1], where the primary objective of the activity is not the killing of migratory birds and/or the disturbance or destruction of their nests or eggs. Under federal jurisdiction, and within the mandate of the Canadian Wildlife Service of Environment Canada, migratory birds are those species identified in Article I of the *Migratory Birds Convention*[2]. The *Migratory Birds Convention Act, 1994* (MBCA) and the *Migratory Birds Regulations* (MBR) include prohibitions to address the conservation and protection of migratory birds in Canada. The MBR contain a blanket prohibition against the disturbance, destruction or take of the nests, eggs, nest shelter, eider duck shelter or duck box of migratory birds (subsection 6(a)).

Active Migratory Bird Nest Survey Program - Overview

Environment Canada recommends that industry avoid activities that will result in the disturbance or destruction of active migratory bird nests. Where the Proponent determines its activities will unavoidably overlap with the breeding bird season, Environment Canada recommends that the Proponent employ an Active Migratory Bird Nest Survey (AMBNS) program to reduce the likelihood of disturbing or destroying active nests. Doing so in turn reduces the likelihood that the Proponent will be in contravention of the MBCA.

The migratory bird breeding season varies between regions across British Columbia. The period from March 15th to August 15th will generally include breeding activity for most, though not all, avian species across the province. Environment Canada can advise on more specific breeding periods on a project-by-project basis. Environment Canada recommends that an AMBNS be employed if potentially harmful activities are proposed for a period immediately before, during or immediately after the general breeding bird season.

In developing an effective[3] AMBNS, the Inventory Methods for Forest and Grassland Birds, RIC 1999[4], is a useful standard that can be employed for the purposes of a nest survey design. Project, species and habitat specifics will determine whether additional or alternate measures are needed to assess breeding bird activity.

Information to be included in an AMBNS report needs to include:

- Methodology or methodologies employed;
- Area surveyed (including adjacent areas to account for spatial extent of disturbance impacts);

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[1] Those activities refer to: logging, fishing, agriculture, mining, recreation, electricity generation, etc.

[2] Occasional Paper number 1 'Birds protected in Canada under the Migratory Birds Convention Act' is Canada's policy document that lists protected bird species under the Act. This document, last updated in 1991, continues to be used on an interim basis until it is revised to better reflect changes in bird taxonomy and distribution.

[3] 'Effective' here is defined as a having a *reasonable likelihood of success.*

[4] Digital copies available at http://www.ilmb.gov.bc.ca/risc/pubs/tebiodiv/songbird/assets/songml20.pdf

- Prevailing meteorological conditions (humidity, wind, temperature);
- Survey effort (i.e. time allocation) and number of replicate surveys;
- Precise (i.e. geo-referenced) location of observation stations and transects;
- Surveyor qualifications (reports must be signed and sealed by a professional biologist (Registered Professional Biologist).

Survey guidelines:

Because most nests are notoriously difficult to find, surveys must be intensive. A systematic, replicated effort improves confidence of assessing the extent of breeding bird activity within a given area.

Survey effort (i.e. area covered/unit of time) will depend on, amongst other things, habitat type and topography. In general terms, 1.0 ha/hour/survey can be considered a rough rule of thumb, and a minimum level of effort. Steep or difficult terrain, and/or dense vegetation (e.g., riparian zones) will significantly increase the time required to carefully survey each area.

Surveys should be replicated at least twice (i.e. a total of three surveys/unit area) over a period of five days. Each survey day counts as one survey (only).

Surveys should be completed from sunrise to 10:00 am, when birds are most active and most easily identified.

Generally, a buffer with a 20-30 m width[5] around active nest trees should be employed, with adjustments for species-specific requirements. For active nests outside the area to be cleared, but within close proximity to it (in the order of 50 m), buffers also need to be employed, again with adjustments for any species-specific requirements. Species-specific buffer widths have been developed for certain bird groups, including for raptors and herons. For example, the recommended buffer width for a Great Blue Heron nest situated within an urban environment is 60 m[6].

Survey protocols:

1) *Observers should use a combination of transects and observation stations with clear lines of sight. Distance between transects should depend on the density of vegetation in each site, with denser sites receiving a greater number of transects per area. Transects must cover areas adjacent to each site to be cleared, to address disturbance impacts to nesting birds not located within the proposed clearing footprint. Particular attention must be given to nests that require relatively large protective buffers, including, for example, for raptor species and herons (see below).*

2) *Observers should record species (observed by sight and/or sound), indications of nesting activity (e.g., courtship behaviour, carrying nesting material or food). Observation stations, transects, nests, and sightings must be geo-referenced and marked on a topographic map.*

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[5] 'Buffer width' as measured from the edge of the nest tree canopy.
[6] For more information, refer to the following publication (available at http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare2006/develop_with_care_intro.html: *Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia.* March 2006. British Columbia Ministry of Environment.

Active Migratory Bird Nest Survey Program – Detailed

1.0 Initiating a New Survey Cycle

Prior to initiation of any clearing or disturbance-related activities, 1 AMBNS and 2 replicates must be completed within a 5 day period. Results of the surveys will determine whether clearing can proceed. If appropriate to do so, the clearing period will start on the day after the last survey and extend for a period of 10 days thereafter.

1.1 Extending the Survey Cycle 1-5 Days Following On-Alignment[7] Survey

To extend an existing AMBNS cycle for an on-alignment area, 1-5 days after the most recent approved survey, ONE replicate survey must be conducted within this 1-5 day period. Note that the day of the last survey counts as day 1.

1.2 Extending the Survey Cycle 1-4 Days Following Off-Alignment[8] Survey

To extend an existing AMBNS cycle for an off-alignment area, 1-4 days after the most recent approved survey, ONE replicate survey must be conducted within this 1-4 day period. Note that the day of the most recent approved survey counts as day 1.

1.3 Extending the Survey Cycle 6-9 Days Following On-Alignment Survey

To extend an existing AMBNS cycle for an on-alignment area, 6-9 days after the most recent approved survey, TWO consecutive replicate surveys must be conducted within the 6-9 day period.

1.4 Extending the Survey Cycle 5-9 Days Following Off-Alignment Survey

To obtain an extension of an existing AMBNS cycle for an off-alignment area, 5-9 days after the most recent approved survey, TWO consecutive replicate surveys must be conducted within the 5-9 day period.

1.6 Report Format, Naming, and Numbering

In instances where Environment Canada requests the results of an AMBNS program, a written report, with the corresponding maps and data sheets attached, must be submitted to the Department via email as a single .pdf file. Every conducted survey should receive its own unique report number. The report number should be assigned based on the previous survey conducted in the area.

1.7 Restarting a Cycle

In the event an AMBNS cycle period expires, a new cycle can be started by following the rules described in section 1.1 above. Note that although a new survey cycle has been started, the unique report number should follow the previous numbers and should not be reset.

1.8 Flagging

When the professional biologist overseeing or performing the survey determines that a bird nest is active, the tree should be clearly marked with flagging tape. A species-specific buffer (typically 20 m) should be established in on-alignment areas. In off-alignment areas, a 30 m buffer width (or other species-specific buffer) should be established around the active nest tree. If the professional biologist determines that a bird nest is inactive, the tree must be clearly marked with flagging tape and continually monitored for signs of activity.

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[7] "On-alignment" refers to a project development that is immediately adjacent to an existing project; for example, widening of an existing highway.

[8] "Off-alignment" refers to a project that is located in pristine or undeveloped habitat; for example, construction of a new road through un-fragmented forest habitat.

1.9 Pre-Clearing Survey

If the area is not cleared within 24 hours after the completion of the third survey, a pre-clearing survey must be conducted prior to clearing. This survey must be conducted by a wildlife specialist, bird surveyor, or a designate.

1.10 Nest Re-assessment

Proponents should contact the Canadian Wildlife Service of Environment Canada for advice regarding re-evaluating nests identified as active.

Environment Canada – Pacific and Yukon
General Guidelines for Contaminated Sites

Introduction

The following guidelines have been prepared to provide general contaminated sites advice in the context of environmental assessments.

These guidelines apply only to Environment Canada's mandate and expertise, primarily related to possible impacts to ecological receptors. The proponent is advised to also contact Fisheries and Oceans Canada (DFO) and Health Canada (HC) with regard to potential impacts to fish and fish habitat and human health, respectively.

Guidelines

Environment Canada recommends that the proponent take into account the following general considerations:

- Environment Canada recommends that contaminated media at the project site be addressed prior to divestiture of the site or the construction of new facilities, including using the correct[1] guidelines. In order to avoid potential liability associated with contaminated media, remediation to applicable guidelines should take current and future land use into account.

- If contaminated media is present at the site, care should be taken to avoid redistribution of contamination during proposed activities. Minimizing potentially contaminated media (i.e. soil, sediment) disruption and adequate containment of media that may be disturbed through the proposed work is recommended.

- If project involves excavation and relocation of contaminated media from the site, we recommend that the proponent be aware of and maintain records of volumes, characteristics and deposition locations. This will help prevent potential future problems regarding contaminated media originating the site. The proponent should take all reasonable measures to ensure that the relocation of contaminated media is conducted in accordance with best management practices.

- The province of BC operates a separate inventory of contaminated sites under provincial jurisdiction, and we recommend that the proponent contact the BC government for more information on contaminated sites as they relate to the proposed project.

The general considerations above are by no means comprehensive and are not necessarily applicable to all sites. Additional site-specific comments may be necessary to adequately address existing and/or potential contamination.

last updated November 9, 2010

[1] Correct guidelines should take into consideration land use and relevant media (i.e. common errors that occur include the application of soil guidelines to sediment, or application of 10 times water quality guidelines for groundwater).

Environment Canada - Pacific and Yukon
Interim Guidance for Addressing Water Quality for Work in and around Water

Introduction

The following guidelines have been prepared to provide general water quality advice for small projects involving construction in and around marine and fresh water that may be frequented by fish, including, for example, docks, bridges, shoreline protection, pile driving, etc.

These guidelines apply to only to Environment Canada's areas of concern, primarily for the protection of water quality. The proponent is advised to contact the regional Fisheries and Oceans Canada office if the project may result in any potential harmful alteration, disruption or destruction of fish habitat.

Guidelines

1. The proponent shall ensure that all plans and specifications relating to this project have been duly prepared and reviewed by appropriate professionals working on its behalf.
2. The proponent should be aware that Section 36(3) of the federal *Fisheries Act*, administered by Environment Canada, prohibits the discharge of deleterious substances to waters frequented by fish. Therefore, the proponent must ensure that deleterious substances from the project are prevented from discharging into fish-bearing waters or any tributaries. Due diligence is required at all times to prevent such discharges. Adherence to the advice of this document does not relieve the proponent of its ongoing responsibilities in this regard.
3. All work associated with the project involving the use of concrete, cement, mortars and other Portland cement or lime-containing construction materials shall be conducted so as to ensure that sediments, debris, concrete, and concrete fines are not deposited, either directly or indirectly into the aquatic environment. Any water contacting uncured or partly cured concrete or Portland cement or lime-containing construction materials, such as the water that may be used for exposed aggregate wash-off, wet curing, equipment and truck washing, etc. shall be prevented from entering, directly or indirectly, the aquatic environment unless this water has been tested and found to have a pH of between 6.5 and 9.0 and a turbidity of less than 25 NTU. Containment facilities shall be provided at the site for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment as required.
4. The proponent shall ensure that sediment or sediment laden waters or other deleterious substances are not allowed to enter the aquatic environment during the proposed work. Work should be conducted in accordance with best management practices, for example the sediment and erosion provisions of the *Land Development Guidelines for the Protection of Aquatic Habitat* (Fisheries and Oceans Canada, 1993, available at http://www-heb.pac.dfo-mpo.gc.ca/publications/pdf/165353.pdf).
5. An appropriate spill prevention, containment, and clean up contingency plan for hydrocarbon products (e.g., fuel, oil, hydraulic fluid, etc.), and other deleterious substances shall be put in place prior to work commencing, and appropriate spill containment and cleanup supplies shall be kept available onsite whenever the works are occurring. Further, all personnel working on the project should be familiar with implementing the spill clean up plan and the deployment of spill response materials.
6. Any fuel handling or storage associated with the project should comply with the Canadian Council of Ministers of the Environment (CCME) *Environmental Code of Practice for*

Aboveground and Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products (2003). Please be aware that Environment Canada currently has proposed *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations* under CEPA, 1999. It is anticipated these Regulations will be published and come into force during early 2008.

7. If land-based equipment or machinery is used to conduct the proposed works, the equipment/machinery should operate from the upland or operate from the intertidal foreshore within the footprint of the proposed works. Impacts to the intertidal foreshore outside the footprint of the proposed works must be prevented.
8. All machinery used on site should be in good repair and free of excess oil and grease. Any fuelling or maintenance of such equipment should occur on the upland well away from the foreshore.
9. Any material, such as rip rap, gravel, etc., placed below the higher high water mark must be free of silt, overburden, debris or any other substances deleterious to aquatic life.
10. A dock facility should be designed and located so as to preclude tidal grounding of any floating component on the foreshore.
11. No unserviced float homes or live-aboard vessels should be moored at a dock facility. Sewage discharges from ships must adhere to Subdivision 4 – Sewage Discharges of the *Canada Shipping Act*.
12. Under the *Fisheries Act*, Management of Contaminated Fisheries Regulations, the harvesting of bivalve molluscs, (oysters, clams, mussels) is prohibited for any purpose within 125 metres of any wharf, dock, platform or other structure used for vessel moorage, or any permanently anchored floating structure, including float homes, barges, platforms and vessels. It is the proponent's responsibility to ensure commercial, recreation and First Nation shellfish harvesting opportunities are not hindered by placement of such structures.
13. Any timber preservatives are to be applied in a manner consistent with current best management practices such as Appendix 2, Requirements for Using Treated Wood, in the guidebook *Environmentally Sustainable Log Handling Facilities in British Columbia* (Fisheries and Oceans Canada, April 2003). Available at http://www.dfo-mpo.gc.ca/Library/274124.pdf.
14. General log handling operations have the potential to cause serious impacts to the local environment through the aquatic deposition of large amounts of secondary woodwaste (i.e. bark chips, etc.). To reduce the amounts of woodwaste introduced into the environment through log handling activities, please refer to DFO published guidebook, *Environmentally Sustainable Log Handling Facilities in British Columbia* , available at: http://www.dfo-mpo.gc.ca/Library/274124.pdf. For information regarding the log bundling strand recycling initiative – see: http://www.pyr.ec.gc.ca/disposal_at_sea/bundlewire_e.htm.
15. If steel piles are to be used, they must be capped to prevent the entry of wildlife.
16. All demolition materials are to be disposed of upland in an authorized manner. In this regard, it should be noted that burning of preservative-treated timber is not permitted. Whenever possible, recycling of materials is encouraged.
17. Only clean, uncontaminated material may be used as fill.

Closing

This advice does not constitute an approval. The proponent is responsible for ensuring that all work associated with the subject project complies with the requirements of the *Fisheries Act*, the *Canadian Environmental Protection Act, 1999*, the *Migratory Birds Convention Act*, the *Species at Risk Act* and all other applicable laws, legislation, and best management practices.

WILDLIFE ADVICE FOR ENVIRONMENTAL ASSESSMENTS
ENVIRONMENT CANADA - CANADIAN WILDLIFE SERVICE
PACIFIC AND YUKON REGION
ADVICE TO INDUSTRY

Introduction

The Canadian Wildlife Service of Environment Canada offers the following general advice on addressing wildlife and wildlife habitat within an environmental assessment, in accordance with the department's mandate. For more detailed advice, Proponents are encouraged to consult the additional guidance documents available on Environment Canada's website at:

> http://www.ec.gc.ca/nature/default.asp?lang=En&n=132ADBFC-1&parent=0C1743A2-4D49-4183-AC5F-1DE909D2FEB1

Migratory Birds and Incidental Take

Incidental take refers to the killing of migratory birds, and/or the disturbance or destruction of their nests or eggs resulting directly or indirectly from human activities, where the primary objective of the activity is not the killing of migratory birds and/or the disturbance or destruction of their nests or eggs. Environment Canada expects due diligence be exercised to avoid harm to migratory birds.

Under the current regulatory framework pursuant to the *Migratory Birds Convention Act, 1994* (MBCA), Environment Canada recommends that Proponents avoid conducting project-related activities during times that have the potential to harm migratory birds or their active nests. The department is currently in the process of developing best management practices and avoidance guidelines that will provide direction to industry and the general public on this matter, and concomitantly support the conservation of migratory birds, as individuals and as populations.

The migratory bird breeding season varies between regions across British Columbia. The period from March 15th to August 15th will generally include breeding activity for most, though not all, avian species across the province. Environment Canada can advise on more specific breeding periods on a project-by-project basis.

In the event a Proponent determines that its activities will unavoidably overlap with the breeding bird season, Environment Canada expects due diligence be exercised to avoid harm to migratory birds, and recommends that the proponent employ an Active Migratory Bird Nest Survey (AMBNS) program to reduce the likelihood of disturbing or destroying active nests. Doing so reduces the likelihood that the Proponent will be in contravention of the MBCA. Environment Canada recommends that an AMBNS be employed if potentially harmful activities are proposed for a period immediately before, during or immediately after the general breeding bird season.

Please contact Environment Canada for a list of technical reports, papers or other information relating to migratory birds and their habitats within British Columbia.

Species at Risk

The purpose of the *Species at Risk Act* (SARA) is to prevent or reduce the likelihood of wildlife species from becoming extinct or extirpated, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming endangered or threatened.

SARA was proclaimed on June 5, 2003 and affords protection to those wildlife species listed in Schedule 1 of the Act. The prohibitions under SARA came into force on June 1, 2004, and apply to individuals of a species, their residences (dwelling places, such as a den or nest or other similar area that is occupied or habitually occupied by one or more individual during part or all of its life cycle), and critical habitat (areas used or formerly used by the species to carry out their life processes that are deemed essential for survival or recovery). Critical habitat will be identified for each listed species in Recovery Strategies and/or Action Plans, available on Environment Canada's *Species at Risk Act* Public Registry: www.sararegistry.gc.ca.

Subsection 79(1) of SARA requires every person who is required by a federal Act to ensure that a federal environmental assessment is conducted to notify the competent Minister(s) without delay if the project is likely to affect a listed wildlife species or its critical habitat. Subsection 79(2) of SARA requires that, where a federal environmental assessment is being carried out on a project that may affect a listed wildlife species or its critical habitat, the person responsible for ensuring the assessment is conducted must identify potential adverse effects on the listed wildlife species and its critical habitat; and, if the project is carried out, ensure that measures are taken to avoid or lessen those adverse effects and to monitor them, and ensure that such measures are consistent with any applicable Recovery Strategy and/or Action Plans. Subsection 79(3) defines 'person' as including an association or organization, and a responsible authority as defined in subsection 2(1) of the *Canadian Environmental Assessment Act* (CEAA).

In managing a project in the context of species at risk, Proponents are advised to identify and evaluate likely species occurrences (including methods such as conducting baseline surveys), assess environmental impacts, develop mitigation strategies and follow-up monitoring plans. The advice below is offered to assist in this process.

1. Complete an in-depth literature review of relevant databases to determine whether any species of concern are known or expected to use the proposed project site or adjacent lands if they are within the zone of influence of the project. This may include:
    - The BC Conservation Data Centre (CDC) database (for any rare element occurrence records), including the 'Species and Ecosystem Explorer search tool';
    - Environment Canada's *Species at Risk Act* Public Registry: www.sararegistry.gc.ca (for Recovery Strategies, Action Plans, Species Accounts);
    - The BC Sensitive Ecosystem Inventory: www.env.gov.bc.ca/sei;
    - Environment Canada's Species at Risk search tool: www.speciesatrisk.gc.ca to determine if the ranges of any Committee on the Status of Endangered Wildlife in Canada (COSEWIC) listed species overlap with the site; and,
    - Scientific journals (many available on-line).

2. Consult with government and non-government agencies and organizations, such as:
    - federal departments with responsibility for species at risk: Fisheries and Oceans Canada (for aquatic species), Parks Canada (for species that occur primarily in national parks), and Environment Canada (for all other species);

- the BC Ministry of the Environment, municipalities and regional districts;
- Species at Risk Recovery Teams; and
- Local naturalist groups and organizations.

3. Complete surveys, following accepted standards and methodologies, of the project area (and adjacent areas as necessary). The appropriate government jurisdiction – provincial or federal – should be consulted for advice on survey design. Permits under the BC *Wildlife Act* or SARA may be required in certain circumstances.

To assist proponents in accounting and managing for species at risk, Environment Canada has developed the following environmental assessment guidance documents:

1. *Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada*
2. *Addressing Species at Risk Act Considerations Under the* Canadian Environmental Assessment Act *for Species Under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada*
3. *The Species at Risk Environmental Checklists for Species Under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada*

These documents will be reviewed and updated on a regular basis; the most up-to-date versions are available at:

http://www.ec.gc.ca/nature/default.asp?lang=En&n=132ADBFC-1&parent=0C1743A2-4D49-4183-AC5F-1DE909D2FEB1

Federal Wetland Policy

Proponents are encouraged to refer to the *Federal Policy on Wetland Conservation*, available at:

http://www.ec.gc.ca/nature/default.asp?lang=En&n=132ADBFC-1&parent=0C1743A2-4D49-4183-AC5F-1DE909D2FEB1

for advice relating to wetland habitats.

Photo 1: View of debris remaining in portion of marsh.

SLR	CWS Permit Application Wilmer Marsh Unit Near Wilmer, BC
PHOTOGRAPH	Project No: 219.05112.00009

Photo 2: View of trail area with buried debris and contaminated soil.

SLR	CWS Permit Application Wilmer Marsh Unit Near Wilmer, BC
PHOTOGRAPH	Project No: 219.05112.00009

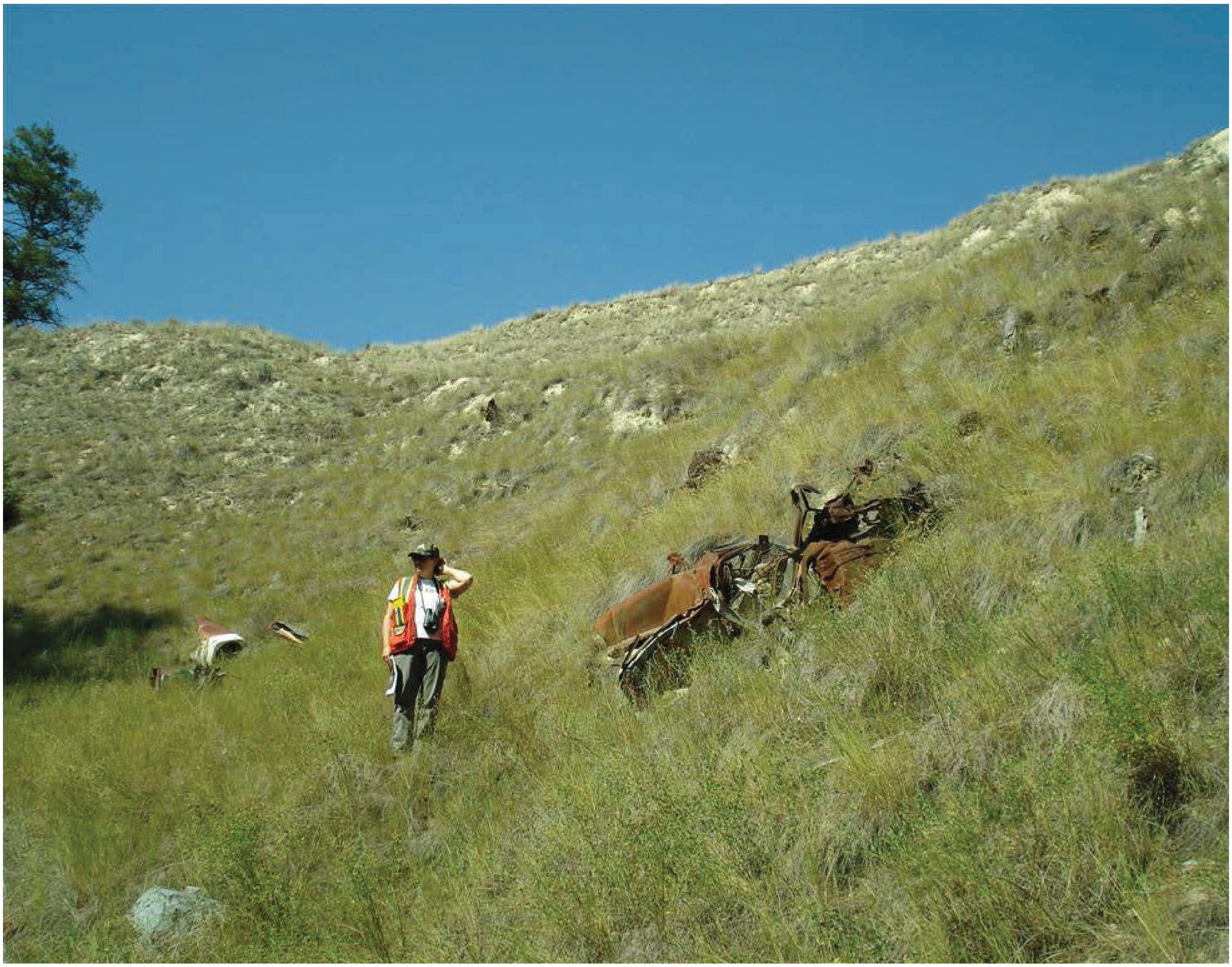
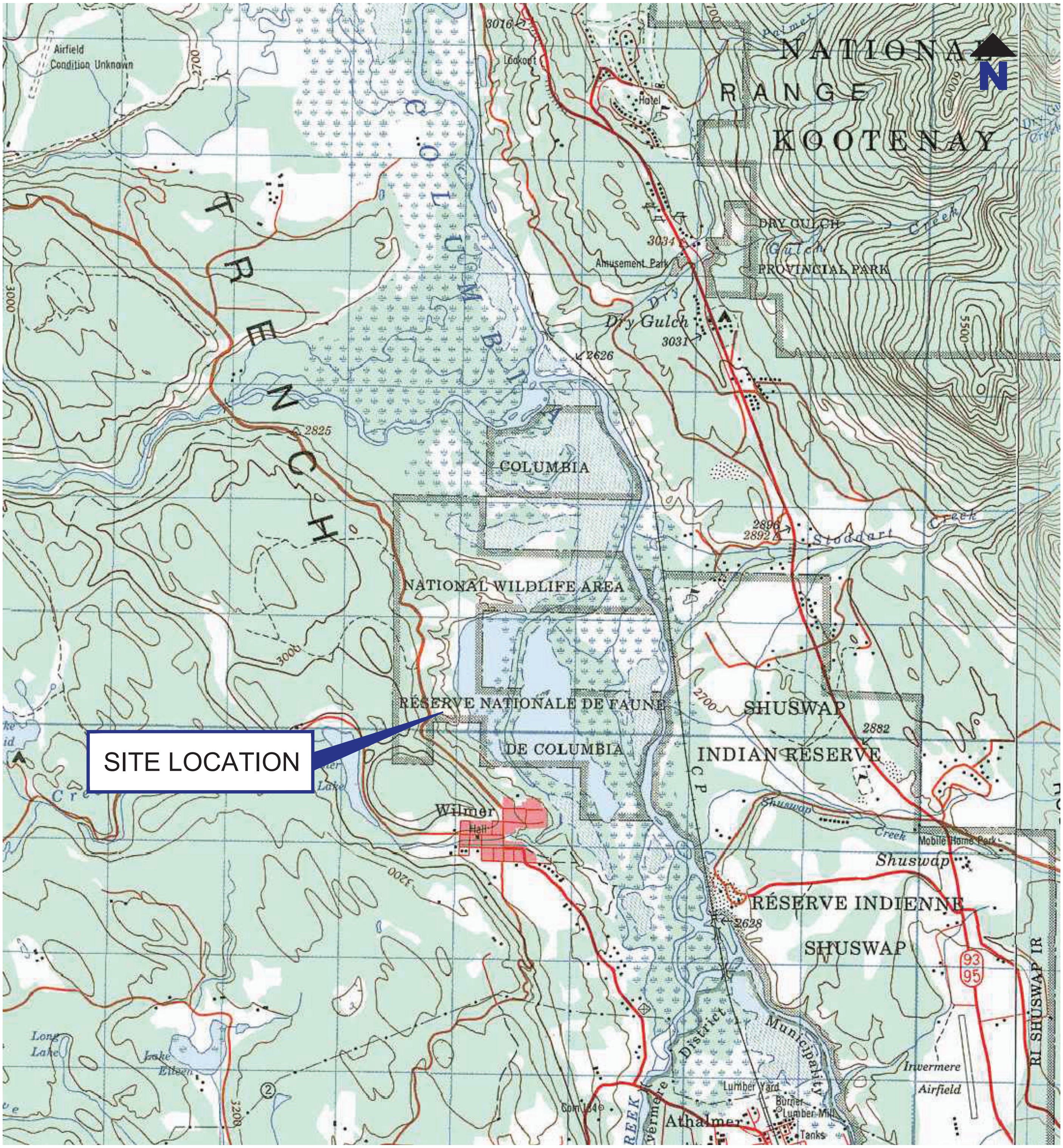


Photo 3: View of debris in trail area.

SLR	CWS Permit Application Wilmer Marsh Unit Near Wilmer, BC
PHOTOGRAPH	Project No: 219.05112.00009

Photo 4: Close-up of car body partially exposed in trail area slope.



REFERENCED FROM : ETOPO MAP SYSTEM
NTS MAP 82 K/09

SCALE 1:50,000
WHEN PLOTTED AT 8.5 x 11 PAGE SIZE

0 0.5 1 2 3 km

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

SLR

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT, COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
SITE LOCATION MAP

Date	February 25, 2014	Scale	AS SHOWN
File Name	S_219-05112-00008-D1	Project No.	219.05112.00008

Drawing No. 1

global environmental solutions

SLR

Environment Canada / Environnement Canada

ENVIRONMENT CANADA - ENVIRONNEMENT CANADA
PERMIT – PERMIS

Remediation Planning Activities	**BC-14-0041**
Permit for/Permis de pour	Permit no./ No. de permis
British Columbia / Colombie Britannique	**4**
province(s), territoires -la (les) provinces / territoires	Issued under section/Délivre en vertu de l'article
Name and address - Nom et adresse	**Wildlife Area Regulations**
	Règlement sur les réserves de la faune
SLR Consulting (Canada) Ltd. **Lindsay Petersen** **200-1475 Ellis Street** **Kelowna BC V1Y 2A3**	**Species At Risk Act 73 and 74** **Loi sur les espèce en péril**
Date of issue/ Date démission : **23 September 2014** Date of expire /Date d'expiration; **15 November 2014**	For the minister/ Pour le ministre

Special Conditions **péciales**

Wilmer Marsh Unit Columbia National Wildlife Area
Remediation Planning Activities
Project No.: 219.05112
Reference no: DFRP # 16096, ARMS # 00394, FCSI # 16096079

Description of Work

Requiring a SARA permit was deemed unlikely by Environment Canada in 2010 given the low possibility of Species at Risk (SAR) to occur at this site. However, further studies prior to the commencement of work were advised by Environment Canada. Recommended wildlife surveys include those for three SARA-listed SAR: American Badger *jeffersonii* subspecies (*Taxidea taxus jeffersonii*), listed as Endangered under SARA; Western Toad (*Anaxyrus boreas*) and Western Painted Turtle (Intermountain - Rocky Mountain population; *Chrysemys picta bellii*, pop. 2), both listed as Special Concern under SARA. Surveys to identify potential wildlife trees were also to be undertaken and "no work" buffer zones would be demarcated around these wildlife trees. Wildlife trees include trees that have the potential to be used for nesting, roosting, feeding, etc. but may currently be active or inactive. In addition, work will be avoided during the migratory bird breeding season so as not to disturb active nests or breeding birds.

SARA-relevant activities proposed for this NWA permitting process of the project are to complete surveys and studies as recommended by Environment Canada (stated above).
Several other SARA-listed species have the potential to use the project site or be in the area of the site (SLR 2013/2014 Site Works Summary and Remedial Action Plan Report – p. 27, Table B: Summary of Species at Risk). As such, regulatory compliance is required with respect to s. 73 and 74 of SARA for all SARA-listed species.

....2

Pre-Conditions

All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted.

Numerous remedial action plans were presented to Environment Canada to provide options based on various remediation concepts, their risks, and strategies. They ranged from surficial debris clean-up at various locations, to partial excavation and debris removal, to complete excavation and debris removal at the main debris area. These plans vary in their potential for invasiveness to SAR. The most beneficial and least intrusive option will be decided upon and adopted.

In terms of SAR, surveys and observations of wildlife, and their habitats and residences, including wildlife trees, will inform best solutions for any necessary mitigation. Survey and observation methods will follow RIC standards and, if needed, CWS and species-specific experts/Recovery Teams will be consulted (i.e., given timing of surveys, targeted wildlife may already be in torpor or preparing for hibernation and RIC standards may not apply for successful surveys).

All feasible measures will be taken to minimize the impact of the activities on SAR or the residences of their individuals.

Prior environmental monitoring for wildlife had been completed and included in a DRAFT report of the entire project (SLR 2013/2014 Site Works Summary and Remedial Action Plan Report) that was submitted to Environment Canada for review. The Canadian Wildlife Service further required other measures to be taken to minimize impacts on SAR or their residences. Initially, this will involve specific surveys of three suggested SAR (as above): American Badger *jeffersonii* subspecies, Western Toad, and Western Painted Turtle *bellii* subspecies – Intermountain-Rocky Mountain population. Additionally, surveys will be undertaken to identify potential wildlife trees and buffers will be placed around them as "no work" zones.

The activity will not jeopardize the survival or recovery of species at risk.

Any impacts from surveys to survival or recovery will be incidental, as the survey work to be carried out is to be non-invasive. Surveys will occur before remediation work commences and will inform remediation activities in order to preempt any possibility of impacts.

General Terms and Conditions

1. Permit must be signed to be valid.
2. Any additional work to be carried out in accordance to permit application.
3. The issuance of this permit does not supersede the necessity to meet other legal requirements to acquire any federal, provincial or municipal licenses, permits or other authorizations required by law.
4. This permit is not transferable to any other person(s) or organisation(s).
5. Upon completion notify Courtney Albert so an inspection of site maybe conducted.
6. This permit becomes invalid if SARA Terms & Conditions described in these Appendices are not respected.
7. Any SARA-listed species collected (i.e., incidental mortalities) shall remain the sole property of the Federal Crown and shall not be traded, sold, or bartered.

. 3

Standard Terms & Conditions

1. Only qualified personnel, experienced in the identification and life cycle of the target Species at Risk and familiar with the specific locations, will monitor and oversee the timing of the activities.
2. All reasonable alternatives to this activity have been considered, all feasible measures will be taken to minimize the impact of the activity on the species, and the activity will not jeopardize the survival or recovery of the species
3. The survey methods to be implemented are non-invasive. Invasive survey methods will not be employed and those include, but are not limited to, trapping, handling, and/or marking. No animals will be killed, injured or removed. No biophysical attributes of survival, recovery, or critical habitat will be destroyed or damaged. Additional threats will not be introduced.
4. Prior to exercising the activities subject to the SARA compliancy Terms & Conditions in these Appendices, the Columbia National Wildlife Area's manager(s) is (are) to be notified relative to survey procedures, times and locations of studies
5. These Terms & Conditions are only valid for the activities described above. They (or a copy) must be carried with the by the applicant or a member of the field crew and be made available to a Wildlife Enforcement Officer upon request.
6. A report shall be provided to CWS, prior to the commencement of works, outlining in detail the survey methods and results, and any observations of SARA-listed species or their residences. Submission of the SARA-specific report should also detail observed impacts of survey activities, including (as applicable) the number of individuals possessed, collected, captured, harmed, harassed, taken, or killed, and the number and location of residences, and the total area and location of habitat impacted.
7. Species at Risk occurrence data must be reported to the Province of British Columbia through the Conservation Data Centre (http://www.env.gov.bc.ca/cdc/contribute.html) or Species Inventory Database.

Specific Terms & Conditions for SARA compliancy

1. A qualified biologist will inform and oversee surveys for species at risk and will advise on biophysical attributes of habitat; Environment Canada will be provided the opportunity to approve the qualifications of the participating QP.
2. SAR surveys must adhere to non-invasive methods described in taxa- or species-specific BC RIC Inventory Methods.
3. Concurrent with surveys, specific RIC survey methods being used must be submitted to CWS explaining how these methods optimize surveying for target species given the time of year, such that most surveys are optimally conducted during and immediately following breeding periods; in September-October, target species may be in or preparing for dormancy/torpor/hibernation.
4. Mitigation measures developed must address wildlife dormancy, torpor, and/or hibernation during work that may possibly disturb hibernacula/shelters.

5. Identification of potential wildlife trees (active and inactive) that may be impacted by remediation works must be buffered as "no-work" zones; surveys should include observations of existing nests, nest boxes, and cavities suitable, for example, for nesting Williamson's Sapsucker or Lewis's Woodpecker; any nest sites encountered are to be left undisturbed and permanently left in place along with neighbouring vegetation.
6. Work should be avoided during the highest-risk seasonal time frame, approximately the end of March to the end of September/beginning of October (i.e., when seasonally active SAR and migratory birds are least likely to be using biophysical attributes within the project area and in order to minimize any incidental (transitory) SAR occurrence).
7. Pre-project surveys: any sign/identification of SAR (i.e. badger dens, Western Toad sightings, and/or observations of unanticipated SAR) should be reported immediately to CWS and Recovery Teams for advice; advice to be used prior to project commencement.

Sub-permit holder: Employee(s) of SLR Consulting, Employee(s) Lotic Environmental Ltd.
Kalina Noel, B.Sc., M.E.Des., P.Biol., R.P.Bio

I declare that I have read and understand this Permit, including all the conditions attached.
Je déclare que j'ai lu et que je comprends le présent permis et toutes les conditions qui y sont prévues.

Signature of permit-holder(s)
Signature du détenteur du permis

Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

Request for Review

A) Contact information

Name of Business/Company:

Environment Canada

Name of Proponent:

Darryl Roberts

Mailing address:

351 St. Joseph Blvd.

City/Town:

Gatineau

Province/Territory:

Quebec

Postal Code:

K1A 0H3

Tel. No. :

Fax No.:

Email:

Select additional contact: Contractor/Agency/Consultant *(if applicable)*:

Lindsay Paterson
SLR Consulting (Canada) Ltd.

Mailing address:

200-1475 Ellis Street

City/Town:

Kelowna

Province/Territory:

British Columbia

Postal Code:

V1Y 2A3

Tel. No. :

250-762-7202

Fax No.:

250-763-7303

Email:

lpaterson@slrconsulting.com

Is the Proponent the main/primary contact? ○ Yes ◉ No

If no, please enter information for the primary contact or any additional contact.

Consultant is primary contact.

B) Description of Project

If your project has a title, please provide it.

REMEDIATION PLANNING ACTIVITIES, WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA, NEAR WILMER, BC

Is the project in response to an emergency circumstance*? ○ Yes ◉ No

Does your project involve work in water? ◉ Yes ○ No

If yes, is the work below the High Water Mark*? ◉ Yes ○ No

What are you planning to do? Briefly describe all project components you are proposing in or near water.

Installation of a sediment curtain in September 2014 in preparation of remediation activities which are proposed for January-February 2015. SLR will be coordinating with FOC Expert Support (Eric Chiang), Environment Canada Expert Support, Health Canada Expert Support and Canadian Wildlife Service for review and approval of the proposed remediation activities.
This request for review is limited to the installation of a sediment curtain which will likely remain in place until Spring 2015. SLR will also be collecting baseline surface water samples and recording GPS coordinates of debris in the marsh in conjunction with the sediment curtain installation.

How are you planning to do it? Briefly describe the construction materials, methods and equipment that you plan to use.

The sediment curtain would be installed from the shoreline in an arc extending to approximately 30 m offshore around the residual debris in the marsh (total length of approximately 120 m, curtain depth of approximately 3 m).

Surface water samples would be collected from shore using an extendable sampling tool or from an inflatable raft.

A site plan showing the location of the site, a Google Earth image identifying the location of the debris in the marsh requiring the sediment curtain and photographs of the debris areas are attached.

Include a site plan (figure/drawing) showing all project components in and near water.

Are details attached? ◉ Yes ○ No

Identify which work categories apply to your project.

- ☐ Aquaculture Operations
- ☐ Aquatic Vegetation Removal
- ☐ Beaches
- ☐ Berms
- ☐ Blasting / Explosives
- ☐ Boat Houses
- ☐ Boat Launches / Ramps
- ☐ Breakwaters
- ☐ Bridges
- ☐ Cable Crossings
- ☐ Causeways
- ☐ Culverts
- ☐ Dams
- ☐ Dewatering / Pumping
- ☐ Docks
- ☐ Dredging / Excavation
- ☐ Dykes
- ☐ Log Handling / Dumps
- ☐ Log Removal
- ☐ Moorings
- ☐ Open Water Disposal
- ☐ Piers
- ☐ Riparian Vegetation Removal
- ☐ Seismic Work
- ☐ Shoreline Protection
- ☐ Stormwater Management Facilities
- ☐ Surface Water Taking
- ☐ Tailings Impoundment Areas
- ☐ Temporary Structures
- ☐ Turbines
- ☐ Water Control Structures
- ☐ Water Intakes / Fish Screens
- ☐ Water Outfalls
- ☐ Watercourse Realignment

☐ Fishways / Ladders
☐ Flow Modification (hydro)
☐ Groundwater Extraction
☐ Groynes
☐ Habitat Restoration
☐ Ice Bridges
☐ Weirs
☐ Wharves
☐ Wind Power Structures
☒ Other Please Specify: Installation of sediment curtain

Was your project submitted for review to another federal or provincial department or agency? ◉ Yes ○ No

If yes, indicate to whom and associated file number(s).

Canadian Wildlife Service (in progress)
BC MOE Water Stewardship Division (in progress)

C) Location of the Project

Coordinates of the proposed project Latitude: 50 degrees 33' 00.78" N Longitude: 116 degrees 4' 16.82" W

OR UTM zone: ; Easting: Northing:

Include a map clearly indicating the location of the project as well as surrounding features.

Name of Nearest Community (City, Town, Village): Wilmer

Municipality, District, Township, County, Province: BC

Name of watershed (if applicable): Wilmer Marsh

Name of watercourse(s) or waterbody(ies) near the proposed project: Wilmer Marsh

Provide detailed directions to access the project site:

Set odometer to zero at intersection of Main and Smith in Wilmer, BC. Main turns into Westside Road and becomes gravel shortly north of town. The site is 1.2 km north from this point on the east side of the road. Look for the National Wildlife Area sign on the east side of the road, just after a big bend to the east.

D) Description of the Aquatic Environment

Identify the predominant type of aquatic habitat where the project will take place.

○ Estuary (Estuarine)
○ Lake (Lacustrine)
○ On the bank/shore at the interface between land and water (Riparian)
○ River or stream (Riverine)
○ Salt water (Marine)
◉ Wetlands (Palustrine)

Provide a detailed description of biological and physical characteristics of the proposed project site.

The project area is situated within the Wilmer Marsh Unit of the Columbia NWA. The Columbia NWA is managed by the Canadian Wildlife Service (CWS) of EC. The Wilmer Marsh Unit is the southernmost of the four units that make up the Columbia NWA.

The project area is depicted on the attached Google Earth Image and site photographs. The sediment curtain would be installed from the shoreline in an arc extending to approximately 30 m offshore around the residual debris in the marsh (total length of approximately 120 m, curtain depth of approximately 3 m).

Include representative photos of affected area (including upstream and downstream area) and clearly identify the location of the project.

E) Potential Effects of the Proposed Project

Have you reviewed the Pathways of Effects (PoE) diagrams (http://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/index-eng.html) that describe the type of cause-effect relationships that apply to your project?

(•) Yes ( ) No

If yes, select the PoEs that apply to your project.

- [ ] Addition or removal of aquatic vegetation
- [ ] Change in timing, duration and frequency of flow
- [ ] Cleaning or maintenance of bridges or other structures
- [ ] Dredging
- [ ] Excavation
- [x] Fish passage issues
- [ ] Grading
- [ ] Marine seismic surveys
- [ ] Organic debris management
- [ ] Placement of marine finfish aquaculture site
- [x] Placement of material or structures in water
- [ ] Riparian Planting
- [ ] Streamside livestock grazing
- [ ] Structure removal
- [ ] Use of explosives
- [ ] Use of industrial equipment
- [ ] Vegetation Clearing
- [ ] Wastewater management
- [ ] Water extraction

Will there be changes (i.e., alteration) in the fish habitat*? ( ) Yes (•) No ( ) Unknown

If yes, provide description.

Will the fish habitat alteration be permanent*? ( ) Yes (•) No ( ) Unknown

Is there likely to be destruction or loss of habitat used by fish? ( ) Yes (•) No ( ) Unknown

What is the footprint (area in square meters) of your project that will take place below the high water mark*?

The sediment curtain would be installed from the shoreline in an arc extending to approximately 30 m offshore around the residual debris in the marsh (total length of approximately 120 m, curtain depth of approximately 3 m).

Is your project likely to change water flows or water levels? ( ) Yes (•) No ( ) Unknown

If your project includes withdrawing water, provide source, volume, rate and duration.

If your project includes water control structure, provide the % of flow reduction.

If your project includes discharge of water, provide source, volume and rate.

Will your project cause death of fish? ◯ Yes ◉ No ◯ Unknown

If yes, how many fish will be killed (for multi-year project, provide average)? What species and lifestages?

Are there aquatic species at risk (http://www.sararegistry.gc.ca/species/aquatic_e.cfm) present? If yes, which ones?

Western Toad and Western Painted Turtle are species of concern in area. However EC has previously indicated that a SARA permit is not required (see letter from Environment Canada dated November 25, 2010). SLR has contacted CWS regarding this proposed project as well.

What is the time frame of your project?

The construction will start on 09/15/2014 and end by 09/30/2014

If applicable, the operation will start on MM/DD/YYYY and end by MM/DD/YYYY

If applicable, provide schedule for the maintenance

If applicable, provide schedule for decommissioning

Spring 2015 following confirmation of surface water total suspended solid and total dissolved solid concentrations.

Are there additional effects to fish and fish habitat that will happen outside of the time periods identified above? ◯ Yes ◉ No

(If yes, provide details)

Have you considered and incorporated all options for redesigning and relocating your project to avoid negative effects to fish and fish habitat?

◉ Yes ◯ No

If yes, describe.

The purpose of this proposed project is to avoid any negative effects to fish and fish habitat that may occur during future work (i.e. remediation activities), specifically the suspension of sediment during removal of debris from the marsh. The debris is located in a specific location and therefore relocation is not possible.

Have you consulted DFO's Measures to Avoid Harm to Fish and Fish Habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html) to determine which measures apply to your project?

◉ Yes ◯ No

Will you be incorporating applicable measures into your project? ◉ Yes ◯ No

If yes, identify which ones. If No, identify which ones and provide reasons.

The purpose of this proposed project is to implement a measure designed to avoid harm to fish and fish habitat.

Have you considered and incorporated additional best practices and mitigation measures recommended in relevant guidelines to avoid negative effects to fish and fish habitat?

◉ No ○ Yes

If Yes, include a list of the guidelines being used to avoid negative effects to fish and fish habitat.

Are there any relevant best practices or mitigation measures that you are unable to incorporate? ○ Yes ◉ No

(If yes, identify which ones.)

Can you follow appropriate Timing Windows (http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html) for all your project activities below the High Water Mark*?

○ Yes ◉ No

(If no, provide explanations.)

Work will be conducted between Sept 15-30. This is outside the windows for Bull Trout, Kokanee and Brook Trout. A memo regarding fish species in the area of the project was previously prepared by SLR in January 2010. Only longnose sucker and bass were considered to be probable fish species in the project area.

What residual effects to fish and fish habitat do you foresee after taking into account the avoidance and mitigation measures described above?

None. The objective of this proposed project is to implement a measure designed to avoid harm to fish and fish habitat.

F) Signature

I, Lindsay Paterson (print name) certify that the information given on this form is to the best of my knowledge, correct and completed.

Signature

15/08/2014
Date

Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the fisheries protection provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-PPU-680. Under the *Privacy Act*, Individuals have a right to, and on request shall be given access to any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provision of the *Access to Information Act*.

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

Guidance on Submitting a Request for Review

This document explains the requirements for a Request for Review by DFO under the fisheries protection provisions of the *Fisheries Act*. To determine whether you should request a review, follow the steps for proponent Self-Assessment on DFO's Projects Near Water webpage (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html).

Incomplete Requests for Review will be returned to the applicant without review by DFO. All information requested must be provided. If you attach documents to your application with additional information, you must still provide appropriate summaries in the spaces provided on the application document or your application will be considered incomplete.

Section A: Contact Information

Provide the full legal name of the proponent and primary mailing address for the proponent. When the proponent is a company, identify the full legal registered name of the company.

If applicable, also provide the contact information of the duly authorized representative of the proponent. Please note that a copy of correspondence to Contractor/Agency/Consultant will also be sent to the Proponent.

Section B: Description of Project

This information is meant to provide background about the proposed project. All components of the proposed project in or near water, must be described.

Proponents should provide information about all appropriate phases of the project, i.e., the construction, operation, maintenance and closure phases for the proposed project.

All details about the construction methods to be used, associated infrastructure, permanent and temporary structures, building materials to be used, machinery and equipment to be used must also be provided. For example, the construction of **permanent structures** may require the construction of temporary structures such as temporary dikes, in conjunction with other associated activities like the withdrawal of water, land clearing, excavation, grading, infilling, blasting, dredging, installing structures, draining or removing debris from water. Similarly, the equipment and materials to be used may include hand tools, backhoes, gravel, blocks or armor stone (provide the average diameter), concrete (indicate if pre-cast or poured in-water), steel beams or wood.

When physical structures in or near water are proposed, provide the plan and specifications of those works which would require a review.

Section C: Location of the Project

The purpose for this information is to describe and illustrate the location of the proposed project, and to provide geographical and spatial context. The information should also facilitate an understanding of how the project will be situated in relation to existing structures.

The details to be provided must include:

- Coordinates of the project (e.g., Latitude and Longitude or Universal Transverse Mercator Grid coordinates);
- A map(s), site plan, or diagrams indicating the high water mark and the location, size and nature of proposed and existing structures (e.g., floating or fixed), landmarks and proposed activities. In a marine setting, it may be helpful to depict the approximate location of the proposed development on a nautical chart or showing the relation of the site to sea marks or other navigational aids. These plans, maps or diagrams should be at an appropriate scale to help determine the relative size of the proposed structures and activities, the proximity to the watercourse or waterbody and the distance from existing structures;
- The community nearest to the location of the proposal as means to provide a general reference point. When possible, proponents should use geographical names recognized by the Geographical Names Board of Canada (http://www.nrcan.gc.ca/earth-sciences/geography-boundary/geographical-name/11680).
- If available, provide aerial photographs or satellite imagery of the water source(s) and waterbody(ies);
- Names of the watershed(s), water source(s) and/or waterbody(ies) likely to be affected by the proposal; and
- Brief directions to access the proposed project site.

Section D: Description of the Aquatic Environment

Proponents must describe the environmental context and aquatic resources present at the proposed site. The information must identify the current state of the fish and fish habitat prior to the carrying on of the project.

It is important to include information about the fish species present, the biological, chemical, physical features present (habitat characteristics), and the fish life-cycle functions (fish characteristics).

The spatial scope for assessing fish and fish habitat should encompass the direct physical footprint of the project, and the upstream and downstream areas affected.

As an example, the following is a non-exhaustive and non-prescriptive list of some common attributes which may characterize the aquatic environment:

- Type of water source or watercourse (groundwater, river, lake, marine, estuary, etc.);
- Characteristics of the water source or waterbody could include:
  - Substrate characterization - describe the types of substrate (e.g., bedrock, boulder, cobble, gravel etc.), identify the predominant substrate type (e.g., 80% cobble, 20% gravel etc.) and provide maps of the substrate;
  - Aquatic and riparian vegetation characterization - identify the prevalent types of vegetation (e.g. rooted, submerged, emergent, etc.), identify the relative abundance of the vegetation (e.g., 10% cattails, 80% grass, 10% sedge) , indicate the predominant vegetation (e.g., by species or types) and identify the vegetation densities (e.g., type of vegetation/ area);
  - Flow characterization - specify if the flow is controlled or if it is natural, identify if the flow is permanent or intermittent, identify the current and tide (marine environment) etc.;
  - Physical waterbody characterization - identify the average depth of water for water bodies, identify bathymetry of water bodies, provide bathymetric maps where available, channel width (determine the width of the channel from the high water mark), slope ;
  - Water quality characterization - (e.g., annual or average pH, salinity, alkalinity, total dissolved solids, turbidity, temperature etc.);
  - Biological water quality characterization - (e.g., benthic macro-invertebrates, zooplankton, phytoplankton, etc.)
- Fish species characterization - identify the fish species (including molluscs, crustaceans, etc.) known or suspected to be in the area, predator prey relationships etc. Identify what source of information was used and to determine the presence of fish in that area; and
- Estimate the fish abundance - estimate the number of fish present, estimate the year class for each species etc.

There are many different methods and attributes available to characterize fish and fish habitat. Proponents must describe all sources of information used, all fish and environment sampling techniques used, all modelling techniques used and all other approaches used to define the fish and fish habitat. Proponents are encouraged to use recognized fisheries inventory methods such as those approved by DFO or provinces and territories, or scientifically defensible methodologies and techniques whenever possible.

Whenever possible, proponents should support descriptions of the aquatic environment with the use of detailed drawings, such as plans or maps and photographs of the habitat features. In an offshore marine setting, photos may not be useful to depict the proposed development site. Instead describe and/or sketch the specific features of the sea floor which may include the presence of submarine features such as canyons, cliffs, caverns, etc.

Section E: Potential Effects of the Proposed Project

The objective of this section is to identify all anticipated effects on fish and fish habitat likely to be caused by the project. Proponents should consider all mitigation or avoidance techniques.

The description must include qualitative and/or quantitative information about the predicted/potential effects to fish species and fish habitat. Some examples of likely effects may include mortality to fish, changes to the life stages of fish affected, area of habitat loss, change to flow, changes to habitat function, reduction in prey availability etc.

The spatial scope of the aquatic effects assessment would include the direct physical "footprint" of the proposed project, and any areas indirectly affected, such as downstream or upstream areas. This may also include areas in or on the water, on the shoreline, coast or bank(s) (i.e., in the riparian zone).

The assessment must include the following attributes:

- Identification of all fish species affected by the proposed project ;
- Identification of the type of fish habitat affected (e.g., spawning habitat - gravel and cobble, feeding and rearing areas - side channel slough, small tributaries, etc.), estimate of the affected area (e.g., square meters or hectares);
- Of the affected fish, identify the life stages affected (e.g., juvenile, yearling, adult etc.);
- Description of the effect (e.g., mortality to fish from entrapment, delayed migration of spawning adults, reduction in prey availability, etc.)
- Probability of the effect - this is the likelihood of the effect occurring (e.g., probability of fish strike from turbines for specific fish sizes, probability of sediment plume within a distance from source, etc., or qualitative assessment: low, medium, high)
- Magnitude of the effect - this is the intensity or severity of the effect (e.g., total number of fish affected, or qualitatively assessment: low, medium, high).
- Geographic extent of the effect - this is the spatial range of the effect (e.g., localized to 100m from the work, channel reach or lake region, entire watershed etc.); and
- Duration of the effect - this is the temporal period for which the effect will persist (e.g., duration of delay to fish migration in hours, days, months or years).

The information to be provided must also describe the methods and techniques used to conduct the assessment. As much as possible, methods and techniques used should be scientifically defensible.

The schedule should, at minimum, identify the proposed start and end dates for carrying out each proposed activity, and where applicable, identify the respective phase of the proposal; i.e., the construction, operation, maintenance and closure phases. In some cases, in order to provide additional context, it may be relevant to identify other information such as the expected life span of permanent and temporary structures.

Proponents must provide comprehensive information about all best available measures and standards that are proposed to avoid or mitigate potential serious harm.

Residual serious harm to fish is any serious harm to fish remaining after the consideration of the application of proposed measures or standards to avoid or mitigate serious harm.

It is important to clearly describe and quantify residual serious harm because DFO will use this information as part of its decision making on whether an authorization is required under subsection 35(2)(*b*) of the *Fisheries Act*.

Section F: Submission and Signature

The proponent must sign the application. A signed original of the Request for Review must be provided to the regional DFO office (http://www.dfo-mpo.gc.ca/pnw-ppe/contact-eng.html), even if an electronic copy was sent by email. Should the review of your project indicate that residual serious harm to fish is likely, the information provided in the Request for Review document can be referred to in the subsequent Application for an Authorization under Paragraph 35(2)(*b*) of the *Fisheries Act*.

Section G: Definitions

Emergency circumstance: If your project must be conducted in response to an emergency, you may apply for an Emergency Authorization. The emergency situations are:

- The project is required as a matter of national security
- The project is being conducted in response to a national emergency where special temporary measures are being taken under the federal *Emergencies Act*

- The project is required to address an emergency that poses a risk to public health or safety or to the environment or property.

Fish habitat: Means spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes.

High Water Mark: The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to leave a mark on the land.

Permanent alteration to fish habitat: An alteration of fish habitat of a special scale and a duration that limits or diminishes the ability of fish to use as spawning grounds for nursery or rearing, or as food supply, or as a migration corridor in order to carry out one or more of their life processes.

(●) No ( ) Yes

If Yes, include a list of the guidelines being used to avoid negative effects to fish and fish habitat.

Are there any relevant best practices or mitigation measures that you are unable to incorporate? ( ) Yes (●) No

(If yes, identify which ones.)

Can you follow appropriate Timing Windows (http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html) for all your project activities below the High Water Mark*?

( ) Yes (●) No

(If no, provide explanations.)

Work will be conducted between Sept 15-30. This is outside the windows for Bull Trout, Kokànee and Brook Trout. A memo regarding fish species in the area of the project was previously prepared by SLR in January 2010. Only longnose sucker and bass were considered to be probable fish species in the project area.

What residual effects to fish and fish habitat do you foresee after taking into account the avoidance and mitigation measures described above?

None. The objective of this proposed project is to implement a measure designed to avoid harm to fish and fish habitat.

F) Signature

I, Lindsay Paterson (print name) certify that the information given on this form is to the best of my knowledge, correct and completed.

LPaterson

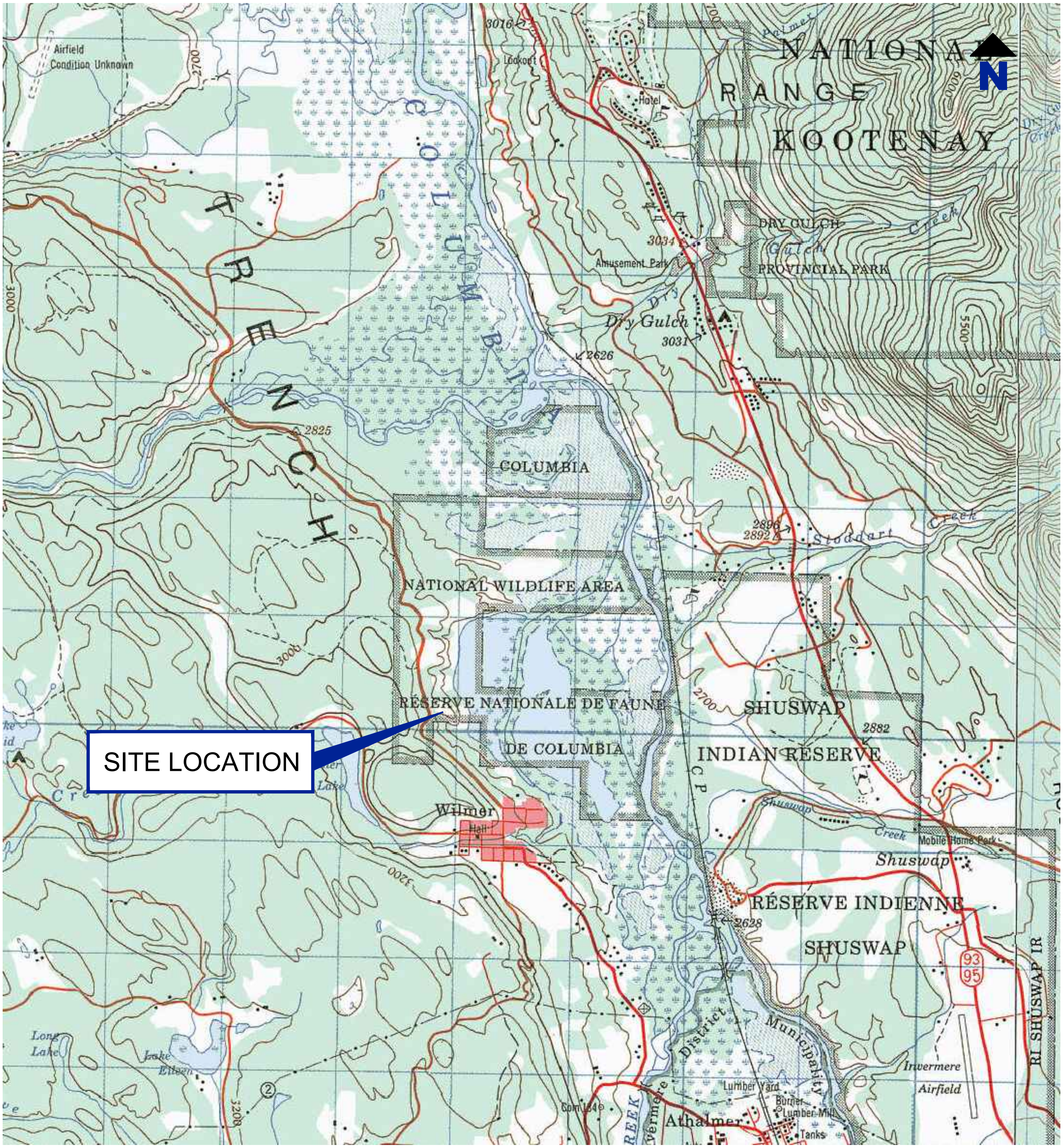
Signature

15/08/2014

Date

Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the fisheries protection provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-PPU-680. Under the *Privacy Act*, Individuals have a right to, and on request shall be given access to any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provision of the *Access to Information Act*.

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*



REFERENCED FROM : ETOPO MAP SYSTEM
NTS MAP 82 K/09

SCALE 1:50,000
WHEN PLOTTED AT 8.5 x 11 PAGE SIZE

0 0.5 1 2 3 km

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

SLR

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT, COLUMBIA NWA
WILMER, BC

Report
2013/2014 PROJECT WORKS SUMMARY AND REMEDIAL ACTION PLAN

Drawing
SITE LOCATION MAP

Date February 25, 2014	Scale AS SHOWN	Drawing No.
File Name S_219-05112-00008-D1	Project No. 219.05112.00008	1


Area of debris and contaminated soil in trail
Area of debris remaining in marsh
Image Parks Canada
© 2013 Google
Google earth
2004
Imagery Date: 7/27/2007 50°33'00.01" N 116°04'03.51" W elev 2711 ft eye alt 3290 ft

Photo 1: View of proposed project area in marsh.

SLR	FOC Permit Application Wilmer Marsh Unit Near Wilmer, BC
PHOTOGRAPH	Project No: 219.05112.00009

Photo 2: View of debris remaining in portion of marsh.

SLR	FOC Permit Application Wilmer Marsh Unit Near Wilmer, BC
PHOTOGRAPH	Project No: 219.05112.00009

SLR Consulting (Canada) Ltd.
200-1620 West 8th Avenue
Vancouver, BC V6J 1V4

Tel: 604-738-2500
Fax: 604-738-2508

Memorandum

To:	Holly Kelly, P.Ag.	**From:**	James Neville, R.P.Bio.
Company:	SLR - Kelowna		SLR - Vancouver
cc:		**Date:**	25 November 2009
Subject:	***POTENTIAL IMPACTS ON FISH HABITAT***		
	REMOVAL OF DEBRIS - WILMER MARSH FORMER REFUSE SITE		

I visited Wilmer Marsh on November 19, 2009, and walked a section of shoreline that included the portion from which debris is to be removed. The water level was quite high, and little emergent vegetation was visible, with the exception of small cattail stands.

As this photograph shows, even at high water levels, the western section of the marsh where work will occur (on the right) appeared to be largely isolated from the rest of the marsh by gravel bars. At lower water levels in summer, it is likely that this section would be fully isolated, or nearly so, and that water temperatures would become elevated.

Fish species expected to be present in this section of the marsh would be ones tolerant of warm, poorly oxygenated, stagnant water.

The Columbia River flows northward approximately one kilometre to the east of this section of the marsh, and a tributary, Horsethief Creek, enters the Columbia River approximately one kilometre to the north. Searches of online databases (FISS and Fish Wizard) resulted in records of fish of eight species inhabiting Horsethief Creek. It is likely that members these species move between the Columbia River and Horsethief Creek, and some potentially into the marsh system, but unlikely that other types of fish, with the possible exception of bass, would be present in the marsh system; as the Columbia River is not much wider than Horsethief Creek at this location, species composition in this portion of the Columbia River is probably similar. (Database searches of aliases used for this portion of the Columbia River, “Bush Arm” and “Beaver Creek Kiwanis Camp” yield fish species present in the entire Columbia River, most of which are not applicable here.)

The table below very briefly summarizes habitat requirements of fish species documented in Horsethief Creek, plus those of bass, which are suspected to inhabit the area (Peter Holmes, pers. comm. to Karen Hutton).

FISH SPECIES OF HORSETHIEF CREEK				
SPECIES	**SPAWNING HABITAT**	**SPAWNING SEASON**	**REARING & ADULT HABITAT**	**LIKELIHOOD IN WILMER MARSH**
Bull Trout	Cold, flowing water	Fall	Cold, flowing water	Very low
Kokanee	Cold streams	Fall	Generally lakes	Very low
Rainbow Trout	Cold, flowing water	Spring	Cold, flowing water	Very low
Westslope (Yellowstone) Cutthroat Trout	Cold streams (sometimes lakeshores)	Late Spring	Young-of-the-year use shallow stream and lake edges with cover; adults mainly use streams	Low
Longnose Dace	Fast streams	Spring	Fast streams	Very low
Longnose Sucker	Moderately flowing streams (sometimes lakeshores)	Early Spring	Wide variety, including rivers, lakes, beaver ponds, sloughs and swamps	Likely
Mountain Whitefish	Moderately flowing streams (sometimes lakeshores)	Fall or Early Winter	Streams and Lakes	Very low
Sculpin (General)	Streams	Spring	Mainly streams	Very low
Largemouth Bass or Smallmouth Bass	Warm, shallow parts of lakes or slow-moving rivers	Summer	Warm, shallow parts of lakes or slow-moving rivers	Likely
Reference: J.D. McPhail (2007), The Freshwater Fishes of British Columbia				

As information in the table indicates, the only fish species likely to be represented in Wilmer Marsh are longnose sucker and bass. These species are not of conservation concern; bass are not native to BC. Cutthroat trout fry may use these types of waters, but access in to the shallow marsh would be difficult in summer, and they would tend to move to streams before winter.

These next three photographs illustrate the large quantity of dumped debris that has accumulated at the bottom of the cliff face and along the margins of Wilmer Marsh. Previous SLR reports have demonstrated that these materials are not only unsightly and physically dangerous, but that they are also causing adverse effects on water and sediment quality, notably elevated levels of total and dissolved metals.

The high water levels at the time I visited the site prevented me from seeing the full extent of debris deposits, but I understand that most is confined to areas close to shore, as it has been dumped from above.

Based on available fish-presence information, I suggest that removal of this debris will result in negligible impacts on fish habitat. Most work can, and should, be shore-based, particularly given the hazards that sharp pieces of metal may present to people and inflatable boats. Sediments introduced into the water or stirred up from the bottom will be localized in the relatively still water, and settle out quickly. If the work is carried out over the Winter season (2009/2010), there is very little likelihood of fish, other vertebrates or macroinvertebrates being adversely affected, as any present would have the ability to move to non-affected areas and avoid the workzone.

Once water levels fall in summer 2010, any debris currently submerged can be evaluated as to whether additional amounts should be removed. This work can likely be mainly shore-based as well, but the slightly higher likelihood of juvenile fish being present may warrant erecting exclusionary fencing and conducting a fish salvage if it is safe for workers to do so.

My conclusion is that removing debris from Wilmer Marsh will be of net benefit to the aquatic habitat, and that this work should be a priority action, given the risk the debris poses to the environment.

Environment Canada Environnement Canada

Environmental Protection Operations
Environmental Stewardship Branch
Pacific and Yukon
201 - 401 Burrard Street
Vancouver, BC V6C 3S5

November 25, 2010

CEAR: 10-01-59103
ECPT: 10-1007
PWGSC: R.032919.005

Mr. Kevin Inouye
Environmental Specialist
Environmental Sciences
Public Works and Government Services Canada
401 – 1230 Government St.
Victoria, BC V8W 3X4

Dear Mr. Inouye:

Re: Environment Canada Determination on Environmental Assessment Role and Advice for Marsh and Shoreline Remediation Works in the Wilmer Marsh Unit, Columbia National Wildlife Area, Wilmer, BC

I am writing in response to your letter dated October 15, 2010 in which you request Environment Canada's comments on the above-mentioned project proposal. Please be advised that Environment Canada has determined that it is obliged to conduct a screening-level environmental assessment of the proposed project under the *Canadian Environmental Assessment Act* (CEAA), and is therefore a Responsible Authority. In accordance with section 5 of CEAA, an environmental assessment is required because Environment Canada:

- is the proponent;
- may provide funding under the Federal Contaminated Sites Action Plan to enable the project to be carried out; and
- may issue a permit pursuant to section 4 of the *Wildlife Area Regulations* under the *Canada Wildlife Act.*

Environment Canada understands that Public Works and Government Services Canada (PWGSC) is acting as the Federal Environmental Assessment Coordinator. The following advice relating to the project proposal is therefore provided to assist PWGSC with completing the required environmental assessment on Environment Canada's behalf.

Environment Canada's Environmental Assessment Unit in the Pacific and Yukon Region has reviewed the following documents relating to the project proposal:

- preliminary project referral (received from PWGSC on October 15, 2010);
- Ecological Risk Assessment documentation (received November 4, 2010);
- *Environmental Assessment Screening Draft Report for Wilmer Marsh and Shoreline Remediation* ('Draft Report'), dated November 2010, prepared by Hemmera (received November 12, 2010);

and hereby offers the following comments and recommendations relating to water quality, species at risk, contaminated sites and wetlands, as well as other CEAA requirements.

PROJECT OVERVIEW

The proposed project site, located 1.2 km north of the Town of Wilmer, BC, is located within the Columbia National Wildlife Area which is managed by the Canadian Wildlife Service of Environment Canada. The site in question has historically been used as an unauthorized dump for garbage and other debris. The project is planned in two phases:

- Phase I: removal of debris/garbage and contaminated sediment from the marsh
- Phase II: removal of debris and contaminated soils from the shoreline

Both phases are expected to be carried out during winter 2010.

DRAFT SCREENING REPORT

Page iii of the Draft Report provides details concerning the environmental assessment. Under "Lead RA Sect.5 Trigger," in addition to "proponent," the "funding" and "permit" triggers should also be checked.

Under section 2.2.1.1 "Site Clean-up and Remediation," it is indicated that helicopters will be used to carry out some of the activities. This is in contradiction to the preferred alternatives section where helicopter activity was not recommended.

The project schedule (section 2.3) indicates that the physical work will be taking place during fall/winter of 2010/2011. It is important to note that if Phase I of the project cannot be finished in fall 2010, then it may need to be completed in fall 2011. If marsh remediation work is undertaken at a different time of year (for example, during spring 2011) there may be additional review or mitigation required.

Air quality is addressed on pages 21-22 of the report. Given that metals are understood to be the key contaminants at the site, air quality is not expected to be a useful indicator of environmental effects, since metals in general are not volatile and therefore are not expected to be present in the air compartment.

Under section 2.4.1.2 "Socio-Economic," the report needs to include a discussion of the current use of land and resources for traditional purposes by Aboriginal persons at the site, in accordance with the definition of environmental effects under CEAA. As well, this section should include information to support the conclusion that the site has low potential for archeological resources.

Under section 2.5, traditional use should be included in the list of valued components.

We cannot comment on Section 3 (including tables 4 and 5) because this part of the report has not been completed.

In Table 6 "Effects Analysis and Mitigation Measures: Biophysical Components", in relation to:

- the Valued Ecosystem Component (VEC) titled Soil and Marsh Sediment, it is stated that work will not be conducted during heavy rainfall. Please define heavy (ex. > x mm of rainfall).

- the VEC titled Vegetation, the residual effects and significance fields have not been completed.
- various VECs (including Vegetation, Fish and Fish Habitat, Wildlife and Birds and Federal Listed Species) there is a mitigation measure that states that a qualified professional will document species at risk found prior to commencement of works. These sections should indicate the mitigation planned if the species are found.
- the VEC titled Surface Water, please find attached the updated document titled *Interim Guidance for Addressing Water Quality for Work In and Around Water.*

Table 7 "Effects Analysis and Mitigation Measures: Socio-Economic Components" lists Native Lands as a Valued Social Component, but the following cells (effects, mitigation, significance etc.) are blank. Table 7 also seems the logical place to include the required assessment of potential impacts to current use of lands and resources for traditional purposes by Aboriginal persons.

Under section 4.2.1 "Spills," note that Environment Canada recommends that all spills be reported to the Provincial Emergency Program (not just spills to land).

Section 4.3 states that there are no cumulative effects because there are no other current activities at the site. However, cumulative effects assessment includes past, current and future projects, and is related to whether the project's residual impacts overlap with the impacts of other (past, present and future) projects. This section should confirm that none of the project residual effects have the potential to interact with effects from other past, present or future projects.

WILDLIFE AND SPECIES AT RISK

The attached guidance document titled *Wildlife Advice for Environmental Assessments* includes basic wildlife and species at risk information, which is provided in addition to the following project-specific advice.

Based on information provided to date, the Canadian Wildlife Service of Environment Canada has determined that a permit under the *Species at Risk Act* (SARA) is not required in relation to the proposed project.

The Canadian Wildlife Service recognizes that the purpose of the project is to remediate existing contamination on the site. It is further acknowledged that alternatives have been considered, including a 'No Action' alternative, and that the proposed option has been selected based on consideration of several factors, including minimizing adverse impacts to species at risk, migratory birds and wetlands. Based on information provided to date, it is likely that the project will improve ecological conditions on the site, including habitat conditions for wildlife. Notwithstanding these considerations, the following specific concerns and recommendations relating to wildlife and species at risk are noted.

<u>Concern (1): *Species at risk surveys*</u>
There is the potential for species at risk (SAR) as defined under SARA to occur at the site, however their presence cannot be confirmed because dedicated field surveys specific to the project area have not been completed. Based on the desktop search and reconnaissance-level information collected to date, the Canadian Wildlife Service agrees that the likelihood for SAR species to occur at the project site can be characterized generally as 'low'. However, for SARA-listed species that have a higher potential to interact with the project, namely, American Badger,

Western Toad, and Painted Turtle, several additional measures should be taken prior to commencement of project activities.

Recommendations:
Generally, the mitigation measures for species at risk identified in Table 6 of the Draft Report are acceptable; however, we recommend that they be amended to include the following:

- In addition to being conducted by a qualified professional, Painted Turtle and Western Toad site surveys should be conducted following Resources Inventory Committee (RIC) standards. Despite the reduced habitat quality on the site caused by contamination, Western Toad and Painted Turtles may be present on the site. Painted Turtles are known to breed in the area (Vanessa Kilburn, Painted Turtle Recovery Team, pers.comm., November 19, 2010) and the site holds habitat characteristics (albeit degraded) for Painted Turtle and Western Toad. Although the late fall is not an ideal time to survey for either species, there is still a reasonable potential that they may be detected if surveys are conducted as soon as possible. If either of these species are identified on the site (during surveys or during the course of the project), the Canadian Wildlife Service should be contacted immediately for advice; this advice should be implemented prior to project commencement/continuation.
- A site survey for active American Badger (jeffersoni subspecies) dens should be conducted prior to project commencement. The survey should follow RIC standards and be conducted by a qualified professional. The survey should be completed as soon as possible since badgers enter a period of inactivity sometime between December and March. If an active den is identified on the project site, the Canadian Wildlife Service and the American Badger recovery team chair should be contacted immediately for advice; this advice should be implemented prior to project commencement, or in the case of active dens indentified during the course of the project, prior to continuation of project activities.
- Based on outcomes of the above and other wildlife surveys conducted prior to commencement of project works, a provincial permit may be required for handling/salvaging/relocating wildlife species. Please contact the British Columbia Ministry of Environment Permit Authorization Service Bureau at 1-866-433-7272 for further information.

Concern (2): *Wildlife trees*
Currently it is unclear whether the project has the potential to impact wildlife trees. These trees serve as important habitat for migratory birds and/or SARA-listed birds and impacts to them should be avoided.

Recommendation:
Reconnaissance surveys should be completed prior to commencement of project activities to identify the wildlife trees on or adjacent to the project site. If wildlife trees with the potential to be impacted by the project are identified, impacts to them should be avoided though the use of appropriate 'no work' buffers. If wildlife trees are identified, the Canadian Wildlife Service should be contacted for advice, and the advice should be implemented prior to project commencement.

Concern (3): *Migratory and SARA-listed bird nest surveys*
It is somewhat unclear whether project activities have the potential to overlap with the breeding bird season (i.e. if there are delays etc.).

Recommendation:
For clarity, we recommend avoiding project-related activities during times that have the potential to harm migratory birds or their active nests. The migratory bird breeding season varies between regions across British Columbia. The period from March 15th to August 15th will generally include breeding activity for most, though not all, avian species across the province. In the event that project activities will unavoidably overlap with the breeding bird season, due diligence must be exercised to avoid harm to migratory birds, and it is recommended that an Active Migratory Bird Nest Survey (AMBNS) program be employed to reduce the likelihood of disturbing or destroying active nests. Please refer to the attached guidance document titled *Active Migratory Bird Nest Surveys* for additional information.

Concern (4): *Masked Sensitive Occurrence*
We note that a BC Conservation Data Centre 'masked sensitive occurrence' is mapped in the area of the project site. Our reviewers have not been able to track down information pertaining to this occurrence.

Recommendation:
We recommend that information in relation to the masked sensitive occurrence be provided directly to Canadian Wildlife Service prior to commencing any project activities. We may offer further comments and recommendations based on the information provided.

Concern (5): *Federally Listed SAR Appendix E*
The information provided in Appendix E appears to be somewhat outdated.

Recommendation:
Appendix E should be updated to include recent assessments by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as well as recent updates to Schedule 1 of SARA. In particular, Lewis' Woodpecker is now listed as Threatened by COSEWIC (not special concern, as the Appendix indicates) and the table should be amended to reflect this. It is noted that several at-risk species are missing from the table at the end of the Appendix, including Western Toad and Painted Turtle. A title and brief explanation should be provided for the table at the end of the Appendix; this should clarify the table contents (i.e. is it meant to be a comprehensive list of species at risk with the potential to occur on the project site? – if so, why are Western Toad and Painted Turtle missing?), the meaning of the 'Identified Wildlife' column in the table, and how the likelihood values (far right column) were determined.

Concern (6): *Backfilling of shoreline area*
The Draft Report indicates that the shoreline area will be backfilled with locally source materials. The Canadian Wildlife Service is concerned that the backfill materials may generate invasive plant issues.

Recommendation:
Measures should be taken to avoid using backfill material containing seeds of invasive plant species.

MANAGEMENT OF CONTAMINANTS

The following comments relate only to the scope of project as defined in section 2.2 of the Draft Report. Please be advised that storing sediment and debris along the shoreline is only appropriate provided that adequate containment is in place to ensure no solid, liquid, or potential run-off associated with the stored sediment/debris enters the marsh. That said, based on the scope of project components as described on pages 8-9, it is unclear how debris will be stored on site; if the intention is for debris to be stored within impermeable on-site storage sacs (as is the case for sediment), it should be noted that this could compromise the impermeability of these storage sacs. The Draft Report should identify how excavated debris will be handled and stored on-site.

Consistent with standard recommendations outlined in the attached *General Guidelines for Contaminated Sites*, best management practices (i.e., mitigation measures) should be employed such that no contaminated media (e.g., sediment, run-off) be permitted to flow down gradient of the work area during excavation, storage, and/or transport of sediment and debris from the marsh.

CLOSING

Please be aware that Section 36(3) of the federal *Fisheries Act*, administered by Environment Canada, prohibits the discharge of deleterious substances to waters frequented by fish, or to a place where those substances might enter such waters. Therefore, the proponent (in this case the department and/or any contractors employed to deliver the project) must ensure that, at all times during the project, deleterious substances are prevented from entering into fish-bearing waters or any tributaries. Due diligence is required at all times to prevent such discharges, and adherence to the proposed courses of action suggested in this letter does not relieve any proponent of the requirement to comply with the *Fisheries Act.* All work associated with the project is also required to comply with the requirements of the *Canadian Environmental Protection Act, 1999*, the *Migratory Birds Convention Act*, the *Species at Risk Act* and all other applicable laws, legislation, and best management practices.

Please consider this advice as constituting fulfillment of Environment Canada's obligations under section 12(3) of CEAA. In order for us to evaluate the effectiveness of our advice under CEAA, we would appreciate receiving a copy of the final decision statement. If you have any questions, please do not hesitate to contact me at 604-666-7715.

Yours sincerely,

[*original signed by*]

Adriana Glos
Environmental Assessment Officer

Att. Environment Canada Interim Guidance for Addressing Water Quality for Work In and Around
Environment Canada Wildlife Advice for Environmental Assessments
Environment Canada Active Migratory Bird Nest Survey Programs
Environment Canada General Guidelines for Contaminated Sites

cc. Nicole Casault, Finance and Corporate Branch, Environment Canada

ACTIVE MIGRATORY BIRD NEST SURVEYS
ENVIRONMENT CANADA - CANADIAN WILDLIFE SERVICE
PACIFIC AND YUKON REGION
ADVICE TO INDUSTRY

Introduction

Incidental take refers to the killing of migratory birds, and/or the disturbance or destruction of their nests or eggs resulting directly or indirectly from human activities[1], where the primary objective of the activity is not the killing of migratory birds and/or the disturbance or destruction of their nests or eggs. Under federal jurisdiction, and within the mandate of the Canadian Wildlife Service of Environment Canada, migratory birds are those species identified in Article I of the *Migratory Birds Convention*[2]. The *Migratory Birds Convention Act, 1994* (MBCA) and the *Migratory Birds Regulations* (MBR) include prohibitions to address the conservation and protection of migratory birds in Canada. The MBR contain a blanket prohibition against the disturbance, destruction or take of the nests, eggs, nest shelter, eider duck shelter or duck box of migratory birds (subsection 6(a)).

Active Migratory Bird Nest Survey Program - Overview

Environment Canada recommends that industry avoid activities that will result in the disturbance or destruction of active migratory bird nests. Where the Proponent determines its activities will unavoidably overlap with the breeding bird season, Environment Canada recommends that the Proponent employ an Active Migratory Bird Nest Survey (AMBNS) program to reduce the likelihood of disturbing or destroying active nests. Doing so in turn reduces the likelihood that the Proponent will be in contravention of the MBCA.

The migratory bird breeding season varies between regions across British Columbia. The period from March 15th to August 15th will generally include breeding activity for most, though not all, avian species across the province. Environment Canada can advise on more specific breeding periods on a project-by-project basis. Environment Canada recommends that an AMBNS be employed if potentially harmful activities are proposed for a period immediately before, during or immediately after the general breeding bird season.

In developing an effective[3] AMBNS, the Inventory Methods for Forest and Grassland Birds, RIC 1999[4], is a useful standard that can be employed for the purposes of a nest survey design. Project, species and habitat specifics will determine whether additional or alternate measures are needed to assess breeding bird activity.

Information to be included in an AMBNS report needs to include:

- Methodology or methodologies employed;
- Area surveyed (including adjacent areas to account for spatial extent of disturbance impacts);

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[1] Those activities refer to: logging, fishing, agriculture, mining, recreation, electricity generation, etc.
[2] Occasional Paper number 1 'Birds protected in Canada under the Migratory Birds Convention Act' is Canada's policy document that lists protected bird species under the Act. This document, last updated in 1991, continues to be used on an interim basis until it is revised to better reflect changes in bird taxonomy and distribution.
[3] 'Effective' here is defined as a having a *reasonable likelihood of success*.
[4] Digital copies available at http://www.ilmb.gov.bc.ca/risc/pubs/tebiodiv/songbird/assets/songml20.pdf

- Prevailing meteorological conditions (humidity, wind, temperature);
- Survey effort (i.e. time allocation) and number of replicate surveys;
- Precise (i.e. geo-referenced) location of observation stations and transects;
- Surveyor qualifications (reports must be signed and sealed by a professional biologist (Registered Professional Biologist).

Survey guidelines:

Because most nests are notoriously difficult to find, surveys must be intensive. A systematic, replicated effort improves confidence of assessing the extent of breeding bird activity within a given area.

Survey effort (i.e. area covered/unit of time) will depend on, amongst other things, habitat type and topography. In general terms, 1.0 ha/hour/survey can be considered a rough rule of thumb, and a minimum level of effort. Steep or difficult terrain, and/or dense vegetation (e.g., riparian zones) will significantly increase the time required to carefully survey each area.

Surveys should be replicated at least twice (i.e. a total of three surveys/unit area) over a period of five days. Each survey day counts as one survey (only).

Surveys should be completed from sunrise to 10:00 am, when birds are most active and most easily identified.

Generally, a buffer with a 20-30 m width[5] around active nest trees should be employed, with adjustments for species-specific requirements. For active nests outside the area to be cleared, but within close proximity to it (in the order of 50 m), buffers also need to be employed, again with adjustments for any species-specific requirements. Species-specific buffer widths have been developed for certain bird groups, including for raptors and herons. For example, the recommended buffer width for a Great Blue Heron nest situated within an urban environment is 60 m[6].

Survey protocols:

1) *Observers should use a combination of transects and observation stations with clear lines of sight. Distance between transects should depend on the density of vegetation in each site, with denser sites receiving a greater number of transects per area. Transects must cover areas adjacent to each site to be cleared, to address disturbance impacts to nesting birds not located within the proposed clearing footprint. Particular attention must be given to nests that require relatively large protective buffers, including, for example, for raptor species and herons (see below).*

2) *Observers should record species (observed by sight and/or sound), indications of nesting activity (e.g., courtship behaviour, carrying nesting material or food). Observation stations, transects, nests, and sightings must be geo-referenced and marked on a topographic map.*

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[5] 'Buffer width' as measured from the edge of the nest tree canopy.
[6] For more information, refer to the following publication (available at http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare2006/develop_with_care_intro.html: *Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia.* March 2006. British Columbia Ministry of Environment.

Active Migratory Bird Nest Survey Program – Detailed

1.0 Initiating a New Survey Cycle
Prior to initiation of any clearing or disturbance-related activities, 1 AMBNS and 2 replicates must be completed within a 5 day period. Results of the surveys will determine whether clearing can proceed. If appropriate to do so, the clearing period will start on the day after the last survey and extend for a period of 10 days thereafter.

1.1 Extending the Survey Cycle 1-5 Days Following On-Alignment[7] Survey
To extend an existing AMBNS cycle for an on-alignment area, 1-5 days after the most recent approved survey, ONE replicate survey must be conducted within this 1-5 day period. Note that the day of the last survey counts as day 1.

1.2 Extending the Survey Cycle 1-4 Days Following Off-Alignment[8] Survey
To extend an existing AMBNS cycle for an off-alignment area, 1-4 days after the most recent approved survey, ONE replicate survey must be conducted within this 1-4 day period. Note that the day of the most recent approved survey counts as day 1.

1.3 Extending the Survey Cycle 6-9 Days Following On-Alignment Survey
To extend an existing AMBNS cycle for an on-alignment area, 6-9 days after the most recent approved survey, TWO consecutive replicate surveys must be conducted within the 6-9 day period.

1.4 Extending the Survey Cycle 5-9 Days Following Off-Alignment Survey
To obtain an extension of an existing AMBNS cycle for an off-alignment area, 5-9 days after the most recent approved survey, TWO consecutive replicate surveys must be conducted within the 5-9 day period.

1.6 Report Format, Naming, and Numbering
In instances where Environment Canada requests the results of an AMBNS program, a written report, with the corresponding maps and data sheets attached, must be submitted to the Department via email as a single .pdf file. Every conducted survey should receive its own unique report number. The report number should be assigned based on the previous survey conducted in the area.

1.7 Restarting a Cycle
In the event an AMBNS cycle period expires, a new cycle can be started by following the rules described in section 1.1 above. Note that although a new survey cycle has been started, the unique report number should follow the previous numbers and should not be reset.

1.8 Flagging
When the professional biologist overseeing or performing the survey determines that a bird nest is active, the tree should be clearly marked with flagging tape. A species-specific buffer (typically 20 m) should be established in on-alignment areas. In off-alignment areas, a 30 m buffer width (or other species-specific buffer) should be established around the active nest tree. If the professional biologist determines that a bird nest is inactive, the tree must be clearly marked with flagging tape and continually monitored for signs of activity.

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[7] "On-alignment" refers to a project development that is immediately adjacent to an existing project; for example, widening of an existing highway.
[8] "Off-alignment" refers to a project that is located in pristine or undeveloped habitat; for example, construction of a new road through un-fragmented forest habitat.

1.9 Pre-Clearing Survey

If the area is not cleared within 24 hours after the completion of the third survey, a pre-clearing survey must be conducted prior to clearing. This survey must be conducted by a wildlife specialist, bird surveyor, or a designate.

1.10 Nest Re-assessment

Proponents should contact the Canadian Wildlife Service of Environment Canada for advice regarding re-evaluating nests identified as active.

Environment Canada – Pacific and Yukon
General Guidelines for Contaminated Sites

Introduction

The following guidelines have been prepared to provide general contaminated sites advice in the context of environmental assessments.

These guidelines apply only to Environment Canada's mandate and expertise, primarily related to possible impacts to ecological receptors. The proponent is advised to also contact Fisheries and Oceans Canada (DFO) and Health Canada (HC) with regard to potential impacts to fish and fish habitat and human health, respectively.

Guidelines

Environment Canada recommends that the proponent take into account the following general considerations:

- Environment Canada recommends that contaminated media at the project site be addressed prior to divestiture of the site or the construction of new facilities, including using the correct[1] guidelines. In order to avoid potential liability associated with contaminated media, remediation to applicable guidelines should take current and future land use into account.

- If contaminated media is present at the site, care should be taken to avoid redistribution of contamination during proposed activities. Minimizing potentially contaminated media (i.e. soil, sediment) disruption and adequate containment of media that may be disturbed through the proposed work is recommended.

- If project involves excavation and relocation of contaminated media from the site, we recommend that the proponent be aware of and maintain records of volumes, characteristics and deposition locations. This will help prevent potential future problems regarding contaminated media originating the site. The proponent should take all reasonable measures to ensure that the relocation of contaminated media is conducted in accordance with best management practices.

- The province of BC operates a separate inventory of contaminated sites under provincial jurisdiction, and we recommend that the proponent contact the BC government for more information on contaminated sites as they relate to the proposed project.

The general considerations above are by no means comprehensive and are not necessarily applicable to all sites. Additional site-specific comments may be necessary to adequately address existing and/or potential contamination.

last updated November 9, 2010

[1] Correct guidelines should take into consideration land use and relevant media (i.e. common errors that occur include the application of soil guidelines to sediment, or application of 10 times water quality guidelines for groundwater).

Environment Canada - Pacific and Yukon
Interim Guidance for Addressing Water Quality for Work in and around Water

Introduction

The following guidelines have been prepared to provide general water quality advice for small projects involving construction in and around marine and fresh water that may be frequented by fish, including, for example, docks, bridges, shoreline protection, pile driving, etc.

These guidelines apply to only to Environment Canada's areas of concern, primarily for the protection of water quality. The proponent is advised to contact the regional Fisheries and Oceans Canada office if the project may result in any potential harmful alteration, disruption or destruction of fish habitat.

Guidelines

1. The proponent shall ensure that all plans and specifications relating to this project have been duly prepared and reviewed by appropriate professionals working on its behalf.
2. The proponent should be aware that Section 36(3) of the federal *Fisheries Act*, administered by Environment Canada, prohibits the discharge of deleterious substances to waters frequented by fish. Therefore, the proponent must ensure that deleterious substances from the project are prevented from discharging into fish-bearing waters or any tributaries. Due diligence is required at all times to prevent such discharges. Adherence to the advice of this document does not relieve the proponent of its ongoing responsibilities in this regard.
3. All work associated with the project involving the use of concrete, cement, mortars and other Portland cement or lime-containing construction materials shall be conducted so as to ensure that sediments, debris, concrete, and concrete fines are not deposited, either directly or indirectly into the aquatic environment. Any water contacting uncured or partly cured concrete or Portland cement or lime-containing construction materials, such as the water that may be used for exposed aggregate wash-off, wet curing, equipment and truck washing, etc. shall be prevented from entering, directly or indirectly, the aquatic environment unless this water has been tested and found to have a pH of between 6.5 and 9.0 and a turbidity of less than 25 NTU. Containment facilities shall be provided at the site for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment as required.
4. The proponent shall ensure that sediment or sediment laden waters or other deleterious substances are not allowed to enter the aquatic environment during the proposed work. Work should be conducted in accordance with best management practices, for example the sediment and erosion provisions of the *Land Development Guidelines for the Protection of Aquatic Habitat* (Fisheries and Oceans Canada, 1993, available at http://www-heb.pac.dfo-mpo.gc.ca/publications/pdf/165353.pdf).
5. An appropriate spill prevention, containment, and clean up contingency plan for hydrocarbon products (e.g., fuel, oil, hydraulic fluid, etc.), and other deleterious substances shall be put in place prior to work commencing, and appropriate spill containment and cleanup supplies shall be kept available onsite whenever the works are occurring. Further, all personnel working on the project should be familiar with implementing the spill clean up plan and the deployment of spill response materials.
6. Any fuel handling or storage associated with the project should comply with the Canadian Council of Ministers of the Environment (CCME) *Environmental Code of Practice for*

Aboveground and Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products (2003). Please be aware that Environment Canada currently has proposed *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations* under CEPA, 1999. It is anticipated these Regulations will be published and come into force during early 2008.

7. If land-based equipment or machinery is used to conduct the proposed works, the equipment/machinery should operate from the upland or operate from the intertidal foreshore within the footprint of the proposed works. Impacts to the intertidal foreshore outside the footprint of the proposed works must be prevented.
8. All machinery used on site should be in good repair and free of excess oil and grease. Any fuelling or maintenance of such equipment should occur on the upland well away from the foreshore.
9. Any material, such as rip rap, gravel, etc., placed below the higher high water mark must be free of silt, overburden, debris or any other substances deleterious to aquatic life.
10. A dock facility should be designed and located so as to preclude tidal grounding of any floating component on the foreshore.
11. No unserviced float homes or live-aboard vessels should be moored at a dock facility. Sewage discharges from ships must adhere to Subdivision 4 – Sewage Discharges of the *Canada Shipping Act.*
12. Under the *Fisheries Act*, Management of Contaminated Fisheries Regulations, the harvesting of bivalve molluscs, (oysters, clams, mussels) is prohibited for any purpose within 125 metres of any wharf, dock, platform or other structure used for vessel moorage, or any permanently anchored floating structure, including float homes, barges, platforms and vessels. It is the proponent's responsibility to ensure commercial, recreation and First Nation shellfish harvesting opportunities are not hindered by placement of such structures.
13. Any timber preservatives are to be applied in a manner consistent with current best management practices such as Appendix 2, Requirements for Using Treated Wood, in the guidebook *Environmentally Sustainable Log Handling Facilities in British Columbia* (Fisheries and Oceans Canada, April 2003). Available at http://www.dfo-mpo.gc.ca/Library/274124.pdf.
14. General log handling operations have the potential to cause serious impacts to the local environment through the aquatic deposition of large amounts of secondary woodwaste (i.e. bark chips, etc.). To reduce the amounts of woodwaste introduced into the environment through log handling activities, please refer to DFO published guidebook, *Environmentally Sustainable Log Handling Facilities in British Columbia* , available at: http://www.dfo-mpo.gc.ca/Library/274124.pdf. For information regarding the log bundling strand recycling initiative – see: http://www.pyr.ec.gc.ca/disposal_at_sea/bundlewire_e.htm.
15. If steel piles are to be used, they must be capped to prevent the entry of wildlife.
16. All demolition materials are to be disposed of upland in an authorized manner. In this regard, it should be noted that burning of preservative-treated timber is not permitted. Whenever possible, recycling of materials is encouraged.
17. Only clean, uncontaminated material may be used as fill.

Closing

This advice does not constitute an approval. The proponent is responsible for ensuring that all work associated with the subject project complies with the requirements of the *Fisheries Act*, the *Canadian Environmental Protection Act, 1999*, the *Migratory Birds Convention Act*, the *Species at Risk Act* and all other applicable laws, legislation, and best management practices.

WILDLIFE ADVICE FOR ENVIRONMENTAL ASSESSMENTS
ENVIRONMENT CANADA - CANADIAN WILDLIFE SERVICE
PACIFIC AND YUKON REGION
ADVICE TO INDUSTRY

Introduction

The Canadian Wildlife Service of Environment Canada offers the following general advice on addressing wildlife and wildlife habitat within an environmental assessment, in accordance with the department's mandate. For more detailed advice, Proponents are encouraged to consult the additional guidance documents available on Environment Canada's website at:

http://www.ec.gc.ca/nature/default.asp?lang=En&n=132ADBFC-1&parent=0C1743A2-4D49-4183-AC5F-1DE909D2FEB1

Migratory Birds and Incidental Take

Incidental take refers to the killing of migratory birds, and/or the disturbance or destruction of their nests or eggs resulting directly or indirectly from human activities, where the primary objective of the activity is not the killing of migratory birds and/or the disturbance or destruction of their nests or eggs. Environment Canada expects due diligence be exercised to avoid harm to migratory birds.

Under the current regulatory framework pursuant to the *Migratory Birds Convention Act, 1994* (MBCA), Environment Canada recommends that Proponents avoid conducting project-related activities during times that have the potential to harm migratory birds or their active nests. The department is currently in the process of developing best management practices and avoidance guidelines that will provide direction to industry and the general public on this matter, and concomitantly support the conservation of migratory birds, as individuals and as populations.

The migratory bird breeding season varies between regions across British Columbia. The period from March 15th to August 15th will generally include breeding activity for most, though not all, avian species across the province. Environment Canada can advise on more specific breeding periods on a project-by-project basis.

In the event a Proponent determines that its activities will unavoidably overlap with the breeding bird season, Environment Canada expects due diligence be exercised to avoid harm to migratory birds, and recommends that the proponent employ an Active Migratory Bird Nest Survey (AMBNS) program to reduce the likelihood of disturbing or destroying active nests. Doing so reduces the likelihood that the Proponent will be in contravention of the MBCA. Environment Canada recommends that an AMBNS be employed if potentially harmful activities are proposed for a period immediately before, during or immediately after the general breeding bird season.

Please contact Environment Canada for a list of technical reports, papers or other information relating to migratory birds and their habitats within British Columbia.

Species at Risk

The purpose of the *Species at Risk Act* (SARA) is to prevent or reduce the likelihood of wildlife species from becoming extinct or extirpated, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming endangered or threatened.

SARA was proclaimed on June 5, 2003 and affords protection to those wildlife species listed in Schedule 1 of the Act. The prohibitions under SARA came into force on June 1, 2004, and apply to individuals of a species, their residences (dwelling places, such as a den or nest or other similar area that is occupied or habitually occupied by one or more individual during part or all of its life cycle), and critical habitat (areas used or formerly used by the species to carry out their life processes that are deemed essential for survival or recovery). Critical habitat will be identified for each listed species in Recovery Strategies and/or Action Plans, available on Environment Canada's *Species at Risk Act* Public Registry: www.sararegistry.gc.ca.

Subsection 79(1) of SARA requires every person who is required by a federal Act to ensure that a federal environmental assessment is conducted to notify the competent Minister(s) without delay if the project is likely to affect a listed wildlife species or its critical habitat. Subsection 79(2) of SARA requires that, where a federal environmental assessment is being carried out on a project that may affect a listed wildlife species or its critical habitat, the person responsible for ensuring the assessment is conducted must identify potential adverse effects on the listed wildlife species and its critical habitat; and, if the project is carried out, ensure that measures are taken to avoid or lessen those adverse effects and to monitor them, and ensure that such measures are consistent with any applicable Recovery Strategy and/or Action Plans. Subsection 79(3) defines 'person' as including an association or organization, and a responsible authority as defined in subsection 2(1) of the *Canadian Environmental Assessment Act* (CEAA).

In managing a project in the context of species at risk, Proponents are advised to identify and evaluate likely species occurrences (including methods such as conducting baseline surveys), assess environmental impacts, develop mitigation strategies and follow-up monitoring plans. The advice below is offered to assist in this process.

1. Complete an in-depth literature review of relevant databases to determine whether any species of concern are known or expected to use the proposed project site or adjacent lands if they are within the zone of influence of the project. This may include:
    - The BC Conservation Data Centre (CDC) database (for any rare element occurrence records), including the 'Species and Ecosystem Explorer search tool';
    - Environment Canada's *Species at Risk Act* Public Registry: www.sararegistry.gc.ca (for Recovery Strategies, Action Plans, Species Accounts);
    - The BC Sensitive Ecosystem Inventory: www.env.gov.bc.ca/sei;
    - Environment Canada's Species at Risk search tool: www.speciesatrisk.gc.ca to determine if the ranges of any Committee on the Status of Endangered Wildlife in Canada (COSEWIC) listed species overlap with the site; and,
    - Scientific journals (many available on-line).

2. Consult with government and non-government agencies and organizations, such as:
    - federal departments with responsibility for species at risk: Fisheries and Oceans Canada (for aquatic species), Parks Canada (for species that occur primarily in national parks), and Environment Canada (for all other species);

- the BC Ministry of the Environment, municipalities and regional districts;
- Species at Risk Recovery Teams; and
- Local naturalist groups and organizations.

3. Complete surveys, following accepted standards and methodologies, of the project area (and adjacent areas as necessary). The appropriate government jurisdiction – provincial or federal – should be consulted for advice on survey design. Permits under the BC *Wildlife Act* or SARA may be required in certain circumstances.

To assist proponents in accounting and managing for species at risk, Environment Canada has developed the following environmental assessment guidance documents:

1. *Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada*
2. *Addressing Species at Risk Act Considerations Under the* Canadian Environmental Assessment Act *for Species Under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada*
3. *The Species at Risk Environmental Checklists for Species Under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada*

These documents will be reviewed and updated on a regular basis; the most up-to-date versions are available at:

http://www.ec.gc.ca/nature/default.asp?lang=En&n=132ADBFC-1&parent=0C1743A2-4D49-4183-AC5F-1DE909D2FEB1

Federal Wetland Policy

Proponents are encouraged to refer to the *Federal Policy on Wetland Conservation*, available at:

http://www.ec.gc.ca/nature/default.asp?lang=En&n=132ADBFC-1&parent=0C1743A2-4D49-4183-AC5F-1DE909D2FEB1

for advice relating to wetland habitats.

Fisheries and Oceans Canada
Pêches et Océans Canada

Suite 200 - 401 Burrard Street
Vancouver, British Columbia
V6C 3S4

Pièce 200 - 401 rue Burrard
Vancouver (C.-B.)
V6C 3S4

Your file *Votre référence*

September 12, 2014

Our file *Notre référence*
14-HPAC-00785

Darryl Roberts
Environment Canada
351 St. Joseph Boulevard
Gatineau, Quebec K1A 0H3

Dear Mr. Roberts:

Subject: Serious harm to fish can be avoided or mitigated

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on August 19, 2014.

Based on the information provided, your proposal has been identified as a project where a *Fisheries Act* authorization is not required given that serious harm to fish can be avoided by following standard measures. Proposals in this category are not considered to need an authorization from the Program under the *Fisheries Act* in order to proceed. In order to comply with the Act, it is recommended that you follow our guidance tools which can be found at the following website (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html). It remains your responsibility to meet the other requirements of federal, provincial and municipal agencies.

Should your plans change or if you have omitted some information in your proposal such that your proposal meets the criteria for a site specific review, as described on our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html), you should complete and submit the request for review form that is also available on the website.

Should you have any questions or concerns about the compliance of your proposal with the *Fisheries Act* (and/or those prohibitions of the *Species at Risk Act* that apply to listed aquatic species)*, you may wish to engage an environmental professional familiar with measures to avoid impacts to fish and fish habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/env-pro-eng.html).

Yours sincerely,

M S Engelsjord

Michael Engelsjord
Triage & Planning Team Leader

CC: Lindsay Paterson, SLR Consulting (Canada) Ltd.

*Those sections most relevant to the review of development proposals include 20 and 35 of the *Fisheries Act* and sections 32, 33 and 58 of the *Species at Risk Act*. For more information please visit www.dfo-mpo.gc.ca.

Canada

From: Engelsjord, Michael
To: Lindsay Paterson
Subject: FW: Request for Review: Remediation Planning Activities, Wilmer Marsh Unit
Date: September 16, 2014 2:04:34 PM
Attachments: @

This message has been archived. View the original item

Hello Lindsay,

Chantelle has just changed work positions and is no longer working in Fisheries Protection Program's Triage & Planning Unit. If you have questions about DFO review of your projects please direct them to our general email inbox referralspacific@dfo-mpo.gc.ca

To answer your question regarding , as these fish species (largemouth and smallmouth bass) are managed by the province of BC if you have a fish collection permit from the province to collect these fish and the permit allows you to destroy the fish then this would not require authorization or review by DFO. Please keep in mind that this exception applies only to killing fish under authority of a fishing licence or fish collection permit.

Regards,

Michael Engelsjord
Team Leader | Chargé d'équipe

Fisheries Protection Program | Programme de protection des pêches

Fisheries and Oceans Canada | Pêches et Océans Canada

200 - 401 Burrard Street | 200, 401 rue Burrard

Vancouver B.C. V6C 3S4

Michael.Engelsjord@dfo-mpo.gc.ca <mailto:Michael.Engelsjord@dfo-mpo.gc.ca>

Telephone | Téléphone: 604-666-2365

Government of Canada | Gouvernement du Canada

DFO "Projects Near Water" website: http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html <http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>

From: Lindsay Paterson [mailto:lpaterson@slrconsulting.com]
Sent: September-15-14 12:54 PM
To: Caron, Chantelle
Subject: RE: Request for Review: Remediation Planning Activities, Wilmer Marsh Unit

Hi Chantelle

I was just contacted by Provincial Fish and Wildlife in Nelson regarding our fish collection permit for the salvage inside the curtain. He requested that we kill any largemouth or smallmouth bass that we capture since they are considered invasive. Since this is a NWA, I wasn't entirely sure if FOC would have an opinion about that. Please advise.

Lindsay

Lindsay Paterson, M.Sc., P.Ag.

Soil Scientist

SLR Consulting (Canada) Ltd.

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<http://www.slrconsulting.com/us>

From: Caron, Chantelle [mailto:Chantelle.Caron@dfo-mpo.gc.ca]
Sent: September 12, 2014 11:06 AM
To: Lindsay Paterson
Subject: Request for Review: Remediation Planning Activities, Wilmer Marsh Unit

Dear Ms. Paterson,

Please find attached a response from Fisheries and Oceans Canada (DFO) regarding your recent request for project review of Remediation Planning Activities, Wilmer Marsh Unit, Columbia National Wildlife Area, near Wilmer, BC. I trust that you will forward this response to Mr. Roberts of Environment Canada.

If you have any questions please do not hesitate to call or email.

Regards,

Chantelle Caron

Biologist, Fisheries Protection Program

Fisheries and Oceans Canada / Government of Canada

Chantelle.Caron@dfo-mpo.gc.ca <mailto:Chantelle.Caron@dfo-mpo.gc.ca> / Tel : (604) 666-2057

Biologiste, Programme de protection des pêches

Pêches et Océans Canada / Gouvernement du Canada
Chantelle.Caron@dfo-mpo.gc.ca <mailto:Chantelle.Caron@dfo-mpo.gc.ca> / Tél : (604)-666-2057

CAMBX1S

Attachments:

image9fbc05.PNG (29 KB)

Ministry of Forests, Lands and Natural Resource Operations

BRITISH COLUMBIA

Wildlife Act of British Columbia FW–17

APPLICATION TO COLLECT FISH FOR SCIENTIFIC PURPOSE

This application is for use by individuals and organizations wishing to collect freshwater fish in British Columbia inland waters.

Please complete all sections of this form. Type or print legibly. Attach additional sheets if needed.

1. APPLICANT INFORMATION:

Legal Last Name: Paterson Legal First Name: Lindsay Legal Middle Initial: J

Legal Company Name (if applicable): SLR Consulting (Canada) Ltd.

Street or PO Box: 200-1475 Ellis Street

City or Town: Kelowna Postal Code: V1Y 2A3 E-mail: lpaterson@slrconsulting.com

Phone (day): 250-808-2320 Date of Birth (MM/DD/YYYY): 03/19/1974

Website (optional): ____________

Additional persons conducting work under this permit*:

Kalina Noel, Brad Seewald, Krystal Ashworth

Kimberley Tasker, Christiane Buie, ____________

____________, ____________, ____________

Refer to item 9, Appendix "A". Any workers not listed must be supervised by the proponent **or one of the additional persons named above.*

2. SAMPLING PROGRAM:

Please ensure that you have read and understand the Application Guidelines provided, and the Reporting Guidelines available at "http://www.env.gov.bc.ca/pasb/reports/fish/"

1. Will collection activities involve live transport? Yes ☐ No ☒

   If so, attach a copy of the ITC permit (Introduction & Transfer Committee Permit) if collection activities involve live transport.

2. Will collection activities involve any tagging, marking, or lethal sampling? ***If yes***, complete **2.6 Lethal Sampling Program Description.** Yes ☐ No ☒

3. Will collection activities involve angling in contravention of existing sport fishing regulations? (see Appendix A) Specify. Yes ☐ No ☒

   ____

4. Will collection activities involve any variances to the listed Permit Conditions? (see Appendix A) Specify. Yes ☐ No ☒

   Site is located within National Wildlife Area, not National Park

5. Will collection activities involve any Species at Risk*? ***If yes,*** list affected species. ***Refer to Appendix B Table 1: Species at Risk** Yes ☐ No ☒

common name ____ scientific name

common name ____ scientific name

➢ 2.1 SAMPLING PERIOD

Start Date (DD/MM/YYYY): 29 / 09 / 2014

End Date (DD/MM/YYYY): 31 / 10 / 2014

➢ 2.2 SAMPLING LOCATION(S) (Refer to guidelines)

(For watershed codes, see HabitatWizard (http://www.env.gov.bc.ca/habwiz/) or the Fisheries Information Data Queries (http://www.env.gov.bc.ca/fish/fidq/).)

ACTIVITY	MOE REGION	WATERBODY	WATERSHED CODE
Fish Salvage	Kootenay	00573COLR ID 703267	300

➢ 2.3 SAMPLING OBJECTIVES (see application guidelines) - please describe project and / or project area – **must include project rationale, methodologies**. You are required to obtain separate permits for additional activities not listed.

(attach sheet if necessary) Will be conducting fish salvage in area of Wilmer Marsh that will be closed off by a sediment curtain in preparation of future contaminated site remediation activities (area = 3600 m2). Fish salvage will involve deployment of hoop nets and minnow traps and use of seine nets to move fish toward hoop nets and minnow traps. Nets/traps will pulled and fish salvaged. Fish will be re-located to areas outside the sediment curtain. Will continue salvage until negligible capture encountered. SLR's review of probable fish species in the vicinity of the sediment curtain area indicate species likely limited to longnose sucker and largemouth and smallmouth bass. Habitat wizard also indicates potential for redside shiner.

2.4 SAMPLING TECHNIQUES

Circle sampling technique codes that you will be using.

Sampling Technique	**Code**
Minnow trapping	MT
Angling	AG
Seining	SN
Dead capture	DC
Trap net	TN
Dip netting	DN
Electrofishing	EF
Gill netting (**complete Section 2.6**)	GN
All of the above	ALL

2.5 SPECIES TO BE SAMPLED

Is this sampling program targeting specific species?

Yes ☐ **If yes, then please identify all target species.**

No ☒ **If no, please indicate potential species encountered.**

Use species codes listed in "Appendix B", Table 2: Species Names and Codes.

No permits will be issued for SARA listed species or for salmon other than Kokanee: see "Appendix A", Item 1.

Link to the SARA permit application forms:

http://www.dfo-mpo.gc.ca/species-especes/permits/sarapermits_e.asp

COMMON NAME	SCIENTIFIC NAME	CODE
Longnose Sucker	Catostomus catostomus	LSU
Largemouth bass	Micropterus salmoides	LMB
Smallmouth bass	Micropterus dolomieui	SMB
Redside Shiner	Richardsonius balteatus	RSC

2.6 LETHAL SAMPLING PROGRAM DESCRIPTION

Complete the following table only if you answered ***yes*** *to* ***section 2.0: Question 2***

TARGET SPECIES	# OF FISH	SAMPLE WATERBODY/CODE

3. FEE: $25 per activity as noted below

Method of Payment:	Cheque/Money Order	☐	Payable to Minister of Finance
	Credit Card (Visa/MasterCard)	☐	(attach credit card authorization sheet)
	Cash/Debit	☐	at Service BC – Government Agent Only
***CREDIT CARD DATA SHOULD NOT BE EMAILED**		☒	at FrontCounter BC office

The information required by this form and any documents you provide with it are collected under the authority of the *Freedom of Information and Protection of Privacy Act* to process your license/permit application under the *Wildlife Act*. This information will be used to verify your eligibility for the license/permit you are seeking and for other purposes related to the administration of the *Wildlife Act*. If you have any questions about the collection or use of this information, contact the Director of Wildlife.

ACKNOWLEDGEMENT:

By signing below, I acknowledge that the information I have provided is true and I am 19 years of age or older. In addition, I have read the Reporting Guidelines and fully understand the level of reporting detail that is expected of myself / my organization, and I ensure that all staff engaged in collection activities under this permit are qualified and trained for collection activities.

	September 12, 2014
Signature of Applicant	**Date of Application**

It is an offence to knowingly make a false statement in order to obtain a permit/licence. Violations may result in prosecution under the *Wildlife Act* and/or refusal of future permit or licence requests. Any permit/licence obtained using false information is invalid.

For adequate processing time, please allow a minimum of 30 days for turnaround.

Incomplete applications may delay processing time for a permit. **Resubmitted** applications are processed in ***resubmitted date order***. **Please ensure your application *Regional boundaries, variance requests are determined from the Fishing Synopsis Regulations, along with your complete work plans*.**

Please send completed application, fees and any supporting documents to the **Permit and Authorization Service Bureau** at one of the following:

By Mail: PO Box 9372 STN PROV GOVT, Victoria BC, V8W 9M3
By Courier: 4th Floor, 2975 Jutland Road, Victoria BC, V8W 9M3
By Fax: (250) 387-1814 or through any Service BC - Government Agent Office
or through any FrontCounter BC Office

Application Guidelines for Scientific Fish Collection Permits

Due to the wide variety of activities that take place under the authorization of this permit, the Ministry has provided the following guidelines to help applicants describe the details and scope that suit their particular sampling program. *For all activities, you are required to familiarize yourself with the provincial and region-specific conditions of your permit, listed in Appendix 'A' of the permit application.*

Questions regarding data report standards can be made to: fishdatasub@gov.bc.ca.

	Activity	Sampling Program Description	Permit Limitations
1.	**Fish Salvage**	Regional Level - Indicate areas within a regional district such as GVRD - Include detailed project objectives	**Maximum 1 year**
Example	Fish collection associated with in-stream works etc.		
2.	**Forestry** **Stream Classification**	Using the TRIM scale, identify the 4^{th} or 5^{th} order stream - Include detailed project objectives	
3.	**Environmental Impact Assessment**	Project Level - Include detailed project objectives	
Example	Pre and / or post development project monitoring (industrial, linear etc.)	- indicate the project/proponent under which the fish collection activity will take place and the water bodies involved - Include detailed project objectives	
4.	**Inventory**	Project Level - indicate the project/proponent under which the fish collection activity will take place and the water bodies involved - Include detailed project objectives	**Maximum 1 year**
Example	(1) Species abundance and distribution (2) Presence / Absence study		

5.	**Research** (fish collection as part of experimental procedure)	Project Level - indicate the project/proponent under which the fish collection activity will take place and the water bodies involved - Include detailed project objectives	
Example	Research to determine how fish populations respond to habitat manipulations		

ACTIVITY	MOE REGION(S)	WATERBODY OR WATERSHED NAME	WATERSHED CODE
Fish Salvage	Required	Indicate area within region (GVRD, Municipality, etc)	Required
Forestry Stream Classification	Required	TRIM scale 4^{th} order stream or larger	Required
Environmental Impact Assessment	Required	Required	Required
Inventory	Required	Required	Required
Research	Required	Required	Required

Appendix A: Fish Collection Permit Conditions

Any Variation of the following terms and conditions will require explicit authorization by the appropriate regional Fish & Wildlife Section Head.

Provincial Conditions

1. This collecting permit is not valid
    - in national parks,
    - in provincial parks unless a Park Use Permit is also obtained,
    - in tidal waters,
    - for eulachon or for salmon* other than kokanee, or
    - for collecting fish by angling unless the permit holder and crew members possess a valid angling licence.

   This collecting permit is **only** valid for species listed as threatened, endangered or extirpated under the Species at Risk Act (SARA) **in conjunction with a permit issued under Section 73 of SARA from Fisheries and Oceans Canada.**

   *Contact the Department of Fisheries and Oceans for fish collecting permits for salmon, eulachon or SARA listed species (see Appendix B).

2. The permit holder (or the project supervisor) named on the application for a scientific collection permit will carry a copy of this permit while engaged in fish collecting and produce it upon request of a conservation officer, fisheries officer or constable.

3. Any specimens surplus to scientific requirements and any species not authorized for collection in this permit shall be immediately and carefully released at the point of capture.

4. Fish collected under authority of this permit shall not be used for food or any purpose other than the objectives set out in the approved application for a scientific collection permit. The permit holder shall not sell, barter, trade, or give away, or offer to sell, barter, trade or give away fish collected under authority of this permit. Dead fish shall be disposed of in a manner that will not constitute a health hazard, nuisance or a threat to wildlife.

5. No fish collected under authority of this permit shall be
    - transported alive unless authorized by this permit, or
    - transplanted unless separately authorized by the Federal/Provincial Fish Transplant Committee.

6. The permit holder shall, within 90 days of the expiry of this permit, submit a report of fish collection activities. Interim reports may also be required and shall be submitted as required by the permit issuer. All submissions must be filed electronically to: http://www.env.gov.bc.ca/fish_data_sub/index.html

   Reporting specifications, information and templates are available from this website and outline the mandatory information requirements. Prior notification of submission or questions regarding data report standards can be made to: fishdatasub@gov.bc.ca

7. This collecting permit is subject to cancellation at any time and shall be surrendered to a conservation officer on demand or to the issuer upon written notice of its cancellation.

8. This permit is valid only for the activities approved on the application form and in accordance with any restrictions set out therein.

9. This permit is valid only for trained, qualified staff named in the Application. The permit holder will comply with all Worker's Compensation Board requirements and other regulatory requirements. Permit holders are responsible for ensuring staff members listed on the permit are properly certified for specific sampling methods or activities (e.g. electroshocking).

10. Any workers not listed on the permit must be supervised by the permit holder or one of the additional persons as named on the permit.

11. All sampling equipment that has been previously used outside of B.C. must be cleaned of mud and dirt and disinfected with 100mg/L chlorine bleach before using in any water course to prevent the spread of fish pathogens (e.g. Whirling disease) and / or invasive plant species. Any washed off dirt or mud must be disposed of in a manner such that it cannot enter a watercourse untreated.

12. No electrofishing is to take place in waters below five degrees C.

13. Electrofishing may not be conducted in the vicinity of spawning gravel, redds, or spawning fish, or around gravels which are capable of supporting eggs or developing embryos of any species of salmonid at a time of year when such eggs or embryos may be present.

14. Angling must only occur in accordance with the regulations specified in the current BC Freshwater Fishing Regulations Synopsis.

Region Specific Conditions

West Coast Region

- Within the boundaries of Management Units 1-1 through 1-13, there shall be no electrofishing in streams above 630 meters in elevation, in anadromous waters, or in lake tributaries from January 1 to June 30.
- All sampling gear follow Association of Professional Biologists' advisory practice bulletin #5. Practice Advisory – Didymo, see: http://www.apbbc.bc.ca/files/Didymo.pdf
- The permit holder must advise the West Coast Region of sampling activities 48 hrs prior to field operations. Please complete the following notification form: http://www.env.gov.bc.ca/pasb/reports/fish/permit_notify1.html

South Coast Region

- The permit holder must notify Iain Lunn, MoE at Iain.Lunn@gov.bc.ca with the following information at least 24 hours prior to undertaking work:
    - approved SFC permit number
    - report number (where applicable)
    - company
    - contact
    - address
    - phone
    - fax
    - water body
    - watershed code
    - purpose of collection
    - start date
    - end date
- All streams sampled, for which a watershed code does not presently exist, will require a map showing the location of the stream and sampling location with the map scale identified at time of reporting.
- Electrofishing and minnow trapping can harm or kill non-target species of management concern such as the endangered Coastal Giant Salamander (within the Chilliwack River drainage system) and Pacific Water Shrew (within the lower Fraser River Valley). Any incidental captures (alive or dead) of any red- or blue-listed wildlife species must be reported to the Ministry of Environment, Lower Mainland Region. For further information on these species or to report incidental captures, please call Kym Welstead, Species at Risk Biologist, MOE, Surrey at (604) 582-5200 or by e-mail at Kym.Welstead@gov.bc.ca.
- Please refer to the following website for the least risk in-stream work windows:
  http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section9/index.html
  Where possible, collection should be conducted during the least risk work windows identified. The exception is seasonal or ephemeral streams where sampling may not be possible during the prescribed window due to flow conditions.
- The permit holder must refer to the following when sampling Salish Sucker, Nooksack Dace and Stickleback species.

Salish sucker sampling guidelines - http://www.zoology.ubc.ca/~schluter/stickleback/Salish_sucker/Guidelines%20for%20collection%20of%20Salish%20sucker.pdf

Nooksack dace sampling guidelines – http://www.zoology.ubc.ca/~schluter/stickleback/Nooksack_dace/non-password%20protected%20files/Guidelines%20for%20the%20Collection%20of%20Nooksack%20Dace.pdf

Stickleback species pairs sampling guidelines - http://www.zoology.ubc.ca/~schluter/stickleback/stickleback_species_pairs/other%20stickleback%20files/Guidelines%20for%20the%20Collection%20and%20In%20Situ%20Scientific%20Study%20of%20Stickleback%20Species%20Pairs.pdf

Thompson/Okanagan Region

- Please refer to information at: http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section9/index.html for the appropriate instream work windows.

Kootenay/Boundary Region

- No electrofishing will be permitted between September 15 and June 15 in streams containing bull trout.
- The permit holder must contact the local zone Conservation Officer Service prior to initiating the field collections.
- All burbot traps must have a section in the top or sidewall that has been secured by a length of untreated, 100% cotton twine no greater than No. 30 (i.e. 30 thread count) or 3 mm diameter. When twine deteriorates, this must produce a square opening with a minimum size of 20 cm x 20 cm. This is intended to ensure that if the trap is lost, the section secured by the twine will rot, allowing captive fish to escape, and preventing the trap from continuing to fish.
- All sampling gear follow Association of Professional Biologist's advisory practice bulletin #5. Practice Advisory Didymo, see: http://www.apbbc.bc.ca/files/Didymo.pdf
- Within 90 days of expiry of this permit, Permittee(s) must submit a report that summarizes all field and any laboratory analysis data related to the sampling program (typically location of catch, species, individual fish tissue metals analysis, moisture content, fish length and weight, etc., and as applicable) and all associated raw laboratory data.

Cariboo Region

- Cariboo Region requires seven days (7) written notice, complete with waterbody and watershed codes for the proposed areas prior to sampling in the Cariboo Region. Please submit written email notice to: Mike.Ramsay@gov.bc.ca or fax to 250 398 4214.
- Until such time as the holder of this permit has discussed specific activities with the Regional Manager and obtains written permission, fish collection, fish sampling or fish salvage may not be undertaken within the boundaries of Management Units 5-04 or 5-05.

Skeena Region

- For information related to Fish Collection Permit Activities in the Skeena Region, please contact Dean Peard at 250-847-7286 or Dean.Peard@gov.bc.ca.

Omineca Region

- No electrofishing will be permitted between September 15 and June 15 in streams containing bull trout.
- Voucher specimens for all regionally significant red and blue-listed species (3 per species), with exception to SARA-listed white sturgeon (*Acipenser transmontanus*), must be submitted to the Regional Fish Information Specialist as per RISC standards.
- All sampling gear follow Association of Professional Biologist's advisory practice bulletin #5. Practice Advisory Didymo, see: http://www.apbbc.bc.ca/files/Didymo.pdf.
- When lethal sampling has occurred for the purposes of environmental effects monitoring or impact assessment, the permit holder shall, within 90 days of the expiry of this permit, submit a report that summarizes all raw data related

to the lethal program. This would typically include location of catch, species, fish tissue metals analysis, fish tissue moisture content, fish length and fish weight, at minimum. Interim reports may also be required and shall be submitted as required by the permit issuer. All fish tissue analysis data related to the lethal program must be submitted ALONG with the standard sampling effort data submission template to http://www.env.gov.bc.ca/fish_data_sub/index.html. Questions regarding submission requirements for lethal sampling may be directed to Susanne.Williamson@gov.bc.ca.

- Lethal fish sampling for metal analysis to environmental studies must have an approved sampling plan prior to any field work; discussion should be held with Environmental Impact Biologists: Bruce Carmichael 250-565-6455 and/or James Jacklin 250-565-7103.

Peace Region

- The permit holder must advise Region 7B (Peace) of sampling activities 48 hrs prior to field operations. Please complete the following notification form: http://www.env.gov.bc.ca/pasb/reports/fish/permit_notify7b.html
- Voucher specimens for all regionally significant red and blue-listed species (3 per species) must be submitted to the Regional Fish Information Specialists as per RISC standards.
- No electrofishing will be permitted between September 15 and June 15 in streams containing bull trout.
- All sampling gear follow Association of Professional Biologists' advisory practice bulletin #5. Practice Advisory – Didymo, see: http://www.apbbc.bc.ca/files/Didymo.pdf
- When lethal sampling has occurred for the purposes of environmental effects monitoring or impact assessment, the permit holder shall, within 90 days of the expiry of this permit, submit a report that summarizes all raw data related to the lethal program. This would typically include location of catch, species, fish tissue metals analysis, fish tissue moisture content, fish length and fish weight, at minimum. Interim reports may also be required and shall be submitted as required by the permit issuer. All fish tissue analysis data related to the lethal program must be submitted ALONG with the standard sampling effort data submission template to http://www.env.gov.bc.ca/fish_data_sub/index.html. Questions regarding submission requirements for lethal sampling may be directed to Susanne.Williamson@gov.bc.ca.
- Lethal fish sampling for metal analysis to environmental studies must have an approved sampling plan prior to any field work.; discussion should be held with Environmental Impact Biologists:

  Bruce Carmichael 250-565-6455 and/or James Jacklin 250 565-7103, and Voucher specimens, any deformed captures in the Pine River watershed, including Murray River and tributaries, must be submitted as per RISC standards to the above at:

  MOE, Environmental Protection Division, 3rd Floor – 1011 4th Avenue, Prince George, BC V2L 3H9.

Appendix B
Table 1 - Species at Risk

The following are species at risk that have been listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as either endangered, threatened or a species of special concern. Species also listed under the Species at Risk Act (SARA) are identified with an asterisk, and are subject to additional permitting requirements through the Federal Department of Fisheries and Oceans (DFO).

Common Name	Scientific Name
Benthic Paxton Lake Stickleback	**Gasterosteus sp.*
Benthic Vananda Creek Stickleback	**Gasterosteus sp.*
Limnetic Paxton Lake Stickleback	**Gasterosteus sp.*
Limnetic Vananda Creek Stickleback	**Gasterosteus sp.*
Nooksack Dace	**Rhinichthys sp.*
Morrison Creek Lamprey	**Lampetra richardsoni*
Vancouver Lamprey (Cowichan Lake Lamprey)	**Lampetra macrostoma*
Cultus Pygmy Sculpin	**Cottus sp.*
Shorthead Sculpin	**Cottus confusus*
Hotwater Physa	**Physella wrighti*
Limnetic Enos Lake Stickleback	*Gasterosteus sp.*
Benthic Enos Lake Stickleback	*Gasterosteus sp.*
Salish Sucker	*Catostomus sp.*
Speckled Dace	*Rhinichthys osculus*
Charlotte Unarmoured Stickleback	*Gasterosteus aculeatus*
Columbia Mottled Sculpin	*Cottus bairdi hubbsi*
Giant Stickleback	*Gasterosteus sp.*
Green Sturgeon	*Acipenser medirostris*
Umatilla Dace	*Rhinichthys umatilla*
West Slope Cutthroat Trout	**Oncorhynchus clarki lewisi*
White Sturgeon	*Acipenser transmontanus*

Applications for permits to specifically collect and retain listed species must be reviewed by the appropriate provincial expert, who will screen permits to ensure that any impacts on listed species are acceptable. For white sturgeon the contact is Steve McAdam (steve.mcadam@gov.bc.ca). For listed non-game freshwater fish the contact is Jordan Rosenfeld (jordan.rosenfeld@gov.bc.ca),.

Table 2 – Species Names and Codes

Common name	Scientific Name	Code	Common name	Scientific Name	Code
American Shad	*Alosa sapidissima*	SH	Mottled Sculpin	*Cottus bairdi*	CBA
Arctic Char	*Salvelinus alpinus*	AC	Mountain Whitefish	*Prosopium williamsoni*	MW
Arctic Cisco	*Coregonus autumnalis*	CA	Ninespine Stickleback	*Pungitius pungitius*	NSB
Arctic Grayling	*Thymallus arcticus*	GR	Nooksack Dace	*Rhinichthys sp*	NDC
Arctic Lamprey	*Lampetra*	AL	Northern Mountain Sucker	*Catostomus platyrhynchus*	MSU
Arctic Smelt	*Osmerus mordax dentex*	ASM	Northern Pearl Dace	*Margariscus margarita*	PDC
Bering Cisco	*Coregonus laurettae*	CB	Northern Pike	*Esox lucius*	NP
Black Catfish/Bullhead	*Ameiurus melas*	BKH	Northern Pikeminnow	*Ptychocheilus oregonensis*	NSC
Black Crappie	*Pomoxis nigromaculatus*	BCB	Northern Redbelly Dace	*Phoxinus eos*	RDC
Brassy Minnow	*Hybognathus hankinsoni*	BMC	Pacific Lamprey	*Lampetra tridentata*	PL
Bridgelip Sucker	*Catastomus columbianus*	BSU	Peamouth Chub	*Mylocheilus caurinus*	PCC
Broad Whitefish	*Coregonus nasus*	BW	Prickly Sculpin	*Cottus asper*	CAS
Brook Stickleback	*Culaea inconstans*	BSB	Pumpkinseed Sunfish	*Lepomis gibbosus*	PMB
Brook Trout	*Salvelinus fontinalis*	EB	Pygmy Longfin Smelt	*Spirinchus sp*	PLS
Brown Catfish (Brown Bullhead)	*Ameiurus nebulosus*	BNH	Pygmy Whitefish	*Prosopium coulteri*	PW
Brown Trout	*Salmo trutta*	GB	Rainbow Smelt	*Osmerus dentex*	RSM
Bull Trout	*Salvelinus confluentus*	BT	Rainbow Trout	*Oncorhynchus mykiss*	RB
Burbot	*Lota lota*	BB	Redside Shiner	*Richardsonius balteatus*	RSC
Carp	*Cyprinus carpio*	CP	River Lamprey	*Lampetra ayresi*	RL
Charlotte Unarmoured Stickleback	*Gasterosteus sp*	SB3	Round Whitefish	*Prosopium cyclindraceum*	RW

Chiselmouth (Chiselmouth Chub)	*Acrocheilus alutaceus*	CMC	Salish Sucker	*Catostomus sp*	SSU
Coastrange Sculpin	*Cottus aleuticus*	CAL	Sharpnose Sculpin	*Cinocottus acuticeps*	CCA
Coastal Cutthroat Trout	*Oncorhynchus clarki clarki*	CCT	Shorthead Sculpin	*Cottus confusus*	CCN
Cultus Lake Sculpin	*Cottus sp*	CCL	Slimy Sculpin	*Cottus cognatus*	CCG
Crayfish	*Pacifastacus leniusculus*	CRA			
Deepwater Sculpin	*Myoxocephalus thompsoni*	CMT	Smallmouth Bass	*Micropterus dolomieui*	SMB
Dolly Varden	*Salvelinus malma*	DV	Speckled Dace	*Rhinichthys osculus*	SDC
Emerald Shiner	*Notropis atherinoides*	ESC	Spoonhead Sculpin	*Cottus ricei*	CRI
Eulachon	*Thaleichthys pacificus*	EU	Spottail Shiner	*Notropis hudsonius*	STC
Fathead Minnow	*Pimephales promelas*	FM	Squanga	*Coregonus sp*	SQ
Finescale Dace	*Phoxinus neogaeus*	FDC	Staghorn Sculpin	*Leptocottus armatus*	CLA
Flathead Chub	*Platygobio gracilis*	FHC	Starry Flounder	*Platichthys stellatus*	SFL
Giant Pygmy Whitefish	*Prosopium sp*	GPW	Steelhead	*Oncorhynchus mykiss*	ST
Giant Stickleback	*Gasterosteus sp*	SB8	Tench	*Tinca tinca*	TC
Golden Trout	*Oncorhynchus aguabonita*	GT	Threespine Stickleback	*Gasterosteus aculeatus*	TSB
Goldeye	*Hiodon alosoides*	GE	Tidepool Sculpin	*Oligocottus maculosus*	COM
Goldfish	*Carassius auratus*	GC	Torrent Sculpin	*Cottus rhotheus*	CRH
Green Sturgeon	*Acipenser medirostris*	GSG	Troutperch	*Percopsis omiscomaycus*	TP
Inconnu	*Stenodus leucichthys*	IN	Umatilla Dace	*Rhinichthys umatilla*	UDC
Kokanee	*Oncorhynchus nerka*	KO	Walleye	*Stizostedion vitreus*	WP
Lake Chub	*Couesius plumbeus*	LKC	Western Brook Lamprey	*Lampetra richardsoni*	BL
Lake Cisco	*Coregonus artedii*	CL	Westslope Cutthroat Trout	*Oncorhynchus clarki lewisi*	WCT
Lake Lamprey	*Lampetra macrostoma*	LL	White Sucker	*Catostomus commersoni*	WSU
Lake Trout	*Salvelinus namaycush*	LT	Yellow Perch	*Perca flavescens*	YP
Lake Whitefish	*Coregonus clupeaformis*	LW	Balkwill Lake Benthic Stickleback	*Gasterosteus sp*	SB1
Largemouth Bass	*Micropterus salmoides*	LMB	Balkwill Lake Limnetic Stickleback	*Gasterosteus sp*	SB2
Largescale Sucker	*Catostomus macrocheilus*	CSU	Emily Lake Benthic Stickleback	*Gasterosteus sp*	SB4
Least Cisco	*Coregonus sardinella*	CS	Emily Lake Limnetic Stickleback	*Gasterosteus sp*	SB5
Leopard Dace	*Rhinichthys falcatus*	LDC	Enos Lake Benthic Stickleback	*Gasterosteus sp*	SB6
Longfin Smelt	*Spirinchus thaleichthys*	LSM	Enos Lake Limnetic Stickleback	*Gasterosteus sp*	SB7
Longnose Dace	*Rhinichthys cataractae*	LNC	Paxton Lake Benthic Stickleback	*Gasterosteus sp*	SB12
Longnose Sucker	*Catostomus catostomus*	LSU	Paxton Lake Limnetic Stickleback	*Gasterosteus sp*	SB13
Morrison Creek Lamprey	*Lampetra richardsoni marifaga*	MCL	Priest Lake Benthic Stickleback	*Gasterosteus sp*	SBB
Mosquitofish	*Gambusia affinis*	GAM	Priest Lake Limnetic Stickleback	*Gasterosteus sp*	SBP

Ministry of Forests, Lands and Natural Resource Operations

FISH COLLECTION PERMIT
Fish Salvage

File: 34770-20

Permit No.: CB14-155834

Permit Holder: SLR Consulting (Canada) Ltd. – Lindsay J. Paterson
200 1475 Ellis Street, Kelowna BC V1Y 2A3

Authorized Persons: Lindsay J. Paterson, Kalina Noel, Brad Seewald, Krystal Ashworth, Kimberley Tasker and Christiane Buie

Pursuant to section 19 of the *Wildlife Act*, RSBC 1996, Chap. 488, and section 18 of the Angling and Scientific Regulations, BC Reg. 125/90, the above named persons are hereby authorized to collect fish for scientific purposes from non-tidal waters subject to the conditions set forth in this Permit:

Permitted Sampling Period: September 29, 2014 to October 31, 2014
Permitted Waterbodies: Kootenay-Boundary Region – Wilmer Marsh (300-973600)
Permitted Sampling Techniques: MT, SN, TN and DN (subject to permit terms and conditions)
Potential Species: LSU, LMB, SMB and RSC (subject to permit terms and conditions)

All Bass must be sacrificed.

Provincial Conditions: (Permit holders must be aware of all terms and conditions):
See Appendix A.
Region Specific Conditions:
See Appendix A.

Authorized by:

Albert Chirico, Resource Information Specialist/Fisheries
Regional Manager
Recreational Fisheries & Wildlife Programs
Kootenay-Boundary Region

Albert Chirico

Date: September 15, 2014 Permit Fee $25

Any contravention or failure to comply with the terms and conditions of this permit is an offense under the *Wildlife Act*, RSBC 1996, Chap. 488 and B.C. Reg. 125/90.

Appendix A: Fish Collection Permit Conditions

Any Variation of the following terms and conditions will require explicit authorization by the appropriate regional Fish & Wildlife Section Head.

Provincial Conditions

1. This collecting permit is not valid
   - in national parks,
   - in provincial parks unless a Park Use Permit is also obtained,
   - in tidal waters,
   - for eulachon or for salmon* other than kokanee, or
   - for collecting fish by angling unless the permit holder and crew members possess a valid angling licence.

   This collecting permit is **only** valid for species listed as threatened, endangered or extirpated under the Species at Risk Act (SARA) **in conjunction with a permit issued under Section 73 of SARA from Fisheries and Oceans Canada.**

   *Contact the Department of Fisheries and Oceans for fish collecting permits for salmon, eulachon or SARA listed species (see Appendix B).

2. The permit holder (or the project supervisor) named on the application for a scientific collection permit will carry a copy of this permit while engaged in fish collecting and produce it upon request of a conservation officer, fisheries officer or constable.

3. Any specimens surplus to scientific requirements and any species not authorized for collection in this permit shall be immediately and carefully released at the point of capture.

4. Fish collected under authority of this permit shall not be used for food or any purpose other than the objectives set out in the approved application for a scientific collection permit. The permit holder shall not sell, barter, trade, or give away, or offer to sell, barter, trade or give away fish collected under authority of this permit. Dead fish shall be disposed of in a manner that will not constitute a health hazard, nuisance or a threat to wildlife.

5. No fish collected under authority of this permit shall be
   - transported alive unless authorized by this permit, or
   - transplanted unless separately authorized by the Federal/Provincial Fish Transplant Committee.

6. The permit holder shall, within 90 days of the expiry of this permit, submit a report of fish collection activities. Interim reports may also be required and shall be submitted as required by the permit issuer. All submissions must be filed electronically to: http://www.env.gov.bc.ca/fish_data_sub/index.html

   Reporting specifications, information and templates are available from this website and outline the mandatory information requirements. Prior notification of submission or questions regarding data report standards can be made to: fishdatasub@gov.bc.ca

7. This collecting permit is subject to cancellation at any time and shall be surrendered to a conservation officer on demand or to the issuer upon written notice of its cancellation.

8. This permit is valid only for the activities approved on the application form and in accordance with any restrictions set out therein.

9. This permit is valid only for trained, qualified staff named in the Application. The permit holder will comply with all Worker's Compensation Board requirements and other regulatory requirements. Permit holders are responsible for ensuring staff members listed on the permit are properly certified for specific sampling methods or activities (e.g. electroshocking).

10. Any workers not listed on the permit must be supervised by the permit holder or one of the additional persons as named on the permit.

Appendix A: Fish Collection Permit Conditions Continued

11. All sampling equipment that has been previously used outside of B.C. must be cleaned of mud and dirt and disinfected with 100mg/L chlorine bleach before using in any water course to prevent the spread of fish pathogens (e.g. Whirling disease) and / or invasive plant species. Any washed off dirt or mud must be disposed of in a manner such that it cannot enter a watercourse untreated.

12. No electrofishing is to take place in waters below five degrees C.

13. Electrofishing may not be conducted in the vicinity of spawning gravel, redds, or spawning fish, or around gravels which are capable of supporting eggs or developing embryos of any species of salmonid at a time of year when such eggs or embryos may be present.

14. Angling must only occur in accordance with the regulations specified in the current BC Freshwater Fishing Regulations Synopsis.

Region Specific Conditions

Kootenay/Boundary Region

- No electrofishing will be permitted between September 15 and June 15 in streams containing bull trout.
- The permit holder must contact the local zone Conservation Officer Service prior to initiating the field collections.
- All burbot traps must have a section in the top or sidewall that has been secured by a length of untreated, 100% cotton twine no greater than No. 30 (i.e. 30 thread count) or 3 mm diameter. When twine deteriorates, this must produce a square opening with a minimum size of 20 cm x 20 cm. This is intended to ensure that if the trap is lost, the section secured by the twine will rot, allowing captive fish to escape, and preventing the trap from continuing to fish.
- All sampling gear follow Association of Professional Biologist's advisory practice bulletin #5. Practice Advisory Didymo, see: https://www.professionalbiology.com/sites/default/files/pdfs/Didymo.pdf
- Within 90 days of expiry of this permit, Permittee(s) must submit a report that summarizes all field and any laboratory analysis data related to the sampling program (typically location of catch, species, individual fish tissue metals analysis, moisture content, fish length and weight, etc., and as applicable) and all associated raw laboratory data.

Appendix B: Table 1 - Species at Risk

The following are species at risk that have been listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as either endangered, threatened or a species of special concern. Species also listed under the Species at Risk Act (SARA) are identified with an asterisk, and are subject to additional permitting requirements through the Federal Department of Fisheries and Oceans (DFO).

Common Name	Scientific Name
Benthic Paxton Lake Stickleback	**Gasterosteus sp.*
Benthic Vananda Creek Stickleback	**Gasterosteus sp.*
Limnetic Paxton Lake Stickleback	**Gasterosteus sp.*
Limnetic Vananda Creek Stickleback	**Gasterosteus sp.*
Nooksack Dace	**Rhinichthys sp.*
Morrison Creek Lamprey	**Lampetra richardsoni*
Vancouver Lamprey (Cowichan Lake Lamprey)	**Lampetra macrostoma*
Cultus Pygmy Sculpin	**Cottus sp.*
Shorthead Sculpin	**Cottus confusus*
Hotwater Physa	**Physella wrighti*
Limnetic Enos Lake Stickleback	*Gasterosteus sp.*
Benthic Enos Lake Stickleback	*Gasterosteus sp.*
Salish Sucker	*Catostomus sp.*
Speckled Dace	*Rhinichthys osculus*
Charlotte Unarmoured Stickleback	*Gasterosteus aculeatus*
Columbia Mottled Sculpin	*Cottus bairdi hubbsi*
Giant Stickleback	*Gasterosteus sp.*
Green Sturgeon	*Acipenser medirostris*
Umatilla Dace	*Rhinichthys umatilla*
West Slope Cutthroat Trout	**Oncorhynchus clarki lewisi*
White Sturgeon	*Acipenser transmontanus*

Applications for permits to specifically collect and retain listed species must be reviewed by the appropriate provincial expert, who will screen permits to ensure that any impacts on listed species are acceptable. For white sturgeon the contact is Steve McAdam (steve.mcadam@gov.bc.ca). For listed non-game freshwater fish the contact is Jordan Rosenfeld (jordan.rosenfeld@gov.bc.ca).

Ministry of Forests, Lands and Natural Resource Operations

FISH COLLECTION PERMIT
Fish Salvage

File: 34770-20

Permit No.: CB14-155834

Permit Holder: SLR Consulting (Canada) Ltd. – Lindsay J. Paterson
200 1475 Ellis Street, Kelowna BC V1Y 2A3

Authorized Persons: Lindsay J. Paterson, Kalina Noel, Brad Seewald, Krystal Ashworth, Kimberley Tasker and Christiane Buie

Pursuant to section 19 of the *Wildlife Act*, RSBC 1996, Chap. 488, and section 18 of the Angling and Scientific Regulations, BC Reg. 125/90, the above named persons are hereby authorized to collect fish for scientific purposes from non-tidal waters subject to the conditions set forth in this Permit:

Permitted Sampling Period: September 29, 2014 to November 15, 2014
Permitted Waterbodies: Kootenay-Boundary Region – Wilmer Marsh (300-973600)
Permitted Sampling Techniques: MT, SN, TN, DN and GN (subject to permit terms and conditions)
Potential Species: LSU, LMB, SMB and RSC (subject to permit terms and conditions)

Provincial Conditions: (Permit holders must be aware of all terms and conditions):
See Appendix A.
Region Specific Conditions:
See Appendix A.

Authorized by:

Albert Chirico, Resource Information Specialist/Fisheries
Regional Manager
Recreational Fisheries & Wildlife Programs
Kootenay-Boundary Region

Albert Chirico

Date: September 15, 2014 Permit Fee $25
Amended: October 17, 2014

Any contravention or failure to comply with the terms and conditions of this permit is an offense under the *Wildlife Act*, RSBC 1996, Chap. 488 and B.C. Reg. 125/90.

Appendix A: Fish Collection Permit Conditions

Any Variation of the following terms and conditions will require explicit authorization by the appropriate regional Fish & Wildlife Section Head.

Provincial Conditions

1. This collecting permit is not valid
   - in national parks,
   - in provincial parks unless a Park Use Permit is also obtained,
   - in tidal waters,
   - for eulachon or for salmon* other than kokanee, or
   - for collecting fish by angling unless the permit holder and crew members possess a valid angling licence.

   This collecting permit is **only** valid for species listed as threatened, endangered or extirpated under the Species at Risk Act (SARA) **in conjunction with a permit issued under Section 73 of SARA from Fisheries and Oceans Canada.**

   *Contact the Department of Fisheries and Oceans for fish collecting permits for salmon, eulachon or SARA listed species (see Appendix B).

2. The permit holder (or the project supervisor) named on the application for a scientific collection permit will carry a copy of this permit while engaged in fish collecting and produce it upon request of a conservation officer, fisheries officer or constable.

3. Any specimens surplus to scientific requirements and any species not authorized for collection in this permit shall be immediately and carefully released at the point of capture.

4. Fish collected under authority of this permit shall not be used for food or any purpose other than the objectives set out in the approved application for a scientific collection permit. The permit holder shall not sell, barter, trade, or give away, or offer to sell, barter, trade or give away fish collected under authority of this permit. Dead fish shall be disposed of in a manner that will not constitute a health hazard, nuisance or a threat to wildlife.

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   - transported alive unless authorized by this permit, or
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Appendix A: Fish Collection Permit Conditions Continued

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14. Angling must only occur in accordance with the regulations specified in the current BC Freshwater Fishing Regulations Synopsis.

Region Specific Conditions

Kootenay/Boundary Region

- No electrofishing will be permitted between September 15 and June 15 in streams containing bull trout.
- The permit holder must contact the local zone Conservation Officer Service prior to initiating the field collections.
- All burbot traps must have a section in the top or sidewall that has been secured by a length of untreated, 100% cotton twine no greater than No. 30 (i.e. 30 thread count) or 3 mm diameter. When twine deteriorates, this must produce a square opening with a minimum size of 20 cm x 20 cm. This is intended to ensure that if the trap is lost, the section secured by the twine will rot, allowing captive fish to escape, and preventing the trap from continuing to fish.
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- Within 90 days of expiry of this permit, Permittee(s) must submit a report that summarizes all field and any laboratory analysis data related to the sampling program (typically location of catch, species, individual fish tissue metals analysis, moisture content, fish length and weight, etc., and as applicable) and all associated raw laboratory data.

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Shorthead Sculpin	**Cottus confusus*
Hotwater Physa	**Physella wrighti*
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Columbia Mottled Sculpin	*Cottus bairdi hubbsi*
Giant Stickleback	*Gasterosteus sp.*
Green Sturgeon	*Acipenser medirostris*
Umatilla Dace	*Rhinichthys umatilla*
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From:	Holmes, Peter N FLNR:EX
To:	Lindsay Paterson
Cc:	Kalina Noel; Chirico, Albert ENV:EX
Subject:	RE: Guidance on salvage effort in Wilmer Marsh
Date:	November 07, 2014 8:55:35 AM
Attachments:	image001.png

Hi Lindsay,

I spoke with Kalina this morning regarding your efforts to salvage fish. Given the only fish being salvaged are considered invasives and you are certain all native species are absent, I would recommend the fish salvage be ceased.

If you have any questions, please contact me.

Peter Holmes
A/Senior Habitat Biologist
Habitat Management Section
Ministry of Forests, Lands and Natural Resource Operations
P.O. Box 2949
Invermere, B.C.
V0A 1K0

Phone: 250.342.4269
Fax: 250.342.4262

From: Lindsay Paterson [mailto:lpaterson@slrconsulting.com]
Sent: Friday, November 7, 2014 9:48 AM
To: Holmes, Peter N FLNR:EX
Cc: Kalina Noel
Subject: Guidance on salvage effort in Wilmer Marsh

Hi Peter
Kalina is still in the field. Here is our catch efforts so far:

Wed PM – 56 bass, 5 redside shiners
Thurs AM – 32 bass, 6 redside shiners
Thurs PM - 40 bass, 7 redside shiners
Fri AM – 52 bass, 1 redside shiner

We are salvaging negligible amounts of redside shiner but still getting returns on the bass. Is there any concern from the province with terminating the salvage program given that it appears there are negligible numbers of redside shiner and apparently numerous bass remaining in the curtained off area (~1200 square meters) which may be affected during our upcoming remediation work? Please confirm.

Thanks
Lindsay

Lindsay Paterson, M.Sc., P.Ag.

Soil Scientist

SLR Consulting (Canada) Ltd.

Cell: 250-808-2320
Office: 250-762-7202
Fax: 250-763-7303
Email: lpaterson@slrconsulting.com

200-1475 Ellis Street, Kelowna, BC, V1Y 2A3, Canada

www.slrconsulting.com

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global environmental solutions
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Fish Data Submission Spreadsheet Template -V 2.0, April 27, 2012

Step 1 Referencing and Locational Information

INSTRUCTIONS | STEP 2 | STEP 3 | STEP 4

IMPORTANT - Please Read:

- Do Not Modify the Spreadsheet other than to enter your data! Modifying the spreadsheet may make it impossible to load your data.
- All fields with Red column headings are required as a minimum data standard
- All fields with Purple Headings are Required for specific situations. See "pop up" comments for each heading
- All fields with Blue Headings are optional but preferred for most activities
- For definitions, methods and recording instuctions hover curser over the red triangles in top right corners of field header boxes

Referencing Information - This Section is Required Scroll over Headings for Further Explanation	
Project Title:	Fish Salvage portion of Wilmer Marsh, 2014, CB14-155834
Company/Agency	Other
Company/Agency (Other)	SLR Consulting (Canada) Ltd.
Spreadsheet Recorder(s):	Corinne Couture, CTech; Kalina Noel, B.Sc., M.E. Des, P.Biol,. R.P.Biol.
Project Type:	Fish Salvage
Other Project Type	
PROVINCIAL PERMIT NUMBER:	CB14-155834
DFO PERMIT NUMBER:	

Statement of Professional Sign-Off Scroll over Headings for Further Explanation	
The information in this submission has been reviewed and verified by a Registered Professional Biologist (Pick list: Yes or No)	Yes
Biologist's Name:	Kalina Noel
Registration Number:	2168
Province of Registration:	BC

Locational Information

IMPORTANT!:
1. Only use one unique reference # for each sampling event.
2. Enter the Reference Numbers from this worksheet to the corresponding lines of the other worksheets that you work on.

													Channel Status	
			Drop Down List							Drop Down List	Drop Down List			Drop Down List	Drop Down List
REFERENCE NUMBER	Gazetted Name	Alias (Local Name)	Waterbody Type	Waterbody (ID) Identifier	Watershed Code (45 Digit)	TWC#	Reach #	Site #	Survey Date	UTM Method	UTM Zone	UTM Easting	UTM Northing	No Visible Channel	Dewatered-Dry/Int Channel
1	Unnamed	Wilmer Marsh	lake	00573COLR	000-000-000-000			1	2014-11-05	GPS general	11	566030.0077	5600292.941	visible channel	
2	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			1	2014-11-06	GPS general	11	566030.0077	5600292.941	visible channel	
3	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			1	2014-11-06	GPS general	11	566030.0077	5600292.941	visible channel	
4	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			1	2014-11-07	GPS general	11	566030.0077	5600292.941	visible channel	
5	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			2	2014-11-05	GPS general	11	566044.1286	5600292.373	visible channel	
6	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			2	2014-11-06	GPS general	11	566044.1286	5600292.373	visible channel	

7	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			2	2014-11-06	GPS general	11	566044.1286	5600292.373	visible channel	
8	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			2	2014-11-07	GPS general	11	566044.1286	5600292.373	visible channel	
9	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			3	2014-11-05	GPS general	11	566057.3066	5600283.189	visible channel	
10	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			3	2014-11-06	GPS general	11	566057.3066	5600283.189	visible channel	
11	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			3	2014-11-06	GPS general	11	566057.3066	5600283.189	visible channel	
12	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			3	2014-11-07	GPS general	11	566057.3066	5600283.189	visible channel	
13	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			4	2014-11-05	GPS general	11	566067.2765	5600274.463	visible channel	
14	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			4	2014-11-06	GPS general	11	566067.2765	5600274.463	visible channel	
15	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			4	2014-11-06	GPS general	11	566067.2765	5600274.463	visible channel	
16	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			4	2014-11-07	GPS general	11	566067.2765	5600274.463	visible channel	
17	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			5	2014-11-05	GPS general	11	566077.6086	5600264.663	visible channel	
18	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			5	2014-11-06	GPS general	11	566077.6086	5600264.663	visible channel	
19	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			5	2014-11-06	GPS general	11	566077.6086	5600264.663	visible channel	
20	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			5	2014-11-07	GPS general	11	566077.6086	5600264.663	visible channel	
21	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			6	2014-11-05	GPS general	11	566084.8177	5600253.83	visible channel	
22	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			6	2014-11-06	GPS general	11	566084.8177	5600253.83	visible channel	
23	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			6	2014-11-06	GPS general	11	566084.8177	5600253.83	visible channel	
24	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			6	2014-11-07	GPS general	11	566084.8177	5600253.83	visible channel	
25	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			7	2014-11-05	GPS general	11	566084.4633	5600241.331	visible channel	
26	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			7	2014-11-06	GPS general	11	566084.4633	5600241.331	visible channel	
27	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			7	2014-11-06	GPS general	11	566084.4633	5600241.331	visible channel	
28	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			7	2014-11-07	GPS general	11	566084.4633	5600241.331	visible channel	
29	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			8	2014-11-05	GPS general	11	566077.229	5600242.452	visible channel	
30	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			8	2014-11-06	GPS general	11	566077.229	5600242.452	visible channel	
31	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			8	2014-11-06	GPS general	11	566077.229	5600242.452	visible channel	
32	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			9	2014-11-05	GPS general	11	566070.9752	5600250.226	visible channel	
33	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			9	2014-11-06	GPS general	11	566070.9752	5600250.226	visible channel	
34	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			9	2014-11-06	GPS general	11	566070.9752	5600250.226	visible channel	
35	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			10	2014-11-05	GPS general	11	566063.0177	5600261.519	visible channel	
36	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			10	2014-11-06	GPS general	11	566063.0177	5600261.519	visible channel	
37	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			10	2014-11-06	GPS general	11	566063.0177	5600261.519	visible channel	
38	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			11	2014-11-05	GPS general	11	566048.755	5600269.182	visible channel	
39	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			11	2014-11-06	GPS general	11	566048.755	5600269.182	visible channel	
40	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			11	2014-11-06	GPS general	11	566048.755	5600269.182	visible channel	
41	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			12	2014-11-05	GPS general	11	566035.7054	5600281.342	visible channel	
42	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			12	2014-11-06	GPS general	11	566035.7054	5600281.342	visible channel	
43	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			12	2014-11-06	GPS general	11	566035.7054	5600281.342	visible channel	
44	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			13	2014-11-05	GPS general	11	566027.0342	5600287.086	visible channel	
45	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			13	2014-11-06	GPS general	11	566027.0342	5600287.086	visible channel	
46	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			13	2014-11-06	GPS general	11	566027.0342	5600287.086	visible channel	
47	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			14	2014-11-05	GPS general	11	566020.7978	5600336.127	visible channel	
48	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			14	2014-11-06	GPS general	11	566020.7978	5600336.127	visible channel	
49	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			14	2014-11-06	GPS general	11	566020.7978	5600336.127	visible channel	
50	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			14	2014-11-07	GPS general	11	566020.7978	5600336.127	visible channel	

51	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			15	2014-11-05	GPS general	11	566011.2927	5600333.108	visible channel	
52	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			15	2014-11-06	GPS general	11	566011.2927	5600333.108	visible channel	
53	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			15	2014-11-06	GPS general	11	566011.2927	5600333.108	visible channel	
54	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			15	2014-11-07	GPS general	11	566011.2927	5600333.108	visible channel	
55	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			16	2014-11-06	GPS general	11	566037.9362	5600293.217	visible channel	
56	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			16	2014-11-07	GPS general	11	566037.9362	5600293.217	visible channel	
57	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			17	2014-11-06	GPS general	11	566073.218	5600268.029	visible channel	
58	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			17	2014-11-07	GPS general	11	566073.218	5600268.029	visible channel	
59	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			18	2014-11-06	GPS general	11	566086.662	5600245.549	visible channel	
60	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			18	2014-11-07	GPS general	11	566086.662	5600245.549	visible channel	
61	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			19	2014-11-06	GPS general	11	566032.8379	5600287.628	visible channel	
62	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			19	2014-11-07	GPS general	11	566032.8379	5600287.628	visible channel	
63	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			20	2014-11-06	GPS general	11	566013.4975	5600325.215	visible channel	
64	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			20	2014-11-07	GPS general	11	566013.4975	5600325.215	visible channel	
65	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			21	2014-11-05	GPS general	11	566070	5600257	visible channel	
66	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			21	2014-11-06	GPS general	11	566070	5600257	visible channel	
67	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			21	2014-11-06	GPS general	11	566070	5600257	visible channel	
68	Unnamed	Wilmer Marsh	lake	00573COLR	300-000000-00000-00000-0000-0000-000-000-000-000-000-000			21	2014-11-07	GPS general	11	566070	5600257	visible channel	

Fish Data Submission Spreadsheet Template V. 2.0, April 27, 2012

Step 2 Fisheries Collection

INSTRUCTIONS | STEP 1 | STEP | STEP

IMPORTANT - Please

Do Not Modify the Spreadsheet other than to enter your data! Modifying the spreadsheet may make it impossible to load your data!

All fields with Red column headings are required as a minimum data standard

All fields with Purple Headings are Required for specific situations. See "pop up" comments for each hea

All fields with Blue Headings are optional but preferred for most activities

To allow functionality of Date/Time selector tools, enable macros.

For definitions, methods and recording instuctions hover curser over the red triangles in top right corners of field header bo

FIRST Enter

Sampling Information

Hover curser over EF Effort heading for more information

Hover curser over Net/Trap Effort heading for more on preferred information for effort and Soak Times

curser over Fish Summary Heading and related headings for fur

tional Info (This information fills in automati					Stream Condition			Site Effort			Electrofisher Specifications									Net/Trap Specifications											Fish Summary					
							Drop Down List	Drop Down List	Preferred Information	Preferred Information	EF Effort			Drop Down List				Drop Down List		Drop Down List				Drop Down List	Net/Trap Effort – Preferred Information – Use Date/Time Selector?					Drop Down List	Drop Down List	Drop Down List	Drop Down List			
zetted Na	ocal Nam	aterbody	Reach #	Site #	Temperature (˚C)	Conductivity (µS/cm)	Turbidity	Sampling Method	Method Number	Haul # /Pass #	EF Seconds	EF Length (m)	EF Width (m)	Enclosure	Voltage	Frequency	Pulse	Make	Model	Gill Net type	Length (m)	Depth (m)	Mesh Size	Set	Date In	Time In	Date Out	Time Out	Soak Time	Habitat	Species	Stage	Age	Total Number	Min. Length (mm)	Max. Length (mm)
Unnamed	Wilmer Marsh	00573COLR	0	1			clear	minnow trapping	1	1														bottom	2014-11-05	10:20:00	2014-11-05	16:27:00	6.12	littoral	Redside Shiner	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	1			clear	minnow trapping	1	1														bottom	2014-11-05	10:20:00	2014-11-05	16:27:00	6.12	littoral	Bass/Sunfish (General)	juvenile		5		
Unnamed	Wilmer Marsh	00573COLR	0	1			clear	minnow trapping	1	2														bottom	2014-11-05	16:27:00	2014-11-06	9:57:00	17.50	littoral	Redside Shiner	juvenile		4		
Unnamed	Wilmer Marsh	00573COLR	0	1			clear	minnow trapping	1	2														bottom	2014-11-05	16:27:00	2014-11-06	9:57:00	17.50	littoral	Bass/Sunfish (General)	juvenile		5		
Unnamed	Wilmer Marsh	00573COLR	0	1			clear	minnow trapping	1	3														bottom	2014-11-06	09:57:00	2014-11-06	15:57:00	6.00	littoral	Redside Shiner	juvenile		7		
Unnamed	Wilmer Marsh	00573COLR	0	1			clear	minnow trapping	1	3														bottom	2014-11-06	09:57:00	2014-11-06	15:57:00	6.00	littoral	Bass/Sunfish (General)	juvenile		8		
Unnamed	Wilmer Marsh	00573COLR	0	1			clear	minnow trapping	1	4														bottom	2014-11-06	15:57:00	2014-11-07	8:10:00	16.22	littoral	Bass/Sunfish (General)	juvenile		4		
Unnamed	Wilmer Marsh	00573COLR	0	2			clear	minnow trapping	1	1														mid-water	2014-11-05	10:28:00	2014-11-05	16:29:00	6.02	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	2			clear	minnow trapping	1	2														mid-water	2014-11-05	16:29:00	2014-11-06	10:00:00	17.52	littoral	Bass/Sunfish (General)	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	2			clear	minnow trapping	1	2														mid-water	2014-11-05	16:29:00	2014-11-06	10:00:00	17.52	littoral	Redside Shiner	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	2			clear	minnow trapping	1	3														mid-water	2014-11-06	10:00:00	2014-11-06	16:02:00	6.03	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	2			clear	minnow trapping	1	4														mid-water	2014-11-06	16:02:00	2014-11-07	8:13:00	16.18	littoral	Bass/Sunfish (General)	juvenile		3		
Unnamed	Wilmer Marsh	00573COLR	0	3			clear	minnow trapping	1	1														mid-water	2014-11-05	10:32:00	2014-11-05	16:31:00	5.98	littoral	Bass/Sunfish (General)	juvenile		3		
Unnamed	Wilmer Marsh	00573COLR	0	3			clear	minnow trapping	1	2														mid-water	2014-11-05	16:31:00	2014-11-06	10:05:00	17.57	littoral	Bass/Sunfish (General)	juvenile		6		
Unnamed	Wilmer Marsh	00573COLR	0	3			clear	minnow trapping	1	3														mid-water	2014-11-06	10:05:00	2014-11-06	16:04:00	5.98	littoral	Bass/Sunfish (General)	juvenile		3		
Unnamed	Wilmer Marsh	00573COLR	0	3			clear	minnow trapping	1	4														mid-water	2014-11-06	16:04:00	2014-11-07	8:14:00	16.17	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	4			clear	minnow trapping	1	1														mid-water	2014-11-05	10:40:00	2014-11-05	16:34:00	5.90	littoral	Bass/Sunfish (General)	juvenile		7		
Unnamed	Wilmer Marsh	00573COLR	0	4			clear	minnow trapping	1	2														mid-water	2014-11-05	16:34:00	2014-11-06	10:08:00	17.57	littoral	Bass/Sunfish (General)	juvenile		5		
Unnamed	Wilmer Marsh	00573COLR	0	4			clear	minnow trapping	1	3														mid-water	2014-11-06	10:08:00	2014-11-06	16:06:00	5.97	littoral	Bass/Sunfish (General)	juvenile		3		
Unnamed	Wilmer Marsh	00573COLR	0	4			clear	minnow trapping	1	4														mid-water	2014-11-06	16:06:00	2014-11-07	8:26:00	16.33	littoral	Redside Shiner	juvenile		1		

Unnamed	Wilmer Marsh	00573COLR	0	5			clear	minnow trapping	1	1														mid-water	2014-11-05	10:49:00	2014-11-05	16:48:00	5.98	littoral	Bass/Sunfish (General)	juvenile		4		
Unnamed	Wilmer Marsh	00573COLR	0	5			clear	minnow trapping	1	2														mid-water	2014-11-05	16:48:00	2014-11-06	10:10:00	17.37	littoral	Bass/Sunfish (General)	juvenile		4		
Unnamed	Wilmer Marsh	00573COLR	0	5			clear	minnow trapping	1	3														mid-water	2014-11-06	10:10:00	2014-11-06	16:10:00	6.00	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	5			clear	minnow trapping	1	4														mid-water	2014-11-06	16:10:00	2014-11-07	8:26:00	16.27	littoral	Bass/Sunfish (General)	juvenile		5		
Unnamed	Wilmer Marsh	00573COLR	0	6			clear	minnow trapping	1	1														mid-water	2014-11-05	10:52:00	2014-11-05	16:51:00	5.98	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	6			clear	minnow trapping	1	2														mid-water	2014-11-05	16:51:00	2014-11-06	10:11:00	17.33	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	6			clear	minnow trapping	1	3														mid-water	2014-11-06	10:11:00	2014-11-06	16:11:00	6.00	littoral	Bass/Sunfish (General)	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	6			clear	minnow trapping	1	4														mid-water	2014-11-06	16:11:00	2014-11-07	8:26:00	16.25	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	7			clear	minnow trapping	1	1														mid-water	2014-11-05	11:00:00	2014-11-05	16:52:00	5.87	littoral	Bass/Sunfish (General)	juvenile		16		
Unnamed	Wilmer Marsh	00573COLR	0	7			clear	minnow trapping	1	2														mid-water	2014-11-05	16:52:00	2014-11-06	10:13:00	17.35	littoral	Bass/Sunfish (General)	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	7			clear	minnow trapping	1	3														mid-water	2014-11-06	10:13:00	2014-11-06	16:15:00	6.03	littoral	Bass/Sunfish (General)	juvenile		8		
Unnamed	Wilmer Marsh	00573COLR	0	7			clear	minnow trapping	1	4														mid-water	2014-11-06	16:15:00	2014-11-07	8:26:00	16.18	littoral	Bass/Sunfish (General)	juvenile		14		
Unnamed	Wilmer Marsh	00573COLR	0	8			clear	minnow trapping	1	1														bottom	2014-11-05	11:18:00	2014-11-05	16:56:00	5.63	littoral	Bass/Sunfish (General)	juvenile		4		
Unnamed	Wilmer Marsh	00573COLR	0	8			clear	minnow trapping	1	2														bottom	2014-11-05	16:56:00	2014-11-06	10:14:00	17.30	littoral	Bass/Sunfish (General)	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	8			clear	minnow trapping	1	3														bottom	2014-11-06	10:14:00	2014-11-06	16:18:00	6.07	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	9			clear	minnow trapping	1	1														bottom	2014-11-05	11:20:00	2014-11-05	16:57:00	5.62	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	9			clear	minnow trapping	1	2														bottom	2014-11-05	16:57:00	2014-11-06	10:16:00	17.32	littoral	Bass/Sunfish (General)	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	9			clear	minnow trapping	1	3														bottom	2014-11-06	10:16:00	2014-11-06	16:19:00	6.05	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	10			clear	minnow trapping	1	1														bottom	2014-11-05	11:24:00	2014-11-05	17:02:00	5.63	littoral	Bass/Sunfish (General)	juvenile		4		
Unnamed	Wilmer Marsh	00573COLR	0	10			clear	minnow trapping	1	2														bottom	2014-11-05	17:02:00	2014-11-06	10:20:00	17.30	littoral	Redside Shiner	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	10			clear	minnow trapping	1	3														bottom	2014-11-06	10:20:00	2014-11-06	16:21:00	6.02	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	11			clear	minnow trapping	1	1														bottom	2014-11-05	11:27:00	2014-11-05	17:05:00	5.63	littoral	Bass/Sunfish (General)	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	11			clear	minnow trapping	1	2														bottom	2014-11-05	17:05:00	2014-11-06	10:23:00	17.30	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	11			clear	minnow trapping	1	3														bottom	2014-11-06	10:23:00	2014-11-06	16:22:00	5.98	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	12			clear	minnow trapping	1	1														bottom	2014-11-05	11:30:00	2014-11-05	17:07:00	5.62	littoral	Bass/Sunfish (General)	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	12			clear	minnow trapping	1	2														bottom	2014-11-05	17:07:00	2014-11-06	10:25:00	17.30	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	12			clear	minnow trapping	1	3														bottom	2014-11-06	10:25:00	2014-11-06	16:23:00	5.97	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	13			clear	minnow trapping	1	1														bottom	2014-11-05	11:34:00	2014-11-05	17:08:00	5.57	littoral	Bass/Sunfish (General)	juvenile		11		
Unnamed	Wilmer Marsh	00573COLR	0	13			clear	minnow trapping	1	1														bottom	2014-11-05	11:34:00	2014-11-05	17:08:00	5.57	littoral	Redside Shiner	juvenile		3		
Unnamed	Wilmer Marsh	00573COLR	0	13			clear	minnow trapping	1	2														bottom	2014-11-05	17:08:00	2014-11-06	10:26:00	17.30	littoral	Bass/Sunfish (General)	juvenile		3		
Unnamed	Wilmer Marsh	00573COLR	0	13			clear	minnow trapping	1	3														bottom	2014-11-06	10:26:00	2014-11-06	16:25:00	5.98	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	14			clear	minnow trapping	1	1														mid-water	2014-11-05	11:49:00	2014-11-05	17:17:00	5.47	littoral	Redside Shiner	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	14			clear	minnow trapping	1	2														mid-water	2014-11-05	17:17:00	2014-11-06	9:45:00	16.47	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	14			clear	minnow trapping	1	3														mid-water	2014-11-06	09:45:00	2014-11-06	15:41:00	5.93	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	14			clear	minnow trapping	1	4														mid-water	2014-11-06	15:41:00	2014-11-07	8:02:00	16.35	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	15			clear	minnow trapping	1	1														mid-water	2014-11-05	11:53:00	2014-11-05	17:21:00	5.47	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	15			clear	minnow trapping	1	2														mid-water	2014-11-05	17:21:00	2014-11-06	9:48:00	16.45	littoral	Bass/Sunfish (General)	juvenile		5		
Unnamed	Wilmer Marsh	00573COLR	0	15			clear	minnow trapping	1	3														mid-water	2014-11-06	09:48:00	2014-11-06	15:42:00	5.90	littoral	Bass/Sunfish (General)	juvenile		3		

Unnamed	Wilmer Marsh	00573COLR	0	15			clear	minnow trapping	1	4														mid-water	2014-11-06	15:42:00	2014-11-07	8:02:00	16.33	littoral	Bass/Sunfish (General)	juvenile		2		
Unnamed	Wilmer Marsh	00573COLR	0	16			clear	minnow trapping	1	1														mid-water	2014-11-06	10:43:00	2014-11-06	16:01:00	5.30	littoral	Bass/Sunfish (General)	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	16			clear	minnow trapping	1	2														mid-water	2014-11-06	16:01:00	2014-11-07	8:12:00	16.18	littoral	Bass/Sunfish (General)	juvenile		2		
Unnamed	Wilmer Marsh	00573COLR	0	17			clear	minnow trapping	1	1														mid-water	2014-11-06	10:50:00	2014-11-06	16:08:00	5.30	littoral	Bass/Sunfish (General)	juvenile		3		
Unnamed	Wilmer Marsh	00573COLR	0	17			clear	minnow trapping	1	2														mid-water	2014-11-06	16:08:00	2014-11-07	8:16:00	16.13	littoral	Bass/Sunfish (General)	juvenile		8		
Unnamed	Wilmer Marsh	00573COLR	0	18			clear	minnow trapping	1	1														mid-water	2014-11-06	10:57:00	2014-11-06	16:13:00	5.27	littoral	Bass/Sunfish (General)	juvenile		8		
Unnamed	Wilmer Marsh	00573COLR	0	18			clear	minnow trapping	1	2														mid-water	2014-11-06	16:13:00	2014-11-07	8:20:00	16.12	littoral	Bass/Sunfish (General)	juvenile		1		
Unnamed	Wilmer Marsh	00573COLR	0	19			clear	minnow trapping	1	1														mid-water	2014-11-06	11:07:00	2014-11-06	16:24:00	5.28	littoral	Bass/Sunfish (General)	juvenile		2		
Unnamed	Wilmer Marsh	00573COLR	0	19			clear	minnow trapping	1	2														mid-water	2014-11-06	16:24:00	2014-11-07	8:11:00	15.78	littoral	Bass/Sunfish (General)	juvenile		2		
Unnamed	Wilmer Marsh	00573COLR	0	20			clear	minnow trapping	1	1														mid-water	2014-11-06	11:16:00	2014-11-06	15:44:00	4.47	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	20			clear	minnow trapping	1	2														mid-water	2014-11-06	15:44:00	2014-11-07	8:05:00	16.35	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	21			clear	trap net	1	1														bottom	2014-11-05	09:46:00	2014-11-05	16:58:00	7.20	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	21			clear	trap net	1	2														bottom	2014-11-05	16:58:00	2014-11-06	10:17:00	17.32	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	21			clear	trap net	1	3														bottom	2014-11-06	10:17:00	2014-11-06	16:20:00	6.05	littoral	No Fish Caught			0		
Unnamed	Wilmer Marsh	00573COLR	0	21			clear	trap net	1	4														bottom	2014-11-06	16:20:00	2014-11-07	9:00:00	16.67	littoral	No Fish Caught			0		

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Key
Species Not Caught
Species in Question
Specific Species
Marine/Estuarine species that are potentially collected

Table A. "Species" column entry options (Sorted alphabetical by COMMON NAME)

STEP	COMMON NAME	SPECIES CODE	COMMENTS
Step 2	No Fish Caught	NFC	
Step 2	No Mussel (Freshwater General) Found	NMF	
Step 2, Step 3	Unidentified Species	SP	
Step 2, Step 3	Unidentifiable Trout - only fry <70mm in length	TR	
Step 2, Step 3	American Shad	SH	
Step 2, Step 3	Arctic Char	AC	
Step 2, Step 3	Arctic Cisco	CA	
Step 2, Step 3	Arctic Grayling	GR	
Step 2, Step 3	Atlantic Salmon	AS	
Step 2, Step 3	Bass/Sunfish (General)	BS	
Step 2, Step 3	Black Bullhead	BKH	
Step 2, Step 3	Black Crappie	BCB	
Step 2, Step 3	Bluegill	BG	
Step 2, Step 3	Brassy Minnow	BMC	
Step 2, Step 3	Bridgelip Sucker	BSU	
Step 2, Step 3	Broad Whitefish	BW	
Step 2, Step 3	Brook Stickleback	BSB	
Step 2, Step 3	Brook Trout	EB	
Step 2, Step 3	Brown Bullhead	BNH	
Step 2, Step 3	Brown Trout	GB	
Step 2, Step 3	Bull Trout	BT	
Step 2, Step 3	Bullhead (General)	BH	
Step 2, Step 3	Burbot	BT	
Step 2, Step 4	Carp (General)	CPG	
Step 2, Step 3	Char (General)	SLV	
Step 2, Step 3	Charlotte Unarmoured Stickleback	SB3	
Step 2, Step 3	Chinook Salmon	CH	
Step 2, Step 3	Chiselmouth	CMC	Formerly known as Chiselmouth Chub
Step 2, Step 3	Chub (General)	CBC	
Step 2, Step 3	Chum Salmon	CM	
Step 2, Step 3	Coastal Cutthroat Trout	CCT	
Step 2, Step 3	Coastrange Sculpin	CAL	Formerly known as Aleutian Sculpin
Step 2, Step 3	Coho Salmon	CO	
Step 2, Step 3	Columbia Sculpin	CCH	
Step 2, Step 3	Common Carp	CP	
Step 2, Step 3	Cultus Lake Pygmy Sculpin	CCL	
Step 2, Step 3	Cutthroat Trout (General)	CT	
Step 2, Step 3	Cutthroat Trout /Rainbow Trout hybrid	CRS	
Step 2, Step 3	Dace (General)	DC	
Step 2, Step 3	Dolly Varden	DV	Also known as Cowichan Lake Lamprey
Step 2, Step 3	Dolly Varden/Bull Trout hybrid (Verified)	DVxBT	
Step 2, Step 3	Emerald Shiner	ESC	
Step 2, Step 3	Enos Lake Benthic Stickleback	SB6	
Step 2, Step 3	Enos Lake Limnetic Stickleback	SB7	
Step 2, Step 3	Eulachon	EU	
Step 2, Step 3	Fathead Minnow	FM	
Step 2, Step 3	Finescale Dace	FDC	
Step 2, Step 3	Salmonid	BT/DV	
Step 2, Step 3	Salmonid	DV/BT	
Step 2, Step 3	Salmonid	CT/RB	
Step 2, Step 3	Salmonid	RB/CT	
Step 2, Step 3	Flathead Chub	FHC	
Step 2, Step 3	Floater Mussel species (General)	ANODON	
Step 2, Step 3	Giant Black Stickleback	SB8	Also known as Western Ridged Mussel
Step 2, Step 3	Giant Pygmy Whitefish	GPW	
Step 2, Step 3	Goldeye	GE	
Step 2, Step 3	Goldfish	GC	
Step 2, Step 3	Great Sculpin	CGS	Marine/Estuarine species that are potentially collected
Step 2, Step 3	Green Sturgeon	GSG	
Step 2, Step 3	Hadley Lake Benthic Stickleback	SB9	
Step 2, Step 3	Hadley Lake Limnetic Stickleback	SB10	
Step 2, Step 3	Inconnu	IN	
Step 2, Step 3	Kokanee	KO	
Step 2, Step 3	Lake Chub	LKC	
Step 2, Step 3	Lake Cisco	CL	Also known as Cisco
Step 2, Step 3	Lake Trout	LT	
Step 2, Step 3	Lake Whitefish	LW	
Step 2, Step 3	Lamprey (General)	L	
Step 2, Step 3	Largemouth Bass	LMB	
Step 2, Step 3	Largescale Sucker	CSU	
Step 2, Step 3	Least Cisco	CS	
Step 2, Step 3	Leopard Dace	LDC	
Step 2, Step 3	Longfin Smelt	LSM	
Step 2, Step 3	Longnose Dace	LNC	
Step 2, Step 3	Longnose Sucker	LSU	
Step 2, Step 3	Minnow (General)	C	

Step 2, Step 3	Misty Lake "Lake" Stickleback	SB14	
Step 2, Step 3	Misty Lake "Stream" Stickleback	SB15	
Step 2, Step 3	Morrison Creek Lamprey	MCL	
Step 2, Step 3	Mountain Sucker	MSU	
Step 2, Step 3	Mountain Whitefish	MW	
Step 2, Step 3	Mountain Whitefish/Round Whitefish hybrid	MWxRW	
Step 2, Step 3	Ninespine Stickleback	NSB	
Step 2, Step 3	Nooksack Dace	NDC	
Step 2, Step 3	Northern Pearl Dace	PDC	
Step 2, Step 3	Northern Pike	NP	
Step 2, Step 3	Northern Pikeminnow	NSC	Formerly known as Northern Squawfish
Step 2, Step 3	Northern Redbelly Dace	RDC	
Step 2, Step 3	Northern Redbelly Dace/Finescale Dace hybrid	XDC	
Step 2, Step 3	Oriental Weatherfish		
Step 2, Step 3	Pacific Lamprey	PL	
Step 2, Step 3	Paxton Lake Benthic Stickleback	SB12	
Step 2, Step 3	Paxton Lake Limnetic Stickleback	SB13	
Step 2, Step 3	Peamouth	PCC	
Step 2, Step 3	Perch (General)	P	
Step 2, Step 3	Pink Salmon	PK	
Step 2, Step 3	Prickly Sculpin	CAS	
Step 2, Step 3	Pumpkinseed	PMB	
Step 2, Step 3	Pygmy Longfin Smelt	PLS	
Step 2, Step 3	Pygmy Whitefish	PW	
Step 2, Step 3	Rainbow Smelt	RSM	In BC may actually be Arctic Smelt, O. Dentex
Step 2, Step 3	Rainbow Trout	RB	
Step 2, Step 3	Redside Shiner	RSC	
Step 2, Step 3	River Lamprey	RL	
Step 2, Step 3	Rocky Mountain Sculpin	CRM	
Step 2, Step 3	Rocky Mountain Ridged Mussel	GONANG	Also known as Western Ridged Mussel
Step 2, Step 3	Round Whitefish	RW	
Step 2, Step 3	Salish Sucker	SSU	
Step 2, Step 3	Salmon (General)	SA	
Step 2, Step 3	Sculpin (General)	CC	
Step 2, Step 3	Sharpnose Sculpin	CCA	Marine/Estuarine species that are potentially collected
Step 2, Step 3	Shorthead Sculpin	CCN	
Step 2, Step 3	Signal Crayfish	CRA	
Step 2, Step 3	Slimy Sculpin	CCG	
Step 2, Step 3	Smallmouth Bass	SMB	
Step 2, Step 3	Smelt (General)	SM	
Step 2, Step 3	Sockeye Salmon	SK	
Step 2, Step 3	Speckled Dace	SDC	
Step 2, Step 3	Splake (Brook Trout/Lake Trout hybrid)	SPK	
Step 2, Step 3	Spoonhead Sculpin	CRI	
Step 2, Step 3	Spottail Shiner	STC	
Step 2, Step 3	Staghorn Sculpin	CLA	Marine/Estuarine species that are potentially collected
Step 2, Step 3	Starry Flounder	SFL	Marine/Estuarine species that are potentially collected
Step 2, Step 3	Steelhead	ST	
Step 2, Step 3	Steelhead (Summer-run)	SST	
Step 2, Step 3	Steelhead (Winter-run)	WST	
Step 2, Step 3	Stickleback (General)	SB	
Step 2, Step 3	Sturgeon (General)	SG	
Step 2, Step 3	Sucker (General)	SU	
Step 2, Step 3	Surf Smelt	SSM	Marine/Estuarine species that are potentially collected
Step 2, Step 3	Tench	TC	
Step 2, Step 3	Threespine Stickleback	TSB	
Step 2, Step 3	Tidepool Sculpin	COM	Marine/Estuarine species that are potentially collected
Step 2, Step 3	Torrent Sculpin	CRH	
Step 2, Step 3	Trout Perch	CRH	
Step 2, Step 3	Umatilla Dace	TP	
Step 2, Step 3	Vananda Creek (Balkwill Lake) Benthic Stickleback	SB1	Actual species name: Vananda Creek Benthic Stickleback. Formerly known as Balkwill Lake Stickleback
Step 2, Step 3	Vananda Creek (Balkwill Lake) Limnetic Stickleback	SB2	Actual species name: Vananda Creek Limnetic Stickleback. Formerly known as Balkwill Lake Stickleback
Step 2, Step 3	Vananda Creek (Emily Lake) Benthic Stickleback	SB4	Actual species name: Vananda Creek Limnetic Stickleback. Formerly known as Emily Lake Stickleback.
Step 2, Step 3	Vananda Creek (Emily Lake) Limnetic Stickleback	SB5	Actual species name: Vananda Creek Benthic Stickleback. Formerly known as Emily Lake Stickleback
Step 2, Step 3	Vananda Creek (Priest Lake) Benthic Stickleback	SBB	Actual species name: Vananda Creek Benthic Stickleback. Formerly known as Preist Lake Stickleback
Step 2, Step 3	Vananda Creek (Priest Lake) Limnetic Stickleback	SBP	Actual species name: Vananda Creek Limnetic Stickleback. Formerly known as Priest Lake Stickleback
Step 2, Step 3	Vancouver Lamprey	LL	Also known as Cowichan Lake Lamprey
Step 2, Step 3	Walleye	WP	
Step 2, Step 3	Western Brook Lamprey	BL	
Step 2, Step 3	Western Floater	ANOKEN	
Step 2, Step 3	Western Pearlshell	MARFAL	
Step 2, Step 3	Westslope Cutthroat Trout	WCT	
Step 2, Step 3	White Sturgeon	WSG	
Step 2, Step 3	White Sucker	WSU	
Step 2, Step 3	Whitefish (General)	WF	
Step 2, Step 3	Winged Floater	ANOCAL	
Step 2, Step 3	Yellow Bullhead	YB	
Step 2, Step 3	Yellow Perch	YP	

Fish Data Submission Spreadsheet Template -V 2.0, April 27, 2012

Key
Species Not Caught
Species in Question
Specific Species
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Table B. Fish Data Submission "Species" column entry options (Sorted by species "GROUP")

STEP	GROUP	COMMON NAME	SCIENTIFIC NAME	SPECIES CODE	COMMENTS
Step 2	NA	No Fish Caught	NA	NFC	
Step 2, Step 3	NA	Unidentified Species	NA	SP	
Step 2, Step 3	Cod	Burbot	*Lota lota*	BB	
Step 2, Step 3	Crayfish	Signal Crayfish	*Pacifastacus leniusculus*	CRA	
Step 2, Step 3	Flounder	Starry Flounder	*Platichths stellatus*	SFL	Marine/Estuarine species that are potentially collected
Step 2, Step 3	Grayling	Arctic Grayling	*Thymallus arcticus*	GR	
Step 2, Step 3	Herring	American Shad	*Alosa sapidissima*	SH	
Step 2, Step 3	Lamprey	Lamprey (General)	Family: Petromyzontidae	L	
Step 2, Step 3	Lamprey	Morrison Creek Lamprey	*Lampetra richardsoni var. Marifuga*	MCL	
Step 2, Step 3	Lamprey	Pacific Lamprey	*Lampetra tridentata*	PL	
Step 2, Step 3	Lamprey	River Lamprey	*Lampetra ayresi*	RL	
Step 2, Step 3	Lamprey	Vancouver Lamprey	*Lampetra macrostoma*	LL	Also known as Cowichan Lake Lamprey
Step 2, Step 3	Lamprey	Western Brook Lamprey	*Lampetra richardsoni*	BL	
Step 2, Step 3	Loach	Oriental Weatherfish	*Misgurnus anguillicaudatus*	OWF	
Step 2, Step 3	Minnow	Minnow (General)	Family: Cyprinidae	C	
Step 2, Step 3	Minnow	Brassy Minnow	*Hybognathus hankinsoni*	BMC	
Step 2, Step 3	Minnow	Chiselmouth	*Acrocheilus alutaceus*	CMC	Formerly known as Chiselmouth Chub
Step 2, Step 3	Minnow	Emerald Shiner	*Notropis atherinoides*	ESC	
Step 2, Step 3	Minnow	Fathead Minnow	*Pimephales promelas*	FM	
Step 2, Step 3	Minnow	Northern Pikeminnow	*Ptychocheilus oregonensis*	NSC	Formerly known as Northern Squawfish
Step 2, Step 3	Minnow	Peamouth	*Mylocheilus caurinus*	PCC	
Step 2, Step 3	Minnow	Redside Shiner	*Richardsonius balteatus*	RSC	
Step 2, Step 3	Minnow	Spottail Shiner	*Notropis hudsonius*	STC	
Step 2, Step 3	Minnow	Tench	*Tinca tinca*	TC	
Step 2, Step 4	Minnow	Carp (General)	Family: Cyprinidae	CPG	
Step 2, Step 3	Minnow	Common Carp	*Cyprinus carpio*	CP	
Step 2, Step 3	Minnow	Goldfish	*Carassius auratus*	GC	
Step 2, Step 3	Minnow	Chub (General)	Family: Cyprinidae	CBC	
Step 2, Step 3	Minnow	Flathead Chub	*Platygobio gracilis*	FHC	
Step 2, Step 3	Minnow	Lake Chub	*Couesius plumbeus*	LKC	
Step 2, Step 3	Minnow	Dace (General)	Family: Cyprinidae	DC	
Step 2, Step 3	Minnow	Northern Redbelly Dace/Finescale Dace hybrid	*Phoxinus eos (Cope) x Phoxinus neogaeus (Cope)*	XDC	
Step 2, Step 3	Minnow	Finescale Dace	*Phoxinus neogaeus*	FDC	
Step 2, Step 3	Minnow	Leopard Dace	*Rhynichthys falcatus*	LDC	
Step 2, Step 3	Minnow	Longnose Dace	*Rhynichthys cataractae*	LNC	
Step 2, Step 3	Minnow	Nooksack Dace	*Rhynichthys cataractae*	NDC	
Step 2, Step 3	Minnow	Northern Pearl Dace	*Margariscus margarita*	PDC	
Step 2, Step 3	Minnow	Northern Redbelly Dace	*Phoxinus eos*	RDC	
Step 2, Step 3	Minnow	Speckled Dace	*Rhynichthys osculus*	SDC	
Step 2, Step 3	Minnow	Umatilla Dace	*Rhynichthys umatilla*	UDC	
Step 2, Step 3	Mooneye	Goldeye	*Hiodon alosoides*	GE	
Step 2	NA	**No Mussels Found**	**NA**	NMF	
Step 2, Step 3	Mussel - Fresh Water	**Rocky Mountain Ridged Mussel**	***Gonidea angulata***	GONANG	Also known as Western Ridged Mussel
Step 2, Step 3	Mussel - Fresh Water	**Western Pearlshell**	***Margaritifera falcata***	MARFAL	
Step 2, Step 3	Mussel - Fresh Water	Floater Mussel species (General)	Family: Unionidae	ANODON	
Step 2, Step 3	Mussel - Fresh Water	Western Floater	*Anodonta kennerlyi/oregonensis*	ANOKEN	
Step 2, Step 3	Mussel - Fresh Water	Winged Floater	*Anodonta californiensis/nuttalliana*	ANOCAL	
Step 2, Step 3	North American Catfish	Bullhead (General)	Family: Ictaluridae	BH	
Step 2, Step 3	North American Catfish	Black Bullhead	*Ameiurus melas*	BKH	
Step 2, Step 3	North American Catfish	Brown Bullhead	*Ameiurus nebulosus*	BNH	
Step 2, Step 3	North American Catfish	Yellow Bullhead	*Ameiurus natalis*	YB	
Step 2, Step 3	Perch	Perch (General)	Family: Percidae	P	
Step 2, Step 3	Perch	Walleye	*Sander vitreus*	WP	
Step 2, Step 3	Perch	Yellow Perch	*Perca flavescens*	YP	
Step 2, Step 3	Pike	Northern Pike	*Esox lucius*	NP	
Step 2, Step 3	Salmonid	Salmon (General)	Family: Salmonidae	SA	
Step 2, Step 3	Salmonid	Char, General	Sub Family: Salmoninae	SLV	
Step 2, Step 3	Salmonid	Dolly Varden/Bull Trout hybrid (Verified)	*Salvelinus malma x Salvelinus confluentus*	DVxBT	
Step 2, Step 3	Salmonid	Splake (Brook Trout/Lake Trout hybrid)	*Salvelinus fontinalis x Salvelinus namaycush*	SPK	
Step 2, Step 3	Salmonid	Arctic Char	*Salvelinus alpinus*	AC	
Step 2, Step 3	Salmonid	Atlantic Salmon	*Salmo salar*	AS	
Step 2, Step 3	Salmonid	Brook Trout	*Salvelinus fontinalis*	EB	
Step 2, Step 3	Salmonid	Brown Trout	*Salmo trutta*	GB	
Step 2, Step 3	Salmonid	Bull Trout	*Salvelinus confluentus*	BT	
Step 2, Step 3	Salmonid	Fish are either DV or BT, but suspect they are BT	*Salvelinus* sp	BT/DV	
Step 2, Step 3	Salmonid	Dolly Varden	*Salvelinus malma*	DV	
Step 2, Step 3	Salmonid	Fish are either DV or BT, but suspect they are DV	Sub Family: Salmoninae	DV/BT	
Step 2, Step 3	Salmonid	Lake Trout	*Salvelinus namaycush*	LT	
Step 2, Step 3	Salmonid	Chinook Salmon	*Oncorhynchus tshawytscha*	CH	
Step 2, Step 3	Salmonid	Chum Salmon	*Oncorhynchus keta*	DV/BT	
Step 2, Step 3	Salmonid	Coho Salmon	*Oncorhynchus kisutch*	CO	
Step 2, Step 3	Salmonid	Pink Salmon	*Oncorhynchus gorbuscha*	PK	
Step 2, Step 3	Salmonid	Kokanee	*Oncorhynchus nerka*	KO	
Step 2, Step 3	Salmonid	Sockeye Salmon	*Oncorhynchus nerka*	SK	
Step 2, Step 3	Salmonid	Unidentifiable Trout - only fry <70mm in length	*Oncorhynchus* sp	TR	
Step 2, Step 3	Salmonid	Cutthroat Trout (General)	Family: Salmonidae	CT	
Step 2, Step 3	Salmonid	Cutthroat Trout /Rainbow Trout hybrid	*Oncorhynchus clarki clarki x Oncorhynchus mykiss*	CRS	
Step 2, Step 3	Salmonid	Fish are either RB or CT, but suspect they are CT	*Oncorhynchus* sp	CT/RB	
Step 2, Step 3	Salmonid	Coastal Cutthroat Trout	*Oncorhynchus clarki clarki*	CCT	
Step 2, Step 3	Salmonid	Westslope Cutthroat Trout	*Oncorhynchus clarki lewisi*	WCT	
Step 2, Step 3	Salmonid	Rainbow Trout	*Oncorhynchus mykiss*	RB	
Step 2, Step 3	Salmonid	Fish are either RB or CT, but suspect they are RB	*Oncorhynchus* sp	RB/CT	
Step 2, Step 3	Salmonid	Steelhead	*Oncorhynchus mykiss*	ST	
Step 2, Step 3	Salmonid	Steelhead (Summer-run)	*Oncorhynchus mykiss*	SST	
Step 2, Step 3	Salmonid	Steelhead (Winter-run)	*Oncorhynchus mykiss*	WST	
Step 2, Step 3	Sculpin	Sculpin (General)	Family: Cottidae	CC	Can be Freshwater or Marine/Estuarine
Step 2, Step 3	Sculpin	Coastrange Sculpin	*Cottus aleuticus*	CAL	Formerly known as Aleutian Sculpin
Step 2, Step 3	Sculpin	Columbia Sculpin	*Cottus hubbsi*	CCH	
Step 2, Step 3	Sculpin	Cultus Lake Pygmy Sculpin	*Cottus aleuticus*	CCL	
Step 2, Step 3	Sculpin	Great Sculpin	*Myoxocephalus polyacanthocepalus*	CMP	Marine/Estuarine species that are potentially collected
Step 2, Step 3	Sculpin	Prickly Sculpin	*Cottus asper*	CAS	
Step 2, Step 3	Sculpin	Rocky Mountain Sculpin	*Cottus* sp	CRM	
Step 2, Step 3	Sculpin	Sharpnose Sculpin	*Cinocottus acuticeps*	CCA	Marine/Estuarine species that are potentially collected
Step 2, Step 3	Sculpin	Shorthead Sculpin	*Cottus confusus*	CCN	
Step 2, Step 3	Sculpin	Slimy Sculpin	*Cottus cognatus*	CCG	
Step 2, Step 3	Sculpin	Spoonhead Sculpin	*Cottus ricei*	CRI	
Step 2, Step 3	Sculpin	Staghorn Sculpin	*Leptocottus armatus*	CLA	Marine/Estuarine species that are potentially collected
Step 2, Step 3	Sculpin	Tidepool Sculpin	*Oligocottus maculosus*	COM	Marine/Estuarine species that are potentially collected
Step 2, Step 3	Sculpin	Torrent Sculpin	*Cottus rhotheus*	CRH	
Step 2, Step 3	Smelt	Smelt (General)	Family: Osmeridae	SM	
Step 2, Step 3	Smelt	Eulachon	*Thaleichthys pacificus*	EU	
Step 2, Step 3	Smelt	Longfin Smelt	*Spirinchus thaleichthys*	LSM	
Step 2, Step 3	Smelt	Pygmy Longfin Smelt	*Spirinchus thaleichthys*	PLS	

Step 2, Step 3	**Smelt**	Rainbow Smelt	*Osmerus mordax*	RSM	In BC may actually be Arctic Smelt, O. Dentex
Step 2, Step 3	**Smelt**	Surf Smelt	*Hypomesus pretiosus*	SSM	Marine/Estuarine species that are potentially collected
Step 2, Step 3	**Stickleback**	Stickleback (General)	Family: Gasterosteidae	SB	
Step 2, Step 3	**Stickleback**	Brook Stickleback	*Culaea inconstans*	BSB	
Step 2, Step 3	**Stickleback**	Charlotte Unarmoured Stickleback	*Gasterosteus aculeatus*	SB3	
Step 2, Step 3	**Stickleback**	Enos Lake Benthic Stickleback	*Gasterosteus* sp	SB6	
Step 2, Step 3	**Stickleback**	Enos Lake Limnetic Stickleback	*Gasterosteus* sp	SB7	
Step 2, Step 3	**Stickleback**	Giant Stickleback	*Gasterosteus* sp	SB8	
Step 2, Step 3	**Stickleback**	Hadley Lake Benthic Stickleback	*Gasterosteus* sp	SB9	
Step 2, Step 3	**Stickleback**	Hadley Lake Limnetic Stickleback	*Gasterosteus* sp	SB10	
Step 2, Step 3	**Stickleback**	Misty Lake Lake Stickleback	*Gasterosteus* sp	SB14	
Step 2, Step 3	**Stickleback**	Misty Lake Stream Stickleback	*Gasterosteus* sp	SB15	
Step 2, Step 3	**Stickleback**	Ninespine Stickleback	*Gasterosteus* sp	NSB	
Step 2, Step 3	**Stickleback**	Paxton Lake Benthic Stickleback	*Gasterosteus* sp	SB12	
Step 2, Step 3	**Stickleback**	Paxton Lake Limnetic Stickleback	*Gasterosteus* sp	SB13	
Step 2, Step 3	**Stickleback**	Threespine Stickleback	*Gasterosteus aculeatus*	TSB	
Step 2, Step 3	**Stickleback**	Vananda Creek (Balkwill Lake) Benthic Stickleback	*Gasterosteus* sp	SB1	Actual species name: Vananda Creek Benthic Stickleback. Formerly known as Balkwill Lake Stickleback
Step 2, Step 3	**Stickleback**	Vananda Creek (Balkwill Lake) Limnetic Stickleback	*Gasterosteus* sp	SB2	Actual species name: Vananda Creek Limnetic Stickleback. Formerly known as Balkwill Lake Stickleback
Step 2, Step 3	**Stickleback**	Vananda Creek (Emily Lake) Limnetic Stickleback	*Gasterosteus* sp	SB4	Actual species name: Vananda Creek Limnetic Stickleback. Formerly known as Emily Lake Stickleback.
Step 2, Step 3	**Stickleback**	Vananda Creek (Emily Lake) Benthic Stickleback	*Gasterosteus* sp	SB5	Actual species name: Vananda Creek Benthic Stickleback. Formerly known as Emily Lake Stickleback
Step 2, Step 3	**Stickleback**	Vananda Creek (Priest Lake) Benthic Stickleback	*Gasterosteus* sp	SBB	Actual species name: Vananda Creek Benthic Stickleback. Formerly known as Preist Lake Stickleback
Step 2, Step 3	**Stickleback**	Vananda Creek (Priest Lake) Limnetic Stickleback	*Gasterosteus* sp	SBP	Actual species name: Vananda Creek Limnetic Stickleback. Formerly known as Priest Lake Stickleback
Step 2, Step 3	**Sturgeon**	Sturgeon (General)	Family: Acipenseridae	SG	
Step 2, Step 3	**Sturgeon**	Green Sturgeon	*Acipenser medirostris*	GSG	
Step 2, Step 3	**Sturgeon**	White Sturgeon	*Acipenser transmontanus*	WSG	
Step 2, Step 3	**Sucker**	Sucker (General)	Family: Catostomidae	SU	
Step 2, Step 3	**Sucker**	Bridgelip Sucker	*Catostomus columbianus*	BSU	
Step 2, Step 3	**Sucker**	Largescale Sucker	*Catostomus macrocheilus*	CSU	
Step 2, Step 3	**Sucker**	Longnose Sucker	*Catostomus catostomus*	LSU	
Step 2, Step 3	**Sucker**	Mountain Sucker	*Catostomus platyhyncus*	MSU	
Step 2, Step 3	**Sucker**	Salish Sucker	*Catostomus catostomus*	SSU	
Step 2, Step 3	**Sucker**	White Sucker	*Catostomus commersoni*	WSU	
Step 2, Step 3	**Sunfish**	Bass/Sunfish (General)	Family: Centrarchidae	BS	
Step 2, Step 3	**Sunfish**	Black Crappie	*Pomoxis nigromaculatus*	BCB	
Step 2, Step 3	**Sunfish**	Bluegill	*Lepomis macrochirus*	BG	
Step 2, Step 3	**Sunfish**	Largemouth Bass	*Micropterus salmoides*	LMB	
Step 2, Step 3	**Sunfish**	Pumpkinseed	*Lepomis gibbosus*	PMB	
Step 2, Step 3	**Sunfish**	Smallmouth Bass	*Micropterus dolomieui*	SMB	
Step 2, Step 3	**Trout-Perch**	Trout Perch	*Percopsis omiscomaycus*	TP	
Step 2, Step 3	**Whitefish**	Whitefish (General)	Family: Coregoninae	WF	
Step 2, Step 3	**Whitefish**	Mountain Whitefish/Round Whitefish hybrid	*Prosopium williamsoni x Prosopium cyclindraceum*	MWxRW	
Step 2, Step 3	**Whitefish**	Broad Whitefish	*Coregonus nasus*	BW	
Step 2, Step 3	**Whitefish**	Giant Pygmy Whitefish	*Prosopium sp*	GPW	
Step 2, Step 3	**Whitefish**	Inconnu	*Stenodus leucichthys*	IN	
Step 2, Step 3	**Whitefish**	Lake Cisco	*Coregonus artedii*	CL	Also known as Cisco
Step 2, Step 3	**Whitefish**	Lake Whitefish	*Coregonus clupeaformis*	LW	
Step 2, Step 3	**Whitefish**	Least Cisco	*Coregonus sardinella*	CS	
Step 2, Step 3	**Whitefish**	Mountain Whitefish	*Prosopium williamsoni*	MW	
Step 2, Step 3	**Whitefish**	Pygmy Whitefish	*Prosopium coulteri*	PW	
Step 2, Step 3	**Whitefish**	Round Whitefish	*Prosopium cyclindraceum*	RW	

From:	Anderson, Kristina FLNR:EX
To:	Lindsay Paterson
Cc:	Holmes, Peter N FLNR:EX
Subject:	RE: Wilmer Marsh Unit, Columbia National Wildlife Area - Remediation Planning Activities
Date:	September 09, 2014 10:39:30 AM
Attachments:	@

This message has been archived. View the original item

Hello Lindsay,

I was informed close to the end of August that Peter Holmes was managing this inquiry, so I did not respond to your email. I will defer to his judgment on the topic.

Regards, Kristina

Kristina Anderson
Water Stewardship Officer
(250) 489-8557

From: Lindsay Paterson [mailto:lpaterson@slrconsulting.com]
Sent: Tuesday, August 19, 2014 1:30 PM
To: Anderson, Kristina FLNR:EX
Subject: Wilmer Marsh Unit, Columbia National Wildlife Area - Remediation Planning Activities

Hi Kristina

I just left you a voicemail. Over the past several years, SLR has been conducting contaminated site investigation and remediation activities at a federal property located within the Columbia National Wildlife Area, north of Wilmer, BC. Historical illegal/unauthorized dumping of refuse and debris has occurred at the site (primarily car bodies, tires, metal debris but including glass, plastic, wood as well). SLR has removed significant amounts of debris from the site over the past several years. However, some debris still exists in an uplands trail area and in the marsh (see attached photoplate and Google Earth picture). Environment Canada would like to remove as much of the remaining debris in January-February 2015.

To that end, we are planning to conduct some remediation planning activities at the site in September. Specifically, we would like to install a sediment curtain prior to the onset of winter and freeze-up of the marsh so that we can best mitigate any potential sediment issues that may occur when the debris is removed from the marsh in January-February 2015. The plan would be to leave the curtain in place until Spring 2015 when surface water returns to baseline conditions. To that end, we are also planning to collect baseline surface water samples to assess baseline turbidity (TSS, TDS). As the area of the sediment curtain installation is located within the federal National Wildlife Area (see attached site location map), I was not certain whether a Water Act notification was required for the installation of curtain. I would appreciate your direction on this.

Please note that the actual remediation work will be discussed this fall with numerous agencies including MOE, Canadian Wildlife Service, Fisheries and Oceans Canada, Health Canada and Environment Canada. This request is only to facilitate the installation of the sediment curtain in September.

Thank you for your assistance. If you have any questions, feel free to call or email.

Lindsay

Lindsay Paterson, M.Sc., P.Ag.

Soil Scientist

SLR Consulting (Canada) Ltd.

Cell:

250-808-2320

Office:

250-762-7202

Fax:

250-763-7303

Email:

lpaterson@slrconsulting.com

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<http://www.slrconsulting.com/us>

Attachments:

image001.png (29 KB)

This report(s) document(s) is provided in electronic format for convenience only. In all circumstances only the original signed hard copy of the report(s) document(s) shall be considered accurate and reliable, and shall govern in the event of any discrepancies between the original and electronic versions. SLR Consulting (Canada) Ltd. shall not be liable in any way for errors or omissions in any electronic version of its report document.

22 October 2014

Peter Holmes, Ecosystem Biologist
Ministry of Forests, Lands and Natural Resource Operations
Box 265
Invermere, BC V0A1K0

Project No.: 219.05112.00010

Dear Mr. Holmes,

RE: WILMER MARSH WATER ACCESS REQUEST

SLR Consulting (Canada) Ltd. (SLR) will be conducting field activities in support of remediation planning at the former refuse site located within the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA) during the week of November 3, 2014. Specifically, SLR will be installing a sediment curtain in the marsh and conducting subsequent fish salvage activities. The sediment curtain installation and fish salvage works are being conducted to facilitate the removal of anthropogenic debris from the NWA which is proposed to occur in early 2015. In order to access the work area on the federal lands during the week of November 3, 2014, SLR requires access to the marsh through provincially owned lands. The work plan would involve accessing the marsh by an ATV trail at the north end of Moffat Avenue in Wilmer, BC (see attached pdf). An ATV/UTV and trailer would be used to relay a small, electric motor-powered boat to the marsh. The boat would transport the sediment curtain and fish salvage supplies (nets, traps) to the work area.

SLR is requesting permission to access the following provincially-owned parcels:

- Remainder Lot 13, Plan X-15 (see attached pdf): the lands would be accessed by foot and by UTV/ATV with trailer transporting the aluminum boat; and
- Southeast quarter of Sublot 5, Plan X-15 (see attached pdf): the terrestrial lands immediately south of the former refuse site would be accessed by foot while the aquatic/water portion of the lands would be traversed by aluminum boat (electric motor-powered).

The proposed access point appears to be the safest option for the remediation planning works (see attached pdf). The trail appears to have regular foot and ATV traffic and consequently, the impact of SLR's access through the lands is anticipated to have a negligible effect on the lands.

Please do not hesitate to contact SLR regarding any questions or concerns you may have.

Yours sincerely,
SLR Consulting (Canada) Ltd.

Applied Science Technologists and Technicians of British Columbia
27570
Corinne Couture
CORINNE COUTURE
Oct 22/2014
CTech

Corinne Couture, CTech
Junior Environmental Technologist

Lindsay Paterson, MSc, PAg
Project Manager

Enc Google Earth Images
CC/LP/cm

SLR Consulting (Canada) Ltd. 200 - 1475 Ellis Street, Kelowna, BC V1Y 2A3
T: 250.762.7202 F: 250.763.7303
www.slrconsulting.com

— INDEX MAP No. X.15. —

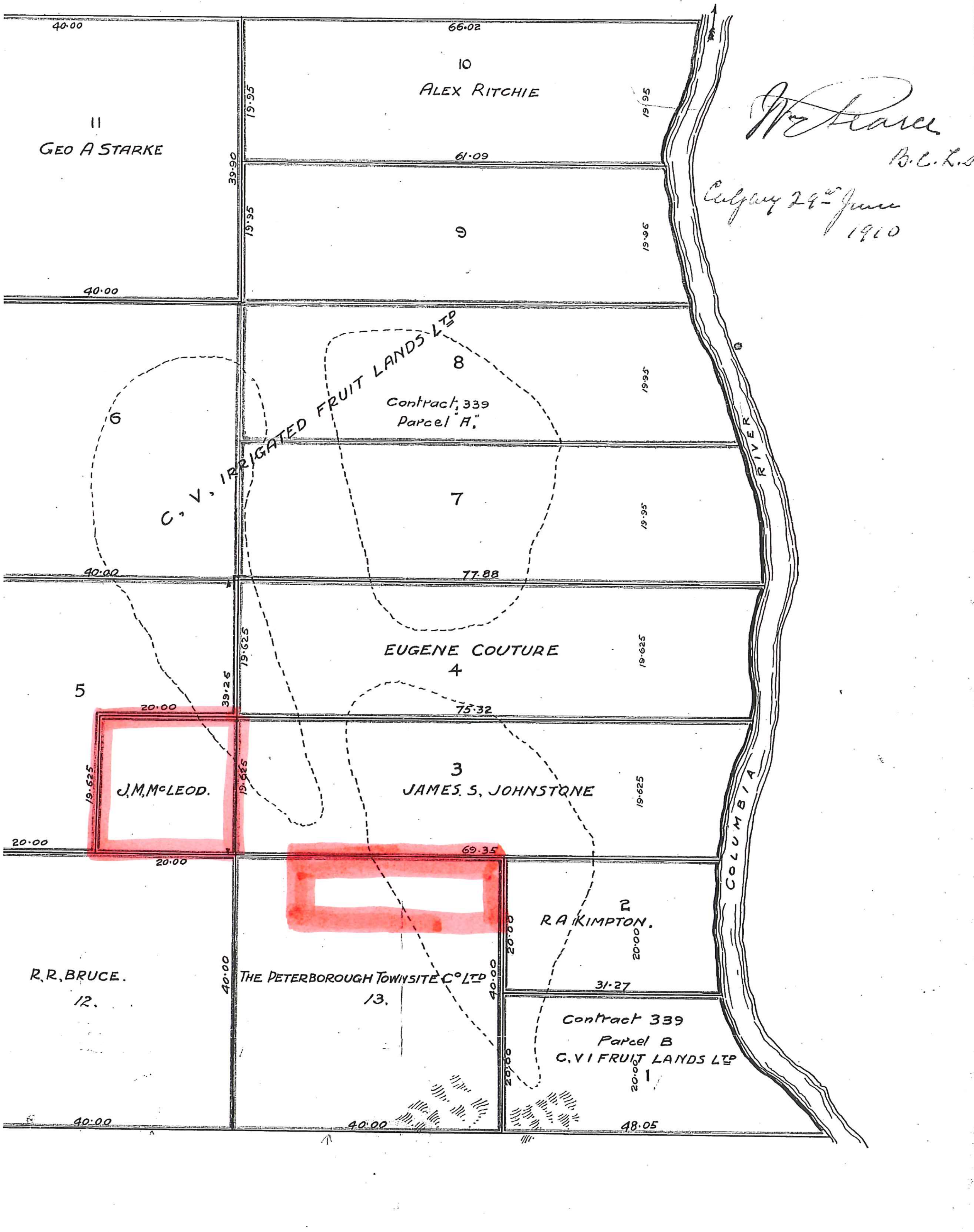
— Deposited this 12th day of June. 1914 —

COLUMBIA AND KOOTENAY RAILWAY COMPANY.

Fred Moffatt

— Deputy District Registrar —

Lot 377 District of East Kootenay B.C.



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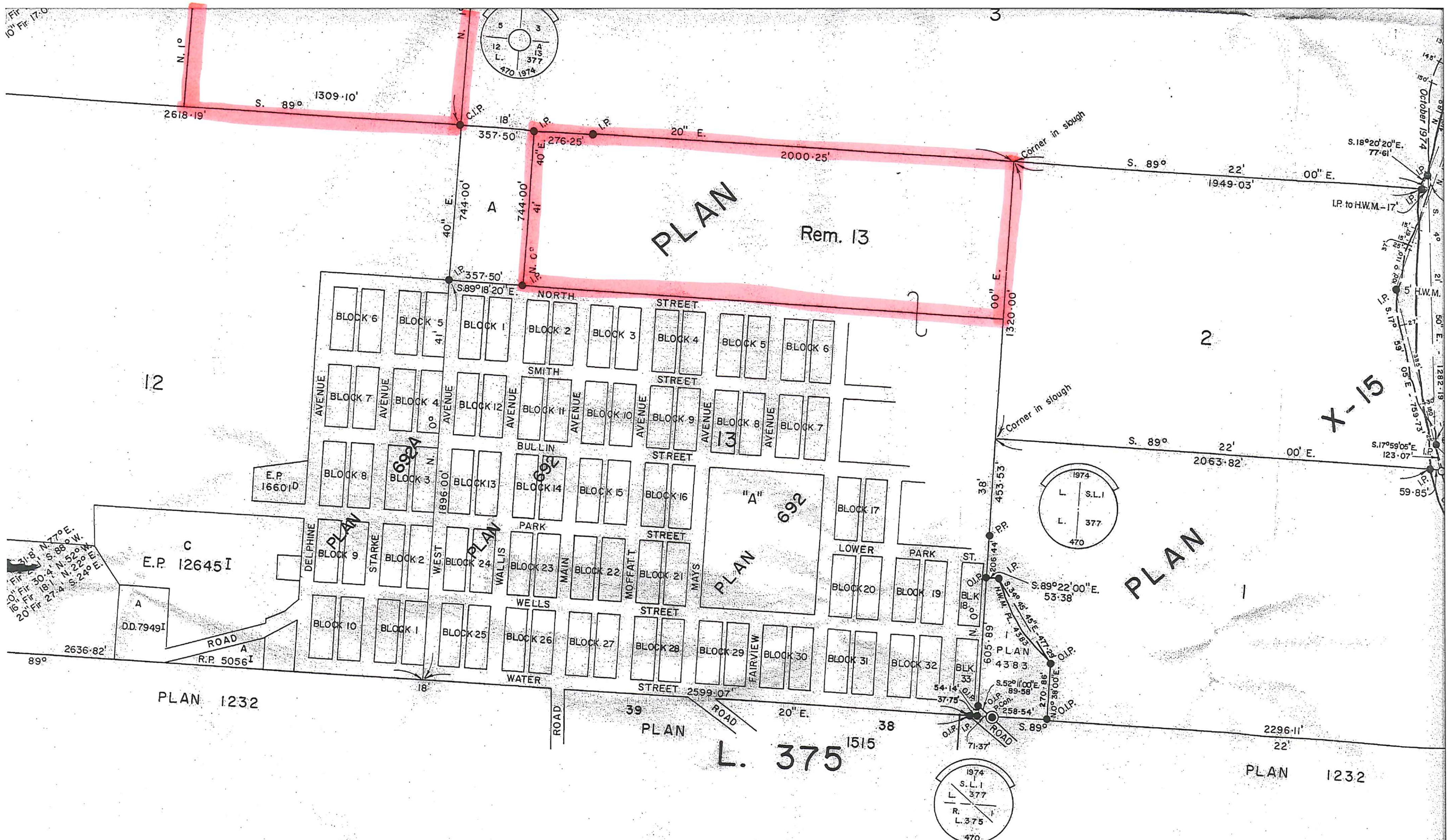
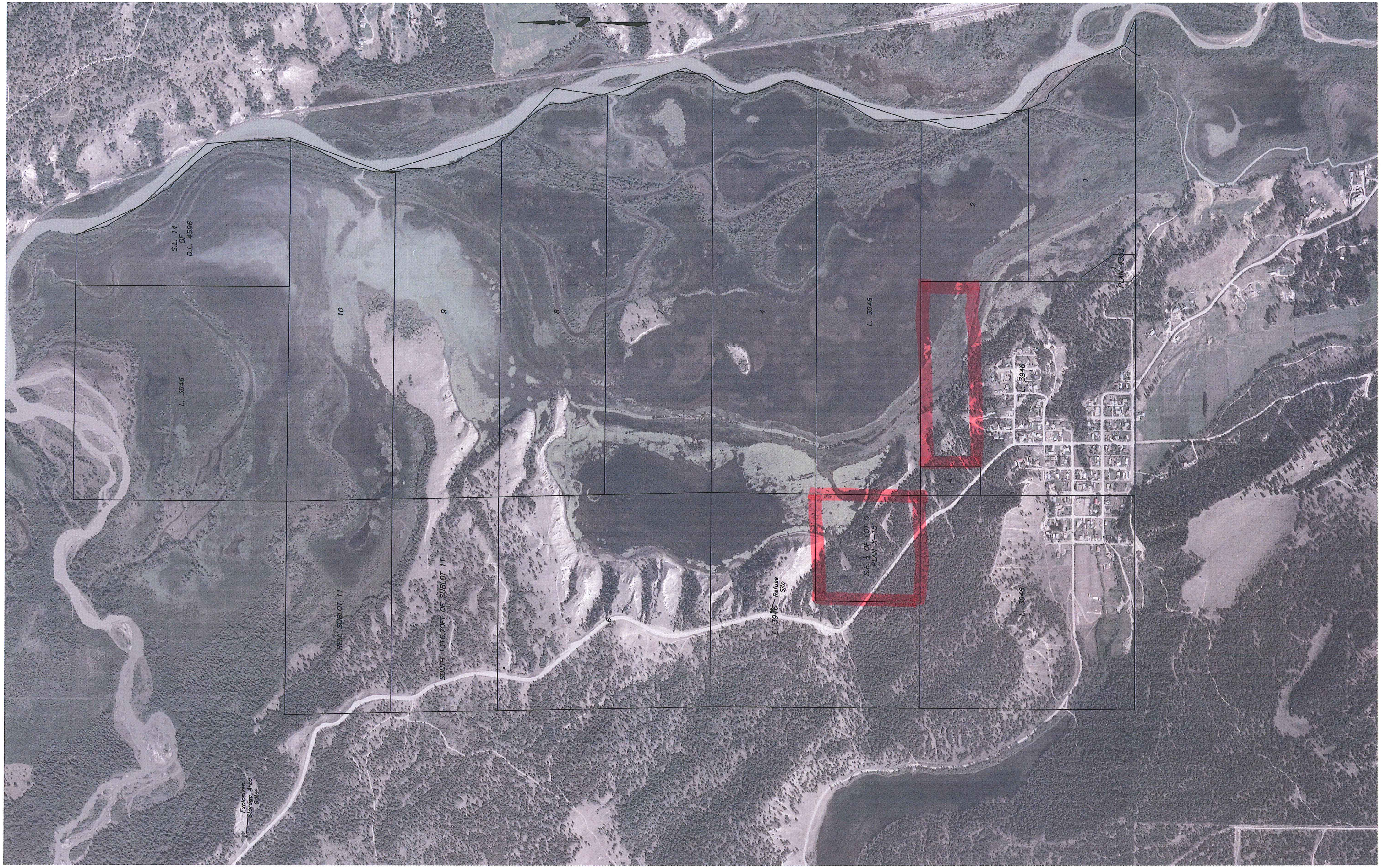


PLAN
Rem. 13
A
12
2
3
X-15
PLAN 1
PLAN 1232
PLAN 39
L. 375
1515
38
E.P. 12645I
C
D.D. 7949I
E.P. 16601D
R.P. 5056I
ROAD A
PLAN 692A
PLAN 692
PLAN "A" 692
PLAN 4383
NORTH STREET
SMITH STREET
BULLIN STREET
PARK STREET
MOFFATT STREET
WELLS STREET
WATER STREET
DELPHINE AVENUE
STARKE AVENUE
WEST AVENUE
WALLIS AVENUE
MAIN AVENUE
MAYS AVENUE
FAIRVIEW
LOWER PARK ST.
Corner in slough
October 1974
2618·19'
1309·10'
S. 89°
357·50'
744·00'
276·25'
2000·25'
1320·00'
1896·00'
2599·07'
2636·82'
1949·03'
2063·82'
2296·11'
453·53'
605·89
206·44'
S.89°18'20"E.
S.89°22'00"E.
53·38'
I.P. to H.W.M.-17'
S.18°20'20"E. 77·61'
S.17°59'05"E. 123·07'
59·85'



S.L. 14 OF DL 4596
L. 3946
10
9
8
7
4
L. 3946
2
1
PLAN 1 4383
3946
S.E. 1/4 OF LOT 5 PLAN X-15
A
Refuse Site
L. 3946
6
REM. SUBLOT 11
SOUTH 1316.70FT OF SUBLOT 11
L. 3946
Explosives Storage Area Gate


7/27/2007
Work Area
Launch Boat
Start of ATV trail to marsh
Image Parks Canada
Google earth
2004
Imagery Date: 7/27/2007
11 U 566488.99 m E 5599809.72 m N elev 2636 ft
eye alt 7215 ft

From:	Holmes, Peter N FLNR:EX
To:	Lindsay Paterson
Subject:	RE: Access Request Letter - Wilmer Marsh Site
Date:	November 01, 2014 11:02:20 AM

Hi Lindsay,

I didn't get the signed letter from John Krebs, Resource Management Director, yesterday. I have recommended he approve the request and realize you plan to start work on Monday. Please proceed on Monday as planned, if you would like to meet up Monday I could try and get the signed letter to you.

Peter Holmes
A/Senior Habitat Biologist
FLNR
Invermere

From: Lindsay Paterson [lpaterson@slrconsulting.com]
Sent: Thursday, October 23, 2014 4:29 PM
To: Holmes, Peter N FLNR:EX
Subject: Access Request Letter - Wilmer Marsh Site

Hi Peter
Have attached our access letter. Please call if you have any questions.
Thanks
Lindsay

Lindsay Paterson, M.Sc., P.Ag.

Soil Scientist

SLR Consulting (Canada) Ltd.

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Fax: 250-763-7303
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[cid:image689187.PNG@ac75202e.4483bf7d]<http://www.slrconsulting.com/us>

28 October 2014

Gloria White
Environment Canada – Canadian Wildlife Service
5241 Robertson Road
RR #1
Delta, BC   V4K 3N2

Project No.:   219.05112.00010
Client Reference No.: DFRP # 16096, ARMS # 00394, FCSI # 16096079

Dear Ms. White,

RE: REQUEST FOR PERMIT
PROPOSED REMEDIATION ACTIVITIES
WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA
NEAR WILMER, BC

SLR Consulting (Canada) Ltd. (SLR) is submitting this request for a permit to conduct remediation activities in the marsh and in the vicinity of the trail connecting the uplands and marsh at the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA), near Wilmer, BC (the Site).

1.0 PROPOSED WORKS

Based on work completed in 2013-2014, Environment Canada (EC) is planning to undertake remediation activities at the Site to remove residual debris present in the marsh and to remove debris and associated contaminated soil located in the trail area between the uplands and the marsh (please refer to SLR draft report *2013/2014 Site Works Summary and Remedial Action Plan Report, Former Refuse Site – Wilmer Marsh Unit, Columbia National Wildlife Area, Near Wilmer, British Columbia,* dated March 31, 2014*).*

This permit request is for the completion of the remediation activities at the Site, specifically:

- Completion of an on-site bidder's meeting at the Site in late November or early December 2014 to allow potential contractors to review the Site, its current conditions and the logistical and wildlife constraints associated with conducting remedial works in the NWA.
- Removal of several large pieces of debris from the marsh utilizing specialized equipment and transporting the debris (potentially via helicopter and/or crane) to a temporary staging area adjacent to Westside Road for transport and off-site disposal.
- Removal of surficial debris (manually and by machine) from the trail area and adjacent slopes and gully to the south of the trail and transport to the temporary staging area along Westside Road for transport and off-site disposal.
- Excavation of debris and associated soil from two zones (referred to as the main debris zone and Area of Impact 3) in the proposed trail work area.

    - Soil in Area of Impact 3 would likely be re-used as backfill and the surrounding area re-contoured to account for the removal of the debris volume. Debris from Area of Impact 3 would be transported to the temporary staging area adjacent to Westside Road for transport and off-site disposal.
    - Soil and debris in the main debris zone would be excavated to a depth of approximately 1.5 m (but potentially deeper in select areas). The soil in the main debris zone would be excavated with the debris. Soil and debris would be transported to the temporary staging area adjacent to Westside Road and then transported off-site for additional screening (i.e. separation of soil from debris) and subsequent disposal. The excavation in the main debris zone would be backfilled with non-contaminated imported material to return the area to the existing grade. SLR is proposing to source the backfill material from a location north of the refuse site along Westside Road, within the NWA.
- Collection of confirmatory soil and surface water samples during the remediation program (estimated to be approximately 80 confirmatory soil samples and 2 confirmatory water samples).

2.0 GENERAL WORK PLAN CONSIDERATIONS

All project works will be carried out in such a manner so as to avoid any adverse impacts on fish or wildlife, or any harmful alteration of fish or wildlife habitat. Specific considerations are detailed below.

A sediment curtain will be installed around the proposed marsh work area in early November 2014 as a measure to avoid causing harm to fish and fish habitat during the remediation activities. Fish salvage will be conducted immediately following curtain installation (permit obtained from Ministry of Forests, Lands and Natural Resource Operations). The curtain will remain in place until surface water testing indicates that turbidity parameters (total suspended solids and total dissolved solids) are consistent with pre-remediation baseline conditions.

A number of measures will be incorporated into the tender specifications for the remediation project to address geotechnical concerns and mitigate potential effects on site soils including:

- Reducing excavation depths.
- Conducting remediation works during extended periods of dry, or frozen, ground conditions.
- Utilizing low-impact equipment with operators experienced in working on steep slopes.
- Exercising caution around the void on the lower portion of the trail.
- Constructing cross-ditches along the trail following remediation to divert surface flow from the disturbed soil surfaces.
- Constructing cross-slope terraces along long sections of steep uniform slopes to break the slope and slow surface runoff along the slope (to be conducted as part of the remediation activities, following debris excavation).
- Providing a geotechnical monitor during the remedial excavation activities.
- Implementing erosion and sediment control measures including deposition of coarse woody debris and installation of coconut fibre mat cover.

Additional measures that will be implemented during the remediation program to mitigate potential effects on wildlife include the following:

- Identification of "no work" zones around identified wildlife trees and native vegetation areas.
- Establishment of "environmental response measures" developed in consultation with CWS in the unlikely event that turtles are disturbed during the marsh debris removal program.
- Completion of inspections of the proposed work areas by an environmental monitor to verify that species at risk and sensitive species are not present in the work areas immediately prior to remediation activities. Should any such species be encountered, CWS will be contacted and the work plan revised to avoid impacts to the species noted.

As part of the bid package, contractors will be requested to provide documentation of their experience working on steep slopes, in sensitive habitats and around sensitive species. As well, as part of the contractor's pre-work submittals, they will have to prepare an Environmental Protection Plan covering erosion and sediment control planning, water management planning, equipment route planning, spill control and contaminant prevention planning and waste management planning.

Please note that based on correspondence with Environment Canada (letter dated November 25, 2010), a Species at Risk permit was not required for previous remediation works completed in the marsh. Based on the results of the October 2014 pre-remediation field activities (included as an attachment to SLR's letter "Request for Permit – Scientific Application Information, Proposed Remediation Activities, Wilmer Marsh Unit, Columbia National Wildlife Area, Near Wilmer, BC"), there is no evidence of current activity of extirpated, endangered or threatened species in the proposed work area. Badger burrows were observed in the vicinity of the proposed trail work area but were noted to be abandoned with no evidence of recent use. As well, at least two individual turtles (species not confirmed) were observed in the vicinity of the proposed marsh work area; it is noted that the Intermountain-Rocky Mountain population of Western Painted Turtle is considered a species of Special Concern under the Species at Risk Act.

3.0 TIMING

SLR is proposing to conduct the on-site bidder's meeting in late November or early December 2014 with the remediation activities conducted between January 5, 2015 and March 31, 2015.

If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours sincerely,
SLR Consulting (Canada) Ltd.

BRITISH COLUMBIA INSTITUTE OF AGROLOGISTS
1598
Lindsay Paterson

10/28/14

Lindsay Paterson, MSc, PAg
Soil Scientist

LP/lp

Attachments: SLR letter "*Request for Permit – Scientific Application Information, Proposed Remediation Activities, Wilmer Marsh Unit, Columbia National Wildlife Area, Near Wilmer, BC*"

2014 Oct 28 Wilmer Permit Request Remediation Program.docx

28 October 2014

Gloria White
Environment Canada – Canadian Wildlife Service
5241 Robertson Road
RR#1
Delta, BC V4K 3N2

Project No.: 219.05112.00010
Client Reference No.: DFRP # 16096, ARMS # 00394, FCSI # 16096079

Dear Ms. White,

RE: REQUEST FOR PERMIT – SCIENTIFIC APPLICATION INFORMATION PROPOSED REMEDIATION ACTIVITIES WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA NEAR WILMER, BC

SLR Consulting (Canada) Ltd. (SLR) is submitting scientific permit application information for a permit to conduct remediation activities in the marsh and in the vicinity of the trail connecting the uplands and marsh at the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA), near Wilmer, BC (the Site).

While it is understood that an application for a permit to kill and/or capture migratory birds is not required as a part of this project, information required in a portion of that application is required for a permit to conduct the proposed works. SLR has provided the information below for each applicable section of the scientific application.

REQUEST FOR MULTI-YEAR PERMIT?

No.

PROJECT START AND END DATES

The proposed remediation activities are proposed to occur from **January 5, 2015** to **March 31, 2015**. It is likely that the project will be completed earlier than this date, and SLR will advise CWS upon completion.

As well, it is anticipated that an on-site bidder's meeting will be required to allow potential contractors to review the Site, its current condition and the logistical and wildlife constraints associated with conducting remedial works in the NWA. The on-site bidder's meeting (anticipated to be one day in duration only) will likely occur in **late November or early December, 2014**.

To that end, SLR is requesting the permit over the period of **November 15, 2014** to **March 31, 2015.**

PROJECT TITLE (maximum 50 letters)

Remediation of former refuse site at NWA.

PROJECT DESCRIPTION (condensed version of proposal, two paragraphs)

The Site is located in the Wilmer Marsh Unit of the Columbia National Wildlife Area near Wilmer, BC. The proposed work area includes a portion of the marsh where residual debris has been observed as well as the area of the trail connecting the uplands bench to the adjacent marsh. The activities associated with this project involve the removal of residual debris present in the marsh and removal of debris and associated contaminated soil located in the trail area.

The project activities will include removal of several large pieces of debris from the marsh utilizing specialized equipment and transporting the debris (potentially via helicopter and/or crane) to a temporary staging area adjacent to Westside Road for transport and off-site disposal. The remediation activities in the trail area will involve removal of surficial debris (manually and by machine) from the trail area and adjacent slopes and gully to the south of the trail. The remediation activities in the trail area will also involve the excavation of debris and associated soil from two zones (referred to as the main debris zone and Area of Impact 3). Soil in Area of Impact 3 would likely be re-used as backfill and the surrounding area re-contoured to account for the removal of the debris volume; debris from Area of Impact 3 would be transported to the temporary staging area adjacent to Westside Road for transport and off-site disposal. The soil in the main debris zone would be excavated with the debris, transported to the temporary staging area adjacent to Westside Road and then transported off-site for additional screening (i.e. separation of soil from debris) and subsequent disposal. For further information, please refer to the draft SLR report titled 2013/2014 Site Works Summary and Remedial Action Plan Report (Section 5.4). The proposed work areas are also depicted on Drawing 1.

PROJECT LOCATION(S)

The Site is located within the Wilmer Marsh Unit of the Columbia National Wildlife Area, approximately 1.2 kilometres north of Wilmer, BC. The latitude and longitude for the gate at the entrance to the Site off of Westside Road is 50˚33’00.78”N, 116˚04’16.82”W.

PROJECT COMPONENT(S)

<u>Marsh Debris Removal:</u>

Based on SLR’s previous experience at the Site, equipment access to the marsh debris areas can only occur when there is sufficient ice upon the marsh to support the weight of the equipment. Specialized equipment (e.g. spider-type hoes) would be mobilized to the marsh via the existing trail and then to the proposed marsh work area over the ice.

Holes would be cut into the ice at previously identified debris locations (refer to Figure 2 of the draft SLR report titled 2013/2014 Site Works Summary and Remedial Action Plan Report), sufficient in size to remove the debris safely without compromising the integrity of the ice to support the equipment. Should debris exceed the safe hole size, the debris would be broken down into smaller pieces for removal. Debris would be contained in impermeable sacks or steel buckets and transported (potentially by helicopter and/or crane) to the staging area along Westside Road for off-site transport and disposal. Please note that the program does not include the excavation or dredging of sediment from the marsh area. Only sediment incidentally adhered to the debris would be removed from the Site. Consequently, the area of disturbance will be localized to the immediate vicinity of the debris and will not involve widespread disturbance of sediments in the work area. It is anticipated that approximately 50 cubic metres of debris may be removed from the marsh during the debris removal program.

Trail Debris Removal:

Work will be conducted following the marsh activities as access to the marsh is required along the trail. The remediation of the trail area is comprised of three parts:

1) excavation of the debris at Area of Impact 3 (approximately 1000 m^3 of soil/debris);

2) removal of surficial debris across the trail and adjacent slopes and gully (approximately 200 m^3 of debris), and;

3) excavation of the debris in the main debris zone to a depth of approximately 1.5 m but potentially deeper in select areas (approximately 1350 m^3 of soil/debris but potentially more).

As the excavation of debris at Impact Area 3 and the removal of surficial debris across the trail area are reliant upon access via the existing trail, the remediation of these areas must be completed prior to the excavation of the main debris zone. In the event that improvements to the existing trail cannot be made to allow the transport of debris from Area of Impact 3 and other parts of the trail, additional measures (i.e. crane) may be required.

Following debris removal, Area of Impact 3 would be recontoured to accommodate the loss of volume corresponding to the removed debris. In the main debris zone, the excavation would be backfilled with non-contaminated imported material to return the area to the existing grade. SLR is proposing to source the backfill material from a location north of the refuse site along Westside Road, within the NWA (refer to Drawing 1).

Soil and debris would be transported to the temporary staging area along Westside Road and then transported for off-site separation, characterization and disposal.

DESCRIPTION OF BIOPHYSICAL EFFECT

Overall, the timing of the remediation project (January-February 2015) is intended to limit disturbance to wildlife using the Site as well as minimizing disturbance to site soils. The use of specialized equipment (such as spider-type hoes and helicopters/cranes) is also intended to minimize disturbance to site soils.

Limited biophysical effects are anticipated in the proposed marsh work area. There may be some short-term disturbance of sediments and benthic organisms during the removal of the debris, resulting in localized turbidity in the water column in the work area. A sediment curtain will be installed around the work area in early November 2014 to mitigate potential impacts outside of the immediate work area (work completed under CWS permit BC-14-0041). The sediment curtain will remain in place until surface water testing indicates that turbidity parameters (total suspended solids and total dissolved solids) are consistent with pre-remediation baseline conditions.

Biophysical effects in the proposed trail work area are primarily related to the removal of soils/debris and local disturbance of vegetation. With the exception of two native vegetation areas which have been identified by SLR and which will be treated as “no work” zones during the remediation project (see further discussion below), the vegetation in the proposed trail work area is comprised of invasive and non-native species (i.e. crested wheatgrass). There are a number of geotechnical concerns related to work at the Site and the proposed project will incorporate a number of mitigation measures (see further discussion below).

CUMULATIVE EFFECTS

The primary cumulative effect at the Site is related to disturbance and potential compaction of site soils from human and equipment traffic. However, the timing of the project as well as the type of equipment to be utilized is intended to minimize adverse effects.

DESCRIPTION OF MITIGATION MEASURES

SLR retained Clarke Geoscience Ltd. (CGL) to evaluate the geotechnical implications of remedial excavation activities in the trail area and to recommend mitigation measures. CGL noted that there were no slope stability concerns associated with remedial activities at Area of Impact 3 based on the shallow depth of the debris in the area and the low slopes. CGL identified a number of potential slope stability and soil erosion concerns associated with the proposed excavation of the main debris zone in the trail area and recommended the following mitigation measures to complete the remedial excavation activities in a safe and effective manner (refer to draft SLR report titled 2013/2014 Site Works Summary and Remedial Action Plan Report):

- ***Reduce excavation areas and depths to minimize the total area of disturbance and to reduce the height of potentially unstable cut slopes.*** Excavation depths will be limited under the proposed work program.
- ***Protect access routes on the Site by installing a 300 mm thick layer of well-graded, crushed angular gravel on a layer of filter fabric.*** It is SLR’s understanding based on previous discussions with personnel from CWS that construction of “roads” on-site is generally not encouraged and may involve a lengthy approval process. Consequently, the work program will be conducted under extended periods of dry, or frozen, ground conditions.
- ***Utilize low-impact equipment such as rubber-tired or spider hoe-type excavators (with operators experience in working on steep slopes) to reduce the potential for ground disturbance.*** SLR will incorporate these recommendations into the tender specifications for the project.
- ***Exercise caution in operating equipment in the vicinity of the void identified on the lower trail.*** SLR will identify the location of the void in the trail during the on-site bidder’s meeting and in the tender specification documents.
- ***Construct cross-ditches at the top of the trail to divert surface flow from the work areas.*** SLR will incorporate this recommendation into the tender specifications.
- ***Construct cross-slope terraces along long sections of steep uniform slopes to break the slope and slow surface runoff along the slope.*** SLR will incorporate this recommendation into the tender specifications.
- ***Provide at least a part-time geotechnical monitor for the duration of the excavation activities.*** A geotechnical monitor will be retained during the remediation project.

- ***Implement erosion and sediment control measures including deposition of coarse woody debris and installation of coconut fibre mat cover.*** SLR will incorporate these recommendations into the tender specifications. Coarse woody debris would be sourced from other areas of the Site or adjacent lands to minimize the potential for introduction of invasive species.

Due to the potential for suspension of sediment (including disturbance of spatially-localized contaminated sediments) during the marsh debris removal program, SLR will be overseeing the installation of a sediment curtain in the marsh in early November 2014. Based on discussions with Fisheries and Oceans Canada as well as the observation of fish in the proposed marsh work area in October 2014, fish salvage will be conducted immediately following installation of the sediment curtain. A fish collection permit has been obtained from the BC Ministry of Forests, Lands and Natural Resource Operations.

In addition to the mitigation measures considered above, SLR also conducted pre-remediation environmental monitoring activities in October 2014 to evaluate whether mitigation measures are also necessary with respect to wildlife at the Site. SLR's report detailing the pre-remediation activities has been attached for reference. The work was completed in response to previous correspondence with Environment Canada (letter dated November 25, 2010) which recommended the completion of the following activities prior to completion of remediation work at the Site:

- Western Toad and Painted Turtle surveys (listed as species of Special Concern under the Species at Risk Act).
- Surveys for active American Badger dens at the Site (listed as Endangered under the Species at Risk Act).
- Surveys to identify potential wildlife trees in the vicinity of the remediation works which may be impacted by the site activities and to identify "no-work" buffer zones around the affected wildlife trees.
- Avoidance of work during the migratory bird breeding season to minimize damage to nests.

The October 2014 pre-remediation environmental monitoring activities noted the following with respect to Species at Risk at the Site:

- Turtles (species not determine) were observed in the vicinity of the proposed marsh work area. SLR will continue to monitor the proposed marsh debris removal area for the presence of turtles during the sediment curtain installation and fish salvage activities which are scheduled for early November. The activities will involve work from aluminum boats which may allow closer observation of any potential turtles. However, in the event that no further information is obtained on the turtles in the proposed marsh work area, SLR will incorporate "environmental response measures" developed in consultation with CWS into the tender specification documents in the unlikely event that turtles are disturbed during the marsh debris removal program.
- Although the Western Toad survey results are inconclusive due to timing constraints, it is considered unlikely that toads will be present in the water or sediment in the area of the marsh debris removal during the winter months (i.e. January-February 2015). Toads, if present, will be upslope of the marsh within the adjacent forested portions of the Site.
- Two abandoned badger burrows were identified near the proposed work area in the trail. However, there was no evidence of recent digging, soil piles or scat and there was

obvious vegetation and lichen growth over the burrows. Based on SLR's field observations, it does not appear that either burrow is being actively used.

- Four wildlife trees were identified along the gully to the south of the proposed trail work area. The UTM coordinates of the trees were recorded to allow for identification of "no work" zones during the proposed remediation activities. The "no work" zones will be incorporated into the tender specification documents for the remediation project.
- Two areas of native vegetation were identified and UTM coordinates recorded to allow for identification of "no work" zones during the proposed remediation activities. One area was located south of the trail and the other was located north of the trail on the uplands bench. The "no work" zones will be incorporated into the tender specifications for the project.
- SLR reviewed the proposed remediation work areas for other SARA-listed species (refer to Table B in SLR draft report 2013/2014 Site Works Summary and Remedial Action Plan Report). None of the SARA-listed species were observed in the proposed remediation work areas during SLR's inspections. It is noted that Hooker's Townsendia (Townsendia Hookerii) has previously been observed at the Site within the uplands bench native vegetation area which will be demarcated as a "no work" zone during remediation activities; Hooker's Townsendia is a provincially red-listed species but is not a SARA-listed species.

In addition to the above, an environmental monitor will be present at the Site for the entire duration of the remediation project. The environmental monitor would conduct an inspection for species at risk/sensitive species immediately prior to the start of the remediation activities and should any be encountered, CWS will be contacted and the work plan revised to avoid impacts to the species noted.

RESIDUAL EFFECTS ADVERSE

None. The project is intended to provide a net benefit to the Site through the removal of debris and remediation of associated soil contamination.

EFFECTS LIKELY SIGNIFICANT

The overall objective for the project work is intended to result in a significant net benefit to the Site in the long-term as the work involves removal of sources of contamination at the Site.

A copy of the permit request, dated October 28, 2014, has been submitted separately to CWS. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours sincerely,
SLR Consulting (Canada) Ltd.

BRITISH COLUMBIA 1598 Lindsay Paterson P.Ag. INSTITUTE OF AGROLOGISTS

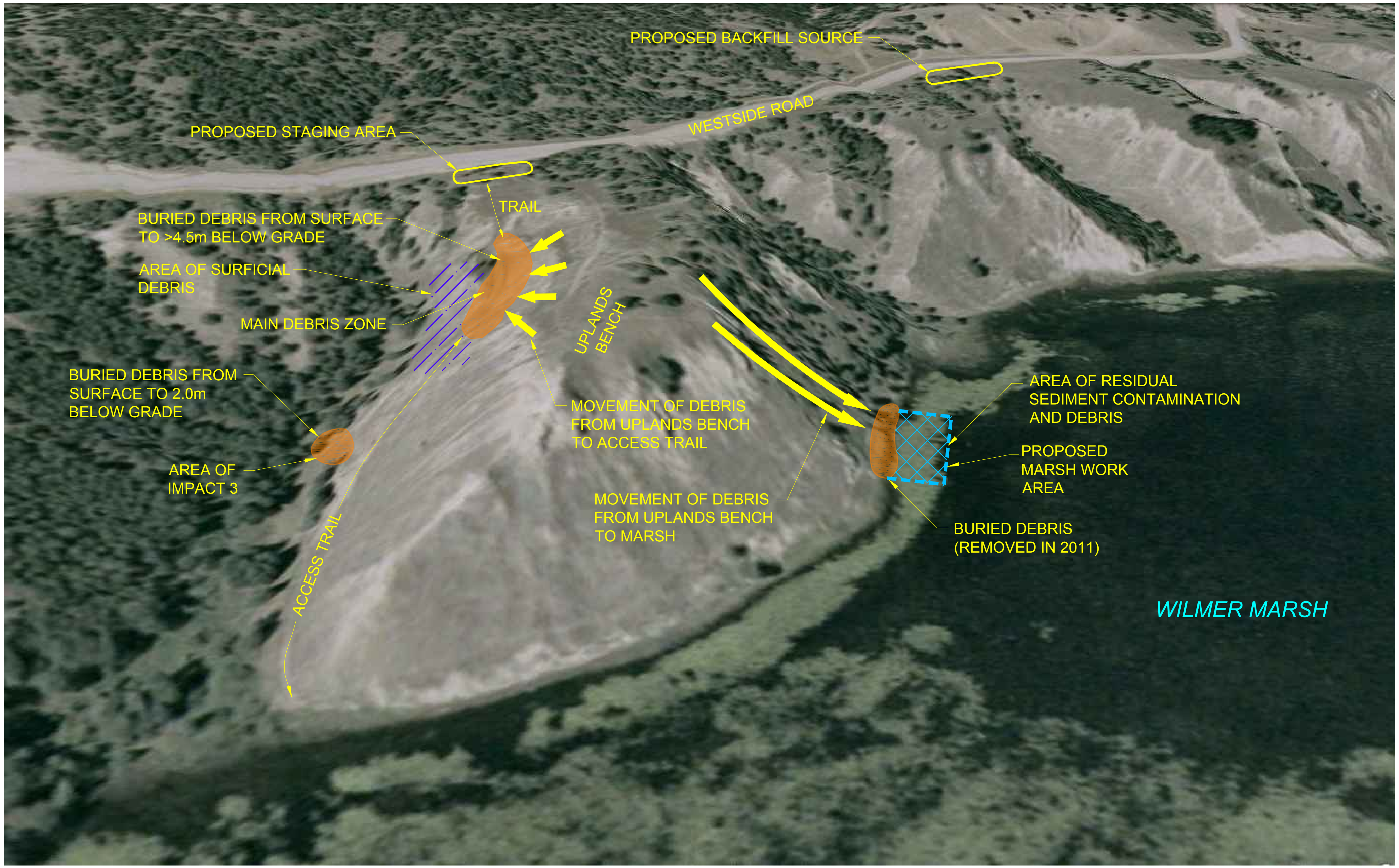
Lindsay Paterson, MSc, PAg
Soil Scientist

10/28/14

Enc Drawing 1: Proposed Work Areas
SLR Report "Environmental Monitoring Notes – Pre-Remediation Field Activities, Wilmer Marsh Unit, Columbia National Wildlife Area, October 6-9, 2014"

LP/lp

2014 Oct 28 Wilmer Permit Request Remediation Program Sci App Info.docx



NOTES

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PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
PERMIT APPLICATION

Drawing
PROPOSED WORK AREAS

Date	October 27, 2014	Scale	NTS
File Name	S_219-05112-00010-B1	Project No.	219.05112.00010
Drawing No.	1		

SLR

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

28 October 2014

Bradley Klaver
Environmental Specialist
Public Works and Government Services Canada
Environmental Services, Pacific Region
219 – 800 Burrard Street
Vancouver, BC V6Z 0B9

By Email: Bradley.Klaver@pwgsc-tpsgc.gc.ca

Dear Mr. Klaver,

RE: ENVIRONMENTAL MONITORING NOTES - PRE-REMEDIATION FIELD ACTIVITIES WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA OCTOBER 6-9, 2014 SLR PROJECT 219.05112.00010

Between October 6 and October 9, 2014, two SLR Consulting (Canada) Ltd. (SLR) representatives (Ms. Kalina Noel, R.P.Bio. – Biologist, and Ms. Corinne Couture – Junior Technologist) accessed the historical refuse site in the Wilmer Marsh Unit of the Columbia National Wildlife Area (the Site) to conduct field activities in support of remediation planning. These activities included:

- identification of the remaining debris in the marsh;
- identification of the limits of the buried and surficial debris areas in the trail;
- identification of a potential backfill source for the remediation activities; and
- collection of baseline surface water turbidity parameters.

Also included in the pre-remediation field activities were the completion of wildlife and wildlife tree surveys, specifically:

- completion of Western Toad and Western Painted Turtle surveys;
- completion of surveys for active American Badger dens at the Site; and
- completion of surveys to identify potential wildlife trees in the vicinity of the remediation works which may be impacted by the proposed remediation activities and to identify “no-work” buffer zones around the affected wildlife trees.

Site Reconnaissance

Following a review of SLR’s health and safety plan, SLR conducted a site reconnaissance to review site conditions. Areas seeded in Spring 2014, such as the uplands gully and 2013 trail test pits, were assessed for vegetation growth.

The sediment fencing and erosion control matting in the uplands gully area were observed to be undisturbed. No signs of erosion were observed and the sediment fencing and matting appeared to be functioning adequately. No seed growth was observed although weed species such as sweet clover and flixweed (Photo 1) were noted to be establishing in the gully.

The area around the test pits advanced in the trail were also observed to be stable and the erosion control matting and coarse woody debris appeared to be functioning adequately. No signs of seed growth were present (Photo 2). However, incursion of crested wheatgrass and other weed species from the north slope into the disturbed areas was observed (Photo 3).

The marsh shoreline was noted to be stable and continuing to re-vegetate (Photo 4). Willow stakes appeared to be growing adequately (Photo 5).

SLR collected two samples of surface water from the proposed marsh debris removal area for assessment of turbidity parameters (total suspended solids and total dissolved solids). The samples were submitted to ALS Environmental for laboratory analysis.

Surrounding Lands Reconnaissance

SLR also conducted a reconnaissance of the surrounding federal lands in the Wilmer Marsh Unit.

The fence line along the road southwest of the Site was found to have been cut and the rock barrier altered (Photos 6 and 7). Evidence of recent activity through the breach in the fence was noted (single track, likely a dirt bike).

SLR walked along Westside Road to identify potential backfill sources within the Wilmer Marsh Unit for future remediation activities. During the walkover, a moose head was observed in the road ditch (Photo 8). As hunting is prohibited in this area, SLR notified the local Conservation Officer (Sgt. Lawrence Umsonst, Columbia – Kootenay Zone).

During the reconnaissance for potential backfill sources, SLR identified dumping on an uplands bench north of the Site (Photo 9). The majority of the dumping appeared to be historic (old vehicles located downslope in areas overgrown by trees, some small tin can dumps) although some more recent debris (broken sheet glass) was also observed on the bench. As well, in an area closer to the road, there appeared to be slightly mounded terrain which was vegetated by disturbance species such as crested wheatgrass (Photo 10). This was noticeable as the surrounding areas were observed to be comprised of native grasses and other vegetation. Coordinates of the debris and the mound were recorded.

SLR did identify a potential backfill source along Westside Road (Photo 11). The potential source appeared to be comprised of similar soil to the trail area soils (i.e. upland bench glaciolacustrine materials). Westside Road has been cut into the upland bench in this location and the fence for the Wilmer Marsh Unit is located approximately 15-20 metres back from the road in this location. The coordinates of the potential backfill source were recorded. The source area appeared to be capable of supplying at least 1500 cubic metres of soil.

SLR also conducted reconnaissance in the Town of Wilmer to identify access points to the marsh for the upcoming sediment curtain installation and fish salvage work. An ATV trail to the marsh was identified at the north end of Moffat Avenue and is presumably located on provincial Crown land based on available land title information.

Marsh Debris

SLR completed an assessment of all debris present along the shoreline from the previously excavated marsh shoreline south to the provincial border. Readily identifiable debris was photographed and Universal Transverse Mercator (UTM) coordinates recorded using a Trimble GeoExplorer unit.

Debris identified included metal (Photo 12), tires (Photo 13) and concrete (Photo 14). Coordinates and information on the material type were recorded for each piece of debris. In total, 105 pieces of debris were identified.

It is noted that numerous pieces of debris were visually identified outside the limits of the proposed marsh debris removal program. It is recommended that these areas be re-assessed in Winter 2014-2015 during the electromagnetic survey planned as part of the remediation activities to confirm that the pieces are spatially small and unlikely to pose a large physical hazard or contaminant degradation risk to ecological receptors.

Trail Debris and Adjacent Slope Debris

SLR conducted an assessment of debris along the trail and in areas to the south and north of the trail. Starting at the provincial border and moving north-westward, 63 points of metal debris were identified, including four tires, one ski, and three larger areas of debris identified using a polygon feature on the GeoExplorer unit (Photos 15-18). Polygons were used in areas where debris was small and too numerous to identify each piece with an individual UTM coordinate.

Along the trail and slope north of the trail, 13 pieces of surficial metal debris were identified. Wood debris piles and one piece of concrete were also noted. Larger areas of debris were mapped using a polygon which included a wood pile (Photo 19) and a pile of mixed wood and metal debris (Photo 20). The wood debris included lumbered wood with nails. One large piece of metal was observed north of the trail within an area of native vegetation (Photo 21).

SLR recorded locations of debris near the surveyed federal-provincial boundary which fell within the federal lands. The locations of thirteen additional pieces of metal debris, one piece of concrete and a piece of wood debris were recorded.

A final review of the uplands bench was made to assess if any debris had been left behind following clean up over the past years. Only one piece of metal debris was observed.

Expert Support Site Visit

Representatives from Environment Canada and Fisheries and Oceans Canada were present at the Site in the afternoon of October 9, 2014. The SLR project manager conducted a walkover inspection of the Site and reviewed the proposed remediation plans for the marsh and trail areas with the Expert Support representatives.

Survey Activities in Support of Remediation Planning

Based on previous correspondence with Environment Canada (letter dated November 25, 2010), a Species at Risk permit was not required for works completed previously in the marsh due to the low possibility of Species at Risk (SAR) occurring at the Site. However, further studies prior to the commencement of site activities were advised by Environment Canada, specifically wildlife surveys for Painted Turtle and Western Toad as wells as identification of American Badger dens. Environment Canada also recommended the completion of wildlife tree surveys for the establishment of "no work" buffer zones during future remediation activities.

CWS also outlined terms and conditions for survey activities in the permit issued to SLR on September 23, 2014 to conduct the remediation planning activities.

SLR attempted to complete the wildlife and wildlife tree survey activities following the requirements outlined by Environment Canada and CWS as closely as possible. However, due to the time of year, species identified as concern under the CWS permit (BC-14-0041) could not be surveyed following the Resources Inventory Committee (RIC) standards. This limitation was acknowledged by CWS as a potential constraint to the survey work. The following sections describe observations made at the Site between October 6 and 9, 2014.

<u>Western Painted Turtle (*Chrysemys picta bellii*, Intermountain-Rocky Mountain population)</u>

SLR reviewed the marsh area on several occasions between October 6 and 9, 2014 for the potential presence of Western Painted Turtle in the proposed marsh debris removal area. Western Painted Turtles are identifiable by the red/orange colouration of the plastron and are listed as species of Special Concern under the Species At Risk Act (SARA).

On one occasion, a turtle was observed offshore in the water. As the turtle was too far from the shore to observe in detail, it was unknown if this was a Western Painted Turtle or another species.

On another occasion, two turtles were observed. A photograph of one of the turtles was attempted (see Photo 22). However, due to the distance from the shore and the turtle's limited exposure above the water surface, the photograph is not definitive for identification purposes.

On a third occasion, one individual turtle was again observed. As during the previous observations, the turtle was located too far offshore to allow definitive identification.

All turtles observed during the field survey were in the water and located too far offshore to determine if the plastron was coloured. As the turtles' plastrons were not clearly visible, SLR examined the heads of the individuals to see if other markings were visible (specifically, red colourations behind the eyes which are indicative of red-eared sliders). One turtle (as seen in Photo 22) was stationary for a period of time long enough to closely observe its head; no red markings were observed on the head. Red markings were also not cursorily noted on the heads of the other turtles observed.

SLR will continue to monitor the proposed marsh debris removal area for the presence of turtles during the sediment curtain installation and fish salvage activities which are scheduled for early November. The activities will involve work from aluminum boats which may allow closer observation of any potential turtles.

Given that proposed remediation activities in the marsh will be limited to the removal of debris and that there will not be any excavation or dredging of sediments in the marsh, disturbances in the marsh will be limited to the immediate vicinity of the debris being removed. Observations of turtles during the survey conducted in October 2014 identified up to two individuals. Given the low number of individuals and the relatively small area of the proposed work area (approximately 25 m by 70 m delineated by sediment curtain) and the even smaller scale of the individual pieces of debris compared to the larger marsh area, it is considered unlikely that any turtles will be present in the immediate vicinity of the debris removal works. However, it is recommended that "environmental response measures" be discussed with CWS in advance of the project and incorporated into the tender specifications for the remediation project should a turtle be discovered during the debris removal program.

Western Toad (*Anaxyrus boreas*)

RIC surveys are to be conducted during migration and breeding seasons for amphibians. According to the British Columbia Ministry of Environment, Western Toads find winter hibernation sites following breeding. Hibernation sites include forested and grassland areas. Preferring damp conditions, toads may venture far from breeding grounds. The Western Toad is listed as a species of Special Concern under SARA.

As noted above, the Western Toad survey could not be completed according to RIC standards due to project timing. However, no toads were observed at the Site during SLR's activities. Although the Western Toad survey results are inconclusive due to timing constraints, it is considered unlikely that toads will be present in the water or sediment in the area of the marsh debris removal during the winter months (i.e. January-February 2015). Toads, if present, will be upslope of the marsh within the adjacent forested portions of the Site.

American Badger (*Taxidea taxus jeffersonii*)

One abandoned badger burrow was observed at the north end of the gully downslope of the trail area (Photos 23 and 24). Three entrances to the burrow were observed. The entrances were heavily overgrown by vegetation and lichens were present on the soil, suggesting that this burrow was abandoned a number of years ago.

A second abandoned badger burrow was observed to the south of the upper part of the trail (Photo 25). Two entrances were found, both covered in vegetation and lichens, suggesting that this burrow was abandoned a number of years ago as well.

The two burrow locations are near one another and may have been dug by the same individual. No current digging marks, soil piles or scat were observed at the burrows. Based on SLR's field observations, it is considered unlikely that a badger is actively using the area of the Site where the remediation activities are proposed. The American Badger is listed as an Endangered species under SARA.

Wildlife Trees and Native Vegetation Exclusion Zones

As part of SLR's survey activities, wildlife trees were also assessed. Four wildlife trees were identified (Photos 26-27) along the gully to the south of the trail. The coordinates of the trees were recorded with the GeoExplorer unit to allow for identification of "no work" zones during the proposed remediation activities.

To ensure that any native vegetation and plant communities present at the Site remain undisturbed during the proposed remediation activities, SLR delineated and obtained the coordinates of the native vegetation using the GeoExplorer unit. Two areas of native vegetation were identified; one area was located south of the trail (Photo 28) and the other was located north of the trail on the uplands bench (Photo 29).

SLR will incorporate the mapped wildlife trees and native vegetation areas into the remediation tender specification documents as prescribed exclusion zones which can be field-flagged during remediation as "no work" areas.

Fish and Other Species Observations

During the review of the marsh debris, SLR observed two different species of fish. One was likely a minnow species and the other a slightly larger unknown fish. Fish salvage activities are planned following the installation of the sediment curtain in the marsh. SLR has discussed the proposed fish salvage activities with Fisheries and Oceans Canada and has obtained a fish collection permit from the BC Ministry of Forests, Lands and Natural Resource Operations (permit CB14-155834) for the fish salvage activities.

As well, muskrat slides, tracks, scat and possible den entrances were also observed along the marsh.

SLR reviewed the proposed remediation work areas for other SARA-listed species (refer to Table B in SLR draft report 2013/2014 Site Works Summary and Remedial Action Plan Report). None of the SARA-listed species were observed in the proposed remediation work areas during SLR's inspections. It is noted that Hooker's Townsendia (*Townsendia Hookerii*) has previously been observed at the Site within the uplands bench native vegetation area which will be demarcated as a "no work" zone during remediation activities; Hooker's Townsendia is a provincially red-listed species but is not a SARA-listed species.

Yours sincerely
SLR Consulting (Canada) Ltd.

BRITISH COLUMBIA INSTITUTE OF AGROLOGISTS
1598
Lindsay Paterson
P.Ag.

10/28/14

Kalina Noel, B.Sc., M.E.Des., P.Biol. R.P.Bio.
Biologist

Lindsay Paterson, M.Sc., P.Ag.
Project Manager

LP/lp

Attachments: Photoplates

219.05112.00010 PreRemediationFieldActivities_Oct 2014.docx

Photo 1: View of uplands bench gully seeded in spring 2014.

Photo 2: View of trail test pits seeded in spring 2014.

Photo 3: Incursion of crested wheatgrass and other weeds in areas disturbed by 2013 test pits.

Photo 4: Marsh shoreline is stable and continuing to re-vegetate.

Photo 5: Willow stakes continuing to grow at marsh.

Photo 6: Rock barrier altered presumably for dirt bike or ATV activity.

Photo 7: Fence cut at entrance to old ATV trail.

Photo 8: Moose head observed along Westside Road – north of site.

Photo 9: Uplands bench north of site with observed historic dumping.

Photo 10: Mounded area on uplands bench north of site with disturbance vegetation (red dashed area).

Photo 11: View of proposed backfill source along Westside Road.

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Photo 12: Metal tank observed within water in marsh area.

Photo 13: Tire observed in water in marsh area.

Photo 14: Concrete block observed along marsh.

Photo 15: Example of metal debris observed in gully located south of trail.

Photo 16: Example of tire observed in gully located south of trail.

Photo 17: Example of surficial debris in trail area.

Photo 18: Example of partially buried debris in trail area.

Photo 19: Area of wood debris observed along the trail.

Photo 20: Mixed wood and metal debris observed on slope north of trail.

Photo 21: One large piece of metal debris observed on the slope north of the trail.

Photo 22: Turtle observed in water along marsh.

Photo 23: Abandoned badger burrow, view of entrance.

Photo 24: Abandoned badger burrow, view of entrances (denoted by red arrows).

Photo 25: Abandoned badger burrow observed along upper part of trail (at red arrow).

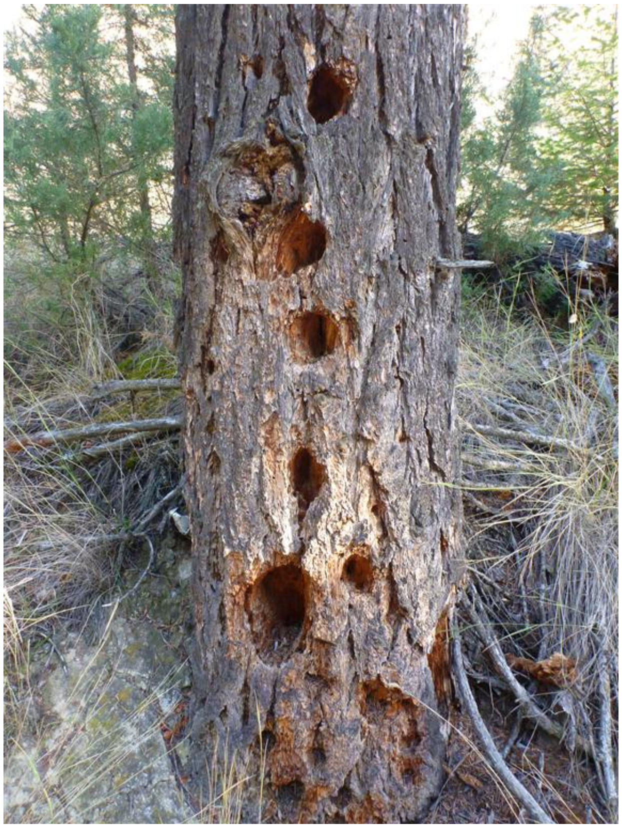


Photo 26: View of wildlife tree observed in gully south of the trail (cavities present).

Photo 27: Wildlife tree observed south of the trail.

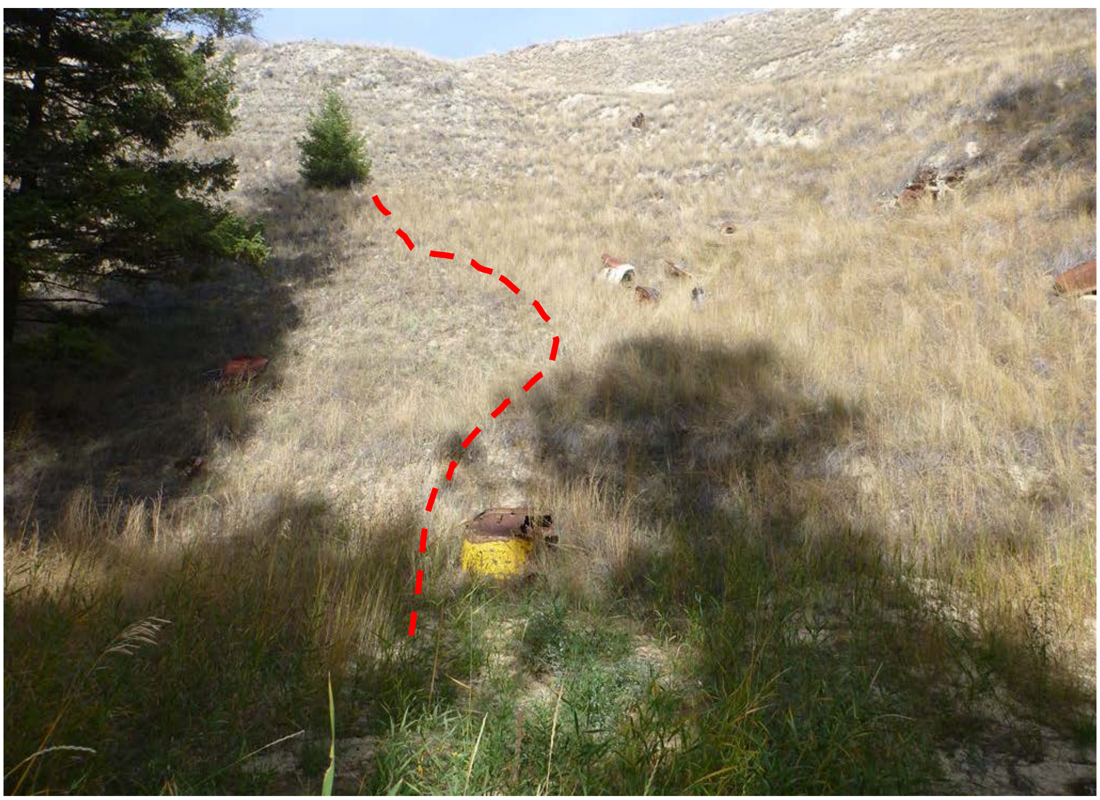


Photo 28: Area of native vegetation identified south of trail (to left of red dashed line).

Photo 29: Native vegetation identified on the upland bench, north of the trail.

28 October 2014

Gloria White
Environment Canada – Canadian Wildlife Service
5241 Robertson Road
RR #1
Delta, BC V4K 3N2

Project No.: 219.05112.00010
Client Reference No.: DFRP # 16096, ARMS # 00394, FCSI # 16096079

Dear Ms. White,

RE: REQUEST FOR PERMIT
PROPOSED REMEDIATION ACTIVITIES
WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA
NEAR WILMER, BC

SLR Consulting (Canada) Ltd. (SLR) is submitting this request for a permit to conduct remediation activities in the marsh and in the vicinity of the trail connecting the uplands and marsh at the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA), near Wilmer, BC (the Site).

1.0 PROPOSED WORKS

Based on work completed in 2013-2014, Environment Canada (EC) is planning to undertake remediation activities at the Site to remove residual debris present in the marsh and to remove debris and associated contaminated soil located in the trail area between the uplands and the marsh (please refer to SLR draft report *2013/2014 Site Works Summary and Remedial Action Plan Report, Former Refuse Site – Wilmer Marsh Unit, Columbia National Wildlife Area, Near Wilmer, British Columbia,* dated March 31, 2014*).*

This permit request is for the completion of the remediation activities at the Site, specifically:

- Completion of an on-site bidder's meeting at the Site in late November or early December 2014 to allow potential contractors to review the Site, its current conditions and the logistical and wildlife constraints associated with conducting remedial works in the NWA.
- Removal of several large pieces of debris from the marsh utilizing specialized equipment and transporting the debris (potentially via helicopter and/or crane) to a temporary staging area adjacent to Westside Road for transport and off-site disposal.
- Removal of surficial debris (manually and by machine) from the trail area and adjacent slopes and gully to the south of the trail and transport to the temporary staging area along Westside Road for transport and off-site disposal.
- Excavation of debris and associated soil from two zones (referred to as the main debris zone and Area of Impact 3) in the proposed trail work area.

    - Soil in Area of Impact 3 would likely be re-used as backfill and the surrounding area re-contoured to account for the removal of the debris volume. Debris from Area of Impact 3 would be transported to the temporary staging area adjacent to Westside Road for transport and off-site disposal.
    - Soil and debris in the main debris zone would be excavated to a depth of approximately 1.5 m (but potentially deeper in select areas). The soil in the main debris zone would be excavated with the debris. Soil and debris would be transported to the temporary staging area adjacent to Westside Road and then transported off-site for additional screening (i.e. separation of soil from debris) and subsequent disposal. The excavation in the main debris zone would be backfilled with non-contaminated imported material to return the area to the existing grade. SLR is proposing to source the backfill material from a location north of the refuse site along Westside Road, within the NWA.
- Collection of confirmatory soil and surface water samples during the remediation program (estimated to be approximately 80 confirmatory soil samples and 2 confirmatory water samples).

2.0 GENERAL WORK PLAN CONSIDERATIONS

All project works will be carried out in such a manner so as to avoid any adverse impacts on fish or wildlife, or any harmful alteration of fish or wildlife habitat. Specific considerations are detailed below.

A sediment curtain will be installed around the proposed marsh work area in early November 2014 as a measure to avoid causing harm to fish and fish habitat during the remediation activities. Fish salvage will be conducted immediately following curtain installation (permit obtained from Ministry of Forests, Lands and Natural Resource Operations). The curtain will remain in place until surface water testing indicates that turbidity parameters (total suspended solids and total dissolved solids) are consistent with pre-remediation baseline conditions.

A number of measures will be incorporated into the tender specifications for the remediation project to address geotechnical concerns and mitigate potential effects on site soils including:

- Reducing excavation depths.
- Conducting remediation works during extended periods of dry, or frozen, ground conditions.
- Utilizing low-impact equipment with operators experienced in working on steep slopes.
- Exercising caution around the void on the lower portion of the trail.
- Constructing cross-ditches along the trail following remediation to divert surface flow from the disturbed soil surfaces.
- Constructing cross-slope terraces along long sections of steep uniform slopes to break the slope and slow surface runoff along the slope (to be conducted as part of the remediation activities, following debris excavation).
- Providing a geotechnical monitor during the remedial excavation activities.
- Implementing erosion and sediment control measures including deposition of coarse woody debris and installation of coconut fibre mat cover.

Additional measures that will be implemented during the remediation program to mitigate potential effects on wildlife include the following:

- Identification of "no work" zones around identified wildlife trees and native vegetation areas.
- Establishment of "environmental response measures" developed in consultation with CWS in the unlikely event that turtles are disturbed during the marsh debris removal program.
- Completion of inspections of the proposed work areas by an environmental monitor to verify that species at risk and sensitive species are not present in the work areas immediately prior to remediation activities. Should any such species be encountered, CWS will be contacted and the work plan revised to avoid impacts to the species noted.

As part of the bid package, contractors will be requested to provide documentation of their experience working on steep slopes, in sensitive habitats and around sensitive species. As well, as part of the contractor's pre-work submittals, they will have to prepare an Environmental Protection Plan covering erosion and sediment control planning, water management planning, equipment route planning, spill control and contaminant prevention planning and waste management planning.

Please note that based on correspondence with Environment Canada (letter dated November 25, 2010), a Species at Risk permit was not required for previous remediation works completed in the marsh. Based on the results of the October 2014 pre-remediation field activities (included as an attachment to SLR's letter "Request for Permit – Scientific Application Information, Proposed Remediation Activities, Wilmer Marsh Unit, Columbia National Wildlife Area, Near Wilmer, BC"), there is no evidence of current activity of extirpated, endangered or threatened species in the proposed work area. Badger burrows were observed in the vicinity of the proposed trail work area but were noted to be abandoned with no evidence of recent use. As well, at least two individual turtles (species not confirmed) were observed in the vicinity of the proposed marsh work area; it is noted that the Intermountain-Rocky Mountain population of Western Painted Turtle is considered a species of Special Concern under the Species at Risk Act.

3.0 TIMING

SLR is proposing to conduct the on-site bidder's meeting in late November or early December 2014 with the remediation activities conducted between January 5, 2015 and March 31, 2015.

If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours sincerely,
SLR Consulting (Canada) Ltd.

BRITISH COLUMBIA
1598
Lindsay Paterson
INSTITUTE OF AGROLOGISTS

10/28/14

Lindsay Paterson, MSc, PAg
Soil Scientist

LP/lp

Attachments: SLR letter "*Request for Permit – Scientific Application Information, Proposed Remediation Activities, Wilmer Marsh Unit, Columbia National Wildlife Area, Near Wilmer, BC*"

2014 Oct 28 Wilmer Permit Request Remediation Program.docx

28 October 2014

Gloria White
Environment Canada – Canadian Wildlife Service
5241 Robertson Road
RR#1
Delta, BC V4K 3N2

Project No.: 219.05112.00010
Client Reference No.: DFRP # 16096, ARMS # 00394, FCSI # 16096079

Dear Ms. White,

***RE: REQUEST FOR PERMIT – SCIENTIFIC APPLICATION INFORMATION
PROPOSED REMEDIATION ACTIVITIES
WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA
NEAR WILMER, BC***

SLR Consulting (Canada) Ltd. (SLR) is submitting scientific permit application information for a permit to conduct remediation activities in the marsh and in the vicinity of the trail connecting the uplands and marsh at the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA), near Wilmer, BC (the Site).

While it is understood that an application for a permit to kill and/or capture migratory birds is not required as a part of this project, information required in a portion of that application is required for a permit to conduct the proposed works. SLR has provided the information below for each applicable section of the scientific application.

REQUEST FOR MULTI-YEAR PERMIT?

No.

PROJECT START AND END DATES

The proposed remediation activities are proposed to occur from **January 5, 2015** to **March 31, 2015**. It is likely that the project will be completed earlier than this date, and SLR will advise CWS upon completion.

As well, it is anticipated that an on-site bidder's meeting will be required to allow potential contractors to review the Site, its current condition and the logistical and wildlife constraints associated with conducting remedial works in the NWA. The on-site bidder's meeting (anticipated to be one day in duration only) will likely occur in **late November or early December, 2014**.

To that end, SLR is requesting the permit over the period of **November 15, 2014** to **March 31, 2015.**

PROJECT TITLE (maximum 50 letters)

Remediation of former refuse site at NWA.

PROJECT DESCRIPTION (condensed version of proposal, two paragraphs)

The Site is located in the Wilmer Marsh Unit of the Columbia National Wildlife Area near Wilmer, BC. The proposed work area includes a portion of the marsh where residual debris has been observed as well as the area of the trail connecting the uplands bench to the adjacent marsh. The activities associated with this project involve the removal of residual debris present in the marsh and removal of debris and associated contaminated soil located in the trail area.

The project activities will include removal of several large pieces of debris from the marsh utilizing specialized equipment and transporting the debris (potentially via helicopter and/or crane) to a temporary staging area adjacent to Westside Road for transport and off-site disposal. The remediation activities in the trail area will involve removal of surficial debris (manually and by machine) from the trail area and adjacent slopes and gully to the south of the trail. The remediation activities in the trail area will also involve the excavation of debris and associated soil from two zones (referred to as the main debris zone and Area of Impact 3). Soil in Area of Impact 3 would likely be re-used as backfill and the surrounding area re-contoured to account for the removal of the debris volume; debris from Area of Impact 3 would be transported to the temporary staging area adjacent to Westside Road for transport and off-site disposal. The soil in the main debris zone would be excavated with the debris, transported to the temporary staging area adjacent to Westside Road and then transported off-site for additional screening (i.e. separation of soil from debris) and subsequent disposal. For further information, please refer to the draft SLR report titled 2013/2014 Site Works Summary and Remedial Action Plan Report (Section 5.4). The proposed work areas are also depicted on Drawing 1.

PROJECT LOCATION(S)

The Site is located within the Wilmer Marsh Unit of the Columbia National Wildlife Area, approximately 1.2 kilometres north of Wilmer, BC. The latitude and longitude for the gate at the entrance to the Site off of Westside Road is 50˚33'00.78"N, 116˚04'16.82"W.

PROJECT COMPONENT(S)

Marsh Debris Removal:

Based on SLR's previous experience at the Site, equipment access to the marsh debris areas can only occur when there is sufficient ice upon the marsh to support the weight of the equipment. Specialized equipment (e.g. spider-type hoes) would be mobilized to the marsh via the existing trail and then to the proposed marsh work area over the ice.

Holes would be cut into the ice at previously identified debris locations (refer to Figure 2 of the draft SLR report titled 2013/2014 Site Works Summary and Remedial Action Plan Report), sufficient in size to remove the debris safely without compromising the integrity of the ice to support the equipment. Should debris exceed the safe hole size, the debris would be broken down into smaller pieces for removal. Debris would be contained in impermeable sacks or steel buckets and transported (potentially by helicopter and/or crane) to the staging area along Westside Road for off-site transport and disposal. Please note that the program does not include the excavation or dredging of sediment from the marsh area. Only sediment incidentally adhered to the debris would be removed from the Site. Consequently, the area of disturbance will be localized to the immediate vicinity of the debris and will not involve widespread disturbance of sediments in the work area. It is anticipated that approximately 50 cubic metres of debris may be removed from the marsh during the debris removal program.

Trail Debris Removal:

Work will be conducted following the marsh activities as access to the marsh is required along the trail. The remediation of the trail area is comprised of three parts:

1) excavation of the debris at Area of Impact 3 (approximately 1000 m^3 of soil/debris);

2) removal of surficial debris across the trail and adjacent slopes and gully (approximately 200 m^3 of debris), and;

3) excavation of the debris in the main debris zone to a depth of approximately 1.5 m but potentially deeper in select areas (approximately 1350 m^3 of soil/debris but potentially more).

As the excavation of debris at Impact Area 3 and the removal of surficial debris across the trail area are reliant upon access via the existing trail, the remediation of these areas must be completed prior to the excavation of the main debris zone. In the event that improvements to the existing trail cannot be made to allow the transport of debris from Area of Impact 3 and other parts of the trail, additional measures (i.e. crane) may be required.

Following debris removal, Area of Impact 3 would be recontoured to accommodate the loss of volume corresponding to the removed debris. In the main debris zone, the excavation would be backfilled with non-contaminated imported material to return the area to the existing grade. SLR is proposing to source the backfill material from a location north of the refuse site along Westside Road, within the NWA (refer to Drawing 1).

Soil and debris would be transported to the temporary staging area along Westside Road and then transported for off-site separation, characterization and disposal.

DESCRIPTION OF BIOPHYSICAL EFFECT

Overall, the timing of the remediation project (January-February 2015) is intended to limit disturbance to wildlife using the Site as well as minimizing disturbance to site soils. The use of specialized equipment (such as spider-type hoes and helicopters/cranes) is also intended to minimize disturbance to site soils.

Limited biophysical effects are anticipated in the proposed marsh work area. There may be some short-term disturbance of sediments and benthic organisms during the removal of the debris, resulting in localized turbidity in the water column in the work area. A sediment curtain will be installed around the work area in early November 2014 to mitigate potential impacts outside of the immediate work area (work completed under CWS permit BC-14-0041). The sediment curtain will remain in place until surface water testing indicates that turbidity parameters (total suspended solids and total dissolved solids) are consistent with pre-remediation baseline conditions.

Biophysical effects in the proposed trail work area are primarily related to the removal of soils/debris and local disturbance of vegetation. With the exception of two native vegetation areas which have been identified by SLR and which will be treated as "no work" zones during the remediation project (see further discussion below), the vegetation in the proposed trail work area is comprised of invasive and non-native species (i.e. crested wheatgrass). There are a number of geotechnical concerns related to work at the Site and the proposed project will incorporate a number of mitigation measures (see further discussion below).

CUMULATIVE EFFECTS

The primary cumulative effect at the Site is related to disturbance and potential compaction of site soils from human and equipment traffic. However, the timing of the project as well as the type of equipment to be utilized is intended to minimize adverse effects.

DESCRIPTION OF MITIGATION MEASURES

SLR retained Clarke Geoscience Ltd. (CGL) to evaluate the geotechnical implications of remedial excavation activities in the trail area and to recommend mitigation measures. CGL noted that there were no slope stability concerns associated with remedial activities at Area of Impact 3 based on the shallow depth of the debris in the area and the low slopes. CGL identified a number of potential slope stability and soil erosion concerns associated with the proposed excavation of the main debris zone in the trail area and recommended the following mitigation measures to complete the remedial excavation activities in a safe and effective manner (refer to draft SLR report titled 2013/2014 Site Works Summary and Remedial Action Plan Report):

- ***Reduce excavation areas and depths to minimize the total area of disturbance and to reduce the height of potentially unstable cut slopes.*** Excavation depths will be limited under the proposed work program.
- ***Protect access routes on the Site by installing a 300 mm thick layer of well-graded, crushed angular gravel on a layer of filter fabric.*** It is SLR's understanding based on previous discussions with personnel from CWS that construction of "roads" on-site is generally not encouraged and may involve a lengthy approval process. Consequently, the work program will be conducted under extended periods of dry, or frozen, ground conditions.
- ***Utilize low-impact equipment such as rubber-tired or spider hoe-type excavators (with operators experience in working on steep slopes) to reduce the potential for ground disturbance.*** SLR will incorporate these recommendations into the tender specifications for the project.
- ***Exercise caution in operating equipment in the vicinity of the void identified on the lower trail.*** SLR will identify the location of the void in the trail during the on-site bidder's meeting and in the tender specification documents.
- ***Construct cross-ditches at the top of the trail to divert surface flow from the work areas.*** SLR will incorporate this recommendation into the tender specifications.
- ***Construct cross-slope terraces along long sections of steep uniform slopes to break the slope and slow surface runoff along the slope.*** SLR will incorporate this recommendation into the tender specifications.
- ***Provide at least a part-time geotechnical monitor for the duration of the excavation activities.*** A geotechnical monitor will be retained during the remediation project.

- ***Implement erosion and sediment control measures including deposition of coarse woody debris and installation of coconut fibre mat cover.*** SLR will incorporate these recommendations into the tender specifications. Coarse woody debris would be sourced from other areas of the Site or adjacent lands to minimize the potential for introduction of invasive species.

Due to the potential for suspension of sediment (including disturbance of spatially-localized contaminated sediments) during the marsh debris removal program, SLR will be overseeing the installation of a sediment curtain in the marsh in early November 2014. Based on discussions with Fisheries and Oceans Canada as well as the observation of fish in the proposed marsh work area in October 2014, fish salvage will be conducted immediately following installation of the sediment curtain. A fish collection permit has been obtained from the BC Ministry of Forests, Lands and Natural Resource Operations.

In addition to the mitigation measures considered above, SLR also conducted pre-remediation environmental monitoring activities in October 2014 to evaluate whether mitigation measures are also necessary with respect to wildlife at the Site. SLR's report detailing the pre-remediation activities has been attached for reference. The work was completed in response to previous correspondence with Environment Canada (letter dated November 25, 2010) which recommended the completion of the following activities prior to completion of remediation work at the Site:

- Western Toad and Painted Turtle surveys (listed as species of Special Concern under the Species at Risk Act).
- Surveys for active American Badger dens at the Site (listed as Endangered under the Species at Risk Act).
- Surveys to identify potential wildlife trees in the vicinity of the remediation works which may be impacted by the site activities and to identify "no-work" buffer zones around the affected wildlife trees.
- Avoidance of work during the migratory bird breeding season to minimize damage to nests.

The October 2014 pre-remediation environmental monitoring activities noted the following with respect to Species at Risk at the Site:

- Turtles (species not determine) were observed in the vicinity of the proposed marsh work area. SLR will continue to monitor the proposed marsh debris removal area for the presence of turtles during the sediment curtain installation and fish salvage activities which are scheduled for early November. The activities will involve work from aluminum boats which may allow closer observation of any potential turtles. However, in the event that no further information is obtained on the turtles in the proposed marsh work area, SLR will incorporate "environmental response measures" developed in consultation with CWS into the tender specification documents in the unlikely event that turtles are disturbed during the marsh debris removal program.
- Although the Western Toad survey results are inconclusive due to timing constraints, it is considered unlikely that toads will be present in the water or sediment in the area of the marsh debris removal during the winter months (i.e. January-February 2015). Toads, if present, will be upslope of the marsh within the adjacent forested portions of the Site.
- Two abandoned badger burrows were identified near the proposed work area in the trail. However, there was no evidence of recent digging, soil piles or scat and there was

obvious vegetation and lichen growth over the burrows. Based on SLR's field observations, it does not appear that either burrow is being actively used.

- Four wildlife trees were identified along the gully to the south of the proposed trail work area. The UTM coordinates of the trees were recorded to allow for identification of "no work" zones during the proposed remediation activities. The "no work" zones will be incorporated into the tender specification documents for the remediation project.
- Two areas of native vegetation were identified and UTM coordinates recorded to allow for identification of "no work" zones during the proposed remediation activities. One area was located south of the trail and the other was located north of the trail on the uplands bench. The "no work" zones will be incorporated into the tender specifications for the project.
- SLR reviewed the proposed remediation work areas for other SARA-listed species (refer to Table B in SLR draft report 2013/2014 Site Works Summary and Remedial Action Plan Report). None of the SARA-listed species were observed in the proposed remediation work areas during SLR's inspections. It is noted that Hooker's Townsendia (Townsendia Hookerii) has previously been observed at the Site within the uplands bench native vegetation area which will be demarcated as a "no work" zone during remediation activities; Hooker's Townsendia is a provincially red-listed species but is not a SARA-listed species.

In addition to the above, an environmental monitor will be present at the Site for the entire duration of the remediation project. The environmental monitor would conduct an inspection for species at risk/sensitive species immediately prior to the start of the remediation activities and should any be encountered, CWS will be contacted and the work plan revised to avoid impacts to the species noted.

RESIDUAL EFFECTS ADVERSE

None. The project is intended to provide a net benefit to the Site through the removal of debris and remediation of associated soil contamination.

EFFECTS LIKELY SIGNIFICANT

The overall objective for the project work is intended to result in a significant net benefit to the Site in the long-term as the work involves removal of sources of contamination at the Site.

A copy of the permit request, dated October 28, 2014, has been submitted separately to CWS. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours sincerely,
SLR Consulting (Canada) Ltd.

British Columbia Institute of Agrologists 1598 Lindsay Paterson P.Ag.

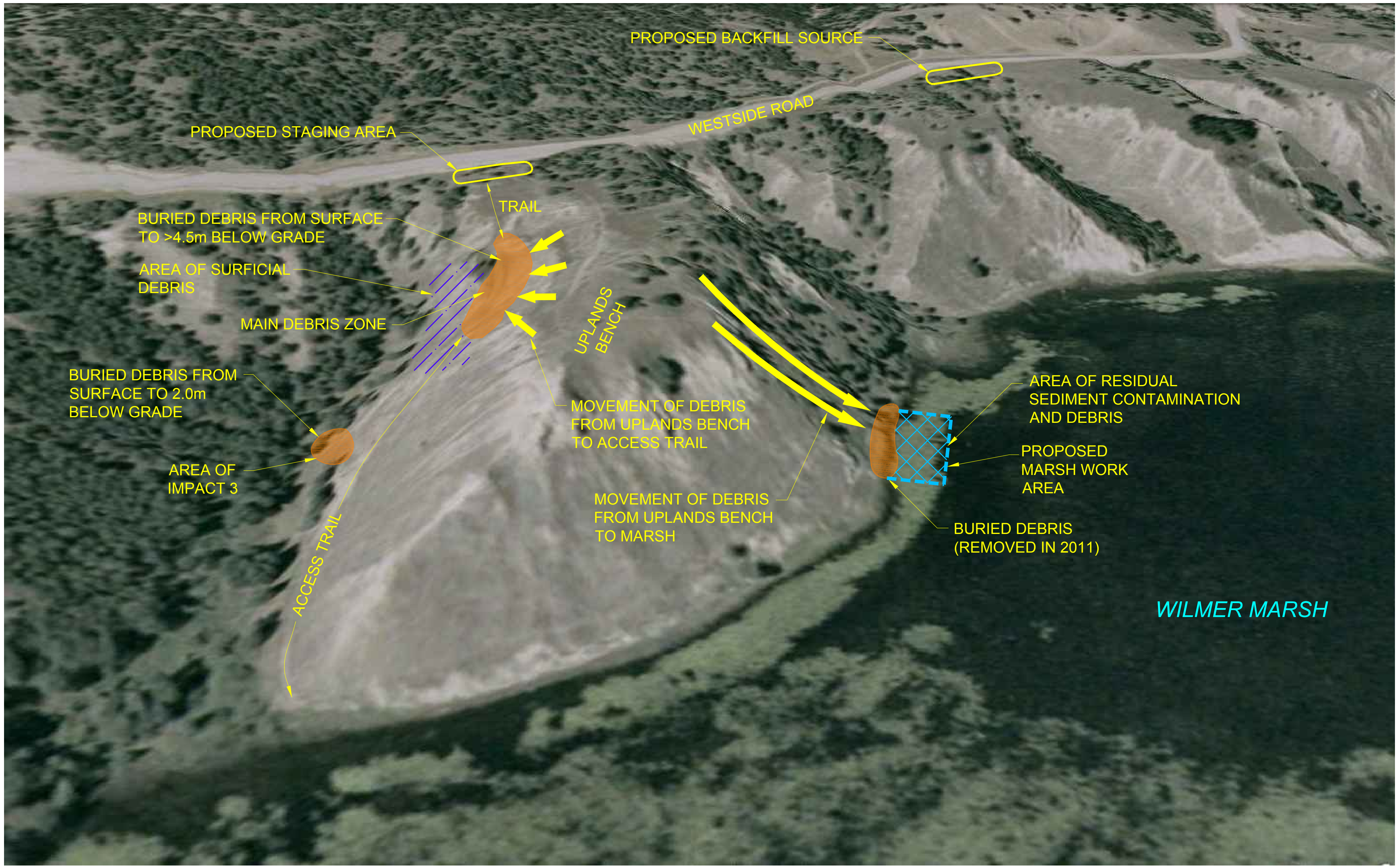
Lindsay Paterson, MSc, PAg
Soil Scientist

10/28/14

Enc Drawing 1: Proposed Work Areas
SLR Report "Environmental Monitoring Notes – Pre-Remediation Field Activities, Wilmer Marsh Unit, Columbia National Wildlife Area, October 6-9, 2014"

LP/lp

2014 Oct 28 Wilmer Permit Request Remediation Program Sci App Info.docx



NOTES

IMAGERY: GOOGLE © 2007 PARKS CANADA

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

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report: PERMIT APPLICATION

Drawing: PROPOSED WORK AREAS

Date	October 27, 2014	Scale	NTS	Drawing No. 1
File Name	S_219-05112-00010-B1	Project No.	219.05112.00010	

SLR

28 October 2014

Bradley Klaver
Environmental Specialist
Public Works and Government Services Canada
Environmental Services, Pacific Region
219 – 800 Burrard Street
Vancouver, BC V6Z 0B9

By Email: Bradley.Klaver@pwgsc-tpsgc.gc.ca

Dear Mr. Klaver,

RE: ENVIRONMENTAL MONITORING NOTES - PRE-REMEDIATION FIELD ACTIVITIES WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA OCTOBER 6-9, 2014 SLR PROJECT 219.05112.00010

Between October 6 and October 9, 2014, two SLR Consulting (Canada) Ltd. (SLR) representatives (Ms. Kalina Noel, R.P.Bio. – Biologist, and Ms. Corinne Couture – Junior Technologist) accessed the historical refuse site in the Wilmer Marsh Unit of the Columbia National Wildlife Area (the Site) to conduct field activities in support of remediation planning. These activities included:

- identification of the remaining debris in the marsh;
- identification of the limits of the buried and surficial debris areas in the trail;
- identification of a potential backfill source for the remediation activities; and
- collection of baseline surface water turbidity parameters.

Also included in the pre-remediation field activities were the completion of wildlife and wildlife tree surveys, specifically:

- completion of Western Toad and Western Painted Turtle surveys;
- completion of surveys for active American Badger dens at the Site; and
- completion of surveys to identify potential wildlife trees in the vicinity of the remediation works which may be impacted by the proposed remediation activities and to identify “no-work” buffer zones around the affected wildlife trees.

Site Reconnaissance

Following a review of SLR’s health and safety plan, SLR conducted a site reconnaissance to review site conditions. Areas seeded in Spring 2014, such as the uplands gully and 2013 trail test pits, were assessed for vegetation growth.

The sediment fencing and erosion control matting in the uplands gully area were observed to be undisturbed. No signs of erosion were observed and the sediment fencing and matting appeared to be functioning adequately. No seed growth was observed although weed species such as sweet clover and flixweed (Photo 1) were noted to be establishing in the gully.

The area around the test pits advanced in the trail were also observed to be stable and the erosion control matting and coarse woody debris appeared to be functioning adequately. No signs of seed growth were present (Photo 2). However, incursion of crested wheatgrass and other weed species from the north slope into the disturbed areas was observed (Photo 3).

The marsh shoreline was noted to be stable and continuing to re-vegetate (Photo 4). Willow stakes appeared to be growing adequately (Photo 5).

SLR collected two samples of surface water from the proposed marsh debris removal area for assessment of turbidity parameters (total suspended solids and total dissolved solids). The samples were submitted to ALS Environmental for laboratory analysis.

Surrounding Lands Reconnaissance

SLR also conducted a reconnaissance of the surrounding federal lands in the Wilmer Marsh Unit.

The fence line along the road southwest of the Site was found to have been cut and the rock barrier altered (Photos 6 and 7). Evidence of recent activity through the breach in the fence was noted (single track, likely a dirt bike).

SLR walked along Westside Road to identify potential backfill sources within the Wilmer Marsh Unit for future remediation activities. During the walkover, a moose head was observed in the road ditch (Photo 8). As hunting is prohibited in this area, SLR notified the local Conservation Officer (Sgt. Lawrence Umsonst, Columbia – Kootenay Zone).

During the reconnaissance for potential backfill sources, SLR identified dumping on an uplands bench north of the Site (Photo 9). The majority of the dumping appeared to be historic (old vehicles located downslope in areas overgrown by trees, some small tin can dumps) although some more recent debris (broken sheet glass) was also observed on the bench. As well, in an area closer to the road, there appeared to be slightly mounded terrain which was vegetated by disturbance species such as crested wheatgrass (Photo 10). This was noticeable as the surrounding areas were observed to be comprised of native grasses and other vegetation. Coordinates of the debris and the mound were recorded.

SLR did identify a potential backfill source along Westside Road (Photo 11). The potential source appeared to be comprised of similar soil to the trail area soils (i.e. upland bench glaciolacustrine materials). Westside Road has been cut into the upland bench in this location and the fence for the Wilmer Marsh Unit is located approximately 15-20 metres back from the road in this location. The coordinates of the potential backfill source were recorded. The source area appeared to be capable of supplying at least 1500 cubic metres of soil.

SLR also conducted reconnaissance in the Town of Wilmer to identify access points to the marsh for the upcoming sediment curtain installation and fish salvage work. An ATV trail to the marsh was identified at the north end of Moffat Avenue and is presumably located on provincial Crown land based on available land title information.

Marsh Debris

SLR completed an assessment of all debris present along the shoreline from the previously excavated marsh shoreline south to the provincial border. Readily identifiable debris was photographed and Universal Transverse Mercator (UTM) coordinates recorded using a Trimble GeoExplorer unit.

Debris identified included metal (Photo 12), tires (Photo 13) and concrete (Photo 14). Coordinates and information on the material type were recorded for each piece of debris. In total, 105 pieces of debris were identified.

It is noted that numerous pieces of debris were visually identified outside the limits of the proposed marsh debris removal program. It is recommended that these areas be re-assessed in Winter 2014-2015 during the electromagnetic survey planned as part of the remediation activities to confirm that the pieces are spatially small and unlikely to pose a large physical hazard or contaminant degradation risk to ecological receptors.

Trail Debris and Adjacent Slope Debris

SLR conducted an assessment of debris along the trail and in areas to the south and north of the trail. Starting at the provincial border and moving north-westward, 63 points of metal debris were identified, including four tires, one ski, and three larger areas of debris identified using a polygon feature on the GeoExplorer unit (Photos 15-18). Polygons were used in areas where debris was small and too numerous to identify each piece with an individual UTM coordinate.

Along the trail and slope north of the trail, 13 pieces of surficial metal debris were identified. Wood debris piles and one piece of concrete were also noted. Larger areas of debris were mapped using a polygon which included a wood pile (Photo 19) and a pile of mixed wood and metal debris (Photo 20). The wood debris included lumbered wood with nails. One large piece of metal was observed north of the trail within an area of native vegetation (Photo 21).

SLR recorded locations of debris near the surveyed federal-provincial boundary which fell within the federal lands. The locations of thirteen additional pieces of metal debris, one piece of concrete and a piece of wood debris were recorded.

A final review of the uplands bench was made to assess if any debris had been left behind following clean up over the past years. Only one piece of metal debris was observed.

Expert Support Site Visit

Representatives from Environment Canada and Fisheries and Oceans Canada were present at the Site in the afternoon of October 9, 2014. The SLR project manager conducted a walkover inspection of the Site and reviewed the proposed remediation plans for the marsh and trail areas with the Expert Support representatives.

Survey Activities in Support of Remediation Planning

Based on previous correspondence with Environment Canada (letter dated November 25, 2010), a Species at Risk permit was not required for works completed previously in the marsh due to the low possibility of Species at Risk (SAR) occurring at the Site. However, further studies prior to the commencement of site activities were advised by Environment Canada, specifically wildlife surveys for Painted Turtle and Western Toad as wells as identification of American Badger dens. Environment Canada also recommended the completion of wildlife tree surveys for the establishment of “no work” buffer zones during future remediation activities.

CWS also outlined terms and conditions for survey activities in the permit issued to SLR on September 23, 2014 to conduct the remediation planning activities.

SLR attempted to complete the wildlife and wildlife tree survey activities following the requirements outlined by Environment Canada and CWS as closely as possible. However, due to the time of year, species identified as concern under the CWS permit (BC-14-0041) could not be surveyed following the Resources Inventory Committee (RIC) standards. This limitation was acknowledged by CWS as a potential constraint to the survey work. The following sections describe observations made at the Site between October 6 and 9, 2014.

Western Painted Turtle (*Chrysemys picta bellii*, Intermountain-Rocky Mountain population)

SLR reviewed the marsh area on several occasions between October 6 and 9, 2014 for the potential presence of Western Painted Turtle in the proposed marsh debris removal area. Western Painted Turtles are identifiable by the red/orange colouration of the plastron and are listed as species of Special Concern under the Species At Risk Act (SARA).

On one occasion, a turtle was observed offshore in the water. As the turtle was too far from the shore to observe in detail, it was unknown if this was a Western Painted Turtle or another species.

On another occasion, two turtles were observed. A photograph of one of the turtles was attempted (see Photo 22). However, due to the distance from the shore and the turtle's limited exposure above the water surface, the photograph is not definitive for identification purposes.

On a third occasion, one individual turtle was again observed. As during the previous observations, the turtle was located too far offshore to allow definitive identification.

All turtles observed during the field survey were in the water and located too far offshore to determine if the plastron was coloured. As the turtles' plastrons were not clearly visible, SLR examined the heads of the individuals to see if other markings were visible (specifically, red colourations behind the eyes which are indicative of red-eared sliders). One turtle (as seen in Photo 22) was stationary for a period of time long enough to closely observe its head; no red markings were observed on the head. Red markings were also not cursorily noted on the heads of the other turtles observed.

SLR will continue to monitor the proposed marsh debris removal area for the presence of turtles during the sediment curtain installation and fish salvage activities which are scheduled for early November. The activities will involve work from aluminum boats which may allow closer observation of any potential turtles.

Given that proposed remediation activities in the marsh will be limited to the removal of debris and that there will not be any excavation or dredging of sediments in the marsh, disturbances in the marsh will be limited to the immediate vicinity of the debris being removed. Observations of turtles during the survey conducted in October 2014 identified up to two individuals. Given the low number of individuals and the relatively small area of the proposed work area (approximately 25 m by 70 m delineated by sediment curtain) and the even smaller scale of the individual pieces of debris compared to the larger marsh area, it is considered unlikely that any turtles will be present in the immediate vicinity of the debris removal works. However, it is recommended that "environmental response measures" be discussed with CWS in advance of the project and incorporated into the tender specifications for the remediation project should a turtle be discovered during the debris removal program.

Western Toad (*Anaxyrus boreas*)

RIC surveys are to be conducted during migration and breeding seasons for amphibians. According to the British Columbia Ministry of Environment, Western Toads find winter hibernation sites following breeding. Hibernation sites include forested and grassland areas. Preferring damp conditions, toads may venture far from breeding grounds. The Western Toad is listed as a species of Special Concern under SARA.

As noted above, the Western Toad survey could not be completed according to RIC standards due to project timing. However, no toads were observed at the Site during SLR's activities. Although the Western Toad survey results are inconclusive due to timing constraints, it is considered unlikely that toads will be present in the water or sediment in the area of the marsh debris removal during the winter months (i.e. January-February 2015). Toads, if present, will be upslope of the marsh within the adjacent forested portions of the Site.

American Badger (*Taxidea taxus jeffersonii*)

One abandoned badger burrow was observed at the north end of the gully downslope of the trail area (Photos 23 and 24). Three entrances to the burrow were observed. The entrances were heavily overgrown by vegetation and lichens were present on the soil, suggesting that this burrow was abandoned a number of years ago.

A second abandoned badger burrow was observed to the south of the upper part of the trail (Photo 25). Two entrances were found, both covered in vegetation and lichens, suggesting that this burrow was abandoned a number of years ago as well.

The two burrow locations are near one another and may have been dug by the same individual. No current digging marks, soil piles or scat were observed at the burrows. Based on SLR's field observations, it is considered unlikely that a badger is actively using the area of the Site where the remediation activities are proposed. The American Badger is listed as an Endangered species under SARA.

Wildlife Trees and Native Vegetation Exclusion Zones

As part of SLR's survey activities, wildlife trees were also assessed. Four wildlife trees were identified (Photos 26-27) along the gully to the south of the trail. The coordinates of the trees were recorded with the GeoExplorer unit to allow for identification of "no work" zones during the proposed remediation activities.

To ensure that any native vegetation and plant communities present at the Site remain undisturbed during the proposed remediation activities, SLR delineated and obtained the coordinates of the native vegetation using the GeoExplorer unit. Two areas of native vegetation were identified; one area was located south of the trail (Photo 28) and the other was located north of the trail on the uplands bench (Photo 29).

SLR will incorporate the mapped wildlife trees and native vegetation areas into the remediation tender specification documents as prescribed exclusion zones which can be field-flagged during remediation as "no work" areas.

Fish and Other Species Observations

During the review of the marsh debris, SLR observed two different species of fish. One was likely a minnow species and the other a slightly larger unknown fish. Fish salvage activities are planned following the installation of the sediment curtain in the marsh. SLR has discussed the proposed fish salvage activities with Fisheries and Oceans Canada and has obtained a fish collection permit from the BC Ministry of Forests, Lands and Natural Resource Operations (permit CB14-155834) for the fish salvage activities.

As well, muskrat slides, tracks, scat and possible den entrances were also observed along the marsh.

SLR reviewed the proposed remediation work areas for other SARA-listed species (refer to Table B in SLR draft report 2013/2014 Site Works Summary and Remedial Action Plan Report). None of the SARA-listed species were observed in the proposed remediation work areas during SLR's inspections. It is noted that Hooker's Townsendia (*Townsendia Hookerii*) has previously been observed at the Site within the uplands bench native vegetation area which will be demarcated as a "no work" zone during remediation activities; Hooker's Townsendia is a provincially red-listed species but is not a SARA-listed species.

Yours sincerely
SLR Consulting (Canada) Ltd.

BRITISH COLUMBIA INSTITUTE OF AGROLOGISTS
1598
Lindsay Paterson
P.Ag.

10/28/14

Kalina Noel, B.Sc., M.E.Des., P.Biol. R.P.Bio.
Biologist

Lindsay Paterson, M.Sc., P.Ag.
Project Manager

LP/lp

Attachments: Photoplates

219.05112.00010 PreRemediationFieldActivities_Oct 2014.docx

Photo 1: View of uplands bench gully seeded in spring 2014.

Photo 2: View of trail test pits seeded in spring 2014.

Photo 3: Incursion of crested wheatgrass and other weeds in areas disturbed by 2013 test pits.

Photo 4: Marsh shoreline is stable and continuing to re-vegetate.

Photo 5: Willow stakes continuing to grow at marsh.

Photo 6: Rock barrier altered presumably for dirt bike or ATV activity.

Photo 7: Fence cut at entrance to old ATV trail.

Photo 8: Moose head observed along Westside Road – north of site.

SLR	Pre-Remediation Field Activities Former Refuse Site – Wilmer Marsh Unit Near Wilmer, British Columbia
SITE PHOTOGRAPHS	Project No: 219.05112.00010

Photo 9: Uplands bench north of site with observed historic dumping.

Photo 10: Mounded area on uplands bench north of site with disturbance vegetation (red dashed area).

Photo 11: View of proposed backfill source along Westside Road.

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Photo 12: Metal tank observed within water in marsh area.

Photo 13: Tire observed in water in marsh area.

Photo 14: Concrete block observed along marsh.

Photo 15: Example of metal debris observed in gully located south of trail.

Photo 16: Example of tire observed in gully located south of trail.

Photo 17: Example of surficial debris in trail area.

Photo 18: Example of partially buried debris in trail area.

Photo 19: Area of wood debris observed along the trail.

Photo 20: Mixed wood and metal debris observed on slope north of trail.

Photo 21: One large piece of metal debris observed on the slope north of the trail.

Photo 22: Turtle observed in water along marsh.

Photo 23: Abandoned badger burrow, view of entrance.

Photo 24: Abandoned badger burrow, view of entrances (denoted by red arrows).

Photo 25: Abandoned badger burrow observed along upper part of trail (at red arrow).

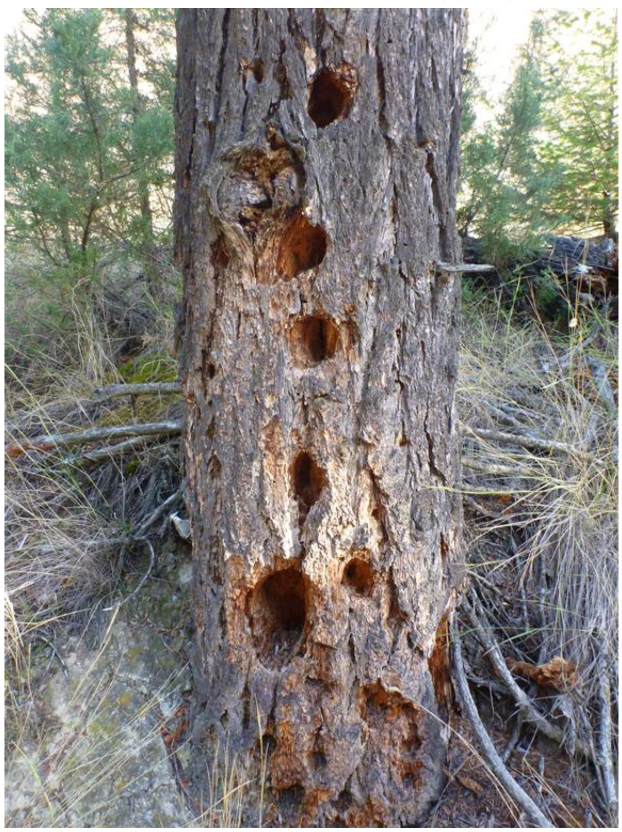

Photo 26: View of wildlife tree observed in gully south of the trail (cavities present).

Photo 27: Wildlife tree observed south of the trail.

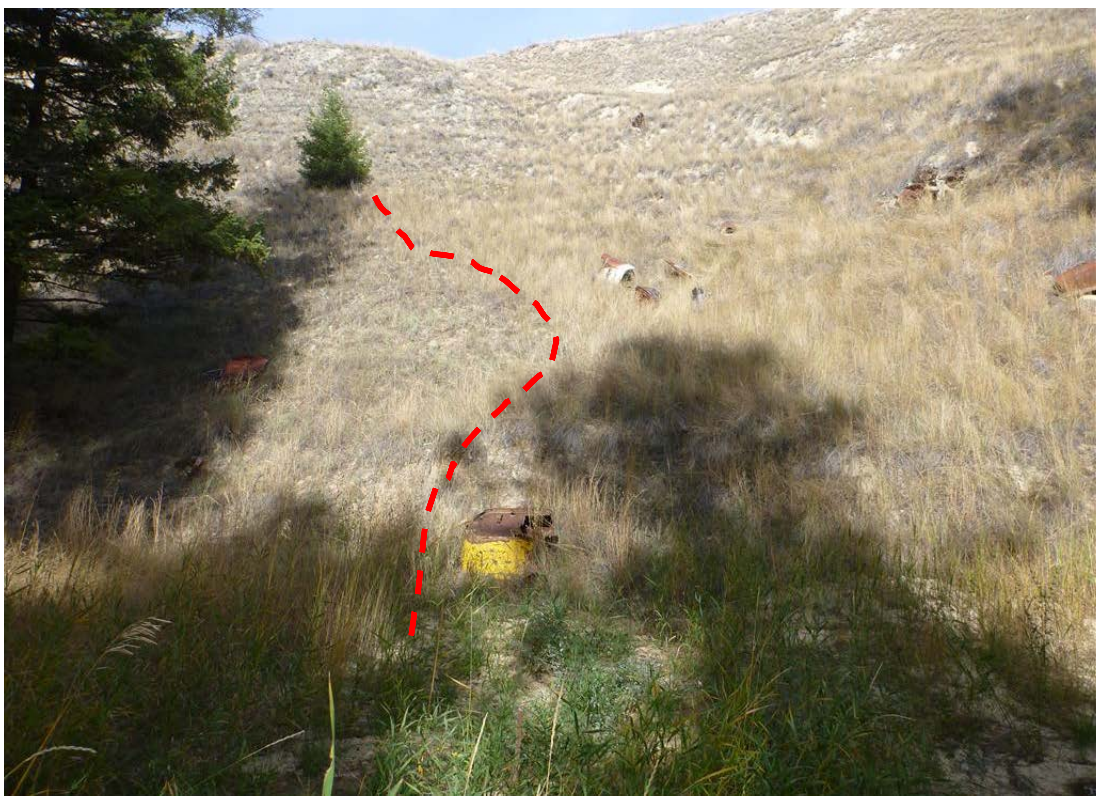

Photo 28: Area of native vegetation identified south of trail (to left of red dashed line).

Photo 29: Native vegetation identified on the upland bench, north of the trail.

From:	White,Gloria [PYR]
To:	Lindsay Paterson
Subject:	RE: Permit Request - Wilmer Marsh Unit
Date:	December 04, 2014 6:04:25 AM
Attachments:	image001.png

I see no problem with this.
Gloria

From: Lindsay Paterson [mailto:lpaterson@slrconsulting.com]
Sent: November 28, 2014 10:47 AM
To: White,Gloria [PYR]
Subject: RE: Permit Request - Wilmer Marsh Unit

Hi Gloria
I am attaching a letter detailing SLR's understanding of the conditions that would be imposed by CWS for the upcoming remediation project based on our call earlier this month. Please review and advise if there are any conditions which are not included in our list provided and/or if there will be removal of any conditions from our list. We will be publishing the specifications for the project in the next few days (which will include the permit conditions) so will need confirmation on the conditions as soon as you are able.
Thanks very much,
Lindsay

Lindsay Paterson, M.Sc., P.Ag.

Soil Scientist

SLR Consulting (Canada) Ltd.

Cell: 250-808-2320
Office: 250-762-7202
Fax: 250-763-7303
Email: lpaterson@slrconsulting.com

200-1475 Ellis Street, Kelowna, BC, V1Y 2A3, Canada

www.slrconsulting.com

SLR
global environmental solutions
1994-2014

Confidentiality Notice and Disclaimer

From: Lindsay Paterson [mailto:lpaterson@slrconsulting.com]
Sent: October 28, 2014 1:59 PM
To: gloria.white@ec.gc.ca
Cc: bradley.klaver@pwgsc-tpsgc.gc.ca
Subject: Permit Request - Wilmer Marsh Unit

Gloria
Please see attached permit request for the proposed remediation activities at the former refuse site at the Wilmer Marsh Unit of the Columbia NWA. I will be giving you a call shortly to discuss.
Thanks
Lindsay

Files attached to this message

Filename	Size	Checksum (SHA1)
2014 Oct 28 Wilmer Permit Request Remediation Program.pdf	6.35 MB	b945b82f29b44fd840c8fd4a770e0afc8d6182cb

Please click on the following link to download the attachments:
https://FileTransfer.slrconsulting.com/message/8fFrn0izCTLIBgFZp0GpaU

This email or download link can be forwarded to anyone.

The attachments are available until: **Tuesday, 4 November.**

Message ID: 8fFrn0iz

SLR File Transfer System: https://FileTransfer.slrconsulting.com

Lindsay Paterson, M.Sc., P.Ag.

Soil Scientist
SLR Consulting (Canada) Ltd.

Cell: 250-808-2320
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Email: lpaterson@slrconsulting.com
200-1475 Ellis Street, Kelowna, BC, V1Y 2A3, Canada

28 November 2014

Gloria White
Environment Canada – Canadian Wildlife Service
5241 Robertson Road
RR #1
Delta, BC V4K 3N2

Project No.: 219.05112.00010
Client Reference No.: DFRP # 16096, ARMS # 00394, FCSI # 16096079

Dear Ms. White,

RE: REQUEST FOR PERMIT
PROPOSED REMEDIATION ACTIVITIES
WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA
NEAR WILMER, BC

SLR Consulting (Canada) Ltd. (SLR) is submitting this letter to formalize our understanding of the conditions that will be imposed by Canadian Wildlife Service (CWS) in the final permit issued for the upcoming remediation project at the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA), near Wilmer, BC (the Site).

SLR's original permit request to CWS for the remediation project was submitted in October 2014. Subsequent telephone discussions with you on November 12, 2014, indicated that CWS could not issue the final permit for the project until the Remediation Contractor's name and equipment information (i.e. type of equipment to be used at the Site) were supplied to CWS. SLR cannot supply this information prior to Contract award; however, all permit conditions, and any other potential constraints on the Contractor's activities, must be known in advance of Contract award and included in the tender specifications for the project.

Based on our telephone conversation of November 12, 2014, it is SLR's understanding that the permit conditions which will be applied to the upcoming remediation project will be identical to the permit conditions listed in SLR's previous permit BC14-0041. Permit BC-14-0041 was issued under Section 4 of the Wildlife Area Regulations and Sections 73 and 74 of the Species At Risk Act. The permit conditions listed in BC14-0041 are the following:

Pre-Conditions

1. All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted.
2. All feasible measures will be taken to minimize the impact of the activities on species at risk or the residences of their individuals.
3. The activity will not jeopardize the survival or recovery of species at risk.

General Terms and Conditions

1. Permit must be signed to be valid.
2. Any additional work to be carried out in accordance to permit application.
3. The issuance of this permit does not supersede the necessity to meet other legal requirements to acquire any federal, provincial or municipal licenses, permits or other authorizations required by law.
4. This permit is not transferable to any other person(s) or organisation(s).
5. Upon completion notify Courtney Albert so an inspection of site may be conducted.
6. This permit becomes invalid if SARA Terms & Conditions described in these Appendices are not respected.
7. Any SARA-listed species collected (i.e., incidental mortalities) shall remain the sole property of the Federal Crown and shall not be traded, sold, or bartered.

Standard Terms & Conditions

1. Only qualified personnel, experienced in the identification and life cycle of the target Species at Risk and familiar with the specific locations, will monitor and oversee the timing of the activities.
2. All reasonable alternatives to this activity have been considered, all feasible measures will be taken to minimize the impact of the activity on the species, and the activity will not jeopardize the survival or recovery of the species
3. The survey methods to be implemented are non-invasive. Invasive survey methods will not be employed and those include, but are not limited to, trapping, handling, and/or marking. No animals will be killed, injured or removed. No biophysical attributes of survival, recovery, or critical habitat will be destroyed or damaged. Additional threats will not be introduced.
4. Prior to exercising the activities subject to the SARA compliancy Terms & Conditions in these Appendices, the Columbia National Wildlife Area's manager(s) is (are) to be notified relative to survey procedures, times and locations of studies.
5. These Terms & Conditions are only valid for the activities described above. They (or a copy) must be carried by the applicant or a member of the field crew and be made available to a Wildlife Enforcement Officer upon request.
6. A report shall be provided to CWS, prior to the commencement of works, outlining in detail the survey methods and results, and any observations of SARA-listed species or their residences. Submission of the SARA-specific report should also detail observed impacts of survey activities, including (as applicable) the number of individuals possessed, collected, captured, harmed, harassed, taken, or killed, and the number and location of residences, and the total area and location of habitat impacted.
7. Species at Risk occurrence data must be reported to the Province of British Columbia through the Conservation Data Centre (http://www.env.gov.bc.ca/cdc/contribute.html) or Species Inventory Database.

Specific Terms & Conditions for SARA compliancy

1. A qualified biologist will inform and oversee surveys for species at risk and will advise on biophysical attributes of habitat; Environment Canada will be provided the opportunity to approve the qualifications of the participating QP.
2. SAR surveys must adhere to non-invasive methods described in taxa- or species-specific BC RIC Inventory Methods.

3. Concurrent with surveys, specific RIC survey methods being used must be submitted to CWS explaining how these methods optimize surveying for target species given the time of year, such that most surveys are optimally conducted during and immediately following breeding periods; in September-October, target species may be in or preparing for dormancy/torpor/hibernation.
4. Mitigation measures developed must address wildlife dormancy, torpor, and/or hibernation during work that may possibly disturb hibernacula/shelters.
5. Identification of potential wildlife trees (active and inactive) that may be impacted by remediation works must be buffered as "no-work" zones; surveys should include observations of existing nests, nest boxes, and cavities suitable, for example, for nesting Williamson's Sapsucker or Lewis's Woodpecker; any nest sites encountered are to be left undisturbed and permanently left in place along with neighbouring vegetation.
6. Work should be avoided during the highest-risk seasonal time frame, approximately the end of March to the end of September/beginning of October (i.e., when seasonally active SAR and migratory birds are least likely to be using biophysical attributes within the project area and in order to minimize any incidental (transitory) SAR occurrence).
7. Pre-project surveys: any sign/identification of SAR (i.e. badger dens, Western Toad sightings, and/or observations of unanticipated SAR) should be reported immediately to CWS and Recovery Teams for advice; advice to be used prior to project commencement.

Please advise immediately if you foresee the imposition of any permit conditions outside of those listed above or if you foresee the removal of any of the above permit conditions.

Finally, it is our understanding that once the Remediation Contractor's name and equipment information has been supplied to CWS, the final permit can be issued in a matter of days (i.e. within a turnaround time of 1 to 5 days). This will be imperative once the Contract has been awarded as the work window to complete the project will be very short in length.

Thank you in advance for your assistance in this matter. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours sincerely,
SLR Consulting (Canada) Ltd.

BRITISH COLUMBIA INSTITUTE OF AGROLOGISTS 1598 Lindsay Paterson

Nov. 28/2014

Lindsay Paterson, MSc, PAg
Soil Scientist

LP/lp

2014 Nov 27 Wilmer Permit Request Remediation Program.docx

13 January 2015

Gloria White
Environment Canada – Canadian Wildlife Service
5241 Robertson Road
RR #1
Delta, BC V4K 3N2

Project No.: 219.05112.00010
Client Reference No.: DFRP # 16096, ARMS # 00394, FCSI # 16096079

Dear Ms. White,

RE: REQUEST FOR PERMIT
PROPOSED REMEDIATION ACTIVITIES
WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA
NEAR WILMER, BC

SLR Consulting (Canada) Ltd. (SLR) is submitting this letter to provide the final information required for the issuance of a permit from Canadian Wildlife Service (CWS) for the upcoming remediation project at the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA), near Wilmer, BC (the Site). The remediation project is scheduled to commence the week of January 19, 2015.

SLR's original permit request to CWS for the remediation project was submitted in October 2014. Subsequent telephone discussions with CWS on November 12, 2014, indicated that the final permit for the project could not be issued until the Remediation Contractor's name and equipment information (i.e. type of equipment to be used at the Site) were supplied to CWS.

The remediation contract was awarded last week to King Hoe Excavating Ltd (King Hoe). Based on information provided by King Hoe, the following equipment will be employed on-site:

- Spider Excavator
- Bell 407 Helicopter
- 200 Class Excavator with thumb
- 160 Class Excavator with thumb
- 85 Class Excavator with thumb
- Morooka/Tracked Dumper
- 650 Class Dozer with winch

The following provides an overview of how the above equipment will be utilized at the Site:

SLR Consulting (Canada) Ltd. 200 - 1475 Ellis Street, Kelowna, BC V1Y 2A3
T: 250 762 7202 F: 250 763 7303
www.slrconsulting.com

General Access:

King Hoe has indicated that temporary construction access mats will be installed from the fence adjacent to Westside Road to the top of the trail leading to the marsh to mitigate impacts from vehicle and equipment traffic on the upland bench. All vehicles and equipment will be required to travel on the access mats in this area.

Marsh Debris Removal:

Following the completion of an ice assessment to determine safe working conditions and an electromagnetic survey to pinpoint the debris locations, King Hoe will cut access holes in the ice using a chain saw. The spider excavator will access the marsh along the existing trail and will be used to remove the debris from the marsh bottom through the access holes using a grapple type attachment. Once brought to the surface, the debris will be cut into smaller pieces, weighed and loaded into steel bins, impermeable sacks or slings to allow transport from the marsh to the staging area along Westside Road via helicopter.

Area of Impact #3 Excavation:

The soil and debris at Area of Impact #3 will be removed by the spider excavator or by the 160 class excavator (if feasible given access) and loaded into the Morooka tracked dumper (low ground pressure equipment). The excavators and the Morooka tracked dumper would access the area using the existing trail. If necessary, the Morooka would be assisted up the slope via the dozer winch system.

Trail Surficial Debris Removal:

Debris located along the slopes proximate to the trail will be removed using the spider excavator or by hand/manually where feasible. The Morooka tracked dumper would be utilized to transport the debris to the staging area along Westside Road (assisted by the dozer winch system where necessary).

Main Debris Zone Excavation:

Access to the main debris zone should allow for the use of a conventional wide track excavator (160 Class). A contingency to utilize the spider excavator has also been included given the surrounding slopes. Soil and debris from this area would be loaded into the Morooka and transported to the staging area along Westside Road.

Backfilling:

Please note that due to funding constraints, the planned backfilling activities in the Main Debris Zone described in the original permit request have been revised. There will be no import of backfill from the off-site borrow source. Rather, only limited backfilling necessary to address any potential health and safety and geotechnical concerns will occur; material used would be taken from immediately adjacent areas through recontouring.

Staging Area:

The original permit request also indicated that soil and debris from the site would be transported from the staging area adjacent to Westside Road to an off-site location for screening of soil and debris and stockpiling. This was primarily due to the need to potentially stockpile large volumes of soil while awaiting ex situ characterization results. However, as material will now be characterized for disposal based on in situ chemistry results, the need for a large soil stockpiling area has been eliminated and it is anticipated that the screening of the soil and debris can occur within the planned staging area adjacent to Westside Road. Please note that the staging area will be outside the fencing for the NWA, will be lined with an impermeable liner and will be located immediately adjacent to Westside Road as it has been during past remediation works.

Thank you in advance for your assistance in this matter. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours sincerely,
SLR Consulting (Canada) Ltd.

BRITISH COLUMBIA INSTITUTE OF AGROLOGISTS
Lindsay Paterson

01/14/15

Lindsay Paterson, MSc, PAg
Soil Scientist

LP/lp

2015 Jan 13 Wilmer Permit Request Remediation Program.docx

Environment Canada Environnement Canada

ENVIRONMENT CANADA - ENVIRONNEMENT CANADA
PERMIT – PERMIS

Wilmer Marsh Unit Columbia National Wildlife Area	**BC-15-0002**
Permit for/Permis de pour	Permit no./ No. de permis
British Columbia / Colombie Britannique	**4**
province(s), territoires -la (les) provinces / territoires	Issued under section/Délivre en vertu de l'article

Name and address - Nom et adresse

SLR Consulting (Canada) Ltd.
Lindsay Petersen
200-1475 Ellis Street
Kelowna BC V1Y 2A3

Wildlife Area Regulations
Règlement sur les réserves de la faune

Date of issue/ Date démission : **20 January 2015**
Date of expire /Date d'expiration; **31 March 2015**

For the minister/ Pour le ministre

Special Conditions / Conditions spéciales

Project No.: 219.05112
Reference no: DFRP # 16096, ARMS # 00394, FCSI # 16096079

The purpose of this permit is to do follow-up of remediation activities at an old garbage site: (a) put down temporary construction access mats rom the fence adjacent to Westside Road to the top of the trail leading to the marsh to mitigate impacts from vehicle and equipment traffic on the upland bench. All vehicles and equipment will be required to travel on the access mats in this area. Equipment to be used on site:

- Spider Excavator
- Bell 407 Helicopter
- 200 Class Excavator with thumb
- 160 Class Excavator with thumb
- 85 Class Excavator with thumb
- Morooka/Tracked Dumper
- 650 Class Dozer with winch

b) Following the completion of an ice assessment to determine safe working conditions and an electromagnetic survey to pinpoint the debris locations, King Hoe will cut access holes in the ice using a chain saw. The spider excavator will access the marsh along the existing trail and will be used to remove the debris from the marsh bottom through the access holes using a grapple type attachment. Once brought to the surface, the debris will be cut into smaller pieces, weighed and loaded into steel bins, impermeable sacks or slings to allow transport from the marsh to the staging area along Westside Road via helicopter.

c) The soil and debris at Area of Impact #3 will be removed by the spider excavator or by the 160 class excavator (if feasible given access) and loaded into the Morooka tracked dumper (low ground pressure equipment). The excavators and the Morooka tracked dumper would access the area using the existing trail. If necessary, the Morooka would be assisted up the slope via the dozer winch system.

d) Debris located along the slopes proximate to the trail will be removed using the spider excavator or by hand/manually where feasible. The Morooka tracked dumper would be utilized to transport the debris to the staging area along Westside Road (assisted by the dozer winch system where necessary).

e) Access to the main debris zone should allow for the use of a conventional wide track excavator (160 Class). A contingency to utilize the spider excavator has also been included given the surrounding slopes. Soil and debris from this area would be loaded into the Morooka and transported to the staging area along Westside Road.

f) Please note that due to funding constraints, the planned backfilling activities in the Main Debris Zone described in the original permit request have been revised. There will be no import of backfill from the off-site borrow source. Rather, only limited backfilling necessary to address any potential health and safety and geotechnical concerns will occur; material used would be taken from immediately adjacent areas through recon touring.

g) The original permit request also indicated that soil and debris from the site would be transported from the staging area adjacent to Westside Road to an off-site location for screening of soil and debris and stockpiling. This was primarily due to the need to potentially stockpile large volumes of soil while awaiting ex situ characterization results. However, as material will now be characterized for disposal based on in situ chemistry results, the need for a large soil stockpiling area has been eliminated and it is anticipated that the screening of the soil and debris can occur within the planned staging area adjacent to Westside Road. Please note that the staging area will be outside the fencing for the NWA, will be lined with an impermeable liner and will be located immediately adjacent to Westside Road as it has been during past remediation works.

Standard Terms & Conditions

1. Permit must be signed to be valid.
2. This permit allows for work around migration in the area.
3. The issuance of this permit does not supersede the necessity to meet other legal requirements to acquire any federal, provincial or municipal licenses, permits or other authorizations required by law.
4. This permit is not transferable to any other person(s) or organisation(s).
5. Upon completion notify Courtney Albert so an inspection of site maybe conducted.
6. Only qualified personnel, experienced in the identification and life cycle of Species at Risk and familiar with the specific locations, will monitor and oversee the timing of the activities.
7. All reasonable alternatives to this activity have been considered, all feasible measures will be taken to minimize the impact of the activity on the species, and the activity will not jeopardize the survival or recovery of the species
8. These Terms & Conditions are only valid for the activities described above. They (or a copy) must be carried with the by the applicant or a member of the field crew and be made available to a Wildlife Enforcement Officer upon request.

Sub-permit holder: Employee(s) of SLR Consulting,
Employee(s) of King Hoe Excavating Ltd. (King Hoe)

I declare that I have read and understand this Permit, including all the conditions attached.
Je déclare que j'ai lu et que je comprends le présent permis et toutes les conditions qui y sont prévues.

____
Signature of permit-holder(s)
Signature du détenteur du permis

19 November 2014

Courtney Albert
Canadian Wildlife Service
5421 Robertson Rd
Delta, BC V4K 3N2

SLR Project No.: 219.05112.00010
Client Reference No.: DFRP # 16096, ARMS # 00394, FCSI # 16096079

Dear Ms. Albert,

RE: PROPOSED SOIL BORROW AREA ON WESTSIDE ROAD
WILMER MARSH FORMER REFUSE SITE, COLUMBIA NATIONAL WILDLIFE AREA

On November 6, 2014, SLR Consulting (Canada) Ltd. assessed an area along Westside Road within the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA) as a potential source of backfill material for the proposed remediation project at the Wilmer Marsh former refuse site (the Site). Specifically, the material in the proposed borrow area would be used to cap any debris or soil contamination remaining in the trail portion of the Site following limited excavation activities.

The proposed borrow area is located approximately 375 m north of the Site on the east side of Westside Road (refer to attached Drawing). The borrow area is approximately 100 m long and 15-20 m wide. The proposed remediation project is anticipated to require approximately 1500 cubic metres of backfill to cap any contamination or debris remaining in the trail area and the proposed soil borrow area is sufficiently large to accommodate this need. The borrow area is located between Westside Road and the existing NWA fence.

The area was assessed as a potential borrow location as previous discussions with Canadian Wildlife Service had indicated that any backfill imported to the site should be consistent with the soil type in the area of the remediation works (provided still considered geotechnically suitable for backfilling) and that it not introduce new invasive species to the work area.

SCOPE OF ASSESSMENT

SLR reviewed the proposed soil borrow area for vegetation type (including presence of non-native plants) and evidence of wildlife use of the soil borrow area, particularly use of the area by American Badger.

FINDINGS

The majority of the proposed soil borrow area is vegetated with a mix of native and non-native, invasive plants including: crested wheatgrass; sweet clover; sagebrush; juniper; fescue; slender wheatgrass; needle-and-thread; June grass; pussytoes; and rose (Photos 1-5).

Three areas of wildlife digging were observed along the west slope edge of the borrow area along Westside Road. However, the diggings did not appear to be completed as burrows when viewed directly from the entrance. These diggings may have been excavated by the same animal in an attempt to either dig a burrow or to follow prey. Two of the three diggings were found to be older (Photos 6-7 and 10-11). These diggings had vegetation growing around the entrance and no new, loose soil. One digging was found to have a newer throw mound and loose soil around the entrance (Photos 8-9). This digging was approximately 20 cm deep and not fully excavated as a burrow when viewed more closely from the entrance. Typical badger burrows are 20-30 cm wide and have claw marks at the tunnel entrance, parallel with the ground. The width was consistent; however, claw marks, badger tracks and scat were not observed.

A fourth larger digging was observed on the opposite side of Westside Road from the proposed soil borrow location (Photo 12). This digging was much larger and was noted to be completed as a burrow; however, evidence of badger activity (claw marks, tracks, scat) was not observed. It is possible that this burrow may have been used by another animal such as a red fox as a maternal den.

CONCLUSION

The vegetation noted in the proposed borrow location is consistent with the species observed in the remediation work area. Consequently, there is limited risk of introducing new invasive species to the work area. In order to further reduce the potential for introducing new invasive species to the work area, the surface soil layers could be stripped to remove the potential seed bank prior to excavating the deeper soil for backfilling purposes.

Due to the time of year, it was not possible to determine if the diggings, especially the larger burrow across Westside Road from the soil borrow area, were used as a maternal den by a fox or a badger. Badger diggings are usually in groupings as an area is hunted. It is possible that these diggings were dug by a badger in previous years. Badgers may have multiple burrows within its home range. The diggings on the west slope of the proposed borrow area may have been attempts at hunting for prey and not used for denning or for overwintering. Due to the very shallow depth of the three diggings located on the west slope of the proposed soil borrow area, it is unlikely that badgers will be using the diggings as burrows during excavation activities.

With respect to the burrow observed on the west side of Westside road, red foxes will re-use a maternal den year after year but only if it is still viable. Foxes are not known to use dens for overwintering. Given the location of the burrow, there is a low likelihood of damage during the proposed excavation activities. However, should this burrow be used as an overwintering den by a badger, it is possible that the individual may be disturbed by the noises and vibrations associated with the borrow area excavation activities. Monitoring of the burrow prior to excavation activities will determine if a badger is present within the burrow. If present, Canadian Wildlife Service would be notified immediately and the proposed excavation of the borrow area would not proceed until approved by Canadian Wildlife Service.

We trust the information presented meets your current needs. If you have any questions or would like to discuss the details of this letter, please feel free to contact the undersigned at your convenience.

Yours sincerely
SLR Consulting (Canada) Ltd.

Kalina Noel, B.Sc., M.E.Des., P.Biol. R.P.Bio.
Biologist

BRITISH COLUMBIA INSTITUTE OF AGROLOGISTS
1598
Lindsay Paterson
P.Ag.
Nov. 20/2014

Lindsay Paterson, M.Sc., P.Ag.
Soil Scientist

Enc Drawing 1: Site Layout
Photoplates

KN/LP/lp

219.05112.00010.CWS.BorrowArea.docx

NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS 010047749–MCS101–R02.DWG AND (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

PROVINCIAL – FEDERAL BOUNDARY

FENCE

VEGETATION EXCLUSION AREA

PROPOSED SOIL AND/OR DEBRIS REMOVAL AREAS

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report: PROPOSED SOIL BORROW AREA ASSESSMENT

Drawing: SITE LAYOUT

Date	November 19, 2014
Scale	AS SHOWN
File Name	S_219-05112-00010-A3
Project No.	219.05112.00010
Drawing No.	1

SLR

Photo 1: View at north end of proposed soil borrow area looking south. Dominated by crested wheatgrass.

Photo 2: View at north end of proposed soil borrow area looking north. Some native vegetation and encroachment of crested wheatgrass and sweet clover.

Photo 3: Remnant native vegetation present along soil borrow area.

Photo 4: Looking north along top of proposed soil borrow area. Significant encroachment by crested wheatgrass.

SLR	Proposed Soil Borrow Area Assessment Wilmer Marsh Former Refuse Site Columbia National Wildlife Area
SITE PHOTOGRAPHS	Project No: 219.05112.00010

Photo 5: Looking south along top of proposed soil borrow area.

Photo 6: Area of digging observed at north end of borrow area (565729E 5600700N UTM 11)

Photo 7: Note vegetation and no recent evidence of activity (565729E 5600700N UTM 11).

Photo 8: Area of digging observed along soil borrow area (565714E 5600666N UTM 11).

Photo 9: Some new loose soil present at entrance (565714E 5600666N UTM 11)

Photo 10: Digging observed at south end of soil borrow area (565706E 5600612N UTM 11).

Photo 11: Very shallow, incomplete digging at this location (565706E 5600612N UTM 11).

Photo 12: Larger burrow observed on opposite side of Westside Road from soil borrow area (565688E 5600640B UTM 11).

12 February 2015

Gloria White
Environment Canada – Canadian Wildlife Service
5241 Robertson Road
RR #1
Delta, BC   V4K 3N2

Project No.:   219.05112.00010
Client Reference No.: DFRP # 16096, ARMS # 00394, FCSI # 16096079

Dear Ms. White,

RE: REQUEST FOR PERMIT AMENDMENT (PERMIT BC-15-0002)
REMEDIATION ACTIVITIES AT
WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA
NEAR WILMER, BC

SLR Consulting (Canada) Ltd. (SLR) is submitting this letter to request an amendment to permit BC-15-0002 issued by Canadian Wildlife Service (CWS) on January 20, 2015 for the remediation project at the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA), near Wilmer, BC (the Site).

SLR submitted its original permit request to CWS for the remediation project in October 2014 and provided additional permit-related documentation in a letter dated January 13, 2015.

SLR's original permit request included plans for excavation and import of backfill for the Main Debris Zone from an off-site borrow source located north of the Site within the NWA. SLR's letter of January 13, 2015 indicated that due to funding constraints, no import of backfill from the off-site borrow source would occur. Due to the excellent progress made by the contractor to date, this funding constraint is no longer an issue and the excavation and import of material from the off-site borrow source can be accommodated within the project work plan. To that end, SLR is requesting an amendment of the existing permit to include import of material from the off-site borrow source. Public Works and Government Services Canada has also contacted Courtney Albert at CWS to discuss the matter.

Thank you in advance for your assistance in this matter. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours sincerely,
SLR Consulting (Canada) Ltd.

BRITISH COLUMBIA
1598
Lindsay Paterson
INSTITUTE OF AGROLOGISTS

Feb 12/2015

Lindsay Paterson, MSc, PAg
Soil Scientist

LP/lp

2015 Feb 12 Wilmer Permit Amendment Request Remediation Program.docx

Environment Canada / Environnement Canada

ENVIRONMENT CANADA - ENVIRONNEMENT CANADA
PERMIT – PERMIS

Wilmer Marsh Unit Columbia National Wildlife Area	**BC-15-0002#1**
Permit for/Permis de pour	Permit no./ No. de permis
British Columbia / Colombie Britannique	**4**
province(s), territoires -la (les) provinces / territoires	Issued under section/Délivre en vertu de l'article

Name and address - Nom et adresse

Wildlife Area Regulations
Règlement sur les réserves de la faune

SLR Consulting (Canada) Ltd.
Lindsay Petersen
200-1475 Ellis Street
Kelowna BC V1Y 2A3

Date of issue/ Date démission : **23 February 2015**
Date of expire /Date d'expiration; **31 March 2015**

S V Schmidt
For the minister/ Pour le ministre

Special Conditions / Conditions spéciales

Project No.: 219.05112
Reference no: DFRP # 16096, ARMS # 00394, FCSI # 16096079
Amendment to BC-15-0002

The purpose of this permit is to do follow-up of remediation activities at an old garbage site: (a) put down temporary construction access mats rom the fence adjacent to Westside Road to the top of the trail leading to the marsh to mitigate impacts from vehicle and equipment traffic on the upland bench. All vehicles and equipment will be required to travel on the access mats in this area. Equipment to be used on site:

- Spider Excavator
- Bell 407 Helicopter
- 200 Class Excavator with thumb
- 160 Class Excavator with thumb
- 85 Class Excavator with thumb
- Morooka/Tracked Dumper
- 650 Class Dozer with winch

b) Following the completion of an ice assessment to determine safe working conditions and an electromagnetic survey to pinpoint the debris locations, King Hoe will cut access holes in the ice using a chain saw. The spider excavator will access the marsh along the existing trail and will be used to remove the debris from the marsh bottom through the access holes using a grapple type attachment. Once brought to the surface, the debris will be cut into smaller pieces, weighed and loaded into steel bins, impermeable sacks or slings to allow transport from the marsh to the staging area along Westside Road via helicopter.

c) The soil and debris at Area of Impact #3 will be removed by the spider excavator or by the 160 class excavator (if feasible given access) and loaded into the Morooka tracked dumper (low ground pressure equipment). The excavators and the Morooka tracked dumper would access the area using the existing trail. If necessary, the Morooka would be assisted up the slope via the dozer winch system.

d) Debris located along the slopes proximate to the trail will be removed using the spider excavator or by hand/manually where feasible. The Morooka tracked dumper would be utilized to transport the debris to the staging area along Westside Road (assisted by the dozer winch system where necessary).

e) Access to the main debris zone should allow for the use of a conventional wide track excavator (160 Class). A contingency to utilize the spider excavator has also been included given the surrounding slopes. Soil and debris from this area would be loaded into the Morooka and transported to the staging area along Westside Road.

f) There will be some backfill from the off-site borrow source, only limited backfilling necessary to address any potential health and safety and geotechnical concerns will occur; material used would be taken from immediately adjacent areas through recon touring.

g) The original permit request also indicated that soil and debris from the site would be transported from the staging area adjacent to Westside Road to an off-site location for screening of soil and debris and stockpiling. This was primarily due to the need to potentially stockpile large volumes of soil while awaiting ex situ characterization results. However, as material will now be characterized for disposal based on in situ chemistry results, the need for a large soil stockpiling area has been eliminated and it is anticipated that the screening of the soil and debris can occur within the planned staging area adjacent to Westside Road. Please note that the staging area will be outside the fencing for the NWA, will be lined with an impermeable liner and will be located immediately adjacent to Westside Road as it has been during past remediation works.

Standard Terms & Conditions

1. Permit must be signed to be valid.
2. This permit allows for work around migration in the area.
3. The issuance of this permit does not supersede the necessity to meet other legal requirements to acquire any federal, provincial or municipal licenses, permits or other authorizations required by law.
4. This permit is not transferable to any other person(s) or organisation(s).
5. Upon completion notify Courtney Albert so an inspection of site maybe conducted.
6. Only qualified personnel, experienced in the identification and life cycle of Species at Risk and familiar with the specific locations, will monitor and oversee the timing of the activities.
7. All reasonable alternatives to this activity have been considered, all feasible measures will be taken to minimize the impact of the activity on the species, and the activity will not jeopardize the survival or recovery of the species
8. These Terms & Conditions are only valid for the activities described above. They (or a copy) must be carried with the by the applicant or a member of the field crew and be made available to a Wildlife Enforcement Officer upon request.

Sub-permit holder: Employee(s) of SLR Consulting,
Employee(s) of King Hoe Excavating Ltd. (King Hoe)

I declare that I have read and understand this Permit, including all the conditions attached.
Je déclare que j'ai lu et que je comprends le présent permis et toutes les conditions qui y sont prévues.

____
Signature of permit-holder(s)
Signature du détenteur du permis

Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

Request for Review

A) Contact information

Name of Business/Company:

Environment Canada

Name of Proponent:

Darryl Roberts

Mailing address:

351 St. Joseph Blvd.

City/Town:

Gatineau

Province/Territory:

Quebec

Postal Code:

K1A 0H3

Tel. No. :

Fax No.:

Email:

Select additional contact:
Contractor/Agency/Consultant *(if applicable):*

Lindsay Paterson
SLR Consulting (Canada) Ltd.

Mailing address:

200-1475 Ellis Street

City/Town:

Kelowna

Province/Territory:

British Columbia

Postal Code:

V1Y 2A3

Tel. No. :

250-762-7202

Fax No.:

250-763-7303

Email:

lpaterson@slrconsulting.com

Is the Proponent the main/primary contact? ○ Yes ◉ No

If no, please enter information for the primary contact or any additional contact.

Consultant is primary contact.

B) Description of Project

If your project has a title, please provide it.

REMEDIATION OF FORMER REFUSE SITE, WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA, NEAR WILMER, BC

Is the project in response to an emergency circumstance*? ○ Yes ◉ No

Does your project involve work in water? ◉ Yes ○ No

If yes, is the work below the High Water Mark*? ◉ Yes ○ No

What are you planning to do? Briefly describe all project components you are proposing in or near water.

SLR conducted a site visit with FOC Expert Support (Eric Chiang) on October 9, 2014 to review the current site conditions and to discuss the proposed remediation activities which are tentatively scheduled for January-February 2015. The remediation project consists of two parts: 1) removal of large debris from the marsh and 2) removal of soil and debris from an uplands trail area. The marsh work would be conducted when the marsh is frozen over and no dredging of sediments will be conducted. The uplands work will be conducted approximately 100-200 metres from the marsh and will involve the excavation of buried debris and contaminated soil.

To facilitate the remediation project, SLR will be installing a sediment curtain around the proposed marsh work area in early November 2014 prior to marsh freeze-up. SLR previously submitted a Request for Review to FOC for the installation of the sediment curtain. Baseline surface water samples for total suspended solids and total dissolved solids were collected in October 2014. Following installation of the sediment curtain, SLR will be conducting fish salvage activities. A fish collection permit for the salvage activities has been obtained from the provincial Ministry of Forests, Lands and Natural Resource Operations. The sediment curtain would remain in place until turbidity parameters return to baseline conditions following removal of the debris in the marsh.

How are you planning to do it? Briefly describe the construction materials, methods and equipment that you plan to use.

SLR's draft report 2013/2014 Site Works Summary and Remedial Action Report (submitted to FOC Expert Support) discusses the conceptual remedial approach. Please note that as the remediation project has not been tendered (nor the contract awarded), it is difficult to provide specific details on the equipment to be utilized and the exact procedure for removing the debris. This information can be requested as part of the contractor's pre-work submittals following contract award. However, all permit terms and conditions must be known in advance of contract award so that they may be incorporated into the tender specification documents.

The following summarizes the conceptual remedial approach for the marsh work area. Based on SLR's previous experience at the site, equipment access to the marsh debris areas can only occur when there is sufficient ice upon the marsh to support the weight of the equipment. Specialized equipment (e.g. spider-type hoes) would be mobilized to the marsh via an existing uplands trail and then to the proposed marsh work area over the ice. Holes would be cut into the ice at previously identified debris locations, sufficient in size to remove the debris safely without compromising the integrity of the ice to support the equipment. Should debris exceed the safe hole size, the debris would be broken down into smaller pieces for removal. Debris would be contained in impermeable sacks or steel buckets and transported (potentially by helicopter and/or crane) to the staging area along Westside Road for off-site transport and disposal. Please note that the program does not include the excavation or dredging of sediment from the marsh area. Only sediment incidentally adhered to the debris would be removed from the site. Consequently, the area of disturbance will be localized to the immediate vicinity of the debris and will not involve widespread disturbance of sediments in the work area. It is anticipated that approximately 50 cubic metres of debris may be removed from the marsh during the debris removal program.

Include a site plan (figure/drawing) showing all project components in and near water.

Are details attached? ◉ Yes ○ No

Identify which work categories apply to your project.

- ☐ Aquaculture Operations
- ☐ Aquatic Vegetation Removal
- ☐ Beaches
- ☐ Berms
- ☐ Blasting / Explosives
- ☐ Boat Houses
- ☐ Log Handling / Dumps
- ☐ Log Removal
- ☐ Moorings
- ☐ Open Water Disposal
- ☐ Piers
- ☐ Riparian Vegetation Removal

☐ Boat Launches / Ramps
☐ Breakwaters
☐ Bridges
☐ Cable Crossings
☐ Causeways
☐ Culverts
☐ Dams
☐ Dewatering / Pumping
☐ Docks
☐ Dredging / Excavation
☐ Dykes
☐ Fishways / Ladders
☐ Flow Modification (hydro)
☐ Groundwater Extraction
☐ Groynes
☐ Habitat Restoration
☐ Ice Bridges
☐ Seismic Work
☐ Shoreline Protection
☐ Stormwater Management Facilities
☐ Surface Water Taking
☐ Tailings Impoundment Areas
☐ Temporary Structures
☐ Turbines
☐ Water Control Structures
☐ Water Intakes / Fish Screens
☐ Water Outfalls
☐ Watercourse Realignment
☐ Weirs
☐ Wharves
☐ Wind Power Structures

☒ Other Please Specify: Removal of debris from marsh

Was your project submitted for review to another federal or provincial department or agency? ◉ Yes ○ No

If yes, indicate to whom and associated file number(s).

Canadian Wildlife Service (in progress)
BC Ministry of Forest, Lands and Natural Resource Operations (in progress with respect to access to adjacent provincial lands)

C) Location of the Project

Coordinates of the proposed project Latitude: 50 degrees 33' 00.78" N Longitude: 116 degrees 4' 16.82" W

OR UTM zone: ; Easting: Northing:

Include a map clearly indicating the location of the project as well as surrounding features.

Name of Nearest Community (City, Town, Village): Wilmer

Municipality, District, Township, County, Province: BC

Name of watershed (if applicable): Wilmer Marsh

Name of watercourse(s) or waterbody(ies) near the proposed project: Wilmer Marsh

Provide detailed directions to access the project site:

Set odometer to zero at intersection of Main and Smith in Wilmer, BC. Main turns into Westside Road and becomes gravel shortly north of town. The site is 1.2 km north from this point on the east side of the road. Look for the National Wildlife Area sign on the east side of the road, just after a big bend to the east.

D) Description of the Aquatic Environment

Identify the predominant type of aquatic habitat where the project will take place.

- ○ Estuary (Estuarine)
- ○ Lake (Lacustrine)
- ○ On the bank/shore at the interface between land and water (Riparian)
- ○ River or stream (Riverine)
- ○ Salt water (Marine)
- ◉ Wetlands (Palustrine)

Provide a detailed description of biological and physical characteristics of the proposed project site.

> The project area is situated within the Wilmer Marsh Unit of the Columbia NWA. The Columbia NWA is managed by the Canadian Wildlife Service (CWS) of EC. The Wilmer Marsh Unit is the southernmost of the four units that make up the Columbia NWA.
>
> The project area is depicted on the attached drawing.

Include representative photos of affected area (including upstream and downstream area) and clearly identify the location of the project.

E) Potential Effects of the Proposed Project

Have you reviewed the Pathways of Effects (PoE) diagrams (http://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/index-eng.html) that describe the type of cause-effect relationships that apply to your project?

◉ Yes ○ No

If yes, select the PoEs that apply to your project.

- ☒ Addition or removal of aquatic vegetation
- ☐ Change in timing, duration and frequency of flow
- ☐ Cleaning or maintenance of bridges or other structures
- ☐ Dredging
- ☐ Excavation
- ☐ Fish passage issues
- ☐ Grading
- ☐ Marine seismic surveys
- ☐ Organic debris management
- ☐ Placement of marine finfish aquaculture site
- ☐ Placement of material or structures in water
- ☐ Riparian Planting
- ☐ Streamside livestock grazing
- ☒ Structure removal
- ☐ Use of explosives
- ☒ Use of industrial equipment
- ☐ Vegetation Clearing
- ☐ Wastewater management
- ☐ Water extraction

Will there be changes (i.e., alteration) in the fish habitat*? ○ Yes ○ No ◉ Unknown

If yes, provide description.

> As the debris is spatially localized to approximately 7-8 discrete points within the proposed marsh work area, significant alterations to fish habitat are not anticipated. It is acknowledged however, that there will be some localized disturbance to benthic invertebrates and aquatic vegetation immediately adjacent to the removed debris.

Will the fish habitat alteration be permanent*? ○ Yes ◉ No ○ Unknown

Is there likely to be destruction or loss of habitat used by fish? ○ Yes ◉ No ○ Unknown

What is the footprint (area in square meters) of your project that will take place below the high water mark*?

The proposed work area will be contained (via sediment curtain) to an area of approximately 1800 square metres.

Is your project likely to change water flows or water levels? ○ Yes ◉ No ○ Unknown

If your project includes withdrawing water, provide source, volume, rate and duration.

If your project includes water control structure, provide the % of flow reduction.

If your project includes discharge of water, provide source, volume and rate.

Will your project cause death of fish? ○ Yes ◉ No ○ Unknown

If yes, how many fish will be killed (for multi-year project, provide average)? What species and lifestages?

Are there aquatic species at risk (http://www.sararegistry.gc.ca/species/aquatic_e.cfm) present? If yes, which ones?

Western Toad and Western Painted Turtle (Intermountain-Rocky Mountain population) are aquatic species listed as Special Concern under the Species at Risk Act which have the potential to be present in the general area of the site. SLR conducted survey activities in October 2014 for these species. Western Toad was not observed and is considered unlikely to be present in the proposed marsh work area during the remediation project (January-February 2015). Turtles (species not confirmed, at least two individuals observed) were identified in the proposed marsh work area and SLR will conduct additional monitoring when on-site in early November 2014. SLR has submitted the results of the October 2014 survey observations to CWS as part of their review process for the project.

What is the time frame of your project?

The construction will start on 01/05/2015 and end by 03/31/2015

If applicable, the operation will start on MM/DD/YYYY and end by MM/DD/YYYY

If applicable, provide schedule for the maintenance

If applicable, provide schedule for decommissioning

Are there additional effects to fish and fish habitat that will happen outside of the time periods identified above? ○ Yes ◉ No

(If yes, provide details)

Have you considered and incorporated all options for redesigning and relocating your project to avoid negative effects to fish and fish habitat?

◉ Yes ○ No

If yes, describe.

The purpose of this proposed project is to remove debris from the marsh. The presence of the debris is contributing to uncertainties associated with the risk assessment of sediment and surface water contaminant concentrations and also poses a physical hazard to wildlife in the area. The debris is located in a specific location and therefore relocation is not possible.

Have you consulted DFO's Measures to Avoid Harm to Fish and Fish Habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html) to determine which measures apply to your project?

(●) Yes ( ) No

Will you be incorporating applicable measures into your project? (●) Yes ( ) No

If yes, identify which ones. If No, identify which ones and provide reasons.

A number of measures outlined in the Measures to Avoid Harm to Fish and Fish Habitat will be implemented in the remediation project, including: timing, contaminant and spill management, erosion and sediment control, fish protection and operation of machinery. Specifically, the proposed project is already implementing measures designed to avoid harm to fish and fish habitat (i.e. installation of sediment curtain around work area in early November 2014 with subsequent fish salvage/removal from the work area). The remediation work will be conducted at a time of year to minimize disturbance to fish and wildlife in the marsh. The contractor conducting the remediation project will be required to submit an Environmental Protection Plan as part of their pre-work submittals which will cover erosion and sediment control planning, water management planning, equipment route planning, spill control and contaminant prevention planning and waste management planning.

Have you considered and incorporated additional best practices and mitigation measures recommended in relevant guidelines to avoid negative effects to fish and fish habitat?

(●) No ( ) Yes

If Yes, include a list of the guidelines being used to avoid negative effects to fish and fish habitat.

Are there any relevant best practices or mitigation measures that you are unable to incorporate? ( ) Yes (●) No

(If yes, identify which ones.)

Can you follow appropriate Timing Windows (http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html) for all your project activities below the High Water Mark*?

( ) Yes (●) No

(If no, provide explanations.)

Work will be conducted between January 5, 2015 and March 31, 2015. This is outside the listed windows for several species located in the Kootenay Region (Region 4) but none of the listed species are anticipated to be present in the proposed marsh work area. Based on previous work completed by SLR, probable fish species in the proposed marsh work area are limited to longnose sucker, largemouth bass, smallmouth bass and redside shiner.

What residual effects to fish and fish habitat do you foresee after taking into account the avoidance and mitigation measures described above?

None. The objective of this proposed project is to provide a net benefit to fish and fish habitat through the removal of debris which is likely to release contaminants (primarily metals) into the marsh over time and which currently poses a physical hazard to wildlife.

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Canada

F) Signature

I, Lindsay Paterson (print name) certify that the information given on this form is to the best of my knowledge, correct and completed.

Signature

28/10/2014

Date

Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the fisheries protection provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-PPU-680. Under the *Privacy Act*, Individuals have a right to, and on request shall be given access to any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provision of the *Access to Information Act*.

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

Guidance on Submitting a Request for Review

This document explains the requirements for a Request for Review by DFO under the fisheries protection provisions of the *Fisheries Act*. To determine whether you should request a review, follow the steps for proponent Self-Assessment on DFO's Projects Near Water webpage (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html).

Incomplete Requests for Review will be returned to the applicant without review by DFO. All information requested must be provided. If you attach documents to your application with additional information, you must still provide appropriate summaries in the spaces provided on the application document or your application will be considered incomplete.

Section A: Contact Information

Provide the full legal name of the proponent and primary mailing address for the proponent. When the proponent is a company, identify the full legal registered name of the company.

If applicable, also provide the contact information of the duly authorized representative of the proponent. Please note that a copy of correspondence to Contractor/Agency/Consultant will also be sent to the Proponent.

Section B: Description of Project

This information is meant to provide background about the proposed project. All components of the proposed project in or near water, must be described.

Proponents should provide information about all appropriate phases of the project, i.e., the construction, operation, maintenance and closure phases for the proposed project.

All details about the construction methods to be used, associated infrastructure, permanent and temporary structures, building materials to be used, machinery and equipment to be used must also be provided. For example, the construction of **permanent structures** may require the construction of temporary structures such as temporary dikes, in conjunction with other associated activities like the withdrawal of water, land clearing, excavation, grading, infilling, blasting, dredging, installing structures, draining or removing debris from water. Similarly, the equipment and materials to be used may include hand tools, backhoes, gravel, blocks or armor stone (provide the average diameter), concrete (indicate if pre-cast or poured in-water), steel beams or wood.

When physical structures in or near water are proposed, provide the plan and specifications of those works which would require a review.

Section C: Location of the Project

The purpose for this information is to describe and illustrate the location of the proposed project, and to provide geographical and spatial context. The information should also facilitate an understanding of how the project will be situated in relation to existing structures.

The details to be provided must include:

- Coordinates of the project (e.g., Latitude and Longitude or Universal Transverse Mercator Grid coordinates);
- A map(s), site plan, or diagrams indicating the high water mark and the location, size and nature of proposed and existing structures (e.g., floating or fixed), landmarks and proposed activities. In a marine setting, it may be helpful to depict the approximate location of the proposed development on a nautical chart or showing the relation of the site to sea marks or other navigational aids. These plans, maps or diagrams should be at an appropriate scale to help determine the relative size of the proposed structures and activities, the proximity to the watercourse or waterbody and the distance from existing structures;
- The community nearest to the location of the proposal as means to provide a general reference point. When possible, proponents should use geographical names recognized by the Geographical Names Board of Canada (http://www.nrcan.gc.ca/earth-sciences/geography-boundary/geographical-name/11680).
- If available, provide aerial photographs or satellite imagery of the water source(s) and waterbody(ies);
- Names of the watershed(s), water source(s) and/or waterbody(ies) likely to be affected by the proposal; and
- Brief directions to access the proposed project site.

Section D: Description of the Aquatic Environment

Proponents must describe the environmental context and aquatic resources present at the proposed site. The information must identify the current state of the fish and fish habitat prior to the carrying on of the project.

It is important to include information about the fish species present, the biological, chemical, physical features present (habitat characteristics), and the fish life-cycle functions (fish characteristics).

The spatial scope for assessing fish and fish habitat should encompass the direct physical footprint of the project, and the upstream and downstream areas affected.

As an example, the following is a non-exhaustive and non-prescriptive list of some common attributes which may characterize the aquatic environment:

- Type of water source or watercourse (groundwater, river, lake, marine, estuary, etc.);
- Characteristics of the water source or waterbody could include:
    - Substrate characterization - describe the types of substrate (e.g., bedrock, boulder, cobble, gravel etc.), identify the predominant substrate type (e.g., 80% cobble, 20% gravel etc.) and provide maps of the substrate;
    - Aquatic and riparian vegetation characterization - identify the prevalent types of vegetation (e.g. rooted, submerged, emergent, etc.), identify the relative abundance of the vegetation (e.g., 10% cattails, 80% grass, 10% sedge) , indicate the predominant vegetation (e.g., by species or types) and identify the vegetation densities (e.g., type of vegetation/ area);
    - Flow characterization - specify if the flow is controlled or if it is natural, identify if the flow is permanent or intermittent, identify the current and tide (marine environment) etc.;
    - Physical waterbody characterization - identify the average depth of water for water bodies, identify bathymetry of water bodies, provide bathymetric maps where available, channel width (determine the width of the channel from the high water mark), slope ;
    - Water quality characterization - (e.g., annual or average pH, salinity, alkalinity, total dissolved solids, turbidity, temperature etc.);
    - Biological water quality characterization - (e.g., benthic macro-invertebrates, zooplankton, phytoplankton, etc.)
- Fish species characterization - identify the fish species (including molluscs, crustaceans, etc.) known or suspected to be in the area, predator prey relationships etc. Identify what source of information was used and to determine the presence of fish in that area; and
- Estimate the fish abundance - estimate the number of fish present, estimate the year class for each species etc.

There are many different methods and attributes available to characterize fish and fish habitat. Proponents must describe all sources of information used, all fish and environment sampling techniques used, all modelling techniques used and all other approaches used to define the fish and fish habitat. Proponents are encouraged to use recognized fisheries inventory methods such as those approved by DFO or provinces and territories, or scientifically defensible methodologies and techniques whenever possible.

Whenever possible, proponents should support descriptions of the aquatic environment with the use of detailed drawings, such as plans or maps and photographs of the habitat features. In an offshore marine setting, photos may not be useful to depict the proposed development site. Instead describe and/or sketch the specific features of the sea floor which may include the presence of submarine features such as canyons, cliffs, caverns, etc.

Section E: Potential Effects of the Proposed Project

The objective of this section is to identify all anticipated effects on fish and fish habitat likely to be caused by the project. Proponents should consider all mitigation or avoidance techniques.

The description must include qualitative and/or quantitative information about the predicted/potential effects to fish species and fish habitat. Some examples of likely effects may include mortality to fish, changes to the life stages of fish affected, area of habitat loss, change to flow, changes to habitat function, reduction in prey availability etc.

The spatial scope of the aquatic effects assessment would include the direct physical "footprint" of the proposed project, and any areas indirectly affected, such as downstream or upstream areas. This may also include areas in or on the water, on the shoreline, coast or bank(s) (i.e., in the riparian zone).

The assessment must include the following attributes:

- Identification of all fish species affected by the proposed project ;
- Identification of the type of fish habitat affected (e.g., spawning habitat - gravel and cobble, feeding and rearing areas - side channel slough, small tributaries, etc.), estimate of the affected area (e.g., square meters or hectares);
- Of the affected fish, identify the life stages affected (e.g., juvenile, yearling, adult etc.);
- Description of the effect (e.g., mortality to fish from entrapment, delayed migration of spawning adults, reduction in prey availability, etc.)
- Probability of the effect - this is the likelihood of the effect occurring (e.g., probability of fish strike from turbines for specific fish sizes, probability of sediment plume within a distance from source, etc., or qualitative assessment: low, medium, high)
- Magnitude of the effect - this is the intensity or severity of the effect (e.g., total number of fish affected, or qualitatively assessment: low, medium, high).
- Geographic extent of the effect - this is the spatial range of the effect (e.g., localized to 100m from the work, channel reach or lake region, entire watershed etc.); and
- Duration of the effect - this is the temporal period for which the effect will persist (e.g., duration of delay to fish migration in hours, days, months or years).

The information to be provided must also describe the methods and techniques used to conduct the assessment. As much as possible, methods and techniques used should be scientifically defensible.

The schedule should, at minimum, identify the proposed start and end dates for carrying out each proposed activity, and where applicable, identify the respective phase of the proposal; i.e., the construction, operation, maintenance and closure phases. In some cases, in order to provide additional context, it may be relevant to identify other information such as the expected life span of permanent and temporary structures.

Proponents must provide comprehensive information about all best available measures and standards that are proposed to avoid or mitigate potential serious harm.

Residual serious harm to fish is any serious harm to fish remaining after the consideration of the application of proposed measures or standards to avoid or mitigate serious harm.

It is important to clearly describe and quantify residual serious harm because DFO will use this information as part of its decision making on whether an authorization is required under subsection 35(2)(*b*) of the *Fisheries Act*.

Section F: Submission and Signature

The proponent must sign the application. A signed original of the Request for Review must be provided to the regional DFO office (http://www.dfo-mpo.gc.ca/pnw-ppe/contact-eng.html), even if an electronic copy was sent by email. Should the review of your project indicate that residual serious harm to fish is likely, the information provided in the Request for Review document can be referred to in the subsequent Application for an Authorization under Paragraph 35(2)(*b*) of the *Fisheries Act*.

Section G: Definitions

Emergency circumstance: If your project must be conducted in response to an emergency, you may apply for an Emergency Authorization. The emergency situations are:

- The project is required as a matter of national security
- The project is being conducted in response to a national emergency where special temporary measures are being taken under the federal *Emergencies Act*

- The project is required to address an emergency that poses a risk to public health or safety or to the environment or property.

Fish habitat: Means spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes.

High Water Mark: The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to leave a mark on the land.

Permanent alteration to fish habitat: An alteration of fish habitat of a special scale and a duration that limits or diminishes the ability of fish to use as spawning grounds for nursery or rearing, or as food supply, or as a migration corridor in order to carry out one or more of their life processes.

Fisheries and Oceans Canada — Pêches et Océans Canada

200-401 Burrard Street
Vancouver BC V6C 3S4

November 7, 2014

Our file *Notre référence*
14-HPAC-01061

Darryl Roberts
Environment Canada
351 St. Joseph Blvd.
Gatineau QB K1A 0H3

Dear Mr. Roberts:

Subject: Serious harm to fish can be avoided or mitigated

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on October 29, 2014.

Based on the information provided, your proposal has been identified as a project where a *Fisheries Act* authorization is not required given that serious harm to fish can be avoided by following standard measures. Proposals in this category are not considered to need an authorization from the Program under the *Fisheries Act* in order to proceed. In order to comply with the Act, it is recommended that you follow our guidance tools which can be found at the following website (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html). It remains your responsibility to meet the other requirements of federal, provincial and municipal agencies.

Should your plans change or if you have omitted some information in your proposal such that your proposal meets the criteria for a site specific review, as described on our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html), you should complete and submit the request for review form that is also available on the website.

Should you have any questions or concerns about the compliance of your proposal with the *Fisheries Act* and/or those prohibitions of the *Species at Risk Act* that apply to listed aquatic species*, you may wish to engage an environmental professional familiar with measures to avoid impacts to fish and fish habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/env-pro-eng.html).

Yours sincerely,

M S Engelsjord

Michael Engelsjord
Team Lead, Triage and Planning
Fisheries Protection Program

*Those sections most relevant to the review of development proposals include 20 and 35 of the *Fisheries Act* and sections 32, 33 and 58 of the *Species at Risk Act*. For more information please visit www.dfo-mpo.gc.ca.

Canada

22 November 2014

Peter Holmes, Ecosystem Biologist
Ministry of Forests, Lands and Natural Resource Operations
Box 265
Invermere, BC V0A1K0

Project No.: 219.05112.00010

Dear Mr. Holmes,

RE: WILMER MARSH ACCESS REQUEST

Remediation activities are planned for the former refuse site located within the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA) in January-March 2015. Specifically, debris will be removed from the marsh in the northeast portion of the site and soil and debris will be removed along the southern portion of the site in the vicinity of the existing trail to the marsh. In order to access the work area in the marsh, the remediation contractor will require access for personnel and equipment to the marsh through provincially owned lands. The work plan would involve accessing the marsh by the existing trail on the southern portion of the site. The trail crosses into provincial land for a short distance before entering back into federal land.

As the remediation project has not yet been tendered nor the contract awarded, the name of the remediation contractor cannot be supplied at this point in time. Consequently, SLR is requesting permission to access the following provincially-owned parcels in preparation of the remediation activities:

- Southeast quarter of Sublot 5, Plan X-15 (see attached pdf).

The trail at the site has had personnel and equipment traffic historically during previous remediation activities. Given the time of year for the project and the probable frozen ground conditions, it is anticipated that access through the provincial lands will have a negligible effect on the lands.

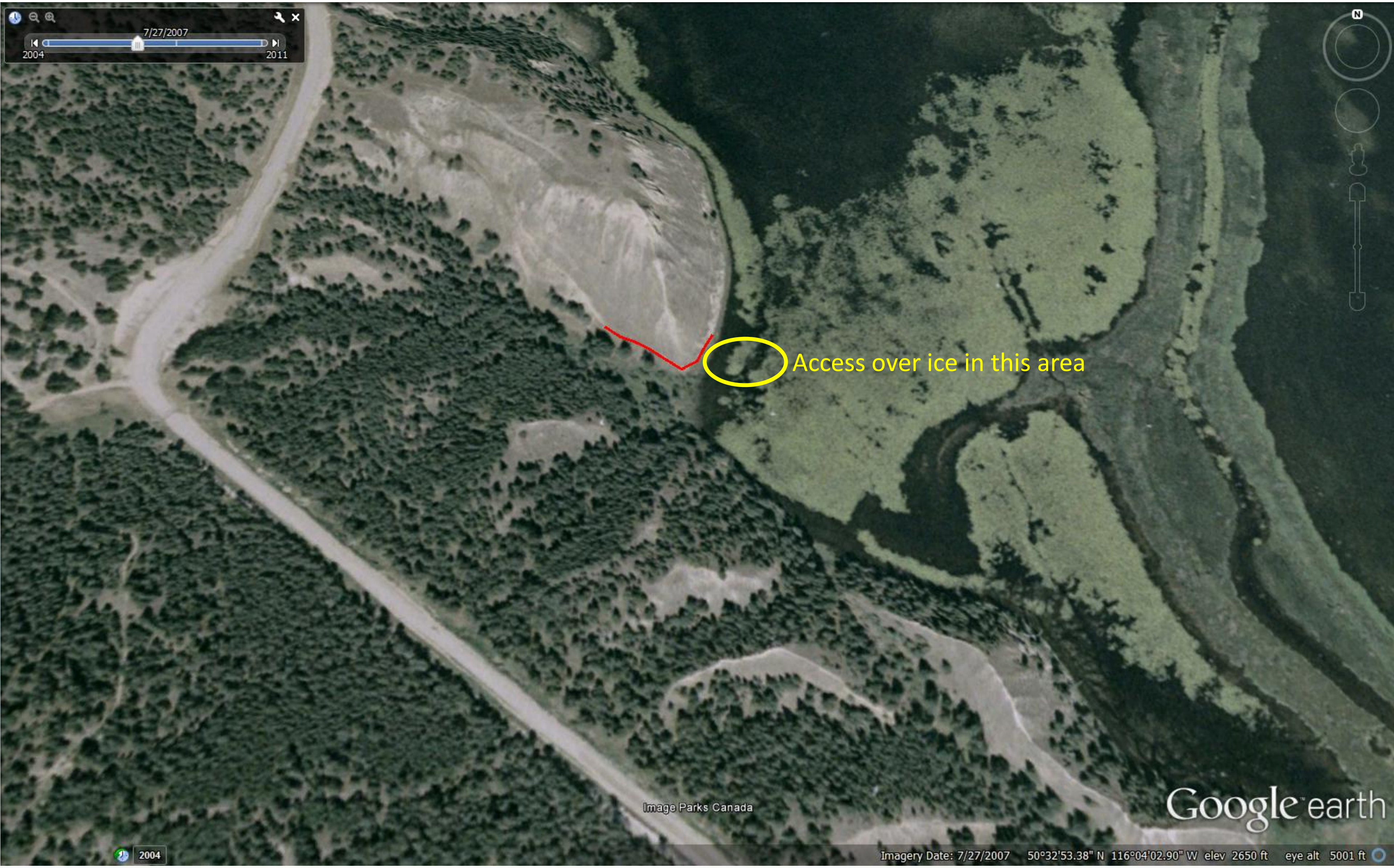
Please do not hesitate to contact SLR regarding any questions or concerns you may have.

Yours sincerely,
SLR Consulting (Canada) Ltd.

Lindsay Paterson, MSc, PAg
Project Manager

Enc Google Earth Images

LP/lp



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SLR

BRITISH
COLUMBIA

December 2, 2014

SLR Consulting (Canada) Ltd.
200 – 1475 Ellis Street
Kelowna BC V1Y 2A3

Attention: Ms. Lindsay Paterson, Project Manager

Dear Ms. Paterson:

Re: Motor Vehicle Access within the Columbia Wetlands Wildlife Management Area (WMA)

I have received your request, dated November 22, 2014, to use a motorized vehicle greater than ten horsepower within the WMA to access a remediation site. This letter will constitute permission to use vehicles to access the remediation site and this permission is granted from January 1, 2015 to March 31, 2015.

Please ensure the vehicles utilize existing trails and all efforts are taken to minimize impacts to soil and vegetation. If damage occurs on the trails, ensure they are properly remediated at the completion of the project.

If you have any questions please contact Peter Holmes at 250-342-4269.

Sincerely,

Michael Knapik
Acting Director, Resource Management Division
Kootenay Boundary Region

cc: Peter Holmes, A/Senior Habitat Biologist, Invermere

Ministry of Forests, Lands and Natural Resource Operations

Kootenay-Boundary
Resource Management Division

Mailing Address:
205 Industrial Road G
Cranbrook BC V1C 7G5

Telephone: 250 489-8540
Facsimile: 250 489-8506
Website: www.env.gov.bc.ca

APPENDIX D
SLR Environmental Monitoring Report

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

30 March 2015

Bradley Klaver
Environmental Specialist
Public Works and Government Services Canada
Environmental Services, Pacific Region
219 – 800 Burrard Street
Vancouver, BC V6Z 0B9

By Email: Bradley.Klaver@pwgsc-tpsgc.gc.ca

Dear Mr. Klaver,

RE: ENVIRONMENTAL MONITORING REPORT - REMEDIATION FIELD ACTIVITIES WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA, FISCAL YEAR 2014-2015
SLR PROJECT NO.: 219.05112.00010

1.0 INTRODUCTION

Between April 2014 and March 2015, a number of activities occurred at the Wilmer Marsh Unit of the Columbia National Wildlife Area (the Site) requiring the presence of an Environmental Monitor (EM). These activities included the following:

- April 28-29, 2014:
  - Installation of coir matting and placement of woody debris in the area of a previously excavated gully in the uplands of the site and in areas of previous test pit work that required stabilization and erosion control measures;
- May 29, 2014:
  - Placement of native seed over the area of uplands gully within the area of the coir matting;
- October 6-9, 2014:
  - Identification and recording locations of remaining debris along the marsh from the previously excavated area (2011) southward along the shoreline to the provincial border;
  - Identification of buried and surficial debris along the trail and gully;
  - Collection of baseline surface water turbidity measurements within the marsh;
  - Identification and recording locations of potential exclusion areas including native plant communities of concern, wildlife trees and badger burrows; and
  - Identification of a potential backfill source to be used following remedial activities;
- November 3-7, 2014:
  - Monitoring installation of a geotextile curtain in the area of the marsh debris removal which occurred in winter 2015;
  - Monitoring and recording activities during fish salvage work (including trap type and locations, fish species and numbers, and overall catch effort) within the isolated area in the marsh prior to debris removal; and

- January 20-March 13, 2015:
    - Monitoring remedial activities to ensure no disturbance to species at risk, identified native plant communities, wildlife trees, identified badger burrows (historical with the potential to be re-used), and areas outside of the curtained off area in the marsh occurred during any part of the site works and ensuring adherence to the environmental management plan (EMP).

2.0 ENVIRONMENTAL MONITORING EVENTS

2.1 Gully Reclamation Work

On April 28 and 29, 2014, SLR was present as the EM during upland gully reclamation works. Prior to commencement of works, SLR met with One Time Fencing of Wimer, British Columbia (BC) to open the fence to the site. Following this, SLR met with Lotic Environmental (Lotic) of Cranbrook, BC to discuss reclamation work within a previously excavated gully in the uplands of the site. In addition, stabilization and erosion control measures were discussed for areas of previous test pit work along the trail.

Lotic started work by collecting woody debris to be cut and used as stakes to hold the coir material for the reclamation and erosion control work in the gully and along the trail (Photograph 1). SLR ensured that no material was used that may harm an existing tree onsite or reduce the value of any standing wildlife trees. Collected material was then manually transported to the gully area. Silt fencing which had been installed in the base of the gully in 2012 was still present; however, it required readjustment. The silt fencing was left in place as silt was observed at the base of the silt fence, indicating the gully was still unstable and required additional erosion measures in addition to the coir (Photograph 2). Due to the weight of the coir rolls, a small utility all-terrain vehicle with tracked wheels was used to move the material from the entrance of the site to the gully (Photograph 3). This type of vehicle was used to reduce overall impact to the site since a conventional vehicle such as truck would cause unnecessary disturbance.

To ensure the coir stayed in place, a trench was dug along the top of the gully to key in the coir material (Photograph 4). The woody material collected earlier was cut into short stakes and used to anchor the coir sheets to the gully sides. Following placement of the coir material with adequate overlap and secured firmly at the top of the gully, additional woody material found in the surrounding area was placed along the top to aid in reducing water runoff, to catch any moving sediment and seeds, and to act as a barrier along the open edge (Photograph 5).

Following gully reclamation works, the remaining coir material was used to reduce erosion potential and stabilize test pit areas that had been advanced along the trail in 2013 (Photographs 6 and 7). Two test pit locations along the north slope of the trail were stabilized with woody debris to channel any runoff to the trail (Photograph 8). In addition, to reduce runoff from damaging the stabilized test pit areas, diversion and cross ditches were established at locations along the trail to intercept and drain down the south slope.

2.2 Gully Seeding

On May 29, 2014, SLR returned to monitor seeding of the areas where coir material had been placed in the gully and along the trail where test pits had been excavated (Photograph 9). Seeding occurred approximately one month following the coir establishment as it was too early to place seed in April. Recent rainfall had occurred at the site and vegetation was already present growing through the coir (Photograph 10). The majority of plants included weedy species and crested wheatgrass. A native seed mix approved by CWS was hand broadcast over the areas where coir had been applied. Remaining seed was placed over the test pit areas along the trail. All areas were noted to be stable and no signs of erosion were present (Photograph 11). Some vegetation was also noted to be growing at these locations (Photograph 12).

2.3 Remaining Debris Identification and Location Recording Work

Between October 6 and October 9, 2014, SLR accessed the Site to conduct field activities in support of remediation planning. These activities included:

- Identification of remaining debris in the marsh and recording locations;
- Identification of locations and limits of the buried and surficial debris areas in the trail;
- Identification of a potential backfill source for the remediation activities; and
- Collection of baseline surface water turbidity measurements.

2.3.1 Site Reconnaissance

On October 6, 2014, SLR conducted a site reconnaissance to review site conditions. Areas seeded in spring 2014, such as the uplands gully and 2013 trail test pits, were assessed for vegetation growth as well as overall condition and stability.

The sediment fencing and erosion control matting in the uplands gully area were observed to be undisturbed. No signs of erosion were observed and the sediment fencing and matting appeared to be functioning adequately (Photograph 13). No seed growth was observed although weed species such as sweet clover (*Melilotus* spp.) and flixweed (*Descurainia sophia*) were noted to be establishing in the gully.

The area around the test pits advanced in the trail was also observed to be stable and the erosion control matting and coarse woody debris appeared to be functioning adequately (Photograph 14). No signs of seed growth were present. However, incursion of crested wheatgrass and other weed species from the north slope into the disturbed areas was observed (Photograph 15).

The marsh shoreline was noted to be stable and continuing to re-vegetate (Photograph 16). A number of willow stakes were noted to be alive with leaves present (Photograph 17).

2.3.2 Marsh Debris

On October 7, 2014, SLR completed an assessment of major debris items present along the shoreline from the previously excavated marsh shoreline south to the provincial border. Readily identifiable debris was photographed and Universal Transverse Mercator (UTM) coordinates recorded using a Garmin Trimble GeoExplorer global positioning system (GPS). The shoreline was walked to collect spatial data on the location of existing debris. Where possible, approximately 2 m into the water was walked to obtain this data. The GPS unit was used to collect the spatial data. Debris was categorized as metal debris, tires, or concrete debris (Photographs 18-20). In total, 70 pieces of metal debris, 10 tires, and 4 pieces of concrete debris were identified.

2.3.3 Gully and Trail Debris

On October 8, 2014, SLR conducted an assessment of debris along and adjacent to (i.e., to the north and south) the trail. Starting at the provincial border and moving north-westward, 64 pieces of metal debris and 4 tires were identified. Three larger areas of debris were also identified using a polygon feature on the GeoExplorer unit (Photographs 21-24) where debris was small and too numerous to identify each piece with an individual UTM coordinate.

Along the trail and adjacent north slope, 13 pieces of surficial metal debris were identified. Wood debris piles and one piece of concrete were also noted. Larger areas of debris were mapped using a polygon which included a wood pile and a pile of mixed wood and metal debris (Photographs 25 and 26). The wood debris included lumbered wood with nails. One large piece of metal was observed north of the trail within an area of native vegetation (Photograph 27).

SLR recorded locations of debris near the surveyed federal-provincial boundary which fell within federal lands. The locations of 13 additional pieces of metal debris, 1 piece of concrete and 1 piece of wood debris were recorded.

A final review of the uplands bench was made to assess if any debris had been left behind following clean up over the past years. Only one piece of metal debris was observed.

2.3.4 Potential Backfill Source

On October 9, 2014, SLR walked along Westside Road to identify potential backfill sources within the Wilmer Marsh Unit for future remediation activities. During the walkover, a moose head was observed in the road ditch (Photograph 28). As hunting is prohibited in this area, SLR notified the local Conservation Officer (Sgt. Lawrence Umsonst, Columbia – Kootenay Zone).

During the reconnaissance for potential backfill sources, SLR identified evidence of dumping on an uplands bench north of the Site (Photograph 29). The majority of the dumping appeared to be historic (e.g., old vehicles located downslope in areas overgrown by trees, some small tin can dumps) although more recent debris (e.g., broken sheet glass) was also observed on the bench. As well, in an area closer to the road, there appeared to be slightly mounded terrain which was vegetated by disturbance species such as crested wheatgrass potentially indicating an additional area of debris (Photograph 30). This previously disturbed area was noticeable as the surrounding areas were observed to be comprised of native grasses and other vegetation. Coordinates of the debris and the mound were recorded.

SLR identified a potential backfill source along Westside Road (Photograph 31). The potential source appeared to be comprised of similar soil to the trail area soils (i.e. upland bench glaciolacustrine materials). Westside Road has been cut into the upland bench in this location and the fence for the Wilmer Marsh Unit is located approximately 15-20 m back from the road in this location. The coordinates of the potential backfill source were recorded. The source area appeared to be capable of supplying at least 1,500 cubic m of soil.

2.3.5 Collection of Baseline Surface Water Turbidity Parameters

Surface water samples at the marsh were collected on October 9, 2014 to determine baseline turbidity prior to installation of a sediment curtain to isolate the area of known larger debris.

SLR collected two samples of surface water prior to marsh debris removal area for assessment of total suspended solids and total dissolved solids. The samples were submitted to ALS Environmental for laboratory analysis. These results will be used to compare to post geotextile curtain removal following debris removal.

2.3.6 Surrounding Lands Reconnaissance

Prior to leaving the area during the October 9, 2014 field activities, SLR also conducted a reconnaissance of the surrounding federal lands in the Wilmer Marsh Unit.

The fence line along the road southwest of the Site was found to have been cut and the rock barrier altered (Photographs 32 and 33)). Evidence of recent activity through the breach in the fence was noted.

SLR also conducted reconnaissance in the Town of Wilmer to identify access points to the marsh for the upcoming sediment curtain installation and fish salvage work.

2.3.7 Federal Expert Support Site Visit

Representatives from Environment Canada and Fisheries and Oceans Canada were present at the Site in the afternoon of October 9, 2014. The SLR project manager conducted a walkover inspection of the Site and reviewed the proposed remediation plans for the marsh and trail areas with the Federal Expert Support representatives.

2.4 Pre-Remediation Wildlife and Vegetation Surveys

Between October 6 and 9, 2014, pre-remediation field surveys were conducted for wildlife and wildlife trees. The following specific activities were conducted:

- Completion of Western Toad and Western Painted Turtle surveys;
- Completion of surveys for active American Badger dens at the Site; and
- Completion of surveys to identify potential wildlife trees in the vicinity of the remediation works to identify “no-work” buffer zones around the wildlife trees.

2.4.1 Survey Activities in Support of Remediation Planning

Based on previous correspondence with Environment Canada (letter dated November 25, 2010), a Species at Risk permit was not required due to the low possibility of Species at Risk (SAR) occurring at the Site. However, further studies prior to the commencement of remedial site activities were recommended by Environment Canada. These included wildlife surveys for Painted Turtle and Western Toad as wells as identification of American Badger dens. Environment Canada also recommended the completion of wildlife tree surveys for the establishment of “no work” buffer zones during future remediation activities.

CWS also outlined terms and conditions for survey activities in the permit issued to SLR on September 23, 2014 to conduct the remediation planning activities.

SLR completed the wildlife and wildlife tree survey activities following the requirements outlined by Environment Canada and CWS as closely as possible. However, due to the time of year, species identified as being of potential concern at the Site under the CWS permit (BC-14-0041) could not be surveyed following the Resources Inventory Committee (RIC) standards. This limitation was acknowledged by CWS as a potential constraint to the survey work; however, follow up surveys were not deemed necessary. The following sections describe observations made at the Site between October 6 and 9, 2014.

Western Painted Turtle (*Chrysemys picta bellii*, Intermountain-Rocky Mountain population)

SLR surveyed the marsh area first thing in the morning and midday between October 6 and 9, 2014 for the potential presence of Western Painted Turtle in the proposed marsh debris removal area. Western Painted Turtles are identifiable by the red/orange colouration of the plastron and are listed as species of Special Concern under the Species At Risk Act (SARA).

On one occasion, a turtle was observed offshore in the water. As the turtle was too far from the shore to observe in detail, it was unknown if this was a Western Painted Turtle or another species.

On another occasion, two turtles were observed. A photograph of one of the turtles was attempted (Photograph 34); however, due to the distance from the shore and the turtle's limited exposure above the water surface, the photograph is not definitive for identification purposes.

On a third occasion, one individual turtle was again observed. Similar to previous observations, the turtle was located too far offshore to allow definitive identification.

All turtles observed during the field survey were in the water and located too far offshore to determine if the plastron was coloured. As the turtles' plastrons were not clearly visible, SLR examined the heads of the individuals to see if other markings were visible (specifically, red colourations behind the eyes which are indicative of red-eared sliders). One turtle was stationary for a period of time long enough to closely observe its head; no red markings were observed on the head. Red markings were also not cursorily noted on the heads of the other turtles observed.

Based on these inconclusive observations, it was determined that SLR would continue to monitor the proposed marsh debris removal area for the presence of turtles during the sediment curtain installation and fish salvage activities which were conducted in early November. These activities involved work from aluminum boats which allowed closer observation of any potential turtles.

Given that proposed remediation activities in the marsh were limited to the removal of debris and that no excavation or dredging of sediments in the marsh occurred, disturbances in the marsh were limited to the immediate vicinity of the debris being removed. Observations of turtles during the survey conducted in October 2014 identified up to two individuals. Given the low number of individuals and the relatively small area of the proposed work area (approximately 25 m by 70 m delineated by sediment curtain) and the even smaller scale of the individual pieces of debris compared to the larger marsh area, it was considered unlikely that any turtles would be present in the immediate vicinity of the debris removal work.

Western Toad (*Anaxyrus boreas*)

RIC surveys are to be conducted during migration and breeding seasons for amphibians. According to the British Columbia Ministry of Environment, Western Toads find winter hibernation sites following breeding. Hibernation sites include forested and grassland areas. Preferring damp conditions, toads may venture far from breeding grounds. The Western Toad is listed as a species of Special Concern under SARA.

As noted above, the Western Toad survey could not be completed according to RIC standards due to project timing. However, no toads were observed at the Site during SLR's activities. Although the Western Toad survey results are inconclusive due to timing constraints, it was considered unlikely that toads would be present in the water or sediment in the area of the marsh debris removal during the winter months (i.e. January-February 2015) as individuals, if present at the Site, would be upslope of the marsh within the adjacent forested portions of the Site.

American Badger (*Taxidea taxus jeffersonii*)

One abandoned badger burrow was observed at the north end of the gully downslope of the trail area (Photographs 35 and 36). Three entrances to the burrow were observed. The entrances were heavily overgrown by vegetation, and lichens were present on the soil, suggesting that this burrow was abandoned a number of years ago.

A second abandoned badger burrow was observed to the south of the upper part of the trail (Photograph 37). Two entrances were found, both covered in vegetation and lichens, similarly suggesting this burrow was abandoned a number of years ago.

The two burrow locations are near one another and may have been dug by the same individual. No current digging marks, soil piles or scat were observed at the burrows. Based on SLR's field observations, it was considered unlikely that a badger is actively using the area of the Site where the remediation activities were conducted. The American Badger is listed as an Endangered species under SARA.

Wildlife Trees and Native Vegetation Exclusion Zones

As part of SLR's survey activities, wildlife trees were also assessed. Four wildlife trees were identified along the gully to the south of the trail (Photographs 38 and 39). The coordinates of the trees were recorded with the GPS unit to allow for identification of "no work" zones during the remediation activities.

To ensure that any native vegetation and plant communities present at the Site remained undisturbed during the proposed remediation activities, SLR delineated and obtained the coordinates of the native vegetation using the GPS unit. Two areas of native vegetation were identified; one area was located south of the trail (Photograph 40) and the other was located north of the trail on the uplands bench (Photograph 41).

SLR incorporated the mapped wildlife trees and native vegetation areas into the remediation tender specification documents as prescribed exclusion zones which were flagged during the remediation program as "no work" areas.

As well, muskrat slides, tracks, scat and possible den entrances were also observed along the marsh.

SLR reviewed the proposed remediation work areas for other SARA-listed species (refer to Table B in SLR draft report 2013/2014 Site Works Summary and Remedial Action Plan Report). None of the SARA-listed species were observed in the proposed remediation work areas during SLR's inspections. However, Hooker's Townsendia (*Townsendia Hookerii*), a provincially red-listed species (not listed under SARA), is present within the area demarcated as a "no work" zone during remediation activities.

2.5 Pre-Remedial Marsh Debris Area Isolation Works

2.5.1 Isolation Curtain Installation

On November 3 and 4, 2014, SLR met with representatives from Lotic to install approximately 120 m of geotextile curtain to isolate the area of the marsh where known debris was present. The purpose of the curtain was to isolate this area of water from the remaining marsh area. This isolated area was then depleted of fish species in advance of debris removal activities.

Due to limited access to the marsh, the geotextile curtain was brought to the isolation area site using a motor-less aluminium boat (Photograph 42). The boat launch was located approximately 700 m to the south of the Site. The launch area was identified during the previous pre-remedial activities in October 2014 and was accessible using an all-terrain vehicle (ATV).

From the boat, using the centroid UTM location of metal debris previously identified using electromagnetic surveys, an area of isolation was identified and the isolation curtain was deployed ensuring that all debris locations were encompassed (Photograph 43). The isolation curtain remained in place in the water as the top was stabilized with internal floats and the bottom with chain. The north and south ends were then anchored using rebar to ensure no movement with wind. A second isolation area was necessary to the north east of the main isolation area to encompass a smaller additional area of debris (Photograph 44).

To ensure that the isolation curtain was flush with the marsh bed, an underwater camera was used. The camera determined that the isolation curtain was adequately established around the debris and along the marsh bed (Photograph 45).

2.5.2 Fish Salvage

On November 5, 2014, SLR performed fish salvage work within the area isolated with geotextile curtain. Following the conditions of the British Columbia, Ministry of Forests, Lands and Natural Resources Operations (MFLNR), Fish Collection Permit (CB14-155834), minnow traps and one hoop net (Photograph 46) were established within the isolated area.

Within the perimeter of the isolation curtain, 7 minnow traps were established. Another 6 traps were established along the shoreline (Photographs 47 and 48). A hoop net was established in a deeper area of water on the south end of the isolation area. Two minnow traps were also established within the smaller isolation area to the northeast. Traps were baited with cat food and UTM locations of the traps were recorded using the GPS unit. The traps were checked after approximately 6 hours. Within the minnow traps, 61 bass (*Micropterus* spp.) (largemouth and smallmouth) juveniles were trapped (Photograph 49) and 5 redside shiners (*Richardsonius* *balteatus*) (Photograph 50). After the initial check, traps were reset and left overnight. No fish were observed within the hoop net. Redside shiners were released on the outside of the isolation area; however, due to the invasive nature of bass, all bass species caught were euthanized and disposed of appropriately in accordance with direction provided by the MFLNR

Traps were re-checked in the morning of November 6, 2014. Within the minnow traps 32 bass specimens and 6 redside shiners were observed. All shiners were released and the bass species were euthanized and disposed of.

During trap checks, it was noted that gaps were present along the seams of the isolation curtain. The gaps were repaired using twine. Three additional traps were then set along the inside perimeter of the isolation curtain and 2 traps within the smaller isolation area to the northeast.

Traps were allowed to fish for an additional 6 hours. Within the 20 minnow traps, 40 bass specimens were captured and euthanized. Seven redside shiners were caught in one single trap, which were released outside the isolation area. Due to the decrease in capture, 6 traps were pulled that had not yielded any fish species. 14 minnow traps were reset and left overnight. No fish species were found in the hoop net.

Traps were re-checked again in the morning of November 7, 2014. Within the 14 traps, 41 individual bass were captured and euthanized. Only 1 redside shiner was trapped and released outside the isolation area. No fish were observed in the hoop net. Due to the reduction in fish species captured, SLR consulted with MFLNR, regarding catch effort. SLR was informed that due to the invasive species types caught and the reduction in numbers of native species caught, the fish salvage at that point was sufficient. All traps were then pulled.

Following field activities, as is required by the permit, fish collection activities were reported and filed electronically to the BC Ministry of Environment at http://www.env.gov.bc.ca/fish_data_sub/index.html.

2.5.3 Borrow Area Assessment

A borrow area for fill material to be used following remedial excavation activities within the known areas of buried debris along the trail was identified during the October pre-remedial activities. This borrow area located north of the site along Westside Road was assessed for the presence of vegetation and wildlife species of potential concern (Photograph 51).

Due to the potential presence of badgers in the area, the borrow location was assessed for burrows/diggings. Located along the road side of the borrow area, 3 previous diggings were identified (Photographs 52-54). These diggings were noted to be older, as no scat or hair was observed, nor were any new digging marks present. A larger burrow/digging was found on the west side of the road, opposite of the borrow area (Photograph 55). This burrow may have been used by a red fox as a maternal den. No new activity was observed. All burrows were marked with pink flagging tape and the location recorded with the GPS.

Native grasses such as fescue, slender wheatgrass and needle-and-thread were observed at the borrow area (Photograph 56). Disturbance and non-native species observed included crested wheatgrass and sweet clover. Both of these species have also been observed at the Site. No noxious weed species were observed.

2.6 Remedial Works Environmental Monitoring

2.6.1 Pre-Remedial Works Assessment

On January 20, 2015, SLR assessed the Site for presence of wildlife prior to initiation of remedial activities. Previously identified burrows were located and assessed for recent activity. None were noted to be active. As snow had fallen, tracks were assessed for wildlife presence. Deer, elk, and rabbits had been present through select areas of the Site.

The previously identified exclusion zones were flagged with yellow flagging and wildlife trees were marked with pink flagging (Photograph 57). These markings were used to identify areas in which no remedial works were permitted.

2.6.2 Remedial Works

Between January 21 and March 13, 2015, SLR EMs were onsite to ensure that the Environmental Protection Plan (EPP) was adhered to throughout the remedial works. Remedial works included:

- Debris removal within the previously isolated area at the marsh shoreline including:
  - Access to the marsh area by the spider hoe;
  - EM survey work to re-locate debris beneath the ice;
  - Ice removal and debris removal using the spider hoe;
  - Debris removal from shoreline;
  - Helicopter work – removal of bins and bags of debris; and
  - Exit of spider hoe from marsh.
- Debris removal from Area of Impact #3 (AI3) using a spider hoe and morooka carriers (morookas).
- Debris removal from Main Area of debris using tracked excavator and morookas.
- Debris removal from south slope, gully and along access trail.
- Re-contouring, installation of diversion ditches, installation of coarse woody debris, and erosion control blanket installation.

SLR EMs also monitored the staging area and soil and debris management facility (SDMF).

Marsh Debris Removal

Throughout the debris removal from the marsh, no wildlife concerns were observed. Due to above normal temperatures, and thinner than normal ice depths, concern for movement of the spider hoe was of highest importance. Upon entrance to the marsh at the base of the trail, the spider hoe did not have any problems accessing the ice. However, approximately 50 m north of the access location, the spider hoe entered the ice. The spider hoe operator was able to move along the shoreline where more solid ice was present. Some instances of broken ice and small ruts into the sediment resulted (Photograph 58).

Following debris removal using the spider hoe (Photographs 59-62), bins and bags were flown out by helicopter on January 27, 2015. No concerns were noted during this work. The spider hoe was then moved back to the trail since ice conditions were not favourable due to continued warm temperatures. The EM walked the existing trail with the spider hoe operator to determine if “walking” the trail with the excavator would be possible. Taking as much time as was needed, the spider hoe was moved along the trail under supervision of the EM to limit potential disturbance. Following movement of the spider hoe along the trail, only minor disturbance was noted which was anticipated to restore through natural revegetation processes (Photographs 64-67).

Area of Impact #3

Between January 27 and 31, 2015, following helicopter removal of marsh debris, excavation of debris at AI3 was conducted (Photograph 68). Due to remaining frozen portions and steepness of the trail, soil rutting and concerns of erosion were raised associated with the morookas travelling along the trail. A winch system attached to a dozer was enabled to aid the morookas travelling up the trail and to reduce the potential for erosion of trail areas (Photograph 69). As needed, the dozer was also used to improve the trail where frost was exposed or melting had occurred. All soil was placed to the side of the trail to be used for re-contouring.

Where possible, vegetation was salvaged in the area of excavation. A larger juniper bush was salvaged at the root ball and placed to the side and was re-planted following excavation and re-contouring work (Photograph 70).

During the excavation, a gas tank was retrieved in which fluid was noted coming from the top. The excavation was halted and the fluid was noted to be water only. Where the dozer was staged at the top of the upper and lower trails, staining was observed in the soil. This was removed and disposed of. No additional environmental concerns were noted during the excavation of AI3. Following completion of excavation of AI3, wattles were placed along the lower trail that had been used by the morookas to transport debris until final re-contouring occurred (Photograph 71).

On February 3, 2015, re-contouring of AI3 was conducted including replacing removed juniper tree (Photograph 72). As per the tender specification, erosion control blankets were installed on the recently disturbed area. Upon laying of the first role it was noted by the EM that the erosion control blanket was composed of coconut fibre/straw between a layer of photodegradable plastic mesh and a layer of biodegradable plastic mesh. To ensure no erosion potential the erosion control blanket was placed on the excavation area temporarily on February 5, 2015 until a fully biodegradable product was brought to site (Photograph 73). These blankets were also installed temporarily along the south slope where larger pieces of debris had been removed on January 29, 2015 (Photograph 74). Temporary diversion ditches and wattles were also installed until the excavation area and lower trail were properly installed with erosion control blanket.

Main Debris Zone

Overnight February 5 and all day February 6, 2015, temperatures were very mild. Rapid melting of existing snow in the area was noted to have occurred. Erosion was observed along the main access trail (Photographs 75 and 76). In addition, melt of subsurface frost had occurred resulting in very wet upper soil on the main trail. The majority of the runoff had been contained by a wattle along the lower trail (Photographs 77 and 78).

On February 7, 2015, blading of the main access trail occurred to remove heavy wet soils which could cause difficulty to morookas removing debris from the main debris zone (MDZ) (Photograph 79). Following work at the excavation area daily, wattles were established upslope of the excavation area to ensure no erosion of disturbed soils should additional snow or rainfall occur.

Excavation in the MDZ commenced on February 7, 2015 (Photograph 80). Excavation works were started at the east end of the MDZ working towards the west end in lifts of approximately 1 m. Excavation works were located at the west end on February 9, 2015 adjacent to two trees (Photograph 81). It was recommended by the EM to retain the trees if possible. Excavation directly under the trees could occur if needed provided that the trees were reinforced for stability and safety.

Due to wet condition of soils and debris in the SDMF, minor amounts of soil was spilled on the east side of the fence (Photograph 82). This loss was cleaned up immediately and continued monitoring of the SDMF was conducted to ensure no additional material was spilled (Photograph 83). Silt fencing was also installed on February 10, 2015 along the fence line to contain any future movement of soil in the SDMF (Photograph 84).

On February 22, 2015, a piece of debris was lodged into the base of the excavator fuel tank ripping off the fuel shut off valve. A loss of approximately 160 L of diesel occurred within the MDZ. Fuel was collected as much as possible with spill pads and containers during the leak (Photograph 85). All pads were collected and disposed of appropriately in plastic bags (Photograph 86). A small area of impacted soil (approximately 8.3 tonnes) was removed from the site and stored separately in the SDMF for disposal at an approved facility (Photograph 87). The spill was reported by King Hoe to the BC MOE.

On March 7, 2015, due to absence of fill material available for re-contouring, available onsite fill was used to stabilize the trees at the west end of the MDZ (Photograph 88). Permanent cross ditches were also installed along the access trail as directed by the geotechnical monitor (Photograph 89). Additional re-contouring where possible with existing material continued to March 9, 2015.

Additional Debris Removal

Where possible, additional debris in the lower gully, slopes, and access trail was removed by hand or mechanically (Photograph 90). On January 28 and 29, 2015, the spider hoe was used to remove larger pieces of debris from the gully area and south slope. These pieces of debris were dragged to a location where they could be loaded into morookas and transported to the SDMF. The EM reviewed these areas following debris removal to ensure vegetation and soil disturbance was limited and the areas were stabilized. Due to the continued disturbance regime of the gully through natural processes, it is likely that recovery by disturbance species such as brome grass will occur. Hand picking of debris continued throughout the duration of the project. Garbage bags were used to collect the debris.

Re-Contouring and Erosion Control

As previously stated, the plastic mesh erosion control blanket installed at AI3 on February 5, 2015, required replacement with a fully biodegradable product. On the same date, diversion ditches were installed along the lower trail in three locations. Temporary wattles were placed there until the trail was completed with erosion control blankets.

On February 16, 2015, a biodegradable erosion control blanket was installed at AI3 to replace the previously lain product (Photograph 91). The new blankets were installed to accommodate runoff from rainfall or snow melt. Native seed was placed on the soil prior to erosion control blanket placement. The blanket stabilized in the area of the excavation by keying in at the top and staked throughout. Woody debris was then placed over the area for additional runoff diversion (Photographs 92 and 93).

Cross ditches were installed on the upper trail on February 25, 2015 (Photograph 93). Four locations were identified by the onsite geotechnical monitor (Clarke Geosciences). The lower trail was seeded and matted with erosion control blankets on March 4, 2015 (Photograph 94).

On March 10, 2015, erosion control blanket installation commenced at the east end of the MDZ (Photograph 95). Channelling water to the gully below, erosion control blankets were installed at the top of the excavation sloping downward (Photograph 96 and 99). Blankets were keyed in at the top of the excavation where possible and staked throughout (Photograph 97). Native seeding was conducted prior to blanket installation and woody debris was also placed on top of the erosion control blanket.

Due to limited fill material, re-contouring was minimized. Where possible, benches were trenched by hand and erosion control blankets were keyed in. The smaller benches were also installed to provide wildlife passage along the steep excavation slopes. Additional trails were created to allow for wildlife passage to the lower area of the excavation (Photograph 98).

Diversion trenches in the upper area of the access trail were also matted with erosion control blankets. Additional woody debris was placed within the trench to reduce water movement and facilitate diversion.

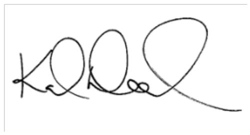
Following a morning rainfall, erosion control blanket installation was completed on March 12, 2015 (Photographs 99-105). The site was assessed to determine if the rainfall had compromised any of the erosion control blankets. The site was noted to be stable and that the rainfall would be beneficial to the seeds placed underneath. Woody debris was placed along the remaining portion of the trail to the gate. The erosion control blanket was keyed in at the north side of the trail and staked on the south end.

Staging Area and Soil and Debris Management Facility

Throughout the project, the EM monitored the staging area including the temporary ATCO trailer office, the seacan storage container, the portable toilet, and the SDMF. Issues of environmental concern included minor staining within the upper area from equipment, greasing of equipment, sediment loss from the SDMF (as previously noted), the generator losing fuel (contained within a spill drip pan), and trespassing by local residents. All spills were cleaned up immediately with impacted soil (if applicable) being transferred to the lined SDMF. The SDMF and staging areas were cleaned up and the area of disturbance was seeded.

Following completion of the erosion control blanket installation, the EM ensured that the fencing was repaired and access to the Site was no longer possible (Photograph 106).

Yours sincerely
SLR Consulting (Canada) Ltd.



Kalina Noel, B.Sc., M.E.Des., P.Biol. R.P.Bio.
Biologist

Photo 1: Collection of woody debris to be used as stakes for installation of coir matting.

Photo 2: Silt fencing installed in 2012.

Photo 3: All-terrain vehicle used to move coir material to gully.

Photo 4: Trench cut at the top of the gully to key in coir.

Photo 5: Coir installed at gully with woody debris around the top for stability.

Photo 6: Installation of coir at test pits along trail.

Photo 7: Looking east along trail at coir installation.

Photo 8: Test pits located on the north slope stabilized with woody debris.

Photo 9: Monitoring of seeding of gully area.

Photo 10: Vegetation noted growing through coir – predominantly weedy species.

Photo 11: Area previously installed with coir material in April 2014 noted as stable.

Photo 12: Vegetation, mainly weedy and crested wheatgrass, growing at trail areas.

Photo 13: View of uplands bench gully seeded in spring 2014.

Photo 14: View of trail test pits seeded in spring 2014.

Photo 15: Incursion of crested wheatgrass and other weeds in areas disturbed by 2013 test pits.

Photo 16: Marsh shoreline (remediated in 2011) is stable and continuing to re-vegetate.

Photo 17: Willow stakes continuing to grow at marsh.

Photo 18: Metal tank observed within water in marsh area.

Photo 19: Tire observed in water in marsh area.

Photo 20: Concrete block observed along marsh.

Photo 21: Example of metal debris observed in gully located south of trail.

Photo 22: Example of tire observed in gully located south of trail.

Photo 23: Example of surficial debris in trail area.

Photo 24: Example of partially buried debris in trail area.

Photo 25 Area of wood debris observed along the trail.

Photo 26: Mixed wood and metal debris observed on slope north of trail.

Photo 27: Debris located upslope in native grasses.

Photo 28: Moose head observed along Westside Road – north of site.

Photo 29: Uplands bench north of site with observed historic dumping.

Photo 30: Mounded area suspected to contain debris on uplands bench north of site with disturbance vegetation (red dashed area).

Photo 31: View of proposed backfill source along Westside Road.

Photo 32: Rock barrier altered presumably for dirt bike or ATV activity.

Photo 33: Fence cut at entrance to old ATV trail.

Photo 34: Turtle observed in water along marsh during wildlife surveys.

Photo 35: Abandoned badger burrow, view of entrance.

Photo 36: Abandoned badger burrow, view of entrances (denoted by red arrows).

Photo 37: Abandoned badger burrow observed along upper part of trail (at red arrow).

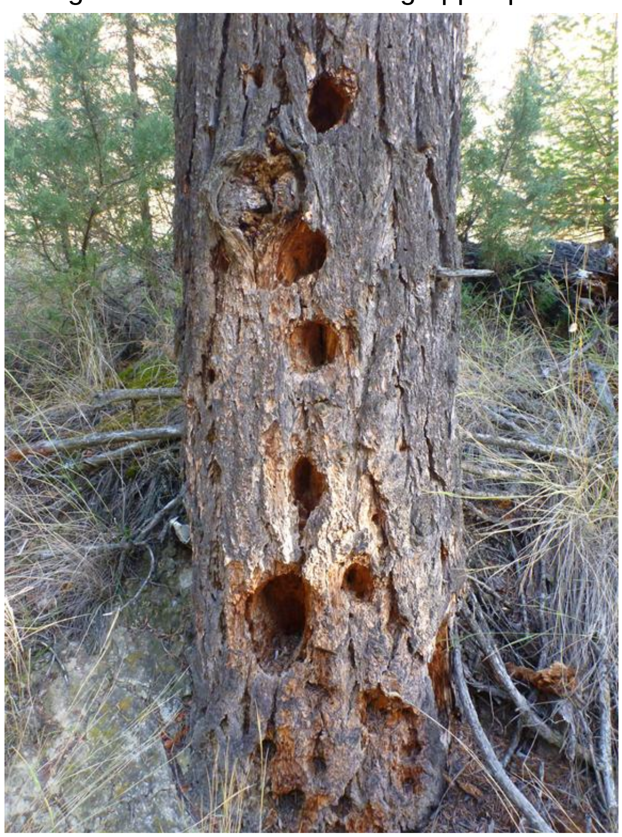


Photo 38: View of wildlife tree observed in gully south of the trail (cavities present).

Photo 39: Wildlife tree observed south of the trail.

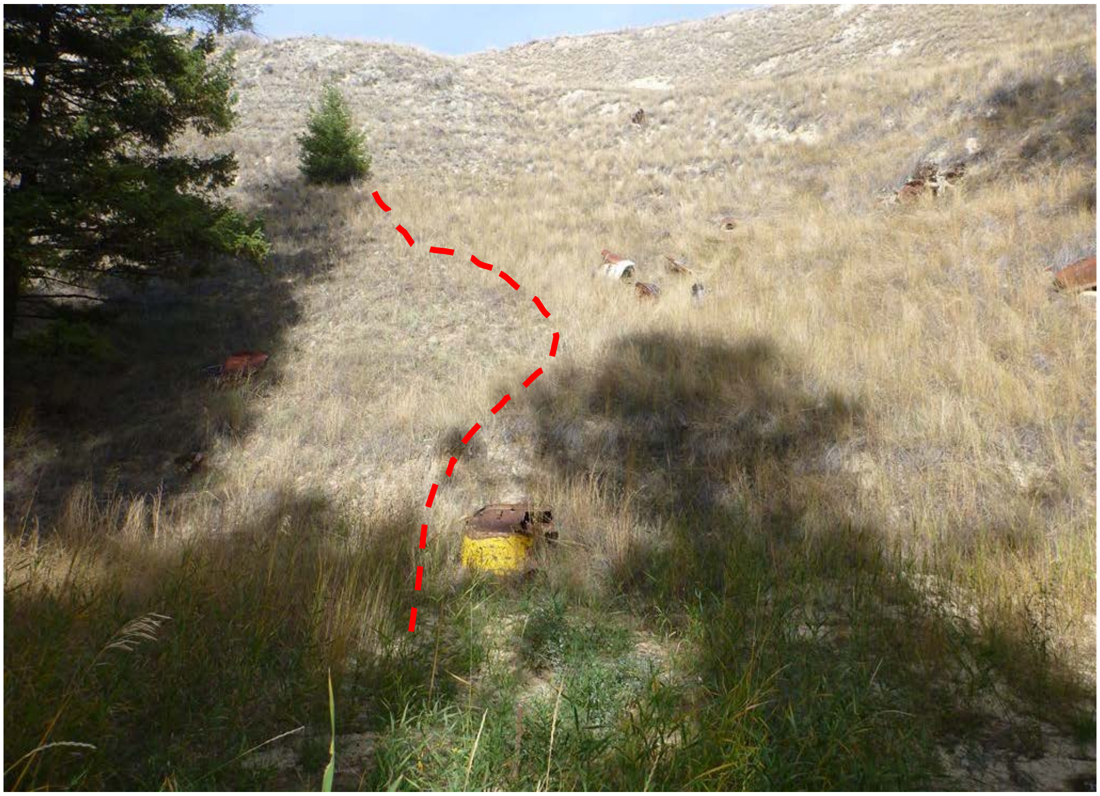


Photo 40: Area of native vegetation identified south of trail (to left of red dashed line).

Photo 41: Native vegetation identified on the upland bench, north of the trail.

Photo 42: Access to boat staging area using ATV.

Photo 43: Geotextile curtain deployed by boat.

Photo 44: Second isolation area installed as per 2013 electromagnetic survey.

Photo 45: Underwater camera to assess placement of geotextile curtain on bottom of marsh.

Photo 46: Hoop net established within isolated area.

Photo 47: Minnow traps established and anchored with orange-flagged stakes along the inside of the isolation curtain and along the shoreline.

Photo 48: Minnow traps established along the shoreline.

Photo 49: Bass juvenile (*Micropterus spp*.)

Photo 50: Redside Shiner (*Richardsonius balteatus*).

Photo 51: Borrow area for fill material assessed for wildlife and vegetation.

Photo 52: Previous potential badger digging located along borrow area.

Photo 53: Previous potential badger digging located along borrow area.

Photo 54: Previous potential badger digging located along borrow area.

Photo 55: Larger burrow observed on west side of Westside Road across from potential borrow source.

Photo 56: Vegetation along borrow source similar to Site.

Photo 57: Prior to remedial works, wildlife trees marked with pink flagging and exclusion zones with yellow flagging.

Photo 58: Access by spider hoe to marsh difficult due to warmer conditions and thinner ice.

Photo 59: Debris removal on ice by spider hoe at locations identified by electromagnetic survey.

Photo 60: Shoreline debris removal using spider hoe.

Photo 61: Material from shoreline and under ice collected in bags and bins.

Photo 62: Larger pieces of debris removed and stockpiled for subsequent transport in bins.

Photo 63: Debris bins and bags flown to stockpile management area by helicopter.

Photo 64: Due to very thin ice condition, spider hoe moved out of marsh by trail.

Photo 65: Spider hoe followed by EM to monitor trail movement.

Photo 66: Minor ruts left by tires.

Photo 67: Some disturbance to shrubs at end of trail – mostly dead vegetation.

Photo 68: Excavation of AI3 by spider hoe.

Photo 69: Winch system used to aid movement of morookas.

Photo 70: Juniper tree removed from AI3 and salvaged for re-contouring work.

Photo 71: Temporary diversion ditches and wattles placed along lower trail until re-contouring work complete.

Photo 72: Replacement of juniper tree during re-contouring of AI3.

Photo 73: AI3 temporarily matted with photodegradable erosion control blankets.

Photo 74: Temporary photodegradable blankets placed along south slope for erosion control.

Photo 75: Erosion channels following rapid snowmelt.

Photo 76: Erosion channels following snowmelt.

Photo 77: Temporary wattle installed at top of lower trail diverted rapid snowmelt water.

Photo 78: Diverted rapid snowmelt water to lower gully area.

Photo 79: Access trail bladed following rapid snowmelt prior to access to MDZ.

Photo 80: Commencement of excavation work in MDZ.

Photo 81: Excavation in MDZ at west end adjacent to existing trees.

Photo 82: Breaching of stockpile on to NWA due to volume.

Photo 83: Cleanup of material that had moved from the stockpile back onto the NWA.

Photo 84: Silt fencing placed along fence line to reduce additional movement onto NWA.

Photo 85: Loss of diesel fuel due to damage to fuel shut off valve.

Photo 86: Fuel soaked absorbent pads collected in plastic bags and removed for disposal.

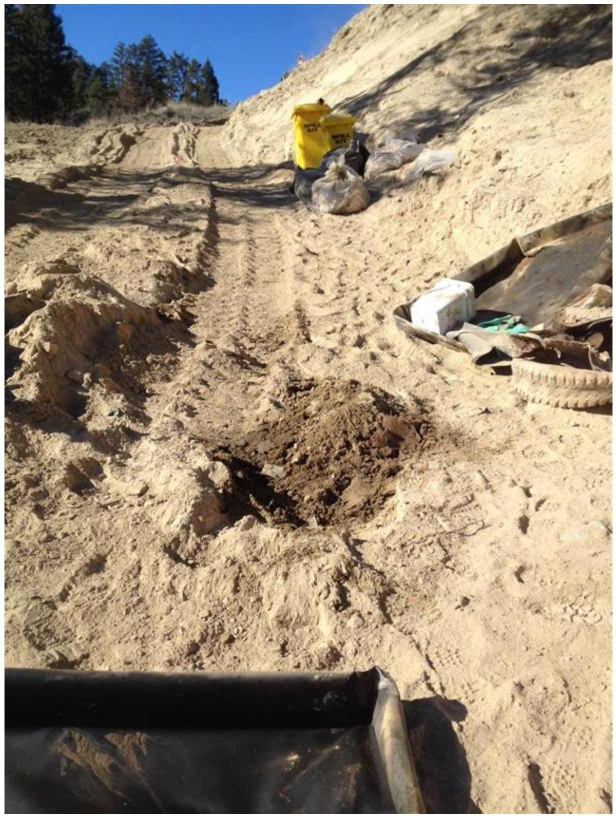


Photo 87: Small area of diesel-impacted soil. Soil was removed and transported to the soil management area for disposal.

Photo 88: Excavation of fill material on north side of trees used for stabilization.

Photo 89: Permanent diversion ditches installed along trail.

Photo 90: Debris removed from gully and other locations where possible.

Photo 91: Biodegradable erosion control blanket.

Photo 92: Biodegradable erosion control blanket and woody debris installation and woody debris – AI3.

Photo 93: Cross ditches on upper and lower trails.

Photo 94: Lower trail erosion control blanket installation completed.

Photo 95: Commencement of erosion control blankets in MDZ.

Photo 96: Installation of erosion control matting in the MDZ to lower slope.

Photo 97: Native vegetation identified on the upland bench, north of the trail.

Photo 98: Connecting trails installed to provide passage for wildlife.

Photo 99: Erosion control blanket keyed in at top of excavation and sloping downward to channel water to lower gully.

Photo 100: Wattles and woody debris installed along steeper portions of excavation area.

Photo 101: View of restored excavation area (looking east).

Photo 102: View of restoration area (looking west).

Photo 103: Restored area at treed area.

Photo 104: Woody debris and wattles installed along upper area of trail.

Photo 105: Trail area restored to fence line. Keyed in at north side of trail and staked at south side.

Photo 106: March 13, 2015 access through fence closed and signage re-installed.

APPENDIX E
Tender Specification

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

Public Works and Government Services Canada

Requisition No. ______________________________

MERX I.D. No. ______________________________

SPECIFICATIONS
for

EC Wilmer Marsh Site Remediation

Wilmer Marsh Unit, Columbia National Wildlife Area, Near Wilmer, BC

Project No. December 2014

APPROVED BY:

______________________________ ____________
Regional Manager ES Date

______________________________ ____________
Construction Safety Coordinator Date

TENDER:

______________________________ ____________
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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1598
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INSTITUTE OF AGROLOGISTS

Dec. 5, 2014

1.1 GENERAL INFORMATION

Public Works and Government Services Canada (PWGSC), on behalf of Environment Canada (EC), intends to remediate a portion of the Wilmer Marsh Unit of the Columbia National Wildlife Area (NWA). The location of the lands to be remediated is approximately 1.2 km north of the town of Wilmer, British Columbia near Invermere, British Columbia (Drawing 1).

All work will be carried out under contract to PWGSC on behalf of EC. PWGSC will be responsible for approving the final extent of materials to be removed, their destination, monitoring remediation progress, and assuring quality of the work.

1.2 INTRODUCTION

The project area known as the Wilmer Marsh former refuse site (the site) is located on the east side of Westside Road 1.2 km north of the town of Wilmer, British Columbia.

The work required under this contract covers:

- Site preparation activities (i.e. ice engineering assessment, demarcation of exclusion zones, confirming locations of marsh debris through electromagnetic (EM, i.e. EM31/EM38) survey, opening fence and installing temporary fencing) immediately prior to the active remediation component of the project.

- The removal and disposal of several large pieces of debris from the marsh area of the site. Please note that no sediment removal will be conducted; only sediment incidentally adhered to debris is to be removed from the marsh area.

- The remediation and restoration of two areas of significant buried debris (known as the Main Debris Zone and Area of Impact 3) in the trail area of the site. The remediation activities will also involve the removal of impacted soil.

- The removal and disposal of numerous pieces of surficially deposited debris in the trail area of the site.

Remediation and restoration activities are to be completed within the wildlife, fisheries and fiscal year windows for the site (January 5 to March 13, 2015). All final submittals must be completed by March 13, 2015.

The site is located on the western side of the Columbia River Valley and consists of remnant river bench upland with an adjacent shoreline and marsh below. The benchland is relatively flat, with steep slopes and gullies on the south, east and north boundaries. Wilmer Marsh borders the site at the bottom of the steep slopes to the east and is located approximately 60 m lower than the upland bench. A steep trail leads down to the marsh along the southern edge of the uplands bench. A fence borders the site along the western boundary (along Westside Road). There are no buildings or any other structures on the site. The remediation work areas are located in the marsh and in the trail area (refer to Drawing 5).

The Columbia NWA is a federally protected area designed to conserve wildlife and their habitat and is not intended for recreational uses. The Columbia NWA is an important segment of a bird migratory corridor within the Pacific Flyway. Unauthorized disposal of refuse occurred at the site over the past several decades. Refuse deposited at the site includes, but is not limited to, automobile bodies and parts, cans, glass, building debris, scrap metal, used oil containers and filters, automotive batteries, drums, etc. In 1997, approximately 150 car bodies were reportedly removed from the site.

Due to the potential presence of sensitive species/habitat in the proposed work areas at the site, all work will be monitored by Environmental Monitors (EMs). The Environmental Monitor will notify the Departmental Representative immediately and without delay at any time that adverse impacts to sensitive species are observed or anticipated. The Departmental Representative will in turn direct the Contractor to stop work.

Due to the terrain and sensitive soils at the site, the work will also be monitored by Geotechnical Monitors (GMs). The Geotechnical Monitor will also notify the Departmental Representative immediately and without delay any time that geotechnical concerns are identified. The Departmental Representative will in turn direct the Contractor to stop work.

The EC Wilmer Marsh site remediation involves removal of approximately 2600 m^3 of refuse/debris with varying amounts of soil. Specifically:

- Trail Area (Main Debris Zone): 45 m by 20 m area to a depth of at least 1.5 m below grade (in situ volume of combined soil and debris of 1350 m^3).
- Trail Area (Area of Impact 3): 20 m by 20 m area to a depth of 2.5 m below grade (in situ volume of combined soil and debris of 1000 m^3).
- Trail Area: removal of numerous pieces of surficial debris (estimated volume of 200 m^3).
- Marsh Area: removal of approximately seven large pieces of debris (estimated volume of 50 m^3). No sediment removal is to be completed.

The proposed excavation areas are depicted on Drawing 5. Excavation depths in the Main Debris Zone in the trail area will extend to at least 1.5 m below grade and potentially deeper in some locations. Excavation in Area of Impact 3 in the trail area will extend to approximately 2.5 m below grade and will correspond to the intersection of native material.

Soil removal associated with this project will be limited to the trail Area. Historical soil analytical data from the trail area is provided in Tables 1 through 3. Soil impacted with metals exceeding the applicable Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (Agricultural (AL) land use guidelines) for the site has been identified in the trail area. Groundwater has not been encountered during environmental investigations at the site.

Sediment curtains have been installed around the large debris in the marsh. The sediment curtains will remain in place until surface water turbidity parameters (i.e. total dissolved solids and total suspended solids) return to baseline conditions.

As unauthorized disposal of refuse occurred at the site, there is the possibility that hazardous materials (e.g., asbestos, lead piping, etc.) will comprise a portion of the debris present on the site. The project work assumes that any hazardous building materials encountered will be handled appropriately and disposed at a facility authorized and/or licensed to accept, treat and dispose of the particular materials, subject to review and approval by the Departmental Representative.

Due to the location of the site within a NWA, limited material handling/storage can occur on the site. Consequently, excavated material (soil and debris) must be transported off-site to a temporary staging area for separation (i.e. screening of soil from debris) prior to disposal at the final, approved disposal facility. It will be the contractor’s responsibility to arrange for such an off-site staging area (referenced in this document as the soil and debris management facility) including obtaining the relevant permits, approvals or authorizations (e.g. soil relocation agreement).

The soils at the site are comprised of fine-textured glaciolacustrine materials that are susceptible to surface erosion and instability once disturbed. Geotechnical assessment of the Main Debris Zone in the trail area in 2013-2014 concluded that remedial excavation activities in the area would accelerate surface erosion, gullying and slump failure. The following mitigation measures are to be implemented by the Contractor:

- Reduce excavation areas and depths to minimize the total area of disturbance and to reduce the height of potentially unstable cut slopes. Consequently, excavation depths in the Main Debris Zone will be limited under the proposed work program.
- Utilize low-impact equipment such as rubber-tired or spider hoe-type excavators (with operators experienced in working on steep slopes) to reduce the potential for ground disturbance.
- Exercise caution in operating equipment in the vicinity of the void identified on the lower trail. The location of the void is depicted on Drawing 5.
- Construct cross-ditches at the top of the trail work area to divert surface flow from the work areas.
- Construct cross-slope terraces along long sections of steep uniform slopes to break the slope and slow surface runoff along the slope.
- Implement erosion and sediment control measures including deposition of coarse woody debris and installation of coconut fibre/straw mat cover. Coarse woody debris is to be sourced from other areas of the site or adjacent lands to minimize the potential for introduction of invasive species.

Please note that installation of crushed gravel on the site to protect access routes has been discussed with Canadian Wildlife Service. However, Canadian Wildlife Service has indicated that construction of “roads” and the importation of crushed gravel is not allowed at the site. Consequently, no roads are to be constructed at the site and the work program must be conducted under extended periods of dry, or frozen, ground conditions.

The physical restoration of the trail area (contouring, terracing, etc) will be conducted based on direction provided in the field. The Departmental Representative, with input from the EMs and GMs, will provide direction on the final site reinstatement conditions.

Following the completion of the soil/debris removal component of the project, the contractor will need to implement a number of permanent erosion and sediment controls including placement of coconut fibre/straw mat cover, deposition of coarse woody debris, construction of cross-ditches and seeding with native plant mix. Any erosion control measures implemented must not introduce invasive or non-native species to the site. The implementation of the erosion and sediment controls will be conducted based on direction provided in the field. The Departmental Representative, with input from the EMs and GMs, will provide direction on the final site reinstatement conditions.

An as-built inspection must be conducted before March 13, 2015. The inspection must document the final areal extent of the excavated and restored areas.

The Contractor is responsible for completing a final as-built drawing for the EC Wilmer Marsh site.

The Contractor is responsible for preparing an Environmental Protection Plan (EPP) prior to work commencing which includes:

- Erosion and Sediment Control Plan
- Spill Control Plan
- Non-Hazardous Solid Waste Disposal Plan
- Air Pollution Control Plan
- Contaminant Prevention Plan
- Truck Route Plan and Traffic Control Plan
- Water Management Plan

The EMs, GMs and Departmental Representative will audit the Contractor's compliance with the EPP. Furthermore, the Environmental Monitor will report immediately to the Departmental Representative situations where the Contractor is in non-compliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection Plan. The Departmental Representative will in turn contact the necessary authorities/agencies.

All equipment brought to the site must be cleaned prior to use (debris, dirt, vegetation) to minimize the potential for introduction of invasive species. The lowest impact equipment that can complete the work must be utilized in the work areas to minimize disturbance. Equipment is to be placed to minimize or eliminate impacts to areas outside of the active remediation and restoration activities. In order to minimize impacts to wildlife and vegetation, access and egress routes for equipment must be established prior to remediation and equipment must not travel off of the designated routes or in areas designated as exclusion zones. Where ground disturbance of access/egress routes is observed, temporary access mats (or other suitable measures approved by the Departmental Representative) must be employed.

All work will be carried out under contract to PWGSC. The Departmental Representative will be responsible for approving the final extent of materials to be removed, their destination, monitoring remediation and restoration progress, and assuring quality of the work.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises the following:

.1 Health and Safety Planning. Submit site-specific project Health and Safety Plan and emergency procedures to PWGSC within ten working days of award.

.2 The Environmental Protection Plan (EPP). The EPP is to provide a comprehensive overview of the work plan and address all known or potential environmental issues which may arise during or be impacted by work activities. Submit EPP to PWGSC within ten working days of award.

.3 Location and protection of all known and unknown buried services on and adjacent to the site. The Contractor is responsible for the identification and protection of this and all known and unknown utilities associated with this project.

.4 Completion of all works under the supervision of the Departmental Representative, with input from the Environmental Monitors and Geotechnical Monitors.

.5 Repair and re-instate to their original condition any utilities or other infrastructure encountered (unless otherwise noted) during the works – including any fencing moved or damaged during works.

.6 Completion of remediation activities including site preparation activities, debris/soil excavation, backfilling of prescribed remediation areas, operation of the off-site staging area (soil and debris management facility), physical restoration activities and implementation of sediment/erosion controls.

.7 Loading and transport of debris and soil to the off-site staging area (soil and debris management facility) for separation of materials.

.8 Disposal of debris, salvageable materials and soil (upon approval from the Departmental Representative) at an appropriately licensed facility.

.2 All work must be conducted in accordance with the mitigation measures outlined in the Permits (refer to Appendix B) and Approvals as required for the work.

1.4 WORK BY OTHERS

.1 Co-operate with the Site Owner and other Contractors in carrying out their respective works and carry out instructions from the Departmental Representative.

.2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor (e.g., Environmental Monitor), report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of work.

1.5 WORK SEQUENCE

.1 Remediation and restoration activities are to be completed within the wildlife, fisheries and fiscal year windows for the site (January 5 to March 13, 2015). All final submittals must be completed by March 13, 2015.

.2 Conduct work in stages. Due to the need to use the trail to access the marsh and Area of Impact 3, these areas must be remediated prior to conducting excavation activities in the Main Debris Zone of the trail. The Contractor must coordinate the work sequence accordingly.

.3 Coordinate Progress Schedule and coordinate with Site Owner during construction.

.4 Maintain fire access/control.

1.6 CONTRACTOR USE OF PREMISES

.1 Portions of the site are potential habitat for sensitive species and therefore equipment storage, temporary material handling areas, routes for equipment and vehicle travel, etc. on the site must be approved by the Departmental Representative in order that the impact to these areas be minimized.

.2 Co-ordinate use of premises under direction of Departmental Representative.

.3 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

.4 At completion of operations the condition of existing work must be equal to or better than that which existed before the new work started.

1.7 OWNER OCCUPANCY

.1 During the entire remediation period, the site Owner will manage adjacent areas.

.2 Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Owner usage of adjacent areas. In the event of a conflict the Contractor must accommodate changes to their operations to minimize interference with Owner operations.

1.8 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING STRUCTURES/SERVICES

.1 Execute work with least possible interference or disturbance to existing structures, services, wildlife and sensitive habitats on the property unless otherwise indicated in this contract or by the Departmental Representative.

1.9 EXISTING SERVICES

.1 Locate all utility lines within and immediately surrounding the work area. Completeness and accuracy of any available utility drawings are not guaranteed and the Contractor is responsible for confirming locations of all utilities.

.2 Notify the Departmental Representative and utility companies of intended interruption of services and obtain required permission. If work requires breaking into or connecting to existing services, the Contractor must submit a request to the Departmental Representative a minimum of 5 working days prior to the event. The Contractor must not proceed until approval has been granted. PWGSC will make every effort to accommodate the request; however, PWGSC will NOT accept delay charges should the request not be accepted.

.3 Minimize duration of interruptions, and where required, provide temporary services to maintain critical systems.

.4 Provide traffic control for personnel and vehicular traffic when work impacts established transportation routes (e.g., Westside Road). Maintain and protect traffic on all routes during construction period except as otherwise specifically directed by the Departmental Representative. At minimum one lane must be kept open for traffic flow at all times.

.5 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.

.6 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.7 Provide adequate bridging over trenches to permit normal traffic.

.8 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.10 Record locations of maintained, re-routed and abandoned service lines. The Contractor must complete an as-built drawing upon project completion.

.11 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.10 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:

- .1 All Permits, Authorizations and Approvals for the proposed works.
- .2 Utility Plans.
- .3 Contract Drawings.
- .4 Specifications.
- .5 Addenda.
- .6 Change Orders and other modifications to Contract.
- .7 Reviewed Shop Drawings, product data and samples.
- .8 List of Outstanding Shop Drawings.
- .9 Field Test Reports.
- .10 Copy of Accepted Project Schedule.
- .11 Health and Safety Plan and Other Safety Related Documents.
- .12 Daily records of on-site (within site) movement of soil.
- .13 Daily records of all material movement onto and off the site, including records (manifests) of waste movement and disposition, and analytical records.
- .14 Worksafe BC notice of project, also to be provided to PWGSC prior to mobilization to the site.
- .15 Environmental Protection Plan.
- .16 Other documents as specified by the Departmental Representative.

END OF SECTION

1.1 WORK WINDOWS

.1 Remediation and restoration activities are to be completed within the wildlife, fisheries and fiscal year windows for the site (January 5 to March 13, 2015). All final submittals must be completed by March 13, 2015.

.2 For the purpose of this tender specification, “working days” are considered to be Monday through Sunday (excluding statutory holidays) and “business days” are considered to be Monday through Friday (excluding statutory holidays).

1.2 ACCESS AND EGRESS

.1 Access to the site is off of Westside Road (refer to Drawing 2).

.2 Provide for personnel, pedestrian and vehicular traffic.

.3 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.4 Design, construct and maintain temporary "access to" and "egress from" work areas in accordance with relevant municipal, provincial and other regulations.

.5 The location of the access and egress routes and on-site hauling routes must be established in consultation with the Departmental Representative prior to remediation in the form of a truck route plan to minimize disturbance to sensitive habitat at the site. The truck route plan must be submitted as part of the Environmental Protection Plan (Section 01 35 43 - Environmental Procedures).

.6 Equipment must stay on designated access and egress routes only and must keep within limits of work. Exclusion zones with respect to access and egress are depicted on Drawing 5.

1.3 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to the site. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Provide for adequate personnel and vehicle access to the site.

.3 Where security is reduced by work, provide temporary means to maintain security.

.4 Closures: protect work temporarily until permanent enclosures are completed.

1.4 EXISTING SERVICES

.1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permissions.

.2 If work requires breaking into or connecting to existing services, the Contractor must submit a request to the Departmental Representative a minimum of 5 working days prior to the event. The Contractor must not proceed until approval has been granted. PWGSC will make every effort to accommodate the request; however, PWGSC will NOT accept delay charges should the request not be accepted.

.3 Minimize duration of interruptions, and where required, provide temporary services to maintain critical systems.

1.5 SPECIAL REQUIREMENTS

.1 The Contractor must take into account that the work is to be conducted in an area containing sensitive wildlife habitat, steep terrain, areas of sensitive vegetation and sensitive soils and that the work must be monitored by qualified EMs and GMs.

.2 The EM will be provided by PWGSC and will coordinate with the Departmental Representative. The EM will notify the Departmental Representative immediately and without delay at any time that adverse impacts to sensitive species or their habitat are observed or anticipated. The Departmental Representative will in turn direct the Contractor to stop work.

.3 The GM will be provided by PWGSC and will coordinate with the Departmental Representative. The GM will notify the Departmental Representative immediately and without delay any time that geotechnical concerns are identified. The Departmental Representative will in turn direct the Contractor to stop work.

.4 The EM and GM will monitor work for the duration of the program and, in coordination with the Departmental Representative, will audit the Contractor to ensure compliance with the Contractor's Environmental Protection Plan. The EMs and GMs will advise the Departmental Representative, who will in turn direct the Contractor, before and during the work program of modifications that must be made to ensure protection of the habitat and/or wildlife present at the site. Modifications may include equipment placement, access/egress routes, requirements for surface erosion control measures to reduce impacts in work areas, depth of excavation in steeply sloped areas, establishment of additional exclusion zones due to habitat and/or wildlife concerns and planned physical restoration activities.

.5 Due to the need to use the trail to access the marsh and Area of Impact 3, these areas must be remediated prior to conducting excavation activities in the Main Debris Zone of the trail. The Contractor must coordinate the work sequence accordingly.

.6 Carry out noise generating work Monday to Sunday from 07:00 to 22:00 hours. If work is to be completed outside of these hours, written pre-approval from the Regional District of East Kootenay is required (per Bylaw No. 1396).

.7 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar Chart.

.8 Ensure that Contractor personnel employed on-site become familiar with and obey regulations including safety, fire, traffic and security regulations. As well, Contractor personnel operating equipment in steep slopes must demonstrate experience working in such conditions.

1.6 SITE SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted anywhere on the property due to the location of the site within a National Wildlife Area and the presence of sensitive species and habitat. Smoking may occur in a designated smoking area established by the Contractor in the pull-out area adjacent to Westside Road.

.2 The Contractor is to provide a designated smoking area and is to ensure proper use and maintenance of ashtrays or other such containers to ensure there is no litter generated and to prevent ignition of vegetation.

END OF SECTION

1.1 ADMINISTRATIVE

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

.2 Departmental Representative will prepare agenda for meetings.

.3 Distribute written notice of each meeting a minimum of two working days in advance of meeting date to all anticipated meeting participants (including Departmental Representative).

.4 Contractor must provide physical space, make arrangements for meetings on-site, and preside at meetings.

.5 Contractor must record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.6 Contractor must reproduce and distribute copies of the minutes within two working days after meetings and transmit to meeting participants, PWGSC, Departmental Representative and affected parties not in attendance for review prior to finalization.

.7 Representative(s) of Contractor, Subcontractor(s) and suppliers attending meetings will be qualified and authorized to act on behalf of the party each represents.

1.2 PRECONSTRUCTION MEETING

.1 Within five working days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Senior representatives from EC, PWGSC and their Representative, the Contractor, major Subcontractors, field inspectors, Environmental Monitors and Geotechnical Monitors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned as soon as possible but a minimum of three working days before the meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:

- .1 Appointment of official representative of participants in the Work.
- .2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules – Bar Chart.
- .3 Site preparation work to be completed to facilitate remediation activities (i.e. ice engineering assessment, demarcation of exclusion zones, confirming marsh debris locations with EM survey, opening fence and installing temporary fencing).
- .4 Schedule of submission of shop drawings and samples. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .5 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
- .6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .7 Proposed changes, change orders, procedures, approvals required, and time extensions.

.8 Owner provided products.

.9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.

.11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.

.12 Progress claims, administrative procedures, photographs.

.13 Appointment of inspection and testing agencies or firms.

.14 Insurances, transcript of policies.

.15 Environmental controls as prescribed in all applicable Permits, Authorizations, Approvals and as outlined in the documentation in Appendix B.

1.3 COORDINATION MEETINGS

.1 At least 5 working days prior to relevant Work commencing, submit final meeting minutes and drawings from coordination with Subcontractors.

1.4 PROGRESS MEETINGS

.1 During course of work, schedule weekly progress meetings, or more frequently as required. The weekly progress meetings must be attended by the PWGSC Project Manager, Departmental Representative, Environmental Monitors, Geotechnical Monitors, Contractor Project Manager, Contractor Superintendent and major Subcontractors, at a minimum.

.2 Notify parties a minimum of two working days prior to meetings.

.3 Contractor is to record minutes of meetings and circulate draft minutes to attending parties and affected parties not in attendance within two working days after the meeting. Meeting minutes to be finalized upon receipt of comments.

.4 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede schedule.

.5 Corrective measures and procedures to regain projected schedule.

.6 Revision to schedule.

.7 Progress schedule, during succeeding work period.

.8 Review submittal schedules: expedite as required.

.9 Health and Safety issues, including near misses.

.10 Environmental compliance and impact: review relating to requirements, changes in weather, other issues.

.11 Review proposed changes for affect on schedule and on completion date.

.12 Maintenance of quality standards.

.13 Review of budget issues.

.14 Other business.

.5 Submittals

.1 Make submittals at least 24 hours prior to scheduled progress meetings as follows:

- .1 Updated progress schedule detailing activities. Include review of progress with respect to previously established dates for starting and stopping various stages of Work, major problems and action taken, injury reports, equipment breakdown, and material removal.
- .2 Copies of transport manifests, trip tickets, and disposal receipts for waste materials removed from work area.
- .3 Daily log sheets of transported materials.
- .4 Weekly copies of site entry and work area logbooks with information on worker and visitor access.
- .5 Weekly results of any health and safety-related air sampling data, including compliance air monitoring results.
- .6 Other information required by Departmental Representative for progress meetings.

END OF SECTION

1.1 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Working Days: Monday through Sunday (excluding statutory holidays).

.5 Business Days: Monday through Friday (excluding statutory holidays).

.6 Construction Work Week: Monday through Sunday, inclusive, (excluding statutory holidays) will constitute the construction work week and define schedule calendar working days as part of Bar Chart submission.

.7 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.8 Master Plan: summary-level schedule that identifies major activities and key milestones.

.9 Milestone: significant event in project, usually completion of major deliverable.

.10 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

1.2 REQUIREMENTS

.1 Ensure Master Plan and Project Schedule are practical and remain within specified Contract duration.

.2 Plan to complete work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately ten working days, to allow for progress reporting.

.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.

.5 Carry out Work in accordance with the Contract and as follows:

  .1 Do not change Schedule accepted by the Departmental Representative without approval from Departmental Representative.

  .2 Conduct interim reviews of Work progress based on Work schedule at Progress Meetings or as instructed by the Departmental Representative and schedule updated by Contractor as instructed by the Departmental Representative.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to Departmental Representative within 10 working days of Contract award Bar Chart as Master Plan for planning, monitoring and reporting of project progress. Bar Chart to include:

  .1 Dates of commencement and completion of Work for each Description of Work identified on the Unit Price Table as well as date of Contract Award, utility locates and kickoff meeting.

  .2 Dates of Submittals including Health and Safety submittal, Environmental Protection Plan submittal, all other submittals required prior to project initiation as outlined in Section 01 33 00 - Submittal Procedures and close-out submittals as outlined in Section 01 33 00 - Submittal Procedures.

  .3 Dates of receipt of all permits, authorizations, approvals, etc. as required for the work.

  .4 Dates of inspection and testing.

  .5 Dates of as-built survey and final inspection.

  .6 Final Completion date within the time period in accordance with the Contract, including Amendments.

.3 Submit Project Schedule to Departmental Representative within five working days of receipt of acceptance of Master Plan.

1.4 PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule. Contractor to identify key milestones on Bar Chart.

1.5 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as in the Bar Chart.

.2 Departmental Representative will review and return revised schedules within 5 business days.

.3 Revise schedule and resubmit within 5 working days.

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

1.6 PROJECT SCHEDULE

.1 All remediation and physical restoration work is to be completed before March 13, 2015. All final submittals must be completed by March 13, 2015.

.2 Develop detailed Project Schedule derived from Master Plan.

.3 Ensure detailed Project Schedule includes as minimum milestone and activity types described above in Section 1.3.2.

1.7 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.

.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 Discuss Project Schedule at weekly site meetings as specified in Section 01 31 19 Project 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 accepted dates shown on Project Schedule.

END OF SECTION

1.1 ADMINISTRATIVE

.1 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 not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with work affected by submittal until review is complete unless directed to do so by the Departmental Representative.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units. Where items or information is not produced in SI Metric units converted values are acceptable.

.4 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 Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.5 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.6 Verify field measurements and affected adjacent work are coordinated.

.7 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative review of submittals.

.8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative.

.9 Keep one reviewed copy of each submission on-site.

1.2 MANIFESTS

.1 All excavated material leaving the site must be manifested.

.2 A copy of all manifests and/or truck weigh scale documents for material brought onto or removed from the site are to be provided to the Departmental Representative.

.3 Manifest and/or weigh scale documents are to be completed in accordance with applicable federal and provincial regulations.

1.3 PROJECT SUBMITAL LIST – PRIOR TO PROJECT INITIATION

.1 Health and safety submittals outlined in Health and Safety for Contaminated Sites Section 01 35 29.14 (2010-05).

.2 Environmental Protection Plan as outlined in Section 01 35 43 - Environmental Procedures.

.3 Master Plan (Bar Chart) as outlined in Section 01 32 16.07 - Construction Progress Schedule –Bar Chart.

.4 Site layout drawings as outlined in Section 01 35 13.43 - Special Project Procedures for Contaminated Sites.

.5 Evidence of appropriate licensing for transport of contaminated soils or Hazardous Waste (including for any subcontractor retained to transport such materials).

.6 Identification of the location of the soil and debris management facility as outlined in Section 01 35 13.43 – Special Project Procedures for Contaminated Sites. Provide evidence that the facility location is licensed and/or authorized to accept the excavated materials. The soil and debris management facility is to be a temporary staging area to allow for separation of excavated materials and is not the final disposal facility.

.7 Identification of the facility(s) that will be used to treat and/or dispose of each of the categories of materials identified. Evidence that they are authorized and/or licensed to accept, treat and dispose of the specific category of material. Disposal Facility requirements:

- .1 Be an existing off-site facility located in Canada.
- .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.
- .3 Hold a valid and subsisting permit, certificate, approval, or any other form of authorization issued by a province or territory for the disposal of soil/sediment, general refuse, construction/demolition waste or other material requiring disposal.
- .4 Comply with applicable municipal zoning, bylaws, and requirements.
- .5 If proposed Disposal Facility is not acceptable to Departmental Representative, identify an alternate Disposal Facility that is acceptable.

.8 Submit information on the equipment and procedure to be used in the remediation activities in the trail area for review and approval by the Departmental Representative. The proposed approach must specifically address the following constraints:

- Area of Impact 3 is located near the southern property boundary and operation of equipment on the adjacent provincial land to the south is not permitted.
- The grade of the trail is approximately 15-20%.
- There is a large void (approximately 2 m wide by 1 m high by 5 m long) on the lower part of the access trail that may collapse under equipment and worker traffic.
- Improvements to the trail (including the use of crushed gravel) are not permitted.
- Surficial debris to be removed is located on the slopes adjacent to the trail. The grade of the slopes are approximately 60-75%.
- The lowest impact equipment that can complete the work must be utilized in the work areas to minimize disturbance to sensitive species and their habitat.
- Equipment cannot be operated in exclusion zones.
- Separation of soil and debris must be conducted to facilitate disposal of the materials.

.9 Submit information on the equipment and procedure to be utilized to remove the debris in the marsh from the site for review and approval by the Departmental Representative. The proposed approach must specifically address the following constraints:

- Although it is anticipated that the marsh will be covered with ice during the remediation activities, this cannot be guaranteed.

- There is limited access from the end of the trail to the marsh work area (trail is very narrow at the base of the slope, is located in sensitive habitat for migratory birds and passage by equipment over the trail is not allowed).
- Operation of a conveyance (other than those specifically allowed within the permit documents provided in Appendix B) is not permitted within the NWA.
- Operation of motorized boats is not permitted in the marsh (refer to Appendix B).
- The grade of the trail is approximately 15-20%.
- There is a large void (approximately 2 m wide by 1 m high by 5 m long) on the lower part of the access trail that may collapse under equipment and worker traffic.
- Improvements to the trail (including the use of crushed gravel) are not permitted.
- The sediment curtain must remain undisturbed during the debris removal.
- The lowest impact equipment that can complete the work must be utilized in the work areas to minimize disturbance to sensitive species and their habitat.
- Equipment cannot be operated in exclusion zones.
- Ice along marsh shore may expose sensitive sediments during warmer periods. Protection of shoreline from equipment and personnel traffic through use of temporary access mats will be required under such conditions.
- Any work on ice over water will require an assessment of the ice and proposed work by a qualified professional as outlined in Section 01 35 13.43 – Special Project Procedures for Contaminated Sites.
- The EMs must be allowed to inspect at the marsh each piece of debris removed for species that may be adhered to the materials.

1.4 PROJECT SUBMITTAL LIST – CLOSEOUT SUBMITTALS

.1 Final survey as described in Section 01 78 00- Closeout Submittals.

END OF SECTION

1.1 REFERENCES (LATEST VERSION)

.1 Manual of Uniform Traffic Control Devices (MUTCD) published by Transport Canada.

.2 Traffic Control Manual for Work on Roadways, 1999 Consolidated Office Edition, published by the British Columbia Ministry of Transportation and Infrastructure.

.3 Highway Maintenance Agreements – Maintenance Specifications – Schedule 21 published by the British Columbia Ministry of Transportation and Infrastructure.

1.2 SUBMITTALS

.1 Truck route plan as outlined in Section 01 35 43 - Environmental Procedures.

  .1 Truck route plan is to be submitted for review by Departmental Representative within 10 working days of Contract award.

.2 Traffic control plan as outlined in Section 01 35 43 - Environmental Procedures.

  .1 Traffic control plan is to be submitted for review by Departmental Representative within 10 working days of Contract award.

1.3 PROTECTION AND MAINTENANCE OF TRAFFIC

.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, including any required permits or authorizations. Obtain such permits and authorizations.

.2 Protect travelling public from damage to person and property.

.3 Provide traffic control for personnel and vehicular traffic when work impacts established transportation routes (e.g., Westside Road). Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by the Departmental Representative. At minimum one lane must be kept open for traffic flow at all times.

.4 When working on travelled way:

  .1 Place equipment in position to present minimum of interference and hazard to travelling public.

  .2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.

  .3 Do not leave equipment on travelled way overnight.

.5 Do not close any lanes of road without approval of the Departmental Representative. Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in applicable legislation or bylaws or permits.

.6 Maintain travelled way (Westside Road between site and the town of Wilmer) to existing condition and of sufficient width for required number of lanes of traffic. Maintain access routes in a tidy condition, free from accumulation of waste products and debris, or as requested by the Departmental Representative.

.7 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.8 Traffic routes must be maintained at all times during the completion of the project work. The Contractor must provide access and temporary relocated roads as necessary to maintain traffic.

.9 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.10 Maintain access and egress routes.

.11 If ground disturbance of on-site access and egress routes is anticipated or observed, the Departmental Representative may stop work until mitigation measures are implemented. The Departmental Representative must provide approval for implementation of appropriate measures to prevent or repair disturbance or damage. Please note that gravel cannot be used to maintain the on-site access/egress routes and the Contractor must employ temporary access mats (or other suitable measures approved by Departmental Representative) in those circumstances.

.12 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic and protection of equipment in areas adjacent to Westside Road.

.13 Dust control: adequate to ensure safe operation at all times.

.14 Provide adequate bridging over trenches to permit normal traffic if and where required.

1.4 INFORMATIONAL AND WARNING DEVICES

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

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in Traffic Control Manual for Work on Roadways, 1999 Consolidated Office Edition, published by the British Columbia Ministry of Transportation and Infrastructure.

.3 Place signs and other devices in locations recommended in Traffic Control Manual for Work on Roadways, 1999 Consolidated Office Edition, published by the British Columbia Ministry of Transportation and Infrastructure.

.4 Meet with Departmental Representative prior to commencement of work to prepare list of signs and other devices required for project. If situation on-site changes, revise list to approval of Departmental Representative.

.5 Continually maintain traffic control devices in use by:

- .1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
- .2 Removing or covering signs which do not apply to conditions existing from day to day.

1.5 CONTROL OF PUBLIC TRAFFIC

.1 Provide competent flag persons, trained in accordance with, and properly equipped as specified in Traffic Control Manual for Work on Roadways, 1999 Consolidated Office Edition, published by the British Columbia Ministry of Transportation and Infrastructure in following situations:

- .1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.

.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.

.3 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

.4 Where temporary protection is required while other traffic control devices are being erected or taken down.

.5 For emergency protection when other traffic control devices are not readily available.

.6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

.7 Delays to public traffic due to contractor's operators to be minimized as much as possible and conducted in accordance with provincial guidance and regulations.

.2 Where roadway, carrying two-way traffic, is restricted to one lane, for 24 hours each day, provide portable traffic signal system. Adjust, as necessary, and regularly maintain system during period of restriction. Signal system to meet requirements of Traffic Control Manual for Work on Roadways, 1999 Consolidated Office Edition, published by the British Columbia Ministry of Transportation and Infrastructure.

1.6 OPERATIONAL REQUIREMENTS

.1 Westside Road is used frequently by the public and therefore a through route must be provided at all times. In the event of an emergency, the Contractor must provide as much access on the roadway as possible.

.2 Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken as specified and approved by Departmental Representative to protect and control public traffic.

.3 Maintain existing conditions for traffic crossing right-of-way.

END OF SECTION

1.1 RELATED SECTIONS

.1 Section 31 23 33.01 – Excavation, Trenching and Backfilling

.2 Section 02 61 00.01 – Soil Remediation

.3 Section 01 35 43 – Environmental Procedures

1.2 REFERENCES (LATEST EDITION)

.1 Canada Labour Code: Part 11-Occupational Health and Safety.

.2 Canada Occupation Health and Safety Regulations.

.3 Canadian Environmental Protection Act, S.C.

.4 Species-at-Risk Act.

.5 Controlled Products Regulations.

.6 Inter-provincial Movement of Hazardous Waste Regulations.

.7 National Fire Code of Canada.

.8 Transportation and Dangerous Goods Act.

.9 Canadian Council of Ministers of the Environment (CCME) Documentation.

.10 Canadian Council of Ministers of the Environment. Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil.

.11 British Columbia Environmental Management Act

.12 British Columbia Contaminated Sites Regulation.

.13 British Columbia Hazardous Waste Regulation.

.14 British Columbia Water Act.

.15 British Columbia Groundwater Protection Regulation.

.16 British Columbia Workers Compensation Act.

.17 British Columbia Occupational Health and Safety Regulation.

.18 Land Development Guidelines for the Protection of Aquatic Habitat (Department of Fisheries and Oceans).

1.3 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures, Section 01 31 19 – Project Meetings and Section 01 35 00.06 Special Procedures for Traffic Control.

.2 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 including following:

  .1 Equipment and personnel decontamination areas (off-site).

  .2 Equipment inspection area (off-site)

  .3 Means of ingress, egress and temporary traffic control facilities.

  .4 Equipment and temporary material handling areas (off-site).

  .5 Soil and debris management facility (off-site).

.6 Exclusion Zones, Contaminant Reduction Zones, and other zones specified in Contractor's site-specific Health and Safety Plan.

1.4 REGULATORY REQUIREMENTS

.1 Conduct work in accordance with Permit conditions (refer to Appendix B).

.2 Work to meet or exceed minimum requirements established by federal, provincial, and local laws and regulations which are applicable.

.1 Contractor: responsible for complying with amendments as they become effective.

.3 In event that compliance exceeds scope of work or conflicts with specific requirements of contract notify Departmental Representative immediately.

1.5 SITE PREPARATION

.1 Complete activities required to facilitate remediation activities, including:

.1 Opening fence and installing temporary security fencing.

.2 Identification of exclusion zones.

.3 Evaluation of ice coverage in marsh area and its ability to support equipment (to be completed by qualified professional).

.4 Confirmation of marsh debris locations through EM survey.

.2 Install security fencing in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

.3 Identify exclusion zones in the field using stakes, flagging or other visual means per Drawing 5. Based on site observations at the time of the site preparation activities, the EMs and GMs may recommend to the Departmental Representative the creation of additional exclusion zones. The Contractor must identify any additional exclusion zones requested by the Departmental Representative using stakes, flagging or other visual means. Any materials used to establish the limits of the exclusion zones must be removed upon completion of work.

.4 Retain qualified professional to assess adequacy of ice cover in marsh to allow movement of equipment and removal of marsh debris based on proposed approach provided in Section 01 33 00 – Submittal Procedures. Qualified professional to evaluate ice type, ice quality, ice thickness, structural homogeneity and defects and acceptable load. Guidance to working on ice over water can be found in Best Practice for Building and Working Safely on Ice Covers in Alberta available on the Worksafe Alberta website.

.5 Conduct electromagnetic survey in marsh debris work areas to refine locations of debris.

1.6 SOIL AND DEBRIS MANAGEMENT FACILITY AND DEBRIS STOCKPILING

.1 Due to the location of the site within a NWA and due to habitat and wildlife constraints at the site, mixed soil and debris removed from the work areas must be transported immediately off-site for screening, sorting, stockpiling and other management activities. The Contractor must demonstrate that the soil and debris management facility is licensed and/or authorized to accept the excavated materials.

.2 Provide, maintain, and operate the soil and debris management facility as authorized and as detailed below.

.3 The soil and debris management facility must be underlain by impermeable materials (i.e. 15 mil polyethylene liner) to ensure that excavated material does not come into contact with the underlying soil and that any water generated from the excavated material does not infiltrate the underlying soils. Material in the soil and debris management facility is to be covered with an impermeable cover (i.e. 6 mil polyethylene cover) nightly, during periods of work stoppage, during periods of high intensity or sustained rainfall, during periods when the excavated materials are not being actively handled and as directed by the Departmental Representative. It is the Contractor's responsibility to ensure that the covers are not left off and are adequately weighted down to ensure the covers are not blown off (e.g. with tires).

.4 It is expected that separation (i.e. screening) of the soil from the general refuse/debris and potentially salvageable materials will be required to facilitate disposal of each specific category of material. Following separation of general refuse/debris and potentially salvageable materials and upon receiving approval from the Departmental Representative, the soil can be transported for disposal at an appropriately permitted facility.

.5 Debris removed from the site which is free of soil/sediment may be temporarily stockpiled adjacent to the site off of Westside Road, provided there is no disruption of traffic flow along Westside Road and provided the Contractor obtains approval from the BC Ministry of Transportation. All stockpiled materials must be underlain by impermeable materials (i.e. 15 mil polyethylene liner).

.6 At completion of Work, Contractor must decommission soil and debris management facility, dispose of all materials associated with the facility and restore area to existing conditions.

1.7 IMPORT OF FILL MATERIAL

.1 Definitions:

.1 Soil includes:

(a) unconsolidated mineral or organic material;

(b) fill; and

(c) sediment deposited on land.

.2 Fill Characterization and Documentation:

.1 No imported fill is to be used to backfill the Area of Impact 3 excavation. Backfilling of the Area of Impact 3 excavation is to be comprised of soil within the excavation limits (where debris can be readily removed and soil concentrations meet the site-specific soil targets provided in Table 4) and/or material borrowed from immediately adjacent areas through re-contouring. Analytical results for soil from within the excavation limits following debris removal must be received by the Departmental Representative prior to use as backfill. The Contractor must not backfill the excavation until approved by the Departmental Representative.

.2 No imported fill material is to be placed in the Main Debris Zone excavation. Backfilling of the Main Debris Zone excavation will be limited to that which is required to mitigate potential erosion and health and safety hazards and that which is required by the Departmental Representative. Backfill in these circumstances will be borrowed from immediately adjacent areas where deemed acceptable by the Departmental Representative, with input from the Environmental Monitor and Geotechnical Monitor.

.3 No fill materials, other than those described above, are to be used at the site due to concerns regarding the introduction of invasive or weed species. Any non-compliant material imported to the site must be immediately excavated, loaded and transported off-site at the Contractor's cost.

1.8 EQUIPMENT DECONTAMINATION

.1 Establish location adjacent to site in pullout area to inspect equipment for soil, debris, grease, vegetation, etc. prior to equipment entering the site.

.2 Establish location adjacent to site in pullout area for personnel decontamination.

.3 Establish off-site location for equipment decontamination.

.4 All equipment brought onto the site must be clean and free from contaminants including but not limited to soil, grease, vegetation, weeds, debris.

.5 Equipment working in the excavation areas must be dedicated to the work area for the duration of the project. If the equipment has to leave site, the Contractor must decontaminate the equipment at the off-site equipment decontamination location prior to it returning to the site.

.6 Decontaminate equipment at the completion of work or as directed by the Departmental Representative.

.7 Decontaminate trucks between loads of contaminated soil and non-contaminated materials.

.8 Perform equipment decontamination in area where any runoff or impacted material can be contained and collected for treatment or disposal.

.9 At minimum, perform following steps during equipment decontamination off-site: 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. 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. Decontaminated equipment will be subject to inspection by the Departmental Representative prior to returning to the site and at the completion of work. Departmental Representative will have right to require additional decontamination to be completed if deemed necessary.

.10 Maintain inspection record on-site which includes: equipment descriptions with identification numbers; time and date of decontamination; and name of inspector with comment stating that decontamination was performed and completed.

.11 Take appropriate measures necessary to minimize drift of mist and spray during decontamination including provision of wind screens.

.12 Collect decontamination wastewaters and sediments which accumulate. Transfer wastewaters to designated wastewater storage tank and dispose of sediments appropriately.

.13 Furnish and equip personnel engaged in equipment decontamination with protective equipment including suitable disposable clothing, respiratory protection, and face shields.

1.9 FINAL DECONTAMINATION

.1 Perform final decontamination of construction facilities, equipment, and materials which may have come in contact with potentially contaminated materials.

.2 Perform decontamination as specified to satisfaction of Departmental Representative. Departmental Representative will direct Contractor to perform additional decontamination if required.

1.10 REMOVAL AND DISPOSAL - GENERAL

.1 Remove surplus materials and temporary facilities from site.

.2 Dispose of wastes as outlined in Section 01 35 43 - Environmental Procedures and in this section.

.3 Dispose of following materials at appropriate off-site facility identified by Contractor and accepted by the Departmental Representative:

- .1 Debris including excess construction material.
- .2 Non-contaminated litter and rubbish.
- .3 Disposable PPE worn during final cleaning.
- .4 Wastewater generated from final decontamination operations.

.4 Minimize generation of hazardous waste during remediation activities (i.e. from operations) to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

.5 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:

- .1 Hazardous wastes recycled in manner constituting disposal.
- .2 Lead-acid battery recycling.

1.11 DRUMS

.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. No drums of liquid waste are to be stored on-site. Drums may be temporarily stored adjacent to the site in the pullout area provided secondary containment is in place.

.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. No drums of solid waste are to be stored on-site. Drums may be temporarily stored adjacent to the site in the pullout area provided secondary containment is in place.

1.12 CONTAMINATED WASTE MANAGEMENT

.1 Segregate, excavate, handle, stockpile, load, transport and dispose all Contaminated Waste (i.e. contaminated soil, general refuse, construction/demolition waste and other waste) within work areas as outlined in this section and in Section 01 35 43 – Environmental Procedures, Section 02 61 00.01 – Soil Remediation and Section 31 23 33.01 – Excavating, Trenching and Backfilling.

.2 Minimize generation of Contaminated Waste to greatest extent practicable.

.3 Material characterization additional to information provided in Contract required by transport or Disposal Facility is the responsibility of Contractor.

1.13 CONTAMINATED WASTE TRANSPORT

.1 Assume ownership of, and be responsible for, Contaminated Waste once it is loaded on a vehicle for transport off-site.

.2 Transport material off-site as soon as practical. There is to be no stockpiling of material on-site.

.3 Transport material as outlined in Section 02 61 00.01 – Soil Remediation.

1.14 CONTAMINATED WASTE DISPOSAL

.1 Contaminated Waste Disposal: dispose Contaminated Waste at Disposal Facility identified by Contractor and accepted by the Departmental Representative. Submit identification of the facility as outlined in Section 01 33 00 – Submittal Procedures.

.2 Dispose material as soon as practical and before March 13, 2015.

.3 Permanently store material sent to a Disposal Facility at that facility.

.4 Submit Certificates of Disposal for all material disposed off-site.

END OF SECTION

1.1 RELATED SECTIONS

.1 Section 01 35 00.06 - Special Procedures for Traffic Control

.2 Section 01 56 00 - Temporary Barriers and Enclosures

.3 Section 31 23 33.01 - Excavating, Trenching and Backfilling

1.2 MEASUREMENT PROCEDURES

.1 Not Used

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit to Departmental Representative submittals listed for review within 10 working days of Contract Award.

.2 Proceed with Work affected by Submittal after review is complete.

.3 Submit the following:

- .1 Health and Safety Plan.
- .2 Proof of good standing with WorkSafe BC.
- .3 Copy of Notice of Project submitted to WorkSafe BC.
- .4 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- .5 Copies of incident and accident reports.
- .6 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .7 Emergency Procedures.

.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 business days after receipt of the plan.

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

.6 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

.7 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 Be construed to imply approval by the Departmental Representative.
- .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
- .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.4 REFERENCES

.1 Government of Canada:

.1 Canada Labour Code - Part II

.2 Canada Occupational Health and Safety Regulations

.2 National Building Code of Canada (NBC):

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

.3 Canadian Standards Association (CSA) as amended:

.1 CSA Z797-2009 Code of Practice for Access Scaffold

.2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes

.3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures

.4 Fire Protection Engineering Services, HRSDC:

.1 FCC No. 301, Standard for Construction Operations

.2 FCC No. 302, Standard for Welding and Cutting

.5 American National Standards Institute (ANSI):

.1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems

.6 Province of British Columbia:

.1 Workers Compensation Act Part 3-Occupational Health and Safety

.2 Occupational Health and Safety Regulation

1.5 REGULATORY REQUIREMENTS

.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.

.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 advise on the course of action to be followed.

1.6 WORKER’S COMPENSATION BOARD COVERAGE

.1 Comply fully with the British Columbia Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the Work.

.2 Maintain WorkSafe BC coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.7 COMPLIANCE WITH REGULATIONS

.1 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

.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 Assume responsibility as the Prime Contractor for Work under this contract.

.1 Be responsible for health and safety of persons, safety of property and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work. Please note the Work is considered to include activities on-site as well as at the off-site soil and debris management facility.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable Federal, Provincial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.9 HEALTH AND SAFETY COORDINATOR

.1 The Health and Safety Coordinator must:

.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.

.2 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.

.3 Be on site during execution of Work.

1.10 GENERAL CONDITIONS

.1 All personnel must check in with the site supervisor prior to entering the site and must be wearing high-visibility vests at all times while on site.

.2 The requirements outlined in this Section pertain to both the on-site and off-site (i.e. soil and debris management facility) work areas.

.3 Provide safety barricades and lights around site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

.4 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the site:

.1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

.2 Secure site and excavation at night time to protect site against entry.

1.11 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with contaminants identified in Specifications and environmental reports.

1.12 WORK PERMITS

.1 Obtain specialty permits related to project before start of Work.

1.13 FILING OF NOTICE

.1 The Prime Contractor is to complete and submit a Notice of Project as required by Provincial authorities.

.2 Provide copies of all notices to the Departmental Representative.

1.14 HEALTH AND SAFETY PLAN

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

.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 Primary requirements:
  - .1 Contractor's safety policy.
  - .2 Identification of applicable compliance obligations.
  - .3 Definition of responsibilities for project safety/organization chart for project.
  - .4 General safety rules for project.
  - .5 Job-specific safe work, procedures.
  - .6 Inspection policy and procedures.
  - .7 Incident reporting and investigation policy and procedures.
  - .8 Occupational Health and Safety Committee/Representative procedures.
  - .9 Occupational Health and Safety meetings.
  - .10 Occupational Health and Safety communications and record keeping procedures.
- .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.
- .3 List hazardous materials to be brought on-site as required by Work.
- .4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
- .5 Identify personal protective equipment (PPE) to be used by workers.
- .6 Identify personnel and alternates responsible for site safety and health.
- .7 Identify personnel training requirements and training plan, including site orientation for new workers.

.3 Outline procedure for addressing unforeseen hazards (refer to 1.17 below).

.4 Outline procedure for addressing hazards associated with working in cold weather, working in ice and snow and working on ice over water.

.5 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.

.6 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.

.7 Departmental Representative's review: the review of Health and Safety Plan by Public Works and Government Services 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 Documents.

1.15 EMERGENCY PROCEDURES

.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 Designated personnel from own company.
 .2 Regulatory agencies applicable to Work and as per legislated regulations.
 .3 Local emergency resources.
 .4 Departmental Representative and site staff.

.2 Include the following provisions in the emergency procedures:

 .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
 .2 Evacuate all workers safely.
 .3 Check and confirm the safe evacuation of all workers.
 .4 Notify the fire department or other emergency responders.
 .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
 .6 Notify Departmental Representative and site staff.

.3 Provide written rescue/evacuation procedures as required for, but not limited to:

 .1 Work at high angles.
 .2 Work in confined spaces or where there is a risk of entrapment.
 .3 Work with hazardous substances.
 .4 Underground work.
 .5 Work on, over, under and adjacent to water.
 .6 Workplaces where there are persons who require physical assistance to be moved.

.4 Design and mark emergency exit routes to provide quick and unimpeded exit.

.5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

1.16 HAZARDOUS PRODUCTS

.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.

.2 Where use of hazardous and toxic products cannot be avoided:

 .1 Notify Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as required.
 .2 Provide adequate means of ventilation as required.

1.17 UNFORESEEN HAZARDS

.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. Conduct a health and safety tailgate meeting to ensure all workers are informed of the factor, hazard or condition before returning to Work.

1.18 POSTED DOCUMENTS

.1 Post legible versions of the following documents on-site:

.1 Health and Safety Plan.

.2 Sequence of Work.

.3 Emergency procedures.

.4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.

.5 Notice of Project.

.6 Floor plans or site plans.

.7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.

.8 Workplace Hazardous Materials Information System (WHMIS) documents.

.9 Material Safety Data Sheets (MSDS).

.10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.2 Post all Material Safety Data Sheets (MSDS) on-site, 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.

.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 Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

.2 Ensure all site personnel attend a health and safety “tailgate” or “toolbox” meeting at the beginning of each shift, which must include:

.1 Sign-in of all attendees.

.2 Planned Work activities and environmental considerations for that shift.

.3 Hazards associated with these Work activities, including environmental hazards (eg. potential for hypothermia, heat exhaustion, heat stroke).

.4 Appropriate job-specific safe work procedures.

.5 Required personal protective equipment (PPE).

.6 Appropriate emergency procedures.

.7 Review recent accidents on Site, including near misses.

.3 Retain records of all health and safety meetings on-site during Work, and retain as corporate records for a minimum of 7 years after Work is completed.

1.20 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.

.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.

.4 Correct non-compliance

1.21 CRITICAL INCIDENT REPORTING

.1 Critical Incident Includes

- .1 An event resulting in death or serious injury to employees, client department personnel, contractors or the general public entering or occupying PWGSC facilities. This can include physically or psychologically traumatic events such as natural disasters, hostage takings, terrorism, rape, acts or threats of violence, accidents, suicides or homicides.
- .2 A fire or explosion causing equipment or property damage or threat to another property.
- .3 Damage to a boiler or other pressure vessel resulting in fire or rupture of equipment.
- .4 The free fall of or damage to an elevating device rendering it unserviceable.
- .5 The uncontrolled release or spill of hazardous wastes or materials.
- .6 The implementation of rescue, revival or other similar emergency procedures.
- .7 A structural failure or collapse of a building, tower, crane, hoist, temporary construction support system or excavation.
- .8 An electric shock, toxic or oxygen deficient atmosphere causing an employee to lose consciousness.

.2 In the event of a Critical Incident, immediate actions include:

- .1 Contacting emergency services as required (ambulance, fire department, police, environment).
- .2 Initiating urgently required corrective action appropriate to the incident (protect life, first-aid treatment, minimize property damage, etc.).
- .3 Contacting the Regional Manager responsible for Safety and Health.
- .4 Ensuring that evidence on the site is not disturbed until investigations have been completed.
- .5 Cooperating with officials authorized to investigate the incident.

1.22 UTILITY CLEARANCE

.1 The Contractor is solely responsible for utility clearance.

.2 The Contractor will not rely upon drawings or other information provided with utility locations.

1.23 PERSONAL PROTECTIVE EQUIPMENT PROGRAM

.1 Submit Personal Protective Equipment (PPE) program to the Departmental Representative addressing:

.1 Donning and doffing procedures.

.2 PPE selection based upon Site hazards.

.3 PPE use and limitations of equipment.

.4 Work mission duration, PPE maintenance and storage.

.5 PPE decontamination and disposal.

.6 PPE inspection procedures prior to, during, and after use.

.7 Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.

.8 Medical surveillance requirements for personnel assigned to work at site.

.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.

.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.

.11 Decontamination procedures for both personnel and equipment.

.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.

.13 Written respiratory protection program for project activities.

.14 Procedures dealing with heat and/or cold stress.

.15 Spill containment program if waste material is generated, excavated, stored, or managed on-site.

1.24 OFF-SITE CONTINGENCY AND EMERGENCY RESPONSE PLAN

.1 Prior to commencing Work involving handling of hazardous materials, develop off-site Contingency and Emergency Response Plan.

.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 Training: ensure personnel entering Site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.

.2 Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity.

.3 Personal Protective Equipment:

- .1 Furnish site personnel with appropriate PPE as specified above. Ensure that safety equipment and protective clothing is kept clean and maintained.

.4 Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:

- .1 Ensure prescription eyeglasses worn are safety glasses and do not permit contact lenses on-site within work zones.
- .2 Ensure footwear is steel-toed safety shoes or boots and is covered by rubber overshoes when entering or working in potentially contaminated work areas.
- .3 Dispose of or decontaminate PPE worn on-site at end of each workday.
- .4 Decontaminate reusable PPE before reissuing.
- .5 Ensure site personnel have passed respirator fit test prior to entering potentially contaminated work areas.
- .6 Ensure facial hair does not interfere with proper respirator fit.

.5 Respiratory Protection:

- .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.
- .2 Develop, implement, and maintain respirator program.
- .3 Monitor, evaluate, and provide respiratory protection for site personnel.
- .4 Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified on-site.
- .5 In absence of additional air monitoring information or substance identification, retain an industrial hygiene specialist to determine minimum levels of respiratory protection required.
- .6 Immediately notify Departmental Representative when level of respiratory protection required increases.
- .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.

.6 Heat Stress/Cold Stress: implement heat stress or cold stress monitoring program as applicable and include in site-specific Health and Safety Plan.

.7 Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:

- .1 Suitable containers for storage and disposal of used disposable PPE.
- .2 Potable water and suitable sanitation facility.

.8 Emergency and First-Aid Equipment:

- .1 Locate and maintain emergency and first-aid equipment in appropriate location on-site including first-aid kit to accommodate number of site personnel; portable emergency eye wash; two 9 kg ABC type dry chemical fire extinguishers.

.9 Site Communications:

.1 Post emergency numbers in high visibility locations on the site.

.2 Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities.

.3 Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.

.4 Furnish selected personnel with 2-way radios.

.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.

END OF SECTION

1.1 DEFINITIONS

.1 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.

.2 Environmental Protection: prevention/control of pollution and habitat or environment 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; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prior to commencing construction activities or delivery of materials to site, submit within 10 working days of Contract Award an Environmental Protection Plan (EPP) for review and acceptance by the Departmental Representative. The EPP is to present comprehensive overview of known or potential environmental issues, which must be addressed during Work.

.3 Address topics at level of detail commensurate with environmental issue and required work tasks.

.4 The Departmental Representative will review the Contractor's EPP and provide comments to the Contractor within three business days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.

.5 The contractor must have an EPP in place prior to initiating work. The EPP must contain all environmental mitigation measures outlined in the documentation provided in Appendix B, permits, and authorizations for the project. The EPP must include but is not limited to the following:

- .1 Names and qualifications of persons responsible for ensuring adherence to EPP.
- .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
- .3 Names and qualifications of persons responsible for training site personnel.
- .4 Descriptions of EPP training program.
- .5 Erosion and sediment control plan (including drawing) which identifies 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, permit conditions, Federal, Provincial, and Municipal laws and regulations.
- .6 The Contractor must have provision in the EPP for mitigating impacts of runoff to downstream surface water bodies, including Wilmer Marsh. The EPP must include a conceptual water management plan describing all mitigation measures that will be taken by the Contractor to ensure that any contaminated material from the Project site, including soil and debris, will be isolated and contained, and to ensure that potential runoff will be intercepted and prevented from contacting potentially contaminated materials.

.7 A truck route plan detailing access/egress routes. The truck route plan must include drawings showing locations of proposed access/egress routes, exclusion zones and structures (fences, construction facilities, and sanitary facilities).

.8 Traffic control plans including methods for controlling soil disturbance related to equipment traffic on-site. Plans should also include measures to minimize amount of mud transported onto public roads by vehicles.

.9 Work area plan showing proposed activity in each portion of area and identifying exclusion zones. Plan to include measures for marking limits of work areas relative to exclusion zones including methods for protection of features to be preserved within authorized work areas. Work area plan must also depict location of fencing.

.10 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.11 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.12 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel outside the work areas.

.13 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.14 Procedures for identifying and protecting historical, archaeological, cultural resources and biological resources. All artifacts of historical or cultural value will remain the property of the Crown.

.15 Details of the sustainable remediation strategies to be implemented by the Contractor during the work.

1.3 REGULATORY REQUIREMENTS

.1 Protect plants and wildlife in accordance with applicable regulations and the documentation in Appendix B.

.2 Provide water control in accordance with applicable regulations and the documentation in Appendix B.

.3 Provide erosion and sediment control in accordance with applicable regulations and the documentation in Appendix B.

.4 Comply with federal, provincial, and local anti-pollution laws, ordinances, codes, and regulations, as well as the documentation in Appendix B, when disposing of waste materials, debris, and rubbish.

1.4 NOTIFICATION

.1 The EMs, GMs and Departmental Representative will audit the Contractor’s compliance with the EPP.

.2 Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of the Contractor's EPP.

.3 Contractor: after receipt of such notice, inform the Departmental Representative of proposed corrective action and take such action for approval by the Departmental Representative.

.4 The Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.5 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

1.5 FIRES

.1 Fires and burning of rubbish and waste materials on site is not permitted.

1.6 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site.

.2 Do not dispose of waste, hazardous wastes or volatile materials, such as mineral spirits, oil or paint thinner, into waterways, storm or sanitary sewers.

.3 All materials removed from the site must be reused, recycled or disposed of through an approved landfill.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

1.7 PLANT PROTECTION

.1 Protect on-site native vegetation areas and wildlife trees through demarcation of exclusion or “no work” zones.

.2 Protect trees and plants on adjacent properties to the site.

.3 The Departmental Representative will coordinate with the Environmental Monitor to evaluate any trees located in the area of the proposed works. If the Environmental Monitor determines that one or more trees on-site are to be left in place during remediation, the Contractor will retain a qualified arborist to determine how to work around the tree in question. Protect roots of designated trees during remediation activities to prevent disturbance or damage. Avoid unnecessary traffic over root zones.

.4 Minimize stripping of topsoil and vegetation.

1.8 WILDLIFE PROTECTION

.1 The site is located within a National Wildlife Area with known Species-at-Risk Act listed species in the area. The Environmental Monitors will notify the Departmental Representative if sensitive species are identified in the work areas and the Departmental Representative will in turn instruct the Contractor to stop work until mitigative measures have been discussed with Canadian Wildlife Service. No standby time will be granted for stoppage due to identification of sensitive species in the work area.

.2 Allow Environmental Monitors to conduct pre-remediation survey activities for potential wildlife in work areas.

.3 Do not harass or disturb any wildlife present on site or adjacent lands. Notify the Environmental Monitor immediately upon identification of wildlife.

.4 Allow Environmental Monitor to conduct fish, vegetation and/or wildlife protection activities prior to and during excavation and debris removal activities and re-contouring and backfill activities. Notify the Departmental Representative in advance of such activities so that the Departmental Representative can coordinate fish, vegetation and/or wildlife protection activities by the EMs.

1.9 WATER CONTROL

.1 Maintain excavations free of water where possible.

.2 Prevent precipitation from infiltrating or from directly running off stockpiled materials at the off-site soil and debris management facility. Cover stockpiled materials as outlined in Section 01 35 13.43 - Special Project Procedures for Contaminated Sites.

.3 Dispose of water in manner not injurious to public health or safety, to property, or to any part of work completed or under construction. Ensure that discharges from site are in compliance with applicable regulations.

.4 Provide, operate, and maintain necessary equipment appropriately sized to keep excavations, staging areas (including soil and debris management facility), and other work areas free from water.

.5 Have on hand sufficient equipment in good working condition for ordinary emergencies, including power outage, and competent workers for operation of water control equipment.

.6 The Contractor is responsible for obtaining all necessary disposal and/or discharge permits as required.

1.10 EROSION AND SEDIMENT CONTROL

.1 Plan and execute construction by methods to control surface drainage from cuts and fills and from stockpiles, staging areas (including soil and debris management facility), and other work areas. Prevent erosion and sedimentation.

.2 Minimize amount of bare soil exposed at one time. Stabilize disturbed soils as quickly as practical. Implement measures intended to minimize erosion as directed by the Departmental Representative, with input from the Environmental Monitor and the Geotechnical Monitor. Remove accumulated sediment resulting from construction activity from adjoining surfaces and water courses, and repair damage caused by soil erosion and sedimentation as directed by the Departmental Representative, with input from the Environmental Monitor and the Geotechnical Monitor. Any such sediment must be transferred to the soil and debris management facility for characterization.

.3 Provide and maintain temporary measures which may include silt cloth and fences, temporary drainage pumps and piping, berms, sedimentation basins, vegetative cover, and other construction required to prevent erosion and migration of silt, mud, sediment, and other debris off-site or to other areas of site where damage might result, or that might otherwise be required by Laws and Regulations. Make sediment control measures available during construction. Materials are to be new and not re-used from other sites in order to minimize the potential for introduction of invasive species. Consult the Environmental Monitor, Geotechnical Monitor and Departmental Representative for approval of erosion control measures. Temporary improvements must remain in place and in operation as necessary or until otherwise directed by the Departmental Representative. All temporary erosion control measures are to be removed from the work area prior to demobilization unless directed by Departmental Representative.

.4 Erosion control measures to remain at the site following the completion of work include constructed cross-ditches, coconut fibre/straw mat cover and coarse woody debris (obtained from on-site locations in order to minimize introduction of invasive or non-native species) along surface runoff channels and/or at locations and frequencies directed by the Departmental Representative, with input from the EM and GM.

  .1 Mat cover to be composed of coconut fibre/straw blend (70% agricultural straw and 30% coconut fibre blend): double net (1.59 cm by 1.59 cm top net, 1.49 cm by 1.3 cm bottom net), mass per unit area of 270 g/ m^2, "C" factor of 0.002, maximum permissible shear stress of 96 Pa, maximum permissible velocity of 2.44 m/s, Manning's "n" of 0.03 .
  .2 Mat must have good contact with the underlying surface (tamp down).
  .3 Mat must be installed with the direction of the slope (i.e. top to bottom) with overlapping edges and pinned in place (install as per manufacturer's recommendations).
  .4 Pins must be at least 50 cm long and comprised of natural materials (i.e. wood stakes) free of invasive species.
  .5 The upslope end of the mat must be buried in a trench at least 300 mm deep. Backfill in the trench must be compacted.

.5 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.

.6 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.

.7 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.

.8 Plan construction procedures to avoid damage to work or equipment encroachment outside of proposed work areas. In event of damage, promptly notify the Departmental Representative, and take action to mitigate effects. Restore affected area to existing condition.

.9 Installation:

  .1 Construct temporary erosion control items as indicated by the Departmental Representative, with input from the Geotechnical Monitor and Environmental Monitor.
  .2 Check erosion and sediment control measures immediately after each rainfall; during prolonged rainfall check daily, during the course of the work.
  .3 Silt fence may be removed temporarily following consultation with the Departmental Representative.
  .4 Repair damaged silt fencing immediately upon identification of deficiencies.

.10 Implement the following mitigative measures to reduce potential for erosion and sedimentation:

  .1 Reduce excavation areas and depths to minimize the total area of disturbance and to reduce the height of potentially unstable cut slopes.
  .2 Conduct remediation activities under extended periods of dry, or frozen, ground conditions.

.3 Utilize low-impact equipment such as rubber-tired or spider hoe-type excavators (with operators experienced in working on steep slopes) to reduce the potential for ground disturbance.

.4 Exercise caution in operating equipment in the vicinity of the void identified on the lower trail. The location of the void is depicted on Drawing 5.

.5 Construct cross-ditches at the top of the trail work area to divert surface flow from the work areas.

.6 Construct cross-slope terraces along long sections of steep uniform slopes to break the slope and slow surface runoff along the slope.

.11 Do not disturb existing embankments or embankment protection unless requested by the Departmental Representative.

.12 Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly notify the Departmental Representative and apply corrective measures.

.13 If soil and debris from site accumulate in low areas, storm sewers, roadways, gutters, ditches, or other areas where in the Departmental Representative's determination it is undesirable, remove accumulation and restore area to original condition.

1.11 DUST AND PARTICULATE CONTROL

.1 Execute work by methods to minimize raising dust from construction operations.

.2 Implement and maintain dust and particulate control measures as directed by the Departmental Representative.

.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

.4 As minimum, use appropriate covers on trucks hauling fine or dusty material.

.5 Prevent dust from spreading to adjacent property sites.

.6 The Departmental Representative will stop work at any time when Contractor's control of dusts and particulates is inadequate for wind conditions present at site.

.7 If Contractor's dust and particulate control is not sufficient for controlling dusts and particulates into atmosphere, stop work. Contractor must discuss procedures with Departmental Representative that Contractor proposes to resolve problem. Make necessary changes to operations prior to resuming excavation, handling, processing, or other work that may cause release of dusts or particulates.

1.12 POLLUTION CONTROL

.1 Maintain pollution control features installed under this contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

.3 Control nuisance odours associated with diesel emissions from construction equipment.

.4 Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious toxic substances and pollutants produced by construction operations.

.5 Contact manufacturer of pollutant if known and ascertain hazards involved, precautions required, and measures used in cleanup or mitigating action.

.6 Ensure that equipment and machinery is properly maintained to minimize unnecessary noise pollution. Consider local municipal noise bylaws when mobilizing equipment.

1.13 SPILLS OR RELEASE OF DELETERIOUS SUBSTANCES

.1 Be prepared to intercept, clean up, and dispose of spills or releases that may occur whether on land or water.

.2 Measures to be implemented to prevent, control or mitigate spills or release of deleterious substances:

.1 Contractors must ensure no deleterious materials enter any surface drainage pathways located in the project area. The recommendations in the Land Development Guidelines for the Protection of Aquatic Habitat (Chillibeck et al. 1993) and the Fisheries and Oceans Canada requirements for erosion and sediment control ((http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm) must be implemented. Silt-laden runoff water from the site must not be allowed to enter nearby surface water. Engineering controls must be implemented to ensure proper isolation of soil from groundwater and surface water.

.2 Emergency response procedure for spills of deleterious substances must be in place. In the event of a spill, the contractor will immediately implement the emergency response procedures and then contact the Departmental Representative. In the event of a spill that cannot be easily contained or cleaned up, the Contractor will immediately implement the emergency response procedures, call 911, and then contact the Departmental Representative.

.3 Provide spill response equipment/materials, including but not limited to, containers, absorbent material, shovels and personal protective equipment.

.4 Provide spill response equipment/materials on-site at all times and train workers in their location and use. The resources on hand must be readily accessible and must be sufficient to respond effectively and expediently to any spill that could occur on site.

.5 Make spill response equipment/materials available at all times in which hazardous materials or wastes are being handled or transported. The spill response equipment/materials are to be compatible with the type of material being handled.

.6 Properly maintain all construction equipment brought onto the site.

.7 Conduct any equipment fuelling or maintenance in a designated area off-site. Guidance regarding siting of fuelling areas is provided by BC Ministry of Environment (A Field Guide to Fuel Handling, Transportation & Storage).

.8 Appropriately place drip pans beneath any equipment remaining on-site overnight.

.9 Prevent discharges containing asphalt, grout, concrete (includes washwater of equipment used for concrete works), or other waste materials from reaching storm drains or nearby surface water bodies. This includes, but is not limited to:

i. Cleaning equipment off-site; and

ii. Protection of any other drainage structures not identified here with engineering controls.

1.14 SUSTAINABLE REMEDIATION

.1 General:

.1 Use biodegradable hydraulic fluids in equipment used in and around waterways.

.2 Energy:

.1 Maintain equipment at peak performance to maximize efficiency and train operators to run equipment efficiently.

.2 Evaluate and optimize energy efficiency of equipment with high energy demands periodically and adjust operations accordingly.

.3 Air Emissions:

.1 Consolidate on-site and off-site vehicular trips to reduce fuel consumption.

.2 Maintain engines of vehicles and machinery in accordance with manufacturer recommendations.

.3 Modify field operations through combined activity schedules, an idle reduction plan, and using machinery with automatic idle-shutdown devices.

END OF SECTION

1.1 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.2 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating as required during the Work period, including attendance, maintenance and fuel.

.2 Construction heaters used inside buildings must be vented to outside or be non flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:

- .1 Facilitate progress of work.
- .2 Protect Work and products against humidity and cold.
- .3 Prevent moisture condensation on surfaces.
- .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Pay costs for maintaining temporary heat.

.5 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

- .1 Conform to applicable codes and standards.
- .2 Enforce safe practices.
- .3 Prevent abuse of services.
- .4 Prevent damage to finishes.
- .5 Vent direct fired combustion units to outside.

.6 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.3 TEMPORARY POWER AND LIGHT

.1 Contractor must pay for and provide for temporary power during construction for temporary lighting, construction facilities and operating of power tools etc. No power is available at the site.

.2 Provide and maintain temporary lighting throughout project.

1.4 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for all required temporary communications to complete the project. Communication utilities available at the site are limited to cellular telephone coverage.

1.5 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

END OF SECTION

1.1 REFERENCES (LATEST VERSION)

.1 Canadian Construction Documents Committee (CCDC)

.2 Canadian General Standards Board (CGSB)

.3 Canadian Standards Association (CSA International)

.4 Measurement Canada: Weights and Measures Act

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.3 INSTALLATION AND REMOVAL

.1 Construction facilities are to be installed off-site adjacent to Westside Road. The Contractor is responsible for obtaining the necessary permits and approvals from the Ministry of Transportation and Infrastructure.

.2 Indicate use of supplemental or other staging area (i.e. off-site soil and debris management facility).

.3 Provide construction facilities in order to execute work expeditiously.

.4 Remove from site all such work after use.

1.4 CONSTRUCTION PARKING

.1 Parking will not be allowed on the site due to sensitive habitat. Acceptable parking areas will be determined and agreed upon by Departmental Representative prior to initiation of work.

.2 Provide and maintain adequate access to project site.

1.5 OFFICES

.1 Provide office space heated to 20 degrees C, lighted, ventilated, of sufficient size to accommodate site meetings and furnished with drawings laydown table.

.2 Provide office space heated to 20 degrees C, lighted, ventilated and with 110V power made available for the Departmental Representative and up to three other individuals (in addition to the Contractor's personnel) to use as a work space, including at minimum a table and chairs for the Departmental Representative's use.

.3 Subcontractors to provide their own offices as necessary. Direct location of these offices to Departmental Representative for approval.

.4 Clean as outlined in Section 01 74 11 - Cleaning.

.5 Maintain at site office one record copy of:

  .1 General Conditions
  .2 All Permits, Authorizations and Approvals for the proposed works.
  .3 Utility Plans.
  .4 Contract Drawings.
  .5 Specifications.
  .6 Addenda.

.7 Change Orders and other modifications to Contract.

.8 Reviewed shop drawings, product data, and samples.

.9 List of Outstanding Shop Drawings.

.10 One set of record drawings and Specifications for “as-built” purposes.

.11 Field and Laboratory Test Reports.

.12 Copy of Accepted Project Schedule.

.13 Health and Safety Plan and Other Safety Related Documents including daily toolbox or tailgate meetings.

.14 Daily work records to be completed by end of each shift which include:

.1 Quantities for each Description of Work identified in the Unit Price Table and Change Orders.

.2 Description of Work performed.

.3 Current Site conditions.

.4 General information including: date, time shift started and ended, Subcontractor(s) on-site, Health and Safety items, and Environmental Protection items.

.5 Records of on-site (within site) movement of soil.

.6 Records of all material movement onto and off the site, including records (manifests) of waste movement and disposition, and analytical records as need be.

.7 Signature of Superintendent and Departmental Representative.

.15 Worksafe BC notice of project, also to be provided to PWGSC prior to mobilization to the site.

.16 Environmental Protection Plan.

.17 Reviewed and accepted submittals.

.18 Manufacturers’ installation and application instructions (as appropriate).

.19 National Building Code of Canada (as appropriate).

.20 Current construction standards of workmanship listed in technical Sections (as appropriate).

.21 Final Meeting Minutes, Agendas and associated Attachments.

.22 Other document as specified by the Departmental Representative.

.6 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage. Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.7 Maintain record documents in clean, dry and legible condition in site office. Do not use record documents for construction purposes.

.8 Keep record documents and samples available for inspection the Departmental Representative.

1.6 FIRST AID

.1 Provide marked and fully stocked first aid case in a readily available location.

1.7 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain lockable storage for tools, equipment and materials.

.2 Locate materials not required on-site in manner to cause least interference with work activities.

.3 Storage of any equipment, tools and materials at the site is at the discretion of the Contractor; PWGSC will not be responsible for damaged, vandalized or stolen items.

1.8 SANITARY FACILITIES

.1 Provide and maintain sanitary facilities for work force in accordance with governing regulations and ordinances. Contractor is responsible for regular, scheduled removal and disposal of sanitary waste.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.9 CLEAN-UP

.1 Complete cleaning as outlined in Section 01 74 11 - Cleaning.

END OF SECTION

1.1 INSTALLATION AND REMOVAL

.1 The site is currently fenced along Westside Road (wooden post and metal wire fencing). In order to access the site, the Contractor must temporarily open the fence. The fence is to be reinstalled to the existing condition upon completion of work. The Contractor must correct any deficiencies observed in the fencing at their cost.

.2 Temporary fencing (i.e. 6 foot high panel fencing) is required along Westside Road where the Contractor has opened the existing fence to allow movement of personnel and equipment. The temporary fencing must be secured nightly to ensure unauthorized access to the site is restricted.

.3 Provide fencing around any excavations that are unsafe for entry due to location, steepness of sides or depth.

.4 Provide temporary controls in order to execute Work expeditiously.

.5 Remove from site all such work after use.

1.2 HOARDING

.1 Provide barriers around trees and plants designated to remain in accordance with Section 01 35 43 - Environmental Procedures. Protect from damage by equipment and construction procedures.

1.3 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around work areas as required by WCB regulations.

1.4 ACCESS TO SITE

.1 Provide and maintain access routes for access to Work. Please note that the use of gravel at the site is not allowed. If necessary, temporary access mats (or other suitable measures approved by the Departmental Representative) are to be utilized to provide access to Work.

1.5 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.6 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

END OF SECTION

1.1 PROJECT CLEANLINESS

.1 Maintain project area in tidy condition, free from accumulation of waste products and debris, or as requested by the Departmental Representative

.2 Provide on-site containers for collection of waste materials, packaging material and debris.

.3 Remove construction debris, waste materials and packaging material from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Waste materials, packaging materials and debris are to be disposed in accordance with Section 01 35 43 - Environmental Procedures.

.4 Clean interior areas of temporary construction facilities prior to, during and following work.

.5 Ensure sanitary facilities are maintained in a hygienic manner.

.6 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

1.2 FINAL CLEANING

.1 When Work is substantially performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Rake clean other surfaces of ground.

.5 Final cleaning will be subject to inspection by the Departmental Representative.

END OF SECTION

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor Design-Builder and Subcontractors: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

  .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Design-Builder's Inspection and that corrections have been made.

.2 Owner Inspection: Departmental Representative, Environmental Monitors, Geotechnical Monitors and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Any deficiencies reported by the Departmental Representative will be corrected by the Contractor at their cost.

.3 Completion: submit written certificate that following have been performed:

  .1 Work has been completed and inspected for compliance with Contract Documents.

  .2 Defects have been corrected and deficiencies have been completed.

  .3 Operation of systems has been demonstrated to Owner's personnel.

  .4 Work is complete and ready for final inspection.

.4 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance.

.5 The Contractor must remove all temporary construction facilities (office, sanitary facilities, equipment storage sheds, soil and debris management facility, etc.) upon completion of the work and at the direction of the Departmental Representative.

.6 The Contractor must remove any temporary erosion control measures and temporary fencing upon completion of the work and at the direction of the Departmental Representative.

.7 Environmental control measures must remain in place until the Departmental Representative, with input from the Geotechnical Monitor and Environmental Monitor, determines they are no longer required.

.8 The Contractor must remove all environmental control measures when the Departmental Representative determines they are no longer required.

.9 The Contractor must not disturb or remove the sediment curtain from the marsh during the project works. The sediment curtain will remain in place at the site until surface water total suspended solid and total dissolved solid concentrations are consistent with previously established baseline concentrations (Table 6).

1.2 CLEANING

.1 In accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Furnish evidence, if requested, for type, source and quality of products provided.

.3 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.4 Pay costs of transportation.

.5 Final survey and as-built record as detailed below.

.6 Revise content of documents as required prior to final submittal.

1.2 AS-BUILTS AND SAMPLES

.1 Contractor is required to submit to Departmental Representative an as-built record in of the site, including information detailed below, at the completion of work. Provide 1 set of CDs in AutoCAD 14 file format with all as-built information on the CDs. The Departmental Representative must provide the original AutoCAD files for “as-built” purposes.

1.3 FINAL SURVEY

.1 Submit final site survey showing:

- .1 Location and extent of excavation, including grade/topography and the location of any utility line replacement to show the work is in conformance with Contract Documents.
- .2 Location of any decommissioned and/or abandoned utilities encountered and location of any utilities encountered not on current Drawings.
- .3 Location and extent of permanent erosion control features (terraces, cross-slope ditches, coconut fibre/straw mat cover, etc.).
- .4 Location of the fence along Westside Road.
- .5 Location of the provincial-federal boundary along the southern border of the site.

END OF SECTION

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 31 23 33.01 - Excavation, Trenching and Backfilling.

1.2 SUMMARY

.1 Work includes:

.1 Providing and installing materials and equipment necessary to complete site preparation activities, remediation and physical restoration.

.2 Completing all activities in conjunction with and under the supervision of the Departmental Representative, with input from the Environmental Monitors and Geotechnical Monitors.

.3 Identifying subsurface utilities, disconnecting utilities and temporarily supplying utilities as required, and, reinstating all utilities and infrastructure following excavation.

.4 Implementing safety work zones, site Health and Safety Plans and Emergency Response Plans, and Environmental Protection Plan.

.5 Completing site preparation activities (i.e. ice engineering assessment, demarcation of exclusion zones, confirming locations of marsh debris through EM survey, opening fence and installing temporary fencing) immediately prior to the active remediation component of the project.

.6 Coordinating with the Departmental Representative to allow the Environmental Monitors to conduct pre-remediation survey activities for potential wildlife and to allow the Environmental Monitors to conduct fish, vegetation and/or wildlife protection activities prior to and during excavation and debris removal activities and re-contouring and backfill activities.

.7 Installing temporary access mats (or other suitable measures approved by the Departmental Representative) on on-site access routes where ground conditions are not frozen.

.8 Removing and disposing several large pieces of debris from the marsh area of the site.

.9 Removing and disposing numerous pieces of surficially deposited debris in the trail area of the site.

.10 Excavating and transferring material excavated from two portions of the trail area of the site (i.e. Main Debris Zone and Area of Impact 3) to the off-site soil and debris management facility for separation/screening of general refuse and salvageable materials from the excavated material.

.11 Preparing the off-site soil and debris management facility, including obtaining all necessary permits, approvals and authorizations and installing impermeable liners.

.12 Screening/separating general refuse and salvageable materials from excavated materials in the soil and debris management facility to facilitate disposal.

.13 Stockpiling of screened soils according to classification provided by the Departmental Representative (refer to Table 5, based on in situ characterization of excavated areas) or as directed by the Departmental Representative, in the soil and debris management facility while awaiting final disposal.

.14 Allowing and assisting the Departmental Representative to collect soil samples from the excavations for characterization purposes, including collection of soil samples from the Main Debris Zone at the beginning of Work. Includes provision of equipment, materials and labour to facilitate sample collection. Approximately five test pits will be advanced to 2.5 m below grade in the Main Debris Zone for sample collection.

.15 Loading of, transporting to, and disposing of excavated and screened soil at licensed and authorized off-site treatment or disposal facilities based on classification provided by the Departmental Representative (refer to Table 5, based on in situ characterization of excavated areas).

.16 Loading of, transporting to, and disposing of stockpiled general refuse at licensed and authorized off-site disposal facilities.

.17 Loading of, transporting to, and disposing of stockpiled salvageable materials at facilities licensed and authorized to accept such materials.

.18 Backfilling Area of Impact 3 excavation with soil removed from the excavation in that location which meets the site-specific soil targets provided in Table 4 and debris has been removed and/or with soil from borrow locations immediately adjacent to Area of Impact 3 through re-contouring.

.19 Backfilling the Main Debris Zone excavation with material from non-impacted areas located immediately adjacent to the excavation area where deemed acceptable by the Departmental Representative, with input from the EMs and GMs. Backfilling in the Main Debris Zone will only be conducted as required to mitigate potential erosion and geotechnical concerns and health and safety hazards.

.20 Constructing cross-ditches at the top of the trail area to divert surface flow from the Main Debris Zone excavation area.

.21 Constructing cross-slope terraces along long sections of steep uniform slopes in the Main Debris Zone excavation area to break the slope and slow surface runoff along the slope.

.22 Implementing erosion and sediment control measures in areas of soil disturbance including depositing coarse woody debris, broadcast seeding with an approved native plant seed mix and installing coconut fibre/straw mat cover.

.23 Maintaining erosion and sediment control at the site and soil and debris management facility, including covering stockpiles, and appropriately managing any surface runoff.

.24 Providing traffic control where required to maintain a safe work or traffic area.

.2 Unit Prices

.1 Provide unit costs for soil remediation in the Unit Price Table form provided.

1.3 REFERENCES (LATEST EDITION)

.1 British Columbia Contaminated Sites Regulation and Hazardous Waste Regulation.

.2 CCME (Canadian Council of Ministers of the Environment) Contaminated Sites, Contaminated Soil and Groundwater, and Remediation of Contaminated Sites most current publications.

1.4 SUBMITTALS

.1 Provide evidence of appropriate licensing for transport of contaminated soils or Hazardous Waste (including for any subcontractor retained to transport such materials).

.2 Identify the location of the soil and debris management facility as outlined in Section 01 35 13.43 – Special Project Procedures for Contaminated Sites. Provide evidence that the facility location is licensed and/or authorized to accept the excavated materials. Work must NOT proceed until the Departmental Representative is satisfied the facility location can afford PWGSC suitable liability protection.

.3 Identify the facility(s) that are to be used to treat and/or dispose of each of the categories of materials identified. Provide evidence that they are authorized and/or licensed to accept, treat and dispose of the specific category of material. Work must NOT proceed until the Departmental Representative is satisfied the receiving facilities are appropriately qualified and afford PWGSC suitable liability protection.

1.5 NEW MATERIALS AND EQUIPMENT

.1 Ship, store and preserve in original packaging with manufacturer's seal and label remain intact.

.2 Ensure materials and equipment are not damaged, altered or soiled during shipment, handling and storage.

.3 Transport rejected equipment and materials from work site immediately.

.4 Store materials and equipment according to manufacturer's and supplier's instructions.

.5 Establish a quality management system for materials and equipment.

1.6 PROJECT/SITE CONDITIONS

.1 Existing Conditions.

  .1 Review the large debris locations in the marsh area and surficial debris locations in the trail area on Drawing 5.

  .2 Review the proposed excavation areas on Drawing 5 that summarizes the approximate areal extent of known debris and soil contamination. The excavation at Area of Impact 3 will extend to approximately 2.5 metres below grade. The excavation in the Main Debris Zone will extend to at least 1.5 metres below grade, potentially deeper in some areas.

  .3 The limits of excavation will be identified in the field by the Departmental Representative as a starting point for the Contractor.

  .4 Buried services to be addressed as outlined in Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.7 SEQUENCING

.1 All remediation works are to be completed within the work windows described in Section 01 14 00 - Work Restrictions.

.2 Due to the need to use the trail to access the marsh and Area of Impact 3, these areas must be remediated prior to conducting excavation activities in the Main Debris Zone of the trail. The Contractor must coordinate the work sequence accordingly.

.3 All other work must be sequenced in consultation with the Departmental Representative.

1.8 PREPARATION

.1 Complete activities required to facilitate remediation activities as outlined in Section 01 56 00 - Temporary Barriers and Enclosures and Section 01 35 13.43 - Special Project Procedures for Contaminated Sites.

.2 Complete plant protection as outlined in Section 01 35 13.43 - Special Project Procedures for Contaminated Sites and Section 01 35 43 - Environmental Procedures.

.3 Establish soil and debris management facility per Section 01 35 13.43 - Special Project Procedures for Contaminated Sites.

1.9 EXCAVATION

.1 Where required, provide water control as outlined in Section 01 35 43- Environmental Procedures.

.2 Complete excavation in accordance with requirements of Section 31 23 33.01 - Excavating, Trenching and Backfilling, Section 01 35 13 43 - Special Project Procedures for Contaminated Sites and Section 01 35 43 - Environmental Procedures.

1.10 BACKFILLING

.1 Complete backfilling in accordance with requirements of Section 31 23 33.01 - Excavating, Trenching and Backfilling, Section 01 35 13 43 - Special Project Procedures for Contaminated Sites and Section 01 35 43 - Environmental Procedures.

1.11 SOIL STOCKPILING

.1 Following separation of refuse and salvageable materials at the soil and debris management facility, screened soils are to be stockpiled in the soil and debris management facility according to the classification provided by the Departmental Representative (refer to Table 5, based on in situ characterization of excavated areas) or as directed by the Departmental Representative while awaiting final disposal.

1.12 SOIL, GENERAL REFUSE AND SALVAGEABLE MATERIAL TRANSPORT

.1 All soil excavated from Area of Impact 3 that exceeds CCME AL land use guidelines and/or the site-specific soil targets provided in Table 4 must be removed from the site and be transported to a facility permitted to receive the material quality (based on classification provided by Departmental Representative) being disposed of or treated.

.2 All soil excavated from the Main Debris Zone must be removed from the site and be transported to a facility permitted to receive the material quality (based on classification provided by Departmental Representative) being disposed of or treated.

.3 All general refuse and construction/demolition waste must be removed from the site and be transported to a facility permitted to receive the material being disposed of.

.4 All salvageable materials must be removed from the site and be transported to a facility licensed and authorized to accept such materials.

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

.6 Use watertight truck bodies for transporting excavated materials. Do not allow excess water in excavated materials to flow out of vehicle during transport.

.7 Stabilize soil or other material as necessary.

.8 Transport material by appropriately licensed and equipped vehicles and operators.

.9 Manifest and correlate weights of all material transported from site documenting weight at removal from site, movement, transfer stations, interim storage and treatment, and weight of material at final disposal facility. Submit all manifests, as instructed by the Departmental Representative.

.10 Resolve discrepancies in manifests for material transported as required by regulations and as acceptable to the Departmental Representative. Discrepancies include:

.1 No manifest or an incomplete manifest.

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

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

.4 The material transported is in a hazardous condition.

.11 Load and transport soil in a manner as to prevent contamination of the site and transportation routes.

.12 Contractor must not load trucks in a manner that causes spillage onto areas not underlain by an impermeable surface.

.13 Contractor must not load trucks with soil such that spillage occurs onto areas not underlain by an impermeable surface during transport.

.14 Immediately scrape up debris or material on access roads which is suspected to be contaminated as directed by the Departmental Representative and transport and place into the soil and debris management facility.

.15 Clean access and transport roads as outlined in Section –01 35 00.06 – Special Procedures for Traffic Control.

.16 Departmental Representative may collect soil samples for chemical analyses from traveling surfaces of constructed and existing access routes prior to, during, and upon completion of Work. Excavate and dispose of clean soil contaminated by Contractor's activities at no additional cost to PWGSC.

1.13 RESTORATION

.1 Construct cross-ditches at the top of the trail area or at other locations specified by the Departmental Representative, with input from the Geotechnical Monitor, to divert surface flow from excavation areas. Locations to be determined in the field in consultation with the Departmental Representative, with input from the Geotechnical Monitors and Environmental Monitors.

.2 Construct cross-slope terraces along long sections of steep uniform slopes in the excavation areas to break the slope and slow surface runoff along the slope. Locations to be determined in the field in consultation with the Departmental Representative, with input from the Geotechnical Monitors and Environmental Monitors.

.3 Implement permanent erosion and sediment control measures in areas of soil disturbance including depositing coarse woody debris and installing coconut fibre/straw mat cover. Coarse woody debris is to be sourced from other areas of the site or adjacent lands to minimize the potential for introduction of invasive species. Permanent erosion control measures are to be installed as outlined in Section 01 35 43 – Environmental Procedures.

.4 Prior to installation of the coconut fibre/straw mat cover, broadcast seed soil disturbance areas with a native plant seed mix. Seek Departmental Representative approval of the proposed native plant seed mix and supplier prior to ordering. The native seed mix and supplier will also be subject to approval by the Canadian Wildlife Service. The native seed mix must be free of invasive species. Apply seed in accordance with supplier's recommendations.

END OF SECTION

1.1 RELATED SECTIONS

.1 Section 02 61 00.01 - Soil Remediation

.2 Section 01 35 29 14 (2010-05) - Health and Safety for Contaminated Sites

.3 Section 01 56 00 - Temporary Barriers and Enclosures

.4 Section 01 35 13.43 – Special Project Procedures for Contaminated Sites

.5 Section 01 35 43 - Environmental Procedures

1.2 MEASUREMENT PROCEDURES

.1 Excavated materials will be measured in accordance with the following procedure.

  .1 For soil and debris removed from the site and transferred to the soil and debris management facility, the truck will be weighed at a certified weigh scale station and the weigh scale records will form the weight of measure for the measure of payment.

  .2 For classified soil, general refuse and salvageable materials transported from the soil and debris management facility to the appropriate final disposal facilities and for general refuse and salvageable materials transported directly from the site to the appropriate final disposal facilities, the truck will be weighed at a certified weigh scale station and the weigh scale records will form the weight of measure for the measure of payment.

1.3 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures, Section 01 35 13.43 – Special Project Procedures for Contaminated Sites, Section 01 35 43 Environmental Procedures and Section 01 35 29.14 (2010-05) – Health and Safety for Contaminated Sites.

.2 Submit drawings identifying all utilities within and immediately surrounding the work area to the Departmental Representative at least 5 working days prior to commencing any subsurface disturbance. Update drawings as instructed by the Departmental Representative.

.3 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in British Columbia, Canada, as required.

.4 Keep design and supporting data on-site.

.5 Do not use any fill material until approved by the Departmental Representative.

1.4 EXISTING CONDITIONS

.1 Examine subsurface investigation reports provided in Appendix A.

.2 Protect existing surface features from damage while work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

.3 Buried services:

  .1 Prior to beginning excavation work, notify Departmental Representative and applicable authorities having jurisdiction and establish location and state of use of buried utilities and structures.

.2 All utilities within and immediately surrounding the work area must be located prior to Work through a BC One Call and a private utility locating company to ensure all buried services are properly located. A hydrovac may be required to confirm actual location of all utilities. Completeness and accuracy of any available utility drawings are not guaranteed and the Contractor is responsible for confirming locations of all utilities. Clearly mark utility locations to prevent disturbance during Work.

.3 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

.4 Cap off any obsolete/inactive buried services encountered in a manner approved by authorities having jurisdiction.

.5 Protect buried services that are required to remain undisturbed.

.6 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing and re-routing.

.7 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.8 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.9 Contractor must survey the location of maintained, re-routed and abandoned underground lines and include on **final as built drawing**.

1.5 PREPARATION/PROTECTION

.1 Complete site preparation/protection activities as outlined in Section 01 35 13.43 - Special Project Procedures for Contaminated Sites, Section 01 35 43 - Environmental Procedures, Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.

.2 Remove obstructions from surfaces to be excavated within limits indicated.

1.6 WATER CONTROL

.1 Protect open excavations against flooding and damage due to surface runoff.

.2 Provide water control as outlined in Section 01 35 43 - Environmental Procedures.

1.7 EXCAVATION

.1 Conduct excavation activities in accordance with requirements of Section 01 35 13.43 - Special Project Procedures for Contaminated Sites, Section 01 35 43 - Environmental Procedures and Section 02 61 00.01 - Soil Remediation.

.2 At the beginning of Work, provide equipment, materials and labour to facilitate the collection of soil samples from the Main Debris Zone. Approximately five test pits will be advanced to a depth of 2.5 m below grade in the Main Debris Zone for sample collection.

.3 Store non-contaminated excavated soil only on non-contaminated site surface areas. Ensure no contact between non-contaminated excavated soil and drainage or contaminated water or contaminated soil.

.4 Keep excavated materials a safe distance from the excavation while awaiting transport to the off-site soil and debris management facility.

.5 Maintain sides and slopes of excavations in a safe condition by appropriate methods and in accordance with all applicable regulations - where conditions are unstable, Departmental Representative will discuss options with Contractor.

.6 Contractor must obtain all excavation permits from authority having jurisdiction. Permission to excavate on-site must be obtained in writing from the Departmental Representative.

.7 Restrict vehicle operations directly adjacent to open trenches.

.8 Obtain Departmental Representative approval of completed excavation.

.9 Following removal of designated material, the Departmental Representative will collect confirmatory samples to ensure that impacted materials have been removed as planned. The Contractor must make clean the bottom and walls of the excavation (including water and other waste material) and provide clear access for the Departmental Representative. Assist the Departmental Representative in collection of samples including provision of equipment and personnel as necessary. In the event that contamination remains, additional material may need to be removed. Any additional work must be approved by the Departmental Representative prior to the commencement of this work.

.10 Departmental Representative will send samples for chemical analysis by a certified laboratory. Five business days (upon receipt at the laboratory) are required for standard analysis. Additional analysis required based on analytical results will require an additional four business day turnaround time. The Contractor must anticipate this and factor it into the unit price costing.

1.8 BACKFILLING

.1 All fill material must meet the requirements outlined in Section 01 35 13.43 - Special Project Procedures for Contaminated Sites.

.2 Backfill Area of Impact 3 excavation with soil obtained from within the excavation limits (where debris can be readily removed and soil concentrations meet the site-specific soil targets provided in Table 4) and/or with soil borrowed from immediately adjacent areas through re-contouring. Analytical results for soil from within the excavation limits following debris removal must be received by the Departmental Representative prior to use as backfill. The Contractor must not backfill the excavation until approved by the Departmental Representative.

.3 Backfill Main Debris Zone excavation with material from non-impacted areas located immediately adjacent to the excavation area where deemed acceptable by the Departmental Representative, with input from the EMs and GMs. Backfilling in the Main Debris Zone will only be conducted as required to mitigate potential erosion and geotechnical concerns and health and safety hazards.

.4 Place backfill material in Area of Impact 3 and Main Debris Zone in no greater than 150 mm lifts or as directed by the Departmental Representative, with input from the Geotechnical Monitor. Compact each layer of material using on-site machinery such that subsidence will be minimized. Submit proposed approach for backfill compaction as part of the pre-work submittals outlined in Section 01 33 00 –Submittal Procedures.

.5 Compact backfill to satisfaction of the Departmental Representative, with input from the Geotechnical Monitor and Environmental Monitor.

.6 Report any issues with compaction that may affect the final grade to the Departmental Representative as soon as they become known.

.7 Contractor must not proceed with backfilling operations unless approved by Departmental Representative.

.8 Rough grade to finish grade or as directed by the Departmental Representative at Area of Impact 3.

.9 Rough grade to levels, profiles and contours as required to implement permanent erosion control features or as directed by the Departmental Representative at the Main Debris Zone.

1.9 RESTORATION

.1 Upon the completion of the excavation activities, complete restoration works as outlined in Section 02 61 00.01 - Soil Remediation.

.2 Upon completion of Work, remove surplus material and material unsuitable for fill or grading, remove waste materials and debris, trim slopes and correct defects as directed by Departmental Representative.

.3 Clean and reinstate areas affected by Work as directed by Departmental Representative.

END OF SECTION

UNIT PRICE TABLE – EC WILMER MARSH SITE REMEDIATION

Item	Specification Section(s)	Description of Work	Unit	Estimated Quantity	Unit Price (GST Extra)	Total Price (GST Extra)
1	01 33 00	Pre-Work Submittals	Lump Sum	1		
2	02 61 00.01	Mobilization for all equipment and vehicles, and for all personnel including all meals, accommodations and other daily living cost for the Contractor and their subcontractors that are associated with the project.	Lump Sum	1		
3	02 61 00.01	Demobilization for all equipment and vehicles, and for all personnel including all meals, accommodations and other daily living cost for the Contractor and their subcontractors that are associated with the project.	Lump Sum	1		
4	01 52 00	Construction Facilities Provision	Lump Sum	1		
5	01 52 00	Construction Facilities Operation Includes maintenance, cleaning and removal	Day	40		
6	01 35 13.43	Equipment and Personnel Decontamination Includes provision of materials, labour and equipment to conduct equipment and personnel decontamination. Includes collection and disposal of any materials generated during decontamination.	Day	40		
7	01 35 29.14	Extreme Weather Delays/Standby **	Day	1		
8	31 23 33.01	Location and Protection of Buried Services	Lump Sum	1		
9	01 35 13.43 01 35 43 01 56 00	Site Preparation Activities Including, but not limited to opening existing fence, identifying limits of exclusion or “no work” zones in the field, completing ice assessment in marsh area, confirming debris locations with EM31/38 survey.	Lump Sum	1		
10	01 35 13.43	Preparation of soil and debris management facility. Includes costs to obtain necessary permits, approval or authorizations to establish soil and debris management facility. Includes cost to supply, install, maintain and decommission/dispose impermeable liner for the soil and debris management facility. Includes cost to supply, place, maintain and dispose covers for the soil and debris management facility.	Lump Sum	1		
11	01 56 00	Installation and removal of temporary panel fencing (6 feet high) including materials, delivery, set-up, maintenance and removal. Includes materials required to secure fencing.	m	100		
12	01 35 43	Installation and removal of temporary erosion and sediment control measures. Includes cost of materials, delivery, set-up, maintenance and removal.	Lump Sum	1		
13	01 35 43 02 61 00.01	Deposition of coarse woody debris as a permanent erosion control feature. Includes equipment, manpower and materials necessary to obtain woody debris from on-site or adjacent lands and transport to disturbed areas.	Lump Sum	1		
14	01 35 43 02 61 00.01	Construction of cross-ditches as a permanent erosion control feature. Includes equipment, manpower and materials necessary to construct cross-ditches.	Lump Sum	1		
15	01 35 43 02 61 00.01	Installation of coconut fibre/straw mat cover and broadcast seeding of native plant seed mix as a permanent erosion control feature including materials, delivery and installation. Includes all equipment, manpower and materials necessary to install.	m^2	5000		
16	01 35 00.06 01 35 43 01 74 11 02 61 00.01	Access/Egress Route and Road Maintenance Includes equipment, manpower and materials to maintain roads and access/egress routes. Includes cost to maintain Westside Road to existing condition.	Day	40		
17	01 33 00 01 35 00.06 02 61 00.01	Temporary Access Mats Includes cost to supply and place temporary access mats on on-site access routes	Day	40		

Table continued on following page...

Item	Specification Section(s)	Description of Work	Unit	Estimated Quantity	Unit Price (GST Extra)	Total Price (GST Extra)
18	01 35 00.06	Traffic Control Includes equipment, manpower and materials to provide traffic control on Westside Road. Includes any necessary permitting.	Day	40		
19	01 35 13.43 02 61 00.01 31 23 33.01	Advancement of Test Pits Includes equipment, manpower and materials to advance approximately five test pits in the Main Debris Zone.	Hour	4		
20	01 11 00	Handling and Disposal of Lead-Containing Hazardous Materials. Including any special monitoring/handling requirements, transport and off-site disposal.	Tonne	0.4		
21	01 11 00	Handling and Disposal of Asbestos-Containing Hazardous Materials. Including any special monitoring/handling requirements, transport and off-site disposal.	Tonne	0.4		
22	01 35 13.43 01 35 43 02 61 00.01 31 23 33.01	Marsh Debris Removal Includes all equipment, manpower and material necessary to remove debris from the marsh and transport to the soil and debris management facility for separation into general refuse and salvageable materials. This includes all equipment, manpower and material necessary to support and/or work around all above and underground existing utilities. This cost will include any downtime related to wildlife, vegetation or fish protection activities.	Tonne	100		
23	01 35 13.43 01 35 43 02 61 00.01 31 23 33.01	Trail Surficial Debris Removal Includes all equipment, manpower and material necessary to remove surficial debris from the trail area and transport to the soil and debris management facility for separation into general refuse and salvageable materials. This includes all equipment, manpower and material necessary to support and/or work around all above and underground existing utilities. This cost will include any downtime related to wildlife and vegetation protection activities.	Tonne	400		
24	01 35 13.43 01 35 43 02 61 00.01 31 23 33.01	Area of Impact 3 Excavation Includes all equipment, manpower and material necessary to excavate soil and debris from Area of Impact 3 and transport debris and soil unsuitable for backfilling to the soil and debris management facility. Includes equipment, manpower and material necessary to assist with collection of confirmatory soil samples. This includes all equipment, manpower and material necessary to support and/or work around all above and underground existing utilities. This cost will include any downtime related to wildlife and vegetation protection activities. Contractors will not be paid for standby time associated with analytical turnaround time (TAT).	Tonne	2000		
25	01 35 13.43 01 35 43 02 61 00.01 31 23 33.01	Main Debris Zone Excavation Includes all equipment, manpower and material necessary to excavate soil and debris from the Main Debris Zone and transport debris and soil to the soil and debris management facility. Includes equipment, manpower and material necessary to assist with collection of confirmatory soil samples. This includes all equipment, manpower and material necessary to support and/or work around all above and underground existing utilities. This cost will include any downtime related to wildlife and vegetation protection activities. Contractors will not be paid for standby time associated with analytical turnaround time (TAT).	Tonne	2700		

Table continued on following page...

UNIT PRICE TABLE – EC WILMER MARSH SITE REMEDIATION

Item	Specification Section(s)	Description of Work	Unit	Estimated Quantity	Unit Price (GST Extra)	Total Price (GST Extra)
26	01 35 13.43 01 35 43 02 61 00.01 31 23 33.01 Table 5	Soil/Sediment Disposal – Class A, Not Contaminated Includes screening of debris and salvageable materials from soil, stockpiling, loading, manifesting, transport, and offsite disposal at permitted facility.	Tonne	800		
27	01 35 13.43 01 35 43 02 61 00.01 31 23 33.01 Table 5	Soil/Sediment Disposal – Class B, < HWR (metals, PAH, hydrocarbons) Includes screening of debris and salvageable materials from soil, stockpiling, loading, manifesting, transport, and offsite disposal at permitted facility.	Tonne	1055		
28	01 35 13.43 01 35 43 02 61 00.01 31 23 33.01 Table 5	Soil/Sediment Disposal – Class C, > HWR (metals, PAH, hydrocarbons) Includes screening of debris and salvageable materials from soil, stockpiling, loading, manifesting, transport, and offsite disposal at permitted facility.	Tonne	25		
29	01 35 13.43 01 35 43 02 61 00.01 31 23 33.01	General Refuse and Construction/Demolition Waste Disposal Includes stockpiling, loading, manifesting, transport and offsite disposal at permitted facility.	Tonne	3100		
30	01 35 13.43 01 35 43 02 61 00.01 31 23 33.01	Salvageable Materials Disposal Includes stockpiling, loading, manifesting, transport and offsite disposal at permitted facility.	Tonne	220		
31	01 35 13.43 01 35 43 02 61 00.01 31 23 33.01	Backfilling, Recontouring and Regrading Area of Impact 3 Includes all equipment, manpower and material necessary to backfill Area of Impact 3 with excavated soil deemed suitable for backfilling and/or soil located in immediately adjacent areas. Includes equipment, manpower and material necessary to place, compact, recontour and regrade excavation area. This cost will include any downtime related to wildlife protection activities. Contractors will not be paid for standby time associated with analytical turnaround time (TAT).	Lump Sum	1		
32	01 35 13.43 01 35 43 02 61 00.01 31 23 33.01	Backfilling, Regrading and Terracing Main Debris Zone Includes all equipment, manpower and material necessary to backfill and compact Main Debris Zone to mitigate erosion and geotechnical concerns and health and safety hazards. Includes all equipment, manpower and material necessary to recontour and regrade excavation area. Includes all equipment, manpower and material necessary to construct cross-slope terraces in the Main Debris Zone. This cost will include any downtime related to wildlife protection activities. Contractors will not be paid for standby time associated with analytical turnaround time (TAT).	Lump Sum	1		
33	01 35 43 02 61 00.01 31 23 33.01	Water Control Includes all equipment, manpower and material necessary to control surface runoff at site and to keep excavation areas from accumulating water.	Day	1		
34	01 35 13.43 01 74 11 01 77 00 01 78 00	Site Closure Includes materials, equipment and manpower required for final cleaning as well as disposal of waste materials generated during final cleaning.	Lump Sum	1		
35	01 33 00 01 78 00	Close Out Submittals and As-built Documents	Lump Sum	1		
		TOTAL ESTIMATED COST				

** Weather Days apply when the weather is such that work at the site must be halted. Pre-approval to charge for a weather delay must be received from the PWGSC Site Project Manager. The PWGSC Project Manager has sole discretion to determine if a weather delay applies or not.

Standby time is not associated with delay costs related to wildlife and plant protection activities by the Environmental Monitors during project activities, for sample turn-around time, nor is it associated with sample collection, testing or inspection carried out by PWGSC and/or its designated agent and/or attending project meetings. Standby time is also not associated with any and all time required for PWGSC to review and approve requests for change orders. All standby time must be pre-authorized by the PWGSC Project Manager and must be beyond the control of the Contractor (i.e.-extreme weather, significant changes to project requested by the PWGSC, etc).
Except of Lump Sum prices, all unit price quantities shown above are estimated only. All payments will be made on the basis of actual quantities.
Invoicing: Invoices are to be made out to the name and address indicated on the 1st page of the resulting contract.

TABLE 1: SOIL CHEMISTRY RESULTS - PETROLEUM HYDROCARBON CONSTITUENTS AND MTBE (mg/kg)

Sample ID	Date	Depth (m)	HSVL (ppmv)	Benzene	Ethylbenzene	Toluene	Xylenes	MTBE	F1 (C6-10)	F2 (C10-16)	F3 (C16-34)	F4 (C34-50+)
TP1-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP1-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP1-4	29-Oct-2013	3.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-3	29-Oct-2013	2.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-4	29-Oct-2013	3.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP2-5	29-Oct-2013	4.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP3-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP3-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP4-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP5-1	29-Oct-2013	0.5	10	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP6-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-1	29-Oct-2013	0.5	10	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-2	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
DUP A (Dup TP7-2)	29-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-3	29-Oct-2013	2.0	---	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP7-4	29-Oct-2013	3.0	15	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	170	84
TP7-5	29-Oct-2013	4.0	10	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	64	< 50
TP8-1	29-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-2	29-Oct-2013	1.0	5	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-3	29-Oct-2013	2.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-4	29-Oct-2013	3.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP8-5	29-Oct-2013	4.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP10-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP11-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP11-2	30-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
DUP B (Dup TP11-2)	30-Oct-2013	1.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP11-3	30-Oct-2013	2.0	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP12-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP13-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
TP14-1	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
DUP D (Dup TP14-1)	30-Oct-2013	0.5	LTDL	< 0.005	< 0.015	< 0.05	< 0.075	< 0.2	< 10	< 30	< 50	< 50
CCME ALfgs		ns	ns	0.0068	0.018	0.08	2.4	ns	---	---	---	---
CCME ALfg		ns	ns	0.0068	0.018	0.08	2.4	ns	---	---	---	---
CCME ALfvs		ns	ns	---	---	---	---	---	610	3100	ns	ns
CCME ALfvb		ns	ns	---	---	---	---	---	710	3600	ns	ns
CCME ALgwf		ns	ns	---	---	---	---	---	170	230	ns	ns
CCME ALml		ns	ns	---	---	---	---	---	800	1000	3500	10000
CCME ALescf		ns	ns	---	---	---	---	---	210	150	1300	5600
CCME ALfdc		ns	ns	---	---	---	---	---	12000	6800	15000	21000

Notes:
m - metres
mg/kg - milligrams per kilogram
HSVL (ppmv) - headspace vapour level (parts per million by volume)
LTDL - Less than instrument detection limit
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
MTBE - methyl tert-butyl ether
VPHs - volatile petroleum hydrocarbons (C6-10), excluding benzene, ethylbenzene, toluene, xylenes
ns - no standard listed
CCME ALfgs: CCME Canadian Soil Quality Guidelines for BTEX, Agricultural Fine-grained Sub-surface (lowest human and environmental health guidelines)
CCME ALfg: CCME Canadian Soil Quality Guidelines for BTEX, Agricultural Fine-grained Surface (lowest human and environmental health guidelines)
CCME ALfvs: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Vapour Inhalation (indoor, slab-on-grade)
CCME ALfvb: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Vapour Inhalation (indoor, basement)
CCME ALgwf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Protection of Potable GW
CCME ALml: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Management Limit
CCME ALescf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Eco Soil Contact
CCME ALfdc: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Direct Contact

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

Sample ID	Date	Depth (m)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	IACR	Benzo(a)pyrene Equivalency
TP1-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP1-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	0.013	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.011	0.16	< 0.02
TP1-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-3	29-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP2-5	29-Oct-2013	4.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP3-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP3-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP4-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP5-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP6-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-2	29-Oct-2013	1.0	< 0.02	< 0.02	< 0.02	< 0.02	0.028	0.037	0.031	< 0.02	0.025	< 0.02	< 0.02	< 0.02	0.021	< 0.02	< 0.02	< 0.02	0.023	0.47	0.046
DUP A (Dup TP7-2)	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-3	29-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP7-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	0.015	< 0.01	< 0.01	< 0.01	< 0.005	0.010	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.013	0.17	< 0.02
TP7-5	29-Oct-2013	4.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-1	29-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	0.011	0.023	< 0.01	< 0.01	0.012	< 0.005	< 0.01	< 0.01	0.011	< 0.01	< 0.01	< 0.01	< 0.01	0.24	< 0.02
TP8-2	29-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-3	29-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-4	29-Oct-2013	3.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP8-5	29-Oct-2013	4.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP10-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP11-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP11-2	30-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
DUP B (Dup TP11-2)	30-Oct-2013	1.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP11-3	30-Oct-2013	2.0	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP12-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP13-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
TP14-1	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
DUP D (Dup TP14-1)	30-Oct-2013	0.5	< 0.005	< 0.005	< 0.004	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.15	< 0.02
CCME TPE/IACR		ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	1	5.3
CCME ALpw		ns	ns	ns	ns	see IACR	see IACR	see IACR	see IACR	see IACR	see IACR	see IACR	ns	ns	see IACR	ns	ns	ns	ns	ns	ns
CCME ALdh		ns	ns	ns	ns	see TPE	see TPE	see TPE	see TPE	see TPE	see TPE	see TPE	ns	ns	see TPE	ns	ns	ns	ns	ns	ns
CCME ALsc		ns	ns	ns	2.5	ns	20	ns	ns	ns	ns	ns	50	ns	ns	ns	ns	ns	ns	ns	ns
CCME ALi		ns	21.5	ns	61.5	6.2	0.6	6.2	ns	6.2	6.2	ns	15.4	15.4	ns	ns	8.8	43	7.7	ns	ns
CCME ALfl		ns	0.28	320	ns	ns	8800	ns	ns	ns	ns	ns	ns	0.25	ns	ns	0.013	0.046	ns	ns	ns
CCME ALi		ns	ns	ns	ns	0.1	ns	0.1	ns	0.1	ns	0.1	ns	ns	0.1	ns	ns	0.1	0.1	ns	ns
CCME ALe		ns	ns	ns	2.5	ns	20	ns	ns	ns	ns	ns	50	ns	ns	ns	0.6	ns	ns	ns	ns

Notes:
m - metres
PAH - polycyclic aromatic hydrocarbons
TPE - Total Potency Equivalency (1X10-5).
IACR - Index of Additive Cancer Risk (for the protection of potable water)
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 ALpw: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Human Health guidelines, Protection of Potable Water
Exceeds CCME ALdh: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Human Health guidelines, Direct Contact
Exceeds CCME ALsc: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Soil Contact
Exceeds CCME ALi: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Soil and Food Ingestion
Exceeds CCME ALfl: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Protection of Freshwater Life
Exceeds CCME ALi: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
Exceeds CCME ALe: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Environmental Health
Exceeds CCME TPE/IACR: CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - TPE and IACR Calculations

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

Sample ID	Date	Depth (m)	pH	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium (+6)	Chromium (total)	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Tin	Uranium	Vanadium	Zinc
TP1-1	29-Oct-2013	0.5	**8.84**	0.47	6.05	122	0.27	0.140	< 0.1	16.8	8.25	15.4	17.9	0.0196	< 0.5	20.1	< 0.2	< 0.1	< 0.05	2.9	0.803	10.9	65.2
TP1-2	29-Oct-2013	1.0	**8.33**	0.97	6.23	128	0.28	0.371	---	18.2	9.06	18.4	24.9	0.0199	0.54	22.0	< 0.2	< 0.1	< 0.05	4.5	0.696	11.6	111
TP1-3	29-Oct-2013	2.0	**8.46**	---	---	---	---	0.073	---	---	---	---	9.34	---	---	18.6	---	---	---	< 2	---	---	42.7
TP1-4	29-Oct-2013	3.0	**8.90**	0.29	5.78	94.7	0.21	0.054	---	14.1	7.96	13.9	8.10	0.0090	< 0.5	18.4	< 0.2	< 0.1	< 0.05	< 2	0.727	9.35	37.7
TP2-1	29-Oct-2013	0.5	**8.57**	0.44	6.17	111	0.31	0.163	< 0.1	18.4	8.97	16.1	17.3	0.0163	< 0.5	25.0	< 0.2	< 0.1	< 0.05	< 2	0.636	12.3	70.5
TP2-2	29-Oct-2013	1.0	**8.56**	0.43	5.88	107	0.25	0.175	---	16.3	8.43	16.5	18.3	0.0166	< 0.5	19.9	< 0.2	< 0.1	< 0.05	< 2	0.569	10.3	69.5
TP2-3	29-Oct-2013	2.0	**8.32**	1.21	6.58	152	0.30	1.01	---	21.5	9.07	24.4	40.2	0.0190	0.74	21.7	< 0.2	0.11	< 0.05	**7.7**	0.527	11.3	168
TP2-4	29-Oct-2013	3.0	**8.13**	0.31	5.85	107	0.25	0.114	---	14.7	8.12	14.3	9.39	0.0119	< 0.5	18.2	< 0.2	< 0.1	< 0.05	< 2	0.360	10.9	43.6
TP2-5	29-Oct-2013	4.0	**8.25**	1.00	6.96	143	0.24	0.920	---	19.2	8.61	38.3	47.1	0.0208	1.04	21.9	< 0.2	< 0.1	< 0.05	**69.4**	0.512	11.0	179
TP3-1	29-Oct-2013	0.5	**8.86**	0.30	5.56	86.6	0.26	0.071	< 0.1	17.3	8.70	14.2	10.3	0.0211	< 0.5	21.4	< 0.2	< 0.1	< 0.05	< 2	0.686	11.1	46.6
TP3-2	29-Oct-2013	1.0	**8.64**	0.30	5.89	86.5	0.26	0.067	---	17.5	9.47	14.3	9.38	0.0133	0.52	21.5	< 0.2	< 0.1	< 0.05	< 2	0.696	10.8	45.8
TP4-1	29-Oct-2013	0.5	**9.01**	0.40	5.94	107	0.26	0.107	---	16.6	8.27	14.8	13.0	0.0138	< 0.5	19.8	< 0.2	< 0.1	< 0.05	< 2	0.649	11.0	50.4
TP5-1	29-Oct-2013	0.5	**9.16**	0.37	7.14	145	0.25	0.064	---	14.4	8.00	15.4	9.37	0.0198	< 0.5	18.7	< 0.2	< 0.1	< 0.05	< 2	0.739	9.70	37.2
TP6-1	29-Oct-2013	0.5	**8.67**	0.74	5.75	110	0.24	0.101	---	12.1	7.28	14.3	10.6	0.0085	< 0.5	16.6	< 0.2	< 0.1	< 0.05	< 2	0.641	9.04	42.7
TP7-1	29-Oct-2013	0.5	**8.88**	0.39	6.02	101	0.28	0.127	< 0.1	16.8	8.69	15.2	14.9	0.0162	< 0.5	20.9	< 0.2	< 0.1	< 0.05	< 2	0.610	11.2	96.2
TP7-2	29-Oct-2013	1.0	**8.21**	1.40	6.49	138	0.27	0.783	---	18.5	9.06	27.5	45.5	0.0220	0.90	**70.4**	< 0.2	< 0.1	0.053	**25.5**	0.641	10.8	**306**
DUP A (Dup TP7-2)	29-Oct-2013	1.0	**8.25**	1.00	6.04	132	0.28	1.11	---	18.5	8.76	26.6	**76.0**	0.0243	0.72	**72.0**	< 0.2	0.14	< 0.05	**14.8**	0.450	10.0	**251**
TP7-3	29-Oct-2013	2.0	**8.09**	2.94	6.97	173	0.30	0.973	---	18.9	8.69	28.1	**81.4**	0.0302	0.80	21.2	< 0.2	0.16	< 0.05	**10.7**	0.598	11.7	**288**
TP7-4	29-Oct-2013	3.0	7.75	1.47	7.10	159	0.24	**15.6**	---	18.8	8.67	36.8	**127**	0.0245	1.32	22.3	< 0.2	0.11	< 0.05	**13.8**	0.452	9.57	**493**
TP7-5	29-Oct-2013	4.0	**8.45**	1.06	6.13	112	0.24	0.614	---	17.2	8.53	21.1	42.0	0.0435	0.65	21.9	< 0.2	< 0.1	< 0.05	**6.5**	0.559	9.96	**213**
TP8-1	29-Oct-2013	0.5	**8.26**	0.54	6.16	108	0.25	0.283	< 0.1	17.0	8.42	16.4	14.9	0.0190	< 0.5	20.1	< 0.2	< 0.1	< 0.05	< 2	0.604	10.4	61.0
TP8-2	29-Oct-2013	1.0	**8.73**	0.48	6.00	105	0.27	0.212	---	16.0	8.43	16.7	17.5	0.0149	< 0.5	19.7	< 0.2	< 0.1	< 0.05	< 2	0.595	10.5	70.9
TP8-3	29-Oct-2013	2.0	**8.38**	0.90	6.07	138	0.26	0.599	---	17.0	8.25	24.3	41.8	0.0175	0.69	20.2	< 0.2	< 0.1	< 0.05	**9.7**	0.535	10.4	177
TP8-4	29-Oct-2013	3.0	**8.39**	0.50	5.97	121	0.25	0.333	---	14.7	7.79	16.9	24.7	0.0238	< 0.5	18.9	< 0.2	< 0.1	< 0.05	2.1	0.491	9.60	86.9
TP8-5	29-Oct-2013	4.0	**8.41**	0.56	5.93	112	0.24	0.404	---	14.3	7.81	17.2	23.9	0.0261	< 0.5	18.3	< 0.2	< 0.1	< 0.05	3.8	0.510	9.74	158
TP10-1	30-Oct-2013	0.5	**8.49**	0.36	6.30	85.7	0.29	0.085	---	15.9	8.58	14.9	12.9	0.0129	< 0.5	20.9	< 0.2	< 0.1	< 0.05	< 2	0.472	10.7	46.4
TP11-1	30-Oct-2013	0.5	**9.01**	0.29	5.70	70.7	0.27	0.075	< 0.1	16.3	8.09	13.5	9.03	0.0086	< 0.5	20.8	< 0.2	< 0.1	< 0.05	< 2	0.417	10.4	42.7
TP11-2	30-Oct-2013	1.0	**8.50**	0.31	5.76	89.9	0.27	0.064	---	17.3	8.52	14.3	9.92	0.0098	< 0.5	21.1	< 0.2	< 0.1	< 0.05	< 2	0.427	11.2	46.5
DUP B (Dup TP11-2)	30-Oct-2013	1.0	**8.50**	0.31	5.69	86.7	0.29	0.095	---	17.3	8.67	14.6	12.8	0.0213	< 0.5	21.0	< 0.2	< 0.1	< 0.05	< 2	0.434	11.0	54.6
TP11-3	30-Oct-2013	2.0	**9.36**	0.31	6.15	86.6	0.27	0.070	---	17.5	8.47	13.7	9.84	0.0085	< 0.5	21.4	< 0.2	< 0.1	< 0.05	< 2	0.670	11.2	44.9
TP12-1	30-Oct-2013	0.5	**8.46**	0.33	5.79	87.5	0.24	0.071	< 0.1	14.7	7.44	13.6	11.2	0.0156	< 0.5	18.2	< 0.2	< 0.1	< 0.05	< 2	0.478	10.3	43.6
TP13-1	30-Oct-2013	0.5	**8.76**	0.49	5.88	114	0.25	0.184	< 0.1	15.8	8.16	16.3	19.6	0.0298	< 0.5	19.5	< 0.2	< 0.1	< 0.05	2.9	0.626	10.7	72.5
TP14-1	30-Oct-2013	0.5	**8.94**	0.31	6.13	69.1	0.29	0.077	---	20.6	9.91	14.9	12.8	0.0250	< 0.5	25.0	< 0.2	< 0.1	< 0.05	< 2	0.707	12.4	58.5
DUP D (Dup TP14-1)	30-Oct-2013	0.5	**8.96**	0.30	5.91	68.1	0.28	0.066	---	19.8	9.54	14.9	11.1	0.0159	< 0.5	24.0	< 0.2	< 0.1	< 0.05	< 2	0.690	11.7	52.2
CCME AL		ns	>6<8	20	12	750	4	1.4	0.4	64	40	63	70	6.6	5	50	1	20	1	5	23	130	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
Exceeds CCME AL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Agricultural

TABLE 4: SITE-SPECIFIC SOIL TARGETS - AREA OF IMPACT 3

Parameter	Site-Specific Soil Target (mg/kg)
Benzene	0.0068
Ethylbenzene	0.018
Toluene	0.08
Xylenes	2.4
MTBE	320
F1 (C6-10)	170
F2 (C10-16)	150
F3 (C16-34)	1300
F4 (C34-50+)	5600
Acenaphthene	0.28
Acenaphthylene	320
Anthracene	2.5
Benzo(a)anthracene	0.1
Benzo(a)pyrene	0.6
Benzo(b)fluoranthene	0.1
Benzo(g,h,i)perylene	ns
Benzo(k)fluoranthene	0.1
Chrysene	6.2
Dibenzo(a,h)anthracene	0.1
Fluoranthene	15.4
Fluorene	0.25
Indeno(1,2,3-c,d)pyrene	0.1
2-Methylnaphthalene	ns
Naphthalene	0.013
Phenanthrene	0.046
Pyrene	0.1
IACR	1
Benzo(a)pyrene Equivalency	5.3
pH	>6<8
Antimony	20
Arsenic	12
Barium	750
Beryllium	4
Cadmium	3.8
Chromium (+6)	0.4
Chromium (total)	64
Cobalt	40
Copper	79
Lead	120
Mercury	6.6
Molybdenum	5
Nickel	50
Selenium	1
Silver	20
Thallium	1
Tin	50
Uranium	23
Vanadium	130
Zinc	200

Notes:
mg/kg - milligrams per kilogram
ns - SSRT not developed

TABLE 5: SOIL CHARACTERIZATION CLASSES FOR DISPOSAL

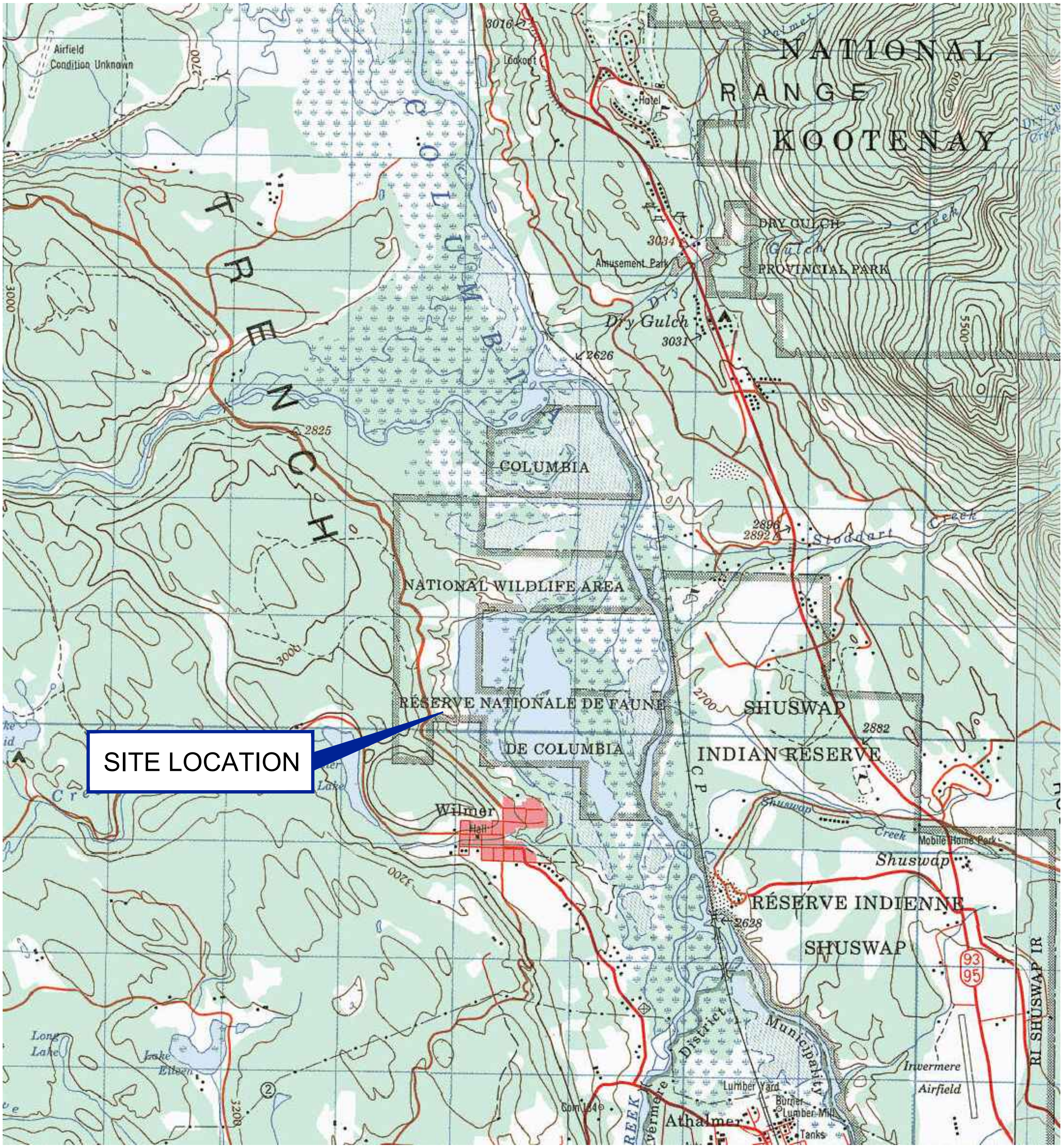
Parameter	Class A Not Contaminated Classification - CSR Sched 7 Column II	Class B Contaminated Soil < HW Classification	Class C Contaminated Soil > HW Classification
Benzene	≤0.04 mg/kg	≤0.5 mg/L waste extract and/or ≤25 mg/kg soil	>0.5 mg/L waste extract and/or >25 mg/kg soil
Ethylbenzene	≤1 mg/kg	≤0.24 mg/L waste extract and/or ≤250 mg/kg soil	>0.24 mg/L waste extract and/or >250 mg/kg soil
Toluene	≤1.5 mg/kg	≤2.4 mg/L waste extract and/or ≤150 mg/kg soil	>2.4 mg/L waste extract and/or >150 mg/kg soil
Xylenes	≤5 mg/kg	≤30 mg/L waste extract and/or ≤250 mg/kg soil	>30 mg/L waste extract and/or >250 mg/kg soil
Total BTEX	-	≤1000 mg/kg soil	>1000 mg/kg soil
MTBE	≤320 mg/kg	-	-
VPHs	≤200 mg/kg	-	-
EPH(C10-19)	≤1000 mg/kg	-	-
EPH(C19-32)	≤1000 mg/kg	-	-
LEPHs	≤1000 mg/kg	-	-
HEPHs	≤1000 mg/kg	-	-
Total VPHs+LEPHs+HEPHs	-	≤30000 mg/kg soil	>30000 mg/kg soil
Acenaphthene	-	-	-
Acenaphthylene	-	-	-
Anthracene	-	-	-
Benzo(a)anthracene	≤1 mg/kg	-	-
Benzo(a)pyrene	≤1 mg/kg	≤0.001 mg/L waste extract	>0.001 mg/L waste extract
Benzo(b)fluoranthene	≤1 mg/kg	-	-
Benzo(g,h,i)perylene	-	-	-
Benzo(k)fluoranthene	≤1 mg/kg	-	-
Chrysene	-	-	-
Dibenzo(a,h)anthracene	≤1 mg/kg	-	-
Fluoranthene	-	-	-
Fluorene	-	-	-
Indeno(1,2,3-c,d)pyrene	≤1 mg/kg	-	-
2-Methylnaphthalene	-	-	-
Naphthalene	≤5 mg/kg	-	-
Phenanthrene	≤5 mg/kg	-	-
Pyrene	≤10 mg/kg	-	-
PAH TEQ	-	≤100 mg/kg soil	>100 mg/kg soil
pH	>2.0 and < 12.5	>2.0 and < 12.5	> 2.0 and < 12.5
Antimony	≤20 mg/kg	-	-
Arsenic	≤15 mg/kg	≤2.5 mg/L waste extract	>2.5 mg/L waste extract
Barium	≤400 mg/kg	≤100 mg/L waste extract	>100 mg/L waste extract
Beryllium	≤4 mg/kg	-	-
Cadmium	≤1.5 mg/kg	≤0.5 mg/L waste extract	>0.5 mg/L waste extract
Chromium (+3)	≤60 mg/kg	-	-
Chromium (+6)	≤60 mg/kg	-	-
Chromium (total)	≤60 mg/kg	≤5 mg/L waste extract	>5 mg/L waste extract
Cobalt	≤50 mg/kg	-	-
Copper	≤90 mg/kg	≤100 mg/L waste extract	>100 mg/L waste extract
Lead	≤100 mg/kg	≤5 mg/L waste extract	>5 mg/L waste extract
Mercury	≤15 mg/kg	≤0.1 mg/L waste extract	>0.1 mg/L waste extract
Molybdenum	≤10 mg/kg	-	-
Nickel	≤100 mg/kg	-	-
Selenium	≤3 mg/kg	≤1 mg/L waste extract	>1 mg/L waste extract
Silver	≤20 mg/kg	≤5 mg/L waste extract	>5 mg/L waste extract
Thallium	-	-	-
Tin	≤50 mg/kg	-	-
Uranium	≤16 mg/kg	≤10 mg/L waste extract	>10 mg/L waste extract
Vanadium	≤200 mg/kg	-	-
Zinc	≤150 mg/kg	≤500 mg/L waste extract	>500 mg/L waste extract
Flash Point	-	> 75 degrees Celsius	< 75 degrees Celsius
Sulphur, elemental and sulfides (total)	-	≤ 500 mg/kg (total)	> 500 mg/kg (total)
Paint Filter Test	-	PASS	FAIL

Notes:
mg/L - milligrams per litre, refers to Leachate Quality per Hazardous Waste Regulation
mg/kg - milligrams per kilogram
PAH TEQ - polycyclic aromatic hydrocarbon toxicity equivalent value relative to benzo[a]pyrene per Part 1 of the Hazardous Waste Regulation
Soil which meets both the Class A and Class B classifications will be considered to be Class A material.

TABLE 6: SURFACE WATER BASELINE CONDITIONS - TDS AND TSS

Sample ID	Date	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)
2014-SW-1	9-Oct-2014	173	< 3.0
2014-SW-2	9-Oct-2014	171	4.3

Notes:
mg/L - milligrams per litre
< - less than analytical detection limit indicated



REFERENCED FROM : ETOPO MAP SYSTEM
NTS MAP 82 K/09

SCALE 1:50,000
WHEN PLOTTED AT 8.5 x 11 PAGE SIZE

0 0.5 1 2 3 km

SLR

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
REMEDIATION TENDER SPECIFICATIONS

Drawing
SITE LOCATION MAP

Date November 18, 2014	Scale AS SHOWN	Drawing No. 1
File Name S_219-05112-00010-A2-1	Project No. 219.05112.00010	

SCALE 1:1250
WHEN PLOTTED AT 24 x 24 PAGE SIZE
0 25 50 75 m

NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS 010047749–MCS101–R02.DWG AND (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

- PROVINCIAL – FEDERAL BOUNDARY
- FENCE
- SEDIMENT CURTAIN
- VEGETATION EXCLUSION AREA
- PROPOSED SOIL AND/OR DEBRIS REMOVAL AREAS

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WILMER, BC

Report
REMEDIATION TENDER SPECIFICATIONS

Drawing
SITE LAYOUT

Date November 18, 2014	Scale AS SHOWN	Drawing No. 2
File Name S_219-05112-00010-A2-2	Project No. 219.05112.00010	

SLR

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

SCALE 1:1500
WHEN PLOTTED AT 11 x 17 PAGE SIZE
0 25 50 100 m

NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS 010047749–MCS101–R02.DWG AND (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

- PROPERTY BOUNDARY
- CONTOUR LINES – MAJOR
- CONTOUR LINES – MINOR
- HIGH WATER MARK
- EXISTING WATER LEVEL

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WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

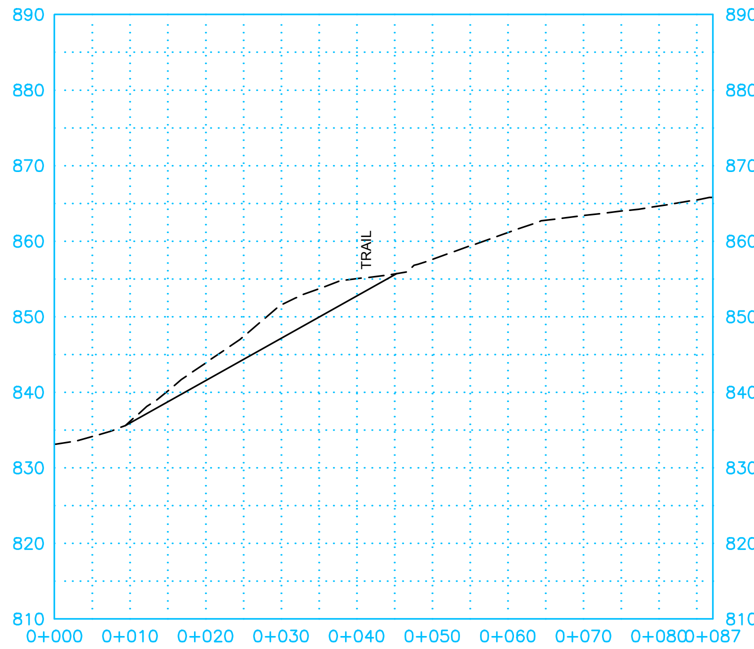
Report
REMEDIATION TENDER SPECIFICATIONS

Drawing
TOPOGRAPHIC LAYOUT OF REMEDIATION AREAS

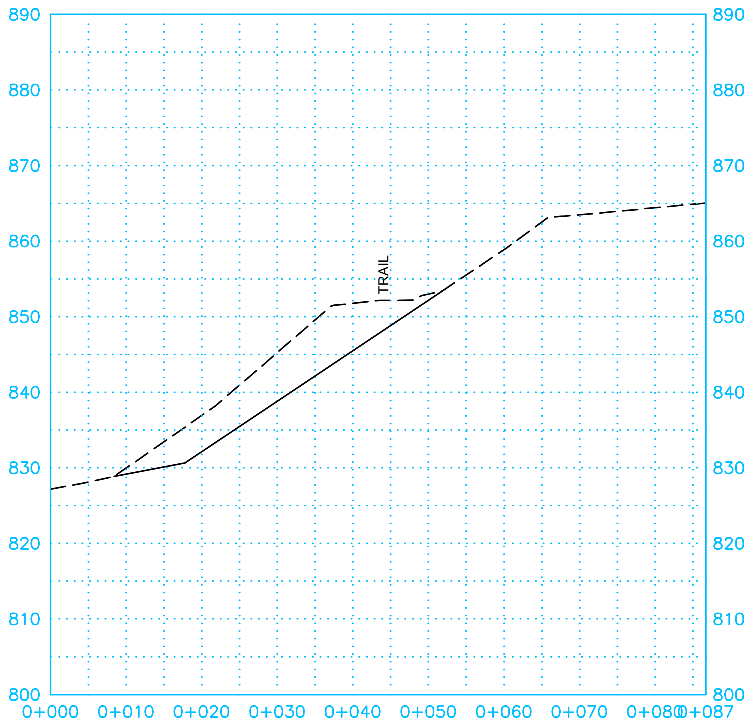
Date November 18, 2014	Scale AS SHOWN	Drawing No. 3
File Name S_219-05112-00010-A2-3	Project No. 219.05112.00010	

SLR

ALIGNMENT 1



ALIGNMENT 2



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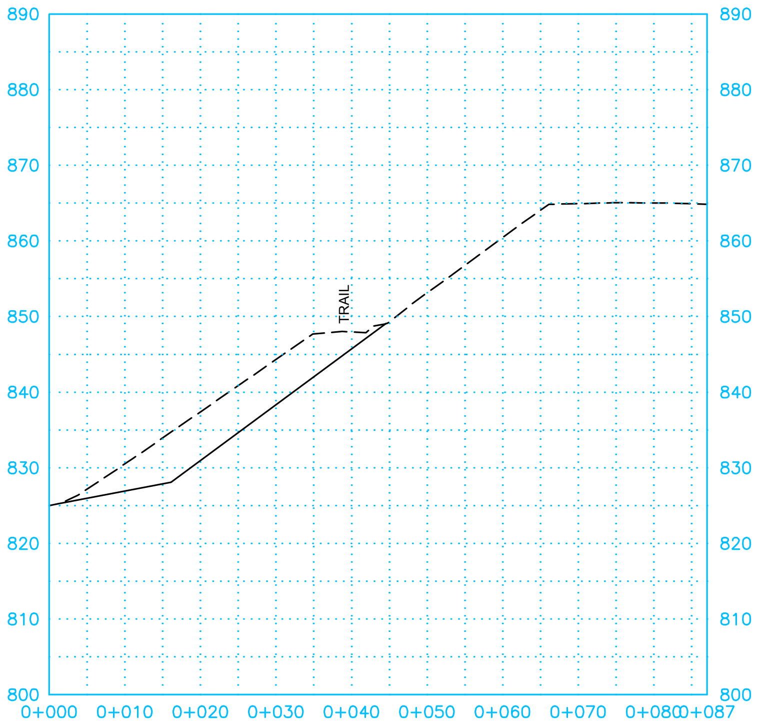

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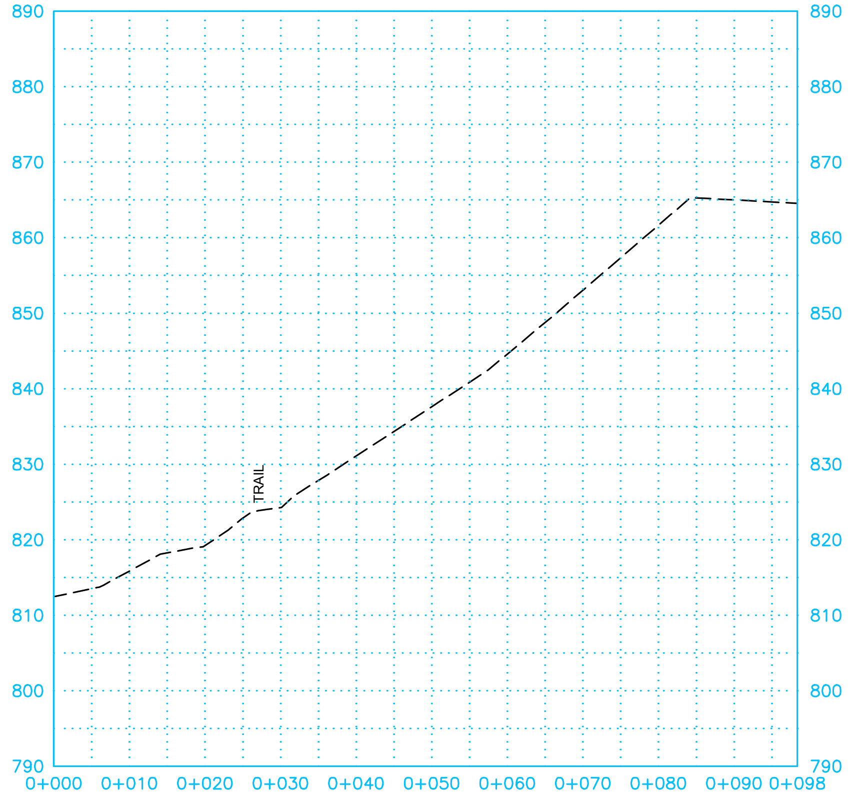

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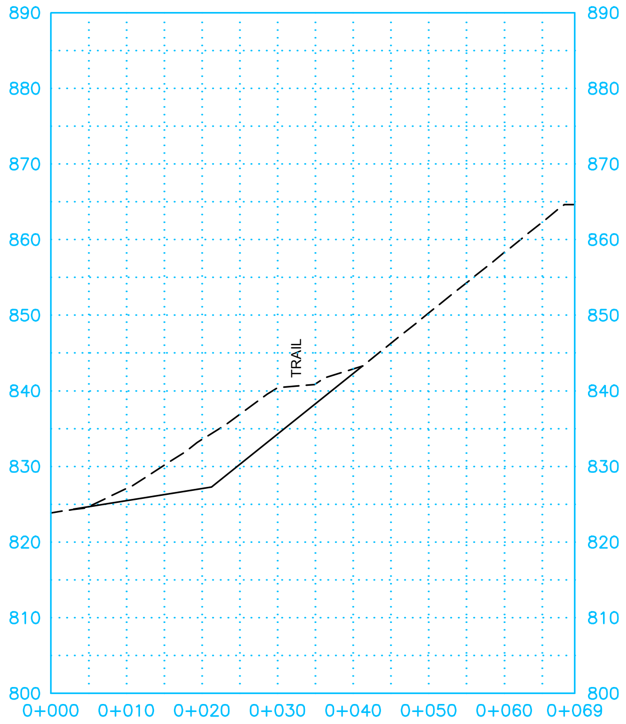

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

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NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS 010047749–MCS101–R02.DWG

LEGEND

EXISTING GRADE

ANTICIPATED NATURAL SLOPE

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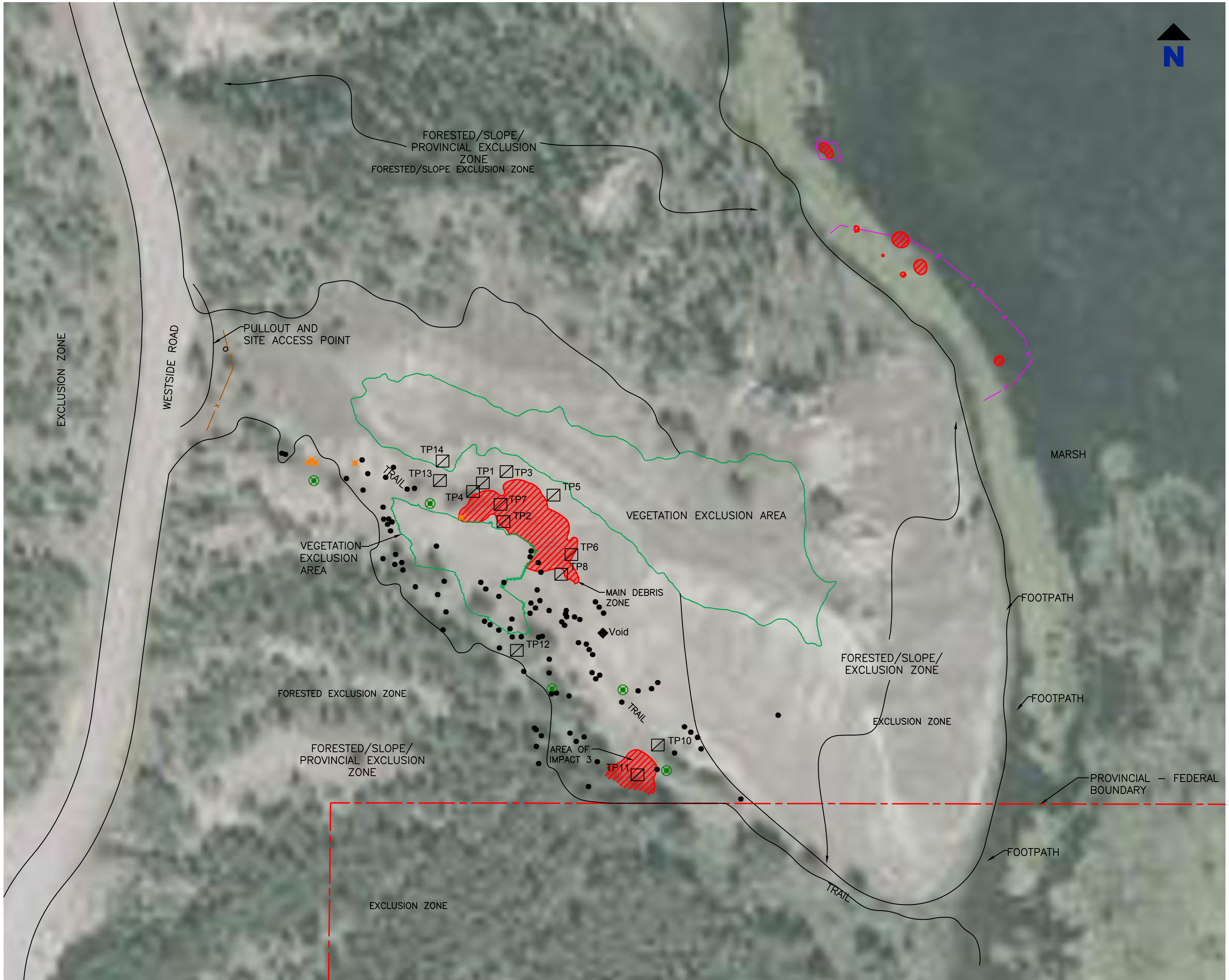
Report
REMEDIATION TENDER SPECIFICATIONS

Drawing
SLOPE CROSS-SECTION IN MAIN DEBRIS ZONE

Date November 18, 2014	Scale AS SHOWN	Drawing No. 4
File Name S_219-05112-00010-A2-4	Project No. 219.05112.00010	

SLR



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

NOTES

DRAWING COMPILED FROM SURVEY PLAN FROM FOCUS 010047749–MCS101–R02.DWG AND (ACAD2004)030400548–102–TP1–R1, DATE MARCH 28, 2010 AND ORTHOPHOTO FROM IMAGE PARKS CANADA

LEGEND

- PROPERTY BOUNDARY
- FENCE
- SEDIMENT FENCE
- VEGETATION EXCLUSION AREA
- PROPOSED SOIL AND/OR DEBRIS REMOVAL AREAS
- TEST PIT LOCATION
- SURFICIAL METAL DEBRIS/REFUSE
- BADGER BORROWS
- WILDLIFE TREES
- VOID

PUBLIC WORKS AND GOVERNMENT SERVICES
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BC

Report
REMEDIATION TENDER SPECIFICATIONS

Drawing
IMPACTED AREAS OF SOIL AND DEBRIS TO BE REMEDIATED

Date November 18, 2014	Scale AS SHOWN	Drawing No. 5
File Name S_219-05112-00010-A2-5	Project No. 219.05112.00010	

SLR

Photo 1: View of fence (Spring 2014).

Photo 2: View of trail area (Fall 2013).

Photo 3: View of upper part of Main Debris Zone (Fall 2013).

Photo 4: View of TP6 and TP8, lower part of Main Debris Zone (Fall 2013).

Photo 5: View of TP7 in Main Debris Zone (Fall 2013).

Photo 6: Debris observed in Main Debris Zone (Fall 2013).

Photo 7: View of test pit in Main Debris Zone (Fall 2013).

Photo 8: View of TP5 upslope of Main Debris Zone (Fall 2013).

Photo 9: Excavation in area of cavity/void in lower portion of trail (Fall 2013).

Photo 10: TP11 in Area of Impact 3 (Fall 2013).

Photo 11: Debris observed in Area of Impact 3 (Fall 2013).

Photo 12: Surficial debris located downslope of the Main Debris Zone (Fall 2013).

Photo 13: Surficial and partially buried debris in trail area (Fall 2013).

Photo 14: Surficial debris in trail area (Fall 2013).

Photo 15: Surficial debris in trail area (Fall 2014).

Photo 16: Surficial debris in trail area (Fall 2014).

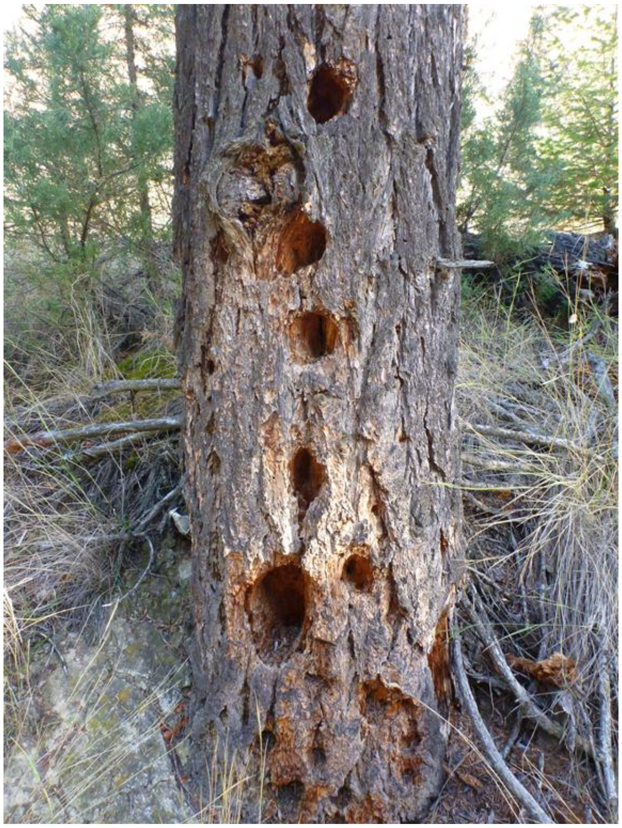


Photo 17: View of wildlife tree at site (Fall 2014).

Photo 18: Wildlife tree in trail area (Fall 2014).

Photo 19: Native vegetation exclusion zone on uplands bench (Fall 2014).

Photo 20: Native vegetation exclusion zone downslope of Main Debris Zone (left hand side of photograph) (Fall 2014).

Photo 21: Metal tank in marsh (Fall 2014).

Photo 22: Debris in marsh viewed from uplands bench above (Spring 2014).

Photo 23: View of marsh area and sediment curtain (Fall 2014).

Photo 24: View of foreshore exclusion zone in marsh area (Fall 2014).

Photo 25: Marsh conditions in February 2011.

Photo 26: View of pull-out area adjacent to site (February 2011).

APPENDIX F
Site-Specific Soil Remedial Targets

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

APPENDIX F: DERIVATION OF SSRTS

APPROACH

Scope

Site-Specific Remedial Targets (SSRTs) must be protective of all human and ecological receptors identified during the Human Health and Ecological Risk Assessment (HHERA) that are potentially exposed to soil within the area to be remediated. The SSRTs developed herein use exposure characteristics specific to potential receptors combined with COPC toxicity information for these receptors of concern. SSRTs calculated for each receptor of concern were compiled and compared to applicable guidelines and regional background concentrations. An SSRT was then recommended for each COPC to be protective of all receptors assuming future parkland use.

COPC Selection

SSRTs were developed for metals that were identified in the Uplands HHERA as COPCs, and for metals that exceeded applicable standards in the trail area adjacent to the area to be remediated. Identified COPCs for SSRT development include cadmium, hexavalent chromium, copper, lead, nickel, thallium, tin, and zinc.

HUMAN HEALTH SSRT DEVELOPMENT

SSRTs were derived following a risk-based approach for specific remediation priorities. It is understood that the area will be fenced and public access prohibited; therefore SSRTs were derived for a teen trespasser based on the following assumptions:

- Teens and young adults are considered the most likely receptors to be able to access the area and to disregard signage; however, teens are slightly more sensitive receptors than young adults based on similar soil contact rates, but lower body weight.
- Children under the age of 12 (i.e., pre-teens) are unlikely to access the area without adults present as the location is a sufficient distance from residential areas such that unescorted access would be limited or unlikely. It is assumed that adults escorting children would comply with signage prohibiting access to the affected area.

Health protective SSRTs were developed for the teen trespasser assuming soil exposure to the remediated area. Receptor characteristics were obtained from Health Canada (2010) and CCME (2006), and using best professional judgment (Table 1). The applicable pathways for exposure of the trespasser to soil were identified as:

- incidental ingestion of soil,
- dermal contact with soil, and
- inhalation of soil particulates.

As the COPCs are limited to metals, and metals are not volatile, exposure to soil vapour was not identified as an exposure pathway of concern.

Human Toxicological Reference Values (TRVs)

Human TRVs for carcinogenic and non-carcinogenic substances, as presented in Table 3, were selected in the HHERA based on the following order of preference.

- Federal Contaminated Site Risk Assessment in Canada. Part II: Health Canada Toxicological Reference Values and Chemical-Specific Factors, Version 2.0. Contaminated Sites Division, Health Canada, September 2010
- Integrated Risk Information System (IRIS), United States Environmental Protection Agency, 2014. Available on-line at: http://www.epa.gov/iris/
- RAIS, 2014. US Department of Energy, Oak Ridge National Laboratory, Risk Assessment Information System.
- BCMOE, 2013. Director's Interim Standard for Contaminated Sites. Industrial Land Use, Human Health Protection - Intake of Contaminated Soil Standard for Lead

TRVs used for SSRT development that differ from those in the Site-Specific HHERA (December 12, 2012) include:

- Cadmium: An Inhalation RfC was obtained from the RAIS database and was based on ATSDR (2012). The HHERA did not have an RfC and therefore an inhalation hazard quotient was not previously calculated.

- Hexavalent Chromium: Oral TDI and Inhalation RfC from the IRIS database (US EPA, 2014). The HHERA did not have a TDI or RfC and therefore hazard quotients were not previously calculated.

SSRT Calculation

Human health exposure equations from the following sources were used to derive the SSRTs.

- Federal Contaminated Site Risk Assessment in Canada. Part I: Guidance on Preliminary Quantitative Risk Assessment (PQRA), Version 2.0. Contaminated Sites Division, Health Canada, September 2010 (revised 2012).
- A Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines, Canadian Council of Ministers of the Environment, 2006. PN 1332

Due to the availability and specificity of TRVs for direct soil contact pathways (i.e., incidental soil ingestion, dermal contact with soil and inhalation of soil particulates), SSRTs were developed as follows: combined oral and dermal SSRTs, and SSRTs for inhalation of soil particulates. Equations from CCME (2006) used to derive SSRTs are presented at the end of this memo.

Recommended Human Health SSRTs ($SSRT_H$)

The proposed SSRTs are based on a combination of site-specific receptor information and soil guidelines applicable to the site and to a teen trespasser. The SSRTs are calculated based on toxicity to individual contaminants and are not based on cumulative effects from all COPCs with a common target or mode of action. It should be noted that several of the metals for which SSRTs were derived affect the lung or respiratory system and this should be considered when evaluating post-remedial soil concentrations above applicable standards.

The final human health SSRTs ($SSRT_H$) for the teen trespasser for each metal COPC are presented in Table 4.

ECOLOGICAL SSRT DEVELOPMENT

SSRTs were developed for COPCs in soil which may present a risk to ecological receptors identified in the HHERA (SLR, 2012).

Ecological Receptors and Applicable Exposure Pathways

Ecological receptors of concern potentially exposed to soil were identified in the HHERA (in accordance with FCSAP DERA guidance). As it is not practical to derive SSRTs for each species potentially present on site, SSRTs were considered for the surrogate receptors or receptor groups identified in the HHERA. SSRTs were derived for these receptors of concern if their exposure pathway to soil was complete and deemed significant to the local population or individual (SAR).

The final list of ecological receptors and their potential exposure pathways to soil are presented in Table A below.

Table A: Complete Exposure Pathways Identified for Ecological Receptors of Concern

Receptor Group		Surrogate ROC	Soil Exposure Pathway		
			Contact	Ingestion	Ingestion of Food Items
Terrestrial Vegetation	Moss, Grass, Shrubs/Forbs, Trees	Community Level	●		
Soil Organisms	Microbes and Ground-dwelling Invertebrates	Community Level	●		
Bird	Herbivorous	Song Sparrow	●	●	●
	Insectivorous	American Robin	●	●	●
	Omnivorous	American Crow	●	●	●
Mammal	Herbivorous	Prairie Vole	●	●	●
	Insectivorous	Vagrant Shrew	●	●	●
	Omnivorous	Deer Mouse	●	●	●
Reptile	Carnivorous	Rubber Boa	●	●	●

Terrestrial vegetation, soil organisms, birds and mammals may be exposed to soil contaminants by direct contact. Soil invertebrates may also be exposed to soil contaminants through ingestion during movement or feeding. Herbivorous, insectivorous, and omnivorous birds and mammals may also ingest soil during feeding or preening.

Wildlife potentially feeding on invertebrates, plants, or other animals inhabiting the site may be exposed to contaminants absorbed into the tissues of their food items. Carnivorous birds and mammals tend to have large home ranges and obtain their food items throughout that range. The COPCs identified herein are assumed to not bioaccumulate significantly or to biomagnify through the food chain. As a result, significant exposure to carnivores is considered unlikely.

TRVs

TRVs were derived in the HHERA for ecological receptors of concern. As described in Section 4.3 of the HHERA (SLR, 2012), derivation of TRVs followed the guidance provided in Technical

Module B of the FCSAP DERA guidance where data was available. The TRVs used in the HHERA were based on LOELs (lowest observed effect levels) for mammal and bird species.

Final selected TRVs for each receptor are presented in Tables J (plants and soil invertebrates) and K (wildlife) of the HHERA.

SSRTs were derived based on continued use as a national wildlife area / refuge and thus, a default of Agricultural and Parkland guidelines relevant for site-related receptors and exposure pathways have been considered.

SSRT Calculation

The equations used to derive SSRTs are based on the recommended equation to characterize ecological risks outlined in the FCSAP DERA guidance (Azimuth 2012).

The SSRTs for plants and soil organisms are based on a hazard quotient (HQ) of 1, and are essentially equal to the TRV (see equations presented after the text).

For wildlife, the SSRT is the soil concentration resulting in a HQ of 1 using the Goal Seek function in the food chain model created for the HHERA.

For cadmium and nickel, SSRTs were not calculated as these two metals were not identified in the HHERA as COPCs for ecological health. However, an overall ecological SSRT ($SSRT_E$) was selected based on receptor-specific guidelines.

Recommended Ecological SSRTs

SSRTs derived for each receptor or receptor group are presented in Table 5.

RECOMMENDED SSRTS

The SSRT selected for each COPC must be protective of both human and ecological receptors and must follow federal guidelines. A summary of the overall final recommended SSRTs and the rationale for their selection is presented in Table 6.

EQUATIONS USED TO CALCULATE HUMAN HEALTH SSRTS

Threshold contaminants – Combined Oral and Dermal Exposure

$$SSRT = \frac{(TDI - EDI) * SAF * BW}{[(AF_G * SIR) + (AF_S * SR)] * ET_1}$$

Threshold contaminants – Inhalation of particulates

$$SSRT = \frac{(TDI - EDI) * SAF * BW}{AF_L * IR_S * ET_1 * ET_2}$$

Non-threshold (Carcinogenic) contaminants – Inhalation of particulates

$$SSRT = \frac{RSD * BW}{[(AF_G * SIR) + (AF_S * SR) + (AF_L * IR_S)] * ET}$$

Where:

SSRT	=	Site Specific Soil Remedial Target (mg/kg)
SAF	=	Soil Allocation Factor (unitless) = 0.2 for inorganic contaminants
TDI	=	Tolerable Daily Intake (mg/kg-day)
EDI	=	Estimated Daily Intake (mg/kg-day)
RSD	=	Risk Specific Dose (mg/kg-day) (based on 10^{-5} risk level)
BW	=	Body Weight (kg)
AF_G	=	Relative Gastrointestinal Absorption Factor (unitless)
SIR	=	Soil Ingestion Rate (kg/day)
AF_S	=	Relative Dermal Absorption Factor (unitless)
SR	=	Soil Dermal Contact Rate (kg/day) (see below)
AF_L	=	Relative Inhalation Absorption Factor (unitless)
IR_S	=	Soil inhalation rate (kg/day)
ET	=	Exposure term = 1 for non-threshold contaminants (unitless)
ET_1	=	Exposure term (threshold contaminants)
	=	days per week/7 x weeks per year/52 (unitless)
ET_2	=	Exposure term (threshold contaminants) (unitless)
	=	hours per day/24 (unitless)

The soil dermal contact rate was calculated using the following CCME (2006) equation:

$$SR = (SA_H * DL_H + SA_O * DL_O) * EF$$

Where:

SA_H	=	Exposed Surface Area of Hands (cm^2)
SA_O	=	Exposed Surface Area of Body Surfaces other than Hands (cm^2)
DL_H	=	Dermal Loading of Soil to Hands (kg/cm^2-event)
DL_O	=	Dermal Loading of Soil to Body Surfaces other than Hands (kg/cm^2-event)
EF	=	Exposure Frequency (events/day)

EQUATIONS USED TO CALCULATE ECOLOGICAL HEALTH SSRTS

Soil Contact for Plants and Soil Organisms:

$$SSRT = HQ \times TRV$$

Where:

SSRT = Site Specific Remedial Target concentration for soil (mg/kg)

HQ = Hazard Quotient = 1

TRV = Toxicity Reference Value (mg/kg)

In order to meet the requirement of a HQ = 1, the SSRT in soil must be equal to the TRV value. Therefore, derivation of the SSRT is as follows:

$$SSRT = TRV$$

Food and Soil Ingestion for Mammals and Birds

The Excel Goal Seek function was used to calculate the SSRT based on the original food chain model in the HHERA (SLR, 2012).

Table 1. Receptor Characteristics

Parameter	Acronym	Value	Unit	Source
TEEN (12-19 YR) TRESPASSER				
Life Expectancy	LE	80	years	HC, 2012
Exposure Frequency	EF	1	events/day	HC, 2012
Hours per Day Exposed	D1	0.06	(1.5) hours/24 hrs*	HC, 2012
Days per Week Exposed	D2	0.3	(2) days/7 days	BPJ
Weeks per Year Exposed - soil pathway	D3	1	(52) weeks/ 52 weeks	HC, 2012
Total Years Exposed to Site	D4	8	years	HC, 2012
Body Weight	BW	59.7	kg	HC, 2012
Soil Ingestion Rate	IR_S	0.00002	kg/day	HC, 2012
Inhalation Rate	IR_A	15.60	m^3/day	HC, 2012
Absorption Factor for Lung	RAF_L	1	unitless	HC, 2012
Particulate Concentration in Air	P_{Air}	7.60E-10	kg/m^3	HC, 2012
Skin Surface Area - Hands - Soil	SA_H	800	cm^2	HC, 2012
Skin Surface Area - Arms + Legs - Soil	SA_{AL}	7200	cm^2	HC, 2012
Soil Loading to Exposed Skin - Hands	SL_H	1.00E-07	kg/cm^2-event	HC, 2012
Soil Loading to Exposed Skin - Other Body Parts	SL_O	1.00E-08	kg/cm^2-event	HC, 2012
Soil Dermal Contact Rate	SR	1.52E-04	kg/day	Calculated - See Notes
Particulate Concentration in Air	P_{Air}	7.60E-10	kg/m^3	HC, 2012

Notes:

* Teens recommended time spent outdoors is 1.5 hrs/day.

BPJ = Best Professional Judgement

SR = Soil Dermal Contact Rate = EF [(SA_H * SL_H) + (SA_A * SL_{NH})]

Source:

Health Canada (HC). 2012. Federal Contaminated Site Risk Assessment in Canada. Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA).

Table 2: Chemical and Site-Specific Properties

Chemical of Potential Concern	AF_{Dermal}		AF_{Oral}	SAF
	Unitless	Source	Unitless	unitless
Metals				
Cadmium	0.01	HC, 2010	1.0	0.2
Chromium (Hexavalent)	0.1	HC, 2010	1.0	0.2
Copper	0.1	HC, 2010	1.0	0.2
Lead	1	BC MOE, 2013*	1.0	0.2
Nickel	0.091	HC, 2010	1.0	0.2
Thallium	0.01	HC, 2010 (Default value)	1.0	0.2
Tin	0.01	HC, 2010 (Default value)	1.0	0.2
Zinc	0.1	HC, 2010	1.0	0.2

Notes:

AF_{Dermal} = Dermal Absorption Factors

AF_{Oral} = Oral (gastrointestinal) Absorption Factor

SAF - Soil Allocation Factor - 20% is recommended by CCME, 2006

* Values not applied in original HHERA

Sources:

BCMOE, 2013. Director's Interim Standard for Contaminated Sites. Industrial Land Use, Human Health Protection - Intake of Contaminated Soil Standard for Lead

CCME, 2006. Candaian Council of Ministers of the Environment. A Protocol for the Derication of Environmental and Human Health Soil Quality Guidelines. PN 1332.

HC, 2010. Health Canada. Part II: Health Canada Toxicological Reference Values (TRVs) and Chemical-Specific Factors.

Table 3: Chemical Toxicity Data

Chemical of Potential Concern	Oral TDI			Inhalation TDI				Carcinogenic WOE	Inhalation Risk Specific Dose				
	RfD_{Oral}	Target	Source	Inhalation RfC	RfD_I	Target	Source		InhalationSlope Factor	Risk Level	RSD_{Inh}	Target	Source
	mg/kg-day			mg/m^3	mg/kg-day				$(mg/kg/day)^{-1}$	unitless	(mg/kg/day)		
Metals													
Cadmium	1.00E-03	kidney	HC, 2010	1.00E-05	2.86E-06	Respiratory system	RAIS, 2014 (ATSDR, 2012)*	II (inh), - (oral) (HC) 1 (IARC) B1 (USEPA)	4.2E+01	1.0E-05	2.4E-07	Lung	HC, 2010
Chromium (Hexavalent)	3.0E-03	No effect reported	USEPA, 2014*	1.00E-04	2.86E-05	Lung	US EPA, 2014*	I (inh), - (oral) (HC) 1 (IARC) A (inh), D (oral) (USEPA)	3.2E+02	1.0E-05	3.1E-08	Lung	HC, 2010
Copper	1.3E-01	Liver, GIT	HC, 2010	NA	NA	NA	NA	- (HC) - (IARC) D (USEPA)	NA	NA	NA	NA	NA
Lead	1.3E-03	CNS	BC MOE, 2013	NA	NA	NA	NA	- (HC) 2A (IARC) B2 (USEPA)	NA	NA	NA	NA	NA
Nickel	1.1E-02	Reproductive system	HC, 2010	1.80E-05	5.14E-06	Lung/ Respiratory (metallic Ni)	HC, 2010	I (HC) 1,2B (IARC) A (USEPA): refinery dust	3	1.0E-05	3.3E-06	Lung, kidney, prostate, mouth	HC, 2010
Thallium	1.00E-05	CNS, lungs, heart, kidney, liver	RAIS, 2014 (PPRTV)	NA	NA	NA	NA	- (HC) - (IARC) - (USEPA)	NA	NA	NA	NA	NA
Tin	6.0E-01	Impaired Reproduction	RAIS, 2014 (HEAST)	NA	NA	NA	NA	- (HC) - (IARC) - (USEPA)	NA	NA	NA	NA	NA
Zinc	5.7E-01	Decreased blood enzymes	HC, 2010	NA	NA	NA	NA	- (HC) - (IARC) D (USEPA)	NA	NA	NA	NA	NA

Notes:

TDI - Tolerable Daily Intake

RSD_{Inh} - Inhalation Risk Specific Dose = Risk Level/ Inhalation Slope Factor, where Risk Level = $1x10^{-5}$

RfD_I - Inhalation Reference Dose, calculated from the RfCs using the following equation (RfD = (RfC * IR_A) / BW) and assuming an inhalation rate of 20 m^3/day and a body weight of 70 kg (US EPA).

RfD_{Oral} - Oral Reference Dose

HEAST - Health Effects Assessment Summary Tables, a database of human health toxicity values developed for the EPA Superfund and Resource Conservation and Recovery Act (RCRA).

NJEPA - New Jersey Department of Environmental Protection

OEHHA - Office of Environmental Health Hazard Assessment's Chronic, California Environmental Protection Agency, Chronic Reference Exposure Levels (RELS) from December 18, 2008 and the Cancer Potency Values (PDF) from July 21, 2009.

PPRTV - Provisional Peer Reviewed Toxicity Values for Superfund, derived by the EPA Superfund Health Risk Technical Support Center (STSC) for the EPA Superfund program.

'-' no carcinogenicity classification available

* Values not applied in original HHERA

Sources:

BCMOE, 2013. Director's Interim Standard for Contaminated Sites. Industrial Land Use, Human Health Protection - Intake of Contaminated Soil Standard for Lead

CCME, 2006. Candaian Council of Ministers of the Environment. A Protocol for the Derication of Environmental and Human Health Soil Quality Guidelines. PN 1332.

HC, 2009. Federal Contaminated Site Risk Assessment in Canada. Spreadsheet Tool for Human Health Detailed Quantitative Risk Assessment (DQRA).

HC, 2010. Health Canada. Part II: Health Canada Toxicological Reference Values (TRVs) and Chemical-Specific Factors.

RAIS, 2014. US Department of Energy, Oak Ridge National Laboratory, Risk Assessment Information System.

USEPA 2014. Integrated Risk Information System (IRIS).

Table 4: Human Health SSRTs

COPCs	$SSRT_T$ Threshold Effects		$SSRT_{NT}$ Non-Threshold Effects		Lowest	Applicable Guidelines		$SSRT_{HH}$*
	Oral + Dermal	Inhalation of Particulates	Oral + Dermal	Inhalation of Particulates				
Metals								
Cadmium	1.94E+03	1.61E+05	NA	1.20E+03	1.20E+03	14	AL - Soil Ingestion (without safety factor of 10 for ingeston of produce)	1.20E+03
Chromium (Hexavalent)	3.56E+03	1.61E+06	NA	1.57E+02	1.57E+02	8	AL/PL - Interim (CCREM 1991)	1.57E+02
Copper	1.81E+05	NA	NA	NA	1.81E+05	1100	AL/PL - Soil Ingestion	1.81E+05
Lead	3.16E+02	NA	NA	NA	3.16E+02	140	AL/PL - Soil Ingestion	3.16E+02
Nickel	2.14E+04	2.90E+05	NA	1.68E+04	1.68E+04	NA	-	1.68E+04
Thallium	1.94E+01	NA	NA	NA	1.94E+01	1	AL/PL - Provisional SQG_{HH} - Soil/food Ingestion	1.94E+01
Tin	1.17E+06	NA	NA	NA	1.17E+06	5 50	AL - Interim (CCREM 1991) PL - Interim (CCREM 1991)	1.17E+06
Zinc	6.77E+05	NA	NA	NA	6.77E+05	10000	BC CSR AL/PL - Soil Intake	6.77E+05

Notes:

All values are in milligrams per kilogram (mg/kg)

SSRT - Site-specific remedial target

$SSRT_{T\text{-}O+D}$ - SSRT for the oral and dermal exposure pathways due to a threshold effect

$SSRT_{T\text{-}I}$ - SSRT for the inhalation exposure pathway due to a threshold effect

$SSRT_{NT\text{-}D+O}$ - SSRT for the oral and dermal exposure pathways due to a non-threshold effect

$SSRT_{NT\text{-}I}$ - SSRT for the inhalation exposure pathway due to a non-threshold effect

* The $SSRT_{HH}$ is the lowest derived SSRT, unless it is below the applicable CCME guideline in which case the CCME guideline becomes the $SSRT_{HH}$.

Equations:

$$SSRT_{T-O+D} = \frac{(TDI_{Oral} - EDI) \times SAF \times BW}{\left[(AF_{Oral} \times IR_S) + (RAF_{Dermal} \times SR)\right] \times D_2 D_3} + BSC$$

$$SSRT_{T-I} = \frac{(TDI_{Inh} - EDI) \times SAF \times BW}{RAF_{Lung} \times IR_A \times P_{Air} \times D_1 \times D_2 \times D_3} + BSC$$

$$SSRT_{NT-I} = \frac{RSD_{Inh} \times BW}{(RAF_{Lung} \times IR_A \times P_{Air} \times D_2 \times D_3)} + BSC$$

See Tables 1 to 3 for acronyms used in these equations.

Table 5: Ecological SSRTs

COPC	Ecological Health												$SSRT_E$[c]
	Derived SSRTs										Applicable Guidelines		
	Invertebrate[a]	Plant[a]	Wildlife[b]							Lowest			
			Song sparrow	American robin	American crow	Deer Mouse	Vagrant shrew	Prairie vole	Rubber Boa				
Metals													
Cadmium[d]	-	-	-	-	-	-	-	-	-	-	3.8 10 54	AL - Soil and food ingestion PL - Soil Contact AL/PL - Nutrient/Energy Cycling	3.8
Chromium, Hexavalent	0.4	NA	9.19E+03	1.19E+03	7.41E+03	3.92E+04	1.15E+05	1.30E+07	6.36E+02	4.00E-01	0.4	AL/PL - Provisional SQG_E - Soil Contact	0.4
Copper	80	79	1.01E+04	1.14E+03	9.82E+03	1.73E+04	4.55E+04	1.79E+07	9.80E+04	7.90E+01	63	AL/PL - Soil and food ingestion	79
Lead	1700	120	1.25E+04	1.10E+03	5.41E+03	5.44E+04	1.34E+05	1.50E+07	1.46E+08	1.20E+02	70 300	AL - Soil and food ingestion AL/PL - Soil contact	120
Nickel[d]	-	-	-	-	-	-	-	-	-	-	50	AL/PL - Soil contact	50
Thallium	NA	1	NA	NA	NA	4.81E+01	1.17E+02	2.30E+04	NA	1.00E+00	1 1.4	AL - Soil and food ingestion AL/PL - Soil contact	1
Tin	2000	50	8.64E+03	1.10E+03	5.24E+03	2.20E+04	5.55E+04	9.09E+06	8.47E+04	5.00E+01	5	AL - Interim (1991)	50
Zinc	120	160	1.32E+06	2.02E+05	2.49E+05	1.95E+06	3.98E+06	2.35E+08	3.24E+06	1.20E+02	200	AL/PL - Soil contact, Nutrient and Energy Cycling	200

Notes:

COPC = Constituent of Potential Concern

[a] For plants, SSRT = TRV * HQ, where: TRV = Toxicity Reference Value, HQ = Hazard Quotient = 1 (See Table J in HHERA Report (2012) for invertebrate and plants/trees TRVs)

[b] For wildlife, the SSRT is the soil concentration resulting in a hazard quotient of 1 using the Goal Seek function in Excel to back-calculate.

[c] The $SSRT_E$ is the lowest derived SSRT, unless it is below the applicable CCME guideline in which case the CCME guideline becomes the $SSRT_E$.

[d] SSRTs for these COPCs were not calculated as described in note b as they were not included as COPCs for ecological health in the HHERA.

Table 6: SSRT Summary

COPC	Human Health			Ecological Health			BACKGROUND SOIL	Final SSRT	
	$SSRT_{HH}$	Applicable Guidelines		$SSRT_E$	Applicable Guidelines		Kootenay Region 4	Value	Rationale
Metals									
Cadmium	1199	14	AL - Soil Ingestion (without safety factor of 10 for ingeston of produce)	3.8	3.8 10 54	AL - Soil and food ingestion PL - Soil Contact AL/PL - Nutrient/Energy Cycling	1.5	3.8	The overal SSRT is equal to the CCME SQG_E which is below the derived $SSRT_{HH}$ and the CCME SQG_{HH}.
Chromium, Hexavalent	157	8	AL/PL - Interim (1991)	0.4	0.4	AL/PL - Provisional SQG_E - Soil Contact	-	0.4	The overal SSRT is equal to the lowest derived $SSRT_E$, equal to the CCME SQG_E, and below the derived $SSRT_{HH}$ and SQG_{HH}.
Copper	180822	1100	AL/PL - Soil Ingestion	79	63	AL/PL - Soil and food ingestion	45	79	The overal SSRT is equal to the lowest derived $SSRT_E$ which is above the CCME SQG_E and below the derived $SSRT_{HH}$ and CCME SQG_{HH}.
Lead	316	140	AL/PL - Soil Ingestion	120	70 300	AL - Soil and food ingestion AL/PL - Soil contact	75	120	The overal SSRT is equal to the derived $SSRT_E$, which is above the lowest $CCME_{Eco}$, and below the CCME SQG_{HH} and $SSRT_{HH}$.
Nickel	16785	NA	-	50	50	AL/PL - Soil contact	50	50	The overal SSRT is equal to the CCME SQG_E which is above the derived $SSRT_E$, below the lowest derived $SSRT_{HH}$ and equal to the regional background level.
Thallium	19.4	1	AL/PL - Provisional SQG_{HH} - Soil/food Ingestion	1	1 1.4	AL - Soil and food ingestion AL/PL - Soil contact	-	1	The overall SSRT is equal to the derived lowest $SSRT_E$, the CCME SQG_E, and the CCME SQG_{HH}, and is below the derived $SSRT_{HH}$.
Tin	1165149	5	AL - Interim (1991)	50	5	AL - Interim (1991)	4	50	The overall SSRT is equal to the CCME SQG_E, and SQG_{HH}, (interim) which are equal to the derived $SSRT_E$ for plants.
Zinc	676713	10000	BC CSR AL/PL - Soil Intake	200	200	AL/PL - Soil contact, Nutrient and Energy Cycling	200	200	The overall SSRT is equal to the CCME SQG_E (and regional background level), which is above the derived $SSRT_E$ and below the derived $SSRT_{HH}$ and the CCME SQG_H.

Notes:

COPC = Constituent of Potential Concern

APPENDIX G
SLR Field Methodology and QA/QC Procedures

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

SLR FIELD PROCEDURES

SLR conducted environmental sampling related to the remediation of soil at the unofficial refuse area within the Wilmer Marsh Unit of the Columbia National Wildlife Area. The field procedures for all works are presented in the following sections.

Soil Sample Collection

Excavation Limit Sample Collection

Excavation limit soil sampling of the walls and floor of the AI3 and MDZ excavations was completed following excavation activities and prior to re-contouring, with the exception of additional surface BETX samples collected in AI3 after re-contouring activities. Confirmatory samples were collected on an approximate 10 m grid along the floor and walls and approximately every metre vertically on the walls where similar material was encountered.

Samples were collected from all excavation walls where present and geotechnical considerations did not preclude sampling. For example, in the eastern portions of the MDZ, a south wall did not exist as the floor of the excavation sloped continuously down to the south toward the gully (blending into the existing topography).

Samples were collected directly from the walls and floor using a trowel, or from the excavator bucket, depending on the location and accessibility (e.g. along steep walls).

Test Pit Sample Collection

Samples were collected every vertical metre within each of the test pits. Samples were collected from the walls and base of the excavated test pits from the excavator bucket. Soil stratigraphy was recorded on test pit logs and test pit locations were recorded using the Trimble GPS.

Field Screening

Soil samples collected during the remediation were described and classified for soil structure, colour, moisture content, odour, and staining, if present. Soil samples were field-screened for the presence of combustible organic vapours using a fixed-volume headspace technique and a RKI Eagle combustible gas detector (Eagle), with the methane elimination feature activated. The Eagle was calibrated to two points prior to field use: 48% lower explosive limit (% LEL) and 400 parts per million volumetric (ppmv) of hexane.

A zipper-lock plastic bag was half-filled with soil and sealed for approximately ten minutes prior to puncturing and analyzing the headspace. The Eagle recorded the concentration of combustible organic vapours in ppmv or percentage of the LEL.

Sample Collection for Laboratory Analysis

Soil samples collected for laboratory analyses were placed in 125 mL laboratory-prepared glass jars, which were labelled and stored in an insulated ice-chilled cooler. Soil samples collected for BETX/F1 and VPH were sampled using a laboratory prepared syringe sampler (approximately 6 grams of soil, wet weight) which was placed into 40 mL glass vials holding 10 mL of methanol. The samples were subsequently transported with a completed chain-of-custody form to Maxxam for analysis.

SLR QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

The following outlines the procedures and results of the quality assurance/quality control program (QA/QC) implemented at the Site.

Field Procedures

QA/QC procedures used during soil sample collection, handling, identification and shipping procedures included:

- Sample containers used were supplied by the laboratory to minimize sample container contamination;
- Samples collected were placed directly in the laboratory supplied containers in the field; date and sample number were placed on each jar;
- Samples were stored in ice-chilled coolers in the field at approximate 4 degrees Celcius (°C) until delivery to the laboratory;
- Equipment and materials that contacted soil (e.g. trowels, shovels) were decontaminated between sample collection to minimize the possibility for cross contamination;
- Soil samples obtained using the excavator bucket were collected from soil that had not come in contact with the bucket itself;
- New nitrile gloves were used for each sampling event to minimize the potential for cross-contamination;
- Chain-of-custody forms were completed to accompany all samples shipped to the laboratory;
- All samples were submitted to and analyzed by the laboratory within hold times specified by the laboratory to assure reliable results; and
- BFDs were submitted for analysis at an approximate ratio of 1:10 (see below).

Sampling procedures were conducted in accordance with:

- BCMOE. Technical Guidance on Contaminated Sites #1. "Site Characterization and Confirmation Testing" (January, 2009); and
- SLR Standard Field Procedures.

Laboratory QA/QC Program

All samples were analyzed by Maxxam or ALS Global (ALS), which are accredited by the Canadian Association for Laboratory Accreditation Inc. for the parameters analyzed during this project. Maxxam and ALS use CCME and BCMOE recognized methods to conduct laboratory analyses. As conveyed by the laboratory, method blanks, control standards samples, certified reference material standards, method spikes, replicates, duplicates, surrogates and instrument blanks are routinely analyzed as part of the QA/QC programs.

Maxxam and ALS conduct routine internal laboratory QA/QC analyses to validate the reliability of the analytical results. The internal laboratory analysis indicated the replicates were within the acceptable limits for samples analyzed at the site. The results of laboratory internal quality control replicates can be found within the attached laboratory analytical reports contained in Appendix N. SLR's QA/QC review of the Maxxam lab reports is provided in Appendix N.

Field Duplicate Results

To verify the reproducibility of the laboratory analyses and to demonstrate that the field sampling techniques utilized by SLR personnel are capable of yielding reproducible results, blind field duplicates (BFDs) were submitted to the project laboratory for analysis of selected parameters. When possible, the relative percent difference (RPD) of the sample and its duplicate was calculated. RPD is defined as the difference of the absolute value of the duplicate results divided by the average of the duplicate results, expressed as a percentage. Analytical error increases near the method detection limit (MDL); therefore the RPD calculation should not be performed unless the concentrations of both samples are greater than five times the MDL. The acceptable RPD values for various parameters in soil and water are presented in below:

- 60% for an individual metals and 60% for a batch average for metals in soil;
- 80% for an individual parameter and 80% for a batch average for organic analyses (BETX/VPH/MTBE, light and heavy extractable petroleum hydrocarbons (LEPH/HEPH, respectively) and PHC F1-F4) in soil; and
- 100% for an individual PAH parameter and 100% for a batch average for PAHs in soil.

Soil RPD Results

SLR collected and submitted BFD samples during the remediation program which were analysed for one or more of the following parameters: metals, PAHs, BETX/MTBE, PHC F1-F4, grain size, leachable metals, leachable PAH, leachable BETX, SWOG, elemental sulfur, flashpoint and paint filter. The number of BFD samples analyzed are summarized below.

Table 1
Summary of BFD and Total Samples Analyzed

Parameter	Number of Samples Analyzed (Total)	Number of BFD Samples Analyzed
Total Metals	90	9
BETX/MTBE	45	5
PHC F1	45	5
PHC F2-F4	45	5
PAH	45	5
TCLP Metals	20	2
TCLP BETX	16	2
TCLP PAH	17	2
Elemental Sulfur, SWOG, Flashpoint, Paint Filter	17	2

As summarized above, BFD samples were analyzed at an approximate ratio of one per every 10 samples analyzed.

A summary of the RPD values that exceeded their target values is presented in Table 2 below.

Table 2
Summary of RPD Exceedances in Duplicate Pairs

Duplicate Pairs	Parameter	RPD Value (%)	Target Value (%)
A3-DUP1 and A3-NW-B-0.5-1.0	zinc	119.5	60
MDZ-WA2-1.0-2.0 and MDZ-WA-1.0-2.0	cadmium	122	60
	molybdenum	70	60
MDZ-DUP-A and MDZ-EW-2-3	copper	162	60
MDZ-DUP-C and MDZ-SW4-2.0-3.0	zinc	83	60
MDZ-DUP-F and MDZ-NW6-B7-5.0	copper	64.1	60
	zinc	180.9	60
TP15-A and TP15-2-1-2	antimony	63	60
	cadmium	68	60
	tin	120	60
	zinc	76	60
TP15-B and TP15-5-1-2	leachable iron	70	60

Some individual RPDs were higher than the recommended target value for metals but overall the average RPDs from these samples were less than the target value of 60 %. Higher individual RPD values could be explained by the heterogeneity of the materials sampled (i.e. soil with significant amounts of metallic debris).

RPD values for BFD collected during the excavation program are also presented in Tables 1 through 13, at the bottom of their respective tables.

APPENDIX H
Ice Survey

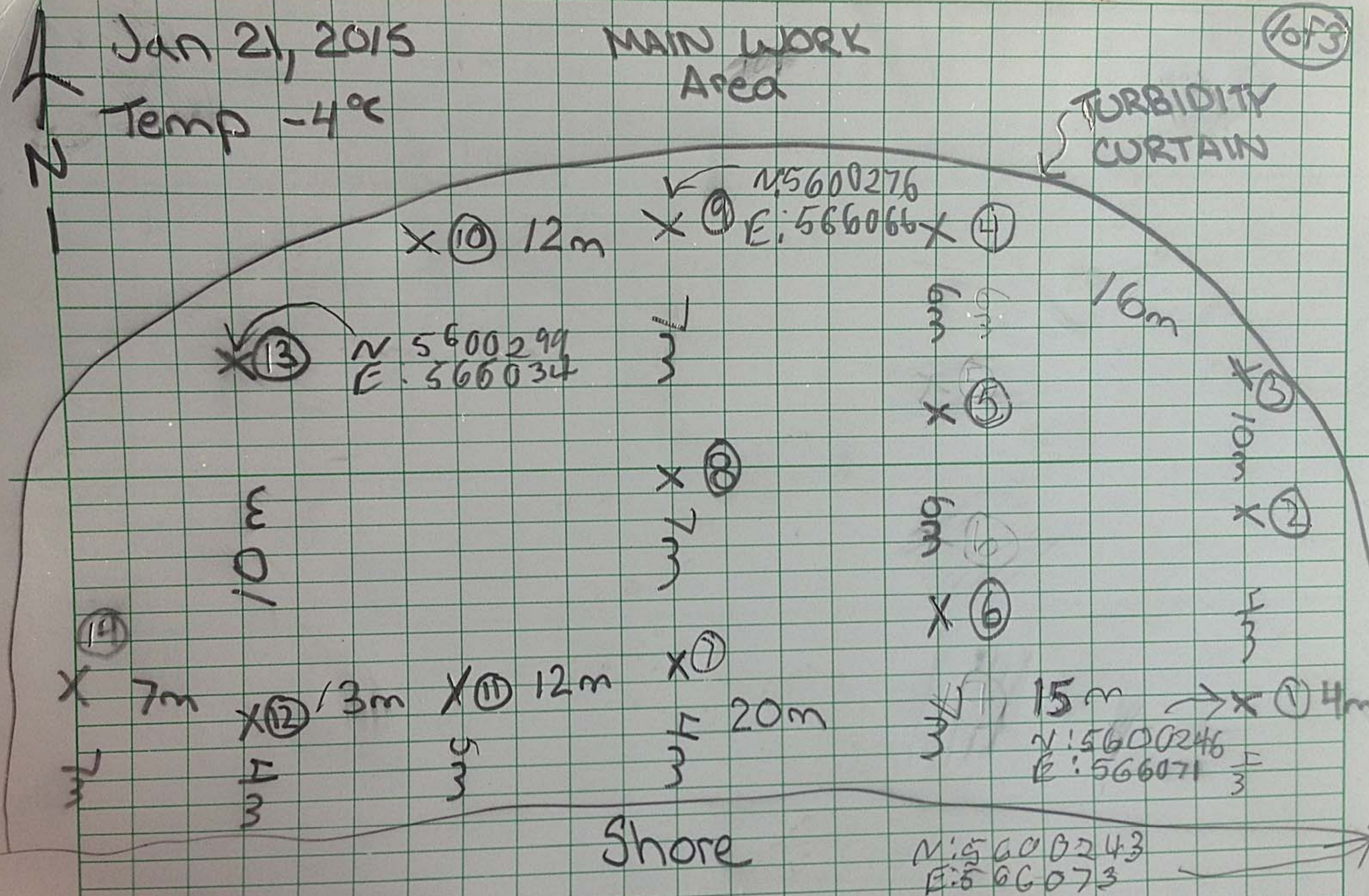
2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

Jan 21, 2015

Temp -4°c

MAIN WORK Area

1 of 3



	ICE	SOD ICE	WTR		DESC
1	0.15				DRY
2	0.28	0.28	0.52		
3	0.27	0.36	1.52		
4	0.28	0.36	1.79		
5	0.28	0.32	1.34		
6	0.24	0.24	0.32		
7	0.22	0.20	0.38		
8	0.28	0.31	1.14		
9	0.28	0.35	2.10		
10	0.28	0.34	1.90		
11	0.28	0.28	0.70		
12	0.28	0.29	0.53		
13	0.28	0.28	2.20		
14	0.28	0.28	1.15		
15	0.23	0.28	0.6	" 0.07 of snow	
16	0.18	0.28	1.2	Ice on	
17	0.25	0.25	1.7	good ICE "	

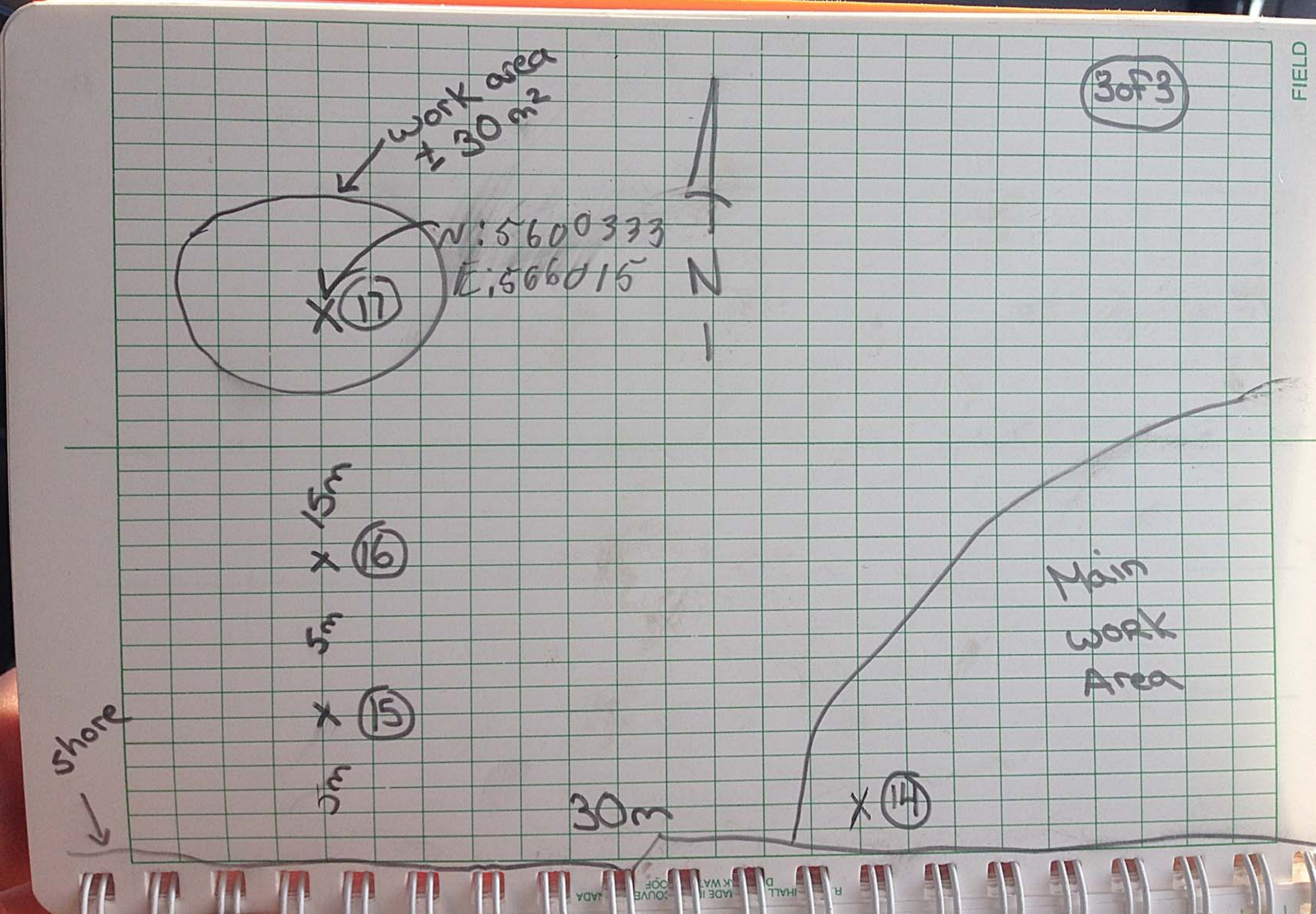
Bin 4x6 ft 2000lbs

Bell 407

BELL 407 5,250 lbs

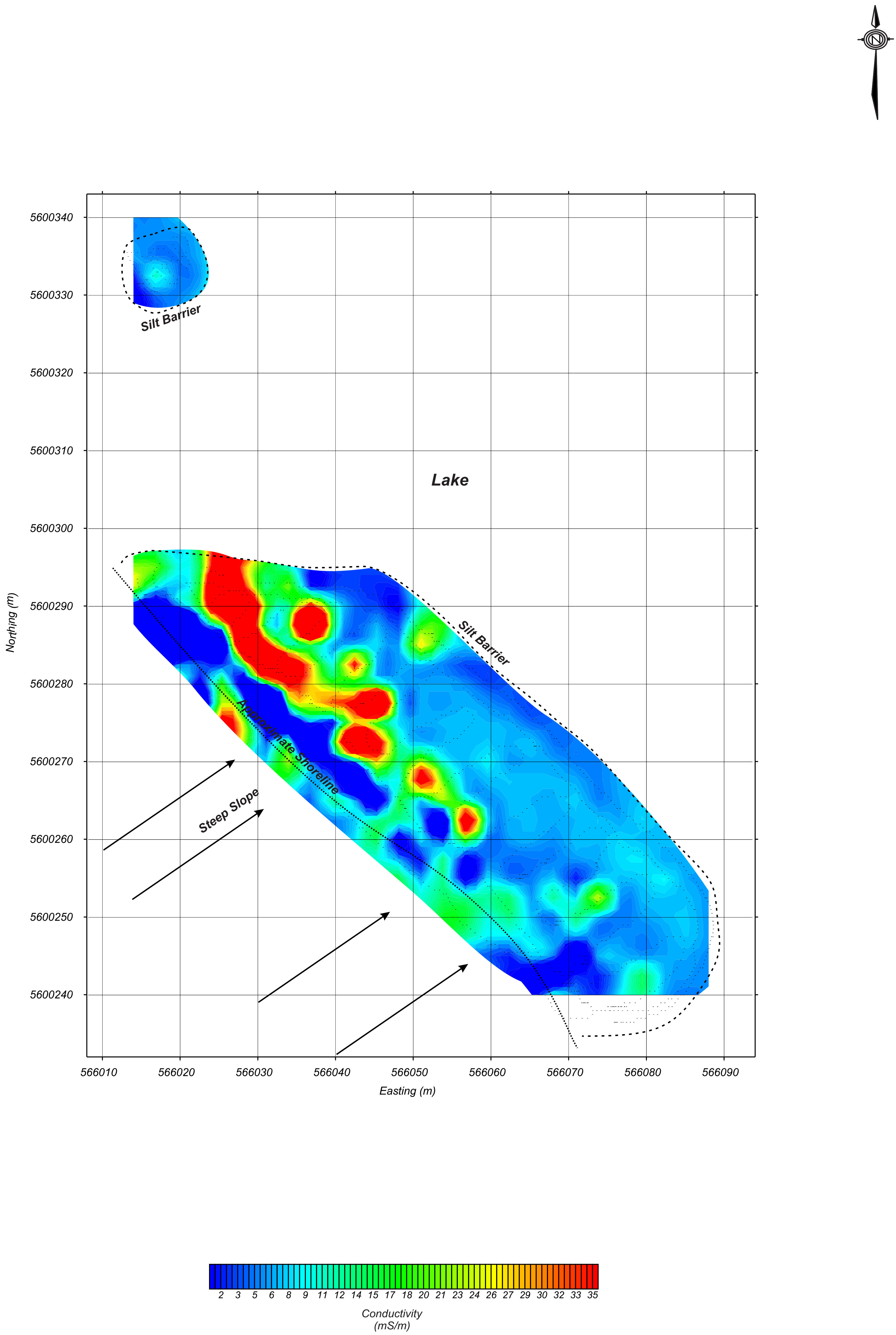
BELL 212 11,200

→ JAN ELBOW 403-[illegible]00-3[illegible]


3 of 3
FIELD
work area
± 30 m²
N:5600333
E:566015
N
17
15m
16
5m
15
5m
shore
30m
14
Main
WORK
Area

APPENDIX I
AKS Geoscience Electromagnetic Survey

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010



Note: Grid Coordinates are in UTM, NAD 83, Zone 11

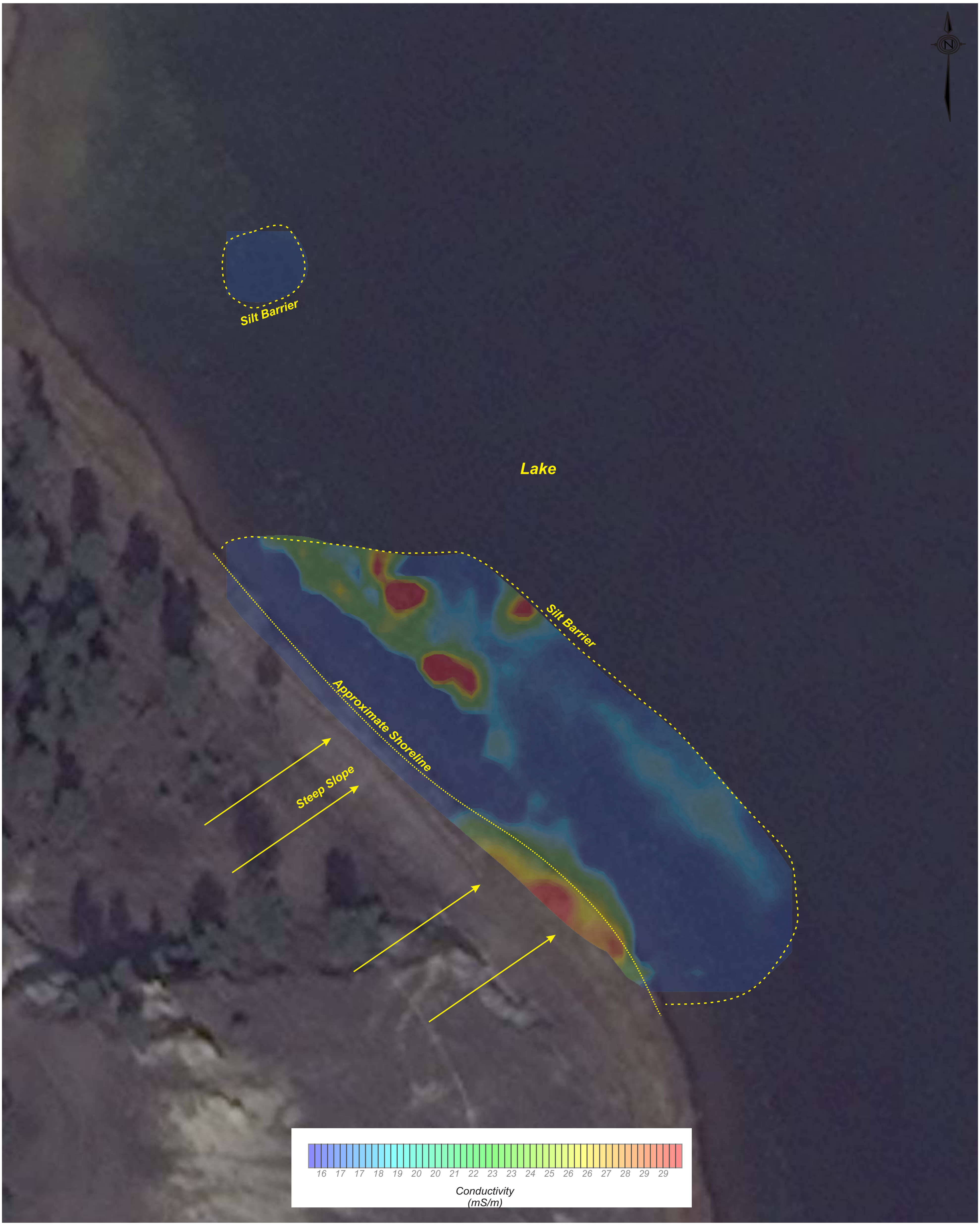
EM38 CONDUCTIVITY DATA
MARSH REFUSE AREA
WILMER, BRITISH COLUMBIA

Prepared by :
AKS GEOSCIENCE

Client: SLR

Job No. 1593 | Scale: 1:500

Dwg No. 2 | Date: Jan. 21, 2015

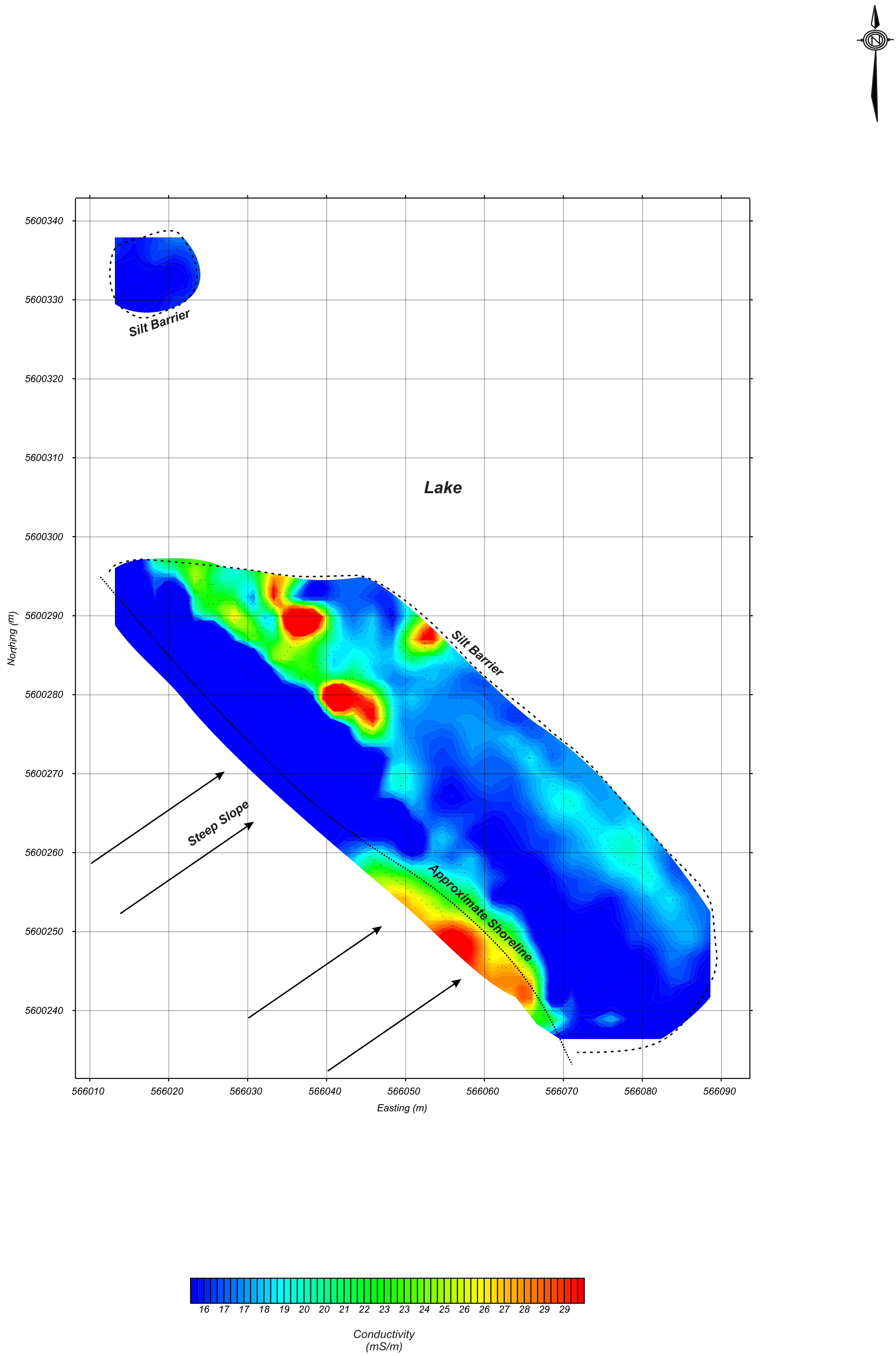


Scale
1:500

0 20 40 m

Note: Grid Coordinates are in UTM, NAD 83, Zone 11

EM31 DATA OVERLAID ON AERIAL PHOTO MARSH REFUSE AREA WILMER, BRITISH COLUMBIA	Prepared by : aks GEOSCIENCE		Client: SLR
			Job No. 1593 / Scale: 1:500
			Dwg No. 3 / Date: Jan. 21, 2015



Note: Grid Coordinates are in UTM, NAD 83, Zone 11

EM31 CONDUCTIVITY DATA MARSH REFUSE AREA WILMER, BRITISH COLUMBIA	Prepared by : AKS GEOSCIENCE		Client: SLR
			Job No. 1593 / Scale: 1:500
			Dwg No. 1 / Date: Jan. 21, 2015

APPENDIX J
Master Sample Tracker

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

TEST PIT SAMPLE TRACKING SHEET - FOR DISPOSAL
Client: PWGSC
Location: Wilmer Marsh Site
Project Number: 219.05112.00010

										UTM Coordinates				Analyses																
Sample ID	Date Sampled	Duplicate	Sampled By	Wall / Floor	Depth (m)	Eagle RKI Reading (ppm)	Hydrocarbon Staining (N - L - M - H)	Hydrocarbon Odour (N - L - M - H)	Soil Description and Comments	Northing	Easting	Lab COC #	Maxxam Job #	CCME Metals	CCME PAH	CCME F1 + BETX	CCME F2-F4	CSR VPH	CSR EPH	TCLP BTEX	TCLP PAH	TCLP Metals	SWOG	Flashpoint	Paint filter	Total elemental sulfur/sulfides	pH	Hold	Comments	Status of Analysis
TP15-1-0.5-1	27-Jan-15		MC/KN	Wall	0.5-1	330	N	N	F.G. soil, light brown, dry; small frags of glass, metal and plastic found throughout.	565896.7909	5600193.3802	458127-01-01, -02-01, -03-01, -04-01	B506951							X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-1-1-2	27-Jan-15		MC/KN	Wall	1-2	15	N	N	F.G. soil, light brown, dry; large metal debris at 1.5 m; small frags of glass, metal and plastic found throughout.	565896.7909	5600193.3802	458127-01-01, -02-01, -03-01, -04-01	B506951					X	X	X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-2-0.5-1	27-Jan-15		MC/KN	Wall	0.5-1	0	N	N	F.G. soil, light brown, dry. Roots and rootlets to 0.25 m; at 0.75 m debris (glass and metal debris) becomes more dense.	565902.4269	5600189.1118	458127-01-01, -02-01, -03-01, -04-01	B506951	X	X	X	X	X	X	X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-2-1-2	27-Jan-15		MC/KN	Wall	1-2	15	N	N	F.G. soil, light brown, dry. At 1.5 m large metal debris.	565902.4269	5600189.1118	458127-01-01, -02-01, -03-01, -04-01	B506951	X	X	X	X	X	X	X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	no rework data for metals requested due to sample heterogeneity
TP15-A (BFD of TP15-2-1-2)	27-Jan-15	TP15-2-1-2	MC/KN	Wall	1-2	15	N	N	F.G. soil, light brown, dry. At 1.5 m large metal debris.	565902.4269	5600189.1118	458127-01-01, -02-01, -03-01, -04-01	B506951	X	X	X	X	X	X	X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	no rework data for metals requested due to sample heterogeneity
TP15-3-0.5-1	27-Jan-15		MC/KN	Wall	0.5-1	5	N	N	F.G. soil, light brown, dry. Debris starts at 0.5 m; debris found from 0.5 to 2.0 mbg.	565906.6400	5600184.6505	458127-01-01, -02-01, -03-01, -04-01	B506951	X	X	X	X	X	X	X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-3-1-2	27-Jan-15		MC/KN	Wall	1-2	5	N	N	F.G. soil, light brown, dry. debris found from 0.5 to 2.0 mbg.	565906.6400	5600184.6505	458127-01-01, -02-01, -03-01, -04-01	B506951	X	X	X	X	X	X	X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-4-0.5-1	27-Jan-15		MC/KN	Wall	0.5-1	20	N	N	F.G. soil, light brown, dry. Metald debris and plastic debris found at 0.5 mbg to 2.0 mbg.	565911.6183	5600177.5462	458127-01-01, -02-01, -03-01, -04-01	B506951	X	X	X	X	X	X	X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-4-1-2	27-Jan-15		MC/KN	Wall	1-2	30	N	N	F.G. soil, light brown, dry. Debris stops at 2.0 m.	565911.6183	5600177.5462	458127-01-01, -02-01, -03-01, -04-01	B506951	X	X	X	X	X	X	X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-5-1-2	27-Jan-15		MC/KN	Wall	1-2	20	N	N	F.G. soil, light brown, dry. Small debris from 0.25 to 0.75 mbg; large debris from 0.75 to 2.0 mbg.	565917.6409	5600171.5439	458127-01-01, -02-01, -03-01, -04-01	B506951					X	X	X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-B (BFD of TP15-5-1-2)	27-Jan-15	TP15-5-1-2	MC/KN	Wall	1-2	20	N	N	F.G. soil, light brown, dry. Small debris from 0.25 to 0.75 mbg; large debris from 0.75 to 2.0 mbg.	565917.6409	5600171.5439	458127-01-01, -02-01, -03-01, -04-01	B506951					X	X	X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-6-0-0.5	27-Jan-15		MC/KN	Wall	0-0.5	30	N	N	F.G. soil, light brown, dry. Roots and rootlets to 0.5 m;	565943.9644	5600097.1891	458127-01-01, -02-01, -03-01, -04-01	B506951							X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-6-0.5-1	27-Jan-15		MC/KN	Wall	0.5-1	70	N	N	F.G. soil, light brown, dry. At 0.75 m debris (glass and metal debris) becomes visable.	565943.9644	5600097.1891	458127-01-01, -02-01, -03-01, -04-01	B506951							X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-6-1-2	27-Jan-15		MC/KN	Wall	1-2	10	N	N	F.G. soil, light brown, dry. Greatest density of debris from 1.5 to 2.5 m.	565943.9644	5600097.1891	458127-01-01, -02-01, -03-01, -04-01	B506951					X	X	X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-6-2-3	27-Jan-15		MC/KN	Wall	2-3	20	N	N	F.G. soil, light brown, dry.Greatest density of debris from 1.5 to 2.5 m; between 2.5 and 3 m soil becomes clean.	565943.9644	5600097.1891	458127-01-01, -02-01, -03-01, -04-01	B506951							X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-7-0-0.5	27-Jan-15		MC/KN	Wall	0-0.5	45	N	N	F.G. soil, light brown, dry. Metal debris found in surface soils, from 0 to 0.25 mbgs.	565949.9036	5600092.6090	458127-01-01, -02-01, -03-01, -04-01	B506951							X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-7-0.5-1	27-Jan-15		MC/KN	Wall	0.5-1	0	N	N	F.G. soil, light brown, dry. No debris observed.	565949.9036	5600092.6090	458127-01-01, -02-01, -03-01, -04-01	B506951							X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-7-1-2	27-Jan-15		MC/KN	Wall	1-2	15	N	N	F.G. soil, light brown, dry. No debris observed.	565949.9036	5600092.6090	458127-01-01, -02-01, -03-01, -04-01	B506951							X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
TP15-7-2-3	27-Jan-15		MC/KN	Wall	2-3	10	N	N	F.G. soil, light brown, dry. No debris observed.	565949.9036	5600092.6090	458127-01-01, -02-01, -03-01, -04-01	B506951							X	X	X	X	X	X	X	X		Sulfur analysis sent on separate COCs to Calgary.	complete
Total Samples Analyzed														7	7	7	7	11	11	19	19	19	19	19	19	19	19	0		

TEST PIT SAMPLE TRACKING SHEET - FOR BACKFILL SOURCE
Client: PWGSC
Location: Wilmer Marsh Site
Project Number: 219.05112.00010

									UTM Coordinates				Analyses									
Sample ID	Date Sampled	Sampled By	Wall / Floor	Depth (m)	Eagle RKI Reading (ppm)	Hydrocarbon Staining (N - L - M - H)	Hydrocarbon Odour (N - L - M - H)	Soil Description and Comments	Northing	Easting	Lab COC #	Maxxam Job #	CCME Metals	CCME PAH	CCME F1 + BETX	CCME F2-F4	Sat paste	pH	Grain size	Hold	Comments	Status of Analysis
TP15-8-0.3-0.8	9-Feb-15	MC/KA	Wall	0.3-0.8	N/A	N	N	F.G. soil, light brown, dry. Household debris observed.	5600207.679	565883.781	458524-01-01	B510759	X					X			On-site backfill source	Complete
TP15-8-1-2	9-Feb-15	MC/KA	Wall	1-2	N/A	N	N	F.G. soil, light brown, dry. Minor amounts of debris observed.	5600207.679	565883.781	458524-01-01	B510759	X	X	X	X		X	X		On-site backfill source	Complete
TP15-8-2-3	9-Feb-15	MC/KA	Wall	2-3	N/A	N	N	F.G. soil, light brown, dry. Minor amounts of debris observed.	5600207.679	565883.781	458524-01-01	B510759	X	X	X	X		X	X		On-site backfill source	Complete
TP15-9-0.3-0.8	9-Feb-15	MC/KA	Wall	0.3-0.8	N/A	N	N	F.G. soil, light brown, dry. Household debris observed.	5600209.53	565879.561	458524-01-01	B510759	X					X			On-site backfill source	Complete
TP15-9-1-2	9-Feb-15	MC/KA	Wall	1-2	N/A	N	N	F.G. soil, light brown, dry. Minor amounts of debris observed.	5600209.53	565879.561	458524-01-01	B510759	X	X	X	X		X	X		On-site backfill source	Complete
TP15-9-2-3	9-Feb-15	MC/KA	Wall	2-3	N/A	N	N	F.G. soil, light brown, dry. Minor amounts of debris observed.	5600209.53	565879.561	458524-01-01	B510759	X					X			On-site backfill source	Complete
TP15-10-0.3-0.8	9-Feb-15	MC/KA	Wall	0.3-0.8	N/A	N	N	F.G. soil, light brown, dry. No debris observed.	5600625.19	565708.247	458524-01-01	B510759	X	X	X	X	X	X	X		Off-site backfill source	Complete
TP15-10-1-2	9-Feb-15	MC/KA	Wall	1-2	N/A	N	N	F.G. soil, light brown, dry. No debris observed.	5600625.19	565708.247	458524-01-01	B510759	X					X			Off-site backfill source	Complete
TP15-11-0.3-0.8	9-Feb-15	MC/KA	Wall	0.3-0.8	N/A	N	N	F.G. soil, light brown, dry. No debris observed.	5600602.354	565709.09	458524-02-01	B510759	X					X			Off-site backfill source	Complete
TP15-11-1-2	9-Feb-15	MC/KA	Wall	1-2	N/A	N	N	F.G. soil, light brown, dry. No debris observed.	5600602.354	565709.09	458524-02-01	B510759	X	X	X	X	X	X	X		Off-site backfill source	Complete
Total samples analyzed													10	5	5	5	2	10	5	0		

AREA OF IMPACT 3 CONFIRMATORY LIMIT SAMPLE TRACKING SHEET -
Client: PWGSC
Location: Wilmer Marsh Site
Project Number: 219.05112.00010

										UTM Coordinates				Analyses								
Sample ID	Date Sampled	Duplicate	Sampled By	Wall / Floor	Depth (m)	Eagle RKI Reading (ppm)	Hydrocarbon Staining (N - L - M - H)	Hydrocarbon Odour (N - L - M - H)	Soil Description and Comments	Northing	Easting	Lab COC #	Maxxam Job #	CCME Metals	CCME PAH	CCME F1 + BETX	CCME F2-F4	pH	Grain size	Hold	Comments	Status of Analysis
A3-NW-A-0.5-1	31-Jan-15		MM	W	0.5 -1.0	5	N	N	fine grained sand/silt, light brown, powdery	5600105.651	565942.305	458127-08-01	B508345	X								Complete
A3-NW-A-1-2	31-Jan-15		MM	W	1.0 - 2.0	5	N	N	fine grained sand/silt, light brown, powdery	5600105.651	565942.305	458127-08-01	B508345	X				X				Complete
A3-NW-B-0.5-1	31-Jan-15		MM	W	0.5 -1.0	0	N	N	fine grained sand/silt, light brown, powdery	5600101.382	565947.228	458127-08-01	B508345	X	X	X	X	X	X		took duplicate for all parameters	Data recheck - rework metals
A3-NW-B-0.5-1 - rework	31-Jan-15		MM	W	0.5 -1.0	0	N	N	fine grained sand/silt, light brown, powdery	5600101.382	565947.228	458127-08-01	B508345	X							sample was re-analysed for metals on SLR's request	rework complete
A3-DUP1 (BFD of A3-NW-B-0.5-1)	31-Jan-15	A3-NW-B-0.5-1.0	MM	W	0.5 -1.0	0	N	N	fine grained sand/silt, light brown, powdery	5600101.382	565947.228	458127-09-01	B508345	X	X		X	X	X		methonol leaked from vials in transport couldn't analyse for BETX/F1	Data recheck - rework metals
A3-DUP1-rework	31-Jan-15		MM	W	0.5 -1.0	0	N	N	fine grained sand/silt, light brown, powdery	5600101.382	565947.228	458127-09-01	B508345	X				X			sample was re-analysed for metals on SLR's request	rework complete
A3-NW-B-1-2	31-Jan-15		MM	W	1.0 - 2.0	5	N	N	fine grained sand/silt, light brown w orange mottling, powdery	5600101.382	565947.228	458127-08-01	B508345	X	X	X	X	X	X			Complete
A3-WW-A-0.5-1	31-Jan-15		MM	W	0.5 -1.0	140	N	N	fine grained sand/silt, light brown, powdery	5600103.302	565934.696	458127-08-01	B508345	X	X	X	X	X	X			Complete
A3-SW-A-0.5-1	31-Jan-15		MM	W	0.5 -1.0	0	N	N	fine grained sand/silt, light brown, powdery	5600100.186	565935.648	458127-08-01	B508345	X				X				Complete
A3-SW-B-0.5-1	31-Jan-15		MM	W	0.5 -1.0	160	N	N	fine grained sand/silt, light brown, powdery, trace organic	5600092.399	565940.778	458127-08-01	B508345	X	X	X	X	X	X			Complete
A3-EW-A-0.5-1	31-Jan-15		MM	W	0.5 -1.0	140	N	N	fine grained sand/silt, light brown, powdery	5600094.794	565945.344	458127-08-01	B508345	X				X				Complete
A3-F1	31-Jan-15		MM	F	1.0	100	N	N	fine grained sand/silt, light brown, powdery	5600103.901	565940.585	458127-09-01	B508345	X	X	X	X	X	X		methonol vial leaked in transport - used unpreserved soil jar sample for analysis	Complete
A3-F2	31-Jan-15		MM	F	1.0	0	N	N	fine grained sand/silt, light brown, powdery	5600100.484	565945.551	458127-09-01	B508345	X				X				Complete
A3-F3	31-Jan-15		MM	F	2.5	0	N	N	fine grained sand/silt, light brown, powdery	5600101.848	565937.187	458127-09-01	B508345	X	X	X	X	X	X			Complete
A3-F4	31-Jan-15		MM	F	2.5	5	N	N	fine grained sand/silt, light brown, powdery	5600095.584	565943.148	458127-09-01	B508345	X				X				Complete
A3-SS1	16-Feb-15		MM/KA	W	0.3-0.5	0	N	N	fine grained sand/silt, light brown, powdery	5600106.343	565943.574	458524-03-01	B513126			X						Complete
A3-SS2	16-Feb-15		MM/KA	W	0.3-0.5	0	N	N	fine grained sand/silt, light brown, powdery	5600103.552	565935.164	458524-03-01	B513126			X						Complete
A3-SS3	16-Feb-15		MM/KA	W	0.3-0.5	0	N	N	fine grained sand/silt, light brown, powdery	5600094.225	565939.167	458524-03-01	B513126			X						Complete
A3-SS4	16-Feb-15		MM/KA	W	0.3-0.5	nm	N	N	fine grained sand/silt, light brown, powdery	5600092.717	565947.467	458524-03-01	B513126			X						Complete
A3-SS5	16-Feb-15		MM/KA	F	0.3-0.5	nm	N	N	fine grained sand/silt, light brown, powdery	5600097.81	565943.715	458524-03-01	B513126			X						Complete
A3-SS6	16-Feb-15		MM/KA	F	0.3-0.5	nm	N	N	fine grained sand/silt, light brown, powdery	5600099.829	565940.329	458524-03-01	B513126			X						Complete
nm - not measured due to equipment malfunction																						
Total Samples Analyzed														15	7	12	7	13	7	0		

MDZ CONFIRMATORY LIMIT SAMPLE TRACKING SHEET -
Client: PWGSC
Location: Wilmer Marsh Site
Project Number: 219.05112.00010

										UTM Coordinates				Analyses									
Sample ID	Date Sampled	Duplicate	Sampled By	Wall / Floor	Depth (m)	Eagle RKI Reading (ppm)	Hydrocarbon Staining (N - L - M - H)	Hydrocarbon Odour (N - L - M - H)	Soil Description and Comments	Northing	Easting	Lab COC #	Maxxam Job #	CCME Metals	CCME PAH	CCME F1 + BETX	CCME F2-F4	pH	Grain size	Hold	TCLP Metals	Comments	Status of Analysis
MDZ - INTERIM CONFIRMATORY SOIL SAMPLES																							
MDZ-WA-0.3-0.8	1-Feb-15		MM	W	0.3 - 0.8	LTDL	N	N	fine grained sand/silt, light brown, trace debris - glass, plastic, brick	5600163.176	565920.594	458127-10-01	B508332	X				X				interim confirmatory soil samples - samples has excavated	complete
MDZ-WA-1.0-2.0	1-Feb-15		MM	W	1.0 - 2.0	LTDL	N	N	fine grained sand/silt, light brown, trace debris - glass, plastic, wire	5600163.176	565920.594	458127-10-01	B508332	X	X	X	X	X	X			interim confirmatory soil samples - samples has excavated	data recheck
MDZ-WA-1.0-2.0-rework-1	1-Feb-15		MM	W	1.0 - 2.0	LTDL	N	N	fine grained sand/silt, light brown, trace debris - glass, plastic, wire	5600163.176	565920.594	458127-10-01	B508332	X								interim confirmatory soil samples - samples has excavated	no rework performed for pH as requested
MDZ-WA2-1.0-2.0	1-Feb-15	BFD of MDZ-WA-1.0-2.0	MM	W	1.0 - 2.0	LTDL	N	N	fine grained sand/silt, light brown, trace debris - glass, plastic, wire	5600163.176	565920.594	458127-10-01	B508332	X	X	X	X	X	X			interim confirmatory soil samples - samples has excavated	data recheck completed
MDZ-WA2-1.0-2.0 - rework-1	1-Feb-15		MM	W	1.0 - 2.0	LTDL	N	N	fine grained sand/silt, light brown, trace debris - glass, plastic, wire	5600163.176	565920.594	458127-10-01	B508332	X		X						interim confirmatory soil samples - samples has excavated	no rework performed for pH, no rework BETX report
MDZ-WA-2.0-3.0	1-Feb-15		MM	W	3.0	LTDL	N	N	fine grained sand/silt, light brown, no debris	5600163.176	565920.594	458127-10-01	B508332	X	X	X	X	X	X			interim confirmatory soil samples - samples has excavated	complete
MDZ-WA-3.0	1-Feb-15		MM	W	3.0	LTDL	N	N	fine grained sand/silt, light brown, no debris	5600163.176	565920.594	458127-10-01	B508332							X		interim confirmatory soil samples - samples has excavated	complete
MDZ-WB-0.3-0.8	1-Feb-15		MM	W	0.3 - 0.8	LTDL	N	N	fine grained sand/silt, light brown, no debris, hard chunks of silt	5600204.029	565873.31	458127-10-01	B508332	X	X	X	X	X	X			interim confirmatory soil samples - samples has excavated	complete
MDZ-WB-1.0-2.0	1-Feb-15		MM	W	1.0 - 2.0	LTDL	N	N	fine grained sand/silt, light brown, no debris, rootlets	5600204.029	565873.31	458127-10-01	B508332	X				X				interim confirmatory soil samples - samples has excavated	complete
MDZ-WB-2.0	1-Feb-15		MM	W	2.0	LTDL	N	N	fine grained sand/silt, light brown, trace glass debris	5600204.029	565873.31	458127-10-01	B508332							X		interim confirmatory soil samples - samples has excavated	complete
MDZ-F1-5.5	8-Feb-15		MC	F	5.5	15	N	N	fine grain sand/ silt, light brown, trace debris.	5600166.974	565915.604	458127-05-01	B510759	X	X	X	X	X	X			interim confirmatory soil samples - samples has excavated	complete
MDZ-EW-0.3-0.8	8-Feb-15		MC	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, trace debris.	5600160.31	565919.431	458127-05-01	B510759	X	X	X	X	X	X			interim confirmatory soil samples - samples has excavated	complete
MDZ-EW-1-2	8-Feb-15		MC	W	1.0-2.0	LTDL	N	N	fine grain sand/ silt, light brown, trace debris.	5600161.192	565919.256	458127-05-01	B510759	X				X				interim confirmatory soil samples - samples has excavated	complete
MDZ-EW-2-3	8-Feb-15		MC	W	2.0-3.0	15	N	N	fine grain sand/ silt, light brown, trace debris.	5600162.147	565918.703	458127-05-01	B510759	X				X				interim confirmatory soil samples - samples has excavated	data recheck completed
MDZ-EW-2-3-rework	8-Feb-15		MC	W	2.0-3.0	15	N	N	fine grain sand/ silt, light brown, trace debris.	5600162.147	565918.703	458127-05-01	B510759	X								interim confirmatory soil samples - samples has excavated	no rework performed for pH
MDZ-DUP-A (BFD of MDZ-EW-2-3)	8-Feb-15	BFD of MDZ-EW-2-3	MC	W	2.0-3.0	10	N	N	fine grain sand/ silt, light brown, trace debris.	5600162.147	565918.703	458524-01-01	B510759	X				X				interim confirmatory soil samples - samples has excavated	data recheck completed
MDZ-DUP-A-rework-1	8-Feb-15		MC	W	2.0-3.0	10	N	N	fine grain sand/ silt, light brown, trace debris.	5600162.147	565918.703	458524-01-01	B510759	X								interim confirmatory soil samples - samples has excavated	no rework performed for pH
MDZ-F2-5	8-Feb-15		MC	F	5.0	15	N	N	fine grain sand/ silt, light brown, trace debris.	5600165.018	565912.68	458127-05-01	B510759	X	X	X	X	X	X			interim confirmatory soil samples - samples has excavated	complete
MDZ - CONFIRMATORY SOIL SAMPLES																							
MDZ-NWA-0.3-0.8	8-Feb-15		MC	W	0.3-0.8	25	N	N	fine grain sand/ silt, light brown, trace debris.	5600171.852	565923.97	458127-05-01	B510759	X				X				interim confirmatory soil samples - samples has excavated	complete
MDZ-NWA-1-2	8-Feb-15		MC	W	1.0-2.0	LTDL	N	N	fine grain sand/ silt, light brown, trace debris.	5600171.23	565923	458127-05-01	B510759	X	X	X	X	X	X				complete
MDZ-NWA-2-3	8-Feb-15		MC	W	2.0-3.0	LTDL	N	N	fine grain sand/ silt, light brown, trace debris.	5600170.418	565921.783	458127-05-01	B510759	X				X					complete
MDZ-NWA-3-4	8-Feb-15		MC	W	3.0-4.0	5	N	N	fine grain sand/ silt, light brown, trace debris.	5600169.914	565920.418	458127-05-01	B510759	X				X					complete
MDZ-NWA-4-5	8-Feb-15		MC	W	4.0-5.0	10	N	N	fine grain sand/ silt, light brown, trace debris.	5600168.771	565918.492	458127-05-01	B510759	X				X					complete
MDZ-EW2-0.3-0.8	4-Mar-15		MC/MM	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, trace glass debris.	5600149.565	565921.317	459576-02-01	B518966	X				X			X		complete
MDZ-EW2-1.0-2.0	4-Mar-15		MC/MM	W	1.0-2.0	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600151.105	565919.09	459576-02-01	B518966	X	X		X	X					complete
MDZ-EW2-2.0	4-Mar-15		MC/MM	W/F	2.0	LTDL	N	N	fine grain sand/ silt, light brown, trace wires debris.	5600152.707	565915.715	459576-02-01	B518966	X				X					complete
MDZ-EW1-0.3-0.8	4-Mar-15		MC/MM	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, trace glass debris.	5600154.47	565926.036	459576-02-01	B518966	X				X					complete
MDZ-EW1-1.0-2.0	4-Mar-15		MC/MM	W	1.0-2.0	LTDL	N	N	fine grain sand/ silt, light brown, trace glass debris.	5600154.954	565924.87	459576-02-01	B518966	X				X					complete
MDZ-EW1-2.0-3.0	4-Mar-15		MC/MM	W	2.0-3.0	LTDL	N	N	fine grain sand/ silt, light brown, trace glass debris.	5600155.805	565922.911	459576-02-01	B518966	X				X					complete
MDZ-EW1-3.0-4.0	4-Mar-15		MC/MM	W	3.0-4.0	LTDL	N	N	fine grain sand/ silt, light brown, trace glass debris.	5600156.239	565921.127	459576-02-01	B518966	X	X	X	X	X	X				complete
MDZ-EW1-4.0-5.0	4-Mar-15		MC/MM	W	4.0-5.0	LTDL	N	N	fine grain sand/ silt, light brown, trace glass debris.	5600156.819	565919.036	459576-02-01	B518966	X				X					complete
MDZ-EW1-5.0	4-Mar-15		MC/MM	W/F	5.0	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600158.236	565917.141	459576-02-01	B518966	X				X					complete
MDZ-SW1-0.3-0.8	4-Mar-15		MC/MM	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600198.641	565875.848	459576-02-01	B518966	X	X	X	X	X	X				complete
MDZ-SW2-0.3-0.8	4-Mar-15		MC/MM	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600192.143	565883.041	459576-02-01	B518966	X	X		X	X			X		complete
MDZ-SW2-1.0-2.0	4-Mar-15		MC/MM	W	1.0-2.0	LTDL	N	N	fine grain sand/ silt, light brown, trace to some metal debris.	5600192.143	565883.041	459576-02-01	B518966	X				X					complete
MDZ-DUP-B (BFD of MDZ-SW2-1.0-2.0)	4-Mar-15	MDZ-SW2-1.0-2.0	MC/MM	W	1.0-2.0	LTDL	N	N	fine grain sand/ silt, light brown, trace to some metal debris.	5600192.143	565883.041	459576-02-01	B518966	X				X					complete
MDZ-SW3-0.3-0.8	4-Mar-15		MC/MM	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, trace glass debris.	5600188.716	565892.2	459576-02-01	B518966	X				X					complete
MDZ-SW3-1.0-2.0	4-Mar-15		MC/MM	W	1.0-2.0	LTDL	N	N	fine grain sand/ silt, light brown, trace glass debris.	5600188.716	565892.2	459576-02-01	B518966	X				X					complete
MDZ-SW3-2.0-3.0	4-Mar-15		MC/MM	W	2.0-3.0	LTDL	N	N	fine grain sand/ silt, light brown, trace glass debris.	5600188.716	565892.2	459576-02-01	B518966	X	X	X	X	X	X				complete
MDZ-SW4-0.3-0.8	4-Mar-15		MC/MM	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, trace debris.	5600182.828	565898.532	459576-02-01	B518966	X	X	X	X	X	X				complete
MDZ-SW4-1.0-2.0	4-Mar-15		MC/MM	W	1.0-2.0	LTDL	N	N	fine grain sand/ silt, light brown, trace debris.	5600182.828	565898.532	459576-02-01	B518966	X				X					complete
MDZ-SW4-2.0-3.0	4-Mar-15		MC/MM	W	2.0-3.0	LTDL	N	N	fine grain sand/ silt, light brown, trace debris.	5600182.828	565898.532	459576-02-01	B518966	X	X	X	X	X	X				complete
MDZ-DUP-C (BFD of MDZ-SW4-2.0-3.0)	4-Mar-15	MDZ-SW4-2.0-3.0	MC/MM	W	2.0-3.0	LTDL	N	N	fine grain sand/ silt, light brown, trace debris.	5600182.828	565898.532	459576-02-01	B518966	X				X					complete
MDZ-SW5-0.3-0.8	4-Mar-15		MC/MM	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600176.379	565903.553	459576-02-01	B518966	X				X					complete
MDZ-SW5-1.0-2.0	4-Mar-15		MC/MM	W	1.0-2.0	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600176.379	565903.553	459576-02-01	B518966	X	X	X	X	X	X				complete
MDZ-SW5-2.0-3.0	4-Mar-15		MC/MM	W	2.0-3.0	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600176.379	565903.553	459576-02-01	B518966	X				X					complete
MDZ-NW1-0.3-0.8	5-Mar-15		MC	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, metal and glass debris	5600162.785	565925.574	458524-05-01	B518971	X	X	X	X	X	X				complete
MDZ-NW1-4.0-5.0	5-Mar-15		MC	W	4.0-5.0	LTDL	N	N	fine grain sand/ silt, light brown, metal and glass debris	5600162.383	565921.836	458524-05-01	B518971	X				X					complete
MDZ-NW1-5.5-6.5	5-Mar-15		MC	W	5.5-6.5	LTDL	N	N	fine grain sand/ silt, light brown, some glass debris	5600162.451	565916.772	458524-05-01	B518971	X	X		X	X					complete
MDZ-NW1-B1-8.0	5-Mar-15		MC	F	8.0	LTDL	N	N	fine grain sand/ silt, light brown, small pieces of metal and glass debris	5600160.105	565910.235	458524-05-01	B518971	X	X	X	X	X	X				complete
MDZ-NWA-B2-7.0	5-Mar-15		MC	F	7.0	LTDL	N	N	fine grain sand/ silt, light brown, small pieces of metal and glass debris	5600166.588	565909.888	458524-05-01	B518971	X	X	X	X	X	X				complete

MDZ CONFIRMATORY LIMIT SAMPLE TRACKING SHEET -
Client: PWGSC
Location: Wilmer Marsh Site
Project Number: 219.05112.00010

										UTM Coordinates				Analyses									
Sample ID	Date Sampled	Duplicate	Sampled By	Wall / Floor	Depth (m)	Eagle RKI Reading (ppm)	Hydrocarbon Staining (N - L - M - H)	Hydrocarbon Odour (N - L - M - H)	Soil Description and Comments	Northing	Easting	Lab COC #	Maxxam Job #	CCME Metals	CCME PAH	CCME F1 + BETX	CCME F2-F4	pH	Grain size	Hold	TCLP Metals	Comments	Status of Analysis
MDZ - INTERIM CONFIRMATORY SOIL SAMPLES																							
MDZ-DUP-D (BFD of NWA-B2-7.0)	5-Mar-15	MDZ-NWA-B2-7.0	MC	F	7.0	LTDL	N	N	fine grain sand/ silt, light brown, small pieces of metal and glass debris	5600166.588	565909.888	458524-07-01	B518971	X	X	X	X	X	X				complete
MDZ-NW2-0.3-0.8	5-Mar-15		MC	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600181.122	565920.556	458524-05-01	B518971	X	X	X	X	X	X				complete
MDZ-NW2-4.0-5.0	5-Mar-15		MC	W	4.0-5.0	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600177.245	565916.007	458524-05-01	B518971	X	X		X	X					complete
MDZ-NW2-B3-6.5	5-Mar-15		MC	F	6.5	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600174.341	565911.827	458524-05-01	B518971	X				X					complete
MDZ-NW3-0.3-0.8	5-Mar-15		MC	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600188.092	565912.811	458524-05-01	B518971	X	X		X	X					complete
MDZ-NW3-4.0-5.0	5-Mar-15		MC	W	4.0-5.0	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600186.396	565909.327	459576-05-01	B518971	X				X					complete
MDZ-NW3-B4-6.0	5-Mar-15		MC	W	6.0	LTDL	N	N	fine grain sand/ silt, light brown, small pieces of metal and glass debris	5600183.016	565906.599	459576-05-01	B518971	X				X					complete
MDZ-NW4-0.3-0.8	5-Mar-15		MC	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, small pieces of metal and glass debris	5600200.271	565898.493	459576-05-01	B518971	X	X	X	X	X	X				complete
MDZ-DUP-E (BFD of NW4-0.3-0.8)	5-Mar-15	MDZ-NW4-0.3-0.8	MC	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, small pieces of metal and glass debris	5600200.271	565898.493	458524-07-01	B518971	X	X	X	X	X	X				complete
MDZ-NW4-2.0-3.0	5-Mar-15		MC	W	2.0-3.0	LTDL	N	N	fine grain sand/ silt, light brown, small pieces of metal and glass debris	5600198.498	565897.159	459576-05-01	B518971	X				X					complete
MDZ-NW4-B5-5.0	5-Mar-15		MC	F	5.0	LTDL	N	N	fine grain sand/ silt, light brown, some metal and plastic debris	5600195.276	565893.966	459576-05-01	B518971	X	X	X	X	X	X				complete
MDZ-NW5-0.3-0.8	5-Mar-15		MC	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, small pieces of metal and glass debris	5600205.352	565889.899	459576-05-01	B518971	X	X	X	X	X	X				complete
MDZ-NW5-1.0-2.0	5-Mar-15		MC	W	1.0-2.0	LTDL	N	N	fine grain sand/ silt, light brown, small pieces of metal and glass debris	5600203.151	565888.958	459576-05-01	B518971	X				X					complete
MDZ-NW5-B6-3.0	5-Mar-15		MC	F	3.0	LTDL	N	N	fine grain sand/ silt, light brown, large pieces of metal debris	5600198.189	565885.11	459576-05-01	B518971	X	X	X	X	X	X		X		complete
MDZ-NW6-0.3-0.8	7-Mar-15		MC	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, no debris.	5600210.041	565879.136	459576-05-01	B518971	X				X					complete
MDZ-NW6-2.0-3.0	7-Mar-15		MC	W	2.0-3.0	LTDL	N	N	fine grain sand/ silt, light brown, trace glass debris.	5600207.129	565876.437	459576-05-01	B518971	X	X	X	X	X	X				complete
MDZ-NW6-B7-5.0	7-Mar-15		MC	F	5.0	LTDL	N	N	fine grain sand/ silt, light brown, some metal and glass debris	5600203.394	565873.919	459576-05-01	B518971	X				X					complete
MDZ-DUP-F (BFD of NW6-B7-5.0)	7-Mar-15	MDZ-NW6-B7-5.0	MC	F	5.0	LTDL	N	N	fine grain sand/ silt, light brown, some metal and glass debris	5600203.394	565873.919	458524-07-01	B518971	X				X					complete
MDZ-NW7-0.3-0.8	5-Mar-15		MC	W	0.3-0.8	LTDL	N	N	fine grain sand/ silt, light brown, trace debris.	5600196.791	565907.191	458524-07-01	B518971	X	X	X	X	X	X			Couldn't collect deeper samples in this area due to slope instability - tension fractures observed along wall	complete
Total Samples Analyzed														68	31	27	31	64	26	2	3		

APPENDIX K
Geotechnical Reports

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

Clarke Geoscience Ltd.

March 31, 2015

CGL Project No. 14-0107

SLR Consulting (Canada) Ltd.
1475 Ellis Street, Suite 200
Kelowna, B.C.
V1Y 2A3

Attention: Lindsay Paterson, Project Manager

Dear Ms. Paterson,

RE: On-Site Geotechnical Monitoring – 2015 Summary Report
Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC
(SLR Project No. 219.05112.00010, Task 0005)

Clarke Geoscience Ltd. (CGL) is pleased to submit the following summary report of on-site geotechnical monitoring, completed on behalf of SLR Consulting (Canada) Ltd. (SLR). SLR was retained by Public Works Government Service of Canada (PWGSC) to provide environmental monitoring and overall site supervision services during the remedial program. Geotechnical monitoring was completed during remediation activities at a site situated within the Wilmer Marsh Unit of the Columbia National Wildlife Area (project site), located near Wilmer, BC. King Hoe Excavating Ltd. (KHE) acted as Prime Contractor for the project. The remediation works were completed between January 21 and March 15, 2015.

Geotechnical Monitoring Responsibilities

Primary responsibility for geotechnical monitoring was that of Clarke Geoscience Ltd., and was completed by Jennifer Clarke, P.Geo. Evan Kleindienst, P.Eng., of Vast Resource Solutions, was retained by CGL as backup for a portion of the project time.

Geotechnical monitoring responsibilities included the following:

- Conducted a site inspection meeting (Jan. 28, 2015) with contractors working on site to review site conditions;
- Conducted on-site geotechnical monitoring during excavation and backfill of the Main Debris Zone (MDZ) (Feb. 7 to Mar. 7, 2015). Work included inspecting the slopes adjacent to and within the excavation area for signs of accelerated instability or surface erosion. Geotechnical recommendations provided by Braun Geotechnical Ltd., on behalf of KHE, were monitored for compliance and applicability to field conditions;
- Provided guidance on excavation depths and cutslope heights during the removal of waste from the slopes within the MDZ;

- Provided guidance and monitored recommendations for backfill placement;
- Addressed incidental stability or erosion control issues on-site; and
- Conducted a final inspection of the completed works.

The geotechnical monitor was provided the ability to shut-down work in the event of unsafe conditions.

Project Work Summary

The following project work summary outlines geotechnical conditions encountered at various key stages of the remediation project. Selected photographs of the work in progress are appended to this report.

1. Project Initiation and Equipment Mobilization

Project work commenced on January 21, 2015 when equipment was mobilized to the remediation site. Over the next 7 - 8 days, remediation work was completed within the Wilmer Marsh area and within Area of Impact 3 (AI3). Geotechnical monitoring was not required for work conducted in these areas. Excavation work commenced within the Main Debris Zone (MDZ) on February 7, 2015.

Equipment mobilized for the purpose of removing contaminated soil and buried debris included a Link-Belt 160 tracked excavator and two rubber-tracked morookas (small off-road dump trucks). A bulldozer was used sparingly to grade the access trail and provide winch assistance to the morookas.

On February 6, 2015, just before work was to proceed on the MDZ excavation, warm weather (up to 5^{o} C) and approx. 5 mm of rain[1] led to the melting of approximately 10 cm of accumulated snow at the site. The rain and snow melt resulted in a short duration (12 hr) runoff event that led to the formation of 20-30 cm deep erosional features (rills and gullies) along the access trail (photo 1). Straw wattles contained and directed runoff onto slopes leading to the adjacent gully. Evidence of silt-laden runoff terminated within the shrubby base of the gully, and did not reach the marsh.

From early February to late February, air temperatures were warm (above 0^{o} C during the day). This led to the thawing of about 20 - 30 cm of ground frost. As the frost was melting, the surface soil layer became gel-like in consistency, resulting in challenging and slippery conditions for the morookas transporting loads up the steeper sections of the MDZ access trail. The slippery conditions were remedied by occasionally breaking up the frozen ground with the excavator bucket and clearing the top 20-30 cm of wet soil from the trail surface with a bulldozer. Soils below the frost layer were dry and caused no issues with machine traction.
In late February and early March, there was a period of sustained cold weather, when ground conditions firmed up with little to no melting.

[1] Climate at Cranbrook Airport (Environment Canada Stn. 1152105) recorded 2 mm of rain (mean air temperature of 2.1^{o} C) on Feb. 5 and 5 mm of rain (mean air temperature of 5.7^{o} C) on Feb. 6.

2. Excavation of Main Debris Zone (MDZ)

Excavation of the MDZ proceeded under the direction of SLR. Because excavated debris volumes from the Marsh and AI3 were lower than expected, a decision was made to increase the proposed excavation depth of the MDZ from 1.5 m. An excavation review, prepared by Braun Geotechnical for KHE (dated February 4, 2015) indicated that the excavation could continue to maximum depths of approximately 4.5 m and that temporary cutslopes could be safely maintained at a 1H:1V slope. As work continued, debris was observed at deeper depths and the excavation depths were increased by another 2 m (approx.) in select areas. Geotechnical review comments, provided by Braun Geotechnical in a memo dated February 11, 2015, indicated that this could be completed while maintaining a 1H:1V cutslope.

Under guidance and monitoring by Clarke Geoscience Ltd., KHE operators excavated debris from the MDZ. In some parts of the MDZ, final excavation depths approached 5-6 m below previous grade[2].

Pertinent observations during the period of MDZ excavation included:

- The north slope of the MDZ excavation was consistently maintained at a 1H:1V slope during excavation activities. This grade approximated the natural slope above the MDZ (photo 2);
- The excavation commenced at the east (downslope) end of the MDZ and proceeded westward in 1 to 2 m lifts;
- Excavated grades along the east and west slopes of the MDZ were consistently maintained at a 1H:1V slope;
- At the west end of the MDZ, the excavation was constrained by an environmental exclusion zone, including several mature trees. The excavation proceeded below grade in the area between the trees and the north slope, resulting in the formation of an excavated gully (photo 3). Excavated slopes behind (on the north side) the trees became steeper (1H:2V) and began to resemble some of the natural gully features in the area; and,
- On March 5, 2015 a tension crack, indicative of slope instability, developed along a 20 m wide section of the north slope (photo 4). Soils, at a depth of 1- 2 m were displaced a very small distance (less than 10 cm) downslope, and led to a heightened level of concern regarding stability of the north slope. The timing of this event coincided with the conclusion of excavation activities, so no stabilization work was required for the period of excavation.

3. Backfill Placement and Erosion and Sediment Control Measures

Backfill placement within the MDZ occurred on March 7, 2015. The overall objectives for backfill placement were to create a stable excavation area and to reduce site grades to facilitate the placement of Erosion and Sediment Control (ESC) matting across the site. Although the overall objectives remained the same, the plan to backfill the MDZ was modified because of schedule and budget limitations.

---

[2] Precise as-built excavation depths were surveyed on behalf of KHE.

The following observations pertaining to backfill placement and erosion and sediment control measures were made:

- Excavated slopes of the MDZ were regraded to a 1H:1V slope, or lower, where possible (photo 5). Regrading was completed using adjacent soils, and locally-sourced backfill consisting of native silt soils was placed at the toe of the excavated slope to facilitate placement of ESC matting;
- Soils were difficult to compact due to low moisture content. Placed material became mobilized and would travel/flow downslope, similar to a snow avalanche, onto the area that was just previously compacted. The excavator worked its way upslope and out, but material continued to flow downslope beyond the reach of the excavator. Approximately 5 to 20 cm of loose silt sits on top of bucket compacted soil. This material will compact naturally over time under its own weight and with rain and snow loads, but may also erode under the ESC matting;
- The depth of fill placed at the toe of the slope is approximately 1 m, and tapers in thickness to the top of the cut. Backfill was graded to a maximum of 1H:1V slope, which is a stable angle for this granular material. Upon project completion much of the backfill was able to be graded to a final slope not exceeding 70% gradient;
- A shallow cross-ditch was constructed at the bottom of the MDZ for drainage;
- Backfill consisted of silt soils, obtained from a designated area on the north west side of the MDZ. The estimated volume of backfill that was utilized within the MDZ was roughly 140 m^3. Excavated slopes from the borrow area were maintained at 2H:1V. Backfill material was placed along the over-steepened south slope directly north of the trees and in the trench area between the trees and the north slope (photo 6). The fill thickness of approximately 0.5-1.0 m (compacted) was bucket and track-packed. This material had a slightly higher moisture content, so it compacted well. The backfill covered the lower 1.0 m of the north and south slopes within the over-steepened gully between the trees and the north slope;
- Two (2) cross-ditches were constructed between the top (west side) of the MDZ and the fence. Access trails below the MDZ (towards AI3) were deactivated with cross-ditches and were recontoured by pulling back fill material (photo 7). The cross-ditches direct water downslope to the south;
- All excavated slopes were left at 1H:1V or less at the conclusion of the project; and,
- A biodegradeable Erosion Control Blanket (ECB) (Nilex SC32BD) was installed across bare soil surfaces by KHE under the direction of the Environment Monitor (photos 8 and 9). Coarse woody debris (CWD) was also placed across the site for erosion control. Some small areas, where surficial debris was removed, were not covered with ECB.

Completion of geotechnical monitoring duties occurred on March 7, 2015. Erosion and sediment control measures were completed by KHE under the direction and monitoring of the Environmental Monitor until March 13, 2015 with the understanding that CGL would be contacted if adverse or unforeseen conditions were encountered with respect to geotechnical concerns. No such concerns arose.

Future Considerations

The 2015 remediation program found that debris depths within the MDZ were greater than expected. Although excavation depths were increased in an effort to access the buried debris, it became apparent that some debris would remain in place. Debris remains buried approximately 3.5 m below grade at the toe of a steep (1H:1V), 30 m high silt slope. The debris is buried and exact extents are unknown. If and when there is a decision to return to excavate the remaining material there are some geotechnical aspects to consider:

- Accessing the buried debris remaining on site will be a large undertaking, with significant geotechnical and safety considerations;
- To access buried debris along the north slope the excavation would likely entail working from the top-down in benches. In order to access material at the toe, the benches would extend into the top of the slope, resulting in a partial loss of the upper plateau. A detailed engineered excavation plan must be prepared, reviewed, and carefully surveyed on-site prior to any work moving forward. The plan should provide details regarding methodology and approach and should provide limits for safety and for slope stability.
- Excavation along the north slope would disturb existing grass vegetation and, depending on the strategy, it is unclear whether the slope could be revegetated. It is possible that the slope would evolve into a near vertical silt bluff. Although there is no information on the historical condition of the site, it is possible that it was a near vertical silt bluff prior to disturbance.

Summary

Based on the on-site geotechnical monitoring of project activities completed between January 21 and March 7, 2015, the following summary of geotechnical observations is provided:

<u>Soil Erosion</u>

- Over the course of the project a single (12 hr) period of rapid snow melt and rain led to surface erosion along the excavated trail. Silt-laden runoff was managed by straw wattles and was directed onto the adjacent slopes. The incident highlights the sensitivity of the silt-textured soils to erosion by runoff but also reflects the expected short duration of runoff events. The local area and the south-facing slopes of the MDZ are characteristically dry, and do not experience sustained periods of runoff. With ECB coverage of the bare soil surfaces, combined with drainage control using cross-ditches, the risk of surface erosion is reduced but not eliminated. With time, the soils will become consolidated. However, until that time, infiltration through the blanket to the underlying soils may lead to scour, erosion, and undermining of the blanket. It is judged that the low gradient vegetated gully downslope is an adequate buffer and that the risk of sediment delivery to the Wilmer Marsh is relatively low.

<u>Slope Stability</u>

- With the MDZ excavation, material was removed from the toe of the north slope. As cutslope heights along the north wall increased, one section of the north slope became unstable and a tension crack developed (March 5, 2015). It is judged that the entire north slope is marginally stable and is subject to shallow slumps and slides, as indicated by historical slide headscarps. While native silts are relatively well consolidated and able to maintain near vertical slopes (when dry), the north slope is mantled with fill, comprised of silty soils pushed down from above. The fill material is not as well consolidated and remains vulnerable to failure, particularly when the toe support is removed.

Because such a large volume of material was removed from the toe of the north slope, and because backfill quantities were limited, there remains a potential for instability. To determine the current stability of the slope a stability analysis should be completed. If the current Factor of Safety for the slope is not acceptable to PWGSC, then the same analysis could be used to determine appropriate depths of backfill to increase the Factor of Safety.

It should be understood that there is an inherent natural condition of slope instability at the site and that long term stability conditions at the site cannot be assured. Activities related to the remediation program may have exacerbated this unstable condition. However, work to restore natural drainage on this slope would improve the overall stability, reduce future erosion, and may be beneficial to the overall environmental condition of the area.

We trust that this summary report meets your current requirements. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-826-4367.

Respectfully submitted,

CLARKE GEOSCIENCE LTD.

PROFESSIONAL GEOSCIENTIST
PROVINCE OF BRITISH COLUMBIA
J.A. CLARKE
25319
JAC
3/31/15

Jennifer Clarke, M.Sc., P.Geo.
Geotechnical Consultant

Attachments:
Photographs 1 to 9

Photo 1: Erosional gullies that formed along the trail after the runoff event of Feb. 6, 2015 (Feb. 7, 2015)

Photo 2: View of the north slope of the MDZ excavation, showing 1H:1V slopes approximating the upslope grade. (Mar. 5, 2015).

Photo 3: MDZ excavation developed a gully feature between the trees (exclusion zone) and the north slope. (Mar. 5, 2015).

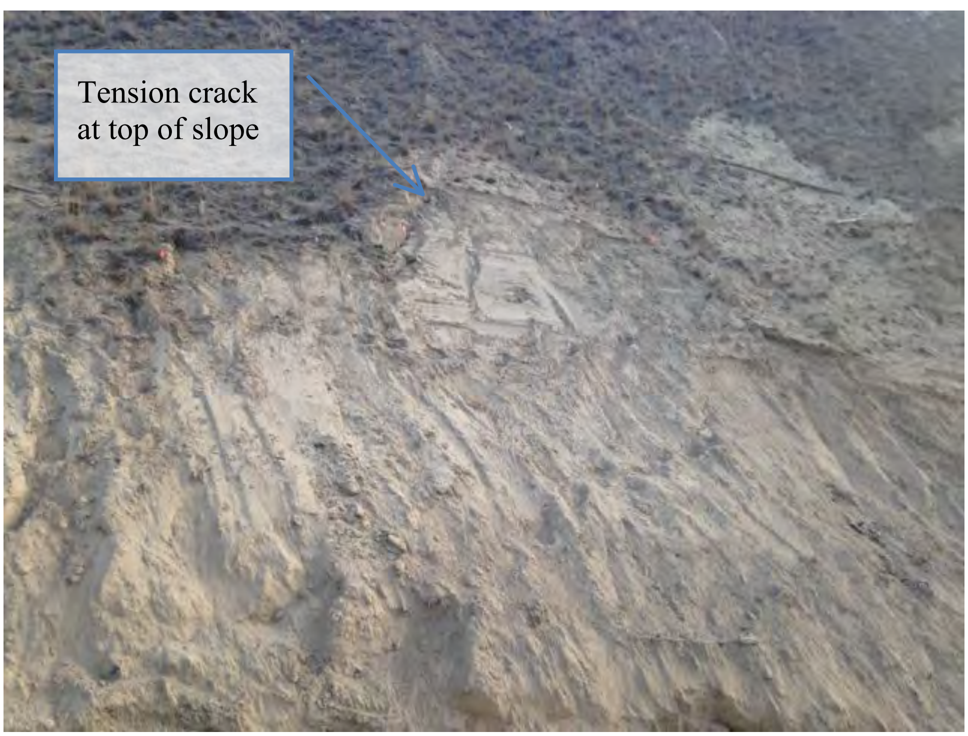


Photo 4: View of tension crack that developed along the north slope on Mar. 5, 2015

Photo 5: View of completed backfill within the MDZ (Mar. 7, 2015)

Photo 6: View of completed backfill in the area behind the trees (Mar. 7, 2015)

Photo 7: View of cross-ditches and regarding of lower trail (Feb. 24, 2015)

Photo 8: Final site completion with installed Erosion Control Blanket and Coarse Woody Debris (Mar. 13, 2015)

Photo 9: Final site completion showing ECB installation and CWD placement (Mar. 13, 2015)

BRAUN GEOTECHNICAL LTD.

ENGINEERING MEMO

TO:	King Hoe Excavating Ltd.	**FILE NO.:**	15-6316
ATTENTION:	Patrick Kerr	**DATE:**	February 4, 2015
FROM:	Stuart Hrysio, P.Eng.	**CLIENT:**	
SUBJECT:	**Excavation Review – Main Debris Zone Excavation**		
LOCATION:	**Wilmer Marsh Remediation, Wilmer BC**		

Braun Geotechnical carried out desk study review of the proposed King Hoe Excavating Work Plan for excavation of debris at the above noted site. Details of the proposed excavation were provided on the King Hoe Excavating Work Plan dated February 4, 2015 (enclosed for reference). A geotechnical field review to confirm site conditions should be carried out by Braun Geotechnical at the time of excavation.

It is understood that the project includes removal of existing deleterious material below the identified 'old road' area. The road alignment traverses along an existing natural slope with slope gradients of about 1H to 1V (Horizontal to Vertical) or flatter. The depth of excavation for removal is expected to be variable to a maximum depth of about 4.5m. Increased cut heights are expected on the upslope side of the excavation.

Natural soils are expected to comprise fine sand & silt in compact condition. Temporary cut slope gradients of 1H to 1V in the natural soils are expected to be satisfactory for geotechnical considerations. Temporary benched slopes providing for a slope gradient less than the 1H to 1V are also considered to be feasible. Maximum near vertical bench cut slope heights should typically be limited to 1.8m.

Following the proposed excavation permanent fill slopes consisting of suitably compacted mineral soils should be constructed at gradients no steeper than 2H to 1V or as directed by the project Geotechnical consultant.

We trust this meets your present requirements.

Encl – King Hoe Work Plan

Braun Geotechnical Ltd.

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — S. W. HRYSIO — #30855

2015Feb4

Stuart Hrysio, P.Eng.

Braun Geotechnical Ltd.

Joseph Oh, P.Eng.

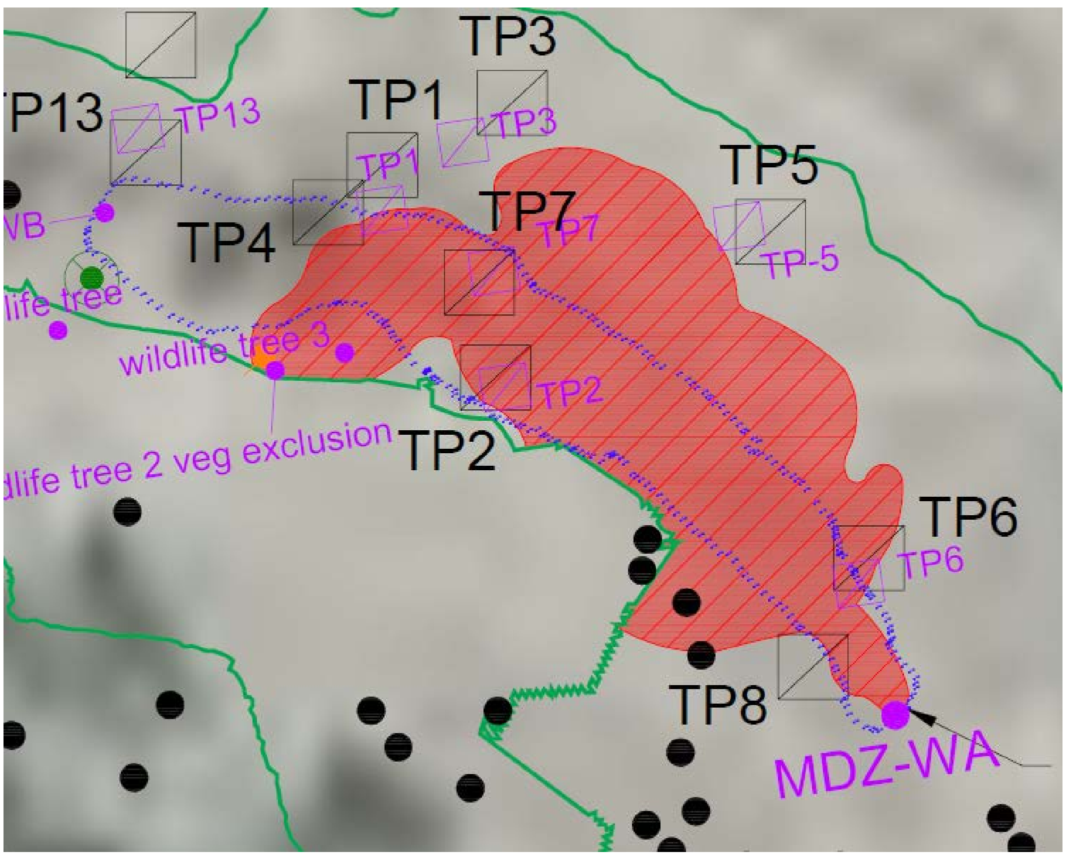
Feb 4, 2015

Project: Wilmer Marsh Remediation, Wilmer BC, EZ897-151665/001/PWY

Main Debris Zone Excavation – Work Plan Notes

- Main debris zone excavation is estimated to be 60m long x 5m wide x (ranging from 2m-4.5m) deep
- Excavation will be completed using a 160 Excavator with thumb, loading tracked dump vehicles to transport debris to stockpile area
- KHE will obtain Braun Geotechnical to review the work plan and inspect the excavation slopes during the works to ensure temporary excavation safety and final slope stability
- KHE will start the excavation at the furthest point down the trail and work upslope
- PWGSC & SLR to provide KHE with the desired final sloping outcome with permit and environmental consideration, as per the attached option sketches

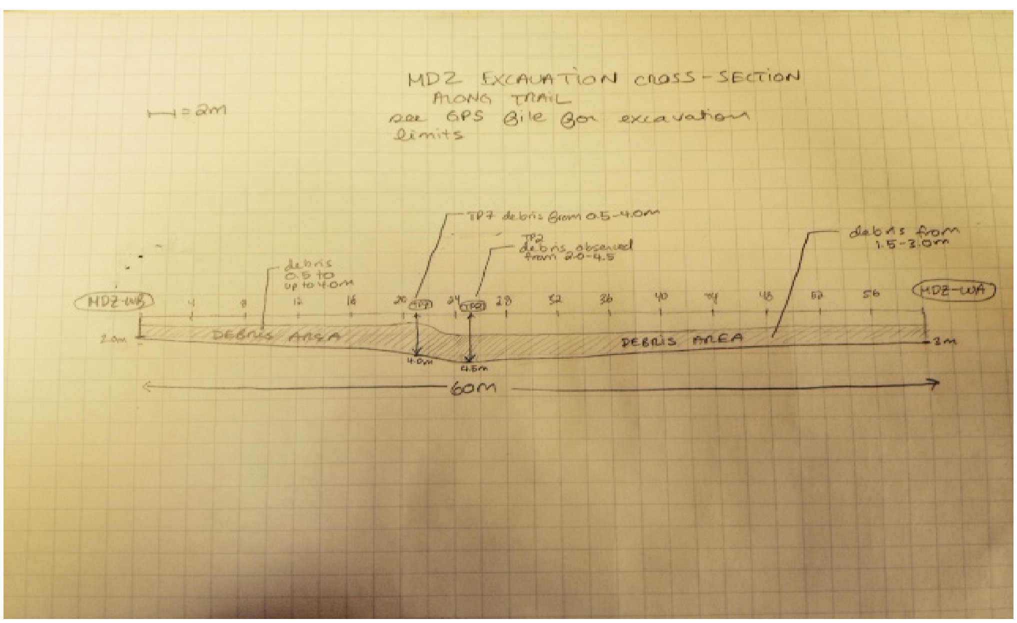
Main Debris Zone Location:



King Hoe Excavating Ltd.
26138 31B Ave, Aldergrove, BC V4W 2Z6
Tel (604) 856-9772 Fax (604) 856-2325
www.kinghoe.ca

Main Debris Zone Photos:

Cross Sections:



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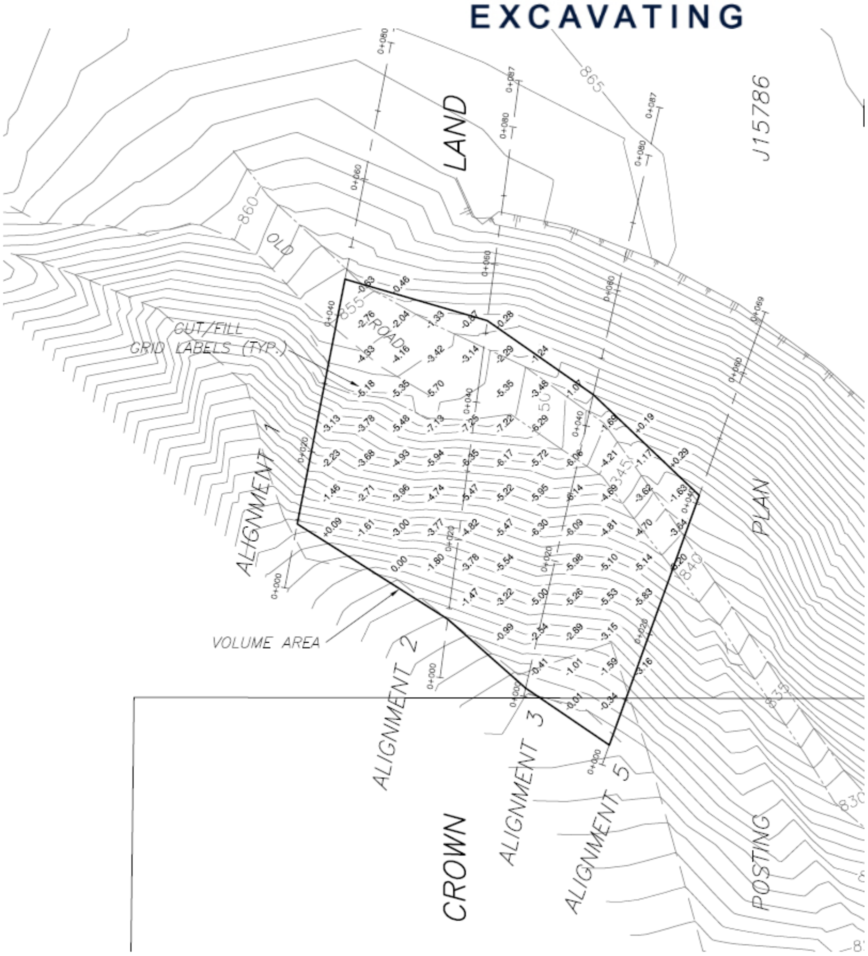

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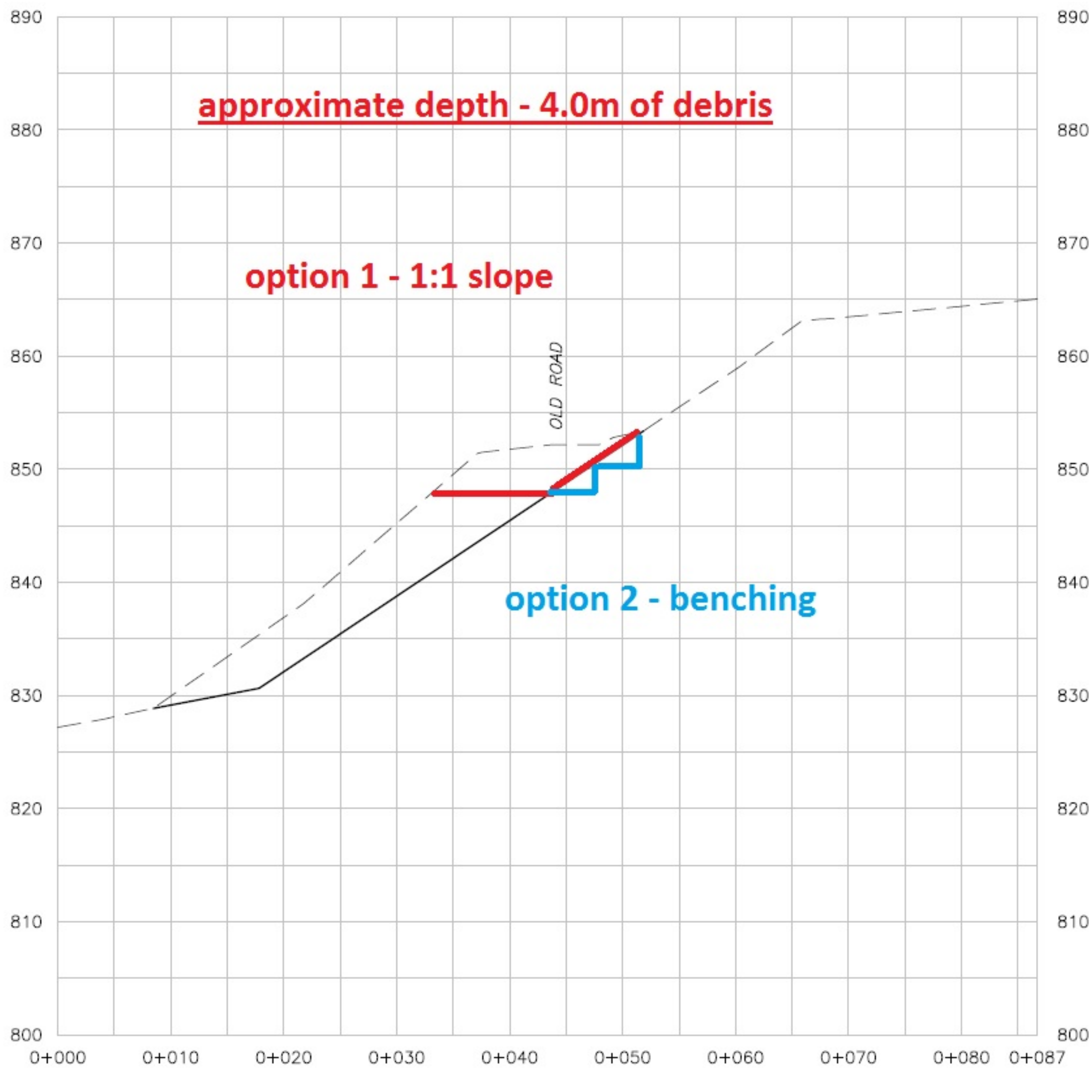
Alignment 2



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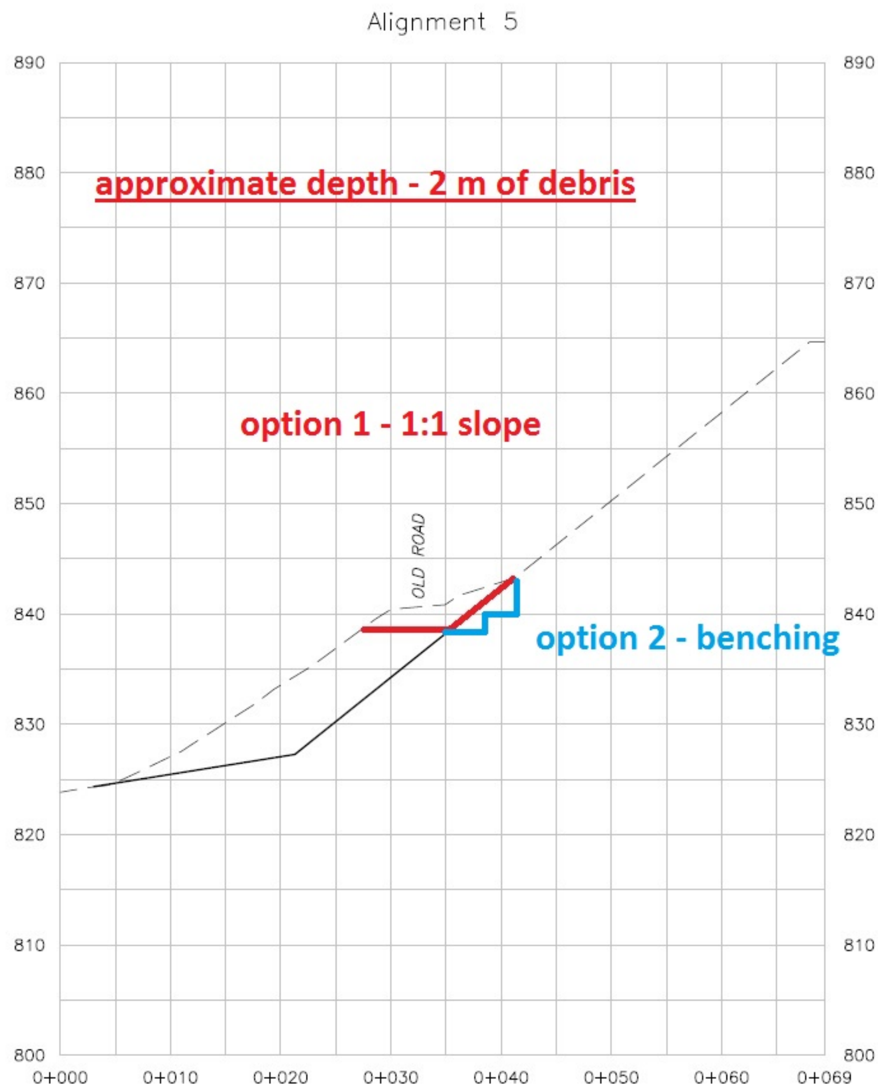

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BRAUN GEOTECHNICAL LTD.

Braun Geotechnical Ltd.
Tel: 604-513-4190
Fax: 604-513-4195
Web: www.braungeo.com
Email: info@braungeo.com

4036

FIELD MEMO

CLIENT: KING HOE EXCAVATING	PROJECT NO.: 15-6316
ATTENTION: MARK LUND - SITE SUPER	DATE: 2015 MAR 10
CC: TRAVIS TOURNIER	FROM: STUART HRYSIO, P.ENG.

SERVICE PROVIDED: WORKSAFE BC EXCAVATION REVIEW
LOCATION: WILMER MARSH REMEDIATION, WILMER BC

OBSERVATIONS/RECOMMENDATIONS

BRAUN GEOTECHNICAL CARRIED OUT A FIELD REVIEW ON 2015 MAR 10 TO REVIEW THE MAIN DEBRIS ZONE EXCAVATION + BACKFILL RESTORATION WORKS.

AT THE TIME OF REVIEW EXCAVATION + BACKFILL WAS SUBSTANTIALLY COMPLETE AND WAS CONSIDERED TO HAVE BEEN CARRIED OUT IN GENERAL ACCORDANCE WITH BRAUN GEOTECHNICAL 2015 MARCH 6 ENGINEERING MEMO REQUIREMENTS.

A GENERAL 1H to 1V SLOPE GRADIENT HAD BEEN PROVIDED WITHIN EXCAVATION + BACKFILL SLOPES.

THE OBSERVED MAIN DEBRIS ZONE EXCAVATION AREA WAS CONSIDERED SAFE FOR WORKERS TO ENTER, INCLUDING ON SLOPE AREAS FOR SEEDING + INSTALLATION OF EROSION CONTROL MATS.

QUALIFIED SITE DESIGNATE SHOULD REVIEW THE EXCAVATION AREA FOR ANY SIGNS OF MOVEMENT DAILY AND PRIOR TO WORKER ENTRY. ANY CHANGED CONDITIONS SHOULD BE REPORTED TO BRAUN GEOTECHNICAL.

WORKSAFE BC MEMO VALID FOR 14 DAYS FROM DATE OF ISSUE

Braun Geotechnical Ltd.
Per:

PROFESSIONAL LICENCE OF S. W. HRYSIO # 30868 BRITISH COLUMBIA ENGINEER

2015 MAR 10

This field memo is preliminary and subject to review by a second representative of Braun Geotechnical Ltd. Furthermore, this field memo shall not be construed as authorization for additional work and/or payment.

APPENDIX L
Test Pit Logs

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: DTP-A

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
1					**SILT** Contains large pieces of metal debris (car parts), light brown, dry					1.0
2										2.0
					End of test pit at 2.7 m No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.					

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

Sheet 1 of 1

SLR CANADA V5.2 2015 WILMER TESTPITS.GPJ SLR_CAN V5.2.GDT 3/19/15

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: DTP-B
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					SILT Contains pieces of glass, light brown, dry					
1					**SILT** No debris, light brown, dry					1.0
2										2.0
					End of test pit at 2.8 m No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.					

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

Sheet 1 of 1

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: DTP-C

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					SILT Contains trace glass debris, light brown, dry					
1					**SILT** No debris, light brown, dry					1.0
					End of test pit at 1.7 m No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.					

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: DTP-D
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0–3.8					**SILT** Contains large pieces of metal debris (car parts), light brown, dry					
1										1.0
2										2.0
3										3.0
					End of test pit at 3.8 m No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.					

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: DTP-E

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
1					**SILT** Contains large pieces of metal debris (car parts), light brown, dry					1.0
2										2.0
					End of test pit at 2.5 m No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.					

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

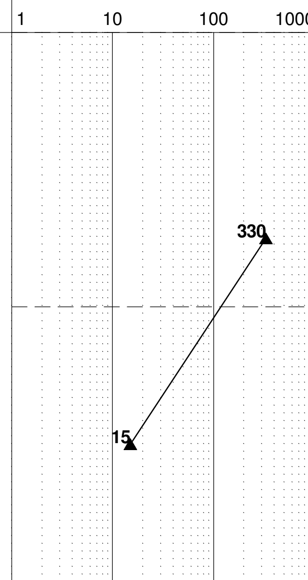
TEST PIT LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT NO: TP15-01
SURFACE ELEVATION: 852.70 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0					**SILT** Contains some to abundant debris consisting of glass, wood and metal, light brown, dry					
	Grab	TP15-1-0.5-1				330				852
1										
	Grab	TP15-1-1-2			@ 1.5 m: large piece of metal debris (car bumper)	15				851
2					End of test pit at 2.0 m					



DRILLING METHOD: Excavator

DRILL DATE: 1/2/2015

LOGGED BY: MC
DRILLER NAME:

Notes: GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: TP15-02
SURFACE ELEVATION: 851.60 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					SILT Contains roots and rootlets, no debrs, light brown, dry					
					SILT Contains some to abundant debris consisting of glass, wood and metal. Size and amount of debris increasing with depth, light brown, dry					851
	GRAB SAMPLE	TP15-2-0.5-1				0				
1										
	GRAB SAMPLE	TP15-2-1-2 & TP15-A			@ 1.5 m: large piece of metal debris	15				850
2					End of test pit at 2.0 m					

DRILLING METHOD: Excavator

DRILL DATE: 1/2/2015

LOGGED BY: MC
DRILLER NAME:

Notes: ■ GRAB SAMPLE

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: TP15-03

SURFACE ELEVATION: 846.80 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0–0.5					**SILT** No debris, light brown, dry					
0.5–1	GRAB SAMPLE	TP15-3-0.5-1			**SILT** Contains some to abundant debris consisting of glass, plastic and metal, light brown, dry	5				846
1–2	GRAB SAMPLE	TP15-3-1-2			@ 1.5 m: contains large pieces of metal debris	5				845
2					End of test pit at 2.0 m					

DRILLING METHOD: Excavator

DRILL DATE: 1/2/2015

LOGGED BY: MC
DRILLER NAME:

Notes: ▬ GRAB SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: TP15-04
SURFACE ELEVATION: 843.80 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) (1 – 10 – 100 – 1000)	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0 – 0.5					**SILT** No debris, light brown, dry					
0.5 – 1	GRAB SAMPLE	TP15-4-0.5-1			**SILT** Contains some to abundant debris consisting of glass, plastic and metal, light brown, dry	20				843
1 – 2	GRAB SAMPLE	TP15-4-1-2			@ 1.5 m: contains large pieces of metal debris	30				842
2					End of test pit at 2.0 m					

DRILLING METHOD: Excavator	Notes: ■ GRAB SAMPLE
DRILL DATE: 1/2/2015	LOGGED BY: MC DRILLER NAME:

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: TP15-05
SURFACE ELEVATION: 841.90 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					SILT No debris, light brown, dry					
					SILT Contains some to abundant debris consisting of small fragments of glass, plastic and metal, light brown, dry					
	grab	TP15-5-0.5-1			@ 0.75 m: contains large pieces of metal debris	20				841
1	grab	TP15-5-1-2 & TP15-B				15				840
2					End of test pit at 2.0 m					

DRILLING METHOD: Excavator
DRILL DATE: 1/2/2015
LOGGED BY: MC
DRILLER NAME:

Notes: ■ GRAB SAMPLE

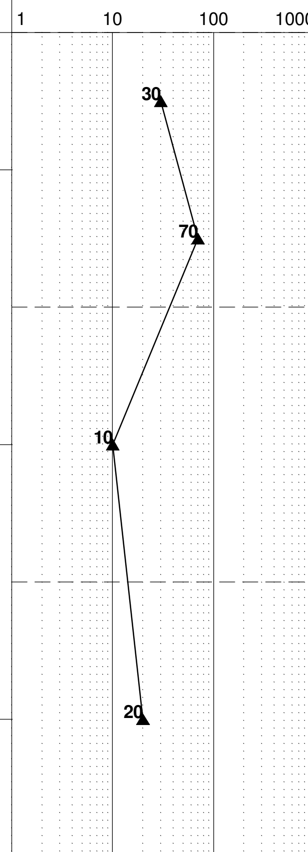
SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: TP15-06
SURFACE ELEVATION: 816.40 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0–0.5		TP15-6-0-0.5			**SILT** Dense, no debris, light brown, dry	30				816
0.5–1.5		TP15-6-0.5-1			**SILT** Contains some to abundant debris consisting of small fragments of glass, plastic and metal, light brown, dry @ 0.7 m to 2.5 m: contains large pieces of metal debris (springs and car parts)	70				
1.5–2.5		TP15-6-1-2			**SILT** Dense, redish brown, dry	10				815
2.5–3		TP15-6-2-3			**SILT** No debris, light brown, dry	20				814
3					End of test pit at 3.0 m					



DRILLING METHOD: Excavator

DRILL DATE: 1/2/2015

LOGGED BY: MC
DRILLER NAME:

Notes: GRAB SAMPLE

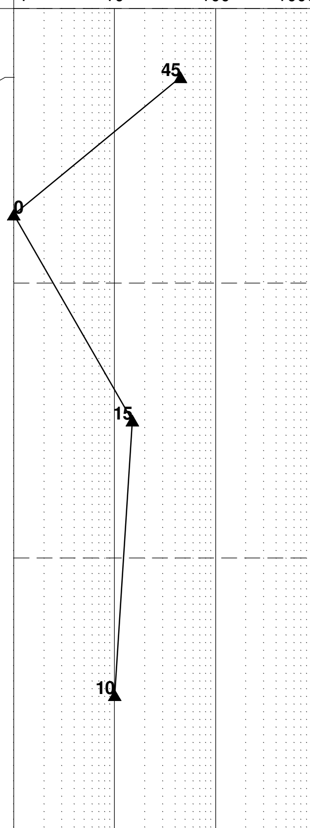
TEST PIT LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT NO: TP15-07
SURFACE ELEVATION: 818.30 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
		TP15-7-0-0.5			**SILT** Contains small pieces of debris (metal and glass), light brown, dry	45				818
					SILT No debris, light brown, dry					
1		TP15-7-0.5-1				0				
		TP15-7-1-2				15				817
2		TP15-7-2-3				10				816
3					End of test pit at 3.0 m					



DRILLING METHOD: Excavator

DRILL DATE: 1/2/2015

LOGGED BY: MC
DRILLER NAME:

Notes: ■ GRAB SAMPLE

Sheet 1 of 1

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: DTP-F

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0–1					**SILT** Contains some glass and metal debris, light brown, dry					
1					**SILT** No debris, light brown, dry					1.0
2										2.0
					End of test pit at 2.5 m					
					No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.					

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: DTP-F2

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					SILT Contains some glass and metal debris, light brown, dry					
1										1.0
					SILT No debris, light brown, dry					
2					End of test pit at 2.0 m No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.					2.0

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: DTP-G

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					SILT Contains abundant metal debris, light brown, dry					
1										1.0
2										2.0
					SILT No debris, light brown, dry					
3										3.0
					End of test pit at 3.5 m No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.					

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

SLR CONSULTING (CANADA) LTD.	CLIENT: **PWGSC** PROJECT: **2014-2015 Site Works Summary Report** ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC** SLR JOB NO: **219.05112.00010**	**TEST PIT LOG** TEST PIT NO: DTP-H SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0–5					**SILT** Contains abundant metal debris, light brown, dry					1.0, 2.0, 3.0, 4.0
5					End of test pit at 5.0 m No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.					5.0

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

Sheet 1 of 1

SLR CANADA V5.2 2015 WILMER TESTPITS.GPJ SLR_CAN V5.2.GDT 3/19/15

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: DTP-I
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					SILT Contains some metal debris, light brown, dry					
1										1.0
2					End of test pit at 2.0 m No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.					2.0

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

CLIENT:	**PWGSC**
PROJECT:	**2014-2015 Site Works Summary Report**
ADDRESS:	**Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO:	**219.05112.00010**

TEST PIT LOG

TEST PIT NO: DTP-J

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0–3.5					**SILT** Contains abundant metal debris, light brown, dry					
1										1.0
2										2.0
3										3.0
3.5–3.6					**SILT** No debris, light brown, dry					
					End of test pit at 3.6 m					

No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: DTP-K

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE		SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					SILT Contains trace to some metal and glass debris, light brown, dry					
1					**SILT** No debris, light brown, dry					1.0
					End of test pit at 1.8 m No soil samples collected. Test pit advanced to delineated depth of debris in MDZ.					

BOREHOLE METHOD: Excavator

BOREHOLE DATE: February 15, 2015 LOGGED BY: MC

Notes:

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: TP15-08

SURFACE ELEVATION: 856.80 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					SILT Some organic material, contains trace glass and metal debris, light brown, dry					
					SILT No organics, trace debris, light brown, dry					
		TP15-8-0.3-0.8				0				856
1		TP15-8-1-2				0				855
2		TP15-8-2-3				0				854
3					End of test pit at 3.0 m					

DRILLING METHOD: Excavator

DRILL DATE: 1/2/2015

LOGGED BY: MC
DRILLER NAME:

Notes: GRAB SAMPLE

Sheet 1 of 1

TEST PIT LOG

SLR CONSULTING (CANADA) LTD.

CLIENT:	**PWGSC**
PROJECT:	**2014-2015 Site Works Summary Report**
ADDRESS:	**Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO:	**219.05112.00010**
TEST PIT NO:	TP15-09
SURFACE ELEVATION:	857.90 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0–0.3					**SILT** Some organic material, contains some glass and metal debris, light brown, dry					
0.3–3.0	Grab sample	TP15-9-0.3-0.8			**SILT** No organics, occasional piece of debris (metal, glass and plactic), light brown, dry	0				
1	Grab sample	TP15-9-1-2				0				857
2	Grab sample	TP15-9-2-3				0				856
3					End of test pit at 3.0 m					855

DRILLING METHOD: Excavator

DRILL DATE: 1/2/2015

LOGGED BY: MC

DRILLER NAME:

Notes: ■ GRAB SAMPLE

Sheet 1 of 1

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: TP15-10

SURFACE ELEVATION: 876.10 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					SILT Dense, trace gravel, rootlets at surface, light brown, dry					876
		TP15-10-0.3-0.8				0				
1										875
		TP15-10-1-2				0				
2					End of test pit at 2.0 m					

DRILLING METHOD: Excavator

DRILL DATE: 1/2/2015

LOGGED BY: MC

DRILLER NAME:

Notes: ■ GRAB SAMPLE

Sheet 1 of 1

SLR CANADA V5.2 2015 WILMER TESTPITS.GPJ SLR_CAN V5.2.GDT 3/27/15

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **2014-2015 Site Works Summary Report**
ADDRESS: **Wilmer Marsh Unit, Columbia NWA, BC**
SLR JOB NO: **219.05112.00010**

TEST PIT LOG

TEST PIT NO: TP15-11
SURFACE ELEVATION: 872.50 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000	TESTPIT COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					SILT Dense, trace gravel, rootlets at surface, light brown, dry					
	GRAB SAMPLE	TP15-11-0.3-0.8				0				872
1										
	GRAB SAMPLE	TP15-11-1-2				0				871
2					End of test pit at 2.0 m					

DRILLING METHOD: Excavator

DRILL DATE: 1/2/2015

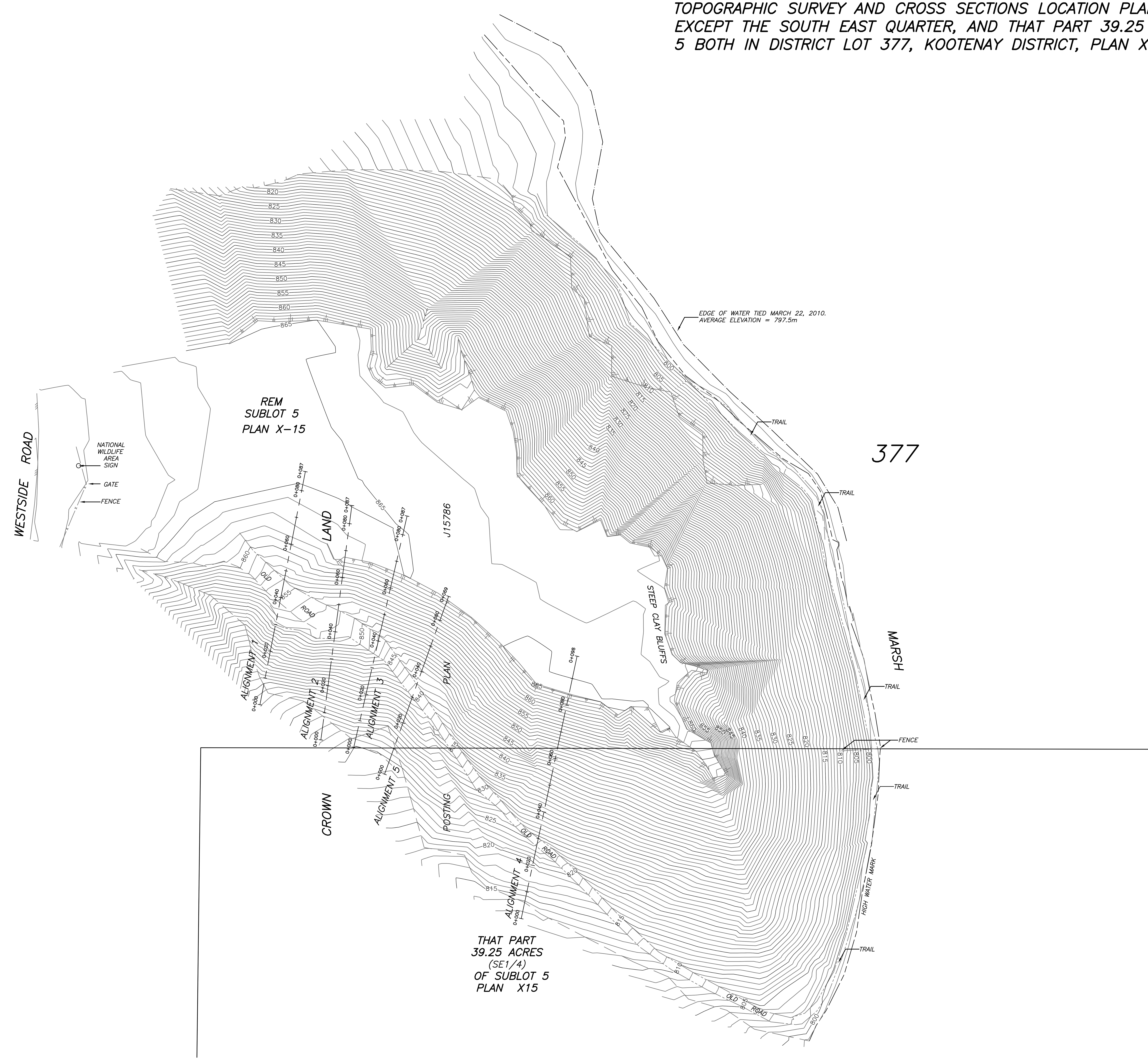
LOGGED BY: MC
DRILLER NAME:

Notes: ■ GRAB SAMPLE

APPENDIX M
Topographic Surveys and Location of Remaining Debris

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

TOPOGRAPHIC SURVEY AND CROSS SECTIONS LOCATION PLAN OF PART OF SUBLOT 5, EXCEPT THE SOUTH EAST QUARTER, AND THAT PART 39.25 ACRES (SE 1/4), OF SUBLOT 5 BOTH IN DISTRICT LOT 377, KOOTENAY DISTRICT, PLAN X 15



Scale = 1:750

15 7.5 0 15 30 45 60

Metres

LEGEND

Date of field survey; March 22 & 23, 2010

Elevations are derived from GPS observations on Invermere ACP 16448, Elevation = 843.962M

Parcel boundaries shown heron are derived from Land Title office records. Boundaries are approximate.

Contour Interval = 1 meter

All distances are in metres and decimals thereof unless otherwise noted.

denotes Bottom of Slope

denotes Top of Slope

denotes Edge of Traveled Raod

denotes Fence

denotes Edge of Water

denotes High Water Mark

Sheet 1 of 2

N

FOCUS

Focus Surveys (BC) Limited Partnership
712D – 10th Street, Invermere, BC
t: 250–342–9767 www.focus.ca

PROJECT

SLR CONSULTING

PROJECT REF. 010047749

SHEET TITLE

TOPOGRAPHIC SURVEY CROSS SECTION LOCATIONS

DRAWN	DATE	CHECKED	SCALE
BKS	2014.02.13	VL	1:750

SHEET No. **010047749-MCSI01-R01**

CROSS SECTIONS

Scale = 1:500

10 5 0 10 20 30 40

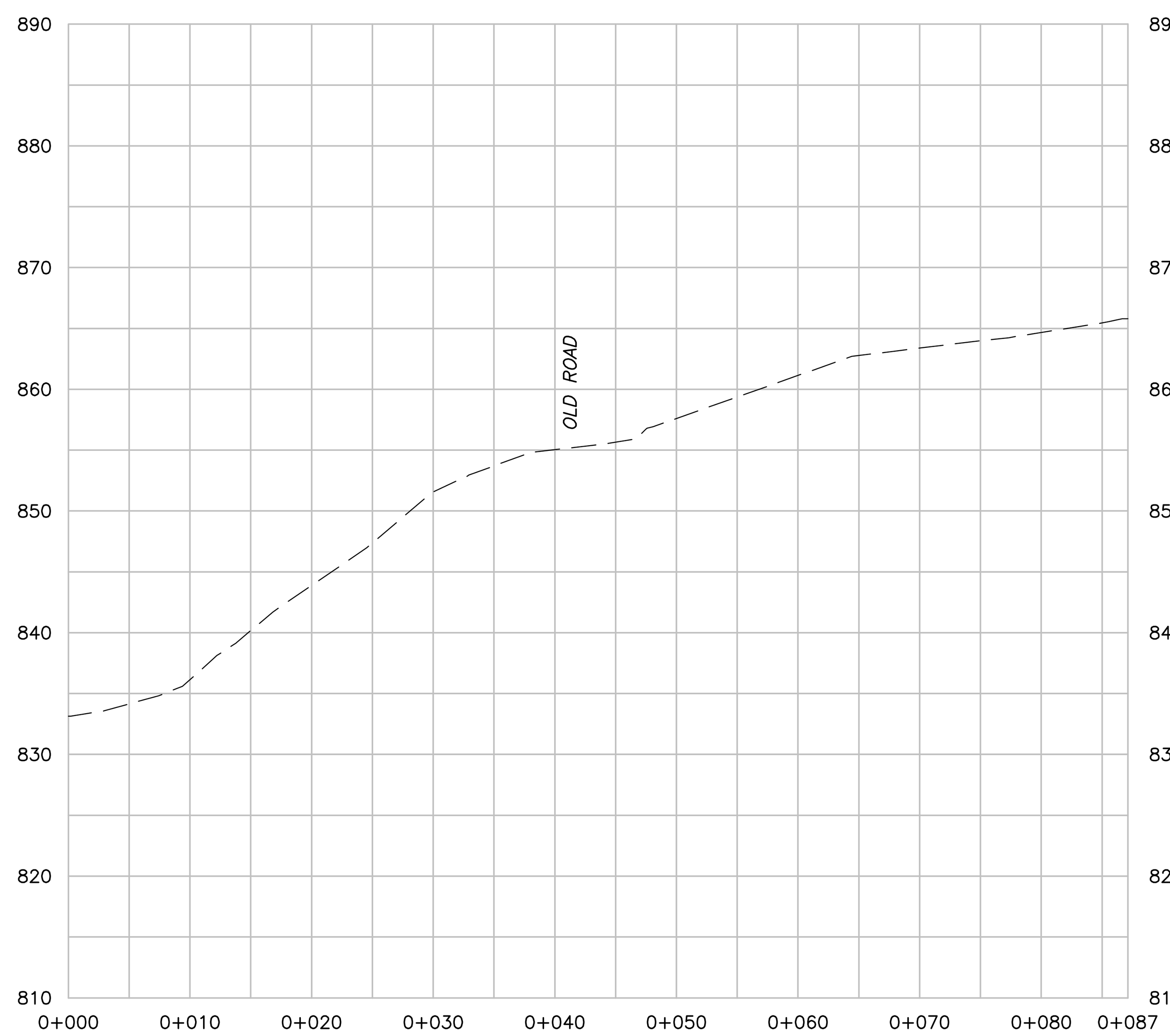
Metres

1:500 Horizontal 1:500 Vertical

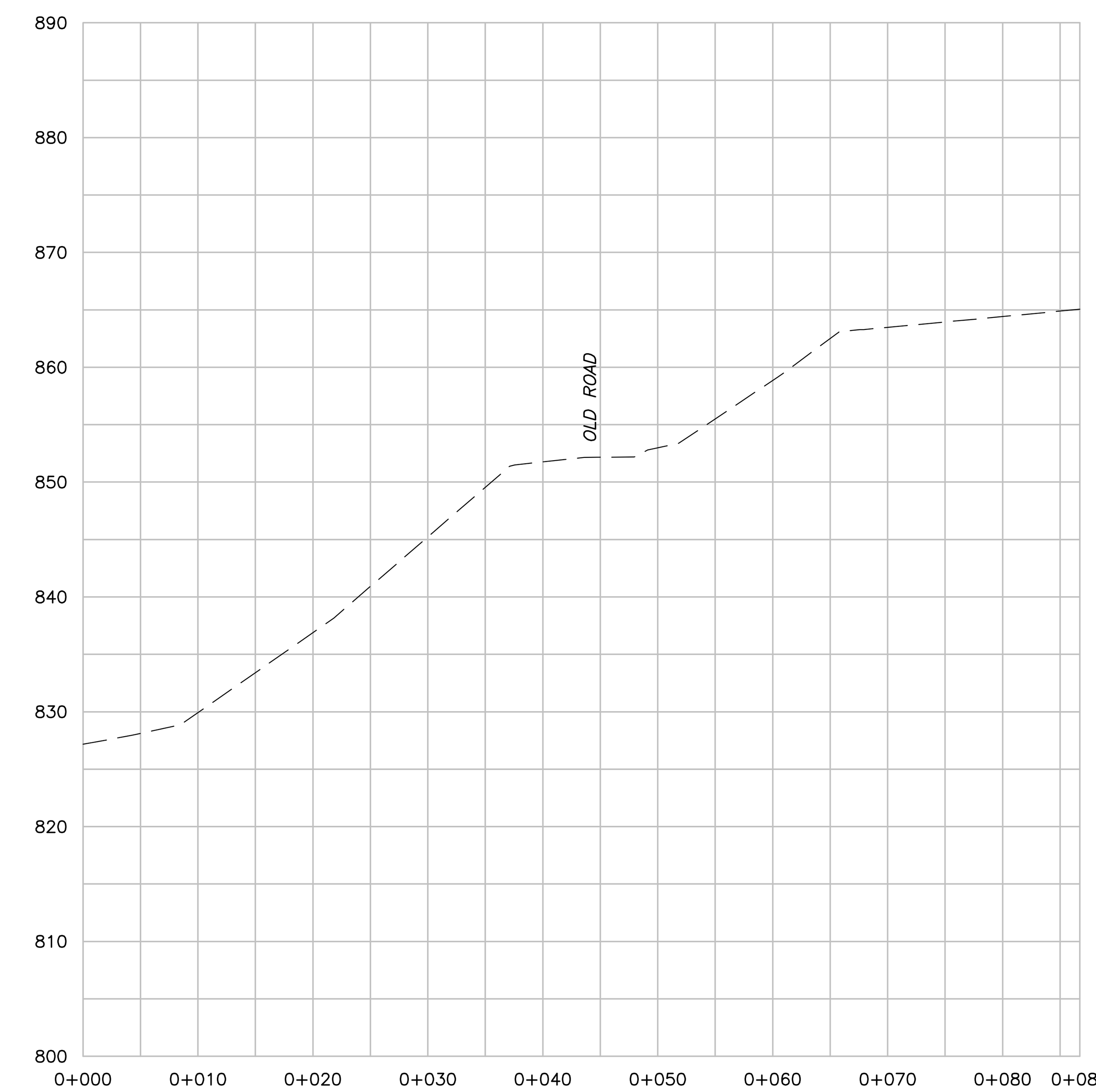
LEGEND

— — — denotes existing ground March 23, 2010

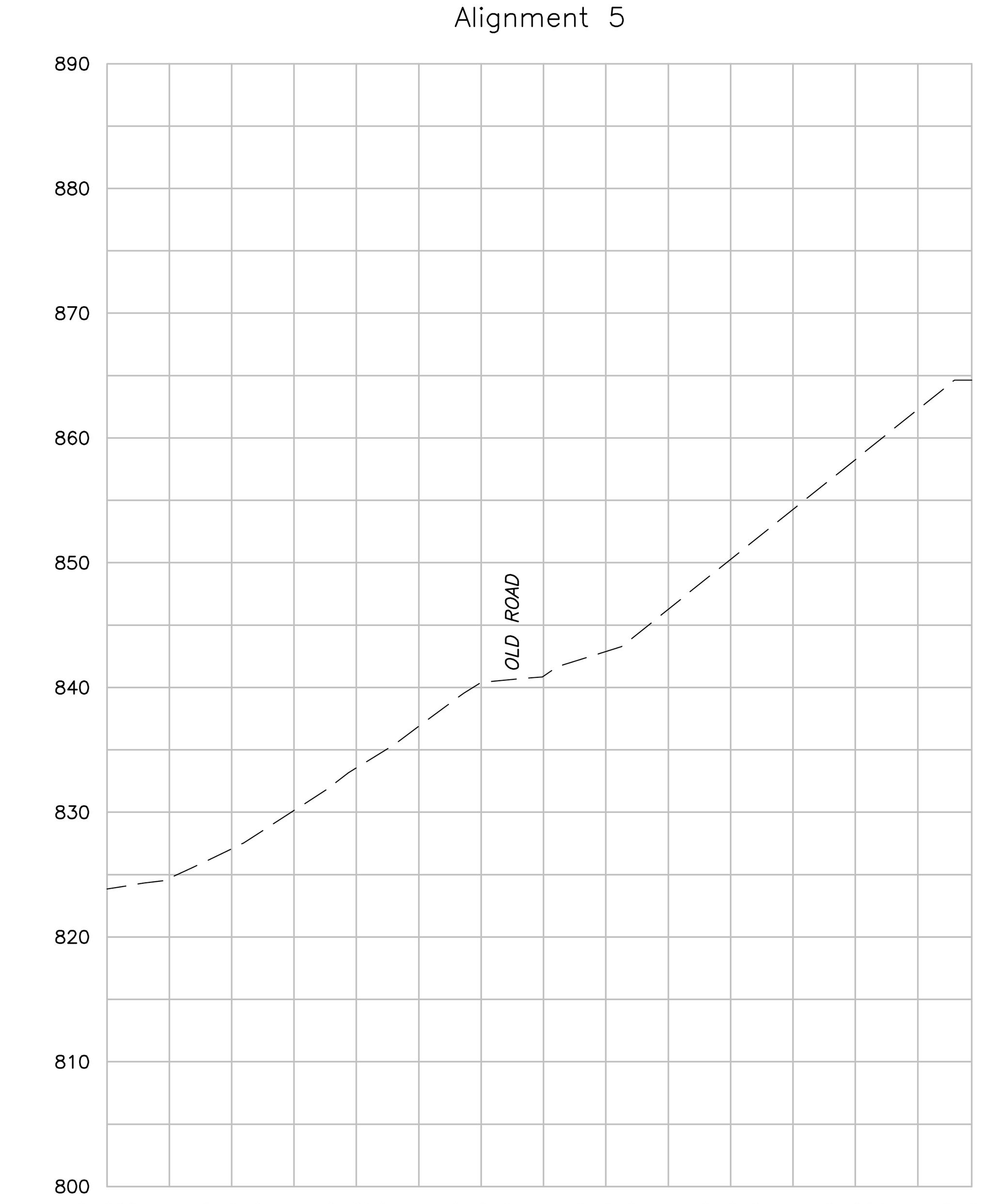
Alignment 1



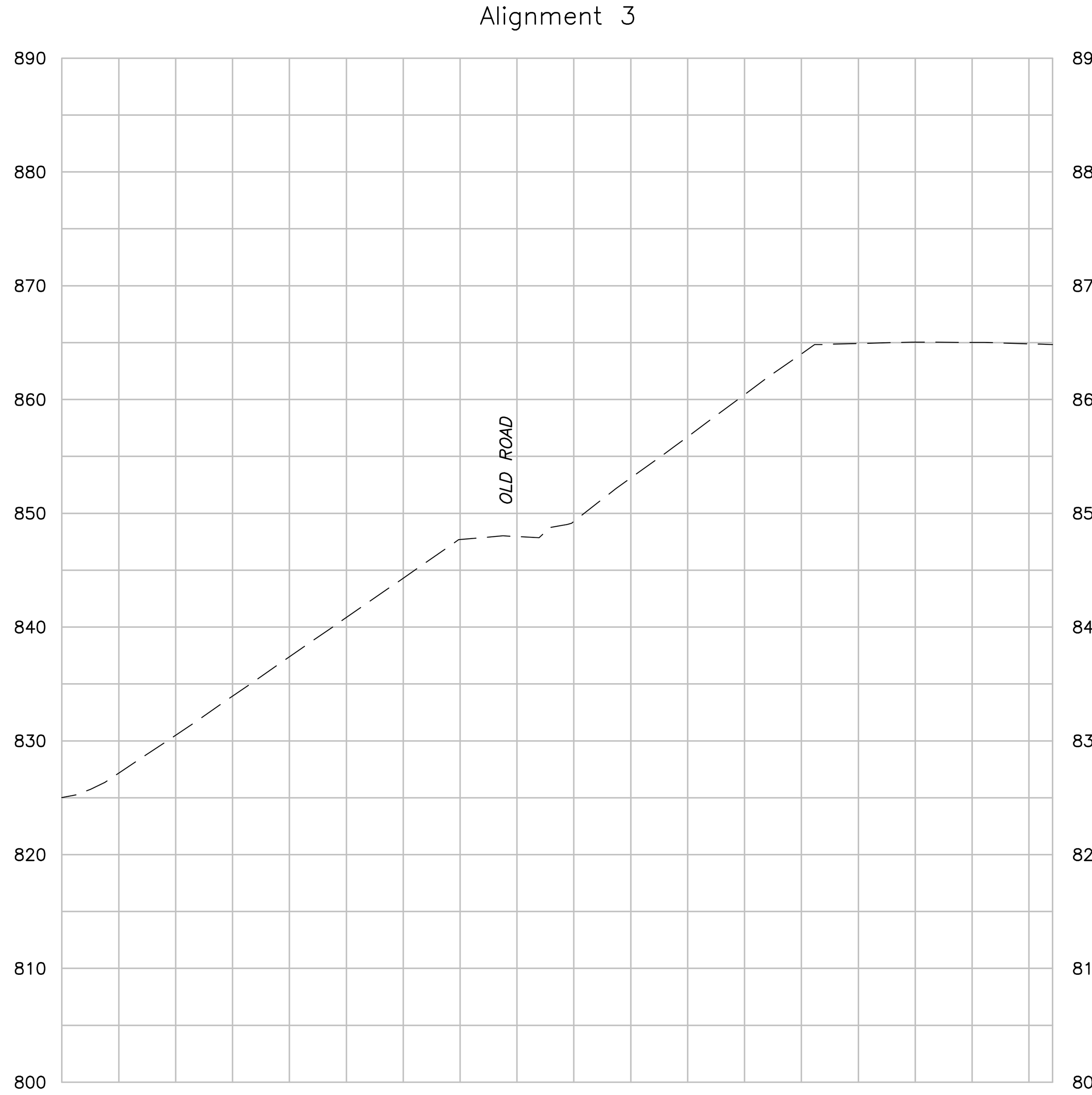
Alignment 2



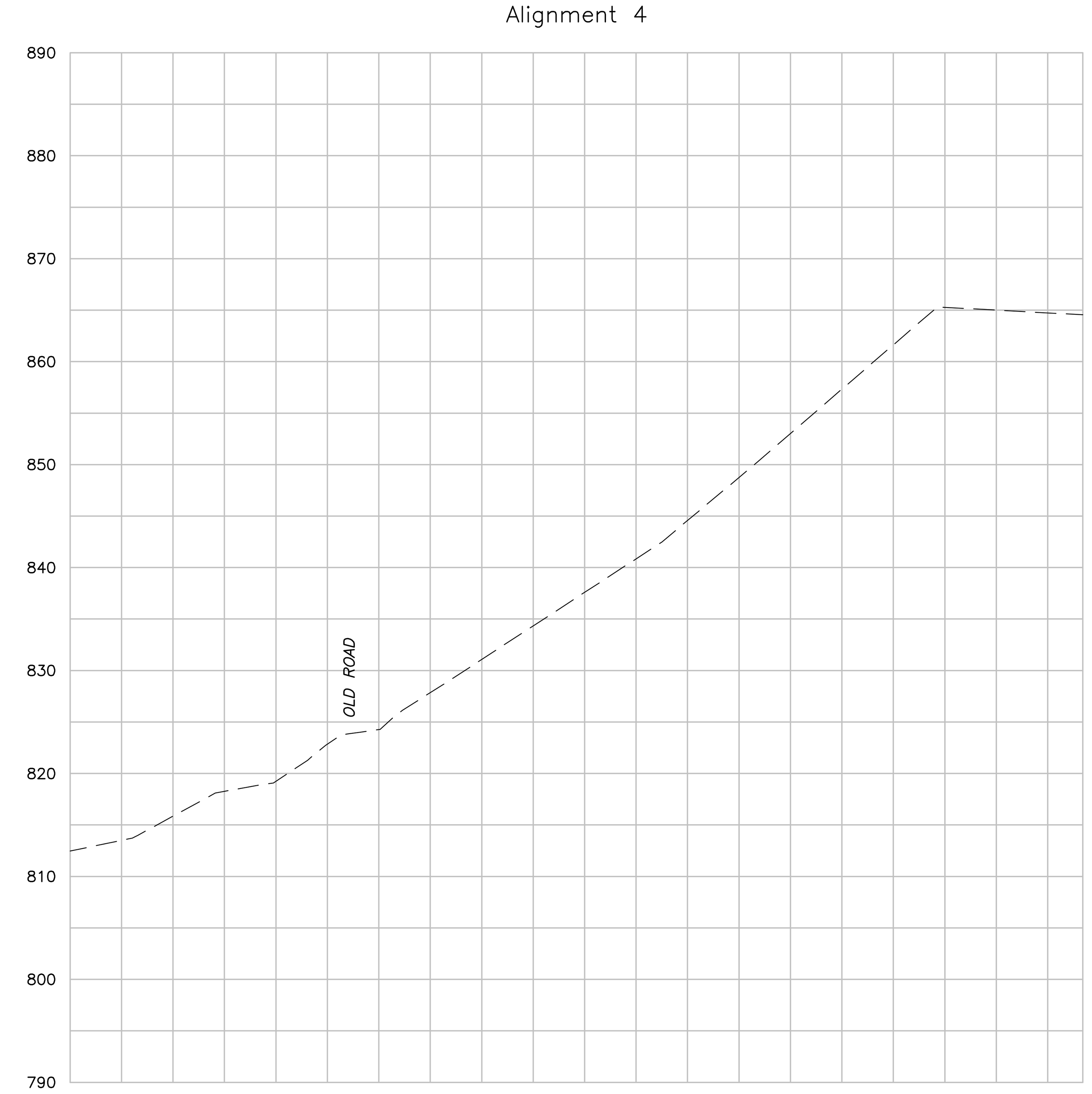
Alignment 5



Alignment 3



Alignment 4



FOCUS
Focus Surveys (BC) Limited Partnership
712D – 10th Street, Invermere, BC
t: 250–342–9767 www.focus.ca

PROJECT

SLR CONSULTING

PROJECT REF. 010047749

SHEET TITLE

TOPOGRAPHIC SURVEY CROSS SECTION LOCATIONS

DRAWN	DATE	CHECKED	SCALE
BKS	2014.02.13	VL	1:500

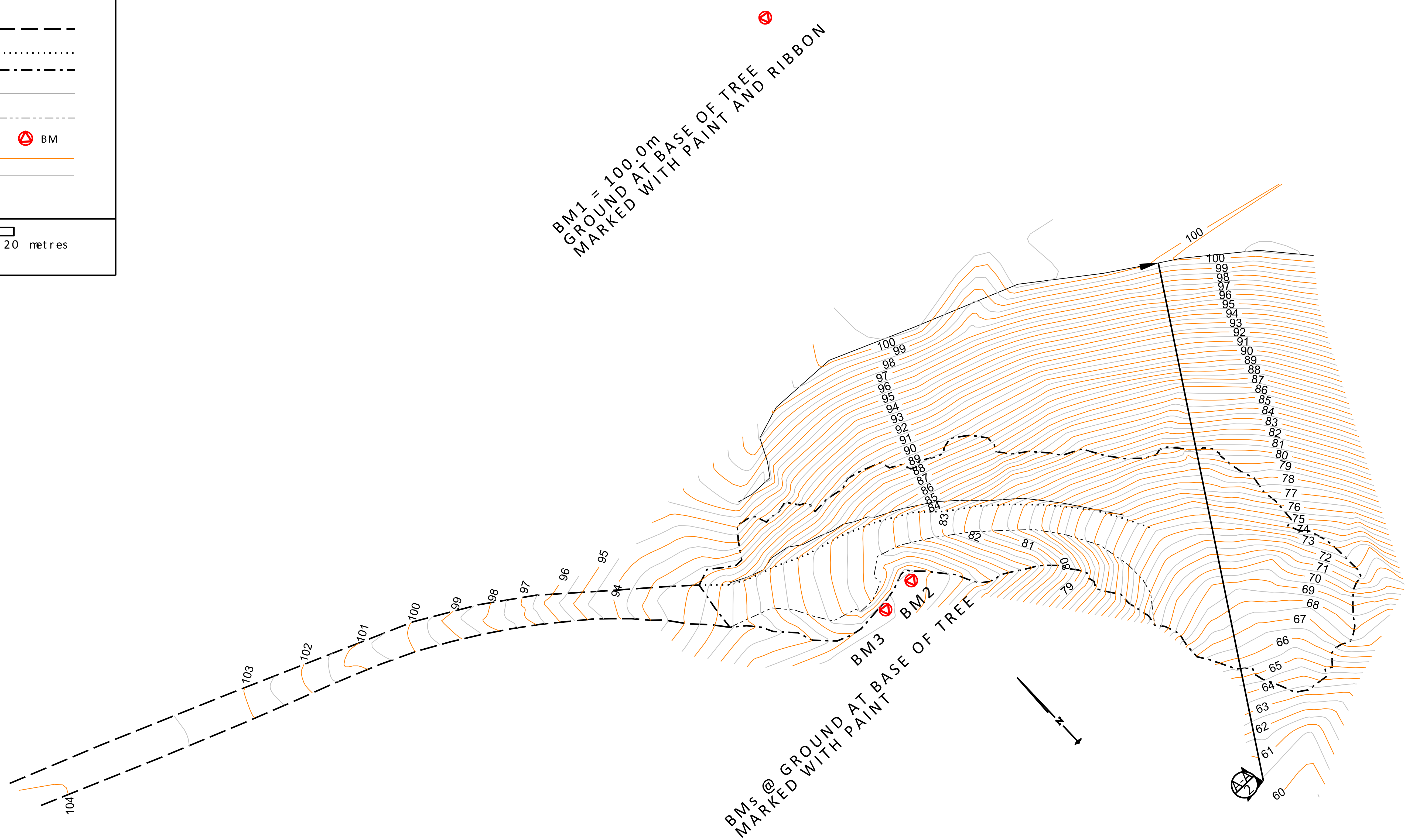
SHEET No. **010047749-MCSI01-R01**

LEGEND:

ROAD EDGE	
ROAD EDGE (EXCAVATED)	
EDGE OF EXCAVATION	
TOP OF BANK	
TOE OF CUT	
BENCHMARK	BM
1.0m INTERVAL CONTOUR	
0.5m INTERVAL CONTOUR	

0 10 20 metres

SCALE 1 : 500



PLAN SKETCH

SCALE 1:500

ISSUED FOR CONSTRUCTION:	DATE: N/ A	TOPO SURVEY	SHEET 1/2
REVISION:		15. 0026. 00	
ISSUED FOR APPROVAL:	DATE: N/ A	WILMER MARSH	
REVIEW:	DATE: N/ A	PRE-BACKFILL SURVEY	
DRAWING: DM	DATE: MAR 06/15		
DESIGN:	DATE: N/ A		
FIELD DATA: CR/DM	DATE: MAR 05/15		

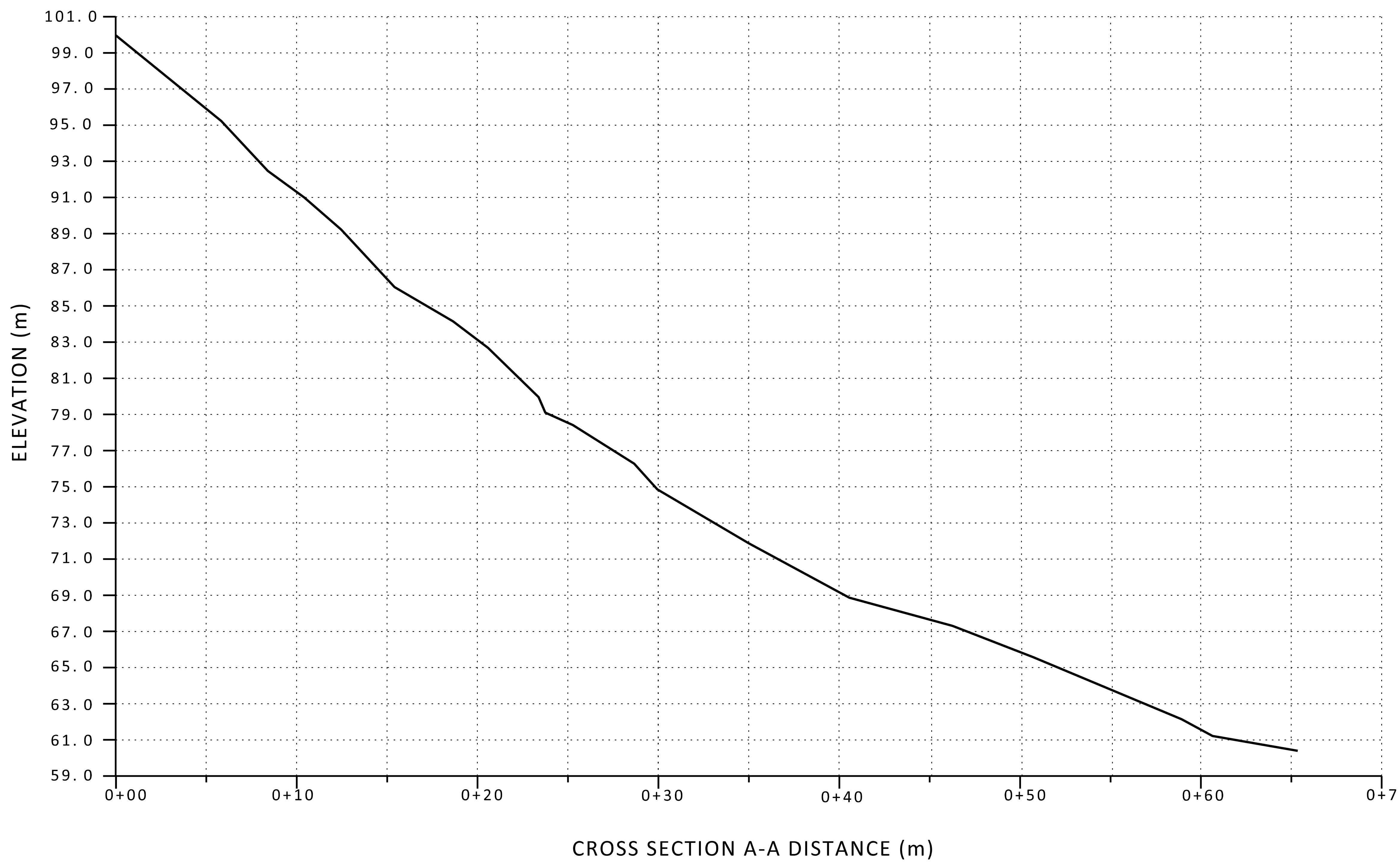
VAST RESOURCE SOLUTIONS

FILE:15.0026.00_TOPO_SURVEY.S01

BRAUN GEOTECHNICAL LTD.

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada



CROSS SECTION A-A PROFILE
SCALE 1:250

VAST RESOURCE SOLUTIONS	ISSUED FOR CONSTRUCTION:	DATE: N/ A	TOPO SURVEY	SHEET 2/2
	REVISION:		15. 0026. 00	
	ISSUED FOR APPROVAL:	DATE: N/ A	WILMER MARSH	
	REVIEW:	DATE: N/ A	PRE-BACKFILL SURVEY	
	DRAWING: DM	DATE: MAR 06/15		
	DESIGN:	DATE: N/ A		
FILE:15.0026.00_TOPO_SURVEY.S01	FIELD DATA: CR/DM	DATE: MAR 05/15		

BRAUN GEOTECHNICAL LTD.

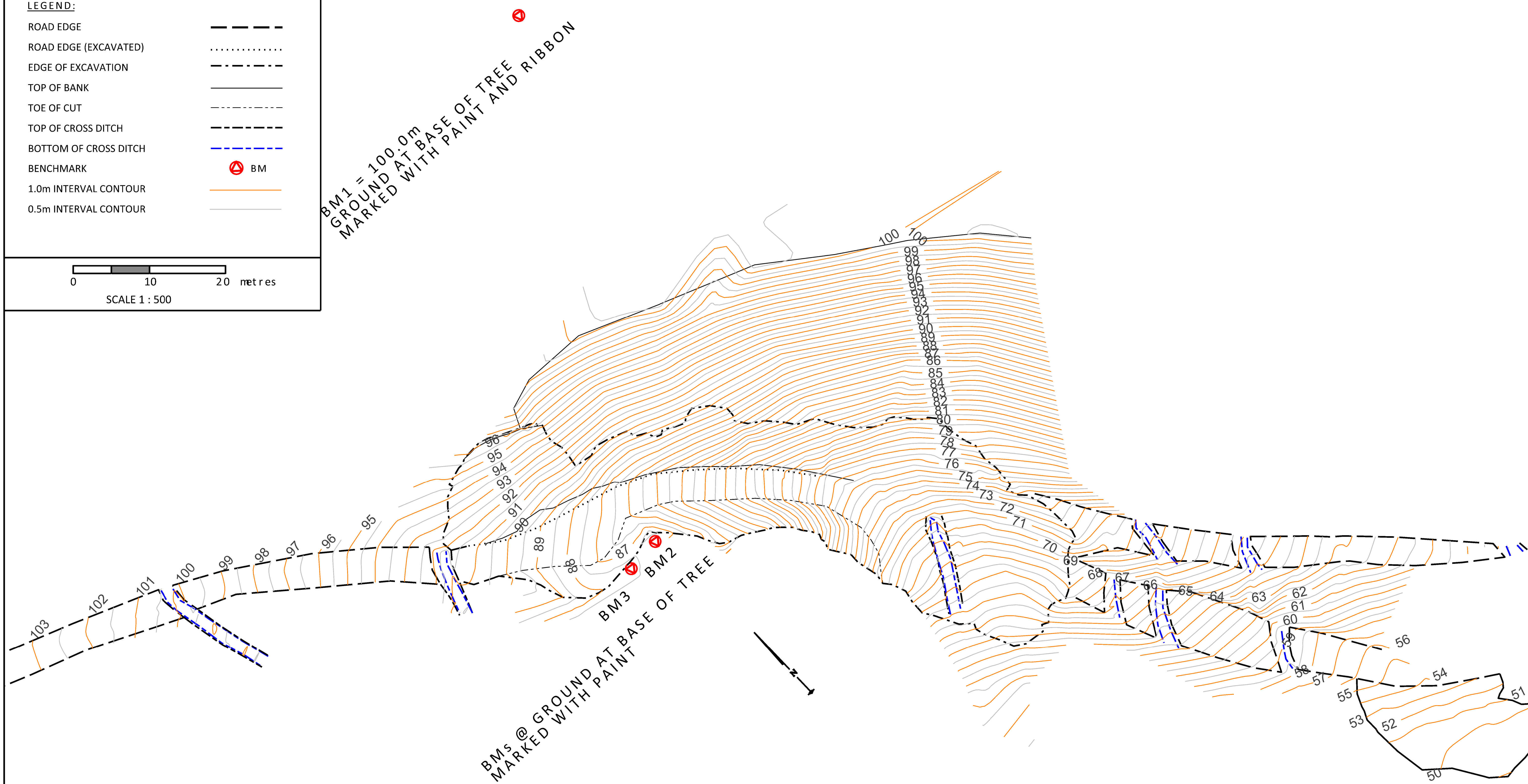
Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

LEGEND:

ROAD EDGE	
ROAD EDGE (EXCAVATED)	
EDGE OF EXCAVATION	
TOP OF BANK	
TOE OF CUT	
TOP OF CROSS DITCH	
BOTTOM OF CROSS DITCH	
BENCHMARK	BM
1.0m INTERVAL CONTOUR	
0.5m INTERVAL CONTOUR	

0 10 20 metres

SCALE 1 : 500



PLAN SKETCH

SCALE 1:500

VAST RESOURCE SOLUTIONS

FILE:15.0026.00_TOPO_SURVEY.S01

ISSUED FOR CONSTRUCTION:	DATE:	N/ A
REVISION:		
ISSUED FOR APPROVAL:	DATE:	N/ A
REVIEW:	DATE:	N/ A
DRAWING: DM	DATE:	MAR 06/15
DESIGN:	DATE:	N/ A
FIELD DATA: CR/DM	DATE:	MAR 05/15

TOPO SURVEY

SHEET 1/1

15. 0026. 00

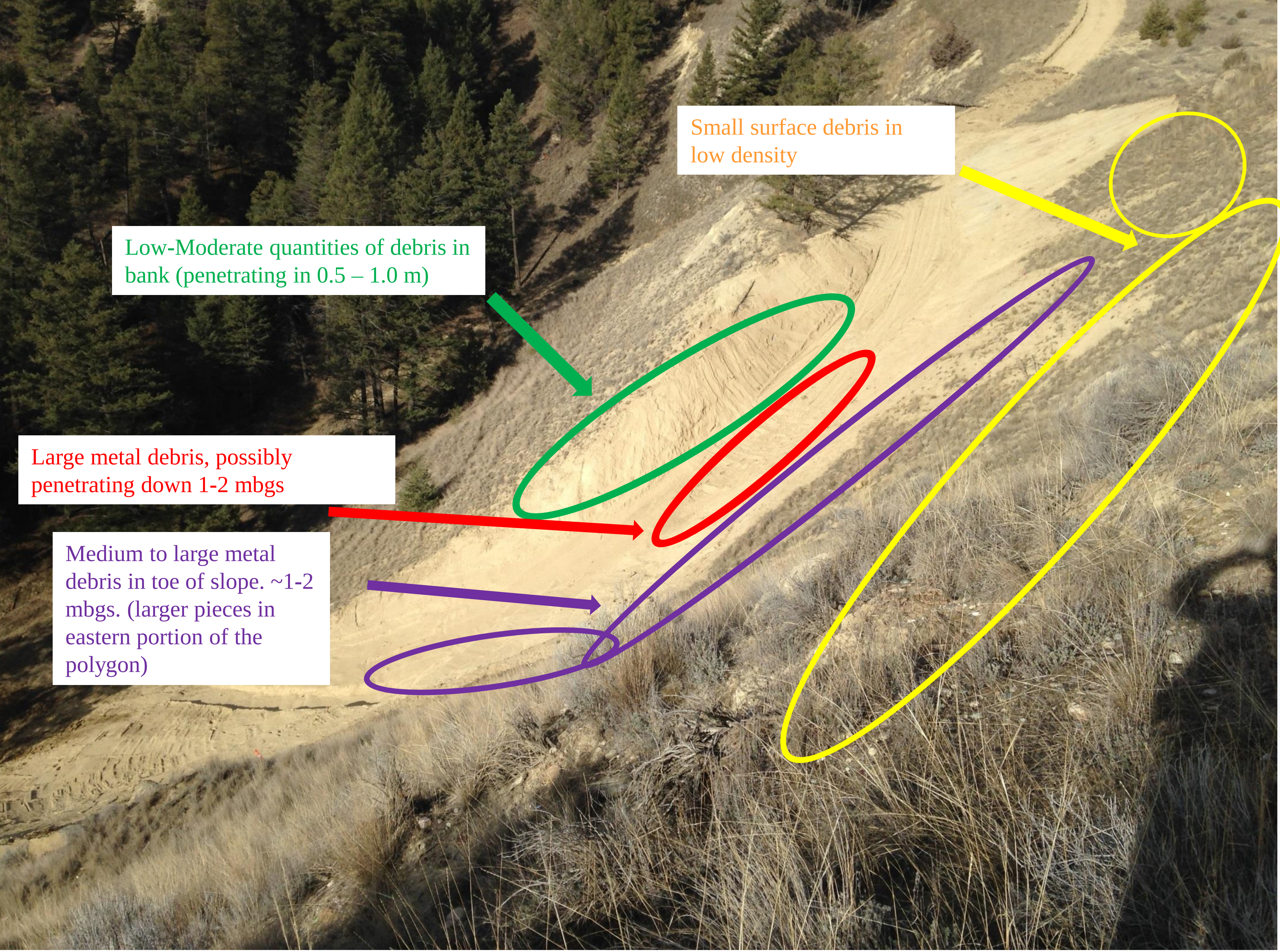
WILMER MARSH

POST-BACKFILL SURVEY

BRAUN GEOTECHNICAL LTD.

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada


Small surface debris in low density
Low-Moderate quantities of debris in bank (penetrating in 0.5 – 1.0 m)
Large metal debris, possibly penetrating down 1-2 mbgs
Medium to large metal debris in toe of slope. ~1-2 mbgs. (larger pieces in eastern portion of the polygon)


Wall void of large debris, though small fragments of metal, glass and plastic observed in low density.
East wall and floor or MDZ in this region void of large debris though small fragments of metal, glass and plastic observed in low density.
Clean wall, void of debris. Polygon extends further west to west boundary of MDZ excavation.
Floor void of large debris, believed to be clean native material.

APPENDIX N
Detailed Analytical Chemistry Report and QAQC Summary Sheets

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: 700315471
Your Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your C.O.C. #: 458127-01-01, 458127-04-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2015/02/05
Report #: R1798157
Version: 4 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B506951
Received: 2015/01/29, 10:25

Sample Matrix: Soil
Samples Received: 19

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE LH VH F1 in Soil - Field Pres.	6	N/A	2015/01/30	BBY8SOP-00010	EPA 8260c R3 m
BTEX/MTBE LH VH F1 in Soil - Field Pres.	4	N/A	2015/02/02	BBY8SOP-00010	EPA 8260c R3 m
BTEX/MTBE Soil LH, VH, F1 SIM/MS	1	2015/02/02	2015/02/02	BBY8SOP-00010, BBY8SOP-00011	EPA 8260c R3 m
BTEX on Leachates by HS GC/MS	3	2015/02/02	2015/02/02	BBY8SOP-00010	EPA 8260c R3 m
BTEX on Leachates by HS GC/MS	8	2015/02/03	2015/02/03	BBY8SOP-00010	EPA 8260c R3 m
BTEX on Leachates by HS GC/MS	8	2015/02/04	2015/02/04	BBY8SOP-00010	EPA 8260c R3 m
Elemental Sulphur (1)	19	2015/02/03	2015/02/03	AB SOP-00035 / CAL SOP-00018	CJSS65:811-813,1985m
Volatile F1-BTEX	6	N/A	2015/02/02	BBY WI-00033	Auto Calc
Volatile F1-BTEX	1	N/A	2015/02/03	BBY WI-00033	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (2)	7	2015/01/30	2015/02/02	BBY8SOP-00030	CCME PHC-CWS
Flash Point in Solid by SetaFlash	19	2015/01/30	2015/01/30	BBY6SOP-00042	ASTM D3828-12a
Elements by ICPMS (total)	7	2015/01/31	2015/02/02	BBY7SOP-00001	EPA 6020a R1 m
Metals - TCLP	12	2015/02/02	2015/02/03	BBY7SOP-00001	EPA 6020a R1 m
Metals - TCLP	7	2015/02/03	2015/02/04	BBY7SOP-00001	EPA 6020a R1 m
Moisture	19	N/A	2015/01/31	BBY8SOP-00017	OMOE E3139 3.1 m
PAH in Soil by GC/MS (SIM) - CCME	7	2015/01/30	2015/02/03	BBY8SOP-00022	EPA 8270d R4 m
Benzo[a]pyrene Equivalency	7	N/A	2015/02/03	BBY WI-00033	Auto Calc
PAH on Leachate by GC/MS (SIM)	12	2015/02/03	2015/02/03	BBY8SOP-00021	EPA 8270d R4 m
PAH on Leachate by GC/MS (SIM)	7	2015/02/04	2015/02/04	BBY8SOP-00021	EPA 8270d R4 m
Total LMW, HMW, Total PAH Calc	19	N/A	2015/02/04	BBY WI-00033	Auto Calc
Total LMW, HMW, Total PAH Calc	7	N/A	2015/02/03	BBY WI-00033	Auto Calc
Free Liquid (Paint filter)	19	N/A	2015/01/30	BBY6SOP-00043	EPA 9095B R2
pH (2:1 DI Water Extract)	19	2015/01/31	2015/02/02	BBY6SOP-00028	BCMOE BCLM Mar2005 m
TCLP pH Measurements	12	N/A	2015/02/03	BBY7SOP-00005	EPA 1311 R1992
TCLP pH Measurements	7	N/A	2015/02/04	BBY7SOP-00005	EPA 1311 R1992
Special Waste Oil and Grease	19	N/A	2015/02/03	BBY8SOP-00008	BCMOE BCLM Mar 2005
EPH less PAH in Soil By GC/FID	7	N/A	2015/02/03	BBY WI-00033	Auto Calc
BC Hydrocarbons in Soil by GC/FID	10	2015/01/30	2015/02/02	BBY8SOP-00029	BCMOE EPH s 07/99 m
BC Hydrocarbons in Soil by GC/FID	1	2015/02/02	2015/02/02	BBY8SOP-00029	BCMOE EPH s 07/99 m

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your P.O. #: 700315471
Your Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your C.O.C. #: 458127-01-01, 458127-04-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

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Sample Matrix: Soil
Samples Received: 19

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Volatile HC-BTEX	10	N/A	2015/02/02	BBY WI-00033	Auto Calc
Volatile HC-BTEX	1	N/A	2015/02/03	BBY WI-00033	Auto Calc

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Calgary Environmental
(2) The method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory; all deviations were justified and validated and are made available upon request; the chromatogram descends to baseline by the retention time of nC50 unless otherwise indicated; all QC criteria met; individual hydrocarbons (nC10, nC16, nC34) are within 10% of their average response factor; linearity is within 15%.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Samantha Fregien, Project Manager
Email: SFregien@maxxam.ca
Phone# (604) 734 7276
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		LO9570	LO9641	LO9642	LO9643	LO9644		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-1-0.5-1**	**TP15-1-1-2**	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**RDL**	**QC Batch**
Elemental Analysis								
Sulphur (Elemental & Polysulphide)	mg/kg	110	170	<100	310	250	100	7796648
OIL & GREASE								
Hazardous Waste Oil	%	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7795564
Polycyclic Aromatics								
Leachate Low Molecular Weight PAH`s	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7793192
Leachate High Molecular Weight PAH`s	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7793192
Leachate Total PAH	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7793192
Physical Properties								
Soluble (2:1) pH	pH	8.35	7.93				N/A	7794868
Physical Properties								
Free Liquid	N/A	PASS	PASS	PASS	PASS	PASS	N/A	7794444

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		LO9645	LO9646	LO9647	LO9648	LO9649		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-3-1-2**	**TP15-4-0.5-1**	**TP15-4-1-2**	**TP15-5-1-2**	**TP15-6-0-0.5**	**RDL**	**QC Batch**
Elemental Analysis								
Sulphur (Elemental & Polysulphide)	mg/kg	110	410	<100	150	210	100	7796648
OIL & GREASE								
Hazardous Waste Oil	%	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7795564
Polycyclic Aromatics								
Leachate Low Molecular Weight PAH`s	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7793192
Leachate High Molecular Weight PAH`s	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7793192
Leachate Total PAH	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7793192
Physical Properties								
Soluble (2:1) pH	pH				8.79	8.72	N/A	7794868
Physical Properties								
Free Liquid	N/A	PASS	PASS	PASS	PASS	PASS	N/A	7794444

RDL = Reportable Detection Limit
N/A = Not Applicable

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Sampler Initials: MC

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		LO9650	LO9651	LO9652	LO9653	LO9654		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-04-01	458127-04-01	458127-04-01	458127-04-01	458127-04-01		
	Units	**TP15-6-0.5-1**	**TP15-6-1-2**	**TP15-6-2-3**	**TP15-7-0-0.5**	**TP15-7-0.5-1**	**RDL**	**QC Batch**
Elemental Analysis								
Sulphur (Elemental & Polysulphide)	mg/kg	270	<100	140	130	<100	100	7796648
OIL & GREASE								
Hazardous Waste Oil	%	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7795575
Polycyclic Aromatics								
Leachate Low Molecular Weight PAH`s	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7793192
Leachate High Molecular Weight PAH`s	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7793192
Leachate Total PAH	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7793192
Physical Properties								
Soluble (2:1) pH	pH	8.93	9.03	9.42	8.72	8.14	N/A	7794868
Physical Properties								
Free Liquid	N/A	PASS	PASS	PASS	PASS	PASS	N/A	7794444

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		LO9655	LO9656	LO9657	LO9658		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-04-01	458127-04-01	458127-04-01	458127-04-01		
	Units	**TP15-7-1-2**	**TP15-7-2-3**	**TP15-A**	**TP15-B**	**RDL**	**QC Batch**
Elemental Analysis							
Sulphur (Elemental & Polysulphide)	mg/kg	<100	<100	<100	<100	100	7796648
OIL & GREASE							
Hazardous Waste Oil	%	<0.50	<0.50	<0.50	<0.50	0.50	7795575
Polycyclic Aromatics							
Leachate Low Molecular Weight PAH`s	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	7793192
Leachate High Molecular Weight PAH`s	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	7793192
Leachate Total PAH	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	7793192
Physical Properties							
Soluble (2:1) pH	pH	9.47	9.26		8.60	N/A	7794868
Physical Properties							
Free Liquid	N/A	PASS	PASS	PASS	PASS	N/A	7794444

RDL = Reportable Detection Limit
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Client Project #: 219.05112.0010
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Sampler Initials: MC

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LO9642	LO9643	LO9644	LO9645	LO9646	LO9647		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**TP15-3-1-2**	**TP15-4-0.5-1**	**TP15-4-1-2**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	<10	10	7796062
F3 (C16-C34 Hydrocarbons)	mg/kg	<10	20	<10	<10	<10	<10	10	7796062
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	11	<10	<10	<10	<10	10	7796062
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	Yes	N/A	7796062
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	122	109	113	115	116	109		7796062

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		LO9657		
Sampling Date		2015/01/27 12:00		
COC Number		458127-04-01		
	Units	**TP15-A**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	10	7796062
F3 (C16-C34 Hydrocarbons)	mg/kg	900	10	7796062
F4 (C34-C50 Hydrocarbons)	mg/kg	1600	10	7796062
Reached Baseline at C50	mg/kg	Yes	N/A	7796062
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	102		7796062

RDL = Reportable Detection Limit
N/A = Not Applicable

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Site Location: Wilmer Marsh
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Sampler Initials: MC

PHYSICAL TESTING (SOIL)

Maxxam ID		LO9570	LO9641	LO9642	LO9643	LO9644	LO9645		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-1-0.5-1**	**TP15-1-1-2**	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**TP15-3-1-2**	**RDL**	**QC Batch**
Physical Properties									
Moisture	%	23	11	5.2	5.9	6.4	5.4	0.30	7794534
RDL = Reportable Detection Limit									

Maxxam ID		LO9646	LO9647	LO9648	LO9649	LO9650	LO9651		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-04-01	458127-04-01		
	Units	**TP15-4-0.5-1**	**TP15-4-1-2**	**TP15-5-1-2**	**TP15-6-0-0.5**	**TP15-6-0.5-1**	**TP15-6-1-2**	**RDL**	**QC Batch**
Physical Properties									
Moisture	%	3.5	2.2	3.5	16	8.6	8.2	0.30	7794534
RDL = Reportable Detection Limit									

Maxxam ID		LO9652	LO9653	LO9654	LO9655	LO9656	LO9657		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-04-01	458127-04-01	458127-04-01	458127-04-01	458127-04-01	458127-04-01		
	Units	**TP15-6-2-3**	**TP15-7-0-0.5**	**TP15-7-0.5-1**	**TP15-7-1-2**	**TP15-7-2-3**	**TP15-A**	**RDL**	**QC Batch**
Physical Properties									
Moisture	%	3.4	6.6	6.8	2.5	2.3	12	0.30	7794534
RDL = Reportable Detection Limit									

Maxxam ID		LO9658		
Sampling Date		2015/01/27 12:00		
COC Number		458127-04-01		
	Units	**TP15-B**	**RDL**	**QC Batch**
Physical Properties				
Moisture	%	3.3	0.30	7794534
RDL = Reportable Detection Limit				

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Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
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Sampler Initials: MC

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		LO9570	LO9641	LO9642	LO9643	LO9644		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-1-0.5-1**	**TP15-1-1-2**	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**RDL**	**QC Batch**
Polycyclic Aromatics								
Leachate Naphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate 2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Quinoline	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7796931
Leachate Acenaphthylene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Acenaphthene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Fluorene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Phenanthrene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Anthracene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Acridine	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7796931
Leachate Fluoranthene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Pyrene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Benzo(a)anthracene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Chrysene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Benzo(b&j)fluoranthene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Benzo(k)fluoranthene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Benzo(a)pyrene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Indeno(1,2,3-cd)pyrene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7796931
Leachate Dibenz(a,h)anthracene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7796931
Leachate Benzo(g,h,i)perylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7796931
Surrogate Recovery (%)								
Leachate D10-ANTHRACENE (sur.)	%	101	99	107	105	104		7796931
Leachate D8-ACENAPHTHYLENE (sur.)	%	96	92	100	99	99		7796931
Leachate D8-NAPHTHALENE (sur.)	%	92	87	93	93	93		7796931
Leachate TERPHENYL-D14 (sur.)	%	93	100	106	104	104		7796931

RDL = Reportable Detection Limit

Maxxam Job #: B506951
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SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		LO9645	LO9646	LO9647	LO9648	LO9649		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-3-1-2**	**TP15-4-0.5-1**	**TP15-4-1-2**	**TP15-5-1-2**	**TP15-6-0-0.5**	**RDL**	**QC Batch**
Polycyclic Aromatics								
Leachate Naphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate 2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Quinoline	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7796931
Leachate Acenaphthylene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Acenaphthene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Fluorene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Phenanthrene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Anthracene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Acridine	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7796931
Leachate Fluoranthene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Pyrene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Benzo(a)anthracene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Chrysene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Benzo(b&j)fluoranthene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Benzo(k)fluoranthene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Benzo(a)pyrene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796931
Leachate Indeno(1,2,3-cd)pyrene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7796931
Leachate Dibenz(a,h)anthracene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7796931
Leachate Benzo(g,h,i)perylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	7796931
Surrogate Recovery (%)								
Leachate D10-ANTHRACENE (sur.)	%	104	64	61	62	65		7796931
Leachate D8-ACENAPHTHYLENE (sur.)	%	96	62	59	60	63		7796931
Leachate D8-NAPHTHALENE (sur.)	%	89	60	57	58	62		7796931
Leachate TERPHENYL-D14 (sur.)	%	104	58 (1)	55 (1)	56 (1)	60		7796931

RDL = Reportable Detection Limit
(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		LO9650	LO9651		LO9652	LO9653	LO9654		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-04-01	458127-04-01		458127-04-01	458127-04-01	458127-04-01		
	Units	**TP15-6-0.5-1**	**TP15-6-1-2**	**QC Batch**	**TP15-6-2-3**	**TP15-7-0-0.5**	**TP15-7-0.5-1**	**RDL**	**QC Batch**
Polycyclic Aromatics									
Leachate Naphthalene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate 2-Methylnaphthalene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Quinoline	ug/L	<0.50	<0.50	7796931	<0.50	<0.50	<0.50	0.50	7798225
Leachate Acenaphthylene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Acenaphthene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Fluorene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Phenanthrene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Anthracene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Acridine	ug/L	<0.50	<0.50	7796931	<0.50	<0.50	<0.50	0.50	7798225
Leachate Fluoranthene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Pyrene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Benzo(a)anthracene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Chrysene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Benzo(b&j)fluoranthene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Benzo(k)fluoranthene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Benzo(a)pyrene	ug/L	<0.10	<0.10	7796931	<0.10	<0.10	<0.10	0.10	7798225
Leachate Indeno(1,2,3-cd)pyrene	ug/L	<0.20	<0.20	7796931	<0.20	<0.20	<0.20	0.20	7798225
Leachate Dibenz(a,h)anthracene	ug/L	<0.20	<0.20	7796931	<0.20	<0.20	<0.20	0.20	7798225
Leachate Benzo(g,h,i)perylene	ug/L	<0.20	<0.20	7796931	<0.20	<0.20	<0.20	0.20	7798225
Surrogate Recovery (%)									
Leachate D10-ANTHRACENE (sur.)	%	64	64	7796931	94	92	93		7798225
Leachate D8-ACENAPHTHYLENE (sur.)	%	60	62	7796931	90	88	89		7798225
Leachate D8-NAPHTHALENE (sur.)	%	57	60	7796931	92	91	92		7798225
Leachate TERPHENYL-D14 (sur.)	%	61	60	7796931	79	78	76		7798225
RDL = Reportable Detection Limit									

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		LO9655	LO9656	LO9657	LO9658		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-04-01	458127-04-01	458127-04-01	458127-04-01		
	Units	**TP15-7-1-2**	**TP15-7-2-3**	**TP15-A**	**TP15-B**	**RDL**	**QC Batch**
Polycyclic Aromatics							
Leachate Naphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate 2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Quinoline	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	7798225
Leachate Acenaphthylene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Acenaphthene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Fluorene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Phenanthrene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Anthracene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Acridine	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	7798225
Leachate Fluoranthene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Pyrene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Benzo(a)anthracene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Chrysene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Benzo(b&j)fluoranthene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Benzo(k)fluoranthene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Benzo(a)pyrene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	7798225
Leachate Indeno(1,2,3-cd)pyrene	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	7798225
Leachate Dibenz(a,h)anthracene	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	7798225
Leachate Benzo(g,h,i)perylene	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	7798225
Surrogate Recovery (%)							
Leachate D10-ANTHRACENE (sur.)	%	89	88	94	90		7798225
Leachate D8-ACENAPHTHYLENE (sur.)	%	88	87	93	89		7798225
Leachate D8-NAPHTHALENE (sur.)	%	88	88	93	89		7798225
Leachate TERPHENYL-D14 (sur.)	%	79	78	88	81		7798225
RDL = Reportable Detection Limit							

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Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		LO9570	LO9641	LO9642	LO9643	LO9644	LO9645	
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01	
	Units	**TP15-1-0.5-1**	**TP15-1-1-2**	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**TP15-3-1-2**	**QC Batch**
TCLP Extraction Procedure								
Initial pH of Sample	pH	9.00	8.94	9.54	9.37	9.69	9.54	7795712
pH after HCl	pH	2.42	3.59	2.29	2.28	2.37	2.40	7795712
Final pH of Leachate	pH	6.67	6.65	6.74	6.76	6.71	6.74	7795712
pH of Leaching Fluid	pH	4.93	4.93	4.93	4.93	4.93	4.93	7795712

Maxxam ID		LO9646	LO9647	LO9648	LO9649	LO9650	LO9651	
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-04-01	458127-04-01	
	Units	**TP15-4-0.5-1**	**TP15-4-1-2**	**TP15-5-1-2**	**TP15-6-0-0.5**	**TP15-6-0.5-1**	**TP15-6-1-2**	**QC Batch**
TCLP Extraction Procedure								
Initial pH of Sample	pH	9.71	9.44	9.57	9.60	9.44	9.54	7795712
pH after HCl	pH	5.46	5.23	5.39	1.59	1.94	1.98	7795712
Final pH of Leachate	pH	6.18	6.21	6.22	6.88	6.81	6.70	7795712
pH of Leaching Fluid	pH	2.87	2.87	2.87	4.93	4.93	4.93	7795712

Maxxam ID		LO9652	LO9653	LO9654	LO9655	LO9656	LO9657	
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	
COC Number		458127-04-01	458127-04-01	458127-04-01	458127-04-01	458127-04-01	458127-04-01	
	Units	**TP15-6-2-3**	**TP15-7-0-0.5**	**TP15-7-0.5-1**	**TP15-7-1-2**	**TP15-7-2-3**	**TP15-A**	**QC Batch**
TCLP Extraction Procedure								
Initial pH of Sample	pH	9.70	9.42	9.24	9.69	9.67	8.79	7797110
pH after HCl	pH	1.92	1.88	2.02	1.74	1.69	2.24	7797110
Final pH of Leachate	pH	6.69	6.73	6.80	6.77	6.73	6.67	7797110
pH of Leaching Fluid	pH	4.94	4.94	4.94	4.94	4.94	4.94	7797110

Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		LO9658	
Sampling Date		2015/01/27 12:00	
COC Number		458127-04-01	
	Units	**TP15-B**	**QC Batch**
TCLP Extraction Procedure			
Initial pH of Sample	pH	9.39	7797110
pH after HCl	pH	1.87	7797110
Final pH of Leachate	pH	6.27	7797110
pH of Leaching Fluid	pH	4.94	7797110

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Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

TOTAL PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		LO9641	LO9642	LO9643	LO9644	LO9645	LO9646		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-1-1-2**	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**TP15-3-1-2**	**TP15-4-0.5-1**	**RDL**	**QC Batch**
Calculated Parameters									
LEPH (C10-C19 less PAH)	mg/kg		<100	<100	<100	<100	<100	100	7791095
HEPH (C19-C32 less PAH)	mg/kg		<100	<100	<100	<100	<100	100	7791095
Hydrocarbons									
EPH (C10-C19)	mg/kg	<100	<100	<100	<100	<100	<100	100	7796058
EPH (C19-C32)	mg/kg	<100	<100	<100	<100	<100	<100	100	7796058
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	96	94	93	95	95	94		7796058
RDL = Reportable Detection Limit									

Maxxam ID		LO9647	LO9648	LO9651	LO9657	LO9658		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-04-01	458127-04-01	458127-04-01		
	Units	**TP15-4-1-2**	**TP15-5-1-2**	**TP15-6-1-2**	**TP15-A**	**TP15-B**	**RDL**	**QC Batch**
Calculated Parameters								
LEPH (C10-C19 less PAH)	mg/kg	<100			<100		100	7791095
HEPH (C19-C32 less PAH)	mg/kg	<100			587		100	7791095
Hydrocarbons								
EPH (C10-C19)	mg/kg	<100	<100	<100	<100	<100	100	7796058
EPH (C19-C32)	mg/kg	<100	<100	<100	587	<100	100	7796058
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	93	96	91	97	95		7796058
RDL = Reportable Detection Limit								

Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		LO9570		LO9641	LO9642	LO9643	LO9644		
Sampling Date		2015/01/27 12:00		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01		458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-1-0.5-1**	**QC Batch**	**TP15-1-1-2**	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**RDL**	**QC Batch**
Volatiles									
Leachate Benzene	mg/L	<0.010	7798289	<0.010	<0.010	<0.010	<0.010	0.010	7797086
Leachate Toluene	mg/L	<0.010	7798289	<0.010	<0.010	<0.010	<0.010	0.010	7797086
Leachate Ethylbenzene	mg/L	<0.010	7798289	<0.010	<0.010	<0.010	<0.010	0.010	7797086
Leachate m & p-Xylene	mg/L	<0.020	7798289	<0.020	<0.020	<0.020	<0.020	0.020	7797086
Leachate o-Xylene	mg/L	<0.010	7798289	<0.010	<0.010	<0.010	<0.010	0.010	7797086
Leachate Styrene	mg/L	<0.010	7798289	<0.010	<0.010	<0.010	<0.010	0.010	7797086
Leachate Xylenes (Total)	mg/L	<0.020	7798289	<0.020	<0.020	<0.020	<0.020	0.020	7797086
Surrogate Recovery (%)									
Leachate 1,4-Difluorobenzene (sur.)	%	112	7798289	100	101	100	100		7797086
Leachate 4-Bromofluorobenzene (sur.)	%	96	7798289	101	101	101	100		7797086
Leachate D4-1,2-Dichloroethane (sur.)	%	93	7798289	103	106	105	103		7797086
RDL = Reportable Detection Limit									

Maxxam ID		LO9645	LO9646	LO9647	LO9648		LO9649		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01		458127-01-01		
	Units	**TP15-3-1-2**	**TP15-4-0.5-1**	**TP15-4-1-2**	**TP15-5-1-2**	**QC Batch**	**TP15-6-0-0.5**	**RDL**	**QC Batch**
Volatiles									
Leachate Benzene	mg/L	<0.010	<0.010	<0.010	<0.010	7797086	<0.010	0.010	7798289
Leachate Toluene	mg/L	<0.010	<0.010	<0.010	<0.010	7797086	<0.010	0.010	7798289
Leachate Ethylbenzene	mg/L	<0.010	<0.010	<0.010	<0.010	7797086	<0.010	0.010	7798289
Leachate m & p-Xylene	mg/L	<0.020	<0.020	<0.020	<0.020	7797086	<0.020	0.020	7798289
Leachate o-Xylene	mg/L	<0.010	<0.010	<0.010	<0.010	7797086	<0.010	0.010	7798289
Leachate Styrene	mg/L	<0.010	<0.010	<0.010	<0.010	7797086	<0.010	0.010	7798289
Leachate Xylenes (Total)	mg/L	<0.020	<0.020	<0.020	<0.020	7797086	<0.020	0.020	7798289
Surrogate Recovery (%)									
Leachate 1,4-Difluorobenzene (sur.)	%	101	102	101	101	7797086	112		7798289
Leachate 4-Bromofluorobenzene (sur.)	%	100	101	100	100	7797086	98		7798289
Leachate D4-1,2-Dichloroethane (sur.)	%	102	102	104	102	7797086	97		7798289
RDL = Reportable Detection Limit									

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Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		LO9650	LO9651	LO9652	LO9653	LO9654		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-04-01	458127-04-01	458127-04-01	458127-04-01	458127-04-01		
	Units	**TP15-6-0.5-1**	**TP15-6-1-2**	**TP15-6-2-3**	**TP15-7-0-0.5**	**TP15-7-0.5-1**	**RDL**	**QC Batch**
Volatiles								
Leachate Benzene	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7798289
Leachate Toluene	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7798289
Leachate Ethylbenzene	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7798289
Leachate m & p-Xylene	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7798289
Leachate o-Xylene	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7798289
Leachate Styrene	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7798289
Leachate Xylenes (Total)	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7798289
Surrogate Recovery (%)								
Leachate 1,4-Difluorobenzene (sur.)	%	112	113	113	114	114		7798289
Leachate 4-Bromofluorobenzene (sur.)	%	97	98	97	98	98		7798289
Leachate D4-1,2-Dichloroethane (sur.)	%	98	94	94	93	95		7798289

RDL = Reportable Detection Limit

Maxxam ID		LO9655		LO9656	LO9657	LO9658		
Sampling Date		2015/01/27 12:00		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-04-01		458127-04-01	458127-04-01	458127-04-01		
	Units	**TP15-7-1-2**	**QC Batch**	**TP15-7-2-3**	**TP15-A**	**TP15-B**	**RDL**	**QC Batch**
Volatiles								
Leachate Benzene	mg/L	<0.010	7798289	<0.010	<0.010	<0.010	0.010	7795896
Leachate Toluene	mg/L	<0.010	7798289	<0.010	<0.010	<0.010	0.010	7795896
Leachate Ethylbenzene	mg/L	<0.010	7798289	<0.010	<0.010	<0.010	0.010	7795896
Leachate m & p-Xylene	mg/L	<0.020	7798289	<0.020	<0.020	<0.020	0.020	7795896
Leachate o-Xylene	mg/L	<0.010	7798289	<0.010	<0.010	<0.010	0.010	7795896
Leachate Styrene	mg/L	<0.010	7798289	<0.010	<0.010	<0.010	0.010	7795896
Leachate Xylenes (Total)	mg/L	<0.020	7798289	<0.020	<0.020	<0.020	0.020	7795896
Surrogate Recovery (%)								
Leachate 1,4-Difluorobenzene (sur.)	%	115	7798289	93	93	98		7795896
Leachate 4-Bromofluorobenzene (sur.)	%	97	7798289	98	100	103		7795896
Leachate D4-1,2-Dichloroethane (sur.)	%	96	7798289	108	105	106		7795896

RDL = Reportable Detection Limit

Maxxam Job #: B506951
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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

MISCELLANEOUS (SOIL)

Maxxam ID		LO9570	LO9641	LO9642	LO9643	LO9644	LO9645		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-1-0.5-1**	**TP15-1-1-2**	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**TP15-3-1-2**	**RDL**	**QC Batch**
Physical Properties									
Flash point	°C	>61	>61	>61	>61	>61	>61	23	7794442
RDL = Reportable Detection Limit									

Maxxam ID		LO9646	LO9647	LO9648	LO9649	LO9650	LO9651		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-04-01	458127-04-01		
	Units	**TP15-4-0.5-1**	**TP15-4-1-2**	**TP15-5-1-2**	**TP15-6-0-0.5**	**TP15-6-0.5-1**	**TP15-6-1-2**	**RDL**	**QC Batch**
Physical Properties									
Flash point	°C	>61	>61	>61	>61	>61	>61	23	7794442
RDL = Reportable Detection Limit									

Maxxam ID		LO9652	LO9653	LO9654	LO9655	LO9656	LO9657		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-04-01	458127-04-01	458127-04-01	458127-04-01	458127-04-01	458127-04-01		
	Units	**TP15-6-2-3**	**TP15-7-0-0.5**	**TP15-7-0.5-1**	**TP15-7-1-2**	**TP15-7-2-3**	**TP15-A**	**RDL**	**QC Batch**
Physical Properties									
Flash point	°C	>61	>61	>61	>61	>61	>61	23	7794442
RDL = Reportable Detection Limit									

Maxxam ID		LO9658		
Sampling Date		2015/01/27 12:00		
COC Number		458127-04-01		
	Units	**TP15-B**	**RDL**	**QC Batch**
Physical Properties				
Flash point	°C	>61	23	7794442
RDL = Reportable Detection Limit				

Maxxam Job #: B506951
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Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

BCCSR BTEX/VPH IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LO9641	LO9648		LO9651	LO9658		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00		2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01		458127-04-01	458127-04-01		
	Units	**TP15-1-1-2**	**TP15-5-1-2**	**QC Batch**	**TP15-6-1-2**	**TP15-B**	**RDL**	**QC Batch**
Volatiles								
VPH (VH6 to 10 - BTEX)	mg/kg	<10	<10	7792032	<10	<10	10	7793715
VH C6-C10	mg/kg	<10	<10	7794516	<10	<10	10	7794516
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	96	97	7794516	100	93		7794516
4-Bromofluorobenzene (sur.)	%	106	97	7794516	101	96		7794516
D10-ETHYLBENZENE (sur.)	%	118	122	7794516	115	117		7794516
D4-1,2-Dichloroethane (sur.)	%	123	98	7794516	100	115		7794516
RDL = Reportable Detection Limit								

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Maxxam Job #: B506951
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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

CCME&CSR BTX/F1/VPH IN SOIL - FIELD PRES (SOIL)

Maxxam ID		LO9642		LO9643	LO9645	LO9646	LO9647		
Sampling Date		2015/01/27 12:00		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01		458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-2-0.5-1**	**RDL**	**TP15-2-1-2**	**TP15-3-1-2**	**TP15-4-0.5-1**	**TP15-4-1-2**	**RDL**	**QC Batch**
Calculated Parameters									
F1 (C6-C10) - BTEX	mg/kg	<10	10	<10	<10	<10	<10	10	7791091
Volatiles									
VPH (VH6 to 10 - BTEX)	mg/kg	<10	10	<10	<10	<10	<10	10	7791340
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	0.10	7794516
Benzene	mg/kg	<0.0058 (1)	0.0058	0.021	0.0088	0.016	<0.0050	0.0050	7794516
Toluene	mg/kg	0.50	0.020	1.2	1.2	1.5	<0.020	0.020	7794516
Ethylbenzene	mg/kg	<0.010	0.010	<0.010	0.013	0.012	<0.010	0.010	7794516
m & p-Xylene	mg/kg	<0.040	0.040	<0.040	<0.040	<0.040	<0.040	0.040	7794516
o-Xylene	mg/kg	<0.040	0.040	<0.040	<0.040	<0.040	<0.040	0.040	7794516
Styrene	mg/kg	<0.030	0.030	<0.030	<0.030	<0.030	<0.030	0.030	7794516
Xylenes (Total)	mg/kg	<0.040	0.040	<0.040	<0.040	<0.040	<0.040	0.040	7794516
VH C6-C10	mg/kg	<10	10	<10	<10	<10	<10	10	7794516
(C6-C10)	mg/kg	<10	10	<10	<10	<10	<10	10	7794516
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	93		103	93	94	91		7794516
4-Bromofluorobenzene (sur.)	%	96		106	101	96	94		7794516
D10-ETHYLBENZENE (sur.)	%	123		111	124	125	120		7794516
D4-1,2-Dichloroethane (sur.)	%	113		103	114	92	111		7794516

RDL = Reportable Detection Limit
(1) RDL raised due to sample matrix interference.

Maxxam Job #: B506951
Report Date: 2015/02/05

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Sampler Initials: MC

CCME&CSR BTX/F1/VPH IN SOIL - FIELD PRES (SOIL)

Maxxam ID		LO9657		
Sampling Date		2015/01/27 12:00		
COC Number		458127-04-01		
	Units	**TP15-A**	**RDL**	**QC Batch**
Calculated Parameters				
F1 (C6-C10) - BTEX	mg/kg	<10	10	7791091
Volatiles				
VPH (VH6 to 10 - BTEX)	mg/kg	<10	10	7791340
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	0.10	7794516
Benzene	mg/kg	<0.0050	0.0050	7794516
Toluene	mg/kg	<0.020	0.020	7794516
Ethylbenzene	mg/kg	<0.010	0.010	7794516
m & p-Xylene	mg/kg	<0.040	0.040	7794516
o-Xylene	mg/kg	<0.040	0.040	7794516
Styrene	mg/kg	<0.030	0.030	7794516
Xylenes (Total)	mg/kg	<0.040	0.040	7794516
VH C6-C10	mg/kg	<10	10	7794516
(C6-C10)	mg/kg	<10	10	7794516
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	97		7794516
4-Bromofluorobenzene (sur.)	%	104		7794516
D10-ETHYLBENZENE (sur.)	%	117		7794516
D4-1,2-Dichloroethane (sur.)	%	121		7794516
RDL = Reportable Detection Limit				

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Maxxam Job #: B506951
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Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

CCME&CSR BTEX/F1/VPH IN SOIL (SOIL)

Maxxam ID		LO9644		
Sampling Date		2015/01/27 12:00		
COC Number		458127-01-01		
	Units	**TP15-3-0.5-1**	**RDL**	**QC Batch**
Calculated Parameters				
F1 (C6-C10) - BTEX	mg/kg	<10	10	7794308
Volatiles				
VPH (VH6 to 10 - BTEX)	mg/kg	<10	10	7793715
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	0.10	7796420
Benzene	mg/kg	<0.0050	0.0050	7796420
Toluene	mg/kg	<0.020	0.020	7796420
Ethylbenzene	mg/kg	<0.010	0.010	7796420
m & p-Xylene	mg/kg	<0.040	0.040	7796420
o-Xylene	mg/kg	<0.040	0.040	7796420
Styrene	mg/kg	<0.030	0.030	7796420
Xylenes (Total)	mg/kg	<0.040	0.040	7796420
VH C6-C10	mg/kg	<10	10	7796420
(C6-C10)	mg/kg	<10	10	7796420
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	94		7796420
4-Bromofluorobenzene (sur.)	%	97		7796420
D10-ETHYLBENZENE (sur.)	%	107		7796420
D4-1,2-Dichloroethane (sur.)	%	100		7796420
RDL = Reportable Detection Limit				

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Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LO9642	LO9643	LO9644	LO9645	LO9646	LO9647		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**TP15-3-1-2**	**TP15-4-0.5-1**	**TP15-4-1-2**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH	8.96	8.83	9.34	8.60	9.16	8.66	N/A	7794866
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	8120	8670	8120	8400	8090	8380	100	7794764
Total Antimony (Sb)	mg/kg	0.41	0.59	0.36	0.96	0.55	0.50	0.10	7794764
Total Arsenic (As)	mg/kg	5.32	5.64	5.42	5.55	5.51	5.29	0.50	7794764
Total Barium (Ba)	mg/kg	95.8	119	149	126	105	108	0.10	7794764
Total Beryllium (Be)	mg/kg	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	7794764
Total Bismuth (Bi)	mg/kg	0.11	0.13	0.10	0.15	0.12	0.12	0.10	7794764
Total Cadmium (Cd)	mg/kg	0.154	0.452	0.260	1.02	0.246	0.290	0.050	7794764
Total Calcium (Ca)	mg/kg	82500	85000	81700	78400	79800	82900	100	7794764
Total Chromium (Cr)	mg/kg	15.2	15.9	14.9	16.6	15.6	15.4	1.0	7794764
Total Cobalt (Co)	mg/kg	7.93	8.24	7.99	8.22	8.22	8.12	0.30	7794764
Total Copper (Cu)	mg/kg	15.5	18.8	16.9	24.3	18.1	17.8	0.50	7794764
Total Iron (Fe)	mg/kg	20600	21700	20500	21000	21800	20500	100	7794764
Total Lead (Pb)	mg/kg	13.5	26.5	13.3	59.6	19.3	18.4	0.10	7794764
Total Lithium (Li)	mg/kg	18.0	18.9	17.8	18.4	17.7	18.4	5.0	7794764
Total Magnesium (Mg)	mg/kg	17600	17500	17500	16800	17500	18100	100	7794764
Total Manganese (Mn)	mg/kg	419	439	417	447	424	432	0.20	7794764
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7794764
Total Molybdenum (Mo)	mg/kg	0.44	0.58	0.45	0.71	0.48	0.45	0.10	7794764
Total Nickel (Ni)	mg/kg	18.7	19.6	23.6	20.5	18.3	20.0	0.80	7794764
Total Phosphorus (P)	mg/kg	535	574	547	576	576	557	10	7794764
Total Potassium (K)	mg/kg	684	803	674	796	740	680	100	7794764
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7794764
Total Silver (Ag)	mg/kg	<0.050	0.069	<0.050	0.108	<0.050	<0.050	0.050	7794764
Total Sodium (Na)	mg/kg	<100	231	123	263	110	196	100	7794764
Total Strontium (Sr)	mg/kg	196	196	193	186	188	198	0.10	7794764
Total Thallium (Tl)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7794764
Total Tin (Sn)	mg/kg	1.32	2.36	0.85	9.29	1.67	1.25	0.10	7794764
Total Titanium (Ti)	mg/kg	80.5	88.4	84.4	81.9	75.5	71.2	1.0	7794764
Total Uranium (U)	mg/kg	0.648	0.562	0.609	0.594	0.618	0.638	0.050	7794764
Total Vanadium (V)	mg/kg	9.7	10.0	9.8	10.1	9.9	9.8	2.0	7794764
Total Zinc (Zn)	mg/kg	52.5	105	60.6	525	82.4	68.8	1.0	7794764

RDL = Reportable Detection Limit
N/A = Not Applicable

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CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LO9642	LO9643	LO9644	LO9645	LO9646	LO9647		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**TP15-3-1-2**	**TP15-4-0.5-1**	**TP15-4-1-2**	**RDL**	**QC Batch**
Total Zirconium (Zr)	mg/kg	1.39	1.15	1.11	1.12	1.09	1.09	0.50	7794764
RDL = Reportable Detection Limit									

Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LO9657		
Sampling Date		2015/01/27 12:00		
COC Number		458127-04-01		
	Units	**TP15-A**	**RDL**	**QC Batch**
Physical Properties				
Soluble (2:1) pH	pH	8.12	N/A	7794866
Total Metals by ICPMS				
Total Aluminum (Al)	mg/kg	8940	100	7794764
Total Antimony (Sb)	mg/kg	1.13	0.10	7794764
Total Arsenic (As)	mg/kg	5.87	0.50	7794764
Total Barium (Ba)	mg/kg	138	0.10	7794764
Total Beryllium (Be)	mg/kg	<0.40	0.40	7794764
Total Bismuth (Bi)	mg/kg	0.26	0.10	7794764
Total Cadmium (Cd)	mg/kg	0.918	0.050	7794764
Total Calcium (Ca)	mg/kg	73300	100	7794764
Total Chromium (Cr)	mg/kg	17.9	1.0	7794764
Total Cobalt (Co)	mg/kg	8.72	0.30	7794764
Total Copper (Cu)	mg/kg	28.4	0.50	7794764
Total Iron (Fe)	mg/kg	24800	100	7794764
Total Lead (Pb)	mg/kg	47.7	0.10	7794764
Total Lithium (Li)	mg/kg	18.7	5.0	7794764
Total Magnesium (Mg)	mg/kg	15300	100	7794764
Total Manganese (Mn)	mg/kg	520	0.20	7794764
Total Mercury (Hg)	mg/kg	<0.050	0.050	7794764
Total Molybdenum (Mo)	mg/kg	0.80	0.10	7794764
Total Nickel (Ni)	mg/kg	21.0	0.80	7794764
Total Phosphorus (P)	mg/kg	695	10	7794764
Total Potassium (K)	mg/kg	975	100	7794764
Total Selenium (Se)	mg/kg	<0.50	0.50	7794764
Total Silver (Ag)	mg/kg	0.086	0.050	7794764
Total Sodium (Na)	mg/kg	207	100	7794764
Total Strontium (Sr)	mg/kg	159	0.10	7794764
Total Thallium (Tl)	mg/kg	<0.050	0.050	7794764
Total Tin (Sn)	mg/kg	9.46	0.10	7794764
Total Titanium (Ti)	mg/kg	80.3	1.0	7794764
Total Uranium (U)	mg/kg	0.517	0.050	7794764
Total Vanadium (V)	mg/kg	10.6	2.0	7794764
Total Zinc (Zn)	mg/kg	234	1.0	7794764

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LO9657		
Sampling Date		2015/01/27 12:00		
COC Number		458127-04-01		
	Units	**TP15-A**	**RDL**	**QC Batch**
Total Zirconium (Zr)	mg/kg	1.30	0.50	7794764
RDL = Reportable Detection Limit				

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Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

TCLP METALS (SOIL)

Maxxam ID		LO9570	LO9641	LO9642	LO9643	LO9644	LO9645		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-1-0.5-1**	**TP15-1-1-2**	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**TP15-3-1-2**	**RDL**	**QC Batch**
Metals									
LEACHATE Antimony (Sb)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Arsenic (As)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Barium (Ba)	mg/L	0.69	0.74	1.24	0.65	1.21	1.05	0.10	7796541
LEACHATE Beryllium (Be)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Boron (B)	mg/L	<0.10	0.17	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Cadmium (Cd)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Chromium (Cr)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Cobalt (Co)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Copper (Cu)	mg/L	<0.10	0.17	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Iron (Fe)	mg/L	2.32	2.52	2.52	2.63	2.57	2.37	0.50	7796541
LEACHATE Lead (Pb)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Mercury (Hg)	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	7796541
LEACHATE Molybdenum (Mo)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Nickel (Ni)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Selenium (Se)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Silver (Ag)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Thallium (Tl)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Uranium (U)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Vanadium (V)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Zinc (Zn)	mg/L	2.40	0.83	<0.10	<0.10	<0.10	0.12	0.10	7796541
LEACHATE Zirconium (Zr)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
RDL = Reportable Detection Limit									

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Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

TCLP METALS (SOIL)

Maxxam ID		LO9646	LO9647	LO9648	LO9649	LO9650	LO9651		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-04-01	458127-04-01		
	Units	**TP15-4-0.5-1**	**TP15-4-1-2**	**TP15-5-1-2**	**TP15-6-0-0.5**	**TP15-6-0.5-1**	**TP15-6-1-2**	**RDL**	**QC Batch**
Metals									
LEACHATE Antimony (Sb)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Arsenic (As)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Barium (Ba)	mg/L	1.47	1.05	0.82	0.79	0.78	0.86	0.10	7796541
LEACHATE Beryllium (Be)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Boron (B)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Cadmium (Cd)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Chromium (Cr)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Cobalt (Co)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Copper (Cu)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Iron (Fe)	mg/L	6.38	6.51	6.36	2.89	2.52	2.73	0.50	7796541
LEACHATE Lead (Pb)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Mercury (Hg)	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	7796541
LEACHATE Molybdenum (Mo)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Nickel (Ni)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Selenium (Se)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Silver (Ag)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Thallium (Tl)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Uranium (U)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Vanadium (V)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Zinc (Zn)	mg/L	0.20	<0.10	0.24	<0.10	<0.10	<0.10	0.10	7796541
LEACHATE Zirconium (Zr)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796541
RDL = Reportable Detection Limit									

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Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

TCLP METALS (SOIL)

Maxxam ID		LO9652	LO9653	LO9654	LO9655	LO9656	LO9657		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-04-01	458127-04-01	458127-04-01	458127-04-01	458127-04-01	458127-04-01		
	Units	**TP15-6-2-3**	**TP15-7-0-0.5**	**TP15-7-0.5-1**	**TP15-7-1-2**	**TP15-7-2-3**	**TP15-A**	**RDL**	**QC Batch**
Metals									
LEACHATE Antimony (Sb)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Arsenic (As)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Barium (Ba)	mg/L	1.39	0.83	0.42	1.70	1.63	0.68	0.10	7797740
LEACHATE Beryllium (Be)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Boron (B)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	0.10	7797740
LEACHATE Cadmium (Cd)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Chromium (Cr)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Cobalt (Co)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Copper (Cu)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Iron (Fe)	mg/L	2.96	3.27	3.27	3.21	3.12	3.31	0.50	7797740
LEACHATE Lead (Pb)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Mercury (Hg)	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	7797740
LEACHATE Molybdenum (Mo)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Nickel (Ni)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Selenium (Se)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Silver (Ag)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Thallium (Tl)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Uranium (U)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Vanadium (V)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
LEACHATE Zinc (Zn)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	1.17	0.10	7797740
LEACHATE Zirconium (Zr)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7797740
RDL = Reportable Detection Limit									

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Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

TCLP METALS (SOIL)

Maxxam ID		LO9658		
Sampling Date		2015/01/27 12:00		
COC Number		458127-04-01		
	Units	**TP15-B**	**RDL**	**QC Batch**
Metals				
LEACHATE Antimony (Sb)	mg/L	<0.10	0.10	7797740
LEACHATE Arsenic (As)	mg/L	<0.10	0.10	7797740
LEACHATE Barium (Ba)	mg/L	0.54	0.10	7797740
LEACHATE Beryllium (Be)	mg/L	<0.10	0.10	7797740
LEACHATE Boron (B)	mg/L	<0.10	0.10	7797740
LEACHATE Cadmium (Cd)	mg/L	<0.10	0.10	7797740
LEACHATE Chromium (Cr)	mg/L	<0.10	0.10	7797740
LEACHATE Cobalt (Co)	mg/L	<0.10	0.10	7797740
LEACHATE Copper (Cu)	mg/L	<0.10	0.10	7797740
LEACHATE Iron (Fe)	mg/L	3.06	0.50	7797740
LEACHATE Lead (Pb)	mg/L	<0.10	0.10	7797740
LEACHATE Mercury (Hg)	mg/L	<0.0020	0.0020	7797740
LEACHATE Molybdenum (Mo)	mg/L	<0.10	0.10	7797740
LEACHATE Nickel (Ni)	mg/L	<0.10	0.10	7797740
LEACHATE Selenium (Se)	mg/L	<0.10	0.10	7797740
LEACHATE Silver (Ag)	mg/L	<0.10	0.10	7797740
LEACHATE Thallium (Tl)	mg/L	<0.10	0.10	7797740
LEACHATE Uranium (U)	mg/L	<0.10	0.10	7797740
LEACHATE Vanadium (V)	mg/L	<0.10	0.10	7797740
LEACHATE Zinc (Zn)	mg/L	<0.10	0.10	7797740
LEACHATE Zirconium (Zr)	mg/L	<0.10	0.10	7797740
RDL = Reportable Detection Limit				

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Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LO9642	LO9643	LO9644	LO9645	LO9646		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-01-01	458127-01-01	458127-01-01	458127-01-01		
	Units	**TP15-2-0.5-1**	**TP15-2-1-2**	**TP15-3-0.5-1**	**TP15-3-1-2**	**TP15-4-0.5-1**	**RDL**	**QC Batch**
Calculated Parameters								
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.31	0.31	0.31	0.31	0.10	7791092
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7791092
Polycyclic Aromatics								
Naphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7796073
2-Methylnaphthalene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7796073
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7796073
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7796073
Fluorene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7796073
Phenanthrene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7796073
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	7796073
Fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7796073
Pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7796073
Benzo(a)anthracene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7796073
Chrysene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7796073
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7796073
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7796073
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7796073
Benzo(a)pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7796073
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7796073
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7796073
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7796073
Low Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7790999
High Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7790999
Total PAH	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7790999
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	102	101	106	100	103		7796073
D8-ACENAPHTHYLENE (sur.)	%	98	100	101	98	98		7796073
D8-NAPHTHALENE (sur.)	%	89	92	94	91	92		7796073
TERPHENYL-D14 (sur.)	%	106	109	112	106	110		7796073
RDL = Reportable Detection Limit								

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Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LO9647	LO9657		
Sampling Date		2015/01/27 12:00	2015/01/27 12:00		
COC Number		458127-01-01	458127-04-01		
	Units	**TP15-4-1-2**	**TP15-A**	**RDL**	**QC Batch**
Calculated Parameters					
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.94	0.10	7791092
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	0.10	7791092
Polycyclic Aromatics					
Naphthalene	mg/kg	<0.010	<0.010	0.010	7796073
2-Methylnaphthalene	mg/kg	<0.020	<0.020	0.020	7796073
Acenaphthylene	mg/kg	<0.0050	<0.0050	0.0050	7796073
Acenaphthene	mg/kg	<0.0050	<0.0050	0.0050	7796073
Fluorene	mg/kg	<0.020	<0.020	0.020	7796073
Phenanthrene	mg/kg	<0.020	<0.020	0.020	7796073
Anthracene	mg/kg	<0.0040	<0.0040	0.0040	7796073
Fluoranthene	mg/kg	<0.020	0.025	0.020	7796073
Pyrene	mg/kg	<0.020	0.039	0.020	7796073
Benzo(a)anthracene	mg/kg	<0.020	0.031	0.020	7796073
Chrysene	mg/kg	<0.020	0.12	0.020	7796073
Benzo(b&j)fluoranthene	mg/kg	<0.020	0.078	0.020	7796073
Benzo(b)fluoranthene	mg/kg	<0.020	0.061	0.020	7796073
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	0.020	7796073
Benzo(a)pyrene	mg/kg	<0.020	0.041	0.020	7796073
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	0.050	7796073
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	0.050	7796073
Benzo(g,h,i)perylene	mg/kg	<0.050	0.083	0.050	7796073
Low Molecular Weight PAH`s	mg/kg	<0.050	<0.050	0.050	7790999
High Molecular Weight PAH`s	mg/kg	<0.050	0.42	0.050	7790999
Total PAH	mg/kg	<0.050	0.42	0.050	7790999
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	105	96		7796073
D8-ACENAPHTHYLENE (sur.)	%	102	95		7796073
D8-NAPHTHALENE (sur.)	%	92	85		7796073
TERPHENYL-D14 (sur.)	%	111	103		7796073
RDL = Reportable Detection Limit					

Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

GENERAL COMMENTS

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

Package 1	1.3°C

Results relate only to the items tested.

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Maxxam Job #: B506951
Report Date: 2015/02/05

QUALITY ASSURANCE REPORT

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7794516	1,4-Difluorobenzene (sur.)	2015/01/30	98	70 - 130	91	70 - 130	105	%				
7794516	4-Bromofluorobenzene (sur.)	2015/01/30	101	70 - 130	98	70 - 130	107	%				
7794516	D10-ETHYLBENZENE (sur.)	2015/01/30	117	50 - 130	109	50 - 130	119	%				
7794516	D4-1,2-Dichloroethane (sur.)	2015/01/30	122	70 - 130	115	70 - 130	123	%				
7795896	Leachate 1,4-Difluorobenzene (sur.)	2015/02/02	93	70 - 130	92	70 - 130	96	%				
7795896	Leachate 4-Bromofluorobenzene (sur.)	2015/02/02	100	70 - 130	98	70 - 130	101	%				
7795896	Leachate D4-1,2-Dichloroethane (sur.)	2015/02/02	100	70 - 130	102	70 - 130	110	%				
7796058	O-TERPHENYL (sur.)	2015/02/02	92	50 - 130	83	50 - 130	91	%				
7796062	O-TERPHENYL (sur.)	2015/02/02	87	50 - 130	80	50 - 130	111	%				
7796073	D10-ANTHRACENE (sur.)	2015/02/02	76	60 - 130	84	60 - 130	95	%				
7796073	D8-ACENAPHTHYLENE (sur.)	2015/02/02	75	50 - 130	82	50 - 130	92	%				
7796073	D8-NAPHTHALENE (sur.)	2015/02/02	68	50 - 130	75	50 - 130	84	%				
7796073	TERPHENYL-D14 (sur.)	2015/02/02	82	60 - 130	88	60 - 130	100	%				
7796420	1,4-Difluorobenzene (sur.)	2015/02/02	96	70 - 130	91	70 - 130	95	%				
7796420	4-Bromofluorobenzene (sur.)	2015/02/02	104	70 - 130	98	70 - 130	98	%				
7796420	D10-ETHYLBENZENE (sur.)	2015/02/02	102	50 - 130	97	50 - 130	105	%				
7796420	D4-1,2-Dichloroethane (sur.)	2015/02/02	98	70 - 130	96	70 - 130	97	%				
7796931	Leachate D10-ANTHRACENE (sur.)	2015/02/03			81	60 - 130	104	%				
7796931	Leachate D8-ACENAPHTHYLENE (sur.)	2015/02/03			77	50 - 130	99	%				
7796931	Leachate D8-NAPHTHALENE (sur.)	2015/02/03			72	50 - 130	91	%				
7796931	Leachate TERPHENYL-D14 (sur.)	2015/02/03			83	60 - 130	110	%				
7797086	Leachate 1,4-Difluorobenzene (sur.)	2015/02/03	101	70 - 130	100	70 - 130	101	%				
7797086	Leachate 4-Bromofluorobenzene (sur.)	2015/02/03	98	70 - 130	99	70 - 130	100	%				
7797086	Leachate D4-1,2-Dichloroethane (sur.)	2015/02/03	99	70 - 130	103	70 - 130	107	%				
7798225	Leachate D10-ANTHRACENE (sur.)	2015/02/04			95	60 - 130	97	%				
7798225	Leachate D8-ACENAPHTHYLENE (sur.)	2015/02/04			89	50 - 130	91	%				
7798225	Leachate D8-NAPHTHALENE (sur.)	2015/02/04			95	50 - 130	94	%				
7798225	Leachate TERPHENYL-D14 (sur.)	2015/02/04			90	60 - 130	93	%				
7798289	Leachate 1,4-Difluorobenzene (sur.)	2015/02/04	111	70 - 130	111	70 - 130	111	%				
7798289	Leachate 4-Bromofluorobenzene (sur.)	2015/02/04	95	70 - 130	95	70 - 130	98	%				
7798289	Leachate D4-1,2-Dichloroethane (sur.)	2015/02/04	93	70 - 130	94	70 - 130	98	%				

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Maxxam Job #: B506951
Report Date: 2015/02/05

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7794442	Flash point	2015/01/30							NC	100		
7794444	Free Liquid	2015/01/30							NC	25		
7794516	(C6-C10)	2015/01/30			102	60 - 140	<10	mg/kg				
7794516	Benzene	2015/01/30	133	60 - 140	119	60 - 140	<0.0050	mg/kg				
7794516	Ethylbenzene	2015/01/30	113	60 - 140	119	60 - 140	<0.010	mg/kg				
7794516	m & p-Xylene	2015/01/30	111	60 - 140	112	60 - 140	<0.040	mg/kg				
7794516	Methyl-tert-butylether (MTBE)	2015/01/30					<0.10	mg/kg				
7794516	o-Xylene	2015/01/30	109	60 - 140	108	60 - 140	<0.040	mg/kg				
7794516	Styrene	2015/01/30					<0.030	mg/kg				
7794516	Toluene	2015/01/30	107	60 - 140	103	60 - 140	<0.020	mg/kg				
7794516	VH C6-C10	2015/01/30			94	60 - 140	<10	mg/kg	NC	40		
7794516	Xylenes (Total)	2015/01/30					<0.040	mg/kg				
7794534	Moisture	2015/01/31					<0.30	%	8.7	20		
7794764	Total Aluminum (Al)	2015/02/02					<100	mg/kg	0.52	35	108	70 - 130
7794764	Total Antimony (Sb)	2015/02/02	76	75 - 125	102	75 - 125	<0.10	mg/kg	NC	30	117	70 - 130
7794764	Total Arsenic (As)	2015/02/02	96	75 - 125	99	75 - 125	<0.50	mg/kg	NC	30	98	70 - 130
7794764	Total Barium (Ba)	2015/02/02	NC	75 - 125	100	75 - 125	<0.10	mg/kg	5.2	35	102	70 - 130
7794764	Total Beryllium (Be)	2015/02/02	102	75 - 125	99	75 - 125	<0.40	mg/kg	NC	30		
7794764	Total Bismuth (Bi)	2015/02/02					<0.10	mg/kg	NC	30		
7794764	Total Cadmium (Cd)	2015/02/02	100	75 - 125	102	75 - 125	<0.050	mg/kg	NC	30	109	70 - 130
7794764	Total Calcium (Ca)	2015/02/02					<100	mg/kg	1.0	30	94	70 - 130
7794764	Total Chromium (Cr)	2015/02/02	97	75 - 125	102	75 - 125	<1.0	mg/kg	1.5	30	114	70 - 130
7794764	Total Cobalt (Co)	2015/02/02	96	75 - 125	101	75 - 125	<0.30	mg/kg	0.026	30	97	70 - 130
7794764	Total Copper (Cu)	2015/02/02	98	75 - 125	106	75 - 125	<0.50	mg/kg	1.2	30	96	70 - 130
7794764	Total Iron (Fe)	2015/02/02					<100	mg/kg	3.4	30	95	70 - 130
7794764	Total Lead (Pb)	2015/02/02	100	75 - 125	103	75 - 125	<0.10	mg/kg	5.1	35	103	70 - 130
7794764	Total Lithium (Li)	2015/02/02	95	75 - 125	96	75 - 125	<5.0	mg/kg	NC	30		
7794764	Total Magnesium (Mg)	2015/02/02					<100	mg/kg	2.9	30	92	70 - 130
7794764	Total Manganese (Mn)	2015/02/02	NC	75 - 125	101	75 - 125	<0.20	mg/kg	1.5	30	101	70 - 130
7794764	Total Mercury (Hg)	2015/02/02	75	75 - 125	105	75 - 125	<0.050	mg/kg	NC	35	83	70 - 130
7794764	Total Molybdenum (Mo)	2015/02/02	82	75 - 125	104	75 - 125	<0.10	mg/kg	NC	35	116	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7794764	Total Nickel (Ni)	2015/02/02	96	75 - 125	100	75 - 125	<0.80	mg/kg	7.5	30	95	70 - 130
7794764	Total Phosphorus (P)	2015/02/02					<10	mg/kg	4.0	30	92	70 - 130
7794764	Total Potassium (K)	2015/02/02					<100	mg/kg	NC	35		
7794764	Total Selenium (Se)	2015/02/02	101	75 - 125	102	75 - 125	<0.50	mg/kg	NC	30		
7794764	Total Silver (Ag)	2015/02/02	100	75 - 125	102	75 - 125	<0.050	mg/kg	NC	35		
7794764	Total Sodium (Na)	2015/02/02					<100	mg/kg				
7794764	Total Strontium (Sr)	2015/02/02	NC	75 - 125	96	75 - 125	<0.10	mg/kg	1.3	35	98	70 - 130
7794764	Total Thallium (Tl)	2015/02/02	101	75 - 125	100	75 - 125	<0.050	mg/kg	NC	30	99	70 - 130
7794764	Total Tin (Sn)	2015/02/02	76	75 - 125	98	75 - 125	<0.10	mg/kg	NC	35		
7794764	Total Titanium (Ti)	2015/02/02	NC	75 - 125	98	75 - 125	<1.0	mg/kg	5.2	35	115	70 - 130
7794764	Total Uranium (U)	2015/02/02	97	75 - 125	98	75 - 125	<0.050	mg/kg	1.2	30	103	70 - 130
7794764	Total Vanadium (V)	2015/02/02	NC	75 - 125	103	75 - 125	<2.0	mg/kg	3.5	30	109	70 - 130
7794764	Total Zinc (Zn)	2015/02/02	100	75 - 125	106	75 - 125	<1.0	mg/kg	1.3	30	95	70 - 130
7794764	Total Zirconium (Zr)	2015/02/02					<0.50	mg/kg	NC	30		
7794866	Soluble (2:1) pH	2015/02/02			101	97 - 103			0.10	N/A		
7794868	Soluble (2:1) pH	2015/02/02			101	97 - 103			1.2	N/A		
7795564	Hazardous Waste Oil	2015/02/03	92	65 - 135	90	65 - 135	<0.50	%	NC	35		
7795575	Hazardous Waste Oil	2015/02/03	91	65 - 135	92	65 - 135	<0.50	%	NC	35		
7795712	Final pH of Leachate	2015/02/03					4.93	pH				
7795712	Initial pH of Sample	2015/02/03					4.93	pH				
7795712	pH of Leaching Fluid	2015/02/03					4.93	pH				
7795896	Leachate Benzene	2015/02/02	103	N/A	104	70 - 130	<0.010	mg/L	NC	50		
7795896	Leachate Ethylbenzene	2015/02/02	115	N/A	111	70 - 130	<0.010	mg/L	NC	50		
7795896	Leachate m & p-Xylene	2015/02/02	111	N/A	108	70 - 130	<0.020	mg/L	NC	50		
7795896	Leachate o-Xylene	2015/02/02	105	N/A	102	70 - 130	<0.010	mg/L	NC	50		
7795896	Leachate Styrene	2015/02/02	108	N/A	105	70 - 130	<0.010	mg/L	NC	50		
7795896	Leachate Toluene	2015/02/02	98	N/A	95	70 - 130	<0.010	mg/L	NC	50		
7795896	Leachate Xylenes (Total)	2015/02/02					<0.020	mg/L	NC	50		
7796058	EPH (C10-C19)	2015/02/02	89	50 - 130	86	50 - 130	<100	mg/kg	NC	40		
7796058	EPH (C19-C32)	2015/02/02	92	50 - 130	87	50 - 130	<100	mg/kg	NC	40		
7796062	F2 (C10-C16 Hydrocarbons)	2015/02/02	108	50 - 130	106	80 - 120	<10	mg/kg	NC	40		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7796062	F3 (C16-C34 Hydrocarbons)	2015/02/02	107	50 - 130	110	80 - 120	<10	mg/kg	NC	40		
7796062	F4 (C34-C50 Hydrocarbons)	2015/02/02	98	50 - 130	104	80 - 120	<10	mg/kg	NC	40		
7796062	Reached Baseline at C50	2015/02/02					YES	mg/kg	NC	50		
7796073	2-Methylnaphthalene	2015/02/03	70	50 - 130	77	50 - 130	<0.020	mg/kg	NC	50		
7796073	Acenaphthene	2015/02/03	71	50 - 130	81	50 - 130	<0.0050	mg/kg	NC	50		
7796073	Acenaphthylene	2015/02/03	70	50 - 130	78	50 - 130	<0.0050	mg/kg	NC	50		
7796073	Anthracene	2015/02/03	71	60 - 130	81	60 - 130	<0.0040	mg/kg	NC	50		
7796073	Benzo(a)anthracene	2015/02/03	64	60 - 130	72	60 - 130	<0.020	mg/kg	NC	50		
7796073	Benzo(a)pyrene	2015/02/03	68	60 - 130	77	60 - 130	<0.020	mg/kg	NC	50		
7796073	Benzo(b&j)fluoranthene	2015/02/03	63	60 - 130	72	60 - 130	<0.020	mg/kg	NC	50		
7796073	Benzo(b)fluoranthene	2015/02/03	63	N/A			<0.020	mg/kg	NC	20		
7796073	Benzo(g,h,i)perylene	2015/02/03	68	60 - 130	75	60 - 130	<0.050	mg/kg	NC	50		
7796073	Benzo(k)fluoranthene	2015/02/03	73	60 - 130	82	60 - 130	<0.020	mg/kg	NC	50		
7796073	Chrysene	2015/02/03	66	60 - 130	74	60 - 130	<0.020	mg/kg	NC	50		
7796073	Dibenz(a,h)anthracene	2015/02/03	71	60 - 130	78	60 - 130	<0.050	mg/kg	NC	50		
7796073	Fluoranthene	2015/02/03	75	60 - 130	83	60 - 130	<0.020	mg/kg	NC	50		
7796073	Fluorene	2015/02/03	73	50 - 130	81	50 - 130	<0.020	mg/kg	NC	50		
7796073	Indeno(1,2,3-cd)pyrene	2015/02/03	71	60 - 130	81	60 - 130	<0.050	mg/kg	NC	50		
7796073	Naphthalene	2015/02/03	66	50 - 130	74	50 - 130	<0.010	mg/kg	NC	50		
7796073	Phenanthrene	2015/02/03	70	60 - 130	78	60 - 130	<0.020	mg/kg	NC	50		
7796073	Pyrene	2015/02/03	76	60 - 130	84	60 - 130	<0.020	mg/kg	NC	50		
7796420	(C6-C10)	2015/02/02			98	60 - 140	<10	mg/kg	NC	40		
7796420	Benzene	2015/02/02	88	60 - 140	85	60 - 140	<0.0050	mg/kg	NC	40		
7796420	Ethylbenzene	2015/02/02	92	60 - 140	92	60 - 140	<0.010	mg/kg	NC	40		
7796420	m & p-Xylene	2015/02/02	90	60 - 140	91	60 - 140	<0.040	mg/kg	NC	40		
7796420	Methyl-tert-butylether (MTBE)	2015/02/02					<0.10	mg/kg	NC	40		
7796420	o-Xylene	2015/02/02	93	60 - 140	87	60 - 140	<0.040	mg/kg	NC	40		
7796420	Styrene	2015/02/02					<0.030	mg/kg	NC	40		
7796420	Toluene	2015/02/02	83	60 - 140	79	60 - 140	<0.020	mg/kg	NC	40		
7796420	VH C6-C10	2015/02/02			93	60 - 140	<10	mg/kg				
7796420	Xylenes (Total)	2015/02/02					<0.040	mg/kg	NC	40		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7796541	LEACHATE Antimony (Sb)	2015/02/03					<0.10	mg/L				
7796541	LEACHATE Arsenic (As)	2015/02/03	107	75 - 125	111	75 - 125	<0.10	mg/L				
7796541	LEACHATE Barium (Ba)	2015/02/03					<0.10	mg/L				
7796541	LEACHATE Beryllium (Be)	2015/02/03	95	75 - 125	102	75 - 125	<0.10	mg/L				
7796541	LEACHATE Boron (B)	2015/02/03					<0.10	mg/L				
7796541	LEACHATE Cadmium (Cd)	2015/02/03	101	75 - 125	108	75 - 125	<0.10	mg/L				
7796541	LEACHATE Chromium (Cr)	2015/02/03	99	75 - 125	105	75 - 125	<0.10	mg/L				
7796541	LEACHATE Cobalt (Co)	2015/02/03	94	75 - 125	100	75 - 125	<0.10	mg/L				
7796541	LEACHATE Copper (Cu)	2015/02/03	101	75 - 125	106	75 - 125	<0.10	mg/L				
7796541	LEACHATE Iron (Fe)	2015/02/03					<0.50	mg/L				
7796541	LEACHATE Lead (Pb)	2015/02/03	97	75 - 125	101	75 - 125	<0.10	mg/L				
7796541	LEACHATE Mercury (Hg)	2015/02/03					<0.0020	mg/L				
7796541	LEACHATE Molybdenum (Mo)	2015/02/03					<0.10	mg/L				
7796541	LEACHATE Nickel (Ni)	2015/02/03	104	75 - 125	107	75 - 125	<0.10	mg/L				
7796541	LEACHATE Selenium (Se)	2015/02/03	105	75 - 125	112	75 - 125	<0.10	mg/L				
7796541	LEACHATE Silver (Ag)	2015/02/03					<0.10	mg/L				
7796541	LEACHATE Thallium (Tl)	2015/02/03					<0.10	mg/L				
7796541	LEACHATE Uranium (U)	2015/02/03	103	75 - 125	105	75 - 125	<0.10	mg/L				
7796541	LEACHATE Vanadium (V)	2015/02/03	102	75 - 125	107	75 - 125	<0.10	mg/L				
7796541	LEACHATE Zinc (Zn)	2015/02/03	101	75 - 125	107	75 - 125	<0.10	mg/L				
7796541	LEACHATE Zirconium (Zr)	2015/02/03					<0.10	mg/L				
7796648	Sulphur (Elemental & Polysulphide)	2015/02/03			101	75 - 125	<100	mg/kg	NC	35	102	75 - 125
7796931	Leachate 2-Methylnaphthalene	2015/02/03			84	50 - 130	<0.10	ug/L				
7796931	Leachate Acenaphthene	2015/02/03			91	50 - 130	<0.10	ug/L				
7796931	Leachate Acenaphthylene	2015/02/03			90	50 - 130	<0.10	ug/L				
7796931	Leachate Acridine	2015/02/03			93	50 - 130	<0.50	ug/L				
7796931	Leachate Anthracene	2015/02/03			101	60 - 130	<0.10	ug/L				
7796931	Leachate Benzo(a)anthracene	2015/02/03			89	60 - 130	<0.10	ug/L				
7796931	Leachate Benzo(a)pyrene	2015/02/03			94	60 - 130	<0.10	ug/L				
7796931	Leachate Benzo(b&j)fluoranthene	2015/02/03			98	60 - 130	<0.10	ug/L				
7796931	Leachate Benzo(g,h,i)perylene	2015/02/03			98	60 - 130	<0.20	ug/L				

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7796931	Leachate Benzo(k)fluoranthene	2015/02/03			88	60 - 130	<0.10	ug/L				
7796931	Leachate Chrysene	2015/02/03			90	60 - 130	<0.10	ug/L				
7796931	Leachate Dibenz(a,h)anthracene	2015/02/03			82	60 - 130	<0.20	ug/L				
7796931	Leachate Fluoranthene	2015/02/03			98	60 - 130	<0.10	ug/L				
7796931	Leachate Fluorene	2015/02/03			92	50 - 130	<0.10	ug/L				
7796931	Leachate Indeno(1,2,3-cd)pyrene	2015/02/03			94	60 - 130	<0.20	ug/L				
7796931	Leachate Naphthalene	2015/02/03			83	50 - 130	<0.10	ug/L				
7796931	Leachate Phenanthrene	2015/02/03			94	60 - 130	<0.10	ug/L				
7796931	Leachate Pyrene	2015/02/03			100	60 - 130	<0.10	ug/L				
7796931	Leachate Quinoline	2015/02/03			148 (1)	50 - 130	<0.50	ug/L				
7797086	Leachate Benzene	2015/02/03	89	70 - 130	95	70 - 130	<0.010	mg/L	NC	50		
7797086	Leachate Ethylbenzene	2015/02/03	95	70 - 130	100	70 - 130	<0.010	mg/L	NC	50		
7797086	Leachate m & p-Xylene	2015/02/03	92	70 - 130	99	70 - 130	<0.020	mg/L	NC	50		
7797086	Leachate o-Xylene	2015/02/03	93	70 - 130	99	70 - 130	<0.010	mg/L	NC	50		
7797086	Leachate Styrene	2015/02/03	92	70 - 130	94	70 - 130	<0.010	mg/L	NC	50		
7797086	Leachate Toluene	2015/02/03	88	70 - 130	93	70 - 130	<0.010	mg/L	NC	50		
7797086	Leachate Xylenes (Total)	2015/02/03					<0.020	mg/L	NC	50		
7797110	Final pH of Leachate	2015/02/04					4.94	pH	0.29	N/A		
7797110	Initial pH of Sample	2015/02/04					4.94	pH	0.11	N/A		
7797110	pH after HCl	2015/02/04							12	N/A		
7797110	pH of Leaching Fluid	2015/02/04					4.94	pH	0	N/A		
7797740	LEACHATE Antimony (Sb)	2015/02/04					<0.10	mg/L	NC	35		
7797740	LEACHATE Arsenic (As)	2015/02/04	103	75 - 125	97	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Barium (Ba)	2015/02/04					<0.10	mg/L	NC	35		
7797740	LEACHATE Beryllium (Be)	2015/02/04	93	75 - 125	94	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Boron (B)	2015/02/04					<0.10	mg/L	NC	35		
7797740	LEACHATE Cadmium (Cd)	2015/02/04	97	75 - 125	96	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Chromium (Cr)	2015/02/04	96	75 - 125	91	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Cobalt (Co)	2015/02/04	95	75 - 125	89	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Copper (Cu)	2015/02/04	100	75 - 125	97	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Iron (Fe)	2015/02/04					<0.50	mg/L	5.9	35		

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Maxxam Job #: B506951
Report Date: 2015/02/05

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7797740	LEACHATE Lead (Pb)	2015/02/04	99	75 - 125	96	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Mercury (Hg)	2015/02/04					<0.0020	mg/L	NC	35		
7797740	LEACHATE Molybdenum (Mo)	2015/02/04					<0.10	mg/L	NC	35		
7797740	LEACHATE Nickel (Ni)	2015/02/04	101	75 - 125	96	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Selenium (Se)	2015/02/04	99	75 - 125	95	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Silver (Ag)	2015/02/04					<0.10	mg/L	NC	35		
7797740	LEACHATE Thallium (Tl)	2015/02/04					<0.10	mg/L	NC	35		
7797740	LEACHATE Uranium (U)	2015/02/04	102	75 - 125	97	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Vanadium (V)	2015/02/04	102	75 - 125	93	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Zinc (Zn)	2015/02/04	97	75 - 125	93	75 - 125	<0.10	mg/L	NC	35		
7797740	LEACHATE Zirconium (Zr)	2015/02/04					<0.10	mg/L	NC	35		
7798225	Leachate 2-Methylnaphthalene	2015/02/04			90	50 - 130	<0.10	ug/L				
7798225	Leachate Acenaphthene	2015/02/04			97	50 - 130	<0.10	ug/L				
7798225	Leachate Acenaphthylene	2015/02/04			92	50 - 130	<0.10	ug/L				
7798225	Leachate Acridine	2015/02/04			92	50 - 130	<0.50	ug/L				
7798225	Leachate Anthracene	2015/02/04			101	60 - 130	<0.10	ug/L				
7798225	Leachate Benzo(a)anthracene	2015/02/04			92	60 - 130	<0.10	ug/L				
7798225	Leachate Benzo(a)pyrene	2015/02/04			90	60 - 130	<0.10	ug/L				
7798225	Leachate Benzo(b&j)fluoranthene	2015/02/04			88	60 - 130	<0.10	ug/L				
7798225	Leachate Benzo(g,h,i)perylene	2015/02/04			92	60 - 130	<0.20	ug/L				
7798225	Leachate Benzo(k)fluoranthene	2015/02/04			105	60 - 130	<0.10	ug/L				
7798225	Leachate Chrysene	2015/02/04			94	60 - 130	<0.10	ug/L				
7798225	Leachate Dibenz(a,h)anthracene	2015/02/04			87	60 - 130	<0.20	ug/L				
7798225	Leachate Fluoranthene	2015/02/04			95	60 - 130	<0.10	ug/L				
7798225	Leachate Fluorene	2015/02/04			90	50 - 130	<0.10	ug/L				
7798225	Leachate Indeno(1,2,3-cd)pyrene	2015/02/04			96	60 - 130	<0.20	ug/L				
7798225	Leachate Naphthalene	2015/02/04			89	50 - 130	<0.10	ug/L				
7798225	Leachate Phenanthrene	2015/02/04			96	60 - 130	<0.10	ug/L				
7798225	Leachate Pyrene	2015/02/04			99	60 - 130	<0.10	ug/L				
7798225	Leachate Quinoline	2015/02/04			124	50 - 130	<0.50	ug/L				
7798289	Leachate Benzene	2015/02/04	79	70 - 130	84	70 - 130	<0.010	mg/L	NC	50		

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Maxxam Job #: B506951
Report Date: 2015/02/05

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7798289	Leachate Ethylbenzene	2015/02/04	85	70 - 130	89	70 - 130	<0.010	mg/L	NC	50		
7798289	Leachate m & p-Xylene	2015/02/04	83	70 - 130	87	70 - 130	<0.020	mg/L	NC	50		
7798289	Leachate o-Xylene	2015/02/04	79	70 - 130	84	70 - 130	<0.010	mg/L	NC	50		
7798289	Leachate Styrene	2015/02/04	79	70 - 130	79	70 - 130	<0.010	mg/L	NC	50		
7798289	Leachate Toluene	2015/02/04	77	70 - 130	81	70 - 130	<0.010	mg/L	NC	50		
7798289	Leachate Xylenes (Total)	2015/02/04					<0.020	mg/L	NC	50		

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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Maxxam Job #: B506951
Report Date: 2015/02/05

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MC

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Andy Lu, Data Validation Coordinator

Peng Liang, Senior Analyst

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Chain Of Custody Record Page 1 of 2

INVOICE TO:	Report Information	Project Information	Laboratory Use Only
Company Name: #1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name: #28804 SLR CONSULTING (CANADA) LTD	Quotation #: PWGSC: E0276-123115	Maxxam Job #:
Contact Name: Brad Klaver	Contact Name: Lindsay P, Dave M, Lab Data	P.O. #:	Bottle Order #: 458127
Address: 641- 800 BURRARD STREET, VANCOUVER BC V6Z 2V8	Address: 200-1475 Ellis Street, Kelowna BC V1Y 2A3	Project #: 219.05112.00010	Chain Of Custody Record: C#458127-02-01
Phone: (604) 775-9349 Fax: (604) 775-6645	Phone: (250) 762-7202 Fax:	Project Name: Wilmer Marsh	Project Manager: Crystal Ireland
Email: Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email: lpaterson@slrconsulting.com	Site #:	
		Sampled By: MC / KN	

Regulatory Criteria:
- [x] CSR
- [x] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☒ ________ ☐
Rush Confirmation Number: ________ (call lab for #)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	~~TCLP BTEX, TCLP PAHs, TCLP Metals~~	~~SWOG, Flashpoint~~	Elemental Sulphur (Calgary)	~~Free Liquid (Paint filter)~~	~~CCME BTEX/F1-F24 in Soil, PAHs~~	~~CSR/CCME Metals in Soil~~	~~VPH~~	~~Extractable Petroleum Hydrocarbons (EPH)~~	~~Grain Size (75um)~~		# of Bottles	Comments
1		TP15-1-0.5-1	15/01/	12:00	Soil				X								1	
2		TP15-1-1-2	↓	↓	↓				X								1	
3		TP15-2-0.5-1							X								1	
4		TP15-2-1-2							X								1	
5		TP15-3-0.5-1							X								1	
6		TP15-3-1-2							X								1	
7		TP15-4-0.5-1							X								1	29-Jan-15 10:25
8		TP15-4-1-2							X								1	
9		TP15-5-1-2							X								1	B506951
10		TP15-6-0-0.5	↓	↓	↓				X								1	JKU KU2

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Matthew Coady	15/01/28	11:05	Jane Musonda	2015/01/29	08:30		☐	1, 1, 2	☐ Yes ☒ No

Lab Use Only

Ice - yes

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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Chain Of Custody Record Page 2 of 2

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD	Quotation #	PWGSC: E0276-123115	Maxxam Job #	Bottle Order #: 458127
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #			
Address	641- 800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	219.05112.00010		
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name	Wilmer Marsh	Chain Of Custody Record	Project Manager
Phone	(604) 775-9349 Fax: (604) 775-6645	Phone	(250) 762-7202 Fax:	Site #		C#458127-03-01	Crystal Ireland
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	ML/KN		

Regulatory Criteria:
- [x] CSR
- [x] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil, PAHs	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)		# of Bottles	Comments
1		TP15-6-0.5-1	15/01/27	12:00	Soil				X								1	
2		TP15-6-1-2							X								1	
3		TP15-6-2-3							X								1	
4		TP15-7-0-0.5							X								1	
5		TP15-7-0.5-1							X								1	
6		TP15-7-1-2							X								1	
7		TP15-7-2-3							X								1	
8		TP15-A							X								1	
9		TP15-B							X								1	
10		TP15																

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: [ ]
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [x] Date Required: ______ [ ]
Rush Confirmation Number: ______ *(call lab for #)*

29-Jan-15 10:25
B506951

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Matthew Coady	15/01/28	11:05	Jane Musonda	2015/01/29	08:30		[ ]	1, 1, 2	[ ] Yes [x] No

ice - yes

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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Chain Of Custody Record

Page 1 of 2

INVOICE TO:		Report Information	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data
Address	641- 800 BURRARD STREET VANCOUVER BC V6Z 2V8	Address	200-1475 Ellis Street Kelowna BC V1Y 2A3
Phone	(604) 775-9349 Fax: (604) 775-6645	Phone	(250) 762-7202 Fax:
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com

Project Information	
Quotation #	PWGSC · E0276-123115
P.O. #	
Project #	219.0512.00010
Project Name	Wilmer Mine
Site #	
Sampled By	MC / KN

Laboratory Use Only	
Maxxam Job #	Bottle Order #:
	458127
Chain Of Custody Record	Project Manager
C#458127-01-01	Crystal Ireland

Regulatory Criteria:
- [x] CSR
- [x] CCME
- [ ] BC Water Quality
- [ ] Other ______

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY ☐ 2 Day ☐ 3 Day ☒ Date Required: ______ ☐
Rush Confirmation Number: ______ (call lab for #)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	~~Elemental Sulphur (Gotgory)~~	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil, PAHs	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)		# of Bottles	Comments
1	L09570	TP15-1-0.5-1	15/01/27	12:00	Soil.		X	X		X							4	
2	L09641	TP15-1-1-2					X	X		X	X	X	X	X			9	
3	L09642	TP15-2-0.5-1					X	X		X	X	X	X	X			9	
4	L09643	TP15-2-1-2					X	X		X			X	X			7	
5	L09644	TP15-3-0.5-1					X	X		X	X	X	X	X			9	
6	L09645	TP15-3-1-2					X	X		X	X	X	X	X			9	
7	L09646	TP15-4-0.5-1					X	X		X	X	X	X	X			9	B506951
8	L09647	TP15-4-1-2					X	X		X	X	X	X	X			9	
9	L09648	TP15-5-1-2					X	X		X			X	X			7	
10																		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
MCH	15/01/28	11:00	Marie-Laurence Berthier	2015/01/30	09:00	

Lab Use Only		
Time Sensitive ☐	Temperature (°C) on Receipt: 3,3,2 / 1,3,2	Custody Seal Intact on Cooler? ☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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Chain Of Custody Record

Page 2 of 2

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD	Quotation #	PWGSC-E0276-123115	Maxxam Job #	Bottle Order #:
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #			456127
Address	641- 800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	219.05112.00010	Chain Of Custody Record	Project Manager
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name	Willner Marsh	C#456127-04-01	Crystal Ireland
Phone	(604) 775-9349 Fax: (604) 775-6645	Phone	(250) 762-7202 Fax	Site #			
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	MC/KN		

Regulatory Criteria:
- [x] CSR
- [x] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Turnaround Time (TAT) Required:

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Regular (Standard) TAT: [ ]
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Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [X] Date Required: ______ [ ]
Rush Confirmation Number: ______ (call lab for #)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	~~[illegible]~~	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil, PAHs	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)		# of Bottles	Comments
1	L09649	TP15-6-0-0.5	15/01/27	12:00	Soil		X	X		X							4	
2	L09650	TP15-6-0.5-1	↓	↓	↓		X	X		X							4	
3	L09651	TP15-6-1-2					X	X		X							4	(7)
4	L09652	TP15-6-2-3					X	X		X							4	
5	L09653	TP15-7-0-0.5					X	X		X							4	
6	L09654	TP15-7-0.5-1					X	X		X							4	B806951
7	L09655	TP15-7-1-2					X	X		X							4	(4)
8	L09656	TP15-7-2-3					X	X		X							4	(1) TP15-7-2-3
9	L09657	TP15-A					X	X		X	X	X	X	X			4	(2)
10	L09658	TP15-B	↓	↓	↓		X	X		X			X	X			4	(4)

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Matt C	15/01/28	11:02	Marc Laurel Berthier	2015/01/30	09:00		[ ]	3,3,2 / 1,3,2	NA [ ] Yes [ ] No

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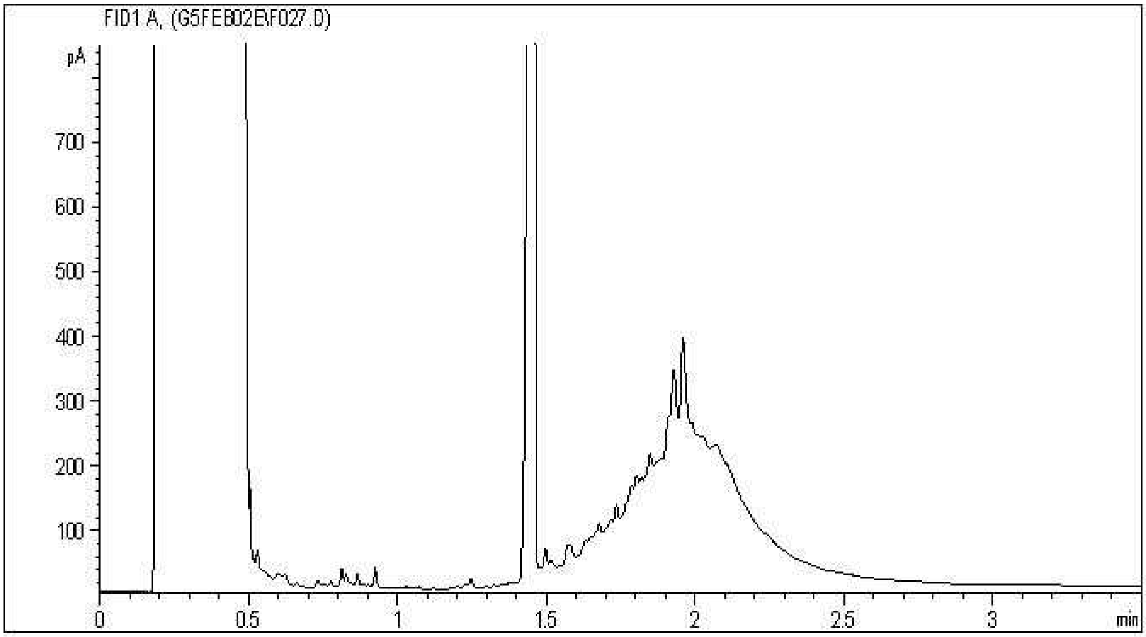
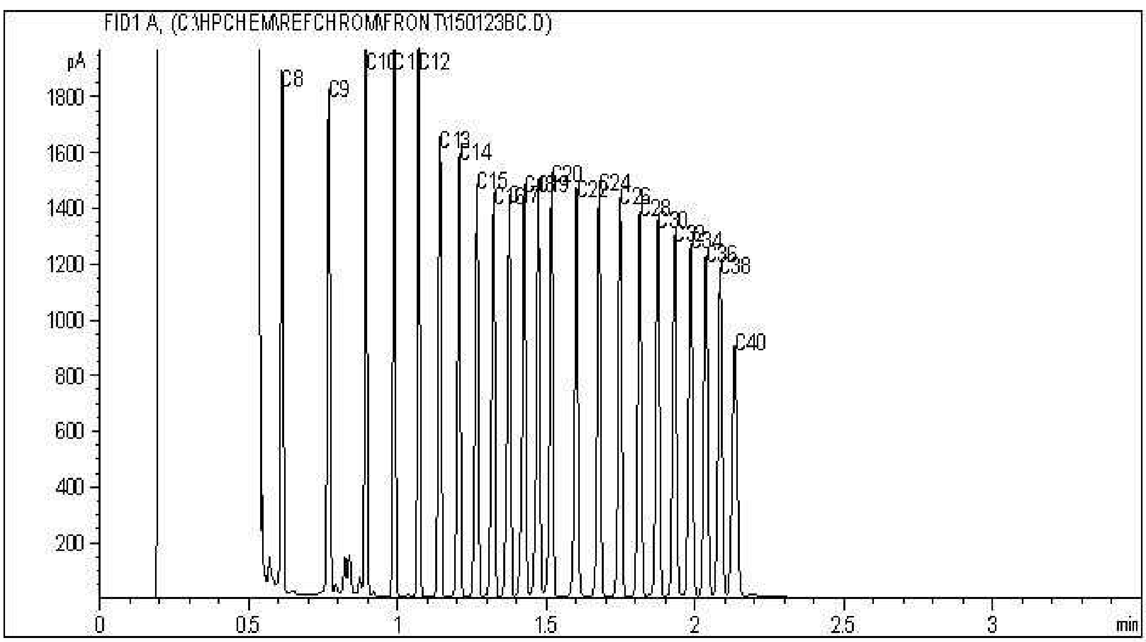
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9641

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-1-1-2

BC Hydrocarbons in Soil by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



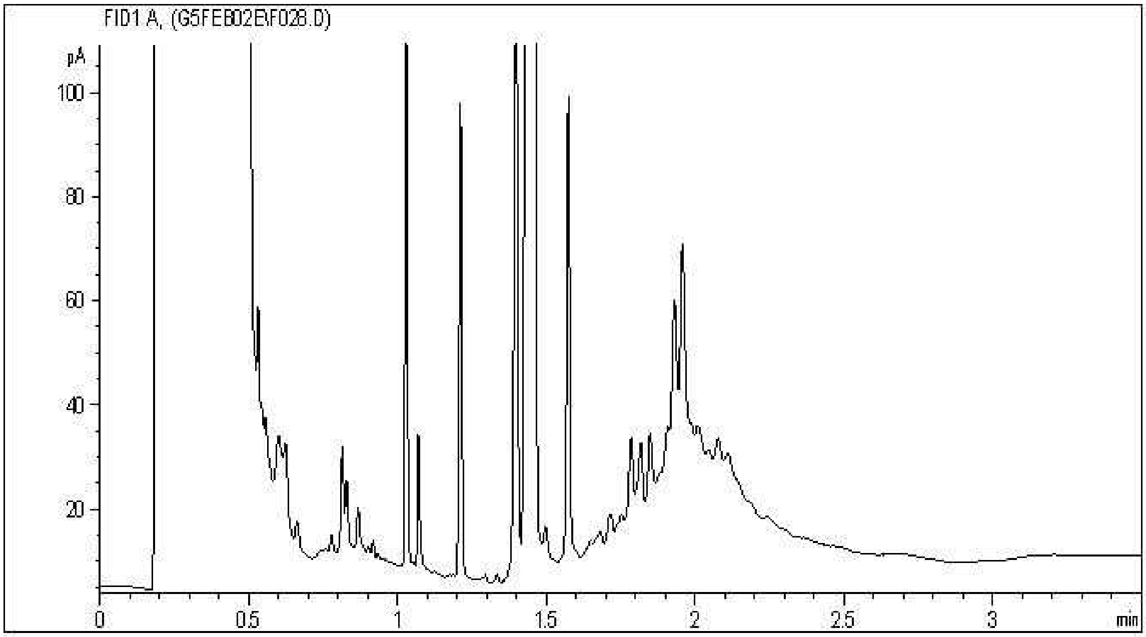
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

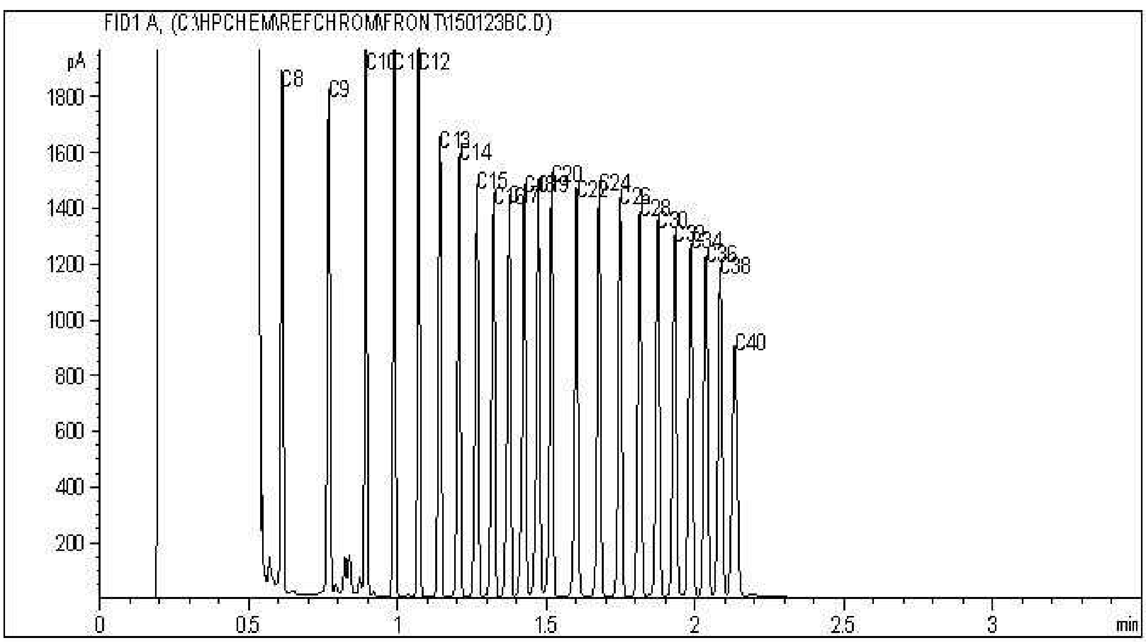
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9642

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-2-0.5-1

BC Hydrocarbons in Soil by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



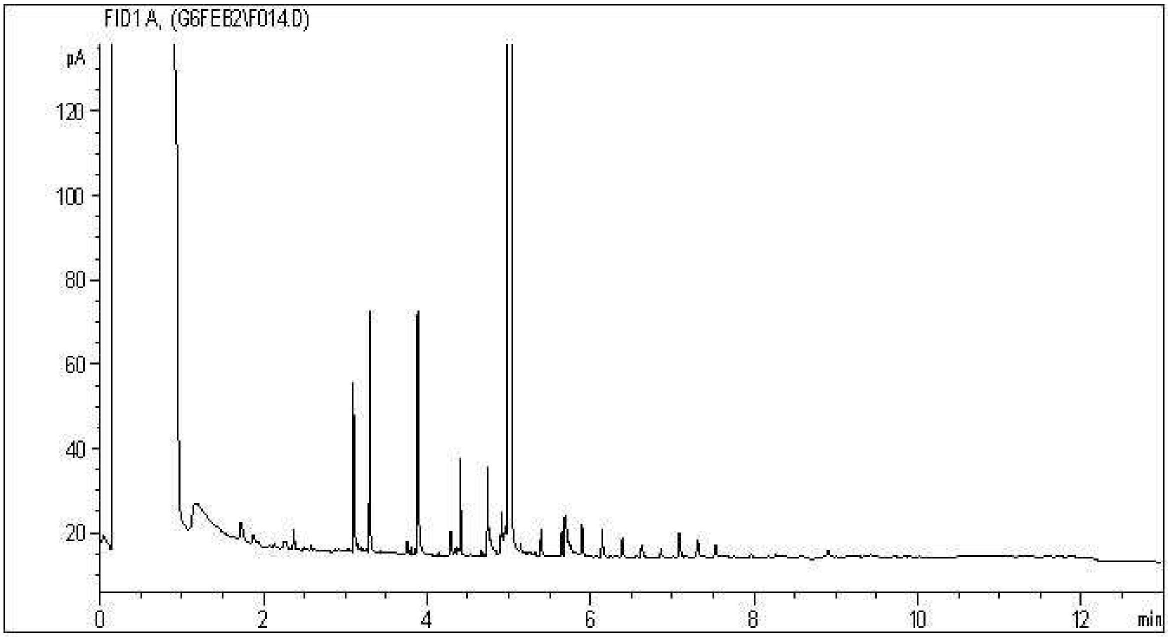
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

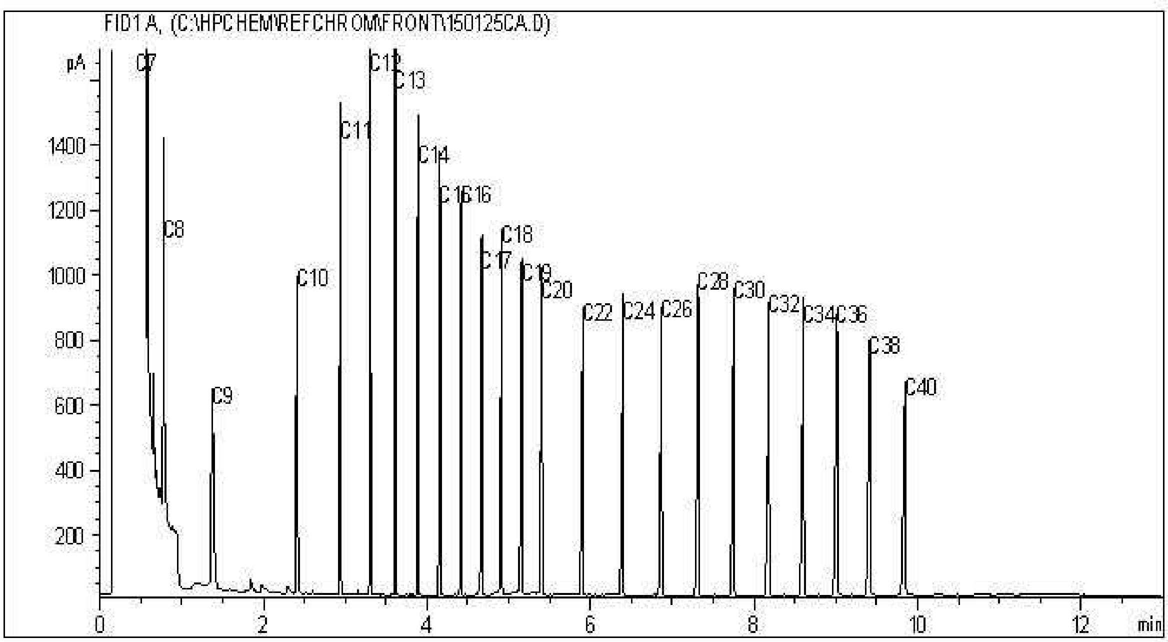
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9642

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-2-0.5-1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



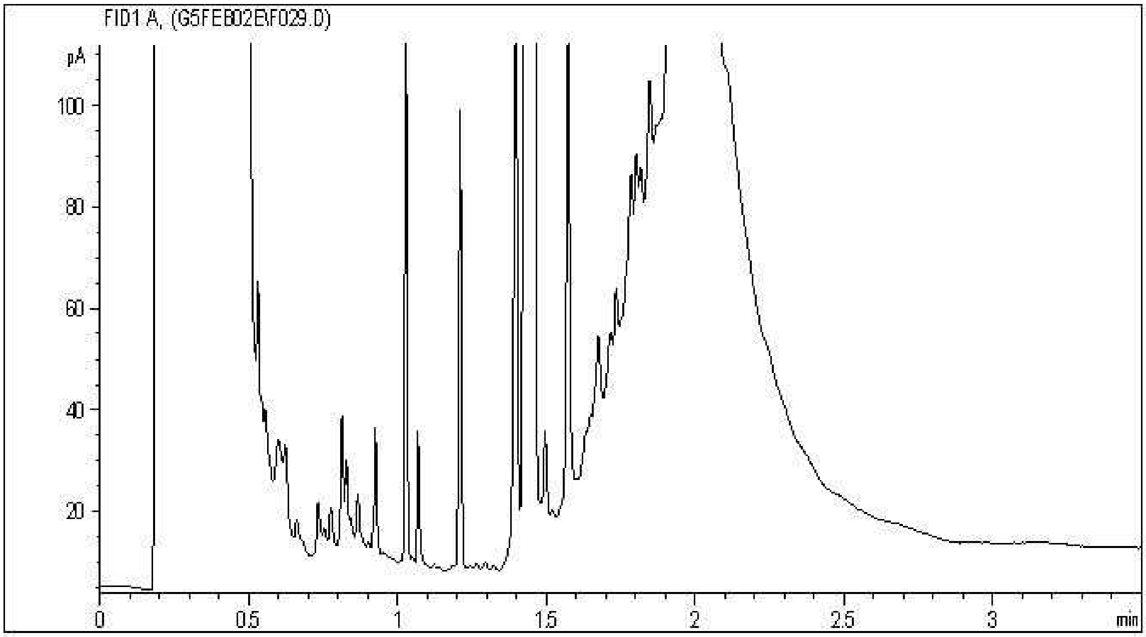
Carbon Range Distribution - Reference Chromatogram



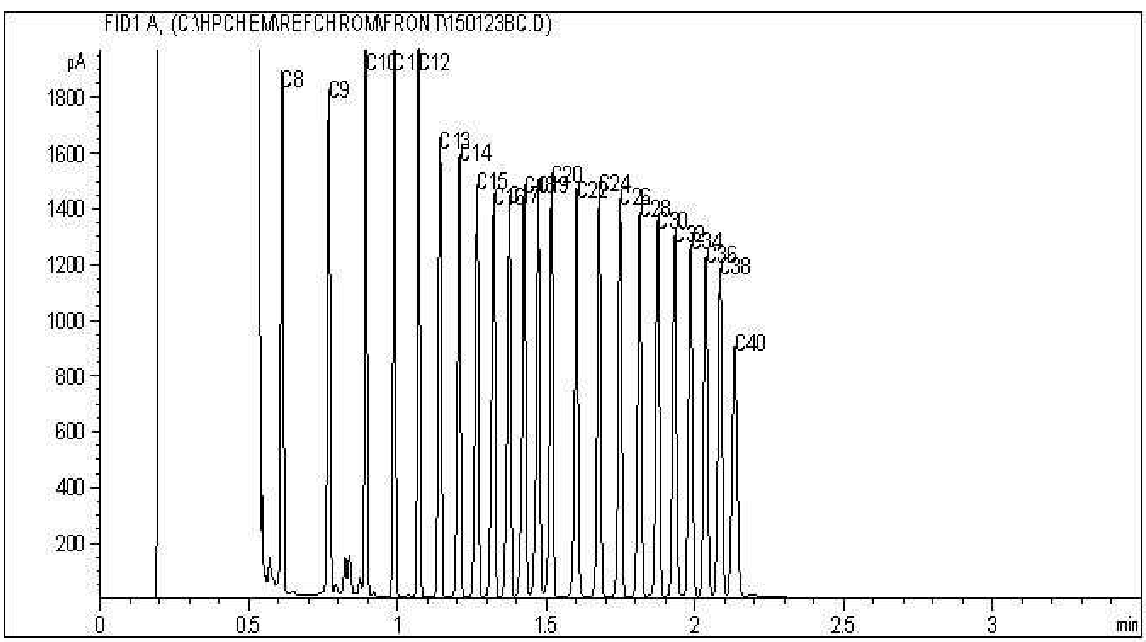
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BC Hydrocarbons in Soil by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



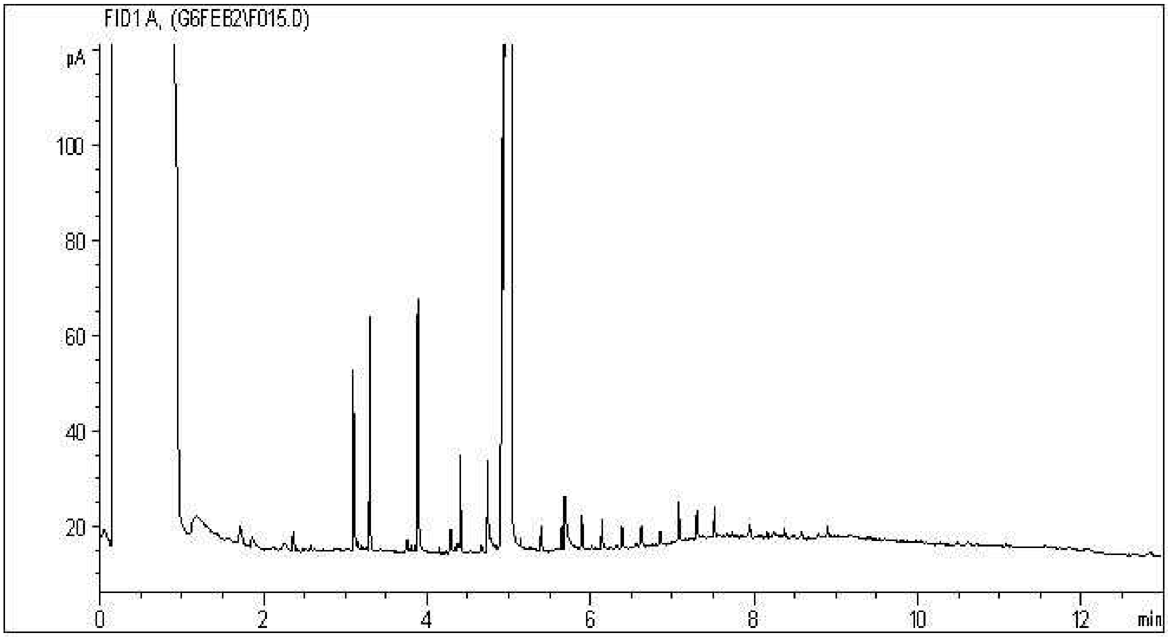
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

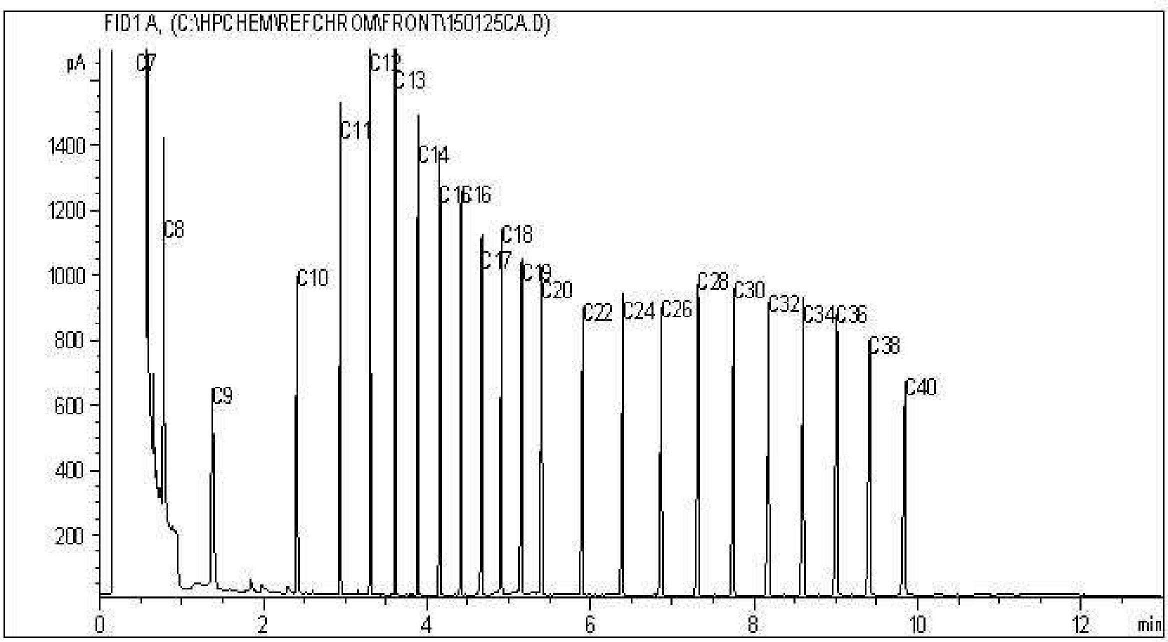
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9643

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-2-1-2

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



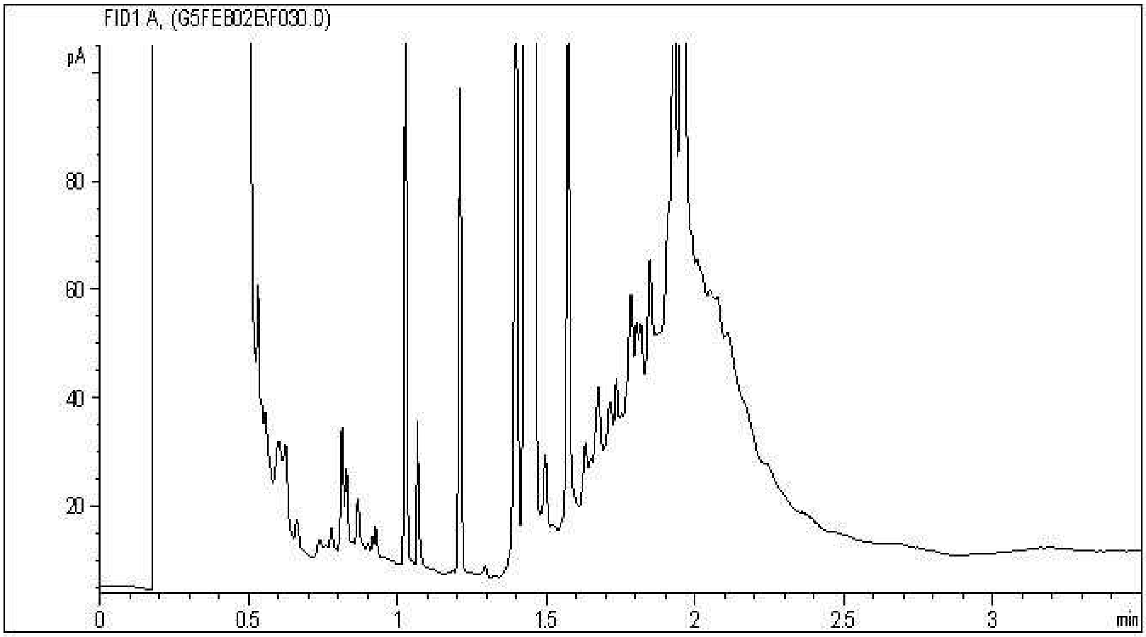
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

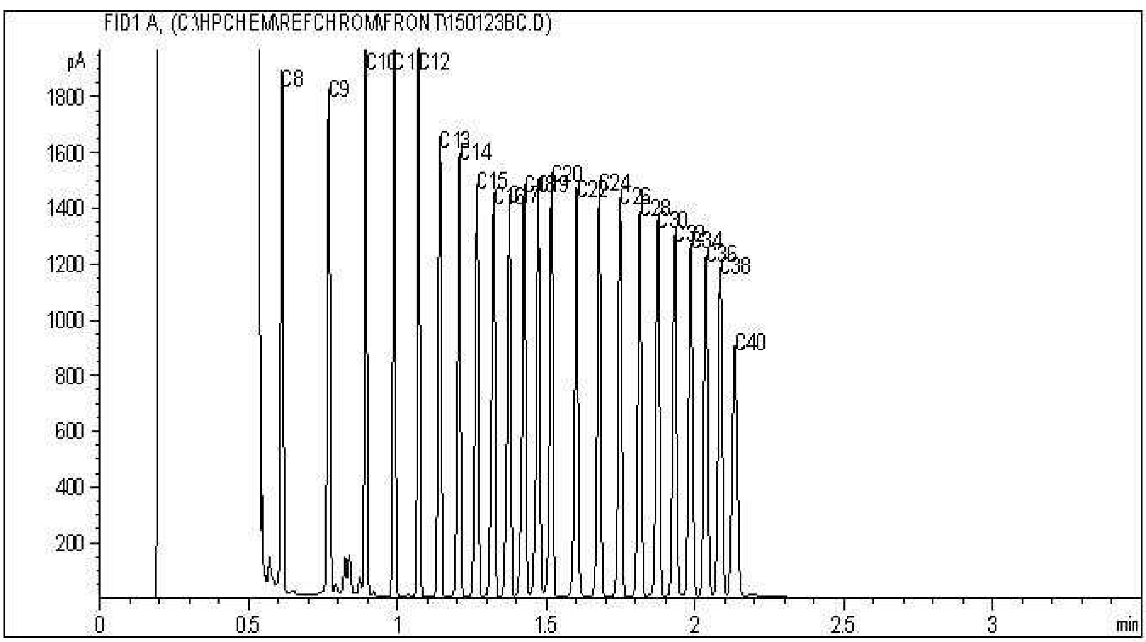
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9643 Lab-Dup

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-2-1-2

BC Hydrocarbons in Soil by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



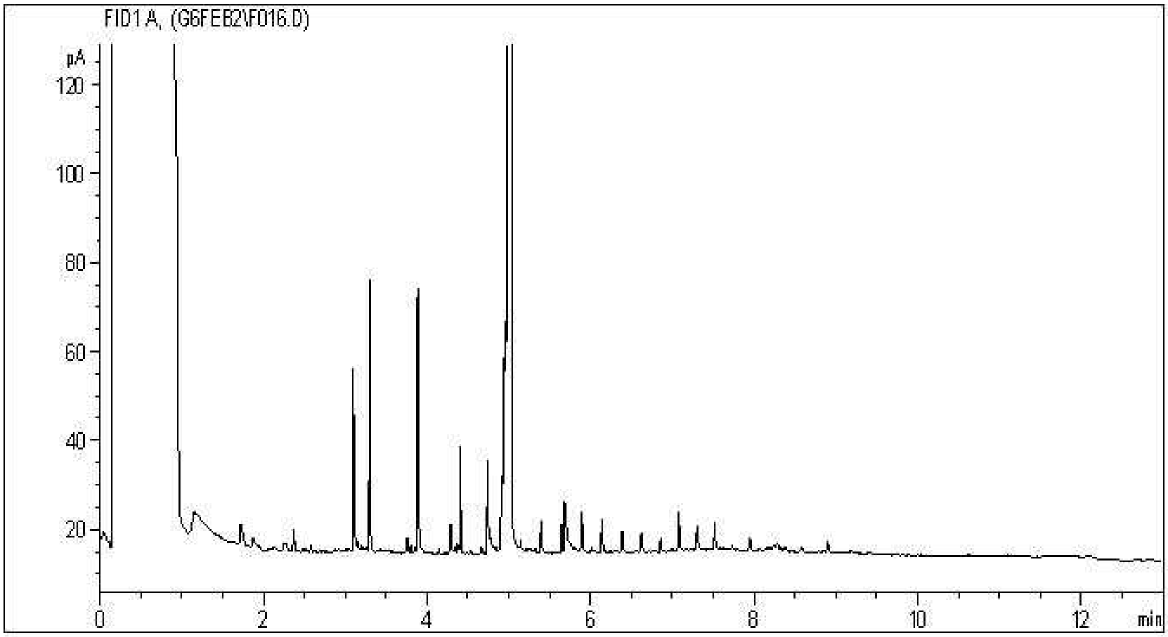
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

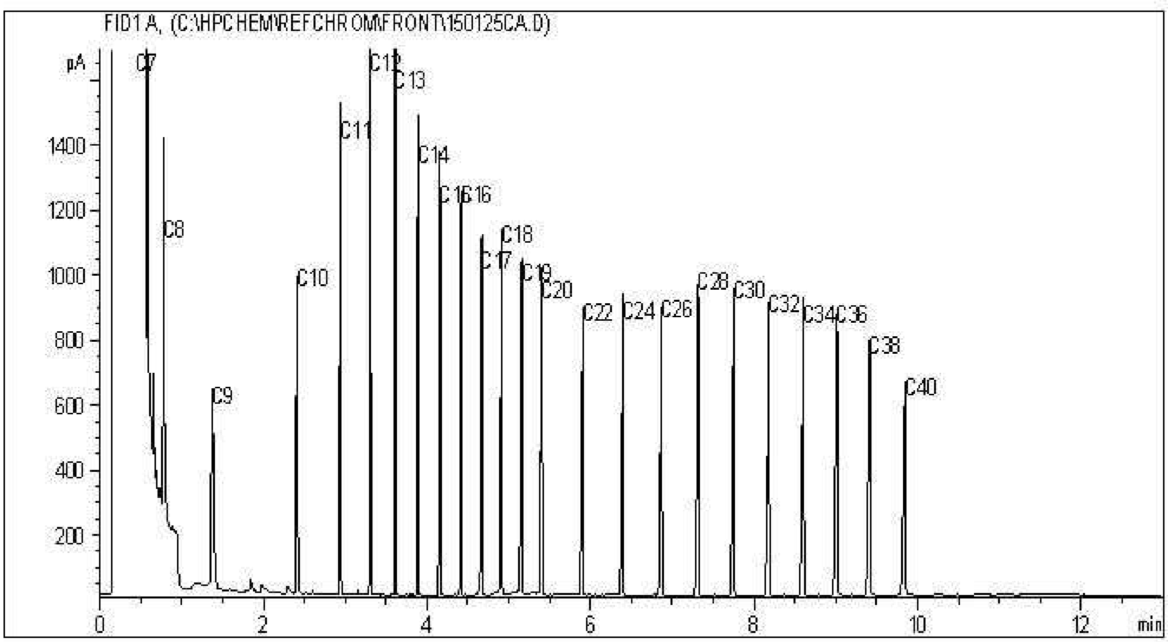
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9643 Lab-Dup

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-2-1-2

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



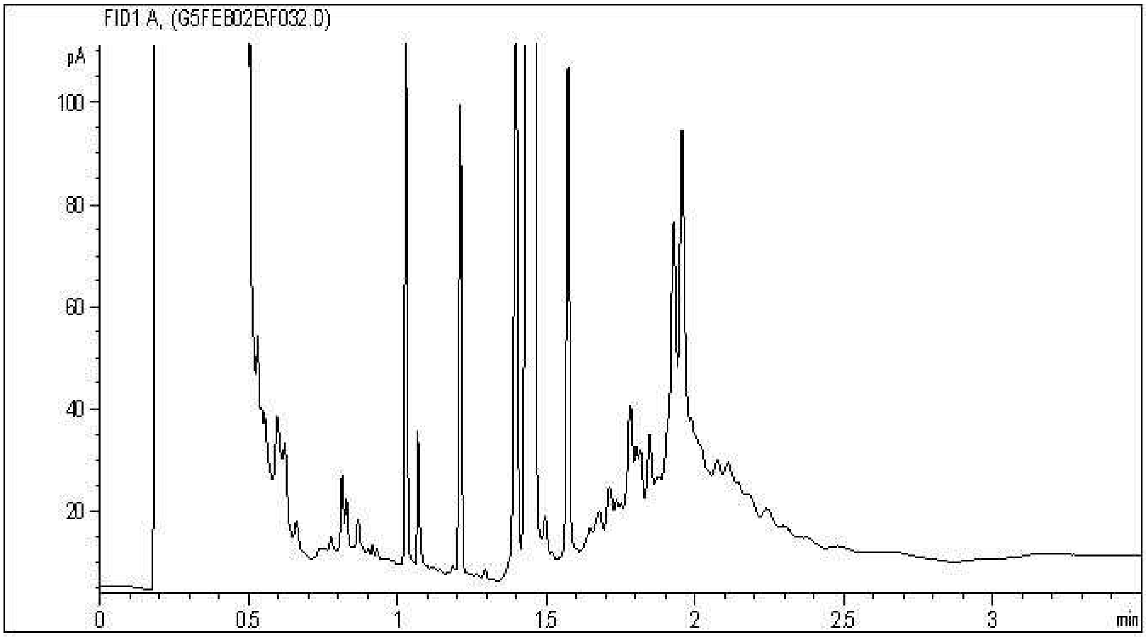
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

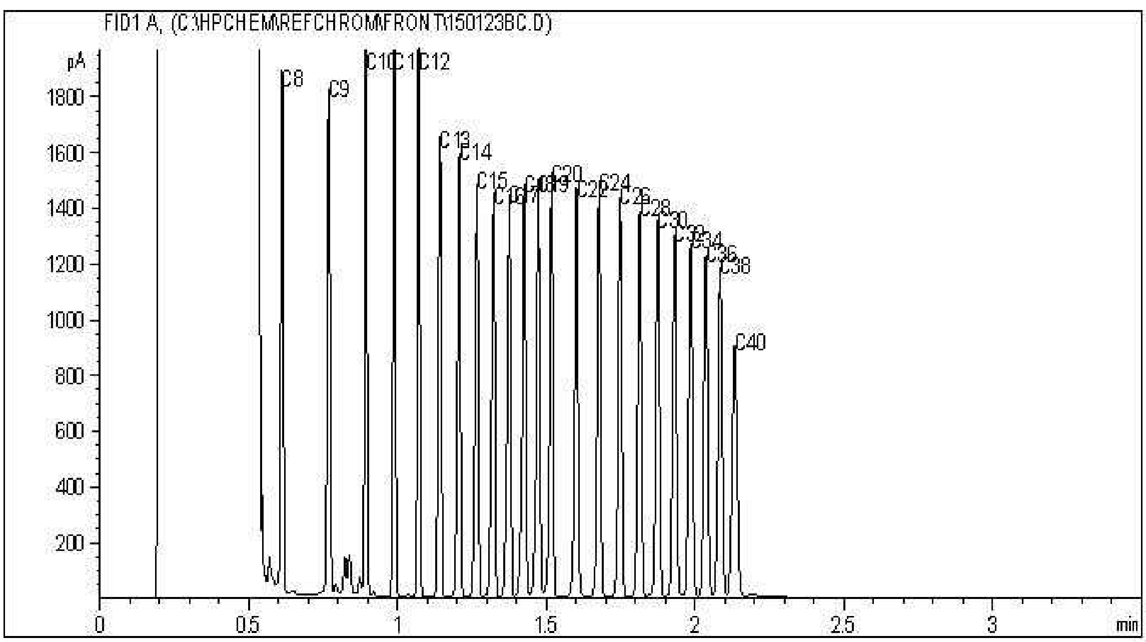
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9644

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-3-0.5-1

BC Hydrocarbons in Soil by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



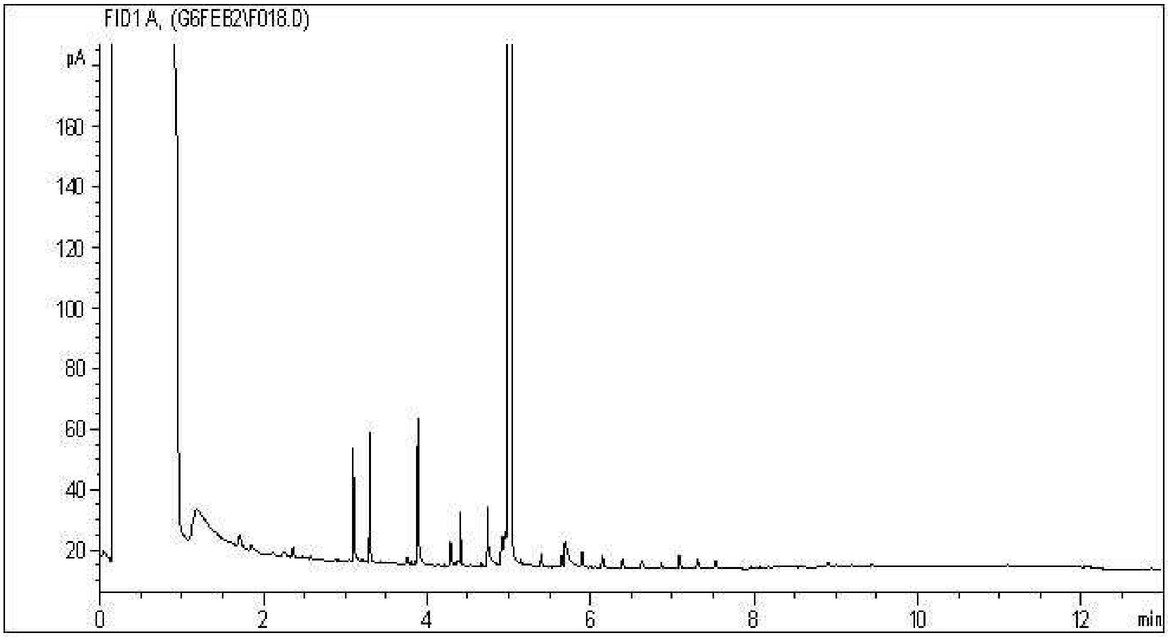
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

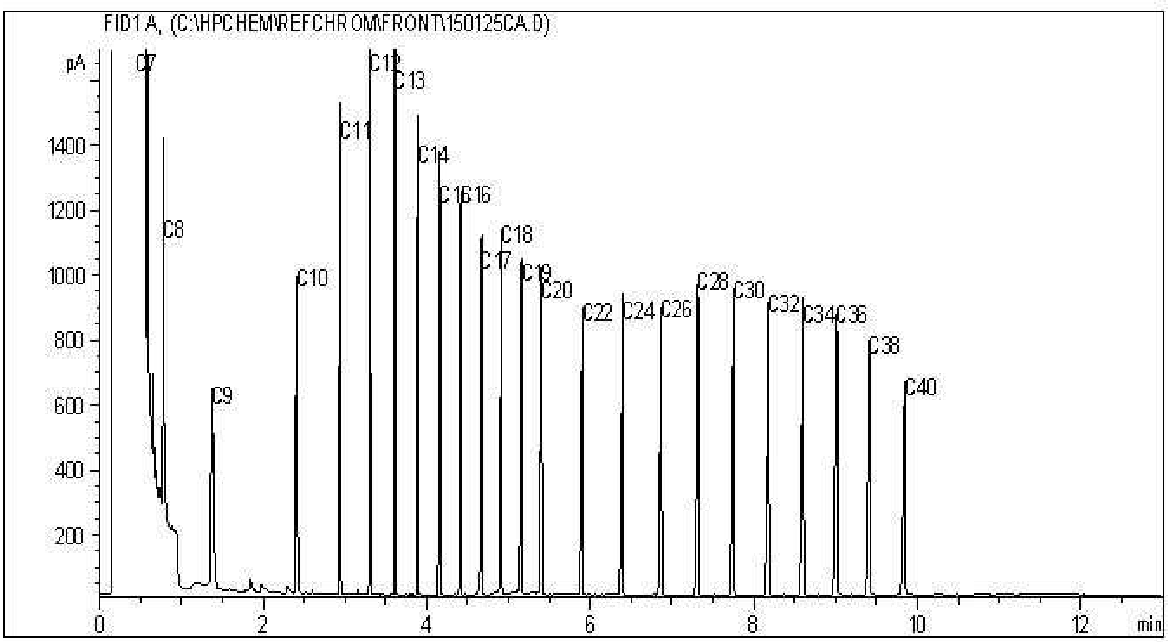
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9644

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-3-0.5-1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



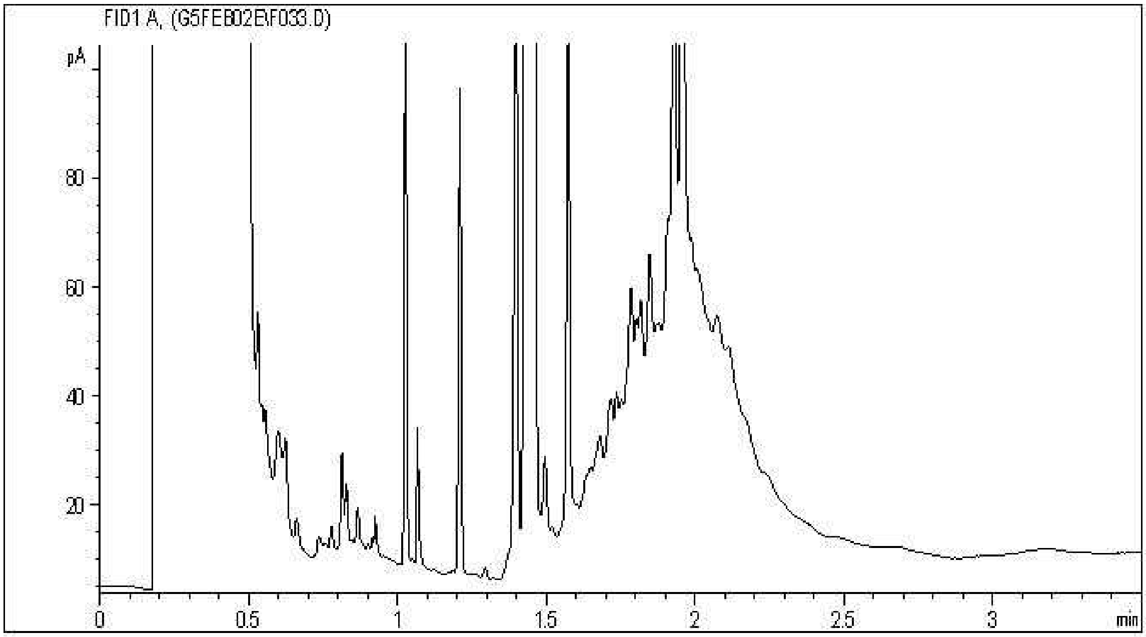
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

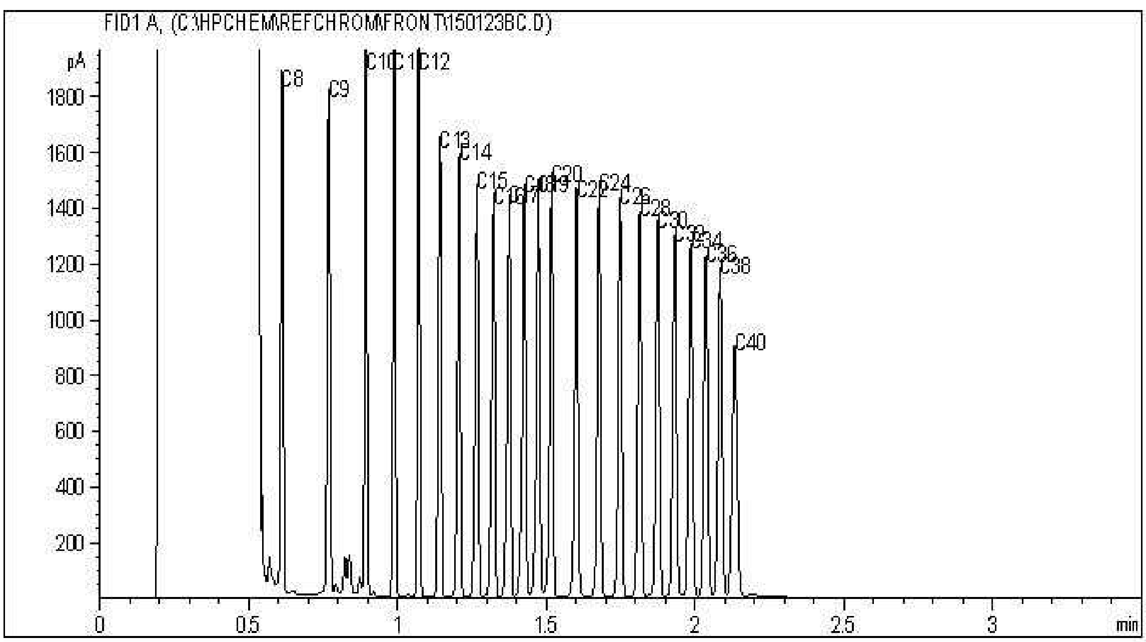
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9645

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-3-1-2

BC Hydrocarbons in Soil by GC/FID Chromatogram



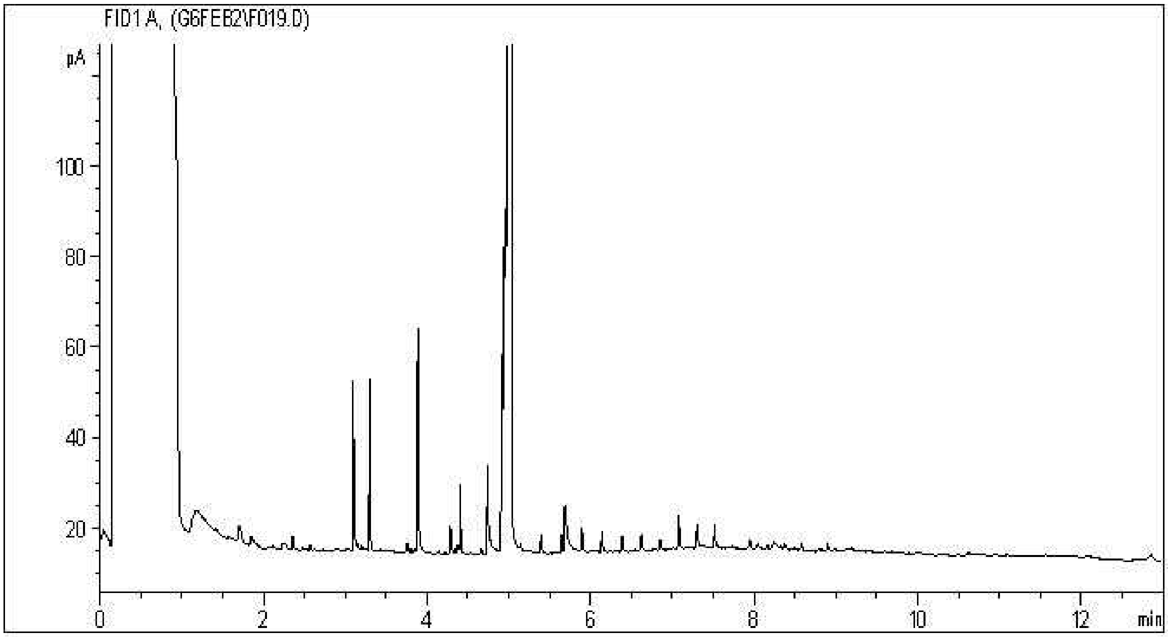
Carbon Range Distribution - Reference Chromatogram



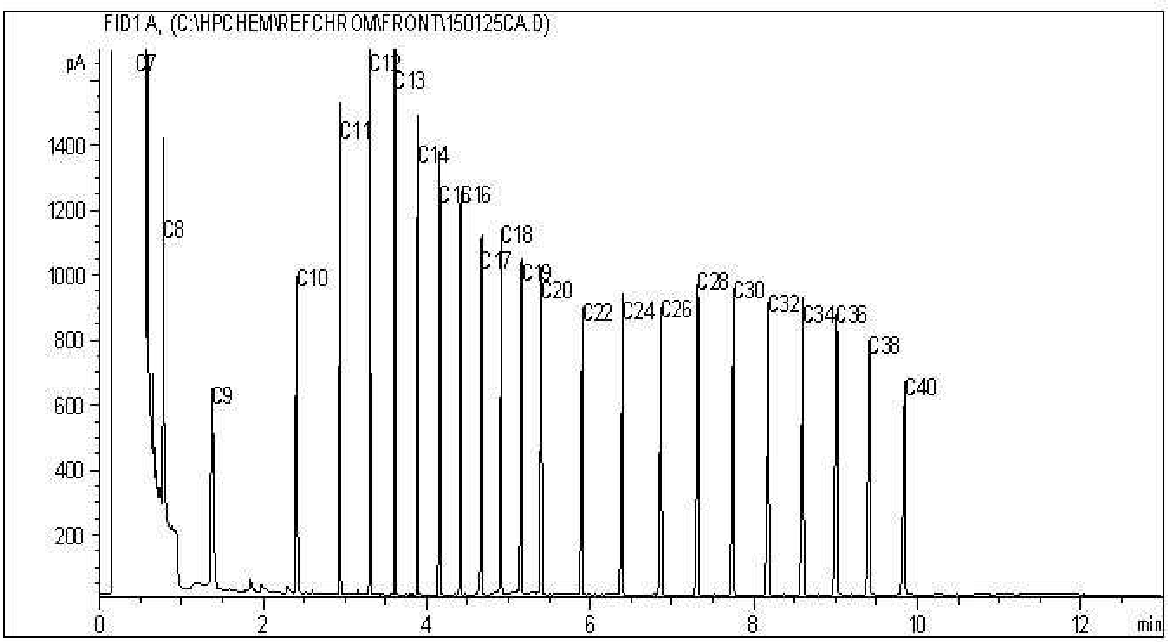
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



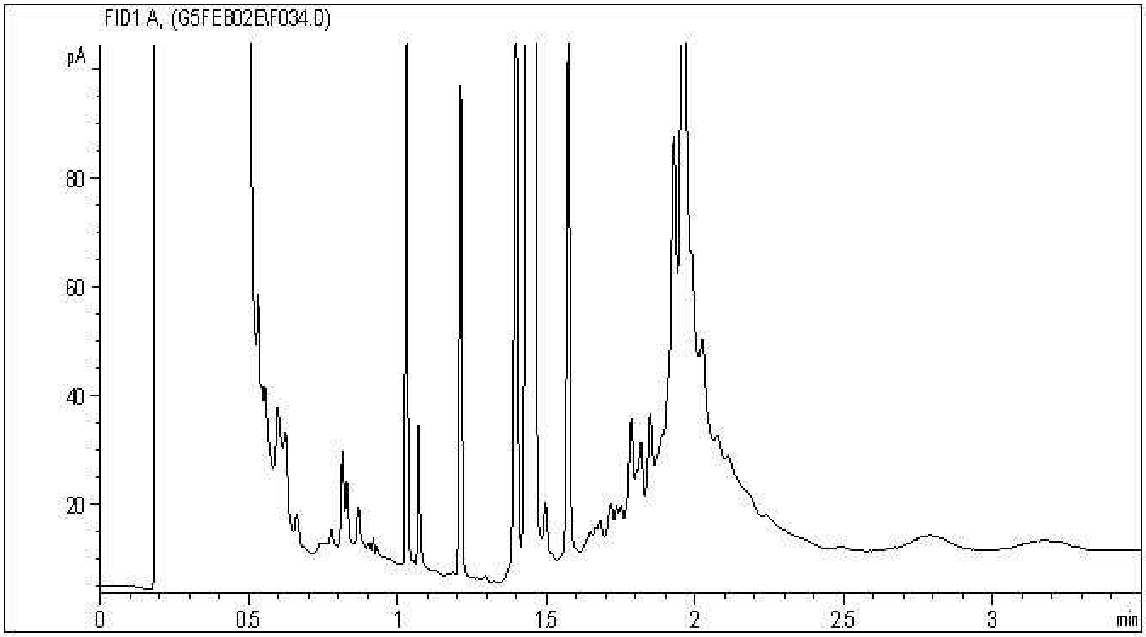
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

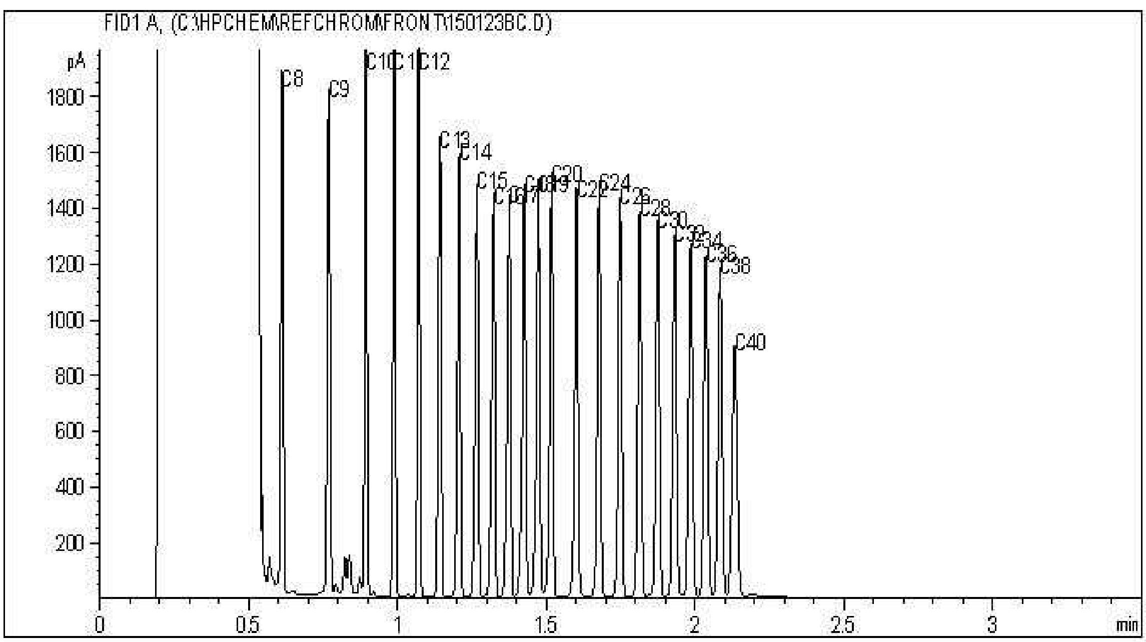
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9646

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-4-0.5-1

BC Hydrocarbons in Soil by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



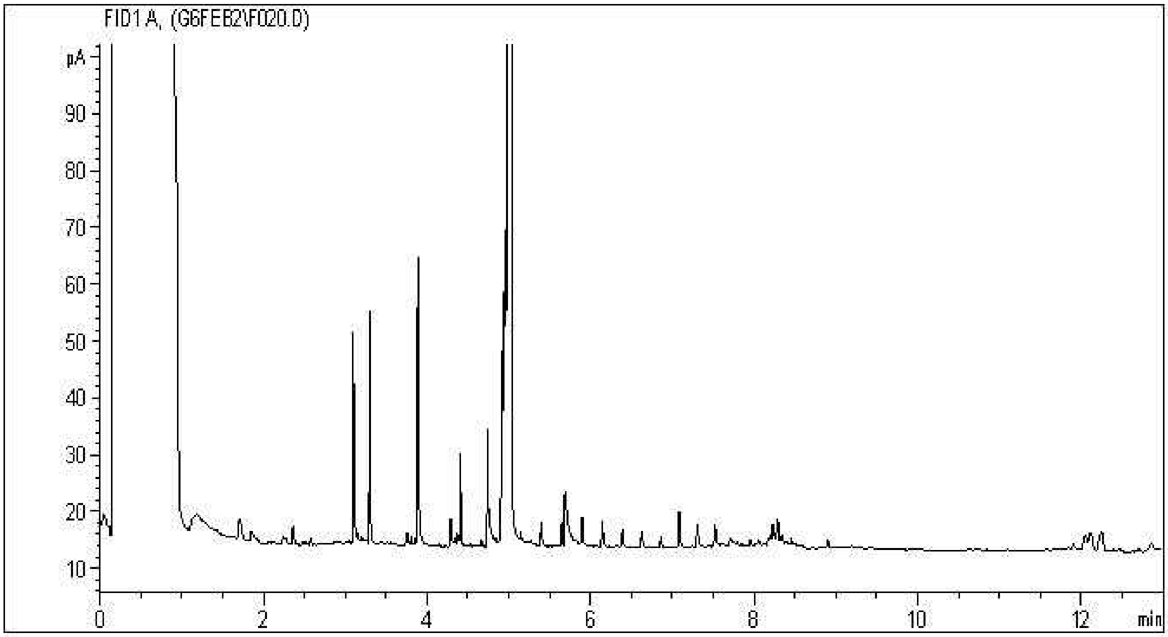
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

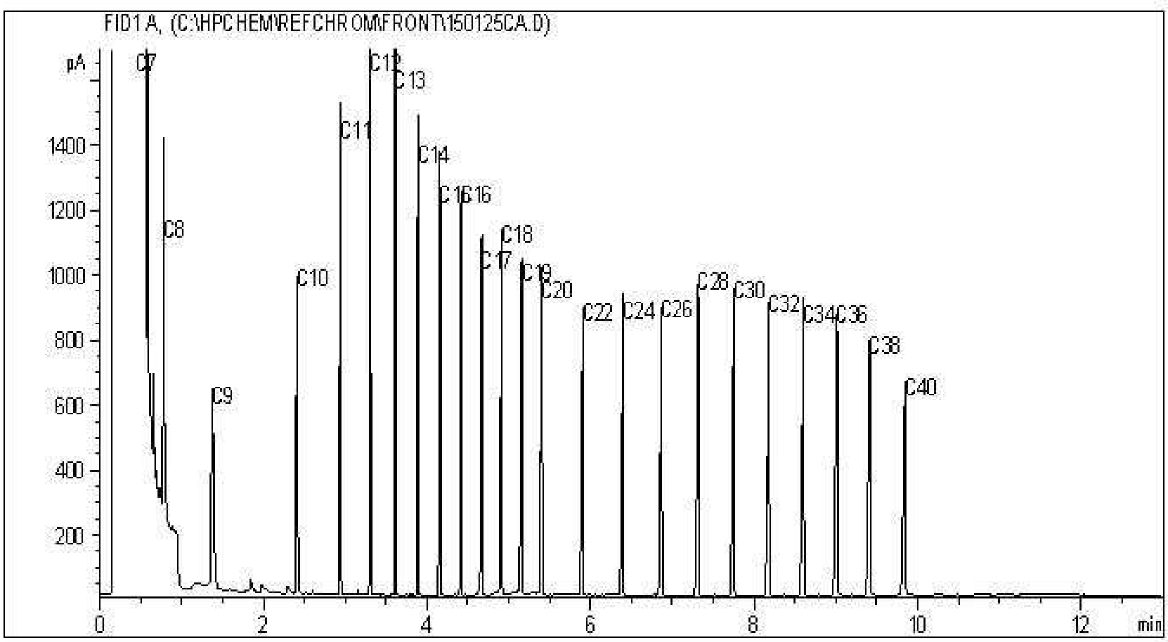
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9646

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-4-0.5-1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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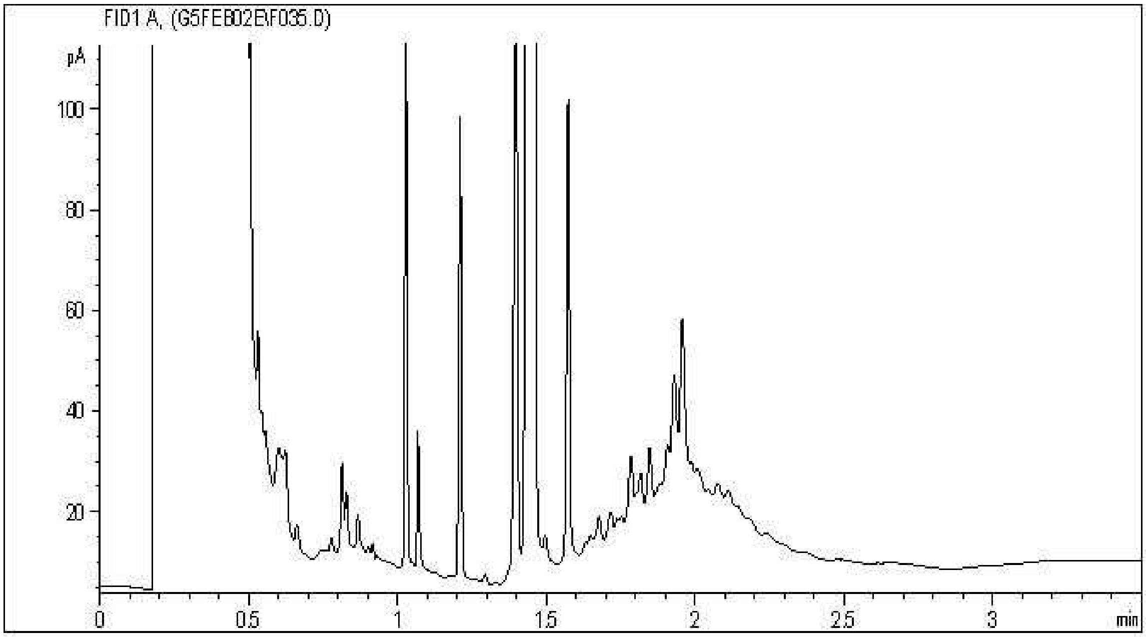
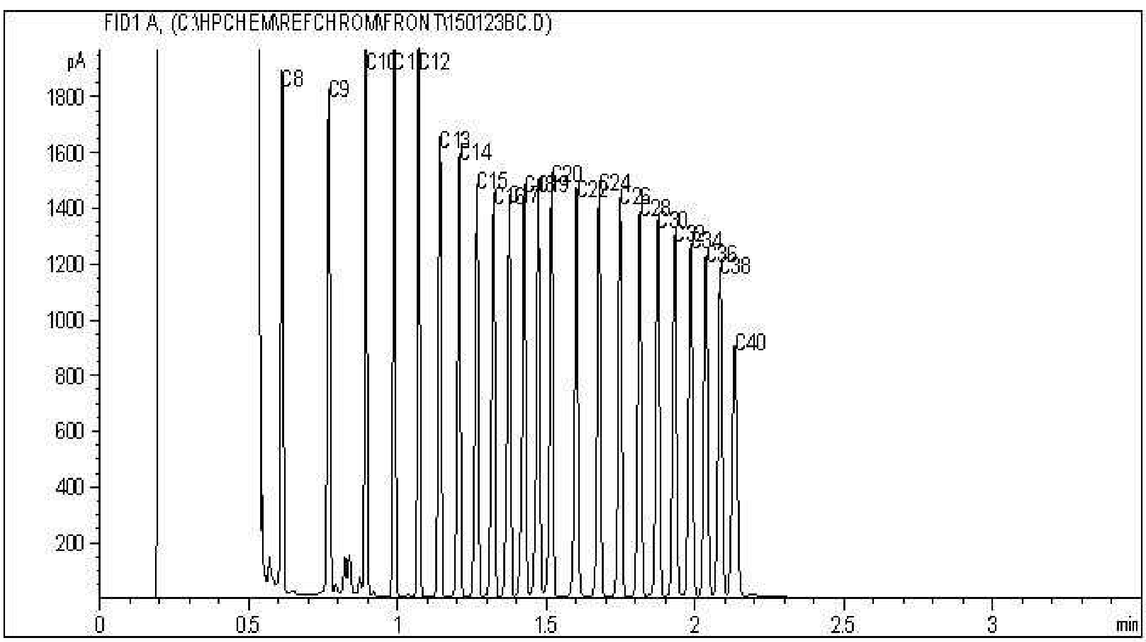
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9647

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-4-1-2

BC Hydrocarbons in Soil by GC/FID Chromatogram



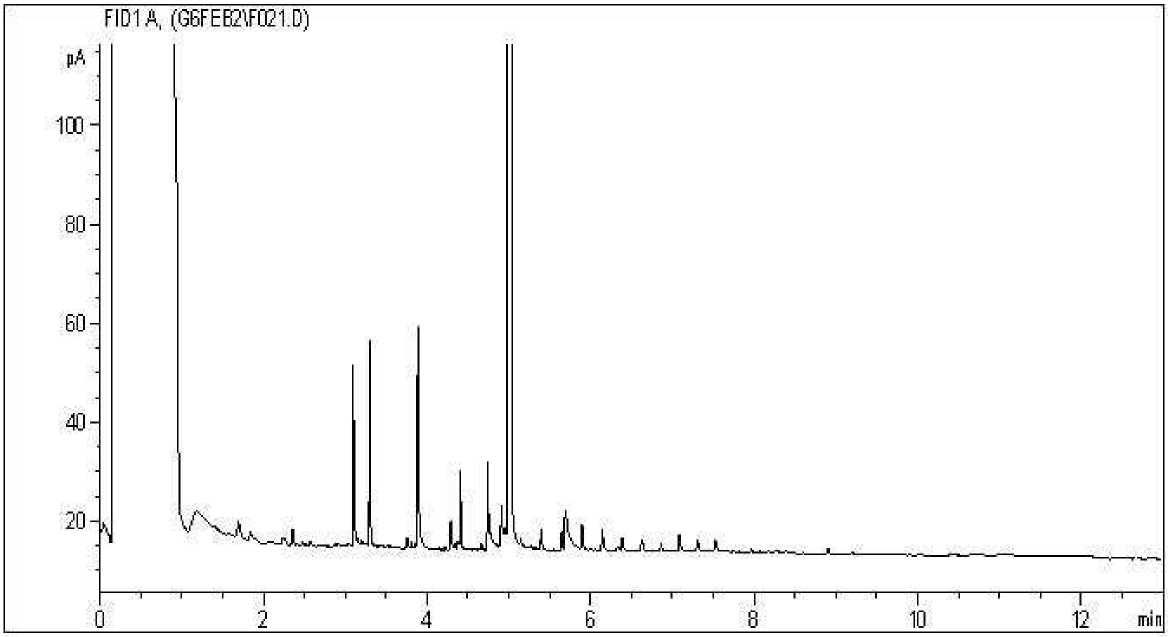
Carbon Range Distribution - Reference Chromatogram



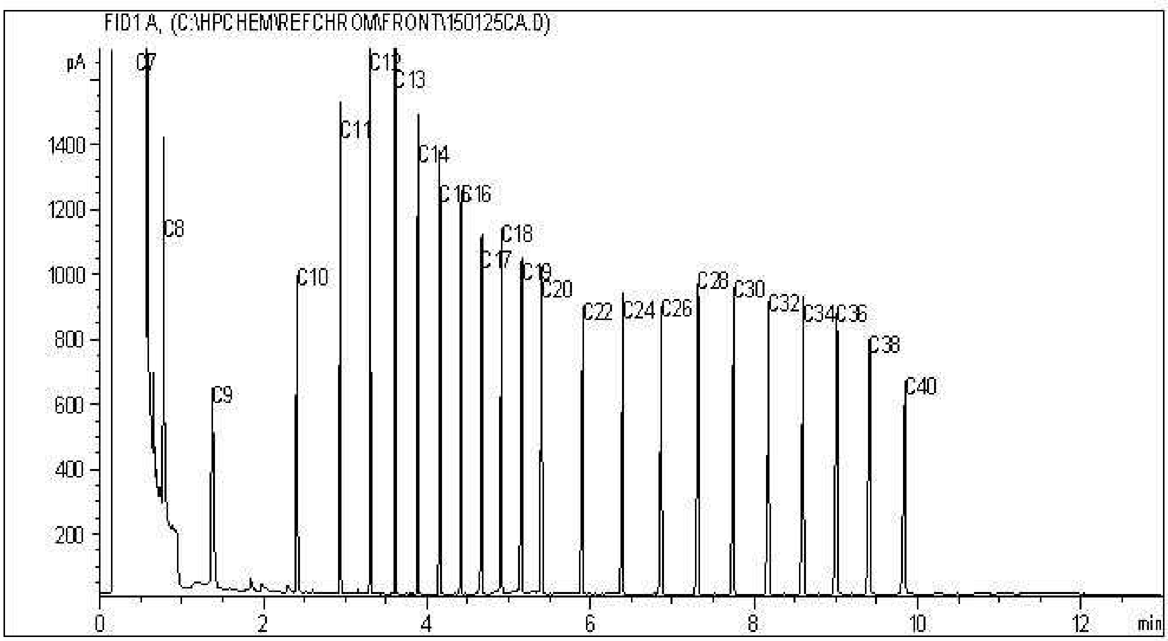
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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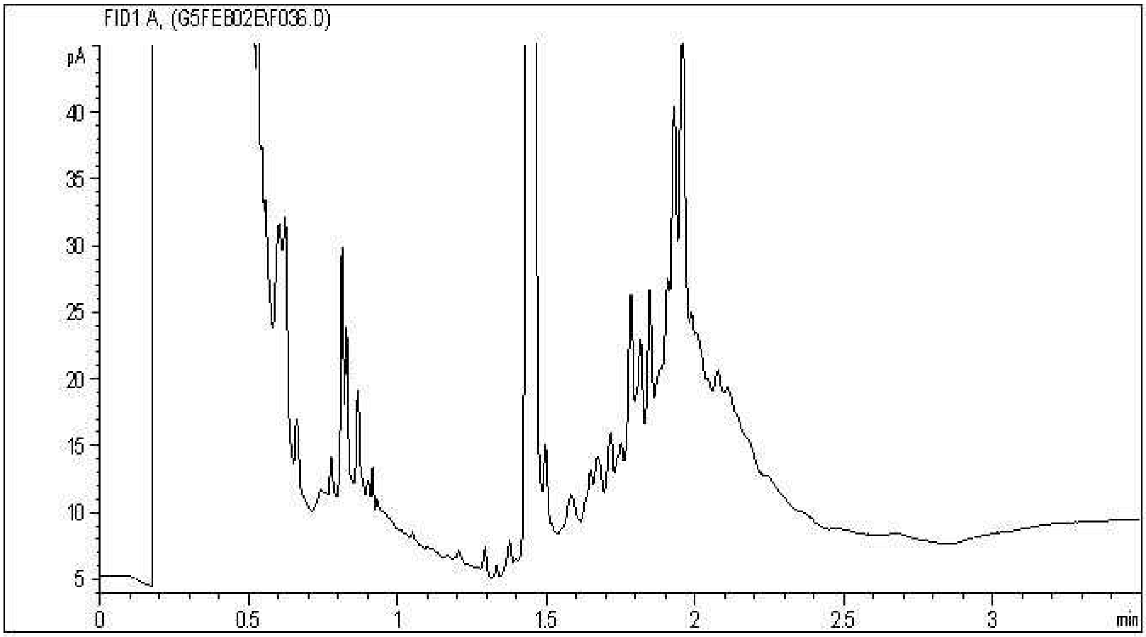
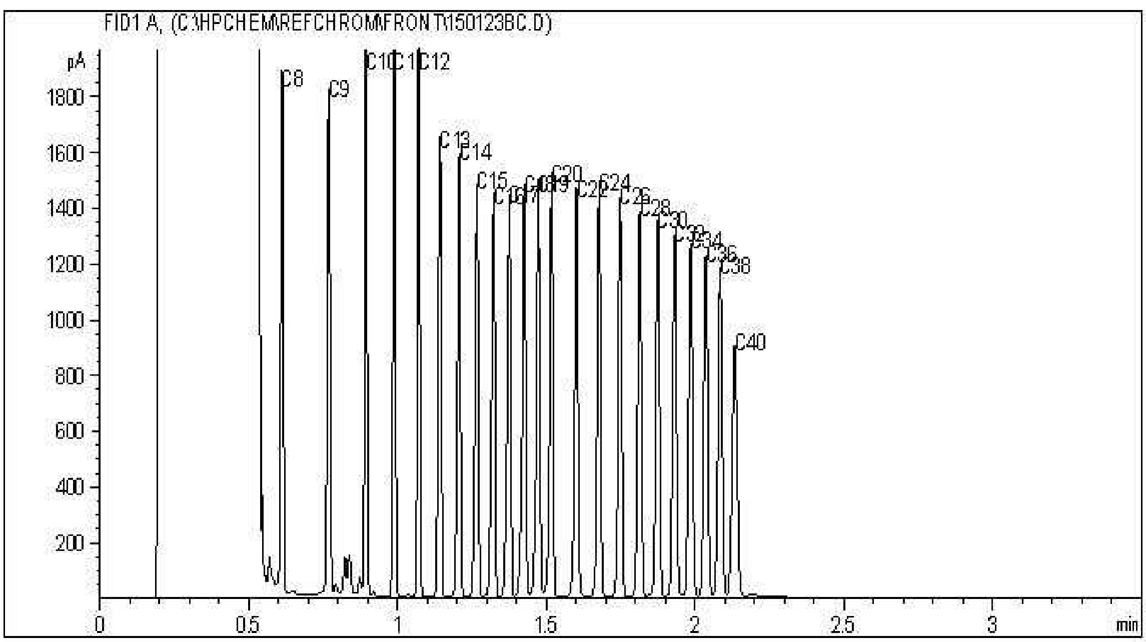
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9648

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-5-1-2

BC Hydrocarbons in Soil by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



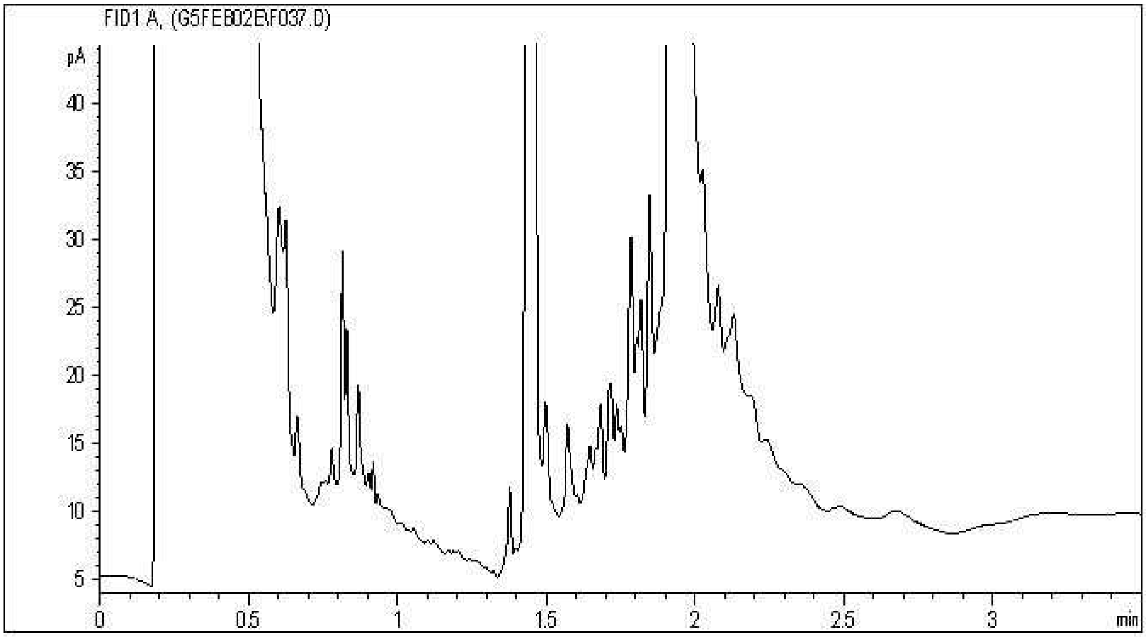
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

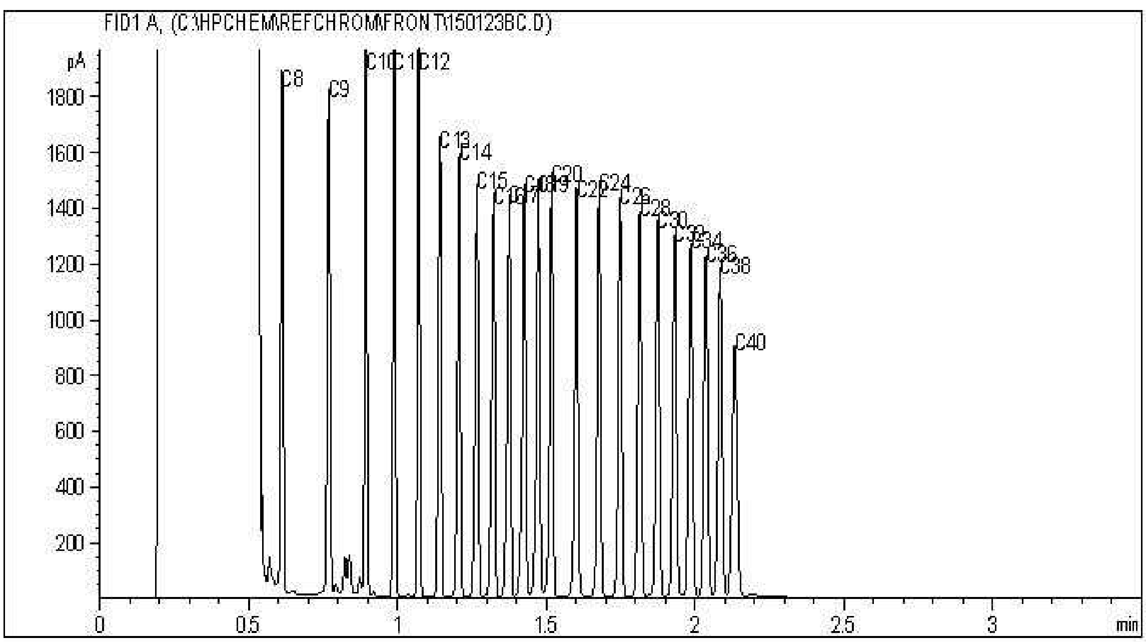
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9651

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-6-1-2

BC Hydrocarbons in Soil by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



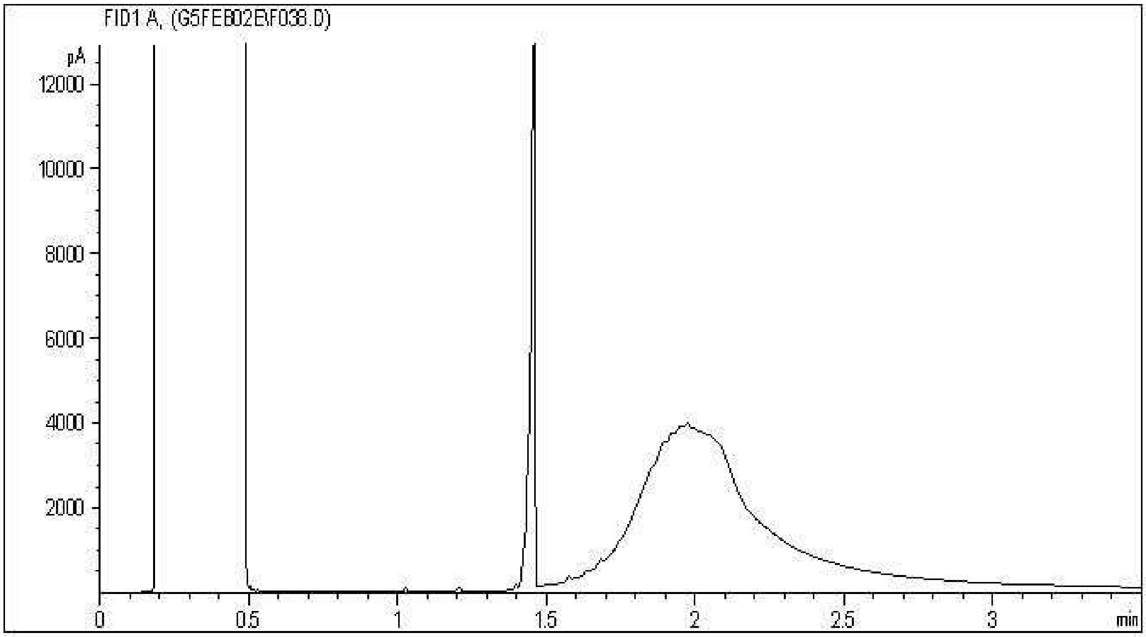
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

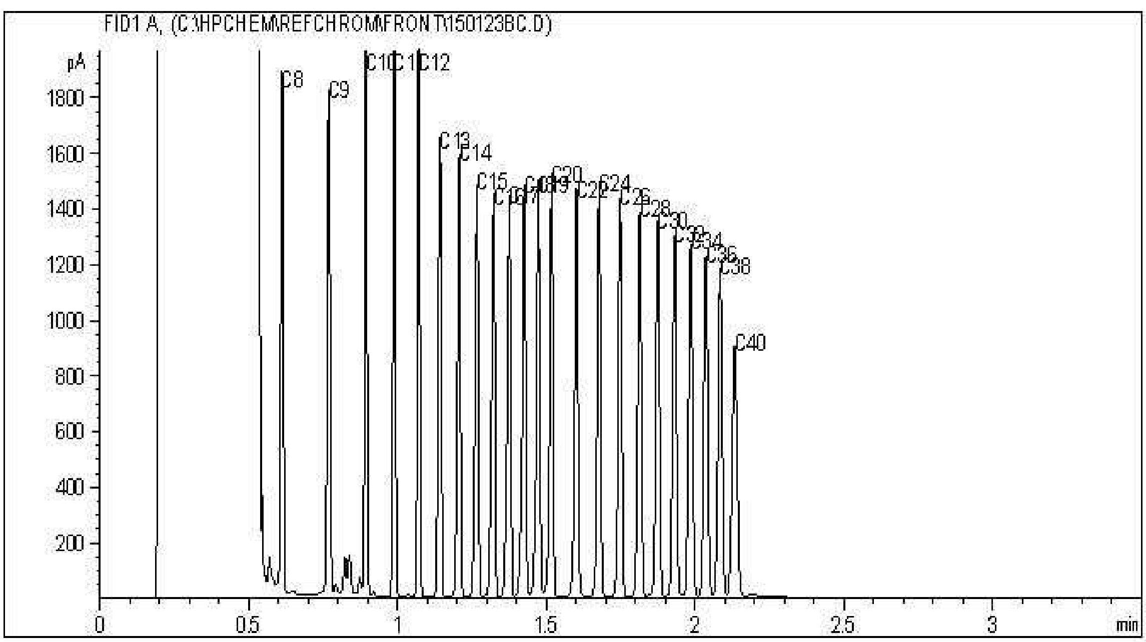
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9657

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-A

BC Hydrocarbons in Soil by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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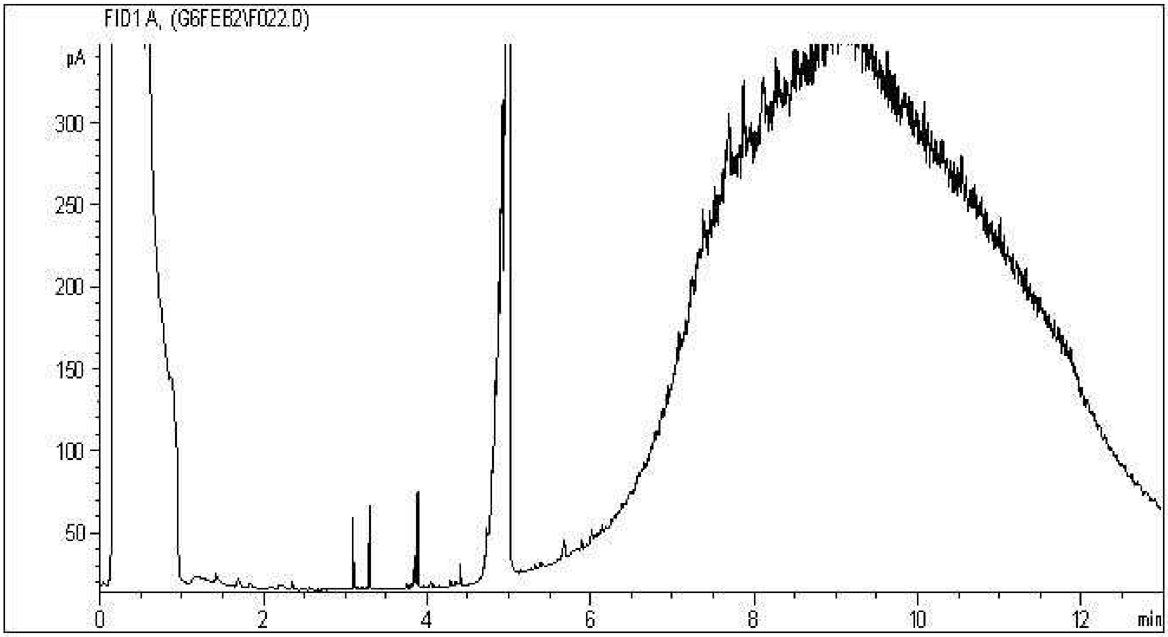
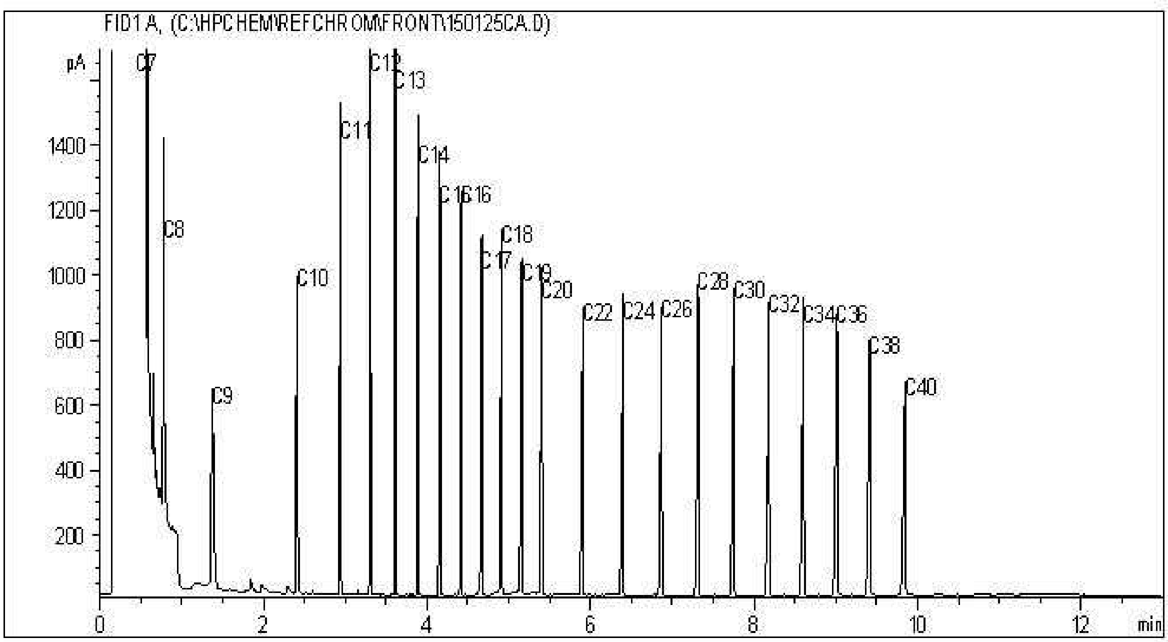
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9657

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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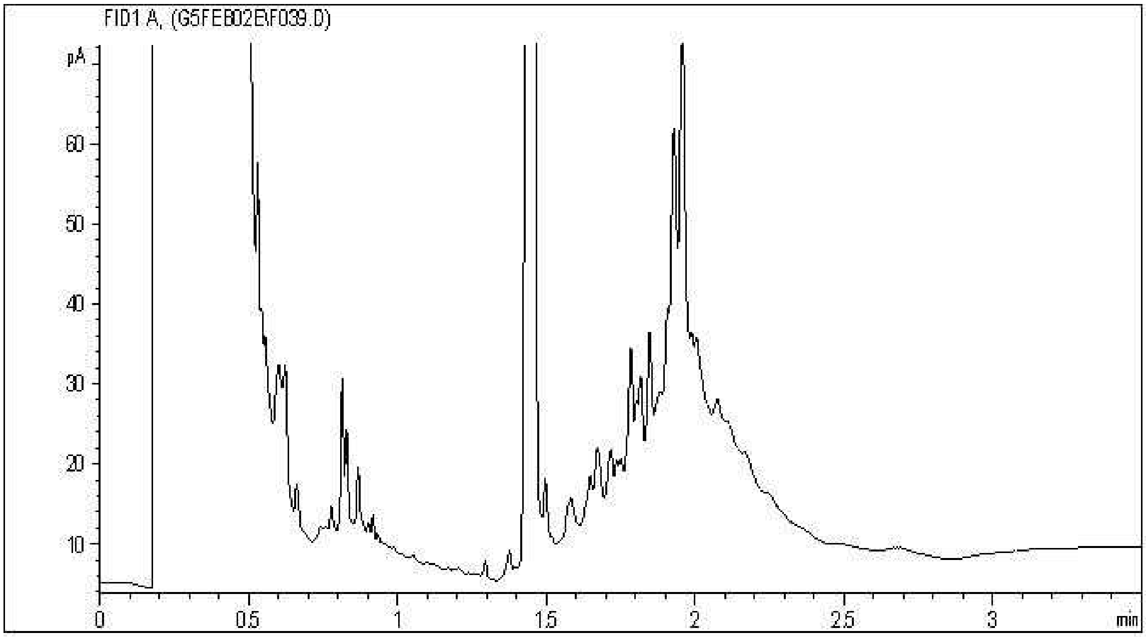
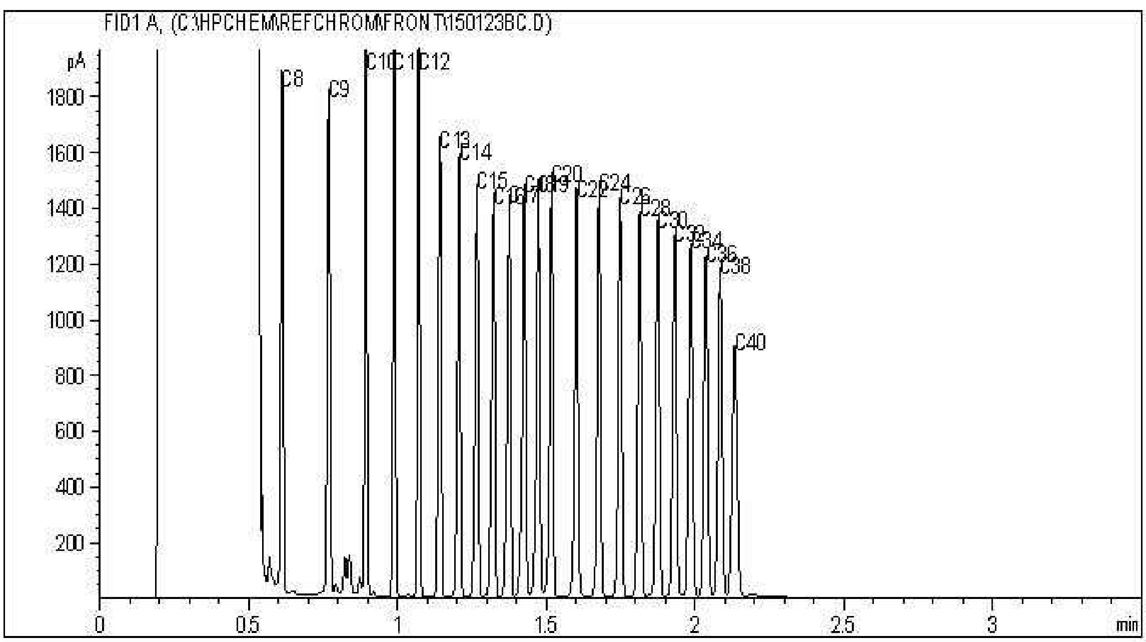
Maxxam Job #: B506951
Report Date: 2015/02/05
Maxxam Sample: LO9658

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: Wilmer Marsh
Client ID: TP15-B

BC Hydrocarbons in Soil by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Your P.O. #: 700315471
Your Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your C.O.C. #: 458127-10-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2015/02/13
Report #: R1803431
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B508332
Received: 2015/02/02, 13:20

Sample Matrix: Soil
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE LH VH F1 in Soil - Field Pres.	4	N/A	2015/02/03	BBY8SOP-00010	EPA 8260c R3 m
BTEX/MTBE LH VH F1 in Soil - Field Pres.	1	N/A	2015/02/13	BBY8SOP-00010	EPA 8260c R3 m
Volatile F1-BTEX	4	N/A	2015/02/04	BBY WI-00033	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (1)	3	2015/02/02	2015/02/04	BBY8SOP-00030	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1)	1	2015/02/02	2015/02/05	BBY8SOP-00030	CCME PHC-CWS
Elements by ICPMS (total)	6	2015/02/03	2015/02/03	BBY7SOP-00001	EPA 6020a R1 m
Elements by ICPMS (total)	2	2015/02/12	2015/02/12	BBY7SOP-00001	EPA 6020a R1 m
Particulate Mesh 200	4	N/A	2015/02/04	BBY6SOP-00039	Carter 2nd ed 55.4
Moisture	4	N/A	2015/02/03	BBY8SOP-00017	OMOE E3139 3.1 m
Moisture	2	N/A	2015/02/11	BBY8SOP-00017	OMOE E3139 3.1 m
PAH in Soil by GC/MS (SIM) - CCME	1	2015/02/02	2015/02/04	BBY8SOP-00022	EPA 8270d R4 m
PAH in Soil by GC/MS (SIM) - CCME	3	2015/02/02	2015/02/05	BBY8SOP-00022	EPA 8270d R4 m
Benzo[a]pyrene Equivalency	4	N/A	2015/02/05	BBY WI-00033	Auto Calc
Total LMW, HMW, Total PAH Calc	4	N/A	2015/02/05	BBY WI-00033	Auto Calc
pH (2:1 DI Water Extract)	6	2015/02/03	2015/02/03	BBY6SOP-00028	BCMOE BCLM Mar2005 m

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

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

(1) The method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory; all deviations were justified and validated and are made available upon request; the chromatogram descends to baseline by the retention time of nC50 unless otherwise indicated; all QC criteria met; individual hydrocarbons (nC10, nC16, nC34) are within 10% of their average response factor; linearity is within 15%.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Samantha Fregien, Project Manager
Email: SFregien@maxxam.ca
Phone# (604) 734 7276
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B508332
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LP7939	LP7940	LP7942	LP7943		
Sampling Date		2015/02/01	2015/02/01	2015/02/01	2015/02/01		
COC Number		458127-10-01	458127-10-01	458127-10-01	458127-10-01		
	Units	**MDZ-WA-1.0-2.0**	**MDZ-WA-2.0-3.0**	**MDZ-WA2-1.0-2.0**	**MDZ-WB-0.3-0.8**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	10	7798068
F3 (C16-C34 Hydrocarbons)	mg/kg	16	19	22	<10	10	7798068
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	18	21	<10	10	7798068
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	N/A	7798068
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	98	101	99	104		7798068

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B508332
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

PARTICLE SIZE DISTRIBUTION ANALYSIS (SOIL)

Maxxam ID		LP7939	LP7940	LP7942	LP7943		
Sampling Date		2015/02/01	2015/02/01	2015/02/01	2015/02/01		
COC Number		458127-10-01	458127-10-01	458127-10-01	458127-10-01		
	Units	**MDZ-WA-1.0-2.0**	**MDZ-WA-2.0-3.0**	**MDZ-WA2-1.0-2.0**	**MDZ-WB-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties							
200 mesh (>.075 mm)	%	12.4	20.3	18.1	15.0	0.10	7797792
200 mesh (<.075 mm)	%	87.6	79.7	82.0	85.0	0.10	7797792
RDL = Reportable Detection Limit							

Maxxam Job #: B508332
Report Date: 2015/02/13

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Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

PHYSICAL TESTING (SOIL)

Maxxam ID		LP7939	LP7940	LP7942	LP7943		
Sampling Date		2015/02/01	2015/02/01	2015/02/01	2015/02/01		
COC Number		458127-10-01	458127-10-01	458127-10-01	458127-10-01		
	Units	**MDZ-WA-1.0-2.0**	**MDZ-WA-2.0-3.0**	**MDZ-WA2-1.0-2.0**	**MDZ-WB-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	4.1	5.0	4.3	4.0	0.30	7795542
RDL = Reportable Detection Limit							

Maxxam ID		LR2713	LR2715		
Sampling Date		2015/02/01	2015/02/01		
COC Number		458127-10-01	458127-10-01		
	Units	**MDZ-WA-1.0-2.0 REWORK 1**	**MDZ-WA2-1.0-2.0 REWORK 1**	**RDL**	**QC Batch**
Physical Properties					
Moisture	%	5.0	4.3	0.30	7805236
RDL = Reportable Detection Limit					

Maxxam Job #: B508332
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
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Your P.O. #: 700315471
Sampler Initials: MM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		LR2713	LR2715		
Sampling Date		2015/02/01	2015/02/01		
COC Number		458127-10-01	458127-10-01		
	Units	**MDZ-WA-1.0-2.0 REWORK 1**	**MDZ-WA2-1.0-2.0 REWORK 1**	**RDL**	**QC Batch**
Total Metals by ICPMS					
Total Aluminum (Al)	mg/kg	9250	8470	100	7806021
Total Antimony (Sb)	mg/kg	0.84	0.90	0.10	7806021
Total Arsenic (As)	mg/kg	6.17	6.17	0.50	7806021
Total Barium (Ba)	mg/kg	145	132	0.10	7806021
Total Beryllium (Be)	mg/kg	<0.40	<0.40	0.40	7806021
Total Bismuth (Bi)	mg/kg	0.14	0.13	0.10	7806021
Total Cadmium (Cd)	mg/kg	0.809	0.583	0.050	7806021
Total Calcium (Ca)	mg/kg	81900	76700	100	7806021
Total Chromium (Cr)	mg/kg	17.1	15.6	1.0	7806021
Total Cobalt (Co)	mg/kg	8.23	7.54	0.30	7806021
Total Copper (Cu)	mg/kg	25.0	22.5	0.50	7806021
Total Iron (Fe)	mg/kg	25000	22000	100	7806021
Total Lead (Pb)	mg/kg	96.2	44.0	0.10	7806021
Total Magnesium (Mg)	mg/kg	17800	16800	100	7806021
Total Manganese (Mn)	mg/kg	483	441	0.20	7806021
Total Mercury (Hg)	mg/kg	<0.050	<0.050	0.050	7806021
Total Molybdenum (Mo)	mg/kg	9.22	0.81	0.10	7806021
Total Nickel (Ni)	mg/kg	20.5	20.3	0.80	7806021
Total Phosphorus (P)	mg/kg	688	630	10	7806021
Total Potassium (K)	mg/kg	941	792	100	7806021
Total Selenium (Se)	mg/kg	<0.50	<0.50	0.50	7806021
Total Silver (Ag)	mg/kg	0.099	0.088	0.050	7806021
Total Sodium (Na)	mg/kg	213	216	100	7806021
Total Strontium (Sr)	mg/kg	191	181	0.10	7806021
Total Thallium (Tl)	mg/kg	<0.050	<0.050	0.050	7806021
Total Tin (Sn)	mg/kg	9.37	4.88	0.10	7806021
Total Titanium (Ti)	mg/kg	83.3	77.3	1.0	7806021
Total Vanadium (V)	mg/kg	10.0	9.9	2.0	7806021
Total Zinc (Zn)	mg/kg	169	130	1.0	7806021
Total Zirconium (Zr)	mg/kg	1.41	1.26	0.50	7806021
RDL = Reportable Detection Limit					

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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

BTEX BY GC-MS (SOIL)

Maxxam ID		LR2713		
Sampling Date		2015/02/01		
COC Number		458127-10-01		
	Units	**MDZ-WA-1.0-2.0 REWORK 1**	**RDL**	**QC Batch**
Volatiles				
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	0.10	7807037
Benzene	mg/kg	<0.0060 (1)	0.0060	7807037
Toluene	mg/kg	0.064	0.020	7807037
Ethylbenzene	mg/kg	0.014	0.010	7807037
m & p-Xylene	mg/kg	<0.040	0.040	7807037
o-Xylene	mg/kg	<0.040	0.040	7807037
Styrene	mg/kg	<0.030	0.030	7807037
Xylenes (Total)	mg/kg	<0.040	0.040	7807037
VH C6-C10	mg/kg	<10	10	7807037
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	101		7807037
4-Bromofluorobenzene (sur.)	%	99		7807037
D10-ETHYLBENZENE (sur.)	%	102		7807037
D4-1,2-Dichloroethane (sur.)	%	105		7807037

RDL = Reportable Detection Limit
(1) RDL raised due to sample matrix interference.

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Sampler Initials: MM

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LP7939	LP7940	LP7942	LP7943		
Sampling Date		2015/02/01	2015/02/01	2015/02/01	2015/02/01		
COC Number		458127-10-01	458127-10-01	458127-10-01	458127-10-01		
	Units	**MDZ-WA-1.0-2.0**	**MDZ-WA-2.0-3.0**	**MDZ-WA2-1.0-2.0**	**MDZ-WB-0.3-0.8**	**RDL**	**QC Batch**
Calculated Parameters							
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	10	7796336
Volatiles							
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	7796535
Benzene	mg/kg	<0.0050	0.020	0.015	<0.0050	0.0050	7796535
Toluene	mg/kg	0.046	2.3	1.8	0.088	0.020	7796535
Ethylbenzene	mg/kg	<0.010	0.017	0.013	<0.010	0.010	7796535
m & p-Xylene	mg/kg	<0.040	0.041	<0.040	<0.040	0.040	7796535
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7796535
Styrene	mg/kg	<0.030	<0.030	<0.030	<0.030	0.030	7796535
Xylenes (Total)	mg/kg	<0.040	0.041	<0.040	<0.040	0.040	7796535
(C6-C10)	mg/kg	<10	<10	<10	<10	10	7796535
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	102	101	101	102		7796535
4-Bromofluorobenzene (sur.)	%	100	98	99	99		7796535
D10-ETHYLBENZENE (sur.)	%	98	113	106	97		7796535
D4-1,2-Dichloroethane (sur.)	%	102	102	103	102		7796535
RDL = Reportable Detection Limit							

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SLR CONSULTING (CANADA) LTD
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Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LP7938	LP7939	LP7940	LP7942	LP7943		
Sampling Date		2015/02/01	2015/02/01	2015/02/01	2015/02/01	2015/02/01		
COC Number		458127-10-01	458127-10-01	458127-10-01	458127-10-01	458127-10-01		
	Units	**MDZ-WA-0.3-0.8**	**MDZ-WA-1.0-2.0**	**MDZ-WA-2.0-3.0**	**MDZ-WA2-1.0-2.0**	**MDZ-WB-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties								
Soluble (2:1) pH	pH	8.55	8.35	8.39	8.30	8.58	N/A	7796624
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	7710	8800	7780	8180	7100	100	7796622
Total Antimony (Sb)	mg/kg	0.45	1.16	0.87	0.98	0.38	0.10	7796622
Total Arsenic (As)	mg/kg	5.78	6.45	6.11	6.03	5.50	0.50	7796622
Total Barium (Ba)	mg/kg	127	154	126	210	98.1	0.10	7796622
Total Beryllium (Be)	mg/kg	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	7796622
Total Bismuth (Bi)	mg/kg	0.13	0.14	0.12	0.13	0.11	0.10	7796622
Total Cadmium (Cd)	mg/kg	0.353	0.798	0.766	3.31	0.188	0.050	7796622
Total Calcium (Ca)	mg/kg	73600	78300	75500	78200	77000	100	7796622
Total Chromium (Cr)	mg/kg	14.2	17.8	17.1	17.3	13.2	1.0	7796622
Total Cobalt (Co)	mg/kg	7.78	8.46	8.21	8.21	7.66	0.30	7796622
Total Copper (Cu)	mg/kg	17.5	28.1	25.8	26.0	14.5	0.50	7796622
Total Iron (Fe)	mg/kg	19900	24500	25200	23100	18700	100	7796622
Total Lead (Pb)	mg/kg	27.1	61.7	65.8	46.4	12.2	0.10	7796622
Total Lithium (Li)	mg/kg	17.9	19.1	19.2	18.0	17.7	5.0	7796622
Total Magnesium (Mg)	mg/kg	17100	17500	16900	17400	17400	100	7796622
Total Manganese (Mn)	mg/kg	441	488	477	470	404	0.20	7796622
Total Mercury (Hg)	mg/kg	<0.050	0.053	<0.050	<0.050	<0.050	0.050	7796622
Total Molybdenum (Mo)	mg/kg	0.52	1.04	4.07	2.15	0.42	0.10	7796622
Total Nickel (Ni)	mg/kg	18.2	21.3	20.6	20.0	17.8	0.80	7796622
Total Phosphorus (P)	mg/kg	575	624	590	610	715	10	7796622
Total Potassium (K)	mg/kg	667	874	777	790	557	100	7796622
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7796622
Total Silver (Ag)	mg/kg	0.066	0.092	0.078	0.087	<0.050	0.050	7796622
Total Sodium (Na)	mg/kg	189	197	201	272	159	100	7796622
Total Strontium (Sr)	mg/kg	164	179	181	183	182	0.10	7796622
Total Thallium (Tl)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7796622
Total Tin (Sn)	mg/kg	1.91	8.66	16.2	9.07	0.56	0.10	7796622
Total Titanium (Ti)	mg/kg	69.1	79.4	66.8	75.7	64.6	1.0	7796622
Total Uranium (U)	mg/kg	0.522	0.593	0.523	0.547	0.681	0.050	7796622
Total Vanadium (V)	mg/kg	9.6	10.8	9.9	10.4	9.4	2.0	7796622
Total Zinc (Zn)	mg/kg	79.7	210	158	196	47.9	1.0	7796622
Total Zirconium (Zr)	mg/kg	1.42	1.19	1.10	1.44	1.09	0.50	7796622

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Job #: B508332
Report Date: 2015/02/13

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Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
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Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LP7944		
Sampling Date		2015/02/01		
COC Number		458127-10-01		
	Units	**MDZ-WB-1.0-2.0**	**RDL**	**QC Batch**
Physical Properties				
Soluble (2:1) pH	pH	8.85	N/A	7796624
Total Metals by ICPMS				
Total Aluminum (Al)	mg/kg	7800	100	7796622
Total Antimony (Sb)	mg/kg	0.32	0.10	7796622
Total Arsenic (As)	mg/kg	5.43	0.50	7796622
Total Barium (Ba)	mg/kg	88.2	0.10	7796622
Total Beryllium (Be)	mg/kg	<0.40	0.40	7796622
Total Bismuth (Bi)	mg/kg	0.10	0.10	7796622
Total Cadmium (Cd)	mg/kg	0.109	0.050	7796622
Total Calcium (Ca)	mg/kg	84200	100	7796622
Total Chromium (Cr)	mg/kg	14.7	1.0	7796622
Total Cobalt (Co)	mg/kg	7.88	0.30	7796622
Total Copper (Cu)	mg/kg	14.3	0.50	7796622
Total Iron (Fe)	mg/kg	20500	100	7796622
Total Lead (Pb)	mg/kg	8.78	0.10	7796622
Total Lithium (Li)	mg/kg	19.4	5.0	7796622
Total Magnesium (Mg)	mg/kg	18800	100	7796622
Total Manganese (Mn)	mg/kg	428	0.20	7796622
Total Mercury (Hg)	mg/kg	<0.050	0.050	7796622
Total Molybdenum (Mo)	mg/kg	0.46	0.10	7796622
Total Nickel (Ni)	mg/kg	18.6	0.80	7796622
Total Phosphorus (P)	mg/kg	556	10	7796622
Total Potassium (K)	mg/kg	579	100	7796622
Total Selenium (Se)	mg/kg	<0.50	0.50	7796622
Total Silver (Ag)	mg/kg	<0.050	0.050	7796622
Total Sodium (Na)	mg/kg	147	100	7796622
Total Strontium (Sr)	mg/kg	201	0.10	7796622
Total Thallium (Tl)	mg/kg	<0.050	0.050	7796622
Total Tin (Sn)	mg/kg	<0.10	0.10	7796622
Total Titanium (Ti)	mg/kg	74.6	1.0	7796622
Total Uranium (U)	mg/kg	0.644	0.050	7796622
Total Vanadium (V)	mg/kg	10.2	2.0	7796622
Total Zinc (Zn)	mg/kg	40.6	1.0	7796622
Total Zirconium (Zr)	mg/kg	1.16	0.50	7796622

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Job #: B508332
Report Date: 2015/02/13

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Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LP7939	LP7940	LP7942	LP7943		
Sampling Date		2015/02/01	2015/02/01	2015/02/01	2015/02/01		
COC Number		458127-10-01	458127-10-01	458127-10-01	458127-10-01		
	Units	**MDZ-WA-1.0-2.0**	**MDZ-WA-2.0-3.0**	**MDZ-WA2-1.0-2.0**	**MDZ-WB-0.3-0.8**	**RDL**	**QC Batch**
Calculated Parameters							
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.31	0.31	0.31	0.10	7796337
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	<0.10	<0.10	0.10	7796337
Polycyclic Aromatics							
Naphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7798003
2-Methylnaphthalene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7798003
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7798003
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7798003
Fluorene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7798003
Phenanthrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7798003
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	7798003
Fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7798003
Pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7798003
Benzo(a)anthracene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7798003
Chrysene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7798003
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7798003
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7798003
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7798003
Benzo(a)pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7798003
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7798003
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7798003
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7798003
Low Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7796338
High Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7796338
Total PAH	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7796338
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	85	86	83	81		7798003
D8-ACENAPHTHYLENE (sur.)	%	87	88	84	83		7798003
D8-NAPHTHALENE (sur.)	%	81	83	80	79		7798003
TERPHENYL-D14 (sur.)	%	91	91	88	86		7798003
RDL = Reportable Detection Limit							

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GENERAL COMMENTS

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

Package 1	5.7°C

[Reworked V2R 2015/02/13] Reported reworked metals and BTEX analysis of samples MDZ-WA-1.0-2.0 and MDZ-WA2-1.0-2.0

Sample LR2715-01 : BTEX data are re-run of LP7942-04; no second vial for re-extraction.

Results relate only to the items tested.

Maxxam Job #: B508332
Report Date: 2015/02/13

QUALITY ASSURANCE REPORT

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7796535	1,4-Difluorobenzene (sur.)	2015/02/03	100	70 - 130	100	70 - 130	103	%				
7796535	4-Bromofluorobenzene (sur.)	2015/02/03	97	70 - 130	99	70 - 130	99	%				
7796535	D10-ETHYLBENZENE (sur.)	2015/02/03	103	50 - 130	90	50 - 130	103	%				
7796535	D4-1,2-Dichloroethane (sur.)	2015/02/03	99	70 - 130	101	70 - 130	102	%				
7798003	D10-ANTHRACENE (sur.)	2015/02/04	82	60 - 130	93	60 - 130	91	%				
7798003	D8-ACENAPHTHYLENE (sur.)	2015/02/04	83	50 - 130	93	50 - 130	90	%				
7798003	D8-NAPHTHALENE (sur.)	2015/02/04	81	50 - 130	90	50 - 130	90	%				
7798003	TERPHENYL-D14 (sur.)	2015/02/04	88	60 - 130	98	60 - 130	97	%				
7798068	O-TERPHENYL (sur.)	2015/02/04	68	50 - 130	69	50 - 130	106	%				
7807037	1,4-Difluorobenzene (sur.)	2015/02/13	98	70 - 130	98	70 - 130	102	%				
7807037	4-Bromofluorobenzene (sur.)	2015/02/13	99	70 - 130	100	70 - 130	96	%				
7807037	D10-ETHYLBENZENE (sur.)	2015/02/13	93	50 - 130	90	50 - 130	101	%				
7807037	D4-1,2-Dichloroethane (sur.)	2015/02/13	101	70 - 130	100	70 - 130	105	%				
7795542	Moisture	2015/02/03					<0.30	%	NC	20		
7796535	(C6-C10)	2015/02/03			107	60 - 140	<10	mg/kg				
7796535	Benzene	2015/02/03	102	60 - 140	100	60 - 140	<0.0050	mg/kg	NC	40		
7796535	Ethylbenzene	2015/02/03	103	60 - 140	101	60 - 140	<0.010	mg/kg	NC	40		
7796535	m & p-Xylene	2015/02/03	98	60 - 140	98	60 - 140	<0.040	mg/kg	NC	40		
7796535	Methyl-tert-butylether (MTBE)	2015/02/03					<0.10	mg/kg				
7796535	o-Xylene	2015/02/03	100	60 - 140	97	60 - 140	<0.040	mg/kg	NC	40		
7796535	Styrene	2015/02/03					<0.030	mg/kg	NC	40		
7796535	Toluene	2015/02/03	96	60 - 140	95	60 - 140	<0.020	mg/kg	NC	40		
7796535	Xylenes (Total)	2015/02/03					<0.040	mg/kg	NC	40		
7796622	Total Aluminum (Al)	2015/02/03					<100	mg/kg	3.2	35	97	70 - 130
7796622	Total Antimony (Sb)	2015/02/03	103	75 - 125	95	75 - 125	<0.10	mg/kg	NC	30	94	70 - 130
7796622	Total Arsenic (As)	2015/02/03	104	75 - 125	96	75 - 125	<0.50	mg/kg	5.3	30	95	70 - 130
7796622	Total Barium (Ba)	2015/02/03	NC	75 - 125	98	75 - 125	0.14, RDL=0.10	mg/kg	4.0	35	98	70 - 130
7796622	Total Beryllium (Be)	2015/02/03	112	75 - 125	95	75 - 125	<0.40	mg/kg	NC	30		
7796622	Total Bismuth (Bi)	2015/02/03					<0.10	mg/kg	NC	30		
7796622	Total Cadmium (Cd)	2015/02/03	109	75 - 125	101	75 - 125	<0.050	mg/kg	NC	30	105	70 - 130

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Maxxam Job #: B508332
Report Date: 2015/02/13

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7796622	Total Calcium (Ca)	2015/02/03					<100	mg/kg	3.7	30	91	70 - 130
7796622	Total Chromium (Cr)	2015/02/03	103	75 - 125	99	75 - 125	<1.0	mg/kg	1.9	30	106	70 - 130
7796622	Total Cobalt (Co)	2015/02/03	102	75 - 125	97	75 - 125	<0.30	mg/kg	1.4	30	92	70 - 130
7796622	Total Copper (Cu)	2015/02/03	NC	75 - 125	102	75 - 125	<0.50	mg/kg	6.5	30	93	70 - 130
7796622	Total Iron (Fe)	2015/02/03					<100	mg/kg	1.3	30	88	70 - 130
7796622	Total Lead (Pb)	2015/02/03	NC	75 - 125	99	75 - 125	<0.10	mg/kg	4.2	35	98	70 - 130
7796622	Total Lithium (Li)	2015/02/03	109	75 - 125	99	75 - 125	<5.0	mg/kg	NC	30		
7796622	Total Magnesium (Mg)	2015/02/03					<100	mg/kg	4.1	30	90	70 - 130
7796622	Total Manganese (Mn)	2015/02/03	NC	75 - 125	101	75 - 125	0.27, RDL=0.20	mg/kg	4.6	30	97	70 - 130
7796622	Total Mercury (Hg)	2015/02/03	105	75 - 125	99	75 - 125	<0.050	mg/kg	NC	35	97	70 - 130
7796622	Total Molybdenum (Mo)	2015/02/03	113	75 - 125	98	75 - 125	<0.10	mg/kg	2.1	35	109	70 - 130
7796622	Total Nickel (Ni)	2015/02/03	104	75 - 125	101	75 - 125	<0.80	mg/kg	3.5	30	97	70 - 130
7796622	Total Phosphorus (P)	2015/02/03					<10	mg/kg	2.3	30	87	70 - 130
7796622	Total Potassium (K)	2015/02/03					<100	mg/kg	0.50	35		
7796622	Total Selenium (Se)	2015/02/03	110	75 - 125	100	75 - 125	<0.50	mg/kg	NC	30		
7796622	Total Silver (Ag)	2015/02/03	108	75 - 125	100	75 - 125	<0.050	mg/kg	NC	35		
7796622	Total Sodium (Na)	2015/02/03					<100	mg/kg	NC	35		
7796622	Total Strontium (Sr)	2015/02/03	NC	75 - 125	92	75 - 125	<0.10	mg/kg	1.3	35	97	70 - 130
7796622	Total Thallium (Tl)	2015/02/03	104	75 - 125	100	75 - 125	<0.050	mg/kg	NC	30	91	70 - 130
7796622	Total Tin (Sn)	2015/02/03	102	75 - 125	91	75 - 125	<0.10	mg/kg	4.3	35		
7796622	Total Titanium (Ti)	2015/02/03	NC	75 - 125	92	75 - 125	<1.0	mg/kg	2.2	35	104	70 - 130
7796622	Total Uranium (U)	2015/02/03	106	75 - 125	97	75 - 125	<0.050	mg/kg	5.5	30	103	70 - 130
7796622	Total Vanadium (V)	2015/02/03	NC	75 - 125	96	75 - 125	<2.0	mg/kg	2.7	30	103	70 - 130
7796622	Total Zinc (Zn)	2015/02/03	NC	75 - 125	106	75 - 125	<1.0	mg/kg	5.2	30	95	70 - 130
7796622	Total Zirconium (Zr)	2015/02/03					<0.50	mg/kg	NC	30		
7796624	Soluble (2:1) pH	2015/02/03			100	97 - 103			0.47	N/A		
7797792	200 mesh (<.075 mm)	2015/02/04							0.090	35		
7797792	200 mesh (>.075 mm)	2015/02/04							NC	35		
7798003	2-Methylnaphthalene	2015/02/05	86	50 - 130	83	50 - 130	<0.020	mg/kg	NC	50		
7798003	Acenaphthene	2015/02/05	84	50 - 130	84	50 - 130	<0.0050	mg/kg	NC	50		

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Maxxam Job #: B508332
Report Date: 2015/02/13

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7798003	Acenaphthylene	2015/02/05	82	50 - 130	82	50 - 130	<0.0050	mg/kg	NC	50		
7798003	Anthracene	2015/02/05	83	60 - 130	84	60 - 130	<0.0040	mg/kg	NC	50		
7798003	Benzo(a)anthracene	2015/02/05	80	60 - 130	79	60 - 130	<0.020	mg/kg	NC	50		
7798003	Benzo(a)pyrene	2015/02/05	81	60 - 130	80	60 - 130	<0.020	mg/kg	NC	50		
7798003	Benzo(b&j)fluoranthene	2015/02/05	80	60 - 130	81	60 - 130	<0.020	mg/kg	NC	50		
7798003	Benzo(b)fluoranthene	2015/02/05	80	60 - 130			<0.020	mg/kg	NC	20		
7798003	Benzo(g,h,i)perylene	2015/02/05	81	60 - 130	73	60 - 130	<0.050	mg/kg	NC	50		
7798003	Benzo(k)fluoranthene	2015/02/05	82	60 - 130	80	60 - 130	<0.020	mg/kg	NC	50		
7798003	Chrysene	2015/02/05	79	60 - 130	81	60 - 130	<0.020	mg/kg	NC	50		
7798003	Dibenz(a,h)anthracene	2015/02/05	83	60 - 130	77	60 - 130	<0.050	mg/kg	NC	50		
7798003	Fluoranthene	2015/02/05	86	60 - 130	85	60 - 130	<0.020	mg/kg	NC	50		
7798003	Fluorene	2015/02/05	83	50 - 130	83	50 - 130	<0.020	mg/kg	NC	50		
7798003	Indeno(1,2,3-cd)pyrene	2015/02/05	85	60 - 130	78	60 - 130	<0.050	mg/kg	NC	50		
7798003	Naphthalene	2015/02/05	81	50 - 130	80	50 - 130	<0.010	mg/kg	NC	50		
7798003	Phenanthrene	2015/02/05	79	60 - 130	80	60 - 130	<0.020	mg/kg	NC	50		
7798003	Pyrene	2015/02/05	86	60 - 130	86	60 - 130	<0.020	mg/kg	NC	50		
7798068	F2 (C10-C16 Hydrocarbons)	2015/02/04	92	50 - 130	96	80 - 120	<10	mg/kg	NC	40		
7798068	F3 (C16-C34 Hydrocarbons)	2015/02/04	89	50 - 130	98	80 - 120	<10	mg/kg	NC	40		
7798068	F4 (C34-C50 Hydrocarbons)	2015/02/04	78	50 - 130	87	80 - 120	<10	mg/kg	NC	40		
7798068	Reached Baseline at C50	2015/02/04					YES	mg/kg	NC	50		
7805236	Moisture	2015/02/12					<0.30	%	8.3	20		
7806021	Total Aluminum (Al)	2015/02/12					<100	mg/kg	0.45	35	113	70 - 130
7806021	Total Antimony (Sb)	2015/02/12	101	75 - 125	99	75 - 125	<0.10	mg/kg	NC	30	106	70 - 130
7806021	Total Arsenic (As)	2015/02/12	99	75 - 125	95	75 - 125	<0.50	mg/kg	0.68	30	101	70 - 130
7806021	Total Barium (Ba)	2015/02/12	NC	75 - 125	98	75 - 125	<0.10	mg/kg	18	35	103	70 - 130
7806021	Total Beryllium (Be)	2015/02/12	109	75 - 125	102	75 - 125	<0.40	mg/kg	NC	30		
7806021	Total Bismuth (Bi)	2015/02/12					<0.10	mg/kg	NC	30		
7806021	Total Cadmium (Cd)	2015/02/12	106	75 - 125	104	75 - 125	<0.050	mg/kg	NC	30	104	70 - 130
7806021	Total Calcium (Ca)	2015/02/12					<100	mg/kg	8.0	30	97	70 - 130
7806021	Total Chromium (Cr)	2015/02/12	104	75 - 125	100	75 - 125	<1.0	mg/kg	1.8	30	112	70 - 130
7806021	Total Cobalt (Co)	2015/02/12	98	75 - 125	96	75 - 125	<0.30	mg/kg	4.8	30	92	70 - 130

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Maxxam Job #: B508332
Report Date: 2015/02/13

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7806021	Total Copper (Cu)	2015/02/12	NC	75 - 125	106	75 - 125	<0.50	mg/kg	0.65	30	101	70 - 130
7806021	Total Iron (Fe)	2015/02/12					<100	mg/kg	0.64	30	99	70 - 130
7806021	Total Lead (Pb)	2015/02/12	108	75 - 125	104	75 - 125	<0.10	mg/kg	4.6	35	103	70 - 130
7806021	Total Magnesium (Mg)	2015/02/12					<100	mg/kg	0.25	30	93	70 - 130
7806021	Total Manganese (Mn)	2015/02/12	NC	75 - 125	98	75 - 125	<0.20	mg/kg	1.7	30	98	70 - 130
7806021	Total Mercury (Hg)	2015/02/12	104	75 - 125	100	75 - 125	<0.050	mg/kg	NC	35	90	70 - 130
7806021	Total Molybdenum (Mo)	2015/02/12	107	75 - 125	101	75 - 125	<0.10	mg/kg	6.3	35	114	70 - 130
7806021	Total Nickel (Ni)	2015/02/12	106	75 - 125	105	75 - 125	<0.80	mg/kg	0.030	30	102	70 - 130
7806021	Total Phosphorus (P)	2015/02/12					<10	mg/kg	0.40	30	98	70 - 130
7806021	Total Potassium (K)	2015/02/12					<100	mg/kg	5.6	35		
7806021	Total Selenium (Se)	2015/02/12	101	75 - 125	97	75 - 125	<0.50	mg/kg	NC	30		
7806021	Total Silver (Ag)	2015/02/12	107	75 - 125	102	75 - 125	<0.050	mg/kg	NC	35		
7806021	Total Sodium (Na)	2015/02/12					<100	mg/kg	NC	35		
7806021	Total Strontium (Sr)	2015/02/12	NC	75 - 125	94	75 - 125	<0.10	mg/kg	19	35	104	70 - 130
7806021	Total Thallium (Tl)	2015/02/12	103	75 - 125	99	75 - 125	<0.050	mg/kg	NC	30	87	70 - 130
7806021	Total Tin (Sn)	2015/02/12	101	75 - 125	95	75 - 125	<0.10	mg/kg	13	35		
7806021	Total Titanium (Ti)	2015/02/12	NC	75 - 125	94	75 - 125	<1.0	mg/kg	0.52	35	111	70 - 130
7806021	Total Vanadium (V)	2015/02/12	NC	75 - 125	98	75 - 125	<2.0	mg/kg	0.011	30	107	70 - 130
7806021	Total Zinc (Zn)	2015/02/12	NC	75 - 125	109	75 - 125	1.3, RDL=1.0	mg/kg	3.4	30	101	70 - 130
7806021	Total Zirconium (Zr)	2015/02/12					<0.50	mg/kg	0.46	30		
7807037	Benzene	2015/02/13	106	60 - 140	99	60 - 140	<0.0050	mg/kg				
7807037	Ethylbenzene	2015/02/13	104	60 - 140	96	60 - 140	<0.010	mg/kg				
7807037	m & p-Xylene	2015/02/13	97	60 - 140	90	60 - 140	<0.040	mg/kg				
7807037	Methyl-tert-butylether (MTBE)	2015/02/13					<0.10	mg/kg				
7807037	o-Xylene	2015/02/13	101	60 - 140	94	60 - 140	<0.040	mg/kg				
7807037	Styrene	2015/02/13					<0.030	mg/kg				
7807037	Toluene	2015/02/13	98	60 - 140	91	60 - 140	<0.020	mg/kg				
7807037	VH C6-C10	2015/02/13			89	60 - 140	<10	mg/kg	NC	40		

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Maxxam Job #: B508332
Report Date: 2015/02/13

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7807037	Xylenes (Total)	2015/02/13					<0.040	mg/kg				

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Maxxam Job #: B508332
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Rob Reinert, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel (604) 734 7276 Toll-Free 800-563-6266 Fax (604) 731 2386 www.maxxam.ca

Chain Of Custody Record

Page 1 of 1

INVOICE TO:		Report Information		Project Information		Laboratory Use Only
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD	Quotation #	70031547I	Maxxam Job #: B508332
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #	219.05112.00010	Bottle Order #: 458127
Address	641- 800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	WILMER	Chain Of Custody Record: C#458127-10-01
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name		Project Manager: Crystal Ireland
Phone	(604) 775-9349 Fax: (604) 775-6645	Phone	(250) 762-7202 Fax:	Site #		
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	MARCI MARTIN	

Regulatory Criteria:
- [ ] CSR
- [x] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: [ ]
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [X] Date Required: ______ [ ]
Rush Confirmation Number: ______ (call lab for #)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil, PAHs	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)	HOLD	# of Bottles	Comments
1	LP7938	MDZ-WA-0.3-0.8	FEB1/2015		SOIL							X					2	
2	LP7939	MDZ-WA-1.0-2.0	↓		↓						X	X					4+	GS bags
3	LP7940	MDZ-WA-2.0-3.0									X	X					4+	GS bags
4	LP7941	MDZ-WA-3.0														X	2	
5	LP7942	MDZ-WA-1.0-2.0									X	X					4+	GS bags
6	LP7943	MDZ-WB-0.3-0.8									X	X					4+	GS bags
7	LP7944	MDZ-WB-1.0-2.0										X					2	
8	LP7945	MDZ-WB-2.0	↓		↓											X	2	
9																		
10																		B508332

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
MARCI MARTIN	2015/02/01	16:00	Laurel Berthier	2015/02/02	13:20		[ ]	6,5,6	NA [ ] Yes [ ] No

Lab Use Only

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

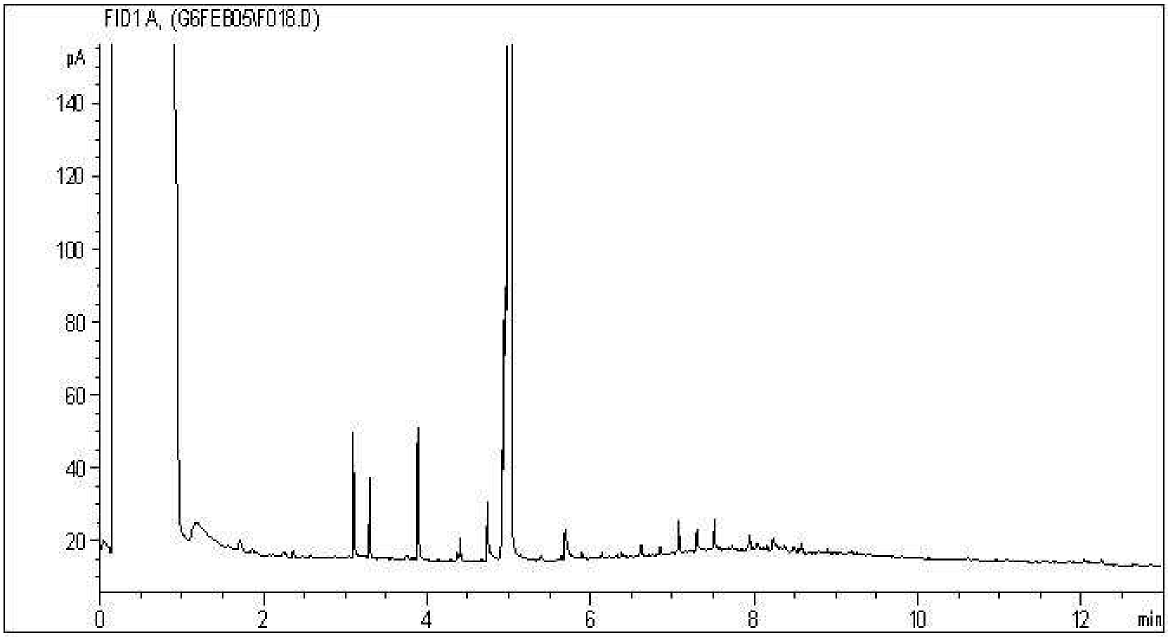
White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

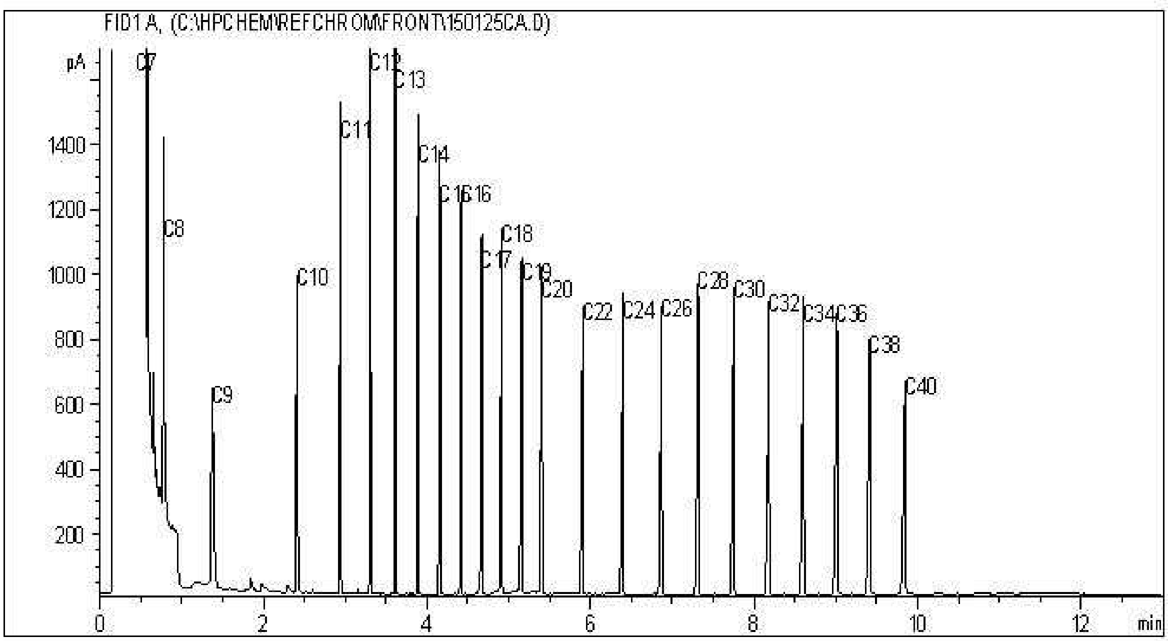
Maxxam Job #: B508332
Report Date: 2015/02/13
Maxxam Sample: LP7939

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: MDZ-WA-1.0-2.0

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



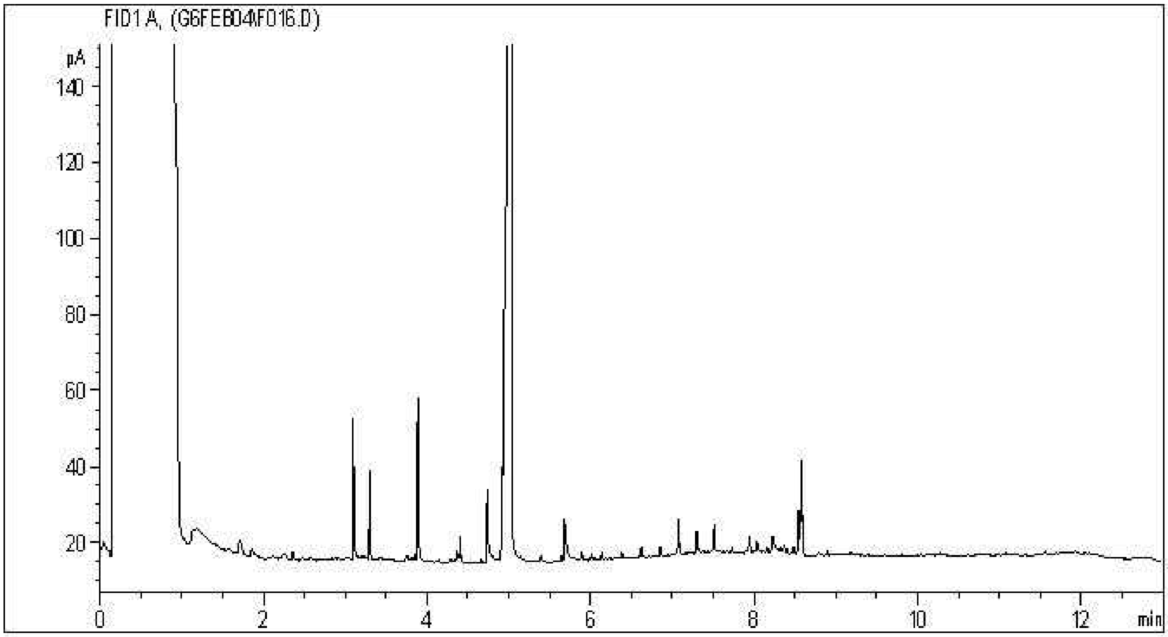
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

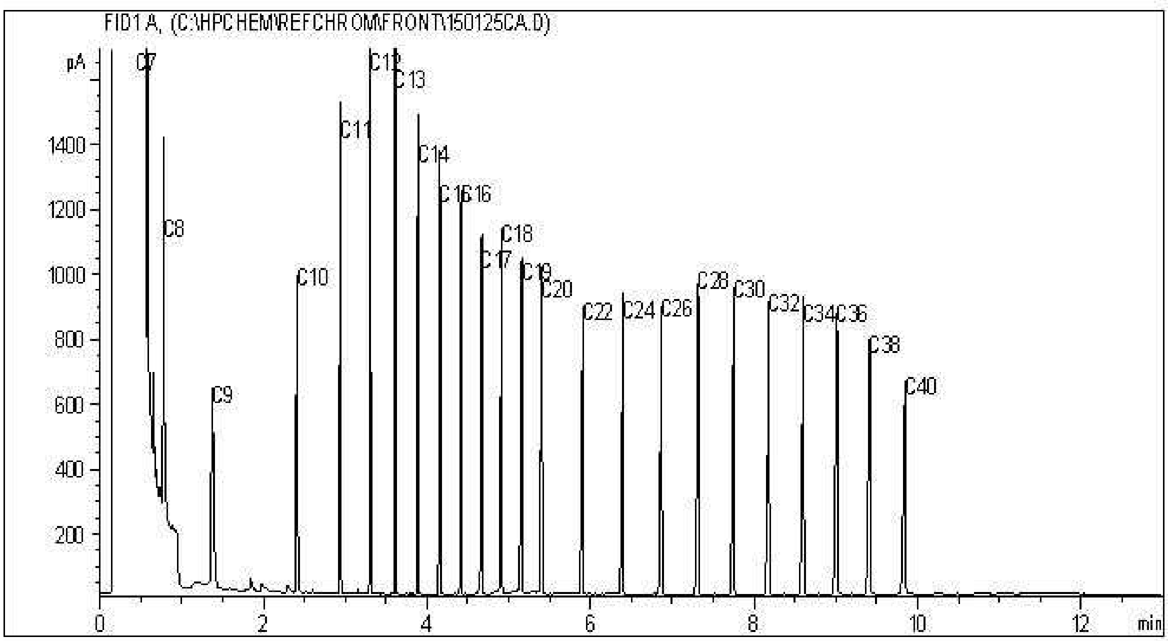
Maxxam Job #: B508332
Report Date: 2015/02/13
Maxxam Sample: LP7940

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: MDZ-WA-2.0-3.0

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



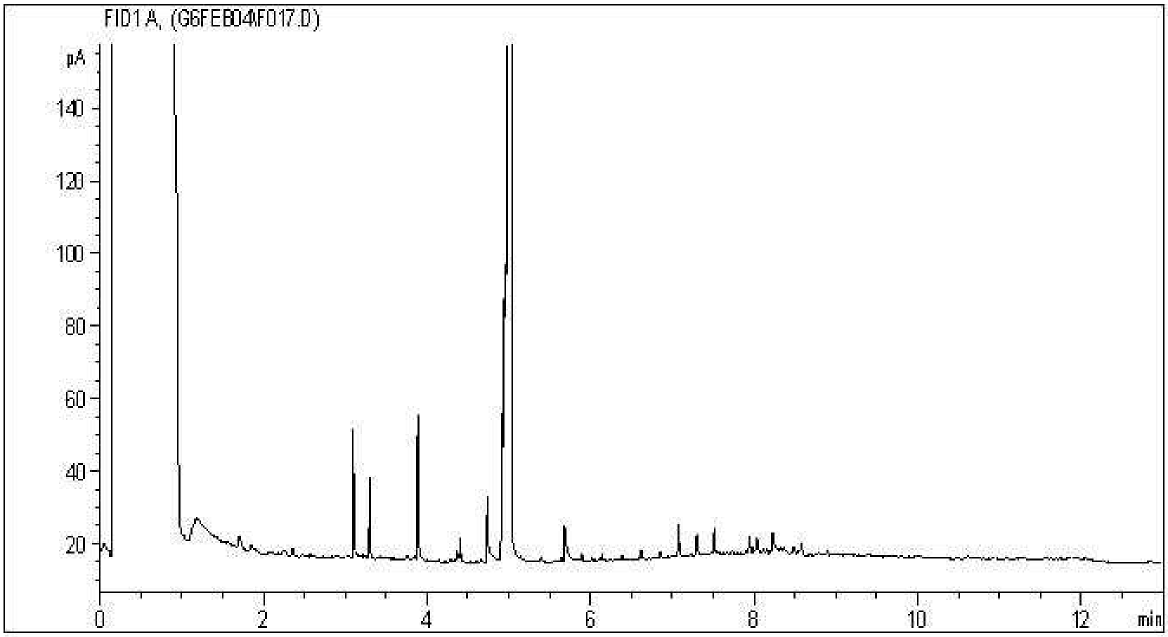
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

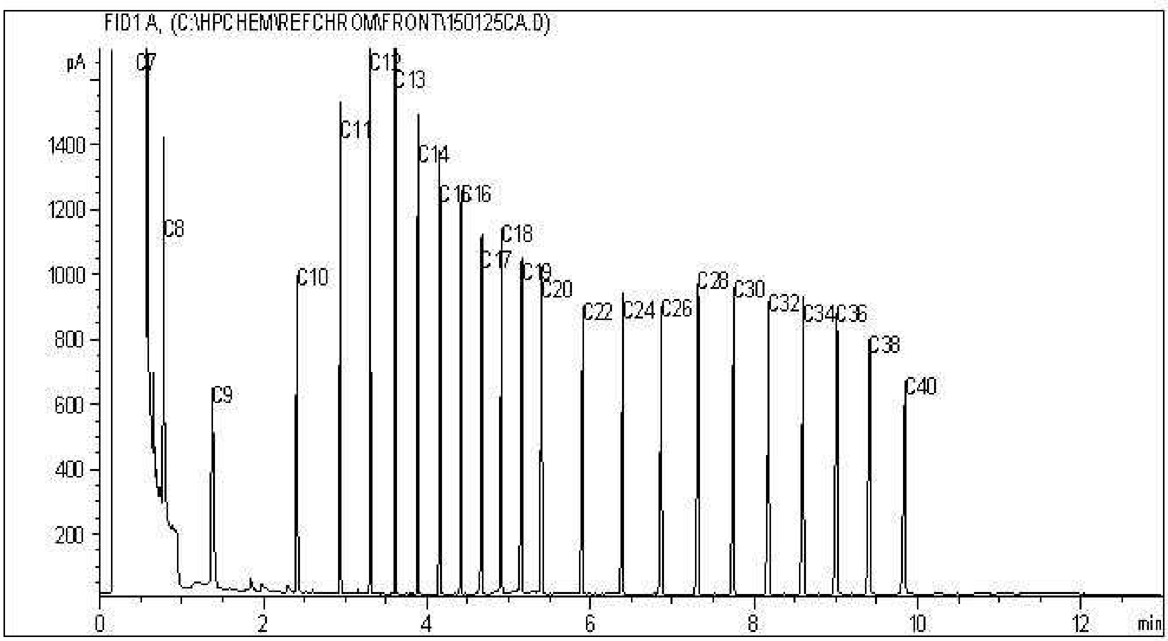
Maxxam Job #: B508332
Report Date: 2015/02/13
Maxxam Sample: LP7940 Lab-Dup

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: MDZ-WA-2.0-3.0

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



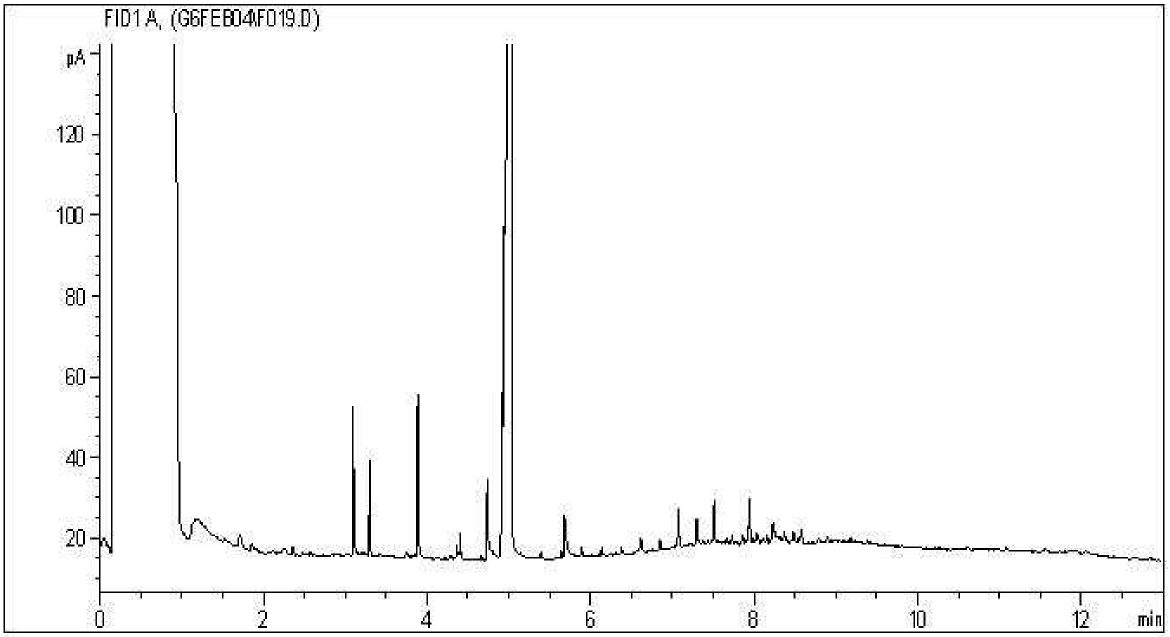
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

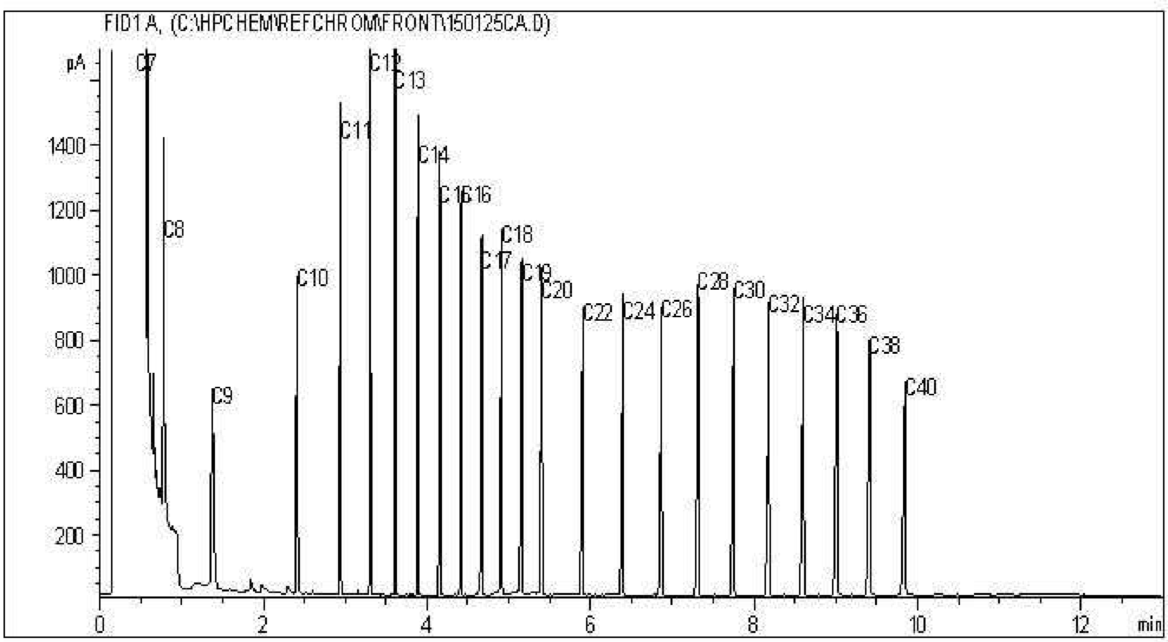
Maxxam Job #: B508332
Report Date: 2015/02/13
Maxxam Sample: LP7942

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: MDZ-WA2-1.0-2.0

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



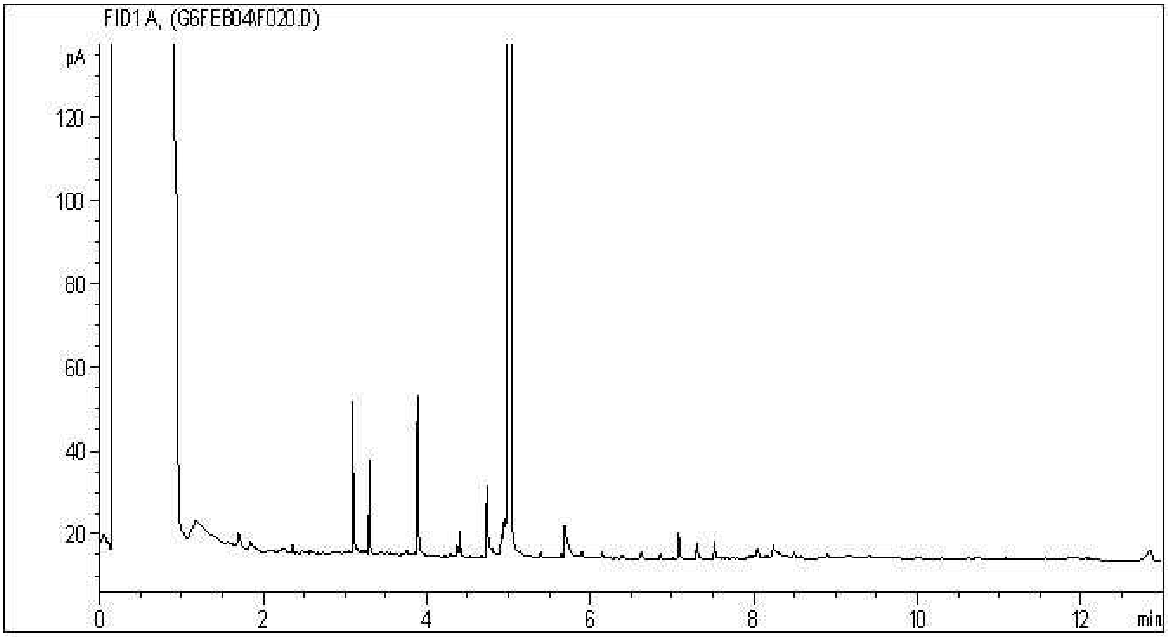
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

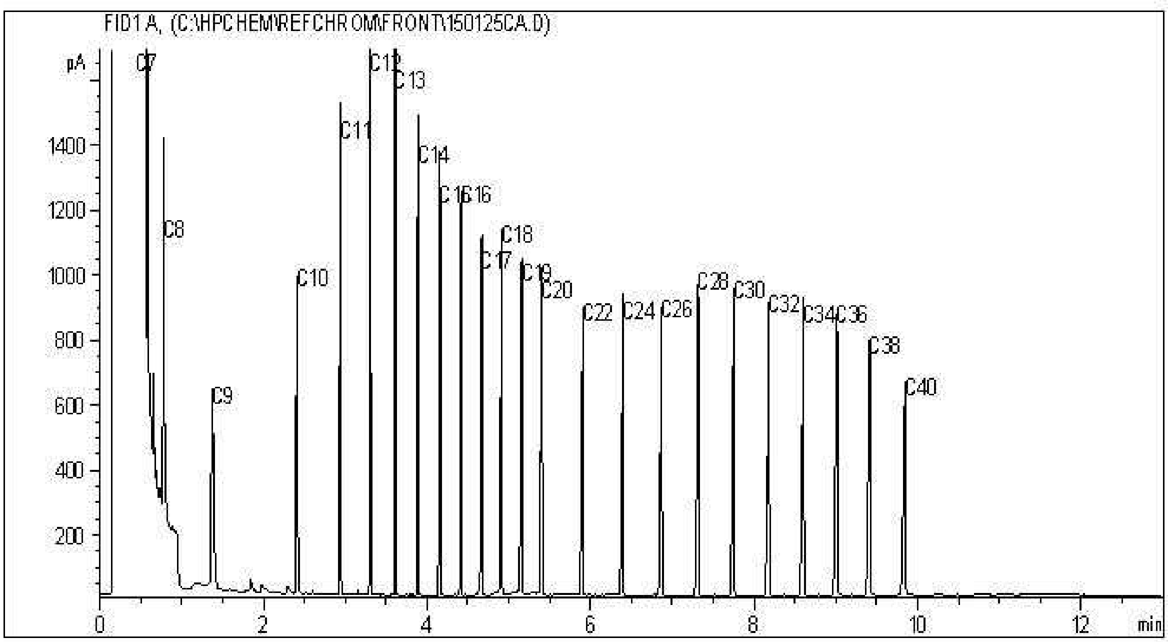
Maxxam Job #: B508332
Report Date: 2015/02/13
Maxxam Sample: LP7943

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: MDZ-WB-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Your P.O. #: 700315471
Your Project #: 219.05112.0010
Site Location: WILMER MARSH
Your C.O.C. #: 458127-08-01, 458127-09-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2015/02/13
Report #: R1803425
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B508345
Received: 2015/02/02, 13:20

Sample Matrix: Soil
Samples Received: 15

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE LH VH F1 in Soil - Field Pres.	5	N/A	2015/02/03	BBY8SOP-00010	EPA 8260c R3 m
BTEX/MTBE Soil LH, VH, F1 SIM/MS	1	2015/02/03	2015/02/04	BBY8SOP-00010, BBY8SOP-00011	EPA 8260c R3 m
Volatile F1-BTEX	5	N/A	2015/02/04	BBY WI-00033	Auto Calc
Volatile F1-BTEX	1	N/A	2015/02/05	BBY WI-00033	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (1)	7	2015/02/02	2015/02/04	BBY8SOP-00030	CCME PHC-CWS
Elements by ICPMS (total)	13	2015/02/03	2015/02/03	BBY7SOP-00001	EPA 6020a R1 m
Elements by ICPMS (total)	2	2015/02/12	2015/02/12	BBY7SOP-00001	EPA 6020a R1 m
Particulate Mesh 200	7	N/A	2015/02/04	BBY6SOP-00039	Carter 2nd ed 55.4
Moisture	7	N/A	2015/02/03	BBY8SOP-00017	OMOE E3139 3.1 m
PAH in Soil by GC/MS (SIM) - CCME	4	2015/02/12	2015/02/12	BBY8SOP-00022	EPA 8270d R4 m
PAH in Soil by GC/MS (SIM) - CCME	3	2015/02/12	2015/02/13	BBY8SOP-00022	EPA 8270d R4 m
Benzo[a]pyrene Equivalency	7	N/A	2015/02/13	BBY WI-00033	Auto Calc
Total LMW, HMW, Total PAH Calc	7	N/A	2015/02/13	BBY WI-00033	Auto Calc
pH (2:1 DI Water Extract)	13	2015/02/03	2015/02/03	BBY6SOP-00028	BCMOE BCLM Mar2005 m

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

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

(1) The method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory; all deviations were justified and validated and are made available upon request; the chromatogram descends to baseline by the retention time of nC50 unless otherwise indicated; all QC criteria met; individual hydrocarbons (nC10, nC16, nC34) are within 10% of their average response factor; linearity is within 15%.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Samantha Fregien, Project Manager
Email: SFregien@maxxam.ca
Phone# (604) 734 7276
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B508345
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LP7992	LP7993	LP7994	LP7996	LP7998	LP8003		
Sampling Date		2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31		
COC Number		458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-09-01		
	Units	**A3-NW-B-0.5-1**	**A3-NW-B-1-2**	**A3-WW-A-0.5-1**	**A3-SW-B-0.5-1**	**A3-F1**	**A3-F3**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	<10	10	7798068
F3 (C16-C34 Hydrocarbons)	mg/kg	15	<10	<10	<10	<10	<10	10	7798068
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	<10	10	7798068
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	Yes	N/A	7798068
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	99	102	102	105	104	103		7798068

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		LP8005		
Sampling Date		2015/01/31		
COC Number		458127-09-01		
	Units	**A3-DUP1**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	10	7798068
F3 (C16-C34 Hydrocarbons)	mg/kg	<10	10	7798068
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	10	7798068
Reached Baseline at C50	mg/kg	Yes	N/A	7798068
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	103		7798068

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B508345
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

PARTICLE SIZE DISTRIBUTION ANALYSIS (SOIL)

Maxxam ID		LP7992	LP7993	LP7994	LP7996	LP7998	LP8003		
Sampling Date		2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31		
COC Number		458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-09-01		
	Units	**A3-NW-B-0.5-1**	**A3-NW-B-1-2**	**A3-WW-A-0.5-1**	**A3-SW-B-0.5-1**	**A3-F1**	**A3-F3**	**RDL**	**QC Batch**
Physical Properties									
200 mesh (>.075 mm)	%	3.46	0.46	0.97	1.19	2.86	1.83	0.10	7797792
200 mesh (<.075 mm)	%	96.5	99.5	99.0	98.8	97.1	98.2	0.10	7797792
RDL = Reportable Detection Limit									

Maxxam ID		LP8005		
Sampling Date		2015/01/31		
COC Number		458127-09-01		
	Units	**A3-DUP1**	**RDL**	**QC Batch**
Physical Properties				
200 mesh (>.075 mm)	%	3.41	0.10	7797792
200 mesh (<.075 mm)	%	96.6	0.10	7797792
RDL = Reportable Detection Limit				

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Maxxam Job #: B508345
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

PHYSICAL TESTING (SOIL)

Maxxam ID		LP7992	LP7993	LP7994	LP7996	LP7998	LP8003		
Sampling Date		2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31		
COC Number		458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-09-01		
	Units	**A3-NW-B-0.5-1**	**A3-NW-B-1-2**	**A3-WW-A-0.5-1**	**A3-SW-B-0.5-1**	**A3-F1**	**A3-F3**	**RDL**	**QC Batch**
Physical Properties									
Moisture	%	9.8	3.0	2.1	6.6	7.9	9.6	0.30	7796450
RDL = Reportable Detection Limit									

Maxxam ID		LP8005		
Sampling Date		2015/01/31		
COC Number		458127-09-01		
	Units	**A3-DUP1**	**RDL**	**QC Batch**
Physical Properties				
Moisture	%	7.9	0.30	7796450
RDL = Reportable Detection Limit				

Maxxam Job #: B508345
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CCME BTEX/F1 BY HS IN SOIL (SOIL)

Maxxam ID		LP7998		
Sampling Date		2015/01/31		
COC Number		458127-08-01		
	Units	**A3-F1**	**RDL**	**QC Batch**
Calculated Parameters				
F1 (C6-C10) - BTEX	mg/kg	<10	10	7796336
Volatiles				
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	0.10	7798990
Benzene	mg/kg	<0.0050	0.0050	7798990
Toluene	mg/kg	<0.020	0.020	7798990
Ethylbenzene	mg/kg	<0.010	0.010	7798990
m & p-Xylene	mg/kg	<0.040	0.040	7798990
o-Xylene	mg/kg	<0.040	0.040	7798990
Styrene	mg/kg	<0.030	0.030	7798990
Xylenes (Total)	mg/kg	<0.040	0.040	7798990
VH C6-C10	mg/kg	<10	10	7798990
(C6-C10)	mg/kg	<10	10	7798990
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	98		7798990
4-Bromofluorobenzene (sur.)	%	105		7798990
D10-ETHYLBENZENE (sur.)	%	97		7798990
D4-1,2-Dichloroethane (sur.)	%	92		7798990
RDL = Reportable Detection Limit				

Maxxam Job #: B508345
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LP7992	LP7993	LP7994	LP7996	LP8003		
Sampling Date		2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31		
COC Number		458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-09-01		
	Units	**A3-NW-B-0.5-1**	**A3-NW-B-1-2**	**A3-WW-A-0.5-1**	**A3-SW-B-0.5-1**	**A3-F3**	**RDL**	**QC Batch**
Calculated Parameters								
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	<10	10	7796336
Volatiles								
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7796535
Benzene	mg/kg	0.0092	<0.0050	0.016	0.032	0.018	0.0050	7796535
Toluene	mg/kg	1.8	<0.020	1.9	4.5	2.5	0.020	7796535
Ethylbenzene	mg/kg	<0.010	<0.010	0.011	0.019	<0.010	0.010	7796535
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	0.046	<0.040	0.040	7796535
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7796535
Styrene	mg/kg	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	7796535
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	0.046	<0.040	0.040	7796535
(C6-C10)	mg/kg	<10	<10	<10	<10	<10	10	7796535
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	102	102	102	103	101		7796535
4-Bromofluorobenzene (sur.)	%	100	99	99	100	99		7796535
D10-ETHYLBENZENE (sur.)	%	107	98	122	114	109		7796535
D4-1,2-Dichloroethane (sur.)	%	105	102	103	102	102		7796535
RDL = Reportable Detection Limit								

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Maxxam Job #: B508345
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LP7990	LP7991	LP7992	LP7993	LP7994	LP7995		
Sampling Date		2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31		
COC Number		458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-08-01		
	Units	**A3-NW-A-0.5-1**	**A3-NW-A-1-2**	**A3-NW-B-0.5-1**	**A3-NW-B-1-2**	**A3-WW-A-0.5-1**	**A3-SW-A-0.5-1**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH	8.78	9.25	8.55	9.43	9.18	9.28	N/A	7796627
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	8410	7910	8280	8250	8080	7810	100	7796614
Total Antimony (Sb)	mg/kg	0.29	0.28	0.29	0.29	0.31	0.30	0.10	7796614
Total Arsenic (As)	mg/kg	5.32	5.15	5.40	5.23	5.19	5.13	0.50	7796614
Total Barium (Ba)	mg/kg	71.2	74.0	79.5	99.1	67.5	55.7	0.10	7796614
Total Beryllium (Be)	mg/kg	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	7796614
Total Bismuth (Bi)	mg/kg	0.11	0.11	0.11	0.10	<0.10	0.11	0.10	7796614
Total Cadmium (Cd)	mg/kg	0.264	0.123	0.343	0.172	0.117	0.113	0.050	7796614
Total Calcium (Ca)	mg/kg	80400	87100	78600	84300	77600	83700	100	7796614
Total Chromium (Cr)	mg/kg	15.7	15.3	15.8	15.9	15.2	15.3	1.0	7796614
Total Cobalt (Co)	mg/kg	7.90	7.85	8.11	8.32	7.98	8.10	0.30	7796614
Total Copper (Cu)	mg/kg	14.0	13.6	15.2	11.7	14.0	13.8	0.50	7796614
Total Iron (Fe)	mg/kg	21000	20500	22400	21300	20500	19900	100	7796614
Total Lead (Pb)	mg/kg	9.62	8.87	12.3	8.77	8.63	8.43	0.10	7796614
Total Lithium (Li)	mg/kg	21.5	21.1	20.2	20.7	20.5	20.3	5.0	7796614
Total Magnesium (Mg)	mg/kg	17000	18300	17500	19500	18800	18400	100	7796614
Total Manganese (Mn)	mg/kg	440	432	453	456	414	428	0.20	7796614
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7796614
Total Molybdenum (Mo)	mg/kg	0.35	0.37	0.43	0.37	0.35	0.34	0.10	7796614
Total Nickel (Ni)	mg/kg	19.5	19.8	23.2	19.7	19.7	20.0	0.80	7796614
Total Phosphorus (P)	mg/kg	529	533	552	554	470	518	10	7796614
Total Potassium (K)	mg/kg	685	483	611	571	527	494	100	7796614
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7796614
Total Silver (Ag)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7796614
Total Sodium (Na)	mg/kg	<100	<100	125	<100	<100	<100	100	7796614
Total Strontium (Sr)	mg/kg	191	206	181	202	191	198	0.10	7796614
Total Thallium (Tl)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7796614
Total Tin (Sn)	mg/kg	0.13	<0.10	0.18	<0.10	<0.10	<0.10	0.10	7796614
Total Titanium (Ti)	mg/kg	63.5	56.6	60.6	71.7	63.1	59.1	1.0	7796614
Total Uranium (U)	mg/kg	0.421	0.488	0.492	0.508	0.549	0.446	0.050	7796614
Total Vanadium (V)	mg/kg	10.1	9.2	9.9	9.9	9.5	9.7	2.0	7796614
Total Zinc (Zn)	mg/kg	47.9	41.5	247	40.8	41.1	39.8	1.0	7796614

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B508345
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LP7990	LP7991	LP7992	LP7993	LP7994	LP7995		
Sampling Date		2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31		
COC Number		458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-08-01		
	Units	**A3-NW-A-0.5-1**	**A3-NW-A-1-2**	**A3-NW-B-0.5-1**	**A3-NW-B-1-2**	**A3-WW-A-0.5-1**	**A3-SW-A-0.5-1**	**RDL**	**QC Batch**
Total Zirconium (Zr)	mg/kg	1.26	0.94	1.08	2.18	1.76	1.11	0.50	7796614
RDL = Reportable Detection Limit									

Maxxam Job #: B508345
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LP7996	LP7997	LP7998	LP7999	LP8003	LP8004		
Sampling Date		2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31		
COC Number		458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-09-01	458127-09-01		
	Units	**A3-SW-B-0.5-1**	**A3-EW-A-0.5-1**	**A3-F1**	**A3-F2**	**A3-F3**	**A3-F4**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH	8.52	8.79	8.54	8.68	8.89	8.78	N/A	7796627
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	8070	8480	8620	8870	8370	8240	100	7796614
Total Antimony (Sb)	mg/kg	0.26	0.26	0.31	0.35	0.30	0.40	0.10	7796614
Total Arsenic (As)	mg/kg	5.29	5.25	5.64	5.66	5.52	5.26	0.50	7796614
Total Barium (Ba)	mg/kg	72.6	73.6	83.8	81.4	56.7	86.9	0.10	7796614
Total Beryllium (Be)	mg/kg	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	7796614
Total Bismuth (Bi)	mg/kg	0.10	0.11	0.12	0.12	<0.10	0.11	0.10	7796614
Total Cadmium (Cd)	mg/kg	0.131	0.134	0.205	0.150	0.131	0.469	0.050	7796614
Total Calcium (Ca)	mg/kg	77300	78800	80100	79800	82200	75600	100	7796614
Total Chromium (Cr)	mg/kg	14.7	16.2	16.4	16.1	15.7	15.8	1.0	7796614
Total Cobalt (Co)	mg/kg	7.66	8.24	8.28	8.50	8.39	7.98	0.30	7796614
Total Copper (Cu)	mg/kg	14.7	14.3	15.4	14.7	13.8	15.4	0.50	7796614
Total Iron (Fe)	mg/kg	19800	21500	22700	21300	21500	22200	100	7796614
Total Lead (Pb)	mg/kg	8.74	8.91	9.90	10.2	9.10	18.3	0.10	7796614
Total Lithium (Li)	mg/kg	19.7	21.3	20.4	20.8	20.6	20.0	5.0	7796614
Total Magnesium (Mg)	mg/kg	15800	16900	17300	17800	18500	17400	100	7796614
Total Manganese (Mn)	mg/kg	431	447	460	458	459	447	0.20	7796614
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7796614
Total Molybdenum (Mo)	mg/kg	0.34	0.32	0.45	0.37	0.38	0.47	0.10	7796614
Total Nickel (Ni)	mg/kg	18.8	20.0	22.4	20.7	19.9	20.7	0.80	7796614
Total Phosphorus (P)	mg/kg	559	515	566	571	543	534	10	7796614
Total Potassium (K)	mg/kg	724	657	692	652	584	628	100	7796614
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7796614
Total Silver (Ag)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7796614
Total Sodium (Na)	mg/kg	188	144	147	<100	<100	102	100	7796614
Total Strontium (Sr)	mg/kg	191	192	178	178	187	180	0.10	7796614
Total Thallium (Tl)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7796614
Total Tin (Sn)	mg/kg	<0.10	<0.10	0.20	0.13	0.13	0.35	0.10	7796614
Total Titanium (Ti)	mg/kg	58.1	61.2	65.6	66.9	67.6	62.7	1.0	7796614
Total Uranium (U)	mg/kg	0.427	0.446	0.477	0.521	0.458	0.472	0.050	7796614
Total Vanadium (V)	mg/kg	9.4	10.0	10.3	10.8	10.4	10.1	2.0	7796614
Total Zinc (Zn)	mg/kg	42.2	45.6	61.0	51.5	43.4	71.8	1.0	7796614

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B508345
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LP7996	LP7997	LP7998	LP7999	LP8003	LP8004		
Sampling Date		2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31		
COC Number		458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-09-01	458127-09-01		
	Units	**A3-SW-B-0.5-1**	**A3-EW-A-0.5-1**	**A3-F1**	**A3-F2**	**A3-F3**	**A3-F4**	**RDL**	**QC Batch**
Total Zirconium (Zr)	mg/kg	1.29	1.37	2.12	1.26	1.22	1.01	0.50	7796614
RDL = Reportable Detection Limit									

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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LP8005		LR0959	LR0960		
Sampling Date		2015/01/31		2015/01/31	2015/01/31		
COC Number		458127-09-01		458127-08-01	458127-09-01		
	Units	**A3-DUP1**	**QC Batch**	**A3-NW-B-0.5-1 REWORK 1**	**A3-DUP1 REWORK 1**	**RDL**	**QC Batch**
Physical Properties							
Soluble (2:1) pH	pH	8.60	7796627			N/A	7796627
Total Metals by ICPMS							
Total Aluminum (Al)	mg/kg	8380	7796614	9200	8890	100	7806021
Total Antimony (Sb)	mg/kg	0.30	7796614	0.33	0.32	0.10	7806021
Total Arsenic (As)	mg/kg	5.39	7796614	5.75	5.73	0.50	7806021
Total Barium (Ba)	mg/kg	81.8	7796614	80.5	79.8	0.10	7806021
Total Beryllium (Be)	mg/kg	<0.40	7796614	<0.40	<0.40	0.40	7806021
Total Bismuth (Bi)	mg/kg	0.12	7796614	0.11	0.11	0.10	7806021
Total Cadmium (Cd)	mg/kg	0.310	7796614	0.231	0.339	0.050	7806021
Total Calcium (Ca)	mg/kg	80000	7796614	80200	80600	100	7806021
Total Chromium (Cr)	mg/kg	16.0	7796614	16.3	16.1	1.0	7806021
Total Cobalt (Co)	mg/kg	8.19	7796614	8.18	8.08	0.30	7806021
Total Copper (Cu)	mg/kg	14.7	7796614	15.4	15.3	0.50	7806021
Total Iron (Fe)	mg/kg	21400	7796614	23100	22700	100	7806021
Total Lead (Pb)	mg/kg	10.2	7796614	18.6	11.0	0.10	7806021
Total Lithium (Li)	mg/kg	20.6	7796614	20.1	21.1	5.0	7806021
Total Magnesium (Mg)	mg/kg	17600	7796614	16900	17100	100	7806021
Total Manganese (Mn)	mg/kg	461	7796614	455	453	0.20	7806021
Total Mercury (Hg)	mg/kg	<0.050	7796614	<0.050	<0.050	0.050	7806021
Total Molybdenum (Mo)	mg/kg	0.39	7796614	0.50	0.40	0.10	7806021
Total Nickel (Ni)	mg/kg	22.6	7796614	22.6	23.4	0.80	7806021
Total Phosphorus (P)	mg/kg	569	7796614	600	633	10	7806021
Total Potassium (K)	mg/kg	656	7796614	699	689	100	7806021
Total Selenium (Se)	mg/kg	<0.50	7796614	<0.50	<0.50	0.50	7806021
Total Silver (Ag)	mg/kg	<0.050	7796614	<0.050	<0.050	0.050	7806021
Total Sodium (Na)	mg/kg	131	7796614	123	116	100	7806021
Total Strontium (Sr)	mg/kg	181	7796614	180	186	0.10	7806021
Total Thallium (Tl)	mg/kg	<0.050	7796614	<0.050	<0.050	0.050	7806021
Total Tin (Sn)	mg/kg	0.15	7796614	0.37	0.23	0.10	7806021
Total Titanium (Ti)	mg/kg	61.0	7796614	62.6	64.2	1.0	7806021
Total Uranium (U)	mg/kg	0.504	7796614	0.491	0.523	0.050	7806021
Total Vanadium (V)	mg/kg	10.4	7796614	10.1	10.0	2.0	7806021
Total Zinc (Zn)	mg/kg	62.2	7796614	62.1	70.4	1.0	7806021
Total Zirconium (Zr)	mg/kg	1.06	7796614	1.17	1.24	0.50	7806021

RDL = Reportable Detection Limit

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Maxxam Job #: B508345
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LP7992	LP7993	LP7994	LP7996	LP7998		
Sampling Date		2015/01/31	2015/01/31	2015/01/31	2015/01/31	2015/01/31		
COC Number		458127-08-01	458127-08-01	458127-08-01	458127-08-01	458127-08-01		
	Units	**A3-NW-B-0.5-1**	**A3-NW-B-1-2**	**A3-WW-A-0.5-1**	**A3-SW-B-0.5-1**	**A3-F1**	**RDL**	**QC Batch**
Calculated Parameters								
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.31	0.31	0.31	0.32	0.10	7806719
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7806719
Polycyclic Aromatics								
Naphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7806868
2-Methylnaphthalene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7806868
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7806868
Fluorene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Phenanthrene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	7806868
Fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Benzo(a)anthracene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Chrysene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.040	0.020	7806868
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Benzo(a)pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806868
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806868
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806868
Low Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806720
High Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806720
Total PAH	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806720
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	97	93	101	98	105		7806868
D8-ACENAPHTHYLENE (sur.)	%	96	95	99	97	98		7806868
D8-NAPHTHALENE (sur.)	%	94	89	94	93	101		7806868
TERPHENYL-D14 (sur.)	%	116	112	101	104	106		7806868
RDL = Reportable Detection Limit								

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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LP8003	LP8005		
Sampling Date		2015/01/31	2015/01/31		
COC Number		458127-09-01	458127-09-01		
	Units	**A3-F3**	**A3-DUP1**	**RDL**	**QC Batch**
Calculated Parameters					
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.31	0.10	7806719
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	0.10	7806719
Polycyclic Aromatics					
Naphthalene	mg/kg	<0.010	<0.010	0.010	7806868
2-Methylnaphthalene	mg/kg	<0.020	<0.020	0.020	7806868
Acenaphthylene	mg/kg	<0.0050	<0.0050	0.0050	7806868
Acenaphthene	mg/kg	<0.0050	<0.0050	0.0050	7806868
Fluorene	mg/kg	<0.020	<0.020	0.020	7806868
Phenanthrene	mg/kg	<0.020	<0.020	0.020	7806868
Anthracene	mg/kg	<0.0040	<0.0040	0.0040	7806868
Fluoranthene	mg/kg	<0.020	<0.020	0.020	7806868
Pyrene	mg/kg	<0.020	<0.020	0.020	7806868
Benzo(a)anthracene	mg/kg	<0.020	<0.020	0.020	7806868
Chrysene	mg/kg	<0.020	<0.020	0.020	7806868
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	0.020	7806868
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	0.020	7806868
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	0.020	7806868
Benzo(a)pyrene	mg/kg	<0.020	<0.020	0.020	7806868
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	0.050	7806868
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	0.050	7806868
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	0.050	7806868
Low Molecular Weight PAH`s	mg/kg	<0.050	<0.050	0.050	7806720
High Molecular Weight PAH`s	mg/kg	<0.050	<0.050	0.050	7806720
Total PAH	mg/kg	<0.050	<0.050	0.050	7806720
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	89	99		7806868
D8-ACENAPHTHYLENE (sur.)	%	99	100		7806868
D8-NAPHTHALENE (sur.)	%	88	91		7806868
TERPHENYL-D14 (sur.)	%	100	102		7806868
RDL = Reportable Detection Limit					

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GENERAL COMMENTS

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

Package 1	4.7°C

Sample LP7998-01 : The sample jar had been previously opend. Pot low bias

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7796535	1,4-Difluorobenzene (sur.)	2015/02/03	100	70 - 130	100	70 - 130	103	%				
7796535	4-Bromofluorobenzene (sur.)	2015/02/03	97	70 - 130	99	70 - 130	99	%				
7796535	D10-ETHYLBENZENE (sur.)	2015/02/03	103	50 - 130	90	50 - 130	103	%				
7796535	D4-1,2-Dichloroethane (sur.)	2015/02/03	99	70 - 130	101	70 - 130	102	%				
7798068	O-TERPHENYL (sur.)	2015/02/04	68	50 - 130	69	50 - 130	106	%				
7798990	1,4-Difluorobenzene (sur.)	2015/02/04	96	70 - 130	96	70 - 130	97	%				
7798990	4-Bromofluorobenzene (sur.)	2015/02/04	107	70 - 130	104	70 - 130	104	%				
7798990	D10-ETHYLBENZENE (sur.)	2015/02/04	95	50 - 130	88	50 - 130	95	%				
7798990	D4-1,2-Dichloroethane (sur.)	2015/02/04	88	70 - 130	89	70 - 130	94	%				
7806868	D10-ANTHRACENE (sur.)	2015/02/12	99	60 - 130	103	60 - 130	94	%				
7806868	D8-ACENAPHTHYLENE (sur.)	2015/02/12	95	50 - 130	90	50 - 130	96	%				
7806868	D8-NAPHTHALENE (sur.)	2015/02/12	97	50 - 130	93	50 - 130	92	%				
7806868	TERPHENYL-D14 (sur.)	2015/02/12	102	60 - 130	99	60 - 130	99	%				
7796450	Moisture	2015/02/03					<0.30	%	6.3	20		
7796535	(C6-C10)	2015/02/03			107	60 - 140	<10	mg/kg				
7796535	Benzene	2015/02/03	102	60 - 140	100	60 - 140	<0.0050	mg/kg	NC	40		
7796535	Ethylbenzene	2015/02/03	103	60 - 140	101	60 - 140	<0.010	mg/kg	NC	40		
7796535	m & p-Xylene	2015/02/03	98	60 - 140	98	60 - 140	<0.040	mg/kg	NC	40		
7796535	Methyl-tert-butylether (MTBE)	2015/02/03					<0.10	mg/kg				
7796535	o-Xylene	2015/02/03	100	60 - 140	97	60 - 140	<0.040	mg/kg	NC	40		
7796535	Styrene	2015/02/03					<0.030	mg/kg	NC	40		
7796535	Toluene	2015/02/03	96	60 - 140	95	60 - 140	<0.020	mg/kg	NC	40		
7796535	Xylenes (Total)	2015/02/03					<0.040	mg/kg	NC	40		
7796614	Total Aluminum (Al)	2015/02/03					<100	mg/kg	1.4	35	106	70 - 130
7796614	Total Antimony (Sb)	2015/02/03	100	75 - 125	93	75 - 125	<0.10	mg/kg	NC	30	117	70 - 130
7796614	Total Arsenic (As)	2015/02/03	104	75 - 125	95	75 - 125	<0.50	mg/kg	1.8	30	101	70 - 130
7796614	Total Barium (Ba)	2015/02/03	NC	75 - 125	98	75 - 125	<0.10	mg/kg	0.53	35	106	70 - 130
7796614	Total Beryllium (Be)	2015/02/03	102	75 - 125	95	75 - 125	<0.40	mg/kg	NC	30		
7796614	Total Bismuth (Bi)	2015/02/03					<0.10	mg/kg	NC	30		
7796614	Total Cadmium (Cd)	2015/02/03	101	75 - 125	100	75 - 125	<0.050	mg/kg	2.0	30	105	70 - 130
7796614	Total Calcium (Ca)	2015/02/03					<100	mg/kg	0.15	30	94	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7796614	Total Chromium (Cr)	2015/02/03	102	75 - 125	97	75 - 125	<1.0	mg/kg	2.2	30	113	70 - 130
7796614	Total Cobalt (Co)	2015/02/03	98	75 - 125	96	75 - 125	<0.30	mg/kg	1.7	30	96	70 - 130
7796614	Total Copper (Cu)	2015/02/03	102	75 - 125	98	75 - 125	<0.50	mg/kg	1.4	30	95	70 - 130
7796614	Total Iron (Fe)	2015/02/03					<100	mg/kg	0.82	30	95	70 - 130
7796614	Total Lead (Pb)	2015/02/03	99	75 - 125	95	75 - 125	<0.10	mg/kg	4.3	35	102	70 - 130
7796614	Total Lithium (Li)	2015/02/03	104	75 - 125	95	75 - 125	<5.0	mg/kg	NC	30		
7796614	Total Magnesium (Mg)	2015/02/03					<100	mg/kg	0.94	30	95	70 - 130
7796614	Total Manganese (Mn)	2015/02/03	NC	75 - 125	98	75 - 125	<0.20	mg/kg	0.28	30	103	70 - 130
7796614	Total Mercury (Hg)	2015/02/03	97	75 - 125	94	75 - 125	<0.050	mg/kg	NC	35	99	70 - 130
7796614	Total Molybdenum (Mo)	2015/02/03	116	75 - 125	97	75 - 125	<0.10	mg/kg	NC	35	102	70 - 130
7796614	Total Nickel (Ni)	2015/02/03	106	75 - 125	96	75 - 125	<0.80	mg/kg	3.3	30	99	70 - 130
7796614	Total Phosphorus (P)	2015/02/03					<10	mg/kg	1.8	30	93	70 - 130
7796614	Total Potassium (K)	2015/02/03					<100	mg/kg	2.3	35		
7796614	Total Selenium (Se)	2015/02/03	105	75 - 125	101	75 - 125	<0.50	mg/kg	NC	30		
7796614	Total Silver (Ag)	2015/02/03	98	75 - 125	98	75 - 125	<0.050	mg/kg	NC	35		
7796614	Total Sodium (Na)	2015/02/03					<100	mg/kg	NC	35		
7796614	Total Strontium (Sr)	2015/02/03	NC	75 - 125	93	75 - 125	<0.10	mg/kg	2.1	35	101	70 - 130
7796614	Total Thallium (Tl)	2015/02/03	101	75 - 125	97	75 - 125	<0.050	mg/kg	NC	30	100	70 - 130
7796614	Total Tin (Sn)	2015/02/03	98	75 - 125	92	75 - 125	<0.10	mg/kg	NC	35		
7796614	Total Titanium (Ti)	2015/02/03	NC	75 - 125	91	75 - 125	<1.0	mg/kg	11	35	113	70 - 130
7796614	Total Uranium (U)	2015/02/03	105	75 - 125	94	75 - 125	<0.050	mg/kg	2.0	30	108	70 - 130
7796614	Total Vanadium (V)	2015/02/03	102	75 - 125	96	75 - 125	<2.0	mg/kg	0.43	30	110	70 - 130
7796614	Total Zinc (Zn)	2015/02/03	NC	75 - 125	102	75 - 125	<1.0	mg/kg	4.3	30	99	70 - 130
7796614	Total Zirconium (Zr)	2015/02/03					<0.50	mg/kg	NC	30		
7796627	Soluble (2:1) pH	2015/02/03			101	97 - 103			0.23	N/A		
7797792	200 mesh (<.075 mm)	2015/02/04							0.090	35		
7797792	200 mesh (>.075 mm)	2015/02/04							NC	35		
7798068	F2 (C10-C16 Hydrocarbons)	2015/02/04	92	50 - 130	96	80 - 120	<10	mg/kg	NC	40		
7798068	F3 (C16-C34 Hydrocarbons)	2015/02/04	89	50 - 130	98	80 - 120	<10	mg/kg	NC	40		
7798068	F4 (C34-C50 Hydrocarbons)	2015/02/04	78	50 - 130	87	80 - 120	<10	mg/kg	NC	40		
7798068	Reached Baseline at C50	2015/02/04					YES	mg/kg	NC	50		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7798990	(C6-C10)	2015/02/04			79	60 - 140	<10	mg/kg	NC (1)	40		
7798990	Benzene	2015/02/04	74	60 - 140	76	60 - 140	<0.0050	mg/kg	NC	40		
7798990	Ethylbenzene	2015/02/04	81	60 - 140	84	60 - 140	<0.010	mg/kg	NC	40		
7798990	m & p-Xylene	2015/02/04	81	60 - 140	82	60 - 140	<0.040	mg/kg	NC	40		
7798990	Methyl-tert-butylether (MTBE)	2015/02/04					<0.10	mg/kg	NC	40		
7798990	o-Xylene	2015/02/04	80	60 - 140	80	60 - 140	<0.040	mg/kg	NC	40		
7798990	Styrene	2015/02/04					<0.030	mg/kg	NC	40		
7798990	Toluene	2015/02/04	73	60 - 140	75	60 - 140	<0.020	mg/kg	NC	40		
7798990	VH C6-C10	2015/02/04			70	60 - 140	<10	mg/kg				
7798990	Xylenes (Total)	2015/02/04					<0.040	mg/kg	NC	40		
7806021	Total Aluminum (Al)	2015/02/12					<100	mg/kg	0.45	35	113	70 - 130
7806021	Total Antimony (Sb)	2015/02/12	101	75 - 125	99	75 - 125	<0.10	mg/kg	NC	30	106	70 - 130
7806021	Total Arsenic (As)	2015/02/12	99	75 - 125	95	75 - 125	<0.50	mg/kg	0.68	30	101	70 - 130
7806021	Total Barium (Ba)	2015/02/12	NC	75 - 125	98	75 - 125	<0.10	mg/kg	18	35	103	70 - 130
7806021	Total Beryllium (Be)	2015/02/12	109	75 - 125	102	75 - 125	<0.40	mg/kg	NC	30		
7806021	Total Bismuth (Bi)	2015/02/12					<0.10	mg/kg	NC	30		
7806021	Total Cadmium (Cd)	2015/02/12	106	75 - 125	104	75 - 125	<0.050	mg/kg	NC	30	104	70 - 130
7806021	Total Calcium (Ca)	2015/02/12					<100	mg/kg	8.0	30	97	70 - 130
7806021	Total Chromium (Cr)	2015/02/12	104	75 - 125	100	75 - 125	<1.0	mg/kg	1.8	30	112	70 - 130
7806021	Total Cobalt (Co)	2015/02/12	98	75 - 125	96	75 - 125	<0.30	mg/kg	4.8	30	92	70 - 130
7806021	Total Copper (Cu)	2015/02/12	NC	75 - 125	106	75 - 125	<0.50	mg/kg	0.65	30	101	70 - 130
7806021	Total Iron (Fe)	2015/02/12					<100	mg/kg	0.64	30	99	70 - 130
7806021	Total Lead (Pb)	2015/02/12	108	75 - 125	104	75 - 125	<0.10	mg/kg	4.6	35	103	70 - 130
7806021	Total Lithium (Li)	2015/02/12	108	75 - 125	101	75 - 125	<5.0	mg/kg	NC	30		
7806021	Total Magnesium (Mg)	2015/02/12					<100	mg/kg	0.25	30	93	70 - 130
7806021	Total Manganese (Mn)	2015/02/12	NC	75 - 125	98	75 - 125	<0.20	mg/kg	1.7	30	98	70 - 130
7806021	Total Mercury (Hg)	2015/02/12	104	75 - 125	100	75 - 125	<0.050	mg/kg	NC	35	90	70 - 130
7806021	Total Molybdenum (Mo)	2015/02/12	107	75 - 125	101	75 - 125	<0.10	mg/kg	6.3	35	114	70 - 130
7806021	Total Nickel (Ni)	2015/02/12	106	75 - 125	105	75 - 125	<0.80	mg/kg	0.030	30	102	70 - 130
7806021	Total Phosphorus (P)	2015/02/12					<10	mg/kg	0.40	30	98	70 - 130
7806021	Total Potassium (K)	2015/02/12					<100	mg/kg	5.6	35		

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7806021	Total Selenium (Se)	2015/02/12	101	75 - 125	97	75 - 125	<0.50	mg/kg	NC	30		
7806021	Total Silver (Ag)	2015/02/12	107	75 - 125	102	75 - 125	<0.050	mg/kg	NC	35		
7806021	Total Sodium (Na)	2015/02/12					<100	mg/kg	NC	35		
7806021	Total Strontium (Sr)	2015/02/12	NC	75 - 125	94	75 - 125	<0.10	mg/kg	19	35	104	70 - 130
7806021	Total Thallium (Tl)	2015/02/12	103	75 - 125	99	75 - 125	<0.050	mg/kg	NC	30	87	70 - 130
7806021	Total Tin (Sn)	2015/02/12	101	75 - 125	95	75 - 125	<0.10	mg/kg	13	35		
7806021	Total Titanium (Ti)	2015/02/12	NC	75 - 125	94	75 - 125	<1.0	mg/kg	0.52	35	111	70 - 130
7806021	Total Uranium (U)	2015/02/12	104	75 - 125	101	75 - 125	<0.050	mg/kg	1.1	30	111	70 - 130
7806021	Total Vanadium (V)	2015/02/12	NC	75 - 125	98	75 - 125	<2.0	mg/kg	0.011	30	107	70 - 130
7806021	Total Zinc (Zn)	2015/02/12	NC	75 - 125	109	75 - 125	1.3, RDL=1.0	mg/kg	3.4	30	101	70 - 130
7806021	Total Zirconium (Zr)	2015/02/12					<0.50	mg/kg	0.46	30		
7806868	2-Methylnaphthalene	2015/02/13	100	50 - 130	94	50 - 130	<0.020	mg/kg	NC	50		
7806868	Acenaphthene	2015/02/13	100	50 - 130	93	50 - 130	<0.0050	mg/kg	NC	50		
7806868	Acenaphthylene	2015/02/13	95	50 - 130	90	50 - 130	<0.0050	mg/kg	NC	50		
7806868	Anthracene	2015/02/13	103	60 - 130	100	60 - 130	<0.0040	mg/kg	NC	50		
7806868	Benzo(a)anthracene	2015/02/13	97	60 - 130	89	60 - 130	<0.020	mg/kg	NC	50		
7806868	Benzo(a)pyrene	2015/02/13	99	60 - 130	90	60 - 130	<0.020	mg/kg	NC	50		
7806868	Benzo(b&j)fluoranthene	2015/02/13	100	60 - 130	90	60 - 130	<0.020	mg/kg	NC	50		
7806868	Benzo(b)fluoranthene	2015/02/13	100	60 - 130	90	60 - 130	<0.020	mg/kg	NC	20		
7806868	Benzo(g,h,i)perylene	2015/02/13	97	60 - 130	87	60 - 130	<0.050	mg/kg	NC	50		
7806868	Benzo(k)fluoranthene	2015/02/13	103	60 - 130	100	60 - 130	<0.020	mg/kg	NC	50		
7806868	Chrysene	2015/02/13	101	60 - 130	95	60 - 130	<0.020	mg/kg	NC	50		
7806868	Dibenz(a,h)anthracene	2015/02/13	98	60 - 130	87	60 - 130	<0.050	mg/kg	NC	50		
7806868	Fluoranthene	2015/02/13	104	60 - 130	100	60 - 130	<0.020	mg/kg	NC	50		
7806868	Fluorene	2015/02/13	96	50 - 130	89	50 - 130	<0.020	mg/kg	NC	50		
7806868	Indeno(1,2,3-cd)pyrene	2015/02/13	103	60 - 130	101	60 - 130	<0.050	mg/kg	NC	50		
7806868	Naphthalene	2015/02/13	94	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50		
7806868	Phenanthrene	2015/02/13	93	60 - 130	90	60 - 130	<0.020	mg/kg	NC	50		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7806868	Pyrene	2015/02/13	102	60 - 130	99	60 - 130	<0.020	mg/kg	NC	50		

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) RDL raised due to background artifacts detected in analysis

Maxxam Job #: B508345
Report Date: 2015/02/13

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Andy Lu, Data Validation Coordinator

Rob Reinert, Data Validation Coordinator

Maxxam Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-Free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

Chain Of Custody Record

Page 1 of 2

INVOICE TO:		Report Information		Project Information	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD	Quotation #	
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #	70031547I
Address	641- 800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	219.05?12.00010
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name	WILMER
Phone	(604) 775-9349 Fax (604) 775-6645	Phone	(250) 762-7202 Fax	Site #	
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	MARCI MARTIN

Laboratory Use Only

Maxxam Job #	Bottle Order #:
B508345	458127
Chain Of Custody Record	Project Manager
C#458127-08-01	Crystal Ireland

Regulatory Criteria:

- [ ] CSR
- [x] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: [ ]
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [x] Date Required ______ [ ]
Rush Confirmation Number: ______ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil, PAHs	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)		# of Bottles	Comments
1	LP7990	A3-NW-A-0.5-1	2015/01/31		SOIL							X					2	
2	LP7991	A3-NW-A-1-2															2	
3	LP7992	A3-NW-B-0.5-1									X				X		4+	GS bag
4	LP7993	A3-NW-B-1-2									X				X		4+	GS bag
5	LP7994	A3-WW-A-0.5-1									X				X		4+	GS bag
6	LP7995	A3-SW-A-0.5-1															2	
7	LP7996	A3-SW-B-0.5-1									X				X		4+	GS bag
8	LP7997	A3-EW-A-0.5-1															2	
9	LP7998	A3-F1									X				X		4+	GS bag
10	LP7999	A3-F2	↓		↓							↓					2	

B508345

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
MARCI MARTIN	2015/02/01	16:00	[illegible]	2015/02/02	13:20	

Lab Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
[ ]	5 3 6	NA [ ] Yes [ ] No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam — Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-Free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

Chain Of Custody Record — Page 2 of 2

INVOICE TO:		Report Information		Project Information	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD	Quotation #	
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #	70031547
Address	641- 800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	219.05112.00010
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name	WILMER
Phone	(604) 775-9349 Fax (604) 775-6645	Phone	(250) 762-7202 Fax	Site #	
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	MARCI MARTIN

Laboratory Use Only

Maxxam Job #	Bottle Order #:
B508345	456127
Chain Of Custody Record	Project Manager
C#456127-09-01	Crystal Ireland

Regulatory Criteria: CSR ☐ CCME ☒ BC Water Quality ☐ Other ☐

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects
Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission)
1 DAY ☐ 2 Day ☐ 3 Day ☒ Date Required: ☐
Rush Confirmation Number (call lab for #)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil, PAHs	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)		# of Bottles	Comments
1	LP8003	A3-F3	2015/01/31		SOIL						X	X			X		4	+ GS bag
2	LP8004	A3-F4	↓		↓							↓					2	
3	LP8005	A3-DUP1	↓		↓						X	↓			X		4	+ GS bag
4																		
5																		
6																		
7																		
8																		
9																		B508345
10																		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
MARCI MARTIN	2015/02/01	16:00	Laurel Berthier	2015/02/02	13:20	

Lab Use Only: Time Sensitive ☐ Temperature (°C) on Receipt: 5 3 6 / 1 1 — Custody Seal Intact on Cooler? Yes ☐ No ☐

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

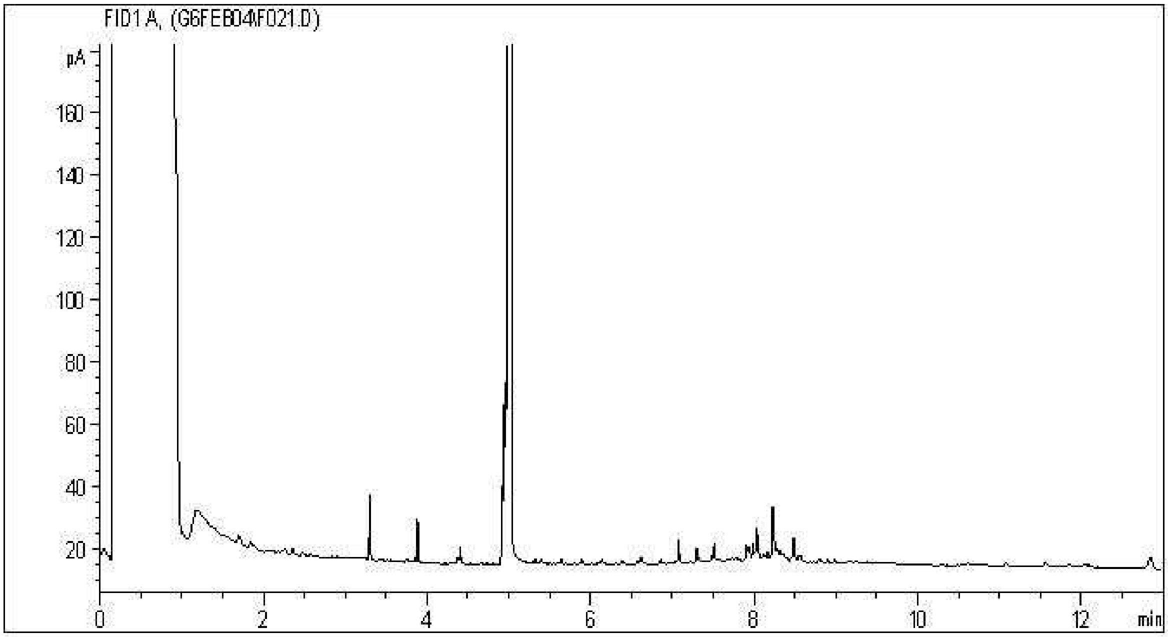
White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

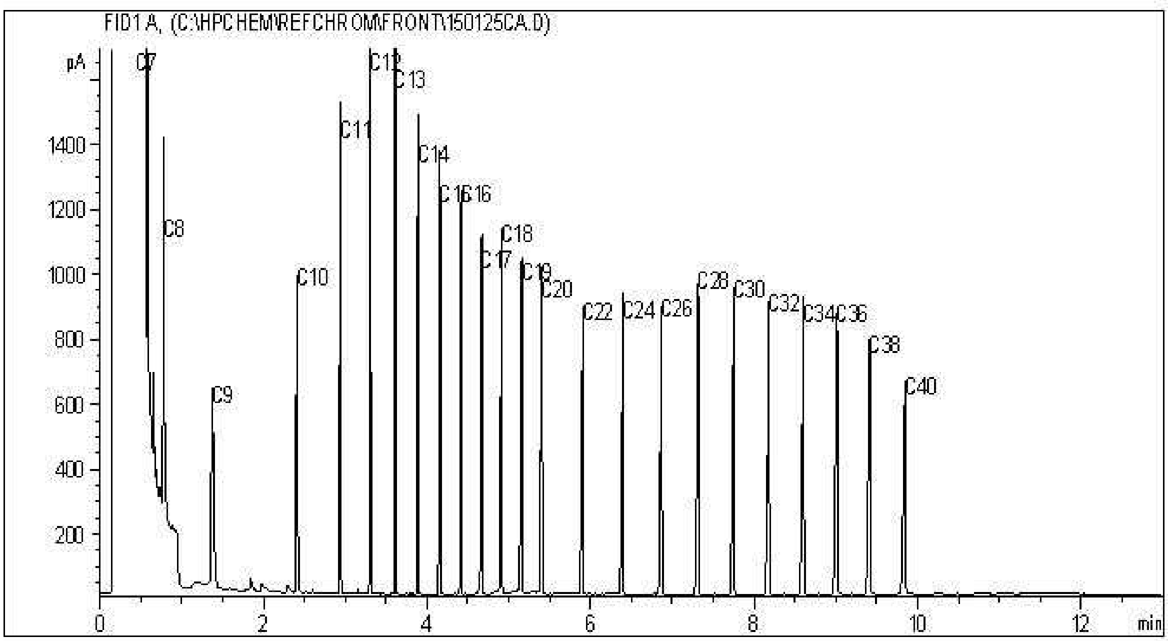
Maxxam Job #: B508345
Report Date: 2015/02/13
Maxxam Sample: LP7992

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: WILMER MARSH
Client ID: A3-NW-B-0.5-1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



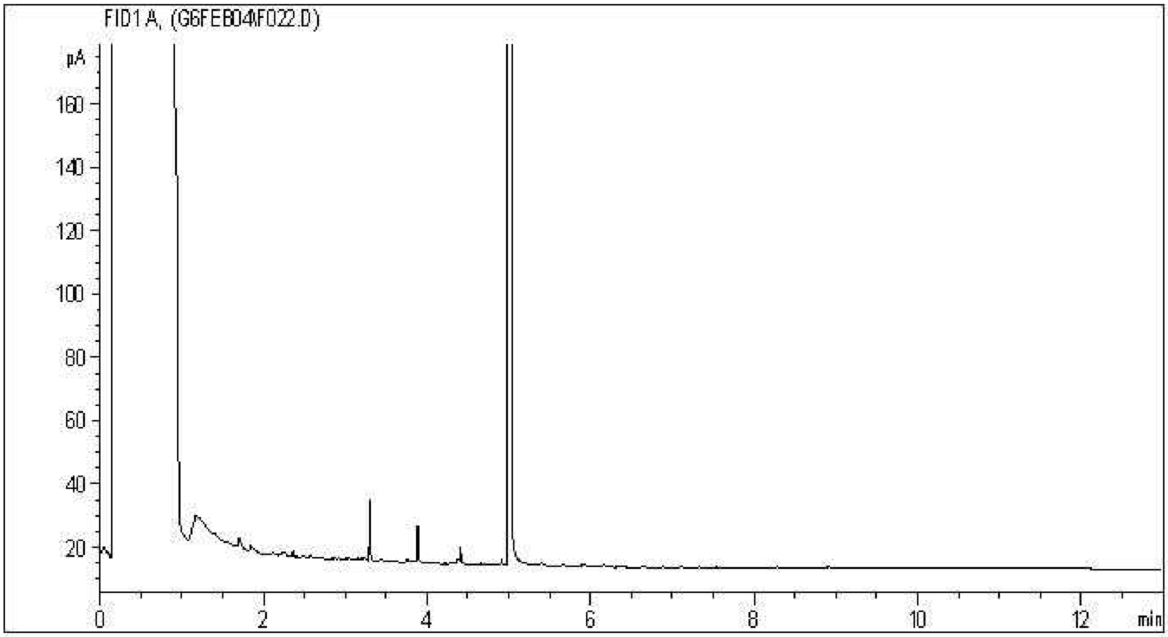
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

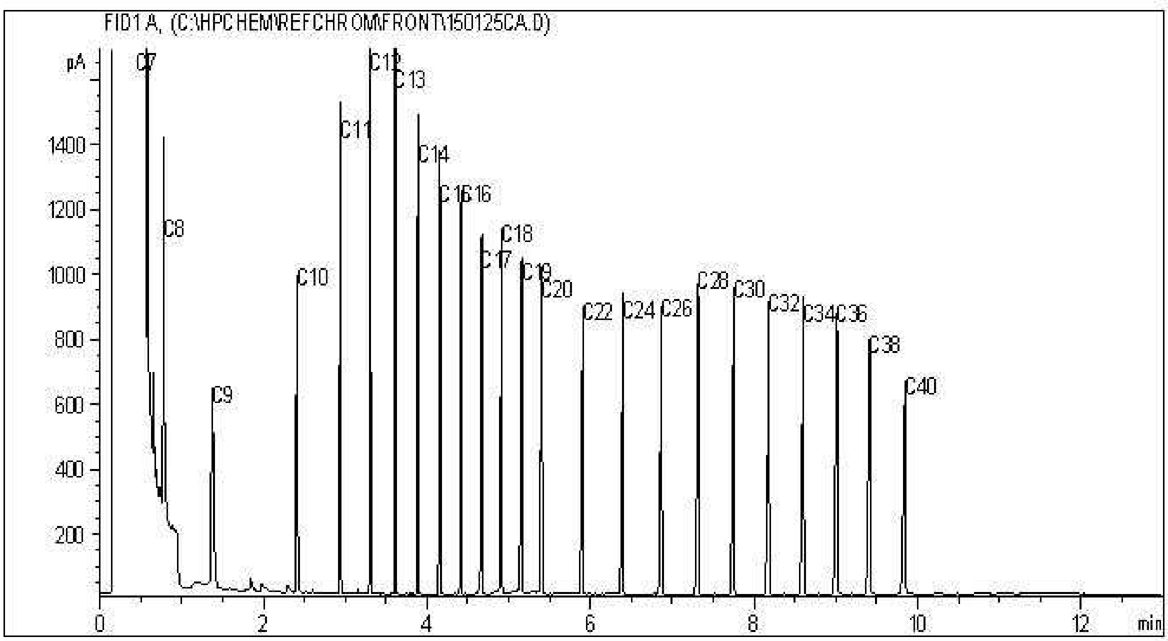
Maxxam Job #: B508345
Report Date: 2015/02/13
Maxxam Sample: LP7993

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: WILMER MARSH
Client ID: A3-NW-B-1-2

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



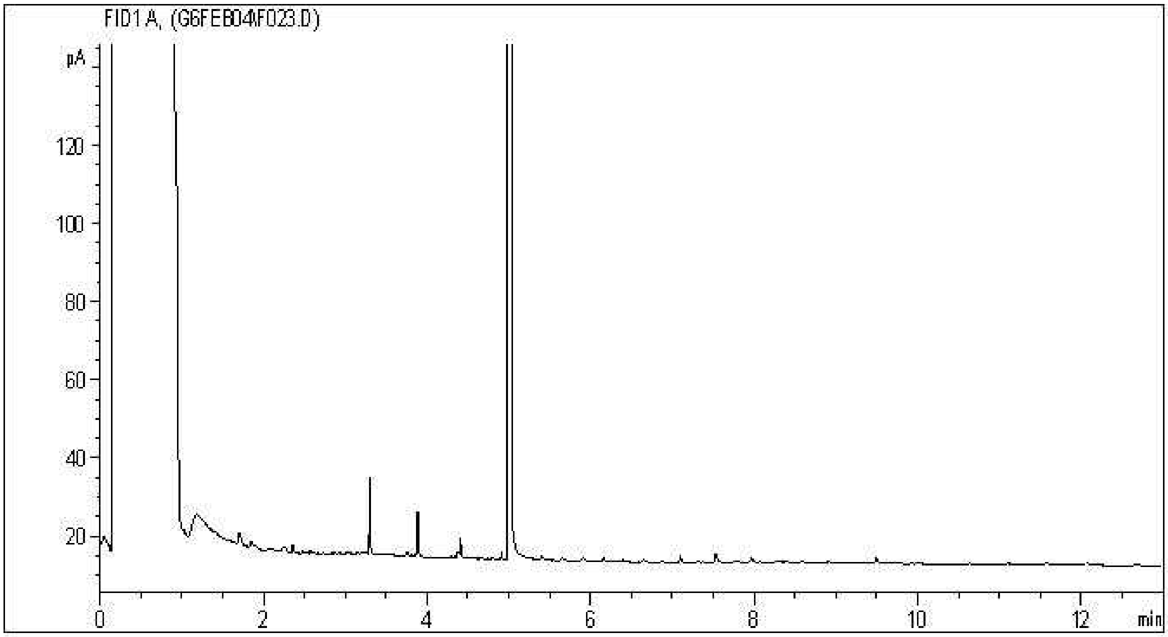
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

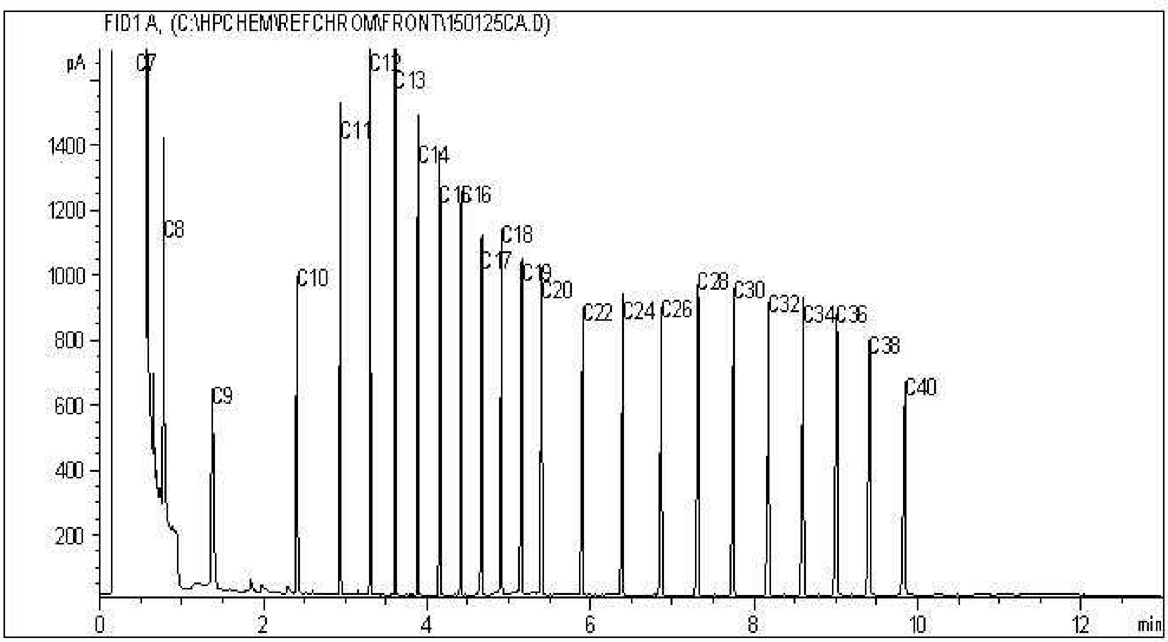
Maxxam Job #: B508345
Report Date: 2015/02/13
Maxxam Sample: LP7994

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: WILMER MARSH
Client ID: A3-WW-A-0.5-1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



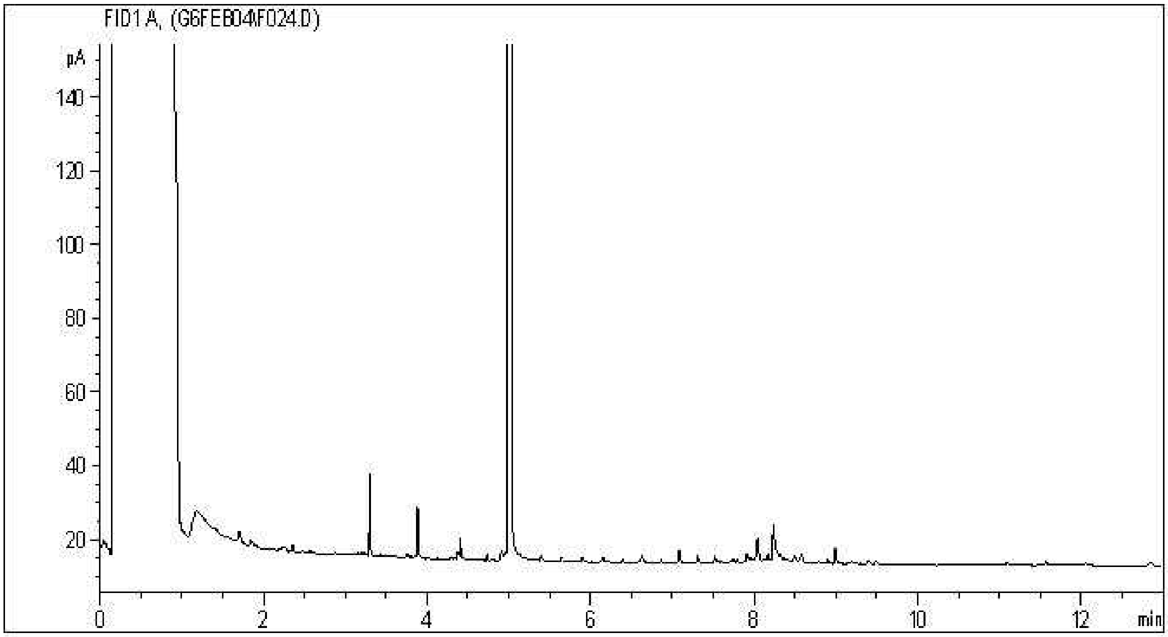
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

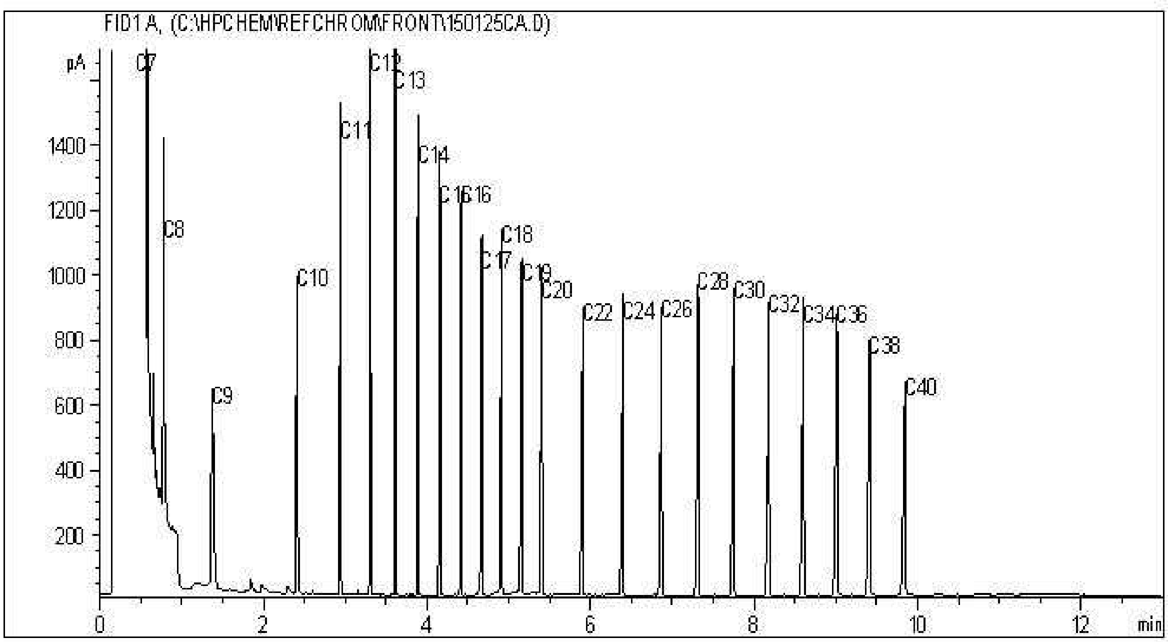
Maxxam Job #: B508345
Report Date: 2015/02/13
Maxxam Sample: LP7996

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: WILMER MARSH
Client ID: A3-SW-B-0.5-1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



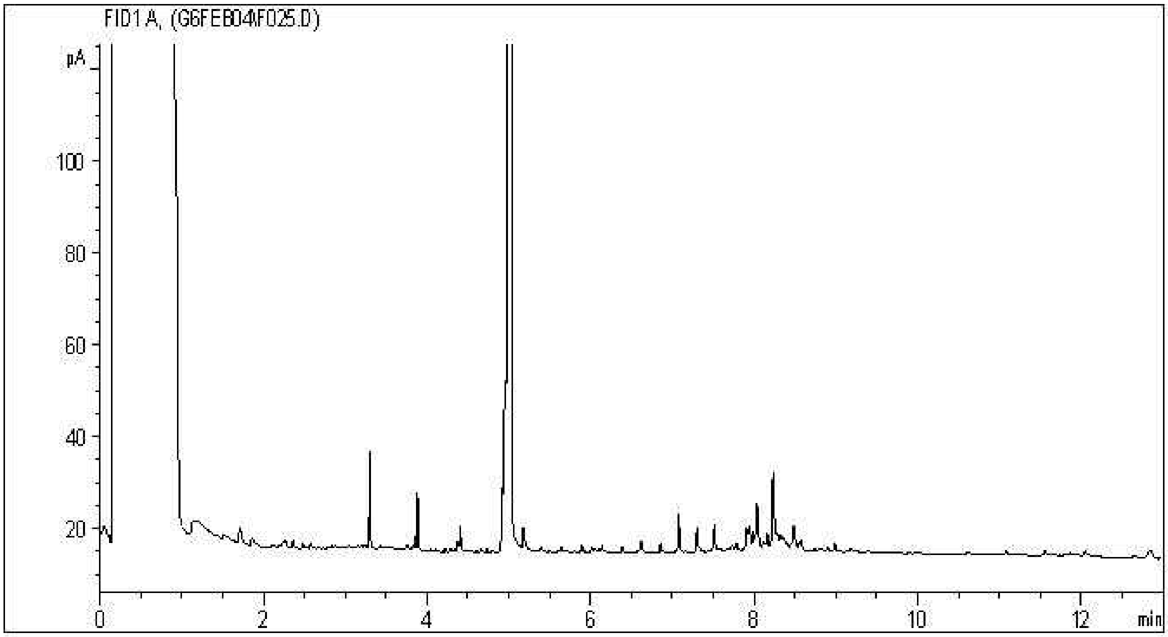
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

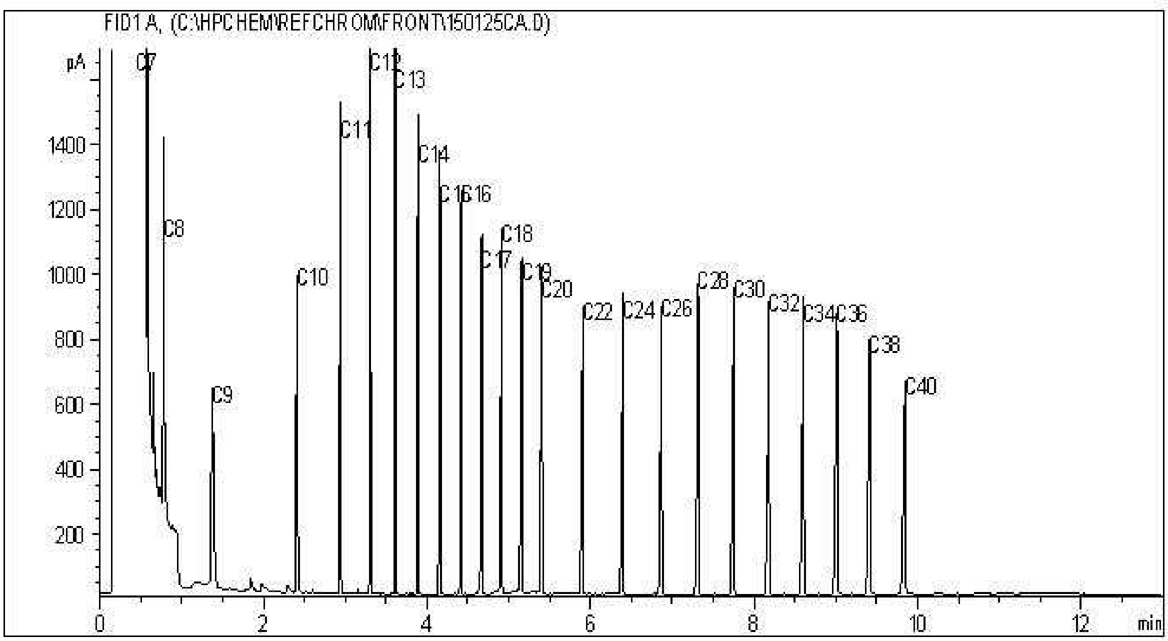
Maxxam Job #: B508345
Report Date: 2015/02/13
Maxxam Sample: LP7998

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: WILMER MARSH
Client ID: A3-F1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



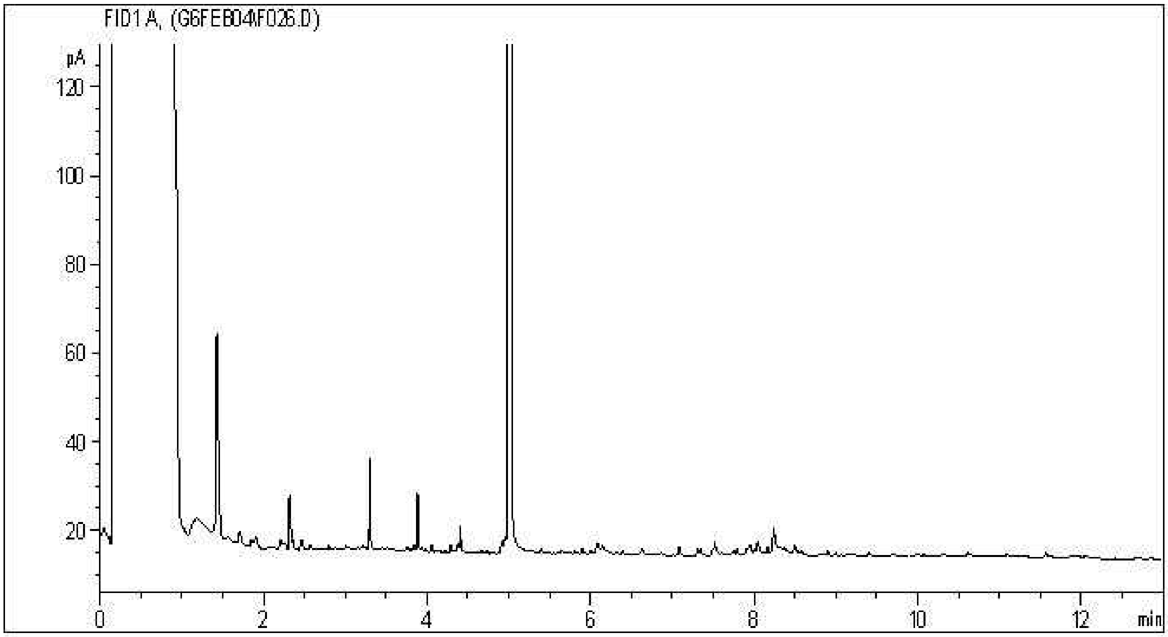
Carbon Range Distribution - Reference Chromatogram



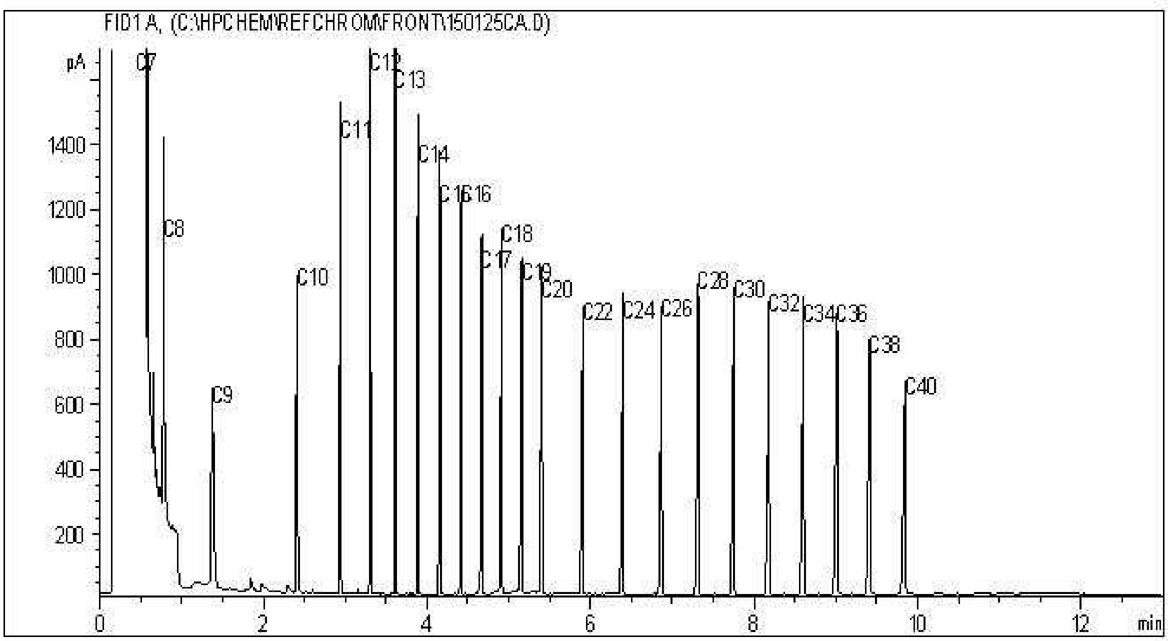
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



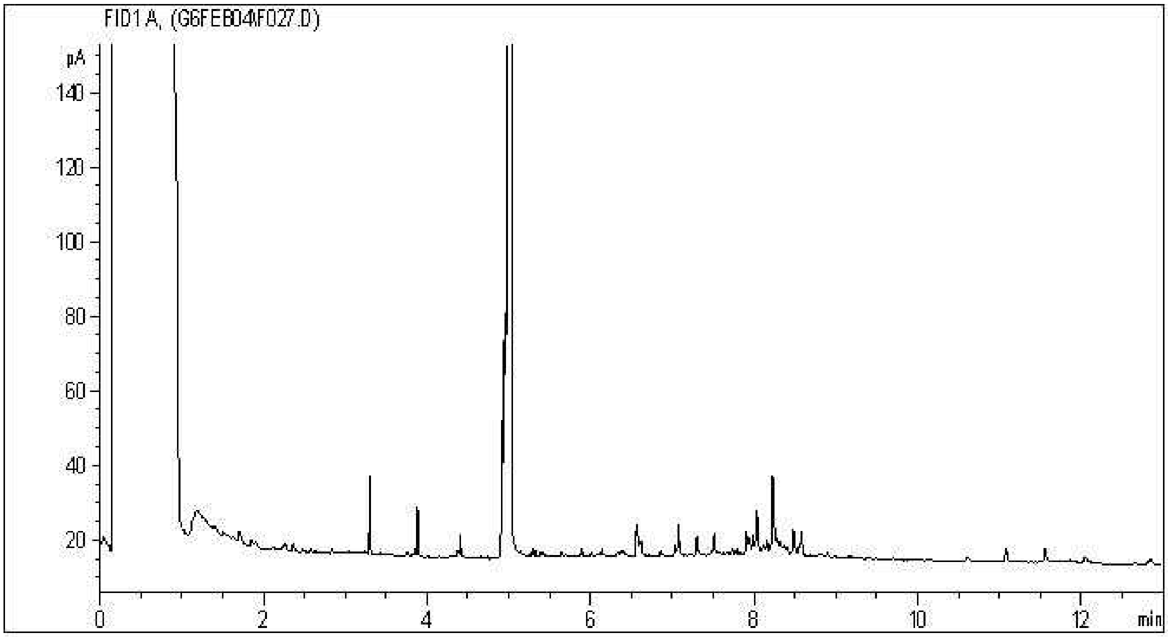
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

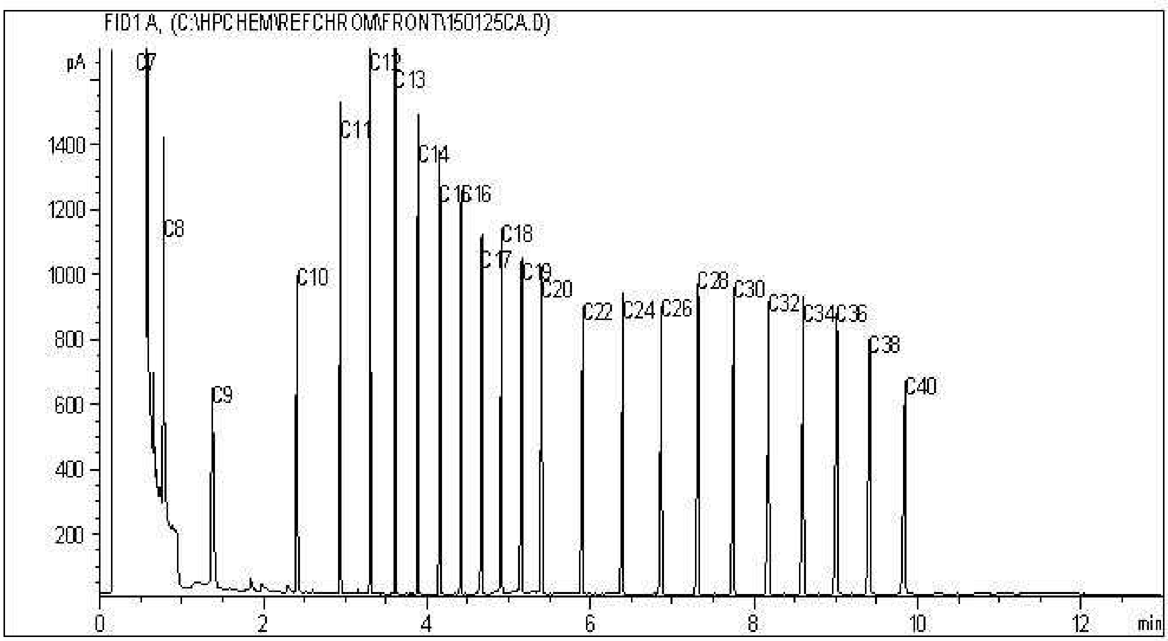
Maxxam Job #: B508345
Report Date: 2015/02/13
Maxxam Sample: LP8005

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: WILMER MARSH
Client ID: A3-DUP1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam
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Success Through Science®

Your P.O. #: 700315471
Your Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your C.O.C. #: 458127-05-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2015/02/17
Report #: R1804567
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B510759
Received: 2015/02/10, 11:45

Sample Matrix: Soil
Samples Received: 23

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE LH VH F1 in Soil - Field Pres.	9	N/A	2015/02/12	BBY8SOP-00010	EPA 8260c R3 m
Chloride (soluble)	2	2015/02/12	2015/02/13	BBY6SOP-00011	SM 22 4500-Cl- G m
Soluble Chloride Ion Calc. (mg/kg)	2	N/A	2015/02/13	BBY WI-00033	Auto Calc
Volatile F1-BTEX	9	N/A	2015/02/12	BBY WI-00033	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (1)	3	2015/02/10	2015/02/11	BBY8SOP-00030	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1)	2	2015/02/10	2015/02/12	BBY8SOP-00030	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1)	1	2015/02/11	2015/02/12	BBY8SOP-00030	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1)	3	2015/02/11	2015/02/13	BBY8SOP-00030	CCME PHC-CWS
Elements by ICPMS (total)	10	2015/02/11	2015/02/11	BBY7SOP-00001	EPA 6020a R1 m
Elements by ICPMS (total)	11	2015/02/12	2015/02/12	BBY7SOP-00001	EPA 6020a R1 m
Elements by ICPMS (total)	2	2015/02/17	2015/02/17	BBY7SOP-00001	EPA 6020a R1 m
Particulate Mesh 200	4	N/A	2015/02/11	BBY6SOP-00039	Carter 2nd ed 55.4
Particulate Mesh 200	5	N/A	2015/02/12	BBY6SOP-00039	Carter 2nd ed 55.4
Moisture	5	N/A	2015/02/11	BBY8SOP-00017	OMOE E3139 3.1 m
Moisture	5	N/A	2015/02/12	BBY8SOP-00017	OMOE E3139 3.1 m
Soluble Sodium Ion Calc. (mg/kg)	2	N/A	2015/02/13	BBY WI-00033	Auto Calc
PAH in Soil by GC/MS (SIM) - CCME	4	2015/02/11	2015/02/13	BBY8SOP-00022	EPA 8270d R4 m
PAH in Soil by GC/MS (SIM) - CCME	5	2015/02/12	2015/02/13	BBY8SOP-00022	EPA 8270d R4 m
Benzo[a]pyrene Equivalency	9	N/A	2015/02/13	BBY WI-00033	Auto Calc
Total LMW, HMW, Total PAH Calc	9	N/A	2015/02/13	BBY WI-00033	Auto Calc
pH (2:1 DI Water Extract)	10	2015/02/11	2015/02/11	BBY6SOP-00028	BCMOE BCLM Mar2005 m
pH (2:1 DI Water Extract)	11	2015/02/12	2015/02/12	BBY6SOP-00028	BCMOE BCLM Mar2005 m
Saturated Paste	2	2015/02/12	2015/02/12	BBY6SOP-00030	Carter 2nd 15.2.1 m
Soluble Cations (Ca,K,Mg,Na,S)	2	N/A	2015/02/12	BBY7SOP-00018	EPA 6010c R3 m

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

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

(1) The method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory; all deviations were justified and validated and are made available upon request; the chromatogram descends to baseline by the retention time of nC50 unless otherwise indicated; all QC criteria met; individual hydrocarbons (nC10, nC16, nC34) are within 10% of their average response factor; linearity is within 15%.

Your P.O. #: 700315471
Your Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your C.O.C. #: 458127-05-01

Attention:Lindsay Paterson

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200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2015/02/17
Report #: R1804567
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B510759
Received: 2015/02/10, 11:45

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Samantha Fregien, Project Manager
Email: SFregien@maxxam.ca
Phone# (604) 734 7276
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LR0475	LR0479	LR0483	LR0484		LR0488		
Sampling Date		2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00		2015/02/09 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01		458127-05-01		
	Units	**MDZ-EW-0.3-0.8**	**MDZ-NWA-1-2**	**MDZ-F1-5.5**	**MDZ-F2-5**	**QC Batch**	**TP15-8-1-2**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	7807215	<10	10	7805189
F3 (C16-C34 Hydrocarbons)	mg/kg	<10	<10	<10	14	7807215	<10	10	7805189
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	<10	7807215	<10	10	7805189
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	7807215	Yes	N/A	7805189
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	112	119	118	119	7807215	130		7805189

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		LR0489	LR0491	LR0493	LR0502		
Sampling Date		2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01		
	Units	**TP15-8-2-3**	**TP15-9-1-2**	**TP15-10-0.3-0.8**	**TP15-11-1-2**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	10	7805189
F3 (C16-C34 Hydrocarbons)	mg/kg	<10	20	<10	<10	10	7805189
F4 (C34-C50 Hydrocarbons)	mg/kg	10	<10	<10	<10	10	7805189
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	N/A	7805189
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	129	128	127	126		7805189

RDL = Reportable Detection Limit
N/A = Not Applicable

PARTICLE SIZE DISTRIBUTION ANALYSIS (SOIL)

Maxxam ID		LR0475	LR0479	LR0483	LR0484		LR0488		
Sampling Date		2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00		2015/02/09 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01		458127-05-01		
	Units	**MDZ-EW-0.3-0.8**	**MDZ-NWA-1-2**	**MDZ-F1-5.5**	**MDZ-F2-5**	**QC Batch**	**TP15-8-1-2**	**RDL**	**QC Batch**
Physical Properties									
200 mesh (>.075 mm)	%	12.1	17.0	4.53	9.77	7806610	0.77	0.10	7804763
200 mesh (<.075 mm)	%	87.9	83.1	95.5	90.2	7806610	99.2	0.10	7804763
RDL = Reportable Detection Limit									

Maxxam ID		LR0489	LR0491	LR0493		LR0502		
Sampling Date		2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00		2015/02/09 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01		458127-05-01		
	Units	**TP15-8-2-3**	**TP15-9-1-2**	**TP15-10-0.3-0.8**	**QC Batch**	**TP15-11-1-2**	**RDL**	**QC Batch**
Physical Properties								
200 mesh (>.075 mm)	%	3.65	17.8	7.32	7804763	2.27	0.10	7806610
200 mesh (<.075 mm)	%	96.4	82.2	92.7	7804763	97.7	0.10	7806610
RDL = Reportable Detection Limit								

Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

PHYSICAL TESTING (SOIL)

Maxxam ID		LR0475	LR0478	LR0479	LR0483	LR0484		
Sampling Date		2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01	458127-05-01		
	Units	**MDZ-EW-0.3-0.8**	**MDZ-NWA-0.3-0.8**	**MDZ-NWA-1-2**	**MDZ-F1-5.5**	**MDZ-F2-5**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	2.2	3.6	2.5	2.5	14	0.30	7805236
RDL = Reportable Detection Limit								

Maxxam ID		LR0488	LR0489	LR0491	LR0493	LR0502		
Sampling Date		2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01	458127-05-01		
	Units	**TP15-8-1-2**	**TP15-8-2-3**	**TP15-9-1-2**	**TP15-10-0.3-0.8**	**TP15-11-1-2**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	1.9	2.2	2.9	5.7	7.2	0.30	7803980
RDL = Reportable Detection Limit								

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Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		LR7975	LR7976		
Sampling Date		2015/02/08 12:00	2015/02/08 12:00		
COC Number		458127-05-01	458127-05-01		
	Units	**MDZ-EW-2-3 REWORK 1**	**MDZ-DUP-A REWORK 1**	**RDL**	**QC Batch**
Total Metals by ICPMS					
Total Aluminum (Al)	mg/kg	8130	8140	100	7809603
Total Antimony (Sb)	mg/kg	6.48	0.96	0.10	7809603
Total Arsenic (As)	mg/kg	6.18	6.14	0.50	7809603
Total Barium (Ba)	mg/kg	153	175	0.10	7809603
Total Beryllium (Be)	mg/kg	<0.40	<0.40	0.40	7809603
Total Bismuth (Bi)	mg/kg	0.15	0.14	0.10	7809603
Total Cadmium (Cd)	mg/kg	4.80	1.28	0.050	7809603
Total Calcium (Ca)	mg/kg	76800	78500	100	7809603
Total Chromium (Cr)	mg/kg	21.5	18.5	1.0	7809603
Total Cobalt (Co)	mg/kg	8.32	8.96	0.30	7809603
Total Copper (Cu)	mg/kg	38.3	39.3	0.50	7809603
Total Iron (Fe)	mg/kg	25900	25300	100	7809603
Total Lead (Pb)	mg/kg	158	61.2	0.10	7809603
Total Magnesium (Mg)	mg/kg	16900	17000	100	7809603
Total Manganese (Mn)	mg/kg	472	484	0.20	7809603
Total Mercury (Hg)	mg/kg	<0.050	<0.050	0.050	7809603
Total Molybdenum (Mo)	mg/kg	1.08	0.82	0.10	7809603
Total Nickel (Ni)	mg/kg	20.5	22.1	0.80	7809603
Total Phosphorus (P)	mg/kg	644	661	10	7809603
Total Potassium (K)	mg/kg	882	939	100	7809603
Total Selenium (Se)	mg/kg	<0.50	<0.50	0.50	7809603
Total Silver (Ag)	mg/kg	0.099	0.116	0.050	7809603
Total Sodium (Na)	mg/kg	177	205	100	7809603
Total Strontium (Sr)	mg/kg	184	190	0.10	7809603
Total Thallium (Tl)	mg/kg	<0.050	<0.050	0.050	7809603
Total Tin (Sn)	mg/kg	18.7	16.5	0.10	7809603
Total Titanium (Ti)	mg/kg	79.9	94.8	1.0	7809603
Total Vanadium (V)	mg/kg	11.0	11.3	2.0	7809603
Total Zinc (Zn)	mg/kg	195	214	1.0	7809603
Total Zirconium (Zr)	mg/kg	1.13	1.42	0.50	7809603
RDL = Reportable Detection Limit					

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Maxxam Job #: B510759
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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LR0475		LR0479		LR0483	LR0484		
Sampling Date		2015/02/08 12:00		2015/02/08 12:00		2015/02/08 12:00	2015/02/08 12:00		
COC Number		458127-05-01		458127-05-01		458127-05-01	458127-05-01		
	Units	**MDZ-EW-0.3-0.8**	**QC Batch**	**MDZ-NWA-1-2**	**QC Batch**	**MDZ-F1-5.5**	**MDZ-F2-5**	**RDL**	**QC Batch**
Calculated Parameters									
F1 (C6-C10) - BTEX	mg/kg	<10	7804420	<10	7805252	<10	<10	10	7804420
Volatiles									
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	7805799	<0.10	7805799	<0.10	<0.10	0.10	7805799
Benzene	mg/kg	<0.0050	7805799	<0.0050	7805799	<0.0050	<0.0050	0.0050	7805799
Toluene	mg/kg	<0.020	7805799	<0.020	7805799	<0.020	<0.020	0.020	7805799
Ethylbenzene	mg/kg	<0.010	7805799	<0.010	7805799	<0.010	<0.010	0.010	7805799
m & p-Xylene	mg/kg	<0.040	7805799	<0.040	7805799	<0.040	<0.040	0.040	7805799
o-Xylene	mg/kg	<0.040	7805799	<0.040	7805799	<0.040	<0.040	0.040	7805799
Styrene	mg/kg	<0.030	7805799	<0.030	7805799	<0.030	<0.030	0.030	7805799
Xylenes (Total)	mg/kg	<0.040	7805799	<0.040	7805799	<0.040	<0.040	0.040	7805799
(C6-C10)	mg/kg	<10	7805799	<10	7805799	<10	<10	10	7805799
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	92	7805799	101	7805799	102	102		7805799
4-Bromofluorobenzene (sur.)	%	103	7805799	99	7805799	99	99		7805799
D10-ETHYLBENZENE (sur.)	%	112	7805799	95	7805799	90	85		7805799
D4-1,2-Dichloroethane (sur.)	%	112	7805799	103	7805799	100	100		7805799
RDL = Reportable Detection Limit									

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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LR0488	LR0489	LR0491	LR0493	LR0502		
Sampling Date		2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01	458127-05-01		
	Units	**TP15-8-1-2**	**TP15-8-2-3**	**TP15-9-1-2**	**TP15-10-0.3-0.8**	**TP15-11-1-2**	**RDL**	**QC Batch**
Calculated Parameters								
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	<10	10	7804420
Volatiles								
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7805799
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7805799
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7805799
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7805799
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7805799
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7805799
Styrene	mg/kg	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	7805799
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	7805799
(C6-C10)	mg/kg	<10	<10	<10	<10	<10	10	7805799
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	102	103	102	103	104		7805799
4-Bromofluorobenzene (sur.)	%	99	100	98	98	98		7805799
D10-ETHYLBENZENE (sur.)	%	86	90	86	86	89		7805799
D4-1,2-Dichloroethane (sur.)	%	101	100	99	98	97		7805799
RDL = Reportable Detection Limit								

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Maxxam Job #: B510759
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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LR0475	LR0476	LR0477	LR0478	LR0479		
Sampling Date		2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01	458127-05-01		
	Units	**MDZ-EW-0.3-0.8**	**MDZ-EW-1-2**	**MDZ-EW-2-3**	**MDZ-NWA-0.3-0.8**	**MDZ-NWA-1-2**	**RDL**	**QC Batch**
Physical Properties								
Soluble (2:1) pH	pH	8.70	8.75	8.47	9.35	8.78	N/A	7806025
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	8080	8270	8650	7380	7140	100	7806021
Total Antimony (Sb)	mg/kg	0.43	0.49	1.40	0.37	0.35	0.10	7806021
Total Arsenic (As)	mg/kg	5.66	5.60	6.46	5.60	5.33	0.50	7806021
Total Barium (Ba)	mg/kg	108	112	145	102	103	0.10	7806021
Total Beryllium (Be)	mg/kg	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	7806021
Total Bismuth (Bi)	mg/kg	0.11	0.12	0.13	0.12	0.11	0.10	7806021
Total Cadmium (Cd)	mg/kg	0.291	0.248	0.987	0.121	0.276	0.050	7806021
Total Calcium (Ca)	mg/kg	76500	81800	78100	73300	73400	100	7806021
Total Chromium (Cr)	mg/kg	14.4	15.2	18.3	12.6	12.1	1.0	7806021
Total Cobalt (Co)	mg/kg	7.33	7.86	8.39	7.46	6.89	0.30	7806021
Total Copper (Cu)	mg/kg	15.8	17.1	61.3	14.7	14.1	0.50	7806021
Total Iron (Fe)	mg/kg	20400	21100	24400	19100	18300	100	7806021
Total Lead (Pb)	mg/kg	15.8	17.5	93.0	9.72	10.9	0.10	7806021
Total Lithium (Li)	mg/kg	17.3	19.6	19.4	15.7	15.8	5.0	7806021
Total Magnesium (Mg)	mg/kg	16600	17400	16700	17000	16700	100	7806021
Total Manganese (Mn)	mg/kg	409	420	476	406	397	0.20	7806021
Total Mercury (Hg)	mg/kg	<0.050	<0.050	0.057	<0.050	<0.050	0.050	7806021
Total Molybdenum (Mo)	mg/kg	0.46	0.48	0.91	0.35	0.40	0.10	7806021
Total Nickel (Ni)	mg/kg	17.6	18.9	21.5	16.6	16.6	0.80	7806021
Total Phosphorus (P)	mg/kg	583	588	645	571	597	10	7806021
Total Potassium (K)	mg/kg	660	640	862	583	548	100	7806021
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7806021
Total Silver (Ag)	mg/kg	<0.050	<0.050	0.098	<0.050	<0.050	0.050	7806021
Total Sodium (Na)	mg/kg	209	157	196	114	273	100	7806021
Total Strontium (Sr)	mg/kg	180	190	188	167	162	0.10	7806021
Total Thallium (Tl)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806021
Total Tin (Sn)	mg/kg	1.28	2.74	11.4	0.17	0.33	0.10	7806021
Total Titanium (Ti)	mg/kg	72.0	65.0	72.6	68.6	64.3	1.0	7806021
Total Uranium (U)	mg/kg	0.555	0.609	0.589	0.493	0.454	0.050	7806021
Total Vanadium (V)	mg/kg	9.3	9.3	10.0	9.0	8.3	2.0	7806021
Total Zinc (Zn)	mg/kg	66.1	71.1	255	38.5	40.9	1.0	7806021

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LR0475	LR0476	LR0477	LR0478	LR0479		
Sampling Date		2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01	458127-05-01		
	Units	**MDZ-EW-0.3-0.8**	**MDZ-EW-1-2**	**MDZ-EW-2-3**	**MDZ-NWA-0.3-0.8**	**MDZ-NWA-1-2**	**RDL**	**QC Batch**
Total Zirconium (Zr)	mg/kg	1.29	1.38	1.30	1.54	1.63	0.50	7806021
RDL = Reportable Detection Limit								

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Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LR0480	LR0481	LR0482	LR0483	LR0484	LR0486		
Sampling Date		2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01	458127-05-01	458127-05-01		
	Units	**MDZ-NWA-2-3**	**MDZ-NWA-3-4**	**MDZ-NWA-4-5**	**MDZ-F1-5.5**	**MDZ-F2-5**	**MDZ-DUP-A**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH	8.89	8.85	8.43	8.72	8.64	8.47	N/A	7806025
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	7220	7400	8660	8410	8370	9140	100	7806021
Total Antimony (Sb)	mg/kg	0.35	0.36	0.85	0.56	0.81	1.19	0.10	7806021
Total Arsenic (As)	mg/kg	5.34	5.60	6.18	5.91	5.72	6.83	0.50	7806021
Total Barium (Ba)	mg/kg	104	102	146	105	118	154	0.10	7806021
Total Beryllium (Be)	mg/kg	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	7806021
Total Bismuth (Bi)	mg/kg	0.10	0.11	0.16	0.11	0.13	0.14	0.10	7806021
Total Cadmium (Cd)	mg/kg	0.152	0.172	1.00	0.381	0.452	1.30	0.050	7806021
Total Calcium (Ca)	mg/kg	71800	73400	75900	81100	79500	82200	100	7806021
Total Chromium (Cr)	mg/kg	12.4	12.5	17.6	16.5	15.7	20.3	1.0	7806021
Total Cobalt (Co)	mg/kg	6.89	7.19	8.17	7.83	7.82	8.59	0.30	7806021
Total Copper (Cu)	mg/kg	14.0	14.8	24.9	19.7	20.5	589	0.50	7806021
Total Iron (Fe)	mg/kg	18000	18500	25100	25500	23200	29900	100	7806021
Total Lead (Pb)	mg/kg	10.2	10.7	74.0	36.1	29.6	82.7	0.10	7806021
Total Lithium (Li)	mg/kg	15.5	15.9	18.8	20.7	18.6	20.0	5.0	7806021
Total Magnesium (Mg)	mg/kg	16100	16200	16300	17200	16700	16700	100	7806021
Total Manganese (Mn)	mg/kg	384	396	469	449	437	513	0.20	7806021
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806021
Total Molybdenum (Mo)	mg/kg	0.37	0.37	0.96	0.68	0.56	1.30	0.10	7806021
Total Nickel (Ni)	mg/kg	16.4	16.4	21.0	27.8	20.0	22.4	0.80	7806021
Total Phosphorus (P)	mg/kg	576	601	631	601	624	672	10	7806021
Total Potassium (K)	mg/kg	585	611	811	677	718	924	100	7806021
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	7806021
Total Silver (Ag)	mg/kg	<0.050	<0.050	0.071	<0.050	0.079	0.115	0.050	7806021
Total Sodium (Na)	mg/kg	239	325	174	160	114	207	100	7806021
Total Strontium (Sr)	mg/kg	165	163	179	193	189	194	0.10	7806021
Total Thallium (Tl)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806021
Total Tin (Sn)	mg/kg	0.31	1.38	7.05	8.85	2.67	19.7	0.10	7806021
Total Titanium (Ti)	mg/kg	68.3	72.8	77.7	79.6	71.3	83.8	1.0	7806021
Total Uranium (U)	mg/kg	0.493	0.439	0.566	0.578	0.608	0.595	0.050	7806021
Total Vanadium (V)	mg/kg	8.5	9.1	10.1	10.0	9.3	11.1	2.0	7806021
Total Zinc (Zn)	mg/kg	42.8	42.5	237	115	116	217	1.0	7806021

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LR0480	LR0481	LR0482	LR0483	LR0484	LR0486		
Sampling Date		2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00	2015/02/08 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01	458127-05-01	458127-05-01		
	Units	**MDZ-NWA-2-3**	**MDZ-NWA-3-4**	**MDZ-NWA-4-5**	**MDZ-F1-5.5**	**MDZ-F2-5**	**MDZ-DUP-A**	**RDL**	**QC Batch**
Total Zirconium (Zr)	mg/kg	1.74	1.88	1.14	0.99	1.46	1.17	0.50	7806021

RDL = Reportable Detection Limit

Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LR0487	LR0488	LR0489	LR0490		LR0491		
Sampling Date		2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00		2015/02/09 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01		458127-05-01		
	Units	**TP15-8-0.3-0.8**	**TP15-8-1-2**	**TP15-8-2-3**	**TP15-9-0.3-0.8**	**QC Batch**	**TP15-9-1-2**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH	8.78	8.89	8.64	9.18	7804649	8.33	N/A	7804731
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	8090	7370	8080	7250	7804648	7310	100	7804651
Total Antimony (Sb)	mg/kg	0.51	0.30	0.37	0.30	7804648	0.47	0.10	7804651
Total Arsenic (As)	mg/kg	5.98	5.56	5.87	5.65	7804648	6.06	0.50	7804651
Total Barium (Ba)	mg/kg	95.0	88.3	90.9	87.8	7804648	116	0.10	7804651
Total Beryllium (Be)	mg/kg	<0.40	<0.40	<0.40	<0.40	7804648	<0.40	0.40	7804651
Total Bismuth (Bi)	mg/kg	0.12	<0.10	0.10	<0.10	7804648	0.11	0.10	7804651
Total Cadmium (Cd)	mg/kg	0.223	0.126	0.222	0.114	7804648	0.351	0.050	7804651
Total Calcium (Ca)	mg/kg	82300	77400	79400	79700	7804648	72100	100	7804651
Total Chromium (Cr)	mg/kg	15.5	13.8	15.0	13.4	7804648	13.6	1.0	7804651
Total Cobalt (Co)	mg/kg	7.80	7.21	7.68	7.14	7804648	7.37	0.30	7804651
Total Copper (Cu)	mg/kg	15.7	13.6	15.5	13.9	7804648	16.9	0.50	7804651
Total Iron (Fe)	mg/kg	21500	20800	21500	19400	7804648	20500	100	7804651
Total Lead (Pb)	mg/kg	16.0	7.91	14.6	8.40	7804648	21.4	0.10	7804651
Total Lithium (Li)	mg/kg	19.6	18.3	19.9	18.4	7804648	16.1	5.0	7804651
Total Magnesium (Mg)	mg/kg	16500	18000	17800	17700	7804648	16300	100	7804651
Total Manganese (Mn)	mg/kg	409	400	416	394	7804648	410	0.20	7804651
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	7804648	<0.050	0.050	7804651
Total Molybdenum (Mo)	mg/kg	0.44	0.38	0.47	0.37	7804648	0.52	0.10	7804651
Total Nickel (Ni)	mg/kg	19.5	18.1	19.4	17.3	7804648	18.1	0.80	7804651
Total Phosphorus (P)	mg/kg	569	612	593	553	7804648	601	10	7804651
Total Potassium (K)	mg/kg	704	495	588	552	7804648	588	100	7804651
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	7804648	<0.50	0.50	7804651
Total Silver (Ag)	mg/kg	<0.050	<0.050	<0.050	<0.050	7804648	<0.050	0.050	7804651
Total Sodium (Na)	mg/kg	<100	172	196	<100	7804648	220	100	7804651
Total Strontium (Sr)	mg/kg	194	191	203	205	7804648	159	0.10	7804651
Total Thallium (Tl)	mg/kg	<0.050	<0.050	<0.050	<0.050	7804648	<0.050	0.050	7804651
Total Tin (Sn)	mg/kg	1.37	<0.10	1.56	<0.10	7804648	5.27	0.10	7804651
Total Titanium (Ti)	mg/kg	66.4	79.1	66.9	68.2	7804648	63.6	1.0	7804651
Total Uranium (U)	mg/kg	0.553	0.666	0.628	0.690	7804648	0.475	0.050	7804651
Total Vanadium (V)	mg/kg	9.6	9.0	9.5	8.7	7804648	9.2	2.0	7804651
Total Zinc (Zn)	mg/kg	65.2	39.9	64.7	40.3	7804648	85.0	1.0	7804651

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LR0487	LR0488	LR0489	LR0490		LR0491		
Sampling Date		2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00		2015/02/09 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01		458127-05-01		
	Units	**TP15-8-0.3-0.8**	**TP15-8-1-2**	**TP15-8-2-3**	**TP15-9-0.3-0.8**	**QC Batch**	**TP15-9-1-2**	**RDL**	**QC Batch**
Total Zirconium (Zr)	mg/kg	1.22	2.00	1.46	1.55	7804648	1.20	0.50	7804651
RDL = Reportable Detection Limit									

Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LR0492		LR0493	LR0494		LR0501		
Sampling Date		2015/02/09 12:00		2015/02/09 12:00	2015/02/09 12:00		2015/02/09 12:00		
COC Number		458127-05-01		458127-05-01	458127-05-01		458127-05-01		
	Units	**TP15-9-2-3**	**QC Batch**	**TP15-10-0.3-0.8**	**TP15-10-1-2**	**QC Batch**	**TP15-11-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH	8.43	7804731	8.60	9.38	7804649	8.87	N/A	7804731
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	7880	7804651	7300	7600	7804648	6820	100	7804651
Total Antimony (Sb)	mg/kg	0.59	7804651	0.33	0.32	7804648	0.26	0.10	7804651
Total Arsenic (As)	mg/kg	5.77	7804651	5.67	6.04	7804648	5.45	0.50	7804651
Total Barium (Ba)	mg/kg	97.8	7804651	80.6	84.0	7804648	101	0.10	7804651
Total Beryllium (Be)	mg/kg	<0.40	7804651	<0.40	<0.40	7804648	<0.40	0.40	7804651
Total Bismuth (Bi)	mg/kg	0.13	7804651	0.11	<0.10	7804648	<0.10	0.10	7804651
Total Cadmium (Cd)	mg/kg	0.209	7804651	0.133	0.108	7804648	0.167	0.050	7804651
Total Calcium (Ca)	mg/kg	76100	7804651	83600	82100	7804648	83900	100	7804651
Total Chromium (Cr)	mg/kg	14.8	7804651	12.2	12.9	7804648	10.9	1.0	7804651
Total Cobalt (Co)	mg/kg	7.49	7804651	7.46	7.50	7804648	6.89	0.30	7804651
Total Copper (Cu)	mg/kg	14.8	7804651	13.9	14.1	7804648	14.9	0.50	7804651
Total Iron (Fe)	mg/kg	22300	7804651	18800	20100	7804648	17300	100	7804651
Total Lead (Pb)	mg/kg	11.8	7804651	8.33	8.23	7804648	8.05	0.10	7804651
Total Lithium (Li)	mg/kg	19.4	7804651	16.4	17.9	7804648	14.5	5.0	7804651
Total Magnesium (Mg)	mg/kg	17300	7804651	16600	19400	7804648	16600	100	7804651
Total Manganese (Mn)	mg/kg	396	7804651	373	389	7804648	369	0.20	7804651
Total Mercury (Hg)	mg/kg	<0.050	7804651	<0.050	<0.050	7804648	<0.050	0.050	7804651
Total Molybdenum (Mo)	mg/kg	0.47	7804651	0.37	0.40	7804648	0.32	0.10	7804651
Total Nickel (Ni)	mg/kg	18.9	7804651	17.1	17.1	7804648	15.5	0.80	7804651
Total Phosphorus (P)	mg/kg	580	7804651	612	601	7804648	663	10	7804651
Total Potassium (K)	mg/kg	581	7804651	568	663	7804648	541	100	7804651
Total Selenium (Se)	mg/kg	<0.50	7804651	<0.50	<0.50	7804648	<0.50	0.50	7804651
Total Silver (Ag)	mg/kg	<0.050	7804651	<0.050	<0.050	7804648	<0.050	0.050	7804651
Total Sodium (Na)	mg/kg	184	7804651	<100	108	7804648	138	100	7804651
Total Strontium (Sr)	mg/kg	183	7804651	179	193	7804648	194	0.10	7804651
Total Thallium (Tl)	mg/kg	<0.050	7804651	<0.050	<0.050	7804648	<0.050	0.050	7804651
Total Tin (Sn)	mg/kg	0.75	7804651	0.11	0.10	7804648	<0.10	0.10	7804651
Total Titanium (Ti)	mg/kg	68.1	7804651	68.8	73.2	7804648	76.1	1.0	7804651
Total Uranium (U)	mg/kg	0.581	7804651	0.424	0.574	7804648	0.398	0.050	7804651
Total Vanadium (V)	mg/kg	9.3	7804651	9.0	9.6	7804648	8.5	2.0	7804651
Total Zinc (Zn)	mg/kg	61.2	7804651	35.8	39.7	7804648	33.6	1.0	7804651

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LR0492		LR0493	LR0494		LR0501		
Sampling Date		2015/02/09 12:00		2015/02/09 12:00	2015/02/09 12:00		2015/02/09 12:00		
COC Number		458127-05-01		458127-05-01	458127-05-01		458127-05-01		
	Units	**TP15-9-2-3**	**QC Batch**	**TP15-10-0.3-0.8**	**TP15-10-1-2**	**QC Batch**	**TP15-11-0.3-0.8**	**RDL**	**QC Batch**
Total Zirconium (Zr)	mg/kg	0.95	7804651	1.27	1.01	7804648	2.23	0.50	7804651
RDL = Reportable Detection Limit									

Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LR0502		
Sampling Date		2015/02/09 12:00		
COC Number		458127-05-01		
	Units	**TP15-11-1-2**	**RDL**	**QC Batch**
Physical Properties				
Soluble (2:1) pH	pH	9.46	N/A	7804649
Total Metals by ICPMS				
Total Aluminum (Al)	mg/kg	7490	100	7804648
Total Antimony (Sb)	mg/kg	0.33	0.10	7804648
Total Arsenic (As)	mg/kg	5.84	0.50	7804648
Total Barium (Ba)	mg/kg	144	0.10	7804648
Total Beryllium (Be)	mg/kg	<0.40	0.40	7804648
Total Bismuth (Bi)	mg/kg	0.11	0.10	7804648
Total Cadmium (Cd)	mg/kg	0.067	0.050	7804648
Total Calcium (Ca)	mg/kg	89100	100	7804648
Total Chromium (Cr)	mg/kg	12.8	1.0	7804648
Total Cobalt (Co)	mg/kg	7.37	0.30	7804648
Total Copper (Cu)	mg/kg	13.5	0.50	7804648
Total Iron (Fe)	mg/kg	19500	100	7804648
Total Lead (Pb)	mg/kg	8.29	0.10	7804648
Total Lithium (Li)	mg/kg	17.8	5.0	7804648
Total Magnesium (Mg)	mg/kg	18800	100	7804648
Total Manganese (Mn)	mg/kg	378	0.20	7804648
Total Mercury (Hg)	mg/kg	<0.050	0.050	7804648
Total Molybdenum (Mo)	mg/kg	0.41	0.10	7804648
Total Nickel (Ni)	mg/kg	18.1	0.80	7804648
Total Phosphorus (P)	mg/kg	571	10	7804648
Total Potassium (K)	mg/kg	656	100	7804648
Total Selenium (Se)	mg/kg	<0.50	0.50	7804648
Total Silver (Ag)	mg/kg	<0.050	0.050	7804648
Total Sodium (Na)	mg/kg	135	100	7804648
Total Strontium (Sr)	mg/kg	246	0.10	7804648
Total Thallium (Tl)	mg/kg	<0.050	0.050	7804648
Total Tin (Sn)	mg/kg	<0.10	0.10	7804648
Total Titanium (Ti)	mg/kg	66.0	1.0	7804648
Total Uranium (U)	mg/kg	0.627	0.050	7804648
Total Vanadium (V)	mg/kg	9.3	2.0	7804648
Total Zinc (Zn)	mg/kg	38.2	1.0	7804648
RDL = Reportable Detection Limit N/A = Not Applicable				

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Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LR0502		
Sampling Date		2015/02/09 12:00		
COC Number		458127-05-01		
	Units	**TP15-11-1-2**	**RDL**	**QC Batch**
Total Zirconium (Zr)	mg/kg	1.09	0.50	7804648
RDL = Reportable Detection Limit				

Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

SOLUBLE SODIUM AND CHLORIDE IN SOIL (SOIL)

Maxxam ID		LR0493			LR0502		
Sampling Date		2015/02/09 12:00			2015/02/09 12:00		
COC Number		458127-05-01			458127-05-01		
	Units	**TP15-10-0.3-0.8**	**RDL**	**QC Batch**	**TP15-11-1-2**	**RDL**	**QC Batch**
ANIONS							
Soluble Chloride (Cl)	mg/L	30.5	5.0	7807980	63.4	5.0	7807980
Calculated Parameters							
Soluble Chloride (Cl)	mg/kg	17.6	2.9	7804547	34.1	2.7	7805705
Soluble Sodium (Na)	mg/kg	13.8	2.9	7804549	40.3	2.7	7805706
Soluble Parameters							
Saturation %	%	57.6	1.0	7806143	53.8	1.0	7806143
Wet Soluble Sodium (Na)	mg/L	24.0	5.0	7806535	74.8	5.0	7806535
RDL = Reportable Detection Limit							

Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LR0475		LR0479		LR0483	LR0484		
Sampling Date		2015/02/08 12:00		2015/02/08 12:00		2015/02/08 12:00	2015/02/08 12:00		
COC Number		458127-05-01		458127-05-01		458127-05-01	458127-05-01		
	Units	**MDZ-EW-0.3-0.8**	**QC Batch**	**MDZ-NWA-1-2**	**QC Batch**	**MDZ-F1-5.5**	**MDZ-F2-5**	**RDL**	**QC Batch**
Calculated Parameters									
Index of Additive Cancer Risk(IARC)	N/A	0.31	7804550	0.31	7805253	0.31	0.31	0.10	7804550
Benzo[a]pyrene equivalency	N/A	<0.10	7804550	<0.10	7805253	<0.10	<0.10	0.10	7804550
Polycyclic Aromatics									
Naphthalene	mg/kg	<0.010	7806868	<0.010	7806868	<0.010	<0.010	0.010	7806868
2-Methylnaphthalene	mg/kg	<0.020	7806868	<0.020	7806868	<0.020	<0.020	0.020	7806868
Acenaphthylene	mg/kg	<0.0050	7806868	<0.0050	7806868	<0.0050	<0.0050	0.0050	7806868
Acenaphthene	mg/kg	<0.0050	7806868	<0.0050	7806868	<0.0050	<0.0050	0.0050	7806868
Fluorene	mg/kg	<0.020	7806868	<0.020	7806868	<0.020	<0.020	0.020	7806868
Phenanthrene	mg/kg	<0.020	7806868	<0.020	7806868	<0.020	<0.020	0.020	7806868
Anthracene	mg/kg	<0.0040	7806868	<0.0040	7806868	<0.0040	<0.0040	0.0040	7806868
Fluoranthene	mg/kg	<0.020	7806868	<0.020	7806868	<0.020	<0.020	0.020	7806868
Pyrene	mg/kg	<0.020	7806868	<0.020	7806868	<0.020	<0.020	0.020	7806868
Benzo(a)anthracene	mg/kg	<0.020	7806868	<0.020	7806868	<0.020	<0.020	0.020	7806868
Chrysene	mg/kg	<0.020	7806868	<0.020	7806868	<0.020	<0.020	0.020	7806868
Benzo(b&j)fluoranthene	mg/kg	<0.020	7806868	<0.020	7806868	<0.020	<0.020	0.020	7806868
Benzo(b)fluoranthene	mg/kg	<0.020	7806868	<0.020	7806868	<0.020	<0.020	0.020	7806868
Benzo(k)fluoranthene	mg/kg	<0.020	7806868	<0.020	7806868	<0.020	<0.020	0.020	7806868
Benzo(a)pyrene	mg/kg	<0.020	7806868	<0.020	7806868	<0.020	<0.020	0.020	7806868
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	7806868	<0.050	7806868	<0.050	<0.050	0.050	7806868
Dibenz(a,h)anthracene	mg/kg	<0.050	7806868	<0.050	7806868	<0.050	<0.050	0.050	7806868
Benzo(g,h,i)perylene	mg/kg	<0.050	7806868	<0.050	7806868	<0.050	<0.050	0.050	7806868
Low Molecular Weight PAH`s	mg/kg	<0.050	7803976	<0.050	7805041	<0.050	<0.050	0.050	7803976
High Molecular Weight PAH`s	mg/kg	<0.050	7803976	<0.050	7805041	<0.050	<0.050	0.050	7803976
Total PAH	mg/kg	<0.050	7803976	<0.050	7805041	<0.050	<0.050	0.050	7803976
Surrogate Recovery (%)									
D10-ANTHRACENE (sur.)	%	88	7806868	106	7806868	98	96		7806868
D8-ACENAPHTHYLENE (sur.)	%	89	7806868	95	7806868	98	96		7806868
D8-NAPHTHALENE (sur.)	%	84	7806868	86	7806868	92	91		7806868
TERPHENYL-D14 (sur.)	%	96	7806868	108	7806868	97	98		7806868

RDL = Reportable Detection Limit

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Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LR0488	LR0489	LR0491	LR0493	LR0502		
Sampling Date		2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00	2015/02/09 12:00		
COC Number		458127-05-01	458127-05-01	458127-05-01	458127-05-01	458127-05-01		
	Units	**TP15-8-1-2**	**TP15-8-2-3**	**TP15-9-1-2**	**TP15-10-0.3-0.8**	**TP15-11-1-2**	**RDL**	**QC Batch**
Calculated Parameters								
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.31	0.31	0.31	0.31	0.10	7806719
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7806719
Polycyclic Aromatics								
Naphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7806868
2-Methylnaphthalene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7806868
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7806868
Fluorene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Phenanthrene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	7806868
Fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Benzo(a)anthracene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Chrysene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Benzo(a)pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7806868
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806868
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806868
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806868
Low Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806720
High Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806720
Total PAH	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7806720
Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	101	97	101	102	97		7806868
D8-ACENAPHTHYLENE (sur.)	%	98	95	100	101	96		7806868
D8-NAPHTHALENE (sur.)	%	78	91	95	95	92		7806868
TERPHENYL-D14 (sur.)	%	109	104	107	121	106		7806868
RDL = Reportable Detection Limit								

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Maxxam Job #: B510759
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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

GENERAL COMMENTS

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

Package 1	8.0°C
Package 2	4.3°C

[Rework V2R 2015/02/17 SF] Reporting reworked results of samples MDZ-EW-2-3 and MDZ-DUP-A

Results relate only to the items tested.

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Maxxam Job #: B510759
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QUALITY ASSURANCE REPORT

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7805189	O-TERPHENYL (sur.)	2015/02/12	93	50 - 130	100	50 - 130	123	%				
7805799	1,4-Difluorobenzene (sur.)	2015/02/11	93	70 - 130	94	70 - 130	94	%				
7805799	4-Bromofluorobenzene (sur.)	2015/02/11	101	70 - 130	102	70 - 130	101	%				
7805799	D10-ETHYLBENZENE (sur.)	2015/02/11	107	50 - 130	100	50 - 130	108	%				
7805799	D4-1,2-Dichloroethane (sur.)	2015/02/11	108	70 - 130	111	70 - 130	108	%				
7806868	D10-ANTHRACENE (sur.)	2015/02/12	99	60 - 130	103	60 - 130	94	%				
7806868	D8-ACENAPHTHYLENE (sur.)	2015/02/12	95	50 - 130	90	50 - 130	96	%				
7806868	D8-NAPHTHALENE (sur.)	2015/02/12	97	50 - 130	93	50 - 130	92	%				
7806868	TERPHENYL-D14 (sur.)	2015/02/12	102	60 - 130	99	60 - 130	99	%				
7807215	O-TERPHENYL (sur.)	2015/02/13	107	50 - 130	65	50 - 130	128	%				
7803980	Moisture	2015/02/10					<0.30	%	4.4	20		
7804648	Total Aluminum (Al)	2015/02/11					<100	mg/kg	3.8	35	103	70 - 130
7804648	Total Antimony (Sb)	2015/02/11	99	75 - 125	100	75 - 125	<0.10	mg/kg	NC	30	113	70 - 130
7804648	Total Arsenic (As)	2015/02/11	100	75 - 125	98	75 - 125	<0.50	mg/kg	0.63	30	96	70 - 130
7804648	Total Barium (Ba)	2015/02/11	NC	75 - 125	97	75 - 125	<0.10	mg/kg	1.3	35	98	70 - 130
7804648	Total Beryllium (Be)	2015/02/11	95	75 - 125	100	75 - 125	<0.40	mg/kg	NC	30		
7804648	Total Bismuth (Bi)	2015/02/11					<0.10	mg/kg	NC	30		
7804648	Total Cadmium (Cd)	2015/02/11	100	75 - 125	103	75 - 125	<0.050	mg/kg	NC	30	109	70 - 130
7804648	Total Calcium (Ca)	2015/02/11					<100	mg/kg	1.1	30	96	70 - 130
7804648	Total Chromium (Cr)	2015/02/11	95	75 - 125	96	75 - 125	<1.0	mg/kg	0.86	30	109	70 - 130
7804648	Total Cobalt (Co)	2015/02/11	94	75 - 125	96	75 - 125	<0.30	mg/kg	1.4	30	94	70 - 130
7804648	Total Copper (Cu)	2015/02/11	95	75 - 125	102	75 - 125	<0.50	mg/kg	1.1	30	95	70 - 130
7804648	Total Iron (Fe)	2015/02/11					<100	mg/kg	0.47	30	99	70 - 130
7804648	Total Lead (Pb)	2015/02/11	96	75 - 125	100	75 - 125	<0.10	mg/kg	2.0	35	100	70 - 130
7804648	Total Lithium (Li)	2015/02/11	90	75 - 125	94	75 - 125	<5.0	mg/kg	NC	30		
7804648	Total Magnesium (Mg)	2015/02/11					<100	mg/kg	1.4	30	95	70 - 130
7804648	Total Manganese (Mn)	2015/02/11	NC	75 - 125	97	75 - 125	<0.20	mg/kg	1.4	30	97	70 - 130
7804648	Total Mercury (Hg)	2015/02/11	97	75 - 125	100	75 - 125	<0.050	mg/kg	NC	35	84	70 - 130
7804648	Total Molybdenum (Mo)	2015/02/11	113	75 - 125	102	75 - 125	<0.10	mg/kg	NC	35	119	70 - 130
7804648	Total Nickel (Ni)	2015/02/11	97	75 - 125	102	75 - 125	<0.80	mg/kg	1.2	30	102	70 - 130
7804648	Total Phosphorus (P)	2015/02/11					<10	mg/kg	2.9	30	95	70 - 130

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Maxxam Job #: B510759
Report Date: 2015/02/17

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7804648	Total Potassium (K)	2015/02/11					<100	mg/kg	1.3	35		
7804648	Total Selenium (Se)	2015/02/11	102	75 - 125	104	75 - 125	<0.50	mg/kg	NC	30		
7804648	Total Silver (Ag)	2015/02/11	98	75 - 125	99	75 - 125	<0.050	mg/kg	NC	35		
7804648	Total Sodium (Na)	2015/02/11					<100	mg/kg	NC	35		
7804648	Total Strontium (Sr)	2015/02/11	NC	75 - 125	93	75 - 125	<0.10	mg/kg	1.6	35	100	70 - 130
7804648	Total Thallium (Tl)	2015/02/11	97	75 - 125	99	75 - 125	<0.050	mg/kg	NC	30	99	70 - 130
7804648	Total Tin (Sn)	2015/02/11	98	75 - 125	98	75 - 125	<0.10	mg/kg	NC	35		
7804648	Total Titanium (Ti)	2015/02/11	NC	75 - 125	94	75 - 125	<1.0	mg/kg	0.85	35	111	70 - 130
7804648	Total Uranium (U)	2015/02/11	98	75 - 125	97	75 - 125	<0.050	mg/kg	4.1	30	108	70 - 130
7804648	Total Vanadium (V)	2015/02/11	98	75 - 125	96	75 - 125	<2.0	mg/kg	NC	30	106	70 - 130
7804648	Total Zinc (Zn)	2015/02/11	NC	75 - 125	108	75 - 125	<1.0	mg/kg	2.1	30	97	70 - 130
7804648	Total Zirconium (Zr)	2015/02/11					<0.50	mg/kg	NC	30		
7804649	Soluble (2:1) pH	2015/02/11			100	97 - 103			0.32	N/A		
7804651	Total Aluminum (Al)	2015/02/11					<100	mg/kg			103	70 - 130
7804651	Total Antimony (Sb)	2015/02/11	94	75 - 125	102	75 - 125	<0.10	mg/kg			106	70 - 130
7804651	Total Arsenic (As)	2015/02/11	93	75 - 125	98	75 - 125	0.84, RDL=0.50	mg/kg			98	70 - 130
7804651	Total Barium (Ba)	2015/02/11	NC	75 - 125	96	75 - 125	<0.10	mg/kg			98	70 - 130
7804651	Total Beryllium (Be)	2015/02/11	101	75 - 125	99	75 - 125	<0.40	mg/kg				
7804651	Total Bismuth (Bi)	2015/02/11					<0.10	mg/kg				
7804651	Total Cadmium (Cd)	2015/02/11	101	75 - 125	104	75 - 125	<0.050	mg/kg			110	70 - 130
7804651	Total Calcium (Ca)	2015/02/11					<100	mg/kg			92	70 - 130
7804651	Total Chromium (Cr)	2015/02/11	94	75 - 125	94	75 - 125	<1.0	mg/kg			107	70 - 130
7804651	Total Cobalt (Co)	2015/02/11	93	75 - 125	92	75 - 125	<0.30	mg/kg			93	70 - 130
7804651	Total Copper (Cu)	2015/02/11	99	75 - 125	102	75 - 125	<0.50	mg/kg			97	70 - 130
7804651	Total Iron (Fe)	2015/02/11					<100	mg/kg			95	70 - 130
7804651	Total Lead (Pb)	2015/02/11	97	75 - 125	98	75 - 125	<0.10	mg/kg	3.7	35	100	70 - 130
7804651	Total Lithium (Li)	2015/02/11	93	75 - 125	98	75 - 125	<5.0	mg/kg				
7804651	Total Magnesium (Mg)	2015/02/11					<100	mg/kg			93	70 - 130
7804651	Total Manganese (Mn)	2015/02/11	NC	75 - 125	93	75 - 125	<0.20	mg/kg			94	70 - 130
7804651	Total Mercury (Hg)	2015/02/11	99	75 - 125	100	75 - 125	<0.050	mg/kg			92	70 - 130

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Maxxam Job #: B510759
Report Date: 2015/02/17

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7804651	Total Molybdenum (Mo)	2015/02/11	103	75 - 125	101	75 - 125	<0.10	mg/kg			107	70 - 130
7804651	Total Nickel (Ni)	2015/02/11	97	75 - 125	102	75 - 125	<0.80	mg/kg			99	70 - 130
7804651	Total Phosphorus (P)	2015/02/11					<10	mg/kg			92	70 - 130
7804651	Total Potassium (K)	2015/02/11					<100	mg/kg				
7804651	Total Selenium (Se)	2015/02/11	99	75 - 125	104	75 - 125	<0.50	mg/kg				
7804651	Total Silver (Ag)	2015/02/11	97	75 - 125	99	75 - 125	<0.050	mg/kg				
7804651	Total Sodium (Na)	2015/02/11					<100	mg/kg				
7804651	Total Strontium (Sr)	2015/02/11	NC	75 - 125	95	75 - 125	<0.10	mg/kg			100	70 - 130
7804651	Total Thallium (Tl)	2015/02/11	96	75 - 125	98	75 - 125	<0.050	mg/kg			99	70 - 130
7804651	Total Tin (Sn)	2015/02/11	94	75 - 125	97	75 - 125	<0.10	mg/kg				
7804651	Total Titanium (Ti)	2015/02/11	NC	75 - 125	92	75 - 125	<1.0	mg/kg			106	70 - 130
7804651	Total Uranium (U)	2015/02/11	96	75 - 125	95	75 - 125	<0.050	mg/kg			103	70 - 130
7804651	Total Vanadium (V)	2015/02/11	NC	75 - 125	93	75 - 125	<2.0	mg/kg			104	70 - 130
7804651	Total Zinc (Zn)	2015/02/11	NC	75 - 125	107	75 - 125	<1.0	mg/kg			97	70 - 130
7804651	Total Zirconium (Zr)	2015/02/11					<0.50	mg/kg				
7804731	Soluble (2:1) pH	2015/02/11			100	97 - 103			0.39	N/A		
7804763	200 mesh (<.075 mm)	2015/02/11							0.23	35		
7804763	200 mesh (>.075 mm)	2015/02/11							2.8	35		
7805189	F2 (C10-C16 Hydrocarbons)	2015/02/11	77	50 - 130	81	80 - 120	<10	mg/kg	NC	40		
7805189	F3 (C16-C34 Hydrocarbons)	2015/02/11	86	50 - 130	93	80 - 120	<10	mg/kg	NC	40		
7805189	F4 (C34-C50 Hydrocarbons)	2015/02/11	79	50 - 130	88	80 - 120	<10	mg/kg	NC	40		
7805189	Reached Baseline at C50	2015/02/11					YES	mg/kg	NC	50		
7805236	Moisture	2015/02/12					<0.30	%	8.3	20		
7805799	(C6-C10)	2015/02/12			97	60 - 140	<10	mg/kg	NC	40		
7805799	Benzene	2015/02/12	94	60 - 140	102	60 - 140	<0.0050	mg/kg	NC	40		
7805799	Ethylbenzene	2015/02/12	95	60 - 140	103	60 - 140	<0.010	mg/kg	NC	40		
7805799	m & p-Xylene	2015/02/12	93	60 - 140	100	60 - 140	<0.040	mg/kg	NC	40		
7805799	Methyl-tert-butylether (MTBE)	2015/02/12					<0.10	mg/kg	NC	40		
7805799	o-Xylene	2015/02/12	92	60 - 140	99	60 - 140	<0.040	mg/kg	NC	40		
7805799	Styrene	2015/02/12					<0.030	mg/kg	NC	40		
7805799	Toluene	2015/02/12	90	60 - 140	97	60 - 140	<0.020	mg/kg	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7805799	Xylenes (Total)	2015/02/12					<0.040	mg/kg	NC	40		
7806021	Total Aluminum (Al)	2015/02/12					<100	mg/kg	0.45	35	113	70 - 130
7806021	Total Antimony (Sb)	2015/02/12	101	75 - 125	99	75 - 125	<0.10	mg/kg	NC	30	106	70 - 130
7806021	Total Arsenic (As)	2015/02/12	99	75 - 125	95	75 - 125	<0.50	mg/kg	0.68	30	101	70 - 130
7806021	Total Barium (Ba)	2015/02/12	NC	75 - 125	98	75 - 125	<0.10	mg/kg	18	35	103	70 - 130
7806021	Total Beryllium (Be)	2015/02/12	109	75 - 125	102	75 - 125	<0.40	mg/kg	NC	30		
7806021	Total Bismuth (Bi)	2015/02/12					<0.10	mg/kg	NC	30		
7806021	Total Cadmium (Cd)	2015/02/12	106	75 - 125	104	75 - 125	<0.050	mg/kg	NC	30	104	70 - 130
7806021	Total Calcium (Ca)	2015/02/12					<100	mg/kg	8.0	30	97	70 - 130
7806021	Total Chromium (Cr)	2015/02/12	104	75 - 125	100	75 - 125	<1.0	mg/kg	1.8	30	112	70 - 130
7806021	Total Cobalt (Co)	2015/02/12	98	75 - 125	96	75 - 125	<0.30	mg/kg	4.8	30	92	70 - 130
7806021	Total Copper (Cu)	2015/02/12	NC	75 - 125	106	75 - 125	<0.50	mg/kg	0.65	30	101	70 - 130
7806021	Total Iron (Fe)	2015/02/12					<100	mg/kg	0.64	30	99	70 - 130
7806021	Total Lead (Pb)	2015/02/12	108	75 - 125	104	75 - 125	<0.10	mg/kg	4.6	35	103	70 - 130
7806021	Total Lithium (Li)	2015/02/12	108	75 - 125	101	75 - 125	<5.0	mg/kg	NC	30		
7806021	Total Magnesium (Mg)	2015/02/12					<100	mg/kg	0.25	30	93	70 - 130
7806021	Total Manganese (Mn)	2015/02/12	NC	75 - 125	98	75 - 125	<0.20	mg/kg	1.7	30	98	70 - 130
7806021	Total Mercury (Hg)	2015/02/12	104	75 - 125	100	75 - 125	<0.050	mg/kg	NC	35	90	70 - 130
7806021	Total Molybdenum (Mo)	2015/02/12	107	75 - 125	101	75 - 125	<0.10	mg/kg	6.3	35	114	70 - 130
7806021	Total Nickel (Ni)	2015/02/12	106	75 - 125	105	75 - 125	<0.80	mg/kg	0.030	30	102	70 - 130
7806021	Total Phosphorus (P)	2015/02/12					<10	mg/kg	0.40	30	98	70 - 130
7806021	Total Potassium (K)	2015/02/12					<100	mg/kg	5.6	35		
7806021	Total Selenium (Se)	2015/02/12	101	75 - 125	97	75 - 125	<0.50	mg/kg	NC	30		
7806021	Total Silver (Ag)	2015/02/12	107	75 - 125	102	75 - 125	<0.050	mg/kg	NC	35		
7806021	Total Sodium (Na)	2015/02/12					<100	mg/kg	NC	35		
7806021	Total Strontium (Sr)	2015/02/12	NC	75 - 125	94	75 - 125	<0.10	mg/kg	19	35	104	70 - 130
7806021	Total Thallium (Tl)	2015/02/12	103	75 - 125	99	75 - 125	<0.050	mg/kg	NC	30	87	70 - 130
7806021	Total Tin (Sn)	2015/02/12	101	75 - 125	95	75 - 125	<0.10	mg/kg	13	35		
7806021	Total Titanium (Ti)	2015/02/12	NC	75 - 125	94	75 - 125	<1.0	mg/kg	0.52	35	111	70 - 130
7806021	Total Uranium (U)	2015/02/12	104	75 - 125	101	75 - 125	<0.050	mg/kg	1.1	30	111	70 - 130
7806021	Total Vanadium (V)	2015/02/12	NC	75 - 125	98	75 - 125	<2.0	mg/kg	0.011	30	107	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7806021	Total Zinc (Zn)	2015/02/12	NC	75 - 125	109	75 - 125	1.3, RDL=1.0	mg/kg	3.4	30	101	70 - 130
7806021	Total Zirconium (Zr)	2015/02/12					<0.50	mg/kg	0.46	30		
7806025	Soluble (2:1) pH	2015/02/12			101	97 - 103			0.13	N/A		
7806143	Saturation %	2015/02/12					<1.0	%	0.90	30	104	75 - 125
7806535	Wet Soluble Sodium (Na)	2015/02/12					<5.0	mg/L	0.64	30	88	75 - 125
7806610	200 mesh (<.075 mm)	2015/02/12							0.096	35		
7806610	200 mesh (>.075 mm)	2015/02/12							0.47	35		
7806868	2-Methylnaphthalene	2015/02/13	100	50 - 130	94	50 - 130	<0.020	mg/kg	NC	50		
7806868	Acenaphthene	2015/02/13	100	50 - 130	93	50 - 130	<0.0050	mg/kg	NC	50		
7806868	Acenaphthylene	2015/02/13	95	50 - 130	90	50 - 130	<0.0050	mg/kg	NC	50		
7806868	Anthracene	2015/02/13	103	60 - 130	100	60 - 130	<0.0040	mg/kg	NC	50		
7806868	Benzo(a)anthracene	2015/02/13	97	60 - 130	89	60 - 130	<0.020	mg/kg	NC	50		
7806868	Benzo(a)pyrene	2015/02/13	99	60 - 130	90	60 - 130	<0.020	mg/kg	NC	50		
7806868	Benzo(b&j)fluoranthene	2015/02/13	100	60 - 130	90	60 - 130	<0.020	mg/kg	NC	50		
7806868	Benzo(b)fluoranthene	2015/02/13	100	60 - 130	90	60 - 130	<0.020	mg/kg	NC	20		
7806868	Benzo(g,h,i)perylene	2015/02/13	97	60 - 130	87	60 - 130	<0.050	mg/kg	NC	50		
7806868	Benzo(k)fluoranthene	2015/02/13	103	60 - 130	100	60 - 130	<0.020	mg/kg	NC	50		
7806868	Chrysene	2015/02/13	101	60 - 130	95	60 - 130	<0.020	mg/kg	NC	50		
7806868	Dibenz(a,h)anthracene	2015/02/13	98	60 - 130	87	60 - 130	<0.050	mg/kg	NC	50		
7806868	Fluoranthene	2015/02/13	104	60 - 130	100	60 - 130	<0.020	mg/kg	NC	50		
7806868	Fluorene	2015/02/13	96	50 - 130	89	50 - 130	<0.020	mg/kg	NC	50		
7806868	Indeno(1,2,3-cd)pyrene	2015/02/13	103	60 - 130	101	60 - 130	<0.050	mg/kg	NC	50		
7806868	Naphthalene	2015/02/13	94	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50		
7806868	Phenanthrene	2015/02/13	93	60 - 130	90	60 - 130	<0.020	mg/kg	NC	50		
7806868	Pyrene	2015/02/13	102	60 - 130	99	60 - 130	<0.020	mg/kg	NC	50		
7807215	F2 (C10-C16 Hydrocarbons)	2015/02/12	90	50 - 130	85	80 - 120	<10	mg/kg	NC	40		
7807215	F3 (C16-C34 Hydrocarbons)	2015/02/12	101	50 - 130	96	80 - 120	<10	mg/kg	NC	40		
7807215	F4 (C34-C50 Hydrocarbons)	2015/02/12	94	50 - 130	92	80 - 120	<10	mg/kg	NC	40		
7807215	Reached Baseline at C50	2015/02/12					YES	mg/kg	NC	50		
7807980	Soluble Chloride (Cl)	2015/02/13	100	75 - 125	105	80 - 120	<5.0	mg/L	3.9	30	94	75 - 125
7809603	Total Aluminum (Al)	2015/02/17					<100	mg/kg	3.4	35	97	70 - 130

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Maxxam Job #: B510759
Report Date: 2015/02/17

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7809603	Total Antimony (Sb)	2015/02/17	97	75 - 125	98	75 - 125	<0.10	mg/kg	2.5	30	106	70 - 130
7809603	Total Arsenic (As)	2015/02/17	97	75 - 125	100	75 - 125	<0.50	mg/kg	1.1	30	103	70 - 130
7809603	Total Barium (Ba)	2015/02/17	NC	75 - 125	99	75 - 125	<0.10	mg/kg	2.6	35	100	70 - 130
7809603	Total Beryllium (Be)	2015/02/17	99	75 - 125	97	75 - 125	<0.40	mg/kg	NC	30		
7809603	Total Bismuth (Bi)	2015/02/17					<0.10	mg/kg	NC	30		
7809603	Total Cadmium (Cd)	2015/02/17	101	75 - 125	102	75 - 125	<0.050	mg/kg	NC	30	106	70 - 130
7809603	Total Calcium (Ca)	2015/02/17					<100	mg/kg	2.3	30	94	70 - 130
7809603	Total Chromium (Cr)	2015/02/17	98	75 - 125	101	75 - 125	<1.0	mg/kg	2.2	30	111	70 - 130
7809603	Total Cobalt (Co)	2015/02/17	100	75 - 125	102	75 - 125	<0.30	mg/kg	1.5	30	96	70 - 130
7809603	Total Copper (Cu)	2015/02/17	NC	75 - 125	102	75 - 125	<0.50	mg/kg	2.1	30	97	70 - 130
7809603	Total Iron (Fe)	2015/02/17					<100	mg/kg	3.5	30	95	70 - 130
7809603	Total Lead (Pb)	2015/02/17	NC	75 - 125	99	75 - 125	<0.10	mg/kg	1.1	35	98	70 - 130
7809603	Total Magnesium (Mg)	2015/02/17					<100	mg/kg	2.9	30	91	70 - 130
7809603	Total Manganese (Mn)	2015/02/17	NC	75 - 125	102	75 - 125	<0.20	mg/kg	0.17	30	99	70 - 130
7809603	Total Mercury (Hg)	2015/02/17	95	75 - 125	99	75 - 125	<0.050	mg/kg	NC	35	98	70 - 130
7809603	Total Molybdenum (Mo)	2015/02/17	103	75 - 125	100	75 - 125	<0.10	mg/kg	13	35	107	70 - 130
7809603	Total Nickel (Ni)	2015/02/17	97	75 - 125	102	75 - 125	<0.80	mg/kg	4.4	30	94	70 - 130
7809603	Total Phosphorus (P)	2015/02/17					<10	mg/kg	5.0	30	91	70 - 130
7809603	Total Potassium (K)	2015/02/17					<100	mg/kg	0.77	35		
7809603	Total Selenium (Se)	2015/02/17	104	75 - 125	106	75 - 125	<0.50	mg/kg	NC	30		
7809603	Total Silver (Ag)	2015/02/17	99	75 - 125	100	75 - 125	<0.050	mg/kg	NC	35		
7809603	Total Sodium (Na)	2015/02/17					<100	mg/kg	NC	35		
7809603	Total Strontium (Sr)	2015/02/17	NC	75 - 125	96	75 - 125	<0.10	mg/kg	7.9	35	101	70 - 130
7809603	Total Thallium (Tl)	2015/02/17	97	75 - 125	98	75 - 125	<0.050	mg/kg	NC	30	94	70 - 130
7809603	Total Tin (Sn)	2015/02/17	101	75 - 125	96	75 - 125	<0.10	mg/kg	0.20	35		
7809603	Total Titanium (Ti)	2015/02/17	NC	75 - 125	97	75 - 125	<1.0	mg/kg	1.8	35	109	70 - 130
7809603	Total Vanadium (V)	2015/02/17	NC	75 - 125	102	75 - 125	<2.0	mg/kg	2.3	30	107	70 - 130
7809603	Total Zinc (Zn)	2015/02/17	NC	75 - 125	111	75 - 125	<1.0	mg/kg	3.0	30	99	70 - 130

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Maxxam Job #: B510759
Report Date: 2015/02/17

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7809603	Total Zirconium (Zr)	2015/02/17					<0.50	mg/kg	0.82	30		

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Maxxam Job #: B510759
Report Date: 2015/02/17

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: ML

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Andy Lu, Data Validation Coordinator

David Huang, BBY Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Chain Of Custody Record

Page 1 of 3

INVOICE TO:	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI
Contact Name	Brad Klaver
Address	641- 800 BURRARD STREET VANCOUVER BC V6Z 2V8
Phone	(604) 775-9349 Fax: (604) 775-6645
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca

Report Information	
Company Name	#28804 SLR CONSULTING (CANADA) LTD
Contact Name	Lindsay P, Dave M, Lab Data
Address	200-1475 Ellis Street Kelowna BC V1Y 2A3
Phone	(250) 762-7202 Fax:
Email	lpaterson@slrconsulting.com

Project Information	
Quotation #	B50110
P.O. #	700315471
Project #	219.02112.00010
Project Name	Wilmer
Site #	
Sampled By	ML / KA

Laboratory Use Only	
Maxxam Job #	Bottle Order #:
B510759	458127
Chain Of Custody Record	Project Manager
C#458127-05-01	Crystal Ireland

Regulatory Criteria:

- [x] CSR
- [x] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: ______
Rush Confirmation Number: ______ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil, PAHs	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)	HOLD	# of Bottles	Comments
1	LR0475	MDZ-EW-0.3-0.8	2015-Feb 8th	12:00	Soil											X	4	+ gs bag.
2	LR0476	MDZ-EW-1-2														X		
3	LR0477	MDZ-EW-2-3														X	4	+ gs bag
4	LR0478	MDZ-NWA-0.3-0.8														X		
5	LR0479	MDZ-NWA-1-2														X	4	+ gs bag
6	LR0480	MDZ-NWA-2-3														X		
7	LR0481	MDZ-NWA-3-4														X		
8	LR0482	MDZ-NWA-4-5														X	4	+ gs bag.
9	LR0483	MDZ-F1-5.5														X	4	+ gs bag.
10	LR0484	MDZ-F2-5														X	4	+ gs bag.

B510759

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Mathew Coudy	15/02/09	18:30	Laurel Berthier	2015/02/10	11:45	Ø

Lab Use Only		
Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
[ ]	7,10,7 / 4,5,4	NA [ ] Yes [ ] No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

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Chain Of Custody Record Page 2 of 2

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD	Quotation #	B50110	Maxxam Job #	Bottle Order #:
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #	700315471	B510759	456524
Address	841- 800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	219.05112.00010	Chain Of Custody Record	Project Manager
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name	Wilmer	C#456524-01-01	Crystal Ireland
Phone	(604) 775-9349 Fax: (604) 775-6645	Phone	(250) 762-7202 Fax:	Site #			
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	M.C / K.A.		

Regulatory Criteria:
- [X] CSR
- [X] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions

B510759

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects
Regular (Standard) TAT: [ ]
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: ______ [ ]
Rush Confirmation Number: ______ (call lab for #)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil, PAHs	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)	HOLD	# of Bottles	Comments
1	LR0486	MDZ-DUP-A	2015-Feb-3rd	12:05	Soil											X	4	+ gs bag (& saturated PASTE)
2	LR0487	TP15-8-0.3-0.8	2015-Feb-9th	12:00	Soil							X					2	
3	LR0488	TP15-8-1-2									X	X			X		4	+ gs bag (& saturated paste)
4	LR0489	TP15-8-2-3									X	X			X		4	+ gs bag (& saturated paste)
5	LR0490	TP15-9-0.3-0.8										X					2	
6	LR0491	TP15-9-1-2									X	X			X		4	+ gs/saturated paste bag.
7	LR0492	TP15-9-2-3										X					2	
8	LR0493	TP15-10-0.3-0.8									X	X			X		4	+ gs/saturated paste bags
9	LR0494	TP15-10-1-2										X					2	
10	LR0495																	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Mathew Coady	15/02/09	18:30	Laurel Berthier	2015/02/10	11:45	Ø	[ ]	7/0/7 / 4/5/4	[ ] Yes [ ] No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

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Maxxam Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-Free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

Chain Of Custody Record Page 33 of 33

INVOICE TO:		Report Information		Project Information	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD	Quotation #	B50110
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #	70031547
Address	641- 800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	219.05112.00010
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name	Wilmer
Phone	(604) 775-9349 Fax (604) 775-6645	Phone	(250) 762-7202 Fax:	Site #	
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	Matt Coady / K Ashworth

Laboratory Use Only

Maxxam Job #	Bottle Order #:
B510759	458524
Chain Of Custody Record	Project Manager
C#458524-02-01	Crystal Ireland

Regulatory Criteria:
- [x] CSR
- [x] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [x] Date Required: ______
Rush Confirmation Number: ______ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil, PAHs	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)	HOLD	# of Bottles	Comments
1	LR0501	TP15-11-0.3-0.8	15/02/09	12:05	Soil							X					2	
2	LR0502	TP15-11-1-2	15/02/09	↓	Soil						X	X			X		4	+GS Bag
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

B510759

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
KAA	15/02/09	18:30	Laurel Berthier	2015/02/10	11:45	Ø

Lab Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
[ ]	7,10,7 / 4,5,4	NA [ ] Yes [ ] No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

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Maxxam
A Bureau Veritas Group Company

PWGSC - MAXXAM ADDITIONAL ANALYSIS REQUEST RECORD

Company Name: SLR Consulting

Contact Name: Lindsay Paterson

Consultant Project #: 219.05112.00010

Maxxam Job #:

Project Name: Wilmer

PWGSC Project Manager: Brad Klaver

PO Task Authorization #: 70031547/

Maxxam Location: BURNABY, BC

(Please complete this form on a per job basis - i.e. one form per original Maxxam Job#)

TURNAROUND TIME		
Priority	(5 days)	☐
Rush	(3 days)	☒
	(2 days)	☐
	(1 day)	☐
	(same day)	☐
Date Required :		

Applicable Guidelines (please specify): CCME AL/RL

LAB USE ONLY
Original COC analysis completed and invoiced at time of add-on (circle one)
YES NO
(if yes original coc in invoice package is for reference only)
New Maxxam Job # (if applicable)

ADDITIONAL ANALYSIS REQUEST

CLIENT SAMPLE ID	Original COC #	LAB ID	Matrix	SAMPLING DATE (YYYY/MM/DD)	SAMPLING Time HH:MM	Sat Paste Na, Cl										Sample previously submitted on hold (Y/N)	SPECIAL INSTRUCTIONS
TP15-8-1-2			SOIL	2015/02/09	12:00	~~X~~ no										N	
TP15-8-2-3																N	
TP15-9-0.3-0.8																N	
TP15-9-1-2																N	
TP15-9-2-3																N	
TP15-10-0.3-0.8						X										N	
TP15-10-1-2																N	
TP15-11-0.3-0.8																N	
TP15-11-1-2						X										N	

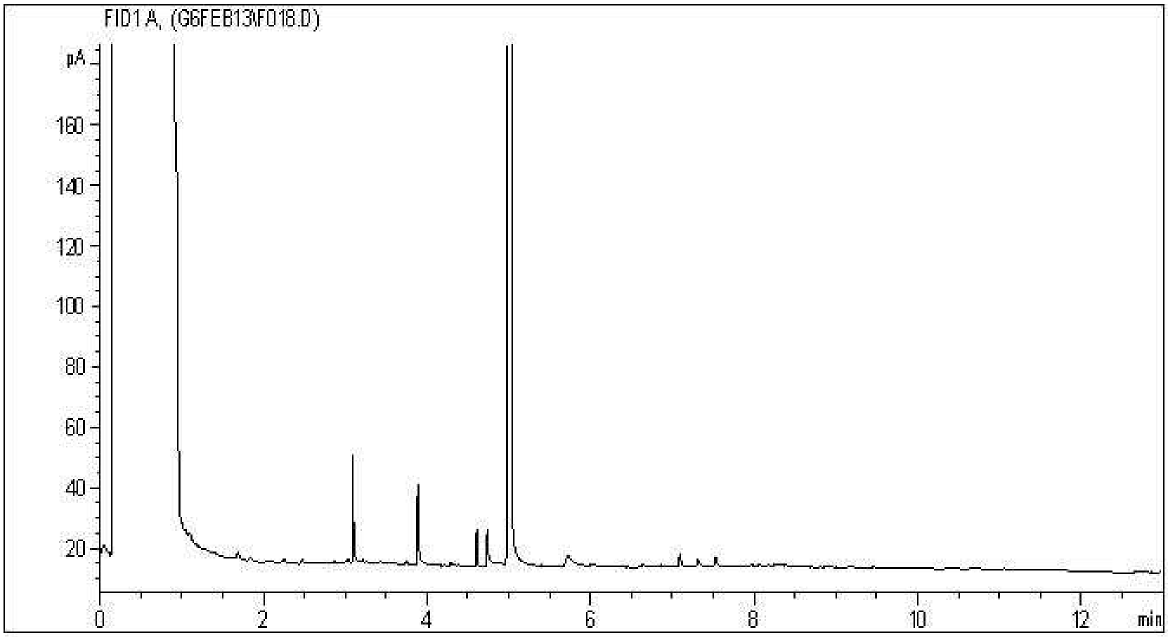
B510759

REQUESTED BY: (Please Sign & Print) L Paterson	DATE: (YYYY/MM/DD) 2015/02/10	TIME: (HH:MM) 14:07
RECEIVED BY: (Please Sign & Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)

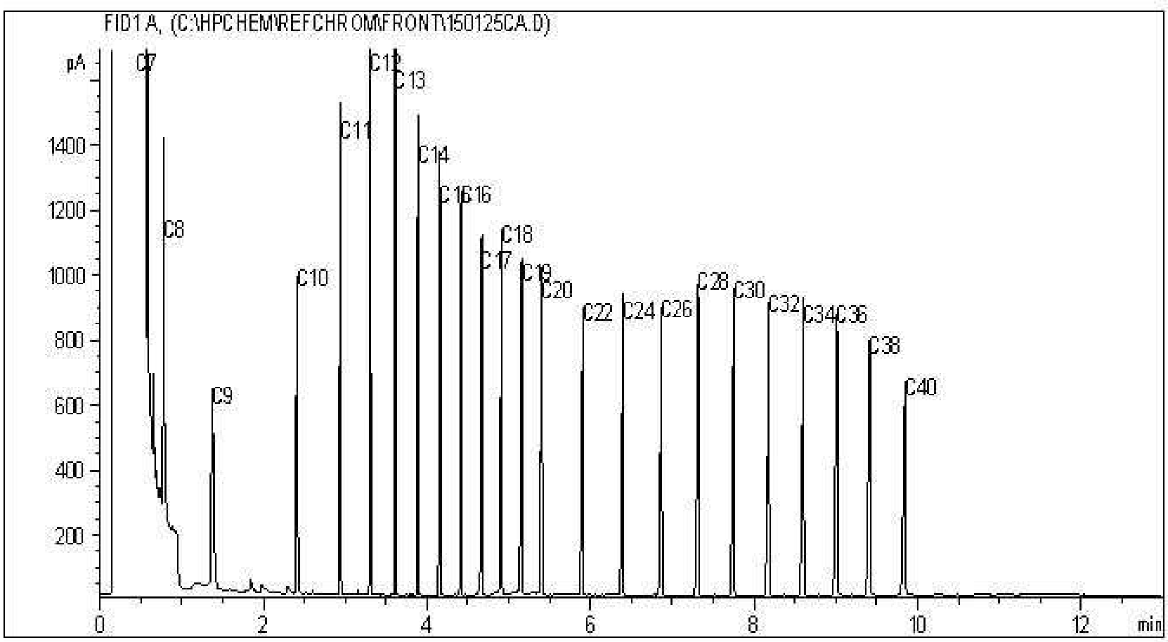
Maxxam Job #: B510759
Report Date: 2015/02/17
Maxxam Sample: LR0475

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: MDZ-EW-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



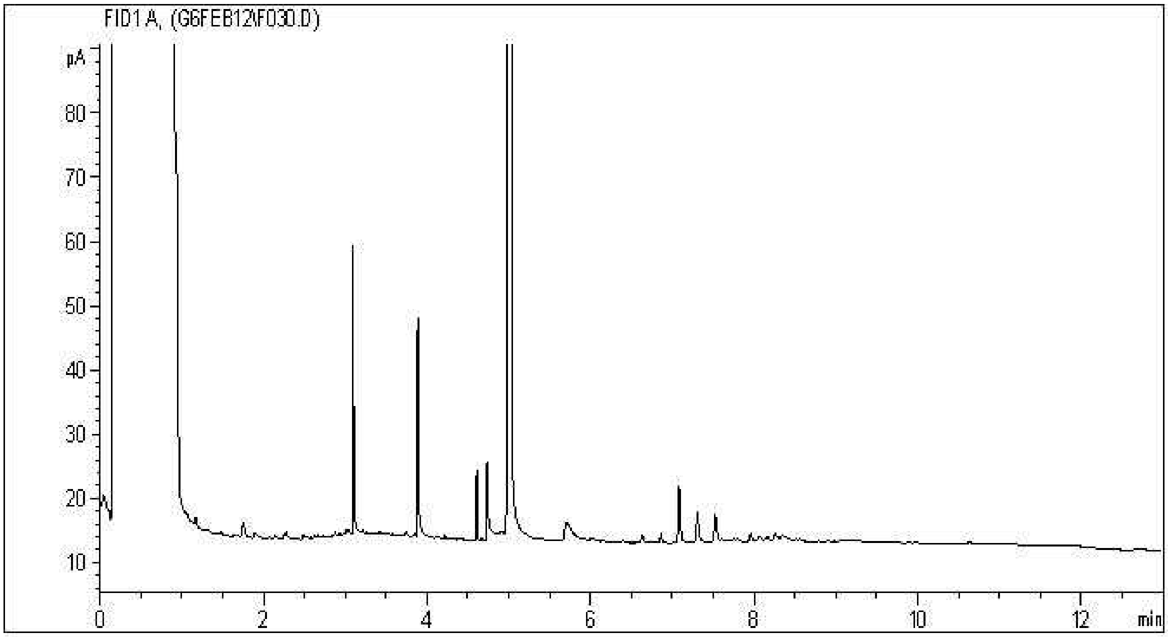
Carbon Range Distribution - Reference Chromatogram



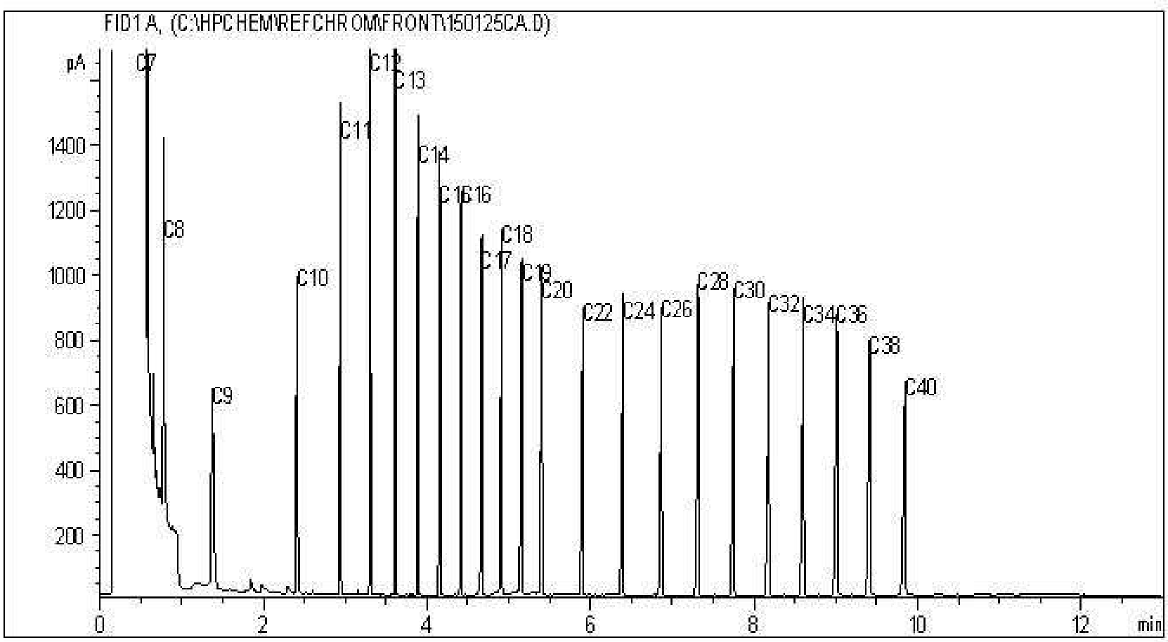
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



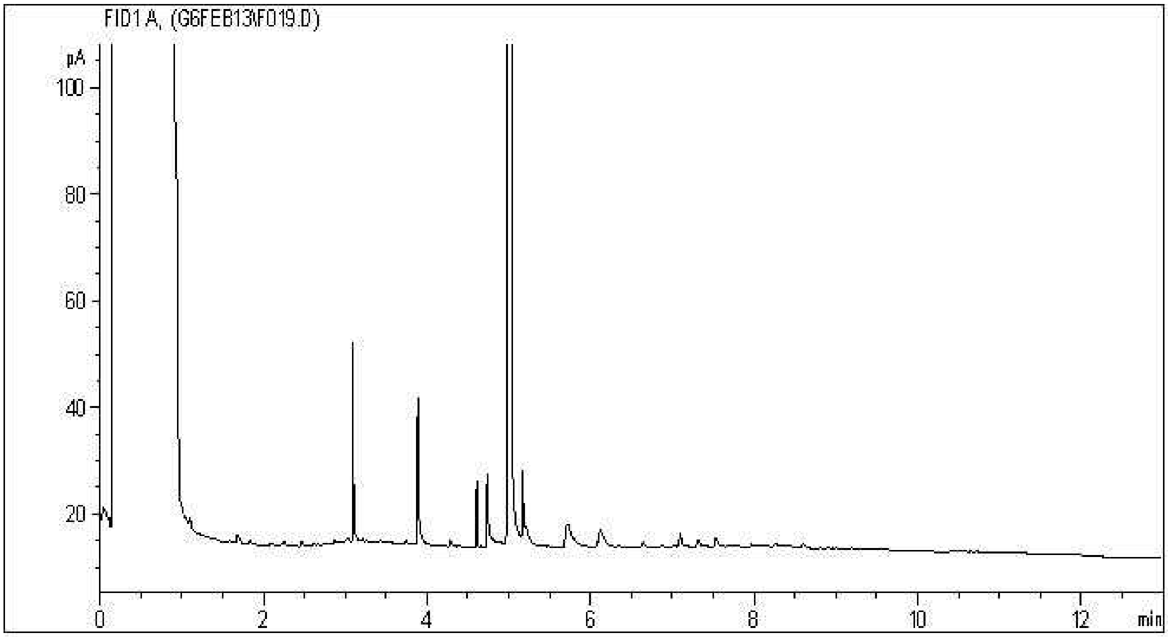
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

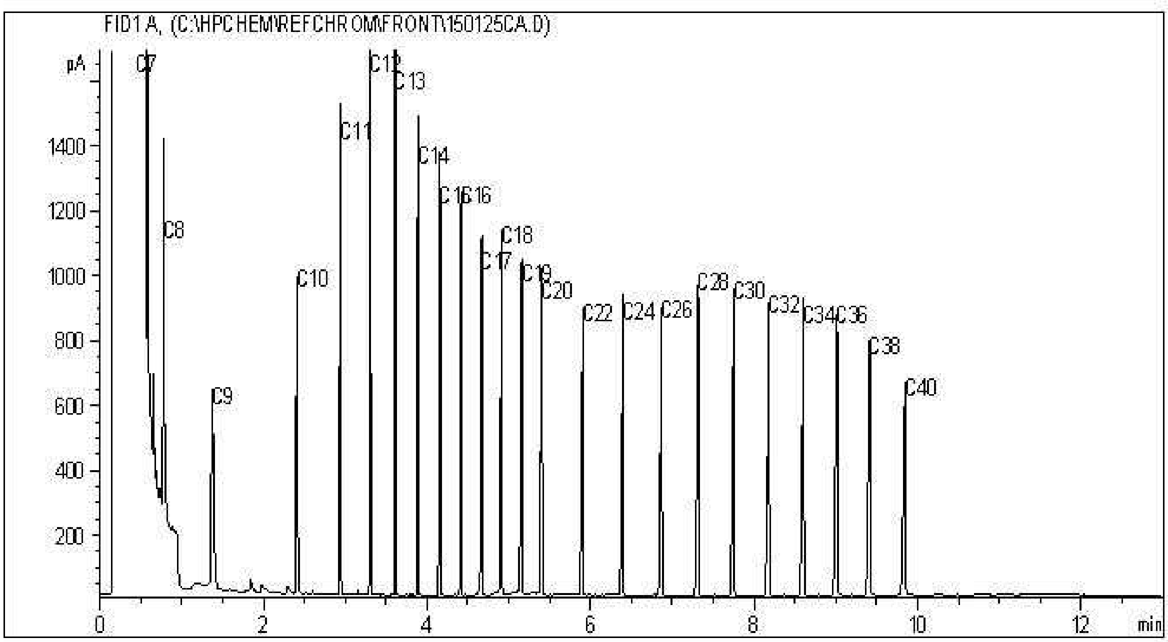
Maxxam Job #: B510759
Report Date: 2015/02/17
Maxxam Sample: LR0483

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: MDZ-F1-5.5

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



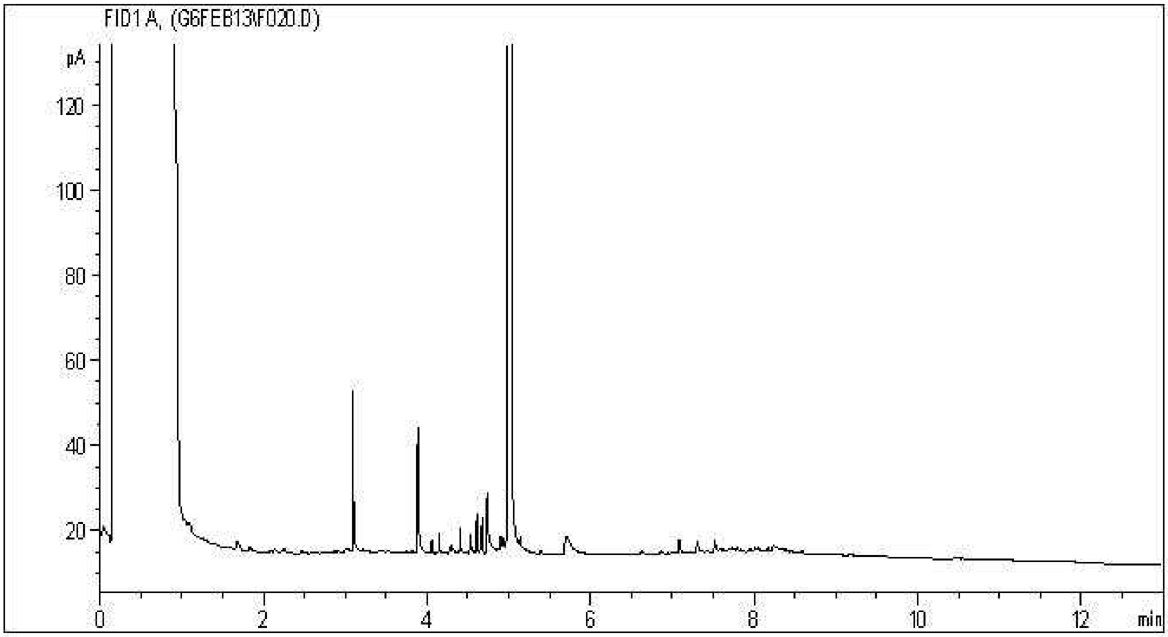
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

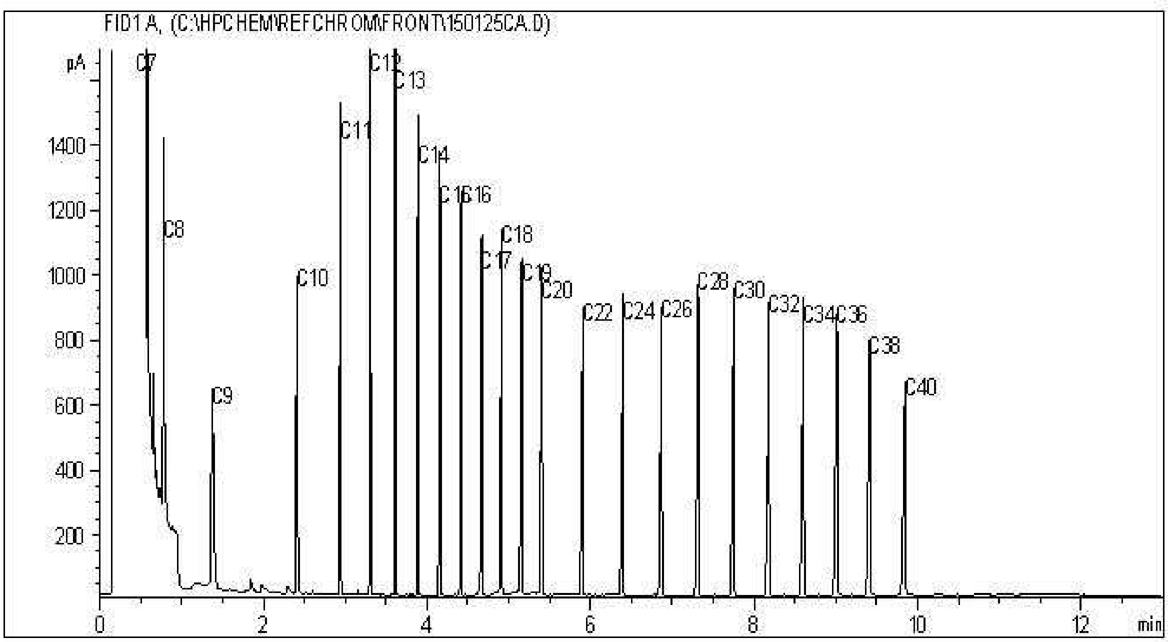
Maxxam Job #: B510759
Report Date: 2015/02/17
Maxxam Sample: LR0484

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: MDZ-F2-5

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



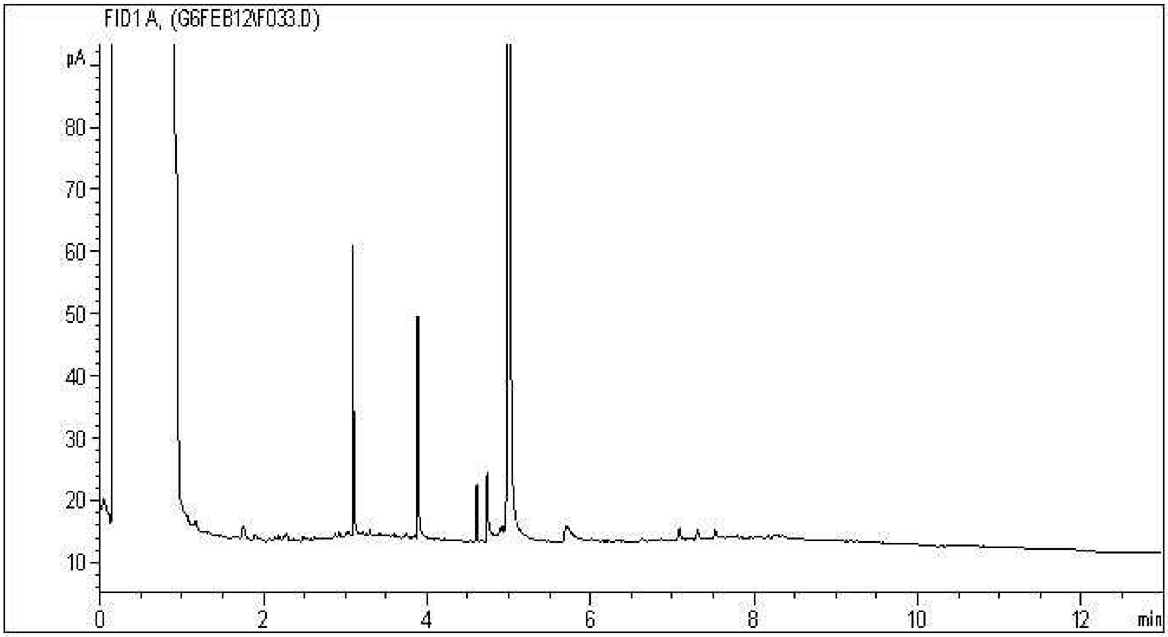
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

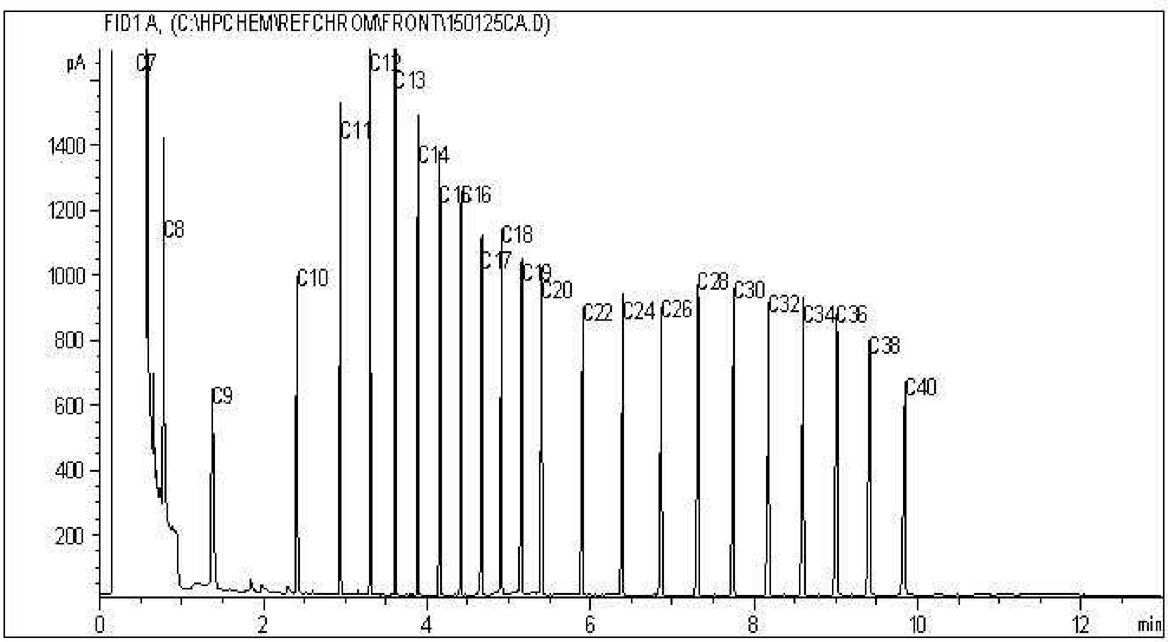
Maxxam Job #: B510759
Report Date: 2015/02/17
Maxxam Sample: LR0484 Lab-Dup

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: MDZ-F2-5

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



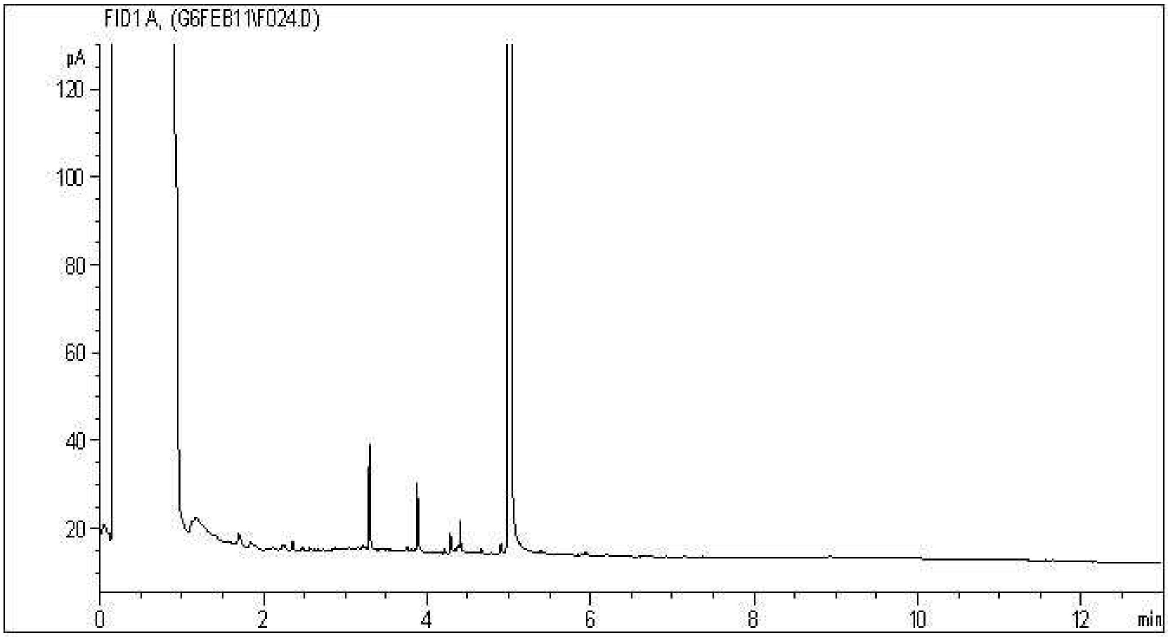
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

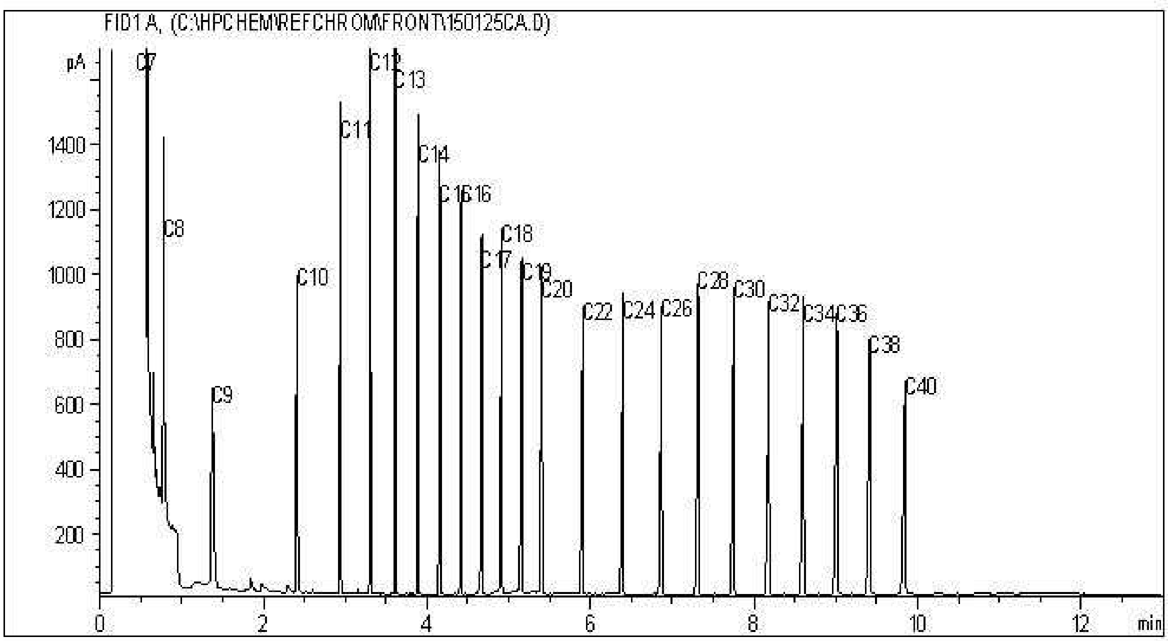
Maxxam Job #: B510759
Report Date: 2015/02/17
Maxxam Sample: LR0488

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: TP15-8-1-2

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



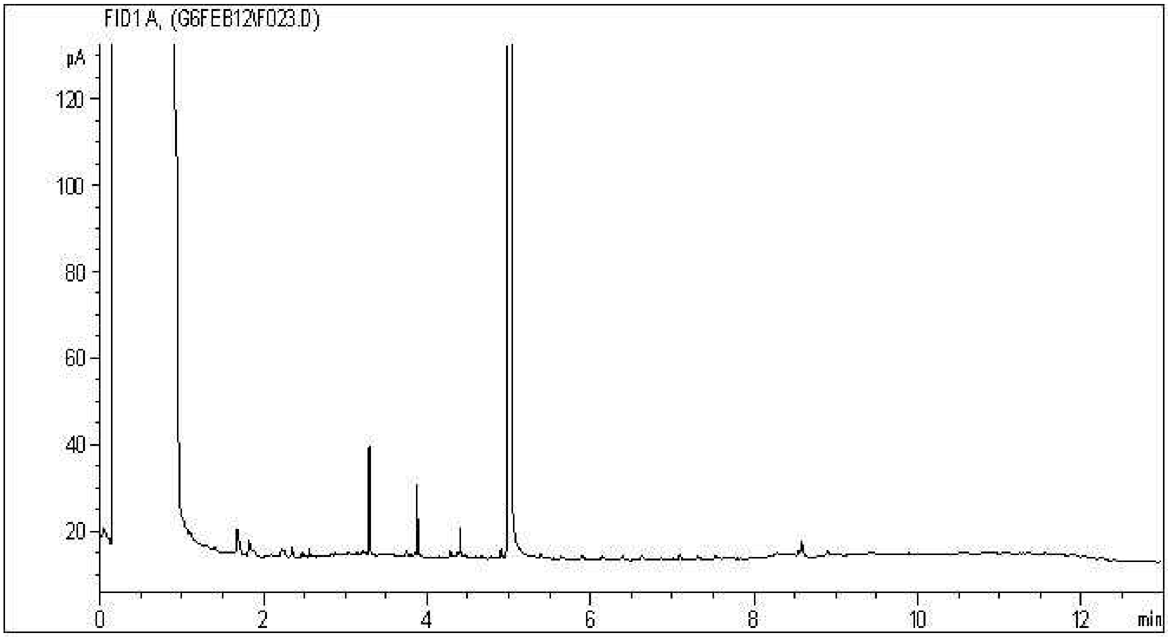
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

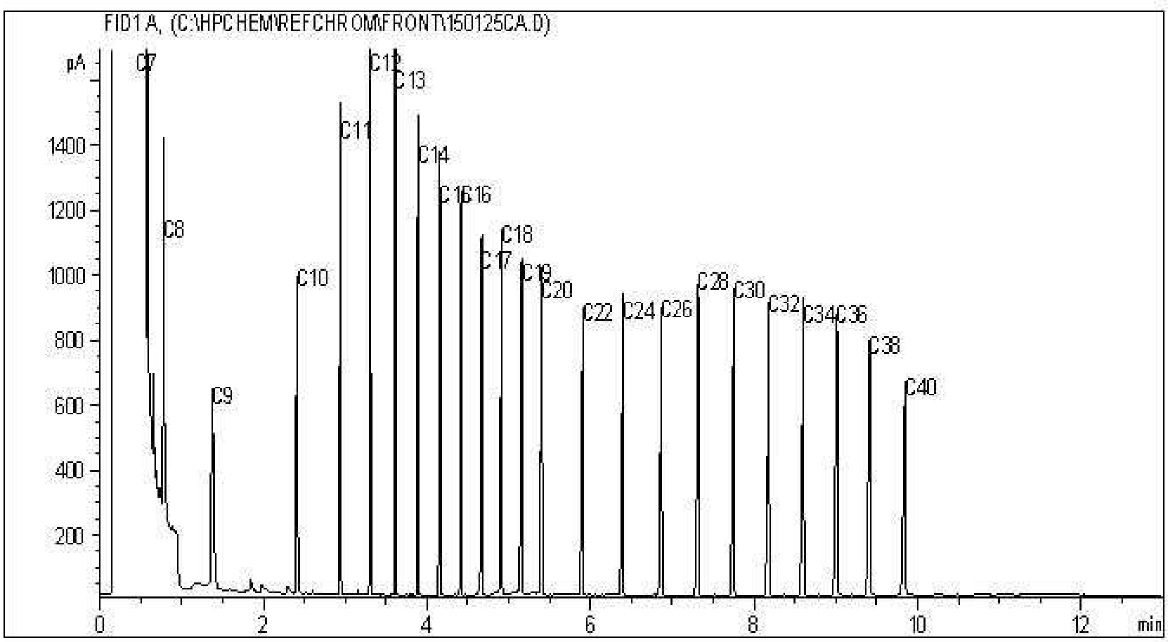
Maxxam Job #: B510759
Report Date: 2015/02/17
Maxxam Sample: LR0489

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: TP15-8-2-3

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



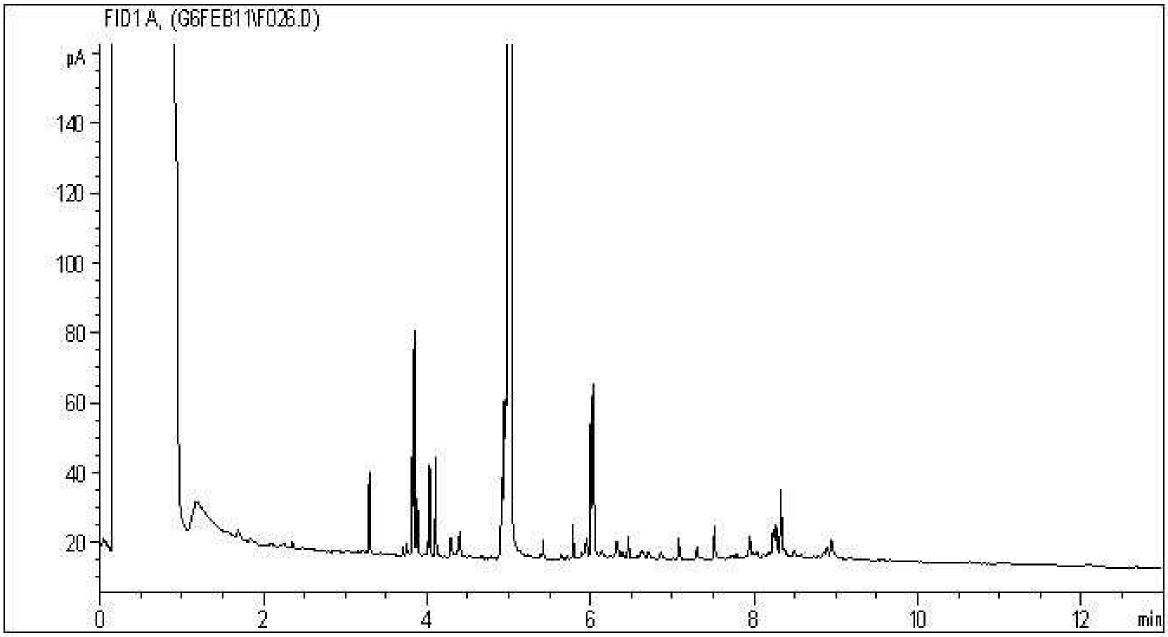
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

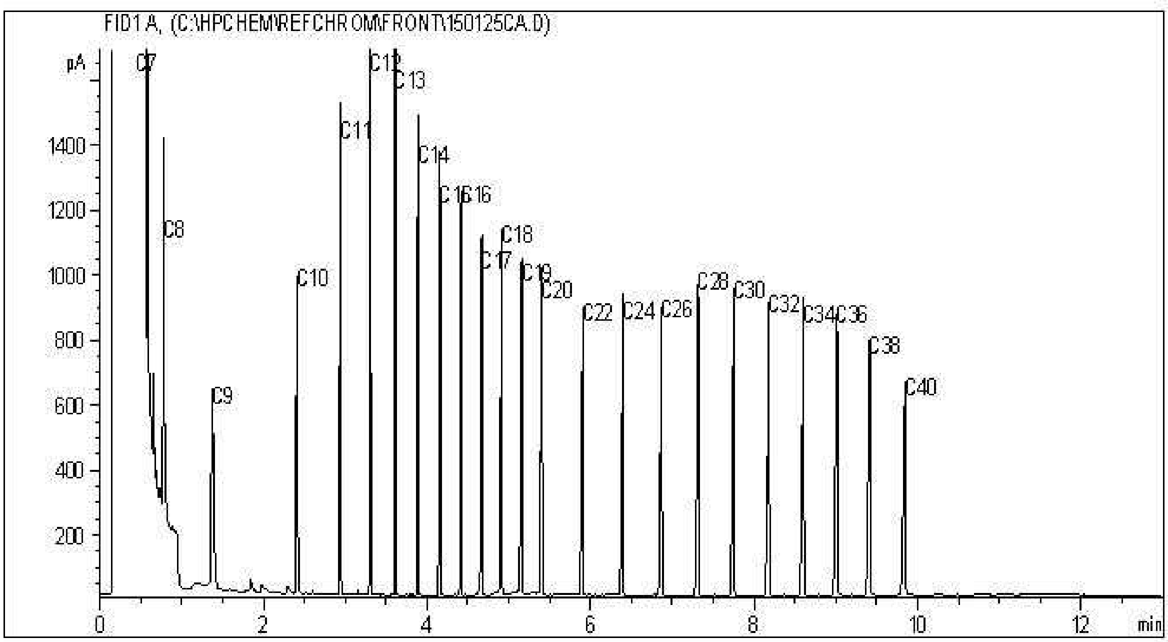
Maxxam Job #: B510759
Report Date: 2015/02/17
Maxxam Sample: LR0491

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: TP15-9-1-2

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



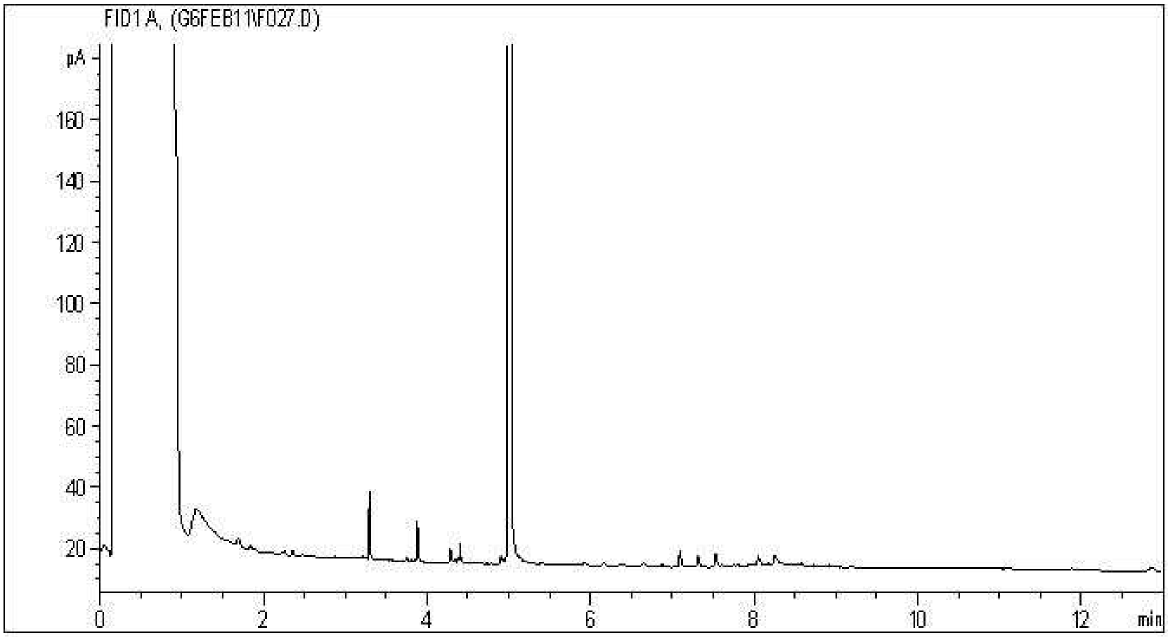
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

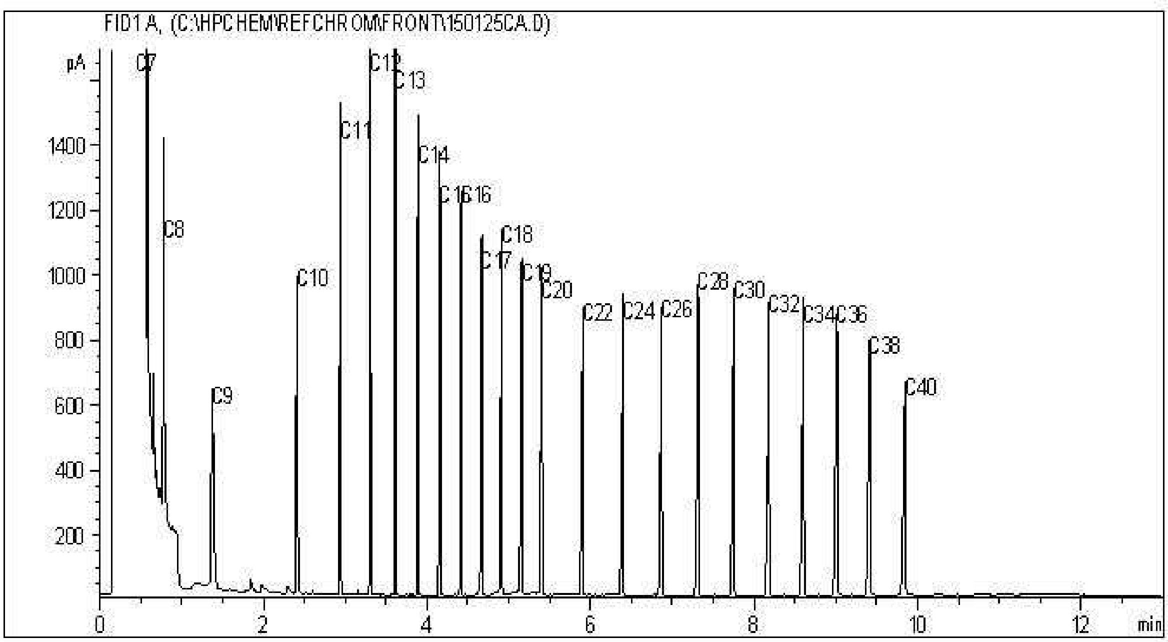
Maxxam Job #: B510759
Report Date: 2015/02/17
Maxxam Sample: LR0493

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: Wilmer Marsh
Client ID: TP15-10-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



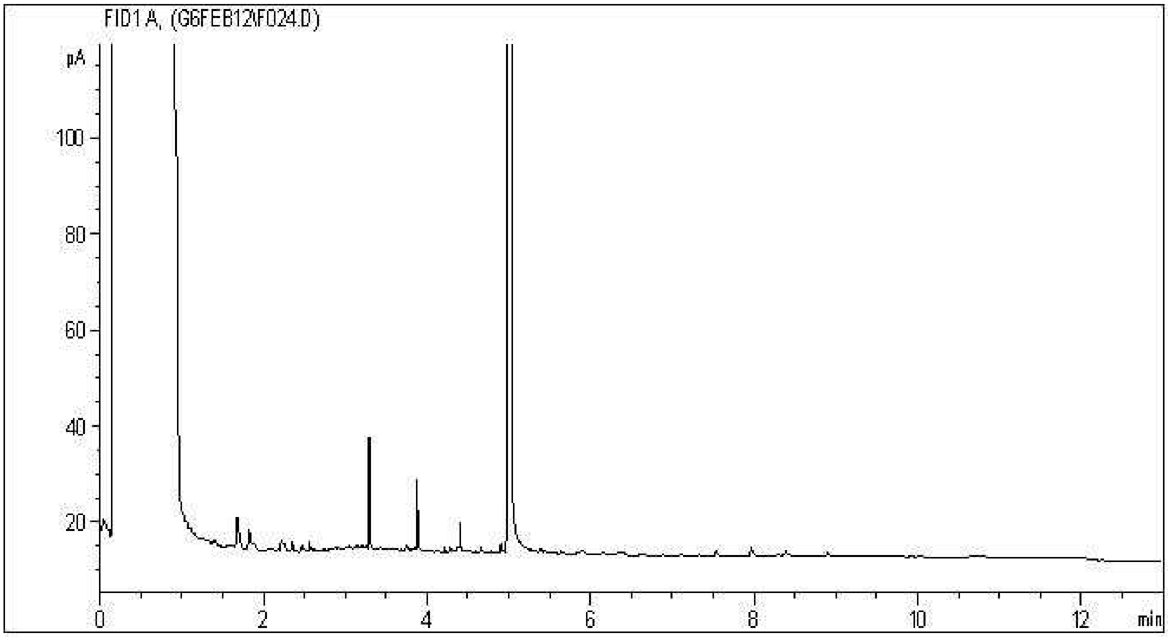
Carbon Range Distribution - Reference Chromatogram



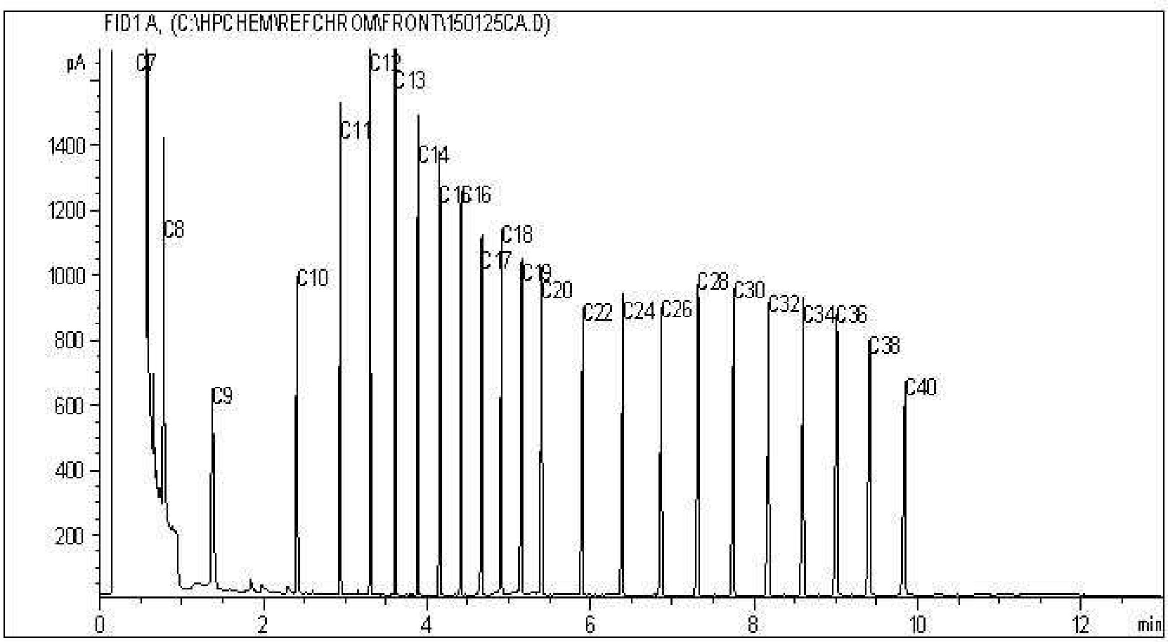
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



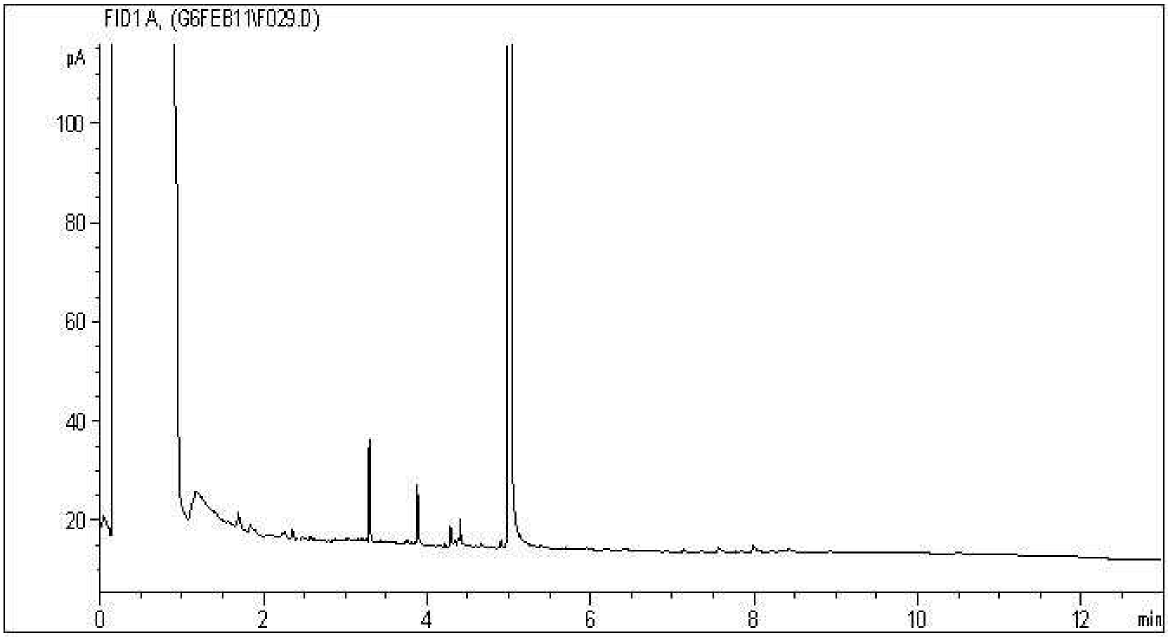
Carbon Range Distribution - Reference Chromatogram



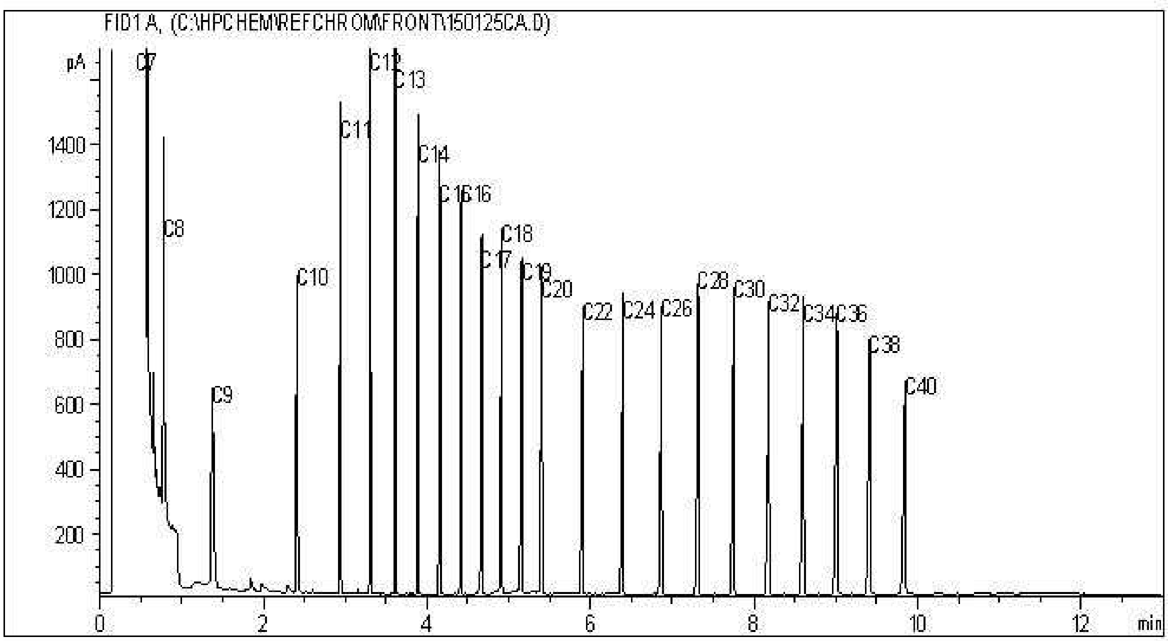
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Your P.O. #: 700315471
Your Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your C.O.C. #: 458524-03-01

Attention:Lindsay Paterson
SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2015/02/25
Report #: R1810418
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B513126
Received: 2015/02/18, 11:05

Sample Matrix: Soil
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE LH VH F1 in Soil - Field Pres.	4	N/A	2015/02/23	BBY8SOP-00010	EPA 8260c R3 m
BTEX/MTBE LH VH F1 in Soil - Field Pres.	2	N/A	2015/02/24	BBY8SOP-00010	EPA 8260c R3 m
Volatile F1-BTEX	4	N/A	2015/02/24	BBY WI-00033	Auto Calc
Volatile F1-BTEX	2	N/A	2015/02/25	BBY WI-00033	Auto Calc
Moisture	5	N/A	2015/02/20	BBY8SOP-00017	OMOE E3139 3.1 m
Moisture	1	N/A	2015/02/24	BBY8SOP-00017	OMOE E3139 3.1 m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Samantha Fregien, Project Manager
Email: SFregien@maxxam.ca
Phone# (604) 734 7276
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B513126
Report Date: 2015/02/25

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

PHYSICAL TESTING (SOIL)

Maxxam ID		LS1971	LS1972	LS1973	LS1974		LS1975		
Sampling Date		2015/02/16	2015/02/16	2015/02/16	2015/02/16		2015/02/16		
COC Number		458524-03-01	458524-03-01	458524-03-01	458524-03-01		458524-03-01		
	Units	**A3-SS1**	**A3-SS2**	**A3-SS3**	**A3-SS4**	**QC Batch**	**A3-SS5**	**RDL**	**QC Batch**
Physical Properties									
Moisture	%	2.3	18	14	10	7812185	24	0.30	7816105
RDL = Reportable Detection Limit									

Maxxam ID		LS1976		
Sampling Date		2015/02/16		
COC Number		458524-03-01		
	Units	**A3-SS6**	**RDL**	**QC Batch**
Physical Properties				
Moisture	%	19	0.30	7812185
RDL = Reportable Detection Limit				

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B513126
Report Date: 2015/02/25

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LS1971			LS1972		LS1973		LS1974		
Sampling Date		2015/02/16			2015/02/16		2015/02/16		2015/02/16		
COC Number		458524-03-01			458524-03-01		458524-03-01		458524-03-01		
	Units	**A3-SS1**	**RDL**	**QC Batch**	**A3-SS2**	**RDL**	**A3-SS3**	**RDL**	**A3-SS4**	**RDL**	**QC Batch**
Calculated Parameters											
F1 (C6-C10) - BTEX	mg/kg	<10	10	7810799	<10	10	<20	20	<10	10	7810799
Volatiles											
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	0.10	7816141	<0.10	0.10	<0.20 (1)	0.20	<0.10	0.10	7816130
Benzene	mg/kg	0.019	0.0050	7816141	<0.010 (2)	0.010	<0.010 (1)	0.010	<0.0050	0.0050	7816130
Toluene	mg/kg	0.56	0.020	7816141	0.59	0.020	0.10 (1)	0.040	<0.020	0.020	7816130
Ethylbenzene	mg/kg	0.012	0.010	7816141	0.019	0.010	<0.020 (1)	0.020	<0.010	0.010	7816130
m & p-Xylene	mg/kg	<0.040	0.040	7816141	<0.040	0.040	<0.080 (1)	0.080	<0.040	0.040	7816130
o-Xylene	mg/kg	<0.040	0.040	7816141	<0.040	0.040	<0.080 (1)	0.080	<0.040	0.040	7816130
Styrene	mg/kg	<0.030	0.030	7816141	<0.030	0.030	<0.060 (1)	0.060	<0.030	0.030	7816130
Xylenes (Total)	mg/kg	<0.040	0.040	7816141	<0.040	0.040	<0.080	0.080	<0.040	0.040	7816130
(C6-C10)	mg/kg	<10	10	7816141	<10	10	<20 (1)	20	<10	10	7816130
Surrogate Recovery (%)											
1,4-Difluorobenzene (sur.)	%	105		7816141	99		99		99		7816130
4-Bromofluorobenzene (sur.)	%	98		7816141	99		99		99		7816130
D10-ETHYLBENZENE (sur.)	%	95		7816141	110		110		106		7816130
D4-1,2-Dichloroethane (sur.)	%	98		7816141	108		106		105		7816130

RDL = Reportable Detection Limit
(1) Detection limit raised based on sample volume used for analysis.
(2) RDL raised due to sample matrix interference.

Maxxam Job #: B513126
Report Date: 2015/02/25

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LS1975		LS1976		
Sampling Date		2015/02/16		2015/02/16		
COC Number		458524-03-01		458524-03-01		
	Units	**A3-SS5**	**QC Batch**	**A3-SS6**	**RDL**	**QC Batch**
Calculated Parameters						
F1 (C6-C10) - BTEX	mg/kg	<10	7810799	<10	10	7810799
Volatiles						
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	7816130	<0.10	0.10	7816141
Benzene	mg/kg	<0.0050	7816130	<0.0050	0.0050	7816141
Toluene	mg/kg	<0.020	7816130	0.27	0.020	7816141
Ethylbenzene	mg/kg	<0.010	7816130	<0.010	0.010	7816141
m & p-Xylene	mg/kg	<0.040	7816130	<0.040	0.040	7816141
o-Xylene	mg/kg	<0.040	7816130	<0.040	0.040	7816141
Styrene	mg/kg	<0.030	7816130	<0.030	0.030	7816141
Xylenes (Total)	mg/kg	<0.040	7816130	<0.040	0.040	7816141
(C6-C10)	mg/kg	<10	7816130	<10	10	7816141
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	98	7816130	106		7816141
4-Bromofluorobenzene (sur.)	%	99	7816130	97		7816141
D10-ETHYLBENZENE (sur.)	%	109	7816130	94		7816141
D4-1,2-Dichloroethane (sur.)	%	107	7816130	100		7816141
RDL = Reportable Detection Limit						

Maxxam Job #: B513126
Report Date: 2015/02/25

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

GENERAL COMMENTS

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

Package 1	2.7°C

Results relate only to the items tested.

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Maxxam Job #: B513126
Report Date: 2015/02/25

QUALITY ASSURANCE REPORT

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
7816130	1,4-Difluorobenzene (sur.)	2015/02/23	97	70 - 130	98	70 - 130	105	%		
7816130	4-Bromofluorobenzene (sur.)	2015/02/23	100	70 - 130	101	70 - 130	97	%		
7816130	D10-ETHYLBENZENE (sur.)	2015/02/23	95	50 - 130	83	50 - 130	93	%		
7816130	D4-1,2-Dichloroethane (sur.)	2015/02/23	103	70 - 130	103	70 - 130	108	%		
7816141	1,4-Difluorobenzene (sur.)	2015/02/24	107	70 - 130	109	70 - 130	105	%		
7816141	4-Bromofluorobenzene (sur.)	2015/02/24	96	70 - 130	101	70 - 130	96	%		
7816141	D10-ETHYLBENZENE (sur.)	2015/02/24	92	50 - 130	82	50 - 130	88	%		
7816141	D4-1,2-Dichloroethane (sur.)	2015/02/24	98	70 - 130	100	70 - 130	100	%		
7812185	Moisture	2015/02/20					<0.30	%	4.2	20
7816105	Moisture	2015/02/24					<0.30	%	19	20
7816130	(C6-C10)	2015/02/23			99	60 - 140	<10	mg/kg		
7816130	Benzene	2015/02/23	101	60 - 140	100	60 - 140	<0.0050	mg/kg	NC	40
7816130	Ethylbenzene	2015/02/23	101	60 - 140	100	60 - 140	<0.010	mg/kg	NC	40
7816130	m & p-Xylene	2015/02/23	94	60 - 140	93	60 - 140	<0.040	mg/kg	NC	40
7816130	Methyl-tert-butylether (MTBE)	2015/02/23					<0.10	mg/kg	NC	40
7816130	o-Xylene	2015/02/23	98	60 - 140	96	60 - 140	<0.040	mg/kg	NC	40
7816130	Styrene	2015/02/23					<0.030	mg/kg	NC	40
7816130	Toluene	2015/02/23	95	60 - 140	94	60 - 140	<0.020	mg/kg	NC	40
7816130	Xylenes (Total)	2015/02/23					<0.040	mg/kg	NC	40
7816141	(C6-C10)	2015/02/24			101	60 - 140	<10	mg/kg		
7816141	Benzene	2015/02/24	90	60 - 140	87	60 - 140	<0.0050	mg/kg	NC	40
7816141	Ethylbenzene	2015/02/24	94	60 - 140	92	60 - 140	<0.010	mg/kg	NC	40
7816141	m & p-Xylene	2015/02/24	94	60 - 140	92	60 - 140	<0.040	mg/kg	NC	40
7816141	Methyl-tert-butylether (MTBE)	2015/02/24					<0.10	mg/kg	NC	40
7816141	o-Xylene	2015/02/24	94	60 - 140	92	60 - 140	<0.040	mg/kg	NC	40
7816141	Styrene	2015/02/24					<0.030	mg/kg	NC	40
7816141	Toluene	2015/02/24	88	60 - 140	86	60 - 140	<0.020	mg/kg	NC	40

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Maxxam Job #: B513126
Report Date: 2015/02/25

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QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
7816141	Xylenes (Total)	2015/02/24					<0.040	mg/kg	NC	40

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Maxxam Job #: B513126
Report Date: 2015/02/25

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: Wilmer Marsh
Your P.O. #: 700315471
Sampler Initials: MM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Rob Reinert, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-Free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

Chain Of Custody Record Page 1 of 1

INVOICE TO:		Report Information		Project Information	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD	Quotation #	B50110
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #	
Address	641- 800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	219.05112.00010
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name	WILMER
Phone	(604) 775-9349 Fax: (604) 775-6645	Phone	(250) 762-7202 Fax	Site #	
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	MM/KA

Laboratory Use Only

Maxxam Job #	Bottle Order #:
B513126	458524
Chain Of Custody Record	Project Manager
C#458524-03-01	Crystal Ireland

Regulatory Criteria:
- [ ] CSR
- [x] CCME
- [ ] BC Water Quality
- [ ] Other

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: [x]
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: ____ [ ]
Rush Confirmation Number: ____ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1 [redacted] in Soil, [redacted]	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)		# of Bottles	Comments
1	LS1971	A3-SS1	2015/02/16		SOIL						X							BETX/F1 only
2	LS1972	A3-SS2	↓		↓						↓							↓
3	LS1973	A3-SS3	↓		↓						↓							↓
4	LS1974	A3-SS4	↓		↓						↓							↓
5	LS1975	A3-SS5	↓		↓						↓							↓
6	LS1976	A3-SS6	↓		↓						↓							↓
7																		
8																		
9																		
10																		B513126

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
MARCI MARTIN	2015/02/17	10:30	CYRHEA GODA	2015/02/18	11:05		[ ]	2, 3, 3	N/A [ ] Yes [ ] No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

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Your P.O. #: 700315471
Your Project #: 219.05112.0010
Site#: WILMER MARSH
Site Location: WILMER MARSH

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Your C.O.C. #: 459576-02-01, 459576-03-01, 459576-04-01

Report Date: 2015/03/30
Report #: R1837443
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B518966
Received: 2015/03/06, 09:25

Sample Matrix: Soil
Samples Received: 23

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE LH VH F1 in Soil - Field Pres.	6	N/A	2015/03/12	BBY8SOP-00010	EPA 8260c R3 m
Volatile F1-BTEX	6	N/A	2015/03/13	BBY WI-00033	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (1)	8	2015/03/11	2015/03/11	BBY8SOP-00030	CCME PHC-CWS
Elements by ICPMS (total)	11	2015/03/12	2015/03/12	BBY7SOP-00001	EPA 6020a R1 m
Elements by ICPMS (total)	12	2015/03/27	2015/03/27	BBY7SOP-00001	EPA 6020a R1 m
Metals - TCLP	2	2015/03/26	2015/03/28	BBY7SOP-00001	EPA 6020a R1 m
Particulate Mesh 200	6	N/A	2015/03/13	BBY6SOP-00039	Carter 2nd ed 55.4
Moisture	8	N/A	2015/03/12	BBY8SOP-00017	OMOE E3139 3.1 m
PAH in Soil by GC/MS (SIM) - CCME	8	2015/03/11	2015/03/12	BBY8SOP-00022	EPA 8270d R4 m
Benzo[a]pyrene Equivalency	8	N/A	2015/03/13	BBY WI-00033	Auto Calc
Total LMW, HMW, Total PAH Calc	8	N/A	2015/03/13	BBY WI-00033	Auto Calc
pH (2:1 DI Water Extract)	11	2015/03/12	2015/03/12	BBY6SOP-00028	BCMOE BCLM Mar2005 m
pH (2:1 DI Water Extract)	12	2015/03/27	2015/03/27	BBY6SOP-00028	BCMOE BCLM Mar2005 m
TCLP pH Measurements	2	N/A	2015/03/27	BBY7SOP-00005	EPA 1311 R1992

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

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

(1) The method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory; all deviations were justified and validated and are made available upon request; the chromatogram descends to baseline by the retention time of nC50 unless otherwise indicated; all QC criteria met; individual hydrocarbons (nC10, nC16, nC34) are within 10% of their average response factor; linearity is within 15%.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Samantha Fregien, Project Manager
Email: SFregien@maxxam.ca
Phone# (604)639-8418
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LV4353	LV4358	LV4361	LV4367	LV4372		
Sampling Date		2015/03/04	2015/03/04	2015/03/04	2015/03/04	2015/03/04		
COC Number		459576-02-01	459576-02-01	459576-02-01	459576-03-01	459576-03-01		
	Units	**MDZ-EW2-1.0-2.0**	**MDZ-EW1-3.0-4.0**	**MDZ-SW1-0.3-0.8**	**MDZ-SW2-0.3-0.8**	**MDZ-SW3-2.0-3.0**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	10	7833943
F3 (C16-C34 Hydrocarbons)	mg/kg	17	18	32	<10	20	10	7833943
F4 (C34-C50 Hydrocarbons)	mg/kg	13	<10	26	<10	<10	10	7833943
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	7833943
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	111	115	112	113	116		7833943

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		LV4373	LV4375	LV4378		
Sampling Date		2015/03/04	2015/03/04	2015/03/04		
COC Number		459576-03-01	459576-03-01	459576-04-01		
	Units	**MDZ-SW4-0.3-0.8**	**MDZ-SW4-2.0-3.0**	**MDZ-SW5-1.0-2.0**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	10	7833943
F3 (C16-C34 Hydrocarbons)	mg/kg	20	12	<10	10	7833943
F4 (C34-C50 Hydrocarbons)	mg/kg	14	11	<10	10	7833943
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	N/A	7833943
Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	111	114	117		7833943

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

PARTICLE SIZE DISTRIBUTION ANALYSIS (SOIL)

Maxxam ID		LV4358	LV4361	LV4372	LV4373	LV4375		
Sampling Date		2015/03/04	2015/03/04	2015/03/04	2015/03/04	2015/03/04		
COC Number		459576-02-01	459576-02-01	459576-03-01	459576-03-01	459576-03-01		
	Units	**MDZ-EW1-3.0-4.0**	**MDZ-SW1-0.3-0.8**	**MDZ-SW3-2.0-3.0**	**MDZ-SW4-0.3-0.8**	**MDZ-SW4-2.0-3.0**	**RDL**	**QC Batch**
Physical Properties								
200 mesh (>.075 mm)	%	12.8	7.40	9.00	10.7	3.17	0.10	7834948
200 mesh (<.075 mm)	%	87.2	92.6	91.0	89.3	96.8	0.10	7834948
RDL = Reportable Detection Limit								

Maxxam ID		LV4378		
Sampling Date		2015/03/04		
COC Number		459576-04-01		
	Units	**MDZ-SW5-1.0-2.0**	**RDL**	**QC Batch**
Physical Properties				
200 mesh (>.075 mm)	%	1.88	0.10	7834948
200 mesh (<.075 mm)	%	98.1	0.10	7834948
RDL = Reportable Detection Limit				

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

PHYSICAL TESTING (SOIL)

Maxxam ID		LV4353	LV4358	LV4361	LV4367	LV4372		
Sampling Date		2015/03/04	2015/03/04	2015/03/04	2015/03/04	2015/03/04		
COC Number		459576-02-01	459576-02-01	459576-02-01	459576-03-01	459576-03-01		
	Units	**MDZ-EW2-1.0-2.0**	**MDZ-EW1-3.0-4.0**	**MDZ-SW1-0.3-0.8**	**MDZ-SW2-0.3-0.8**	**MDZ-SW3-2.0-3.0**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	4.2	4.5	4.1	3.6	2.7	0.30	7832422
RDL = Reportable Detection Limit								

Maxxam ID		LV4373	LV4375	LV4378		
Sampling Date		2015/03/04	2015/03/04	2015/03/04		
COC Number		459576-03-01	459576-03-01	459576-04-01		
	Units	**MDZ-SW4-0.3-0.8**	**MDZ-SW4-2.0-3.0**	**MDZ-SW5-1.0-2.0**	**RDL**	**QC Batch**
Physical Properties						
Moisture	%	2.9	4.5	3.6	0.30	7832422
RDL = Reportable Detection Limit						

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Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		LV4352	LV4367	
Sampling Date		2015/03/04	2015/03/04	
COC Number		459576-02-01	459576-03-01	
	Units	**MDZ-EW2-0.3-0.8**	**MDZ-SW2-0.3-0.8**	**QC Batch**
TCLP Extraction Procedure				
Initial pH of Sample	pH	9.23	9.77	7847788
pH after HCl	pH	5.67	5.55	7847788
Final pH of Leachate	pH	6.21	6.81	7847788
pH of Leaching Fluid	pH	2.91	2.91	7847788

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LV4358	LV4361	LV4372	LV4373		
Sampling Date		2015/03/04	2015/03/04	2015/03/04	2015/03/04		
COC Number		459576-02-01	459576-02-01	459576-03-01	459576-03-01		
	Units	**MDZ-EW1-3.0-4.0**	**MDZ-SW1-0.3-0.8**	**MDZ-SW3-2.0-3.0**	**MDZ-SW4-0.3-0.8**	**RDL**	**QC Batch**
Calculated Parameters							
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	10	7832020
Volatiles							
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	7834464
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7834464
Toluene	mg/kg	<0.020	0.027	<0.020	0.023	0.020	7834464
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7834464
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7834464
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7834464
Styrene	mg/kg	<0.030	<0.030	<0.030	<0.030	0.030	7834464
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7834464
(C6-C10)	mg/kg	<10	<10	<10	<10	10	7834464
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	110	109	110	109		7834464
4-Bromofluorobenzene (sur.)	%	98	99	99	99		7834464
D10-ETHYLBENZENE (sur.)	%	89	88	86	90		7834464
D4-1,2-Dichloroethane (sur.)	%	93	92	92	93		7834464
RDL = Reportable Detection Limit							

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LV4375	LV4378		
Sampling Date		2015/03/04	2015/03/04		
COC Number		459576-03-01	459576-04-01		
	Units	**MDZ-SW4-2.0-3.0**	**MDZ-SW5-1.0-2.0**	**RDL**	**QC Batch**
Calculated Parameters					
F1 (C6-C10) - BTEX	mg/kg	<10	<10	10	7832020
Volatiles					
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	0.10	7834464
Benzene	mg/kg	<0.0050	<0.0050	0.0050	7834464
Toluene	mg/kg	<0.020	<0.020	0.020	7834464
Ethylbenzene	mg/kg	<0.010	<0.010	0.010	7834464
m & p-Xylene	mg/kg	<0.040	<0.040	0.040	7834464
o-Xylene	mg/kg	<0.040	<0.040	0.040	7834464
Styrene	mg/kg	<0.030	<0.030	0.030	7834464
Xylenes (Total)	mg/kg	<0.040	<0.040	0.040	7834464
(C6-C10)	mg/kg	<10	<10	10	7834464
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	109	109		7834464
4-Bromofluorobenzene (sur.)	%	98	99		7834464
D10-ETHYLBENZENE (sur.)	%	88	90		7834464
D4-1,2-Dichloroethane (sur.)	%	93	92		7834464
RDL = Reportable Detection Limit					

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4352		LV4353		LV4354		
Sampling Date		2015/03/04		2015/03/04		2015/03/04		
COC Number		459576-02-01		459576-02-01		459576-02-01		
	Units	**MDZ-EW2-0.3-0.8**	**QC Batch**	**MDZ-EW2-1.0-2.0**	**QC Batch**	**MDZ-EW2-2.0**	**RDL**	**QC Batch**
Physical Properties								
Soluble (2:1) pH	pH	8.52	7848843	8.22	7833589	8.93	N/A	7848843
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	8270	7848823	8060	7833587	7540	100	7848823
Total Antimony (Sb)	mg/kg	0.51	7848823	0.27	7833587	0.31	0.10	7848823
Total Arsenic (As)	mg/kg	7.07	7848823	5.04	7833587	6.04	0.50	7848823
Total Barium (Ba)	mg/kg	112	7848823	79.3	7833587	95.7	0.10	7848823
Total Beryllium (Be)	mg/kg	<0.40	7848823	<0.40	7833587	<0.40	0.40	7848823
Total Bismuth (Bi)	mg/kg	0.12	7848823	0.11	7833587	0.11	0.10	7848823
Total Cadmium (Cd)	mg/kg	0.334	7848823	0.108	7833587	0.073	0.050	7848823
Total Calcium (Ca)	mg/kg	90900	7848823	78700	7833587	79100	100	7848823
Total Chromium (Cr)	mg/kg	19.0 (1)	7848823	14.1	7833587	15.2	1.0	7848823
Total Cobalt (Co)	mg/kg	10.1	7848823	7.70	7833587	8.72	0.30	7848823
Total Copper (Cu)	mg/kg	22.4	7848823	14.3	7833587	14.8	0.50	7848823
Total Iron (Fe)	mg/kg	22600	7848823	19600	7833587	18900	100	7848823
Total Lead (Pb)	mg/kg	22.7 (1)	7848823	9.77	7833587	9.36	0.10	7848823
Total Lithium (Li)	mg/kg	20.3	7848823	17.6	7833587	18.3	5.0	7848823
Total Magnesium (Mg)	mg/kg	23400	7848823	15600	7833587	19000	100	7848823
Total Manganese (Mn)	mg/kg	535	7848823	438	7833587	432	0.20	7848823
Total Mercury (Hg)	mg/kg	0.075	7848823	<0.050	7833587	<0.050	0.050	7848823
Total Molybdenum (Mo)	mg/kg	0.51	7848823	0.32	7833587	0.37	0.10	7848823
Total Nickel (Ni)	mg/kg	23.2	7848823	18.3	7833587	19.6	0.80	7848823
Total Phosphorus (P)	mg/kg	750	7848823	591	7833587	575	10	7848823
Total Potassium (K)	mg/kg	792	7848823	669	7833587	547	100	7848823
Total Selenium (Se)	mg/kg	<0.50	7848823	<0.50	7833587	<0.50	0.50	7848823
Total Silver (Ag)	mg/kg	0.059	7848823	<0.050	7833587	<0.050	0.050	7848823
Total Sodium (Na)	mg/kg	305	7848823	<100	7833587	167	100	7848823
Total Strontium (Sr)	mg/kg	208	7848823	154	7833587	202	0.10	7848823
Total Thallium (Tl)	mg/kg	<0.050	7848823	<0.050	7833587	<0.050	0.050	7848823
Total Tin (Sn)	mg/kg	1.60 (1)	7848823	0.15	7833587	0.13	0.10	7848823
Total Titanium (Ti)	mg/kg	70.4	7848823	57.5	7833587	52.9	1.0	7848823
Total Uranium (U)	mg/kg	0.569	7848823	0.396	7833587	0.484	0.050	7848823
Total Vanadium (V)	mg/kg	11.4	7848823	10.0	7833587	9.2	2.0	7848823
Total Zinc (Zn)	mg/kg	115	7848823	38.9	7833587	38.8	1.0	7848823

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Matrix Spike outside acceptance criteria (10% of analytes failure allowed)

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4352		LV4353		LV4354		
Sampling Date		2015/03/04		2015/03/04		2015/03/04		
COC Number		459576-02-01		459576-02-01		459576-02-01		
	Units	**MDZ-EW2-0.3-0.8**	**QC Batch**	**MDZ-EW2-1.0-2.0**	**QC Batch**	**MDZ-EW2-2.0**	**RDL**	**QC Batch**
Total Zirconium (Zr)	mg/kg	0.97	7848823	2.38	7833587	0.80	0.50	7848823
RDL = Reportable Detection Limit								

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4355		LV4356	LV4357		
Sampling Date		2015/03/04		2015/03/04	2015/03/04		
COC Number		459576-02-01		459576-02-01	459576-02-01		
	Units	**MDZ-EW1-0.3-0.8**	**QC Batch**	**MDZ-EW1-1.0-2.0**	**MDZ-EW1-2.0-3.0**	**RDL**	**QC Batch**
Physical Properties							
Soluble (2:1) pH	pH	8.60	7833589	8.47	8.63	N/A	7848843
Total Metals by ICPMS							
Total Aluminum (Al)	mg/kg	8460	7833587	8360	7410	100	7848823
Total Antimony (Sb)	mg/kg	0.53	7833587	0.54	3.12	0.10	7848823
Total Arsenic (As)	mg/kg	5.40	7833587	6.19	6.26	0.50	7848823
Total Barium (Ba)	mg/kg	94.7	7833587	109	112	0.10	7848823
Total Beryllium (Be)	mg/kg	<0.40	7833587	<0.40	<0.40	0.40	7848823
Total Bismuth (Bi)	mg/kg	0.12	7833587	0.13	0.14	0.10	7848823
Total Cadmium (Cd)	mg/kg	0.255	7833587	0.306	0.282	0.050	7848823
Total Calcium (Ca)	mg/kg	80500	7833587	86500	89200	100	7848823
Total Chromium (Cr)	mg/kg	23.7	7833587	16.6	16.3	1.0	7848823
Total Cobalt (Co)	mg/kg	8.49	7833587	8.49	8.34	0.30	7848823
Total Copper (Cu)	mg/kg	16.5	7833587	20.2	24.5	0.50	7848823
Total Iron (Fe)	mg/kg	21300	7833587	25000	24700	100	7848823
Total Lead (Pb)	mg/kg	72.0	7833587	25.0	333	0.10	7848823
Total Lithium (Li)	mg/kg	19.1	7833587	18.4	17.5	5.0	7848823
Total Magnesium (Mg)	mg/kg	17500	7833587	18700	19600	100	7848823
Total Manganese (Mn)	mg/kg	450	7833587	464	459	0.20	7848823
Total Mercury (Hg)	mg/kg	<0.050	7833587	0.050	0.050	0.050	7848823
Total Molybdenum (Mo)	mg/kg	0.54	7833587	0.64	0.55	0.10	7848823
Total Nickel (Ni)	mg/kg	20.0	7833587	21.2	20.8	0.80	7848823
Total Phosphorus (P)	mg/kg	600	7833587	639	834	10	7848823
Total Potassium (K)	mg/kg	721	7833587	735	619	100	7848823
Total Selenium (Se)	mg/kg	<0.50	7833587	<0.50	<0.50	0.50	7848823
Total Silver (Ag)	mg/kg	<0.050	7833587	0.053	4.97	0.050	7848823
Total Sodium (Na)	mg/kg	101	7833587	158	191	100	7848823
Total Strontium (Sr)	mg/kg	187	7833587	190	183	0.10	7848823
Total Thallium (Tl)	mg/kg	<0.050	7833587	<0.050	0.057	0.050	7848823
Total Tin (Sn)	mg/kg	2.52	7833587	11.1	3.32	0.10	7848823
Total Titanium (Ti)	mg/kg	65.5	7833587	61.0	66.3	1.0	7848823
Total Uranium (U)	mg/kg	0.538	7833587	0.548	0.514	0.050	7848823
Total Vanadium (V)	mg/kg	10.1	7833587	9.5	9.6	2.0	7848823
Total Zinc (Zn)	mg/kg	71.5	7833587	95.4	127	1.0	7848823
Total Zirconium (Zr)	mg/kg	1.02	7833587	1.11	1.17	0.50	7848823

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4358		LV4359	LV4360		LV4361		
Sampling Date		2015/03/04		2015/03/04	2015/03/04		2015/03/04		
COC Number		459576-02-01		459576-02-01	459576-02-01		459576-02-01		
	Units	**MDZ-EW1-3.0-4.0**	**QC Batch**	**MDZ-EW1-4.0-5.0**	**MDZ-EW1-5.0**	**QC Batch**	**MDZ-SW1-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH	8.55	7833589	8.64	9.09	7848843	8.58	N/A	7833589
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	7800	7833587	7830	6430	7848823	8790	100	7833587
Total Antimony (Sb)	mg/kg	0.45	7833587	0.44	0.32	7848823	0.46	0.10	7833587
Total Arsenic (As)	mg/kg	5.39	7833587	5.92	5.55	7848823	5.28	0.50	7833587
Total Barium (Ba)	mg/kg	107	7833587	102	97.6	7848823	109	0.10	7833587
Total Beryllium (Be)	mg/kg	<0.40	7833587	<0.40	<0.40	7848823	<0.40	0.40	7833587
Total Bismuth (Bi)	mg/kg	0.11	7833587	0.12	<0.10	7848823	0.12	0.10	7833587
Total Cadmium (Cd)	mg/kg	0.269	7833587	0.205	0.067	7848823	0.277	0.050	7833587
Total Calcium (Ca)	mg/kg	74700	7833587	79800	72900	7848823	83800	100	7833587
Total Chromium (Cr)	mg/kg	14.7	7833587	15.8	13.4	7848823	15.9	1.0	7833587
Total Cobalt (Co)	mg/kg	8.19	7833587	8.64	7.46	7848823	8.32	0.30	7833587
Total Copper (Cu)	mg/kg	17.3	7833587	16.3	14.2	7848823	18.6	0.50	7833587
Total Iron (Fe)	mg/kg	21900	7833587	19500	16900	7848823	21800	100	7833587
Total Lead (Pb)	mg/kg	24.8	7833587	16.9	8.23	7848823	18.9	0.10	7833587
Total Lithium (Li)	mg/kg	18.1	7833587	19.2	15.7	7848823	19.6	5.0	7833587
Total Magnesium (Mg)	mg/kg	16700	7833587	20100	19700	7848823	18300	100	7833587
Total Manganese (Mn)	mg/kg	456	7833587	447	405	7848823	453	0.20	7833587
Total Mercury (Hg)	mg/kg	<0.050	7833587	<0.050	<0.050	7848823	<0.050	0.050	7833587
Total Molybdenum (Mo)	mg/kg	0.58	7833587	0.45	0.31	7848823	0.50	0.10	7833587
Total Nickel (Ni)	mg/kg	19.8	7833587	19.8	18.1	7848823	20.8	0.80	7833587
Total Phosphorus (P)	mg/kg	573	7833587	636	548	7848823	571	10	7833587
Total Potassium (K)	mg/kg	644	7833587	654	469	7848823	742	100	7833587
Total Selenium (Se)	mg/kg	<0.50	7833587	<0.50	<0.50	7848823	<0.50	0.50	7833587
Total Silver (Ag)	mg/kg	0.077	7833587	0.077	<0.050	7848823	0.055	0.050	7833587
Total Sodium (Na)	mg/kg	172	7833587	175	140	7848823	199	100	7833587
Total Strontium (Sr)	mg/kg	180	7833587	210	186	7848823	207	0.10	7833587
Total Thallium (Tl)	mg/kg	<0.050	7833587	<0.050	<0.050	7848823	<0.050	0.050	7833587
Total Tin (Sn)	mg/kg	1.82	7833587	2.83	0.13	7848823	1.95	0.10	7833587
Total Titanium (Ti)	mg/kg	55.0	7833587	63.0	49.7	7848823	74.5	1.0	7833587
Total Uranium (U)	mg/kg	0.537	7833587	0.584	0.570	7848823	0.668	0.050	7833587
Total Vanadium (V)	mg/kg	9.7	7833587	9.5	8.4	7848823	10.0	2.0	7833587
Total Zinc (Zn)	mg/kg	82.2	7833587	64.8	35.4	7848823	83.9	1.0	7833587
Total Zirconium (Zr)	mg/kg	1.01	7833587	1.75	1.08	7848823	1.04	0.50	7833587

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4367		LV4368	LV4369		LV4370		
Sampling Date		2015/03/04		2015/03/04	2015/03/04		2015/03/04		
COC Number		459576-03-01		459576-03-01	459576-03-01		459576-03-01		
	Units	**MDZ-SW2-0.3-0.8**	**QC Batch**	**MDZ-SW2-1.0-2.0**	**MDZ-DUP-B**	**QC Batch**	**MDZ-SW3-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH	8.89	7833589	9.16	9.06	7848843	8.64	N/A	7833589
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	8070	7833587	8310	8060	7848823	8410	100	7833587
Total Antimony (Sb)	mg/kg	1.15	7833587	0.32	0.31	7848823	0.38	0.10	7833587
Total Arsenic (As)	mg/kg	4.99	7833587	5.60	5.76	7848823	4.88	0.50	7833587
Total Barium (Ba)	mg/kg	95.2	7833587	84.4	85.3	7848823	93.8	0.10	7833587
Total Beryllium (Be)	mg/kg	<0.40	7833587	<0.40	<0.40	7848823	<0.40	0.40	7833587
Total Bismuth (Bi)	mg/kg	0.11	7833587	0.12	0.11	7848823	0.11	0.10	7833587
Total Cadmium (Cd)	mg/kg	0.209	7833587	0.061	0.059	7848823	0.157	0.050	7833587
Total Calcium (Ca)	mg/kg	79000	7833587	95400	84600	7848823	84400	100	7833587
Total Chromium (Cr)	mg/kg	14.5	7833587	15.6	16.5	7848823	15.2	1.0	7833587
Total Cobalt (Co)	mg/kg	7.80	7833587	8.52	8.73	7848823	8.24	0.30	7833587
Total Copper (Cu)	mg/kg	16.5	7833587	14.1	14.5	7848823	15.4	0.50	7833587
Total Iron (Fe)	mg/kg	20900	7833587	22200	20500	7848823	21200	100	7833587
Total Lead (Pb)	mg/kg	75.5	7833587	9.57	9.17	7848823	11.6	0.10	7833587
Total Lithium (Li)	mg/kg	18.1	7833587	19.7	20.6	7848823	20.2	5.0	7833587
Total Magnesium (Mg)	mg/kg	17200	7833587	20400	20200	7848823	18000	100	7833587
Total Manganese (Mn)	mg/kg	427	7833587	431	442	7848823	437	0.20	7833587
Total Mercury (Hg)	mg/kg	<0.050	7833587	<0.050	<0.050	7848823	<0.050	0.050	7833587
Total Molybdenum (Mo)	mg/kg	0.49	7833587	0.47	0.43	7848823	0.42	0.10	7833587
Total Nickel (Ni)	mg/kg	19.8	7833587	19.7	20.8	7848823	19.9	0.80	7833587
Total Phosphorus (P)	mg/kg	565	7833587	564	579	7848823	551	10	7833587
Total Potassium (K)	mg/kg	643	7833587	598	652	7848823	641	100	7833587
Total Selenium (Se)	mg/kg	<0.50	7833587	<0.50	<0.50	7848823	<0.50	0.50	7833587
Total Silver (Ag)	mg/kg	0.052	7833587	<0.050	<0.050	7848823	<0.050	0.050	7833587
Total Sodium (Na)	mg/kg	<100	7833587	101	<100	7848823	157	100	7833587
Total Strontium (Sr)	mg/kg	207	7833587	215	213	7848823	212	0.10	7833587
Total Thallium (Tl)	mg/kg	<0.050	7833587	<0.050	<0.050	7848823	<0.050	0.050	7833587
Total Tin (Sn)	mg/kg	6.79	7833587	0.12	0.12	7848823	0.23	0.10	7833587
Total Titanium (Ti)	mg/kg	71.4	7833587	61.9	65.7	7848823	76.3	1.0	7833587
Total Uranium (U)	mg/kg	0.604	7833587	0.668	0.657	7848823	0.649	0.050	7833587
Total Vanadium (V)	mg/kg	10.3	7833587	9.4	9.6	7848823	10.3	2.0	7833587
Total Zinc (Zn)	mg/kg	68.7	7833587	37.6	39.3	7848823	49.3	1.0	7833587
Total Zirconium (Zr)	mg/kg	1.03	7833587	1.17	1.19	7848823	1.32	0.50	7833587

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4371		LV4372	LV4373		
Sampling Date		2015/03/04		2015/03/04	2015/03/04		
COC Number		459576-03-01		459576-03-01	459576-03-01		
	Units	**MDZ-SW3-1.0-2.0**	**QC Batch**	**MDZ-SW3-2.0-3.0**	**MDZ-SW4-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties							
Soluble (2:1) pH	pH	8.81	7848843	8.43	8.60	N/A	7833589
Total Metals by ICPMS							
Total Aluminum (Al)	mg/kg	7470	7848823	9050	8210	100	7833587
Total Antimony (Sb)	mg/kg	0.49	7848823	0.76	0.53	0.10	7833587
Total Arsenic (As)	mg/kg	5.89	7848823	5.61	5.46	0.50	7833587
Total Barium (Ba)	mg/kg	105	7848823	108	107	0.10	7833587
Total Beryllium (Be)	mg/kg	<0.40	7848823	<0.40	<0.40	0.40	7833587
Total Bismuth (Bi)	mg/kg	0.11	7848823	0.13	0.13	0.10	7833587
Total Cadmium (Cd)	mg/kg	0.311	7848823	0.555	0.490	0.050	7833587
Total Calcium (Ca)	mg/kg	85300	7848823	84800	79600	100	7833587
Total Chromium (Cr)	mg/kg	15.3	7848823	16.9	15.1	1.0	7833587
Total Cobalt (Co)	mg/kg	8.67	7848823	8.76	8.22	0.30	7833587
Total Copper (Cu)	mg/kg	17.3	7848823	20.7	18.4	0.50	7833587
Total Iron (Fe)	mg/kg	21100	7848823	24500	22600	100	7833587
Total Lead (Pb)	mg/kg	18.2	7848823	21.9	25.5	0.10	7833587
Total Lithium (Li)	mg/kg	17.9	7848823	21.7	18.4	5.0	7833587
Total Magnesium (Mg)	mg/kg	20300	7848823	17000	16800	100	7833587
Total Manganese (Mn)	mg/kg	447	7848823	489	467	0.20	7833587
Total Mercury (Hg)	mg/kg	<0.050	7848823	<0.050	<0.050	0.050	7833587
Total Molybdenum (Mo)	mg/kg	0.47	7848823	0.63	0.52	0.10	7833587
Total Nickel (Ni)	mg/kg	21.4	7848823	22.9	20.9	0.80	7833587
Total Phosphorus (P)	mg/kg	635	7848823	605	595	10	7833587
Total Potassium (K)	mg/kg	666	7848823	775	694	100	7833587
Total Selenium (Se)	mg/kg	<0.50	7848823	<0.50	<0.50	0.50	7833587
Total Silver (Ag)	mg/kg	<0.050	7848823	<0.050	<0.050	0.050	7833587
Total Sodium (Na)	mg/kg	165	7848823	120	112	100	7833587
Total Strontium (Sr)	mg/kg	200	7848823	201	201	0.10	7833587
Total Thallium (Tl)	mg/kg	<0.050	7848823	<0.050	<0.050	0.050	7833587
Total Tin (Sn)	mg/kg	1.96	7848823	2.13	9.76	0.10	7833587
Total Titanium (Ti)	mg/kg	64.6	7848823	74.1	67.1	1.0	7833587
Total Uranium (U)	mg/kg	0.516	7848823	0.586	0.553	0.050	7833587
Total Vanadium (V)	mg/kg	9.3	7848823	10.5	10.1	2.0	7833587
Total Zinc (Zn)	mg/kg	95.3	7848823	109	88.4	1.0	7833587
Total Zirconium (Zr)	mg/kg	1.04	7848823	1.30	1.24	0.50	7833587

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4374		LV4375	LV4376		LV4377		
Sampling Date		2015/03/04		2015/03/04	2015/03/04		2015/03/04		
COC Number		459576-03-01		459576-03-01	459576-03-01		459576-04-01		
	Units	**MDZ-SW4-1.0-2.0**	**QC Batch**	**MDZ-SW4-2.0-3.0**	**MDZ-DUP-C**	**QC Batch**	**MDZ-SW5-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH	8.63	7848843	8.01	7.99	7833589	9.05	N/A	7848843
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	8170	7848823	6930	6740	7833587	7260	100	7848823
Total Antimony (Sb)	mg/kg	0.47	7848823	0.34	0.31	7833587	0.35	0.10	7848823
Total Arsenic (As)	mg/kg	6.39	7848823	5.55	5.70	7833587	5.54	0.50	7848823
Total Barium (Ba)	mg/kg	102	7848823	109	106	7833587	93.7	0.10	7848823
Total Beryllium (Be)	mg/kg	<0.40	7848823	<0.40	<0.40	7833587	<0.40	0.40	7848823
Total Bismuth (Bi)	mg/kg	0.13	7848823	0.14	0.13	7833587	<0.10	0.10	7848823
Total Cadmium (Cd)	mg/kg	0.189	7848823	0.266	0.206	7833587	0.101	0.050	7848823
Total Calcium (Ca)	mg/kg	96500	7848823	65700	64300	7833587	82900	100	7848823
Total Chromium (Cr)	mg/kg	17.1	7848823	11.6	11.3	7833587	14.8	1.0	7848823
Total Cobalt (Co)	mg/kg	9.13	7848823	8.54	8.30	7833587	8.04	0.30	7848823
Total Copper (Cu)	mg/kg	17.5	7848823	18.0	17.5	7833587	14.2	0.50	7848823
Total Iron (Fe)	mg/kg	24400	7848823	19000	18700	7833587	19000	100	7848823
Total Lead (Pb)	mg/kg	16.8	7848823	12.7	12.6	7833587	10.5	0.10	7848823
Total Lithium (Li)	mg/kg	19.1	7848823	14.6	14.0	7833587	17.5	5.0	7848823
Total Magnesium (Mg)	mg/kg	21200	7848823	13500	13100	7833587	19500	100	7848823
Total Manganese (Mn)	mg/kg	479	7848823	552	538	7833587	415	0.20	7848823
Total Mercury (Hg)	mg/kg	<0.050	7848823	<0.050	<0.050	7833587	<0.050	0.050	7848823
Total Molybdenum (Mo)	mg/kg	0.43	7848823	0.40	0.37	7833587	0.34	0.10	7848823
Total Nickel (Ni)	mg/kg	21.3	7848823	17.7	17.1	7833587	19.0	0.80	7848823
Total Phosphorus (P)	mg/kg	664	7848823	802	776	7833587	606	10	7848823
Total Potassium (K)	mg/kg	717	7848823	731	709	7833587	585	100	7848823
Total Selenium (Se)	mg/kg	<0.50	7848823	<0.50	<0.50	7833587	<0.50	0.50	7848823
Total Silver (Ag)	mg/kg	<0.050	7848823	<0.050	0.050	7833587	<0.050	0.050	7848823
Total Sodium (Na)	mg/kg	119	7848823	<100	<100	7833587	<100	100	7848823
Total Strontium (Sr)	mg/kg	202	7848823	136	132	7833587	201	0.10	7848823
Total Thallium (Tl)	mg/kg	<0.050	7848823	<0.050	<0.050	7833587	<0.050	0.050	7848823
Total Tin (Sn)	mg/kg	1.01	7848823	0.21	0.19	7833587	0.34	0.10	7848823
Total Titanium (Ti)	mg/kg	74.8	7848823	49.7	46.8	7833587	64.8	1.0	7848823
Total Uranium (U)	mg/kg	0.547	7848823	0.369	0.373	7833587	0.484	0.050	7848823
Total Vanadium (V)	mg/kg	10.8	7848823	8.5	8.3	7833587	8.9	2.0	7848823
Total Zinc (Zn)	mg/kg	73.6	7848823	44.8	45.0	7833587	42.3	1.0	7848823
Total Zirconium (Zr)	mg/kg	1.05	7848823	1.84	1.79	7833587	1.09	0.50	7848823

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4378		LV4379		
Sampling Date		2015/03/04		2015/03/04		
COC Number		459576-04-01		459576-04-01		
	Units	**MDZ-SW5-1.0-2.0**	**QC Batch**	**MDZ-SW5-2.0-3.0**	**RDL**	**QC Batch**
Physical Properties						
Soluble (2:1) pH	pH	8.96	7833589	8.93	N/A	7848843
Total Metals by ICPMS						
Total Aluminum (Al)	mg/kg	8010	7833587	7830	100	7848823
Total Antimony (Sb)	mg/kg	0.41	7833587	0.36	0.10	7848823
Total Arsenic (As)	mg/kg	5.68	7833587	5.62	0.50	7848823
Total Barium (Ba)	mg/kg	114	7833587	102	0.10	7848823
Total Beryllium (Be)	mg/kg	<0.40	7833587	<0.40	0.40	7848823
Total Bismuth (Bi)	mg/kg	0.14	7833587	0.10	0.10	7848823
Total Cadmium (Cd)	mg/kg	0.214	7833587	0.117	0.050	7848823
Total Calcium (Ca)	mg/kg	62100	7833587	84600	100	7848823
Total Chromium (Cr)	mg/kg	14.1	7833587	16.6	1.0	7848823
Total Cobalt (Co)	mg/kg	8.30	7833587	9.40	0.30	7848823
Total Copper (Cu)	mg/kg	17.2	7833587	15.2	0.50	7848823
Total Iron (Fe)	mg/kg	20900	7833587	21000	100	7848823
Total Lead (Pb)	mg/kg	22.0	7833587	11.2	0.10	7848823
Total Lithium (Li)	mg/kg	17.5	7833587	20.1	5.0	7848823
Total Magnesium (Mg)	mg/kg	13600	7833587	21600	100	7848823
Total Manganese (Mn)	mg/kg	534	7833587	458	0.20	7848823
Total Mercury (Hg)	mg/kg	<0.050	7833587	<0.050	0.050	7848823
Total Molybdenum (Mo)	mg/kg	0.49	7833587	0.42	0.10	7848823
Total Nickel (Ni)	mg/kg	19.6	7833587	20.9	0.80	7848823
Total Phosphorus (P)	mg/kg	754	7833587	603	10	7848823
Total Potassium (K)	mg/kg	797	7833587	628	100	7848823
Total Selenium (Se)	mg/kg	<0.50	7833587	<0.50	0.50	7848823
Total Silver (Ag)	mg/kg	<0.050	7833587	<0.050	0.050	7848823
Total Sodium (Na)	mg/kg	<100	7833587	103	100	7848823
Total Strontium (Sr)	mg/kg	128	7833587	213	0.10	7848823
Total Thallium (Tl)	mg/kg	<0.050	7833587	<0.050	0.050	7848823
Total Tin (Sn)	mg/kg	1.23	7833587	2.03	0.10	7848823
Total Titanium (Ti)	mg/kg	61.3	7833587	64.7	1.0	7848823
Total Uranium (U)	mg/kg	0.410	7833587	0.786	0.050	7848823
Total Vanadium (V)	mg/kg	9.9	7833587	9.7	2.0	7848823
Total Zinc (Zn)	mg/kg	57.0	7833587	50.6	1.0	7848823
Total Zirconium (Zr)	mg/kg	1.67	7833587	1.21	0.50	7848823

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

TCLP METALS (SOIL)

Maxxam ID		LV4352	LV4367		
Sampling Date		2015/03/04	2015/03/04		
COC Number		459576-02-01	459576-03-01		
	Units	**MDZ-EW2-0.3-0.8**	**MDZ-SW2-0.3-0.8**	**RDL**	**QC Batch**
Metals					
LEACHATE Antimony (Sb)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Arsenic (As)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Barium (Ba)	mg/L	0.70	1.26	0.10	7849573
LEACHATE Beryllium (Be)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Boron (B)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Cadmium (Cd)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Chromium (Cr)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Cobalt (Co)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Copper (Cu)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Iron (Fe)	mg/L	<0.50	<0.50	0.50	7849573
LEACHATE Lead (Pb)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Mercury (Hg)	mg/L	<0.0020	<0.0020	0.0020	7849573
LEACHATE Molybdenum (Mo)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Nickel (Ni)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Selenium (Se)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Silver (Ag)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Thallium (Tl)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Uranium (U)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Vanadium (V)	mg/L	<0.10	<0.10	0.10	7849573
LEACHATE Zinc (Zn)	mg/L	0.18	<0.10	0.10	7849573
LEACHATE Zirconium (Zr)	mg/L	<0.10	<0.10	0.10	7849573
RDL = Reportable Detection Limit					

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Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LV4353	LV4358	LV4361	LV4367		
Sampling Date		2015/03/04	2015/03/04	2015/03/04	2015/03/04		
COC Number		459576-02-01	459576-02-01	459576-02-01	459576-03-01		
	Units	**MDZ-EW2-1.0-2.0**	**MDZ-EW1-3.0-4.0**	**MDZ-SW1-0.3-0.8**	**MDZ-SW2-0.3-0.8**	**RDL**	**QC Batch**
Calculated Parameters							
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.31	0.31	0.31	0.10	7830848
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	<0.10	<0.10	0.10	7830848
Polycyclic Aromatics							
Naphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7833905
2-Methylnaphthalene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7833905
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7833905
Fluorene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Phenanthrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	7833905
Fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Benzo(a)anthracene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Chrysene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Benzo(a)pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7833905
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7833905
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7833905
Low Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7830849
High Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7830849
Total PAH	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7830849
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	110	107	107	118		7833905
D8-ACENAPHTHYLENE (sur.)	%	102	97	101	104		7833905
D8-NAPHTHALENE (sur.)	%	103	96	102	105		7833905
TERPHENYL-D14 (sur.)	%	116	115	118	125		7833905

RDL = Reportable Detection Limit

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LV4372	LV4373	LV4375	LV4378		
Sampling Date		2015/03/04	2015/03/04	2015/03/04	2015/03/04		
COC Number		459576-03-01	459576-03-01	459576-03-01	459576-04-01		
	Units	**MDZ-SW3-2.0-3.0**	**MDZ-SW4-0.3-0.8**	**MDZ-SW4-2.0-3.0**	**MDZ-SW5-1.0-2.0**	**RDL**	**QC Batch**
Calculated Parameters							
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.31	0.31	0.31	0.10	7830848
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	<0.10	<0.10	0.10	7830848
Polycyclic Aromatics							
Naphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7833905
2-Methylnaphthalene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7833905
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7833905
Fluorene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Phenanthrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	7833905
Fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Benzo(a)anthracene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Chrysene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Benzo(a)pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7833905
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7833905
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7833905
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7833905
Low Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7830849
High Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7830849
Total PAH	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7830849
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	107	101	105	108		7833905
D8-ACENAPHTHYLENE (sur.)	%	96	93	96	95		7833905
D8-NAPHTHALENE (sur.)	%	98	93	96	95		7833905
TERPHENYL-D14 (sur.)	%	116	110	113	115		7833905
RDL = Reportable Detection Limit							

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
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Sampler Initials: MM

GENERAL COMMENTS

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

Package 1	4.3°C
Package 2	7.0°C

[Revision V2R 2015/03/30 SF] Added 12 metals and 2 tclp metals

Results relate only to the items tested.

Maxxam
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Success Through Science®

Maxxam Job #: B518966
Report Date: 2015/03/30

QUALITY ASSURANCE REPORT

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
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Sampler Initials: MM

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7833905	D10-ANTHRACENE (sur.)	2015/03/12	97	60 - 130	97	60 - 130	104	%				
7833905	D8-ACENAPHTHYLENE (sur.)	2015/03/12	91	50 - 130	87	50 - 130	95	%				
7833905	D8-NAPHTHALENE (sur.)	2015/03/12	92	50 - 130	93	50 - 130	100	%				
7833905	TERPHENYL-D14 (sur.)	2015/03/12	106	60 - 130	105	60 - 130	108	%				
7833943	O-TERPHENYL (sur.)	2015/03/11	105	50 - 130	98	50 - 130	128	%				
7834464	1,4-Difluorobenzene (sur.)	2015/03/12	108	70 - 130	109	70 - 130	110	%				
7834464	4-Bromofluorobenzene (sur.)	2015/03/12	100	70 - 130	99	70 - 130	99	%				
7834464	D10-ETHYLBENZENE (sur.)	2015/03/12	87	50 - 130	75	50 - 130	79	%				
7834464	D4-1,2-Dichloroethane (sur.)	2015/03/12	93	70 - 130	94	70 - 130	92	%				
7832422	Moisture	2015/03/12					<0.30	%	7.7	20		
7833587	Total Aluminum (Al)	2015/03/12					<100	mg/kg	1.9	35	108	70 - 130
7833587	Total Antimony (Sb)	2015/03/12	95	75 - 125	97	75 - 125	<0.10	mg/kg	NC	30	96	70 - 130
7833587	Total Arsenic (As)	2015/03/12	95	75 - 125	94	75 - 125	<0.50	mg/kg	NC	30	92	70 - 130
7833587	Total Barium (Ba)	2015/03/12	NC	75 - 125	99	75 - 125	<0.10	mg/kg	1.4	35	102	70 - 130
7833587	Total Beryllium (Be)	2015/03/12	99	75 - 125	96	75 - 125	<0.40	mg/kg	NC	30		
7833587	Total Bismuth (Bi)	2015/03/12					<0.10	mg/kg	NC	30		
7833587	Total Cadmium (Cd)	2015/03/12	96	75 - 125	97	75 - 125	<0.050	mg/kg	NC	30	104	70 - 130
7833587	Total Calcium (Ca)	2015/03/12					<100	mg/kg	4.7	30	96	70 - 130
7833587	Total Chromium (Cr)	2015/03/12	100	75 - 125	98	75 - 125	<1.0	mg/kg	6.5	30	108	70 - 130
7833587	Total Cobalt (Co)	2015/03/12	98	75 - 125	99	75 - 125	<0.30	mg/kg	2.7	30	96	70 - 130
7833587	Total Copper (Cu)	2015/03/12	102	75 - 125	101	75 - 125	<0.50	mg/kg	0.16	30	96	70 - 130
7833587	Total Iron (Fe)	2015/03/12					<100	mg/kg	4.7	30	97	70 - 130
7833587	Total Lead (Pb)	2015/03/12	99	75 - 125	98	75 - 125	<0.10	mg/kg	9.6	35	98	70 - 130
7833587	Total Lithium (Li)	2015/03/12	98	75 - 125	96	75 - 125	<5.0	mg/kg	NC	30		
7833587	Total Magnesium (Mg)	2015/03/12					<100	mg/kg	0.54	30	95	70 - 130
7833587	Total Manganese (Mn)	2015/03/12	NC	75 - 125	100	75 - 125	<0.20	mg/kg	2.7	30	100	70 - 130
7833587	Total Mercury (Hg)	2015/03/12	90	75 - 125	93	75 - 125	<0.050	mg/kg	NC	35	102	70 - 130
7833587	Total Molybdenum (Mo)	2015/03/12	103	75 - 125	99	75 - 125	<0.10	mg/kg	NC	35	117	70 - 130
7833587	Total Nickel (Ni)	2015/03/12	100	75 - 125	100	75 - 125	<0.80	mg/kg	0.34	30	100	70 - 130
7833587	Total Phosphorus (P)	2015/03/12					<10	mg/kg	4.9	30	90	70 - 130
7833587	Total Potassium (K)	2015/03/12					<100	mg/kg	1.7	35		

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7833587	Total Selenium (Se)	2015/03/12	95	75 - 125	94	75 - 125	<0.50	mg/kg	NC	30		
7833587	Total Silver (Ag)	2015/03/12	99	75 - 125	100	75 - 125	<0.050	mg/kg	NC	35		
7833587	Total Sodium (Na)	2015/03/12					<100	mg/kg				
7833587	Total Strontium (Sr)	2015/03/12	106	75 - 125	99	75 - 125	<0.10	mg/kg	0.099	35	102	70 - 130
7833587	Total Thallium (Tl)	2015/03/12	97	75 - 125	99	75 - 125	<0.050	mg/kg	NC	30	97	70 - 130
7833587	Total Tin (Sn)	2015/03/12	96	75 - 125	96	75 - 125	<0.10	mg/kg	NC	35		
7833587	Total Titanium (Ti)	2015/03/12	NC	75 - 125	96	75 - 125	<1.0	mg/kg	4.3	35	108	70 - 130
7833587	Total Uranium (U)	2015/03/12	100	75 - 125	97	75 - 125	<0.050	mg/kg	8.7	30	106	70 - 130
7833587	Total Vanadium (V)	2015/03/12	NC	75 - 125	96	75 - 125	<2.0	mg/kg	7.9	30	106	70 - 130
7833587	Total Zinc (Zn)	2015/03/12	98	75 - 125	98	75 - 125	<1.0	mg/kg	0.55	30	92	70 - 130
7833587	Total Zirconium (Zr)	2015/03/12					<0.50	mg/kg	1.7	30		
7833589	Soluble (2:1) pH	2015/03/12			100	97 - 103			0.36	N/A		
7833905	2-Methylnaphthalene	2015/03/12	89	50 - 130	85	50 - 130	<0.020	mg/kg	NC	50		
7833905	Acenaphthene	2015/03/12	94	50 - 130	89	50 - 130	<0.0050	mg/kg	NC	50		
7833905	Acenaphthylene	2015/03/12	89	50 - 130	84	50 - 130	<0.0050	mg/kg	NC	50		
7833905	Anthracene	2015/03/12	96	60 - 130	93	60 - 130	<0.0040	mg/kg	NC	50		
7833905	Benzo(a)anthracene	2015/03/12	87	60 - 130	82	60 - 130	<0.020	mg/kg	NC	50		
7833905	Benzo(a)pyrene	2015/03/12	91	60 - 130	82	60 - 130	<0.020	mg/kg	NC	50		
7833905	Benzo(b&j)fluoranthene	2015/03/12	86	60 - 130	76	60 - 130	<0.020	mg/kg	NC	50		
7833905	Benzo(b)fluoranthene	2015/03/12	86	60 - 130	76	60 - 130	<0.020	mg/kg	NC	20		
7833905	Benzo(g,h,i)perylene	2015/03/12	93	60 - 130	80	60 - 130	<0.050	mg/kg	NC	50		
7833905	Benzo(k)fluoranthene	2015/03/12	98	60 - 130	97	60 - 130	<0.020	mg/kg	NC	50		
7833905	Chrysene	2015/03/12	91	60 - 130	89	60 - 130	<0.020	mg/kg	NC	50		
7833905	Dibenz(a,h)anthracene	2015/03/12	92	60 - 130	81	60 - 130	<0.050	mg/kg	NC	50		
7833905	Fluoranthene	2015/03/12	98	60 - 130	92	60 - 130	<0.020	mg/kg	NC	50		
7833905	Fluorene	2015/03/12	93	50 - 130	87	50 - 130	<0.020	mg/kg	NC	50		
7833905	Indeno(1,2,3-cd)pyrene	2015/03/12	94	60 - 130	82	60 - 130	<0.050	mg/kg	NC	50		
7833905	Naphthalene	2015/03/12	89	50 - 130	87	50 - 130	<0.010	mg/kg	NC	50		
7833905	Phenanthrene	2015/03/12	93	60 - 130	89	60 - 130	<0.020	mg/kg	NC	50		
7833905	Pyrene	2015/03/12	95	60 - 130	90	60 - 130	<0.020	mg/kg	NC	50		
7833943	F2 (C10-C16 Hydrocarbons)	2015/03/11	100	50 - 130	99	70 - 130	<10	mg/kg	NC	40		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7833943	F3 (C16-C34 Hydrocarbons)	2015/03/11	104	50 - 130	104	70 - 130	<10	mg/kg	NC	40		
7833943	F4 (C34-C50 Hydrocarbons)	2015/03/11	105	50 - 130	104	70 - 120	<10	mg/kg	NC	40		
7833943	Reached Baseline at C50	2015/03/11							NC	50		
7834464	(C6-C10)	2015/03/12			104	60 - 140	<10	mg/kg				
7834464	Benzene	2015/03/13	99	60 - 140	81	60 - 140	<0.0050	mg/kg	NC	40		
7834464	Ethylbenzene	2015/03/13	106	60 - 140	86	60 - 140	<0.010	mg/kg	NC	40		
7834464	m & p-Xylene	2015/03/13	99	60 - 140	81	60 - 140	<0.040	mg/kg	NC	40		
7834464	Methyl-tert-butylether (MTBE)	2015/03/13					<0.10	mg/kg	NC	40		
7834464	o-Xylene	2015/03/13	102	60 - 140	83	60 - 140	<0.040	mg/kg	NC	40		
7834464	Styrene	2015/03/13					<0.030	mg/kg	NC	40		
7834464	Toluene	2015/03/13	96	60 - 140	79	60 - 140	<0.020	mg/kg	NC	40		
7834464	Xylenes (Total)	2015/03/13					<0.040	mg/kg	NC	40		
7834948	200 mesh (<.075 mm)	2015/03/13							0.67	35		
7834948	200 mesh (>.075 mm)	2015/03/13							3.9	35		
7847788	Final pH of Leachate	2015/03/27					4.97	pH	0	N/A		
7847788	Initial pH of Sample	2015/03/27					4.97	pH	0.12	N/A		
7847788	pH after HCl	2015/03/27							0.64	N/A		
7847788	pH of Leaching Fluid	2015/03/27					4.97	pH	0	N/A		
7848823	Total Aluminum (Al)	2015/03/27					<100	mg/kg	1.1	35	97	70 - 130
7848823	Total Antimony (Sb)	2015/03/27	103	75 - 125	102	75 - 125	<0.10	mg/kg	NC	30	102	70 - 130
7848823	Total Arsenic (As)	2015/03/27	122	75 - 125	100	75 - 125	<0.50	mg/kg	8.6	30	108	70 - 130
7848823	Total Barium (Ba)	2015/03/27	NC	75 - 125	99	75 - 125	<0.10	mg/kg	1.9	35	104	70 - 130
7848823	Total Beryllium (Be)	2015/03/27	108	75 - 125	101	75 - 125	<0.40	mg/kg	NC	30		
7848823	Total Bismuth (Bi)	2015/03/27					<0.10	mg/kg	NC	30		
7848823	Total Cadmium (Cd)	2015/03/27	100	75 - 125	96	75 - 125	<0.050	mg/kg	6.6	30	95	70 - 130
7848823	Total Calcium (Ca)	2015/03/27					<100	mg/kg	7.4	30	109	70 - 130
7848823	Total Chromium (Cr)	2015/03/27	132 (1)	75 - 125	108	75 - 125	<1.0	mg/kg	4.9	30	108	70 - 130
7848823	Total Cobalt (Co)	2015/03/27	123	75 - 125	107	75 - 125	<0.30	mg/kg	4.0	30	107	70 - 130
7848823	Total Copper (Cu)	2015/03/27	112	75 - 125	105	75 - 125	<0.50	mg/kg	9.6	30	95	70 - 130
7848823	Total Iron (Fe)	2015/03/27					<100	mg/kg	6.0	30	100	70 - 130
7848823	Total Lead (Pb)	2015/03/27	141 (1)	75 - 125	99	75 - 125	<0.10	mg/kg	0.98	35	103	70 - 130

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Success Through Science®

Maxxam Job #: B518966
Report Date: 2015/03/30

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7848823	Total Lithium (Li)	2015/03/27	114	75 - 125	104	75 - 125	<5.0	mg/kg	NC	30		
7848823	Total Magnesium (Mg)	2015/03/27					<100	mg/kg	6.5	30	99	70 - 130
7848823	Total Manganese (Mn)	2015/03/27	NC	75 - 125	107	75 - 125	<0.20	mg/kg	6.4	30	101	70 - 130
7848823	Total Mercury (Hg)	2015/03/27	105	75 - 125	98	75 - 125	<0.050	mg/kg	NC	35	106	70 - 130
7848823	Total Molybdenum (Mo)	2015/03/27	114	75 - 125	103	75 - 125	<0.10	mg/kg	NC	35	105	70 - 130
7848823	Total Nickel (Ni)	2015/03/27	121	75 - 125	108	75 - 125	<0.80	mg/kg	7.3	30	99	70 - 130
7848823	Total Phosphorus (P)	2015/03/27					<10	mg/kg	6.9	30	100	70 - 130
7848823	Total Potassium (K)	2015/03/27					<100	mg/kg	4.8	35		
7848823	Total Selenium (Se)	2015/03/27	107	75 - 125	92	75 - 125	<0.50	mg/kg	NC	30		
7848823	Total Silver (Ag)	2015/03/27	95	75 - 125	101	75 - 125	<0.050	mg/kg	NC	35		
7848823	Total Sodium (Na)	2015/03/27					<100	mg/kg	NC	35		
7848823	Total Strontium (Sr)	2015/03/27	NC	75 - 125	97	75 - 125	<0.10	mg/kg	2.1	35	104	70 - 130
7848823	Total Thallium (Tl)	2015/03/27	105	75 - 125	96	75 - 125	<0.050	mg/kg	NC	30	99	70 - 130
7848823	Total Tin (Sn)	2015/03/27	128 (1)	75 - 125	101	75 - 125	<0.10	mg/kg	19	35		
7848823	Total Titanium (Ti)	2015/03/27	NC	75 - 125	105	75 - 125	<1.0	mg/kg	5.6	35	105	70 - 130
7848823	Total Uranium (U)	2015/03/27	106	75 - 125	96	75 - 125	<0.050	mg/kg	1.3	30	102	70 - 130
7848823	Total Vanadium (V)	2015/03/27	124	75 - 125	105	75 - 125	<2.0	mg/kg	6.8	30	101	70 - 130
7848823	Total Zinc (Zn)	2015/03/27	NC	75 - 125	103	75 - 125	<1.0	mg/kg	22	30	94	70 - 130
7848823	Total Zirconium (Zr)	2015/03/27					<0.50	mg/kg	NC	30		
7848843	Soluble (2:1) pH	2015/03/27			101	97 - 103			0.23	N/A		
7849573	LEACHATE Antimony (Sb)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Arsenic (As)	2015/03/28			109	75 - 125	<0.10	mg/L				
7849573	LEACHATE Barium (Ba)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Beryllium (Be)	2015/03/28			107	75 - 125	<0.10	mg/L				
7849573	LEACHATE Boron (B)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Cadmium (Cd)	2015/03/28			102	75 - 125	<0.10	mg/L				
7849573	LEACHATE Chromium (Cr)	2015/03/28			114	75 - 125	<0.10	mg/L				
7849573	LEACHATE Cobalt (Co)	2015/03/28			112	75 - 125	<0.10	mg/L				
7849573	LEACHATE Copper (Cu)	2015/03/28			114	75 - 125	<0.10	mg/L				
7849573	LEACHATE Iron (Fe)	2015/03/28					<0.50	mg/L				
7849573	LEACHATE Lead (Pb)	2015/03/28			105	75 - 125	<0.10	mg/L				

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7849573	LEACHATE Mercury (Hg)	2015/03/28					<0.0020	mg/L				
7849573	LEACHATE Molybdenum (Mo)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Nickel (Ni)	2015/03/28			115	75 - 125	<0.10	mg/L				
7849573	LEACHATE Selenium (Se)	2015/03/28			103	75 - 125	<0.10	mg/L				
7849573	LEACHATE Silver (Ag)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Thallium (Tl)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Uranium (U)	2015/03/28			101	75 - 125	<0.10	mg/L				
7849573	LEACHATE Vanadium (V)	2015/03/28			111	75 - 125	<0.10	mg/L				
7849573	LEACHATE Zinc (Zn)	2015/03/28			111	75 - 125	<0.10	mg/L				
7849573	LEACHATE Zirconium (Zr)	2015/03/28					<0.10	mg/L				

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B518966
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Andy Lu, Data Validation Coordinator

Rob Reinert, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Chain Of Custody Record

Page 1 of 3

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD	Quotation #	B50110	Maxxam Job #	Bottle Order #:
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #	700315471	B518966	459576
Address	641- 800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	219.05112.0010	Chain Of Custody Record	Project Manager
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name		C#459576-02-01	Samantha Fregien
Phone	(604) 775-9349 Fax: (604) 775-6645	Phone	(250) 762-7202 Fax:	Site #	WILMER MARSH		
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	MM/MC		

Regulatory Criteria: CSR ☐ CCME ☐ BC Water Quality ☐ Other ☐ ______

Special Instructions: ALL SAMPLES ON HOLD LINDSAY PATERSON OR DAVE McKEOWN TO SELECT ANALYSIS

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects
Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission)
1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ______ ☐
Rush Confirmation Number: ______ (call lab for #)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)	PAHs	# of Bottles	Comments
1	LV4352	MDZ-EW2-0.3-0.8	2015/03/04	PM	SOIL												4 + 1bag	ALL SAMPLES ON HOLD
2	LV4353	MDZ-EW2-1.0-2.0															2	
3	LV4354	MDZ-EW2-2.0															4 + 1bag	
4	LV4355	MDZ-EW1-0.3-0.8															2	
5	LV4356	MDZ-EW1-1.0-2.0															4 + 1bag	
6	LV4357	MDZ-EW1-2.0-3.0															2	
7	LV4358	MDZ-EW1-3.0-4.0															4 + 1bag	B518966
8	LV4359	MDZ-EW1-4.0-5.0															2	
9	LV4360	MDZ-EW1-5.0															2	
10	LV4361	MDZ-SW1-0.3-0.8															4 + 1bag	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
MARCI MATKIN	15/03/05	9:30AM	Veronica de Guzman	2015/03/06	09:25		☐	6,3,4 / 7,7,7	N/A ☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

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Chain Of Custody Record Page 2 of 3

INVOICE TO:		Report Information		Project Information	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD	Quotation #	B50110
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #	700315471
Address	641- 800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	219.05112.0010
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name	
Phone	(604) 775-9349 Fax (604) 775-6645	Phone	(250) 762-7202 Fax	Site #	WILMER MARSH
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	MM/MC

Laboratory Use Only

Maxxam Job #	Bottle Order #:
B518966	459576
Chain Of Custody Record	Project Manager
C#459576-03-01	Samantha Fragien

Regulatory Criteria: CSR / CCME / BC Water Quality / Other

Special Instructions: ALL SAMPLES ON HOLD LINDSAY PATERSON OR DAVE McKEOWN TO CHOOSE ANALYSIS

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC): Metals Field Filtered ? (Y / N); TCLP BTEX, TCLP PAHs, TCLP Metals; SWOG, Flashpoint; Elemental Sulphur (Calgary); Free Liquid (Paint filter); CCME BTEX/F1-F24 in Soil; CSR/CCME Metals in Soil; VPH; Extractable Petroleum Hydrocarbons (EPH); Grain Size (75um); PAHs

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects
Regular (Standard) TAT:
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission)
1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ____
Rush Confirmation Number: ____ (call lab for #)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	# of Bottles	Comments
1	LV4367	MDZ-SW2-0.3-0.8	2015/03/04	PM	SOIL	2	ALL SAMPLES ON
2	LV4368	MDZ-SW2-1.0-2.0				4+1 bag	HOLD
3	LV4369	MDZ-DUP-B				4+1 bag	
4	LV4370	MDZ-SW3-0.3-0.8				2	
5	LV4371	MDZ-SW3-1.0-2.0				2	
6	LV4372	MDZ-SW3-2.0-3.0				4+1 bag	
7	LV4373	MDZ-SW4-0.3-0.8				4+1 bag	B518966
8	LV4374	MDZ-SW4-1.0-2.0				2	
9	LV4375	MDZ-SW4-2.0-3.0				4+1 bag	
10	LV4376	MDZ-DUP-C				2	

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
MAREL MARTIN	15/03/05	9:30AM	Veronica de Guzman	2015/03/06	09:25	

Lab Use Only: Time Sensitive ☐ | Temperature (°C) on Receipt: 6,3,4 / 7,7,7 | Custody Seal Intact on Cooler? N/A ☐ Yes ☐ No

IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-Free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

Chain Of Custody Record Page 3 of 3

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28804 SLR CONSULTING (CANADA) LTD	Quotation #	B50110	Maxxam Job #	Bottle Order #:
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #	700315471	B518966	459576
Address	641- 800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	219.05112.0010	Chain Of Custody Record	Project Manager
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name		C#459576-04-01	Samantha Fragien
Phone	(604) 775-9349 Fax (604) 775-6645	Phone	(250) 762-7202 Fax	Site #	WILMER MARSH		
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	MM / MC		

Regulatory Criteria:
- ☐ CSR
- ☐ CCME
- ☐ BC Water Quality
- ☐ Other

Special Instructions: ALL SAMPLES ON HOLD LINDSAY PATERSON OR DAVE McKEOWN TO SELECT ANALYSIS

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects
Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission)
1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required ☐
Rush Confirmation Number: (call lab for #)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)	PAHs	# of Bottles	Comments
1	LV4377	MD7-SW5-0.3-0.8	2015/01/04	PM	SOIL												2	ALL SAMPLES ON HOLD
2	LV4378	MD7-SW5-1.0-2.0	↓	↓	↓												4 + 1 bag	
3	LV4379	MD7-SW5-2.0-3.0	↓	↓	↓												2	↓
4																		
5																		
6																		
7																		B518966
8																		
9																		
10																		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
MANEL MATIN	15/03/05	9:30AM	Veronica de Guzman	2015/03/06	09:25		☐	6,3,4 / 7,7,7	N/A ☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Analytics Inc

PWGSC - MAXXAM ADDITIONAL ANALYSIS REQUEST RECORD

B518966

Consultant Name: SLR Consulting

Contact Name: David McKeown

Consultant Project #: 219.05112.00010

Maxxam Job #: B518966

(Please complete this form on a per job basis - i.e. one form per original Maxxam Job#)

Project Name: Wilmer Marsh

PWGSC Project Manager: Brad Klaver

Task Authorization #: PO# 70031547I

Maxxam Location:

TURNAROUND TIME		
Standard	(5 days)	☐
Rush	(3 days)	☑
	(2 days)	☐
	(1 day)	☐
	(same day)	☐
Date Required :		

LAB USE ONLY

Original COC analysis completed & invoiced at time of add-on (circle one)

YES NO

(If yes original coc in invoice package for reference only)

New Maxxam Job # (if applicable)

Applicable Guidelines (please specify): CCME AL/RL

ADDITIONAL ANALYSIS REQUEST

CLIENT SAMPLE ID	Original COC #	LAB ID	Matrix	SAMPLING DATE (YY/MM/DD)	SAMPLING Time HH:MM	CCME Metals/pH	CCME PAH	CCME BTEX + F1	CCME F2-F4	Grain Size					Hold	Sample previously submitted on hold (Y/N)	SPECIAL INSTRUCTIONS
MDZ-EW2-0.3-0.8	C459576-02-01		Soil	15/03/04											X	Y	LV4352
MDZ-EW2-1.0-2.0						X	X		X								LV4353
MDZ-EW2-2.0															X		LV4354
MDZ-EW1-0.3-0.8						X											LV4355
MDZ-EW1-1.0-2.0															X		LV4356
MDZ-EW1-2.0-3.0															X		LV4357
MDZ-EW1-3.0-4.0						X	X	X	X	X							LV4358
MDZ-EW1-4.0-5.0															X		LV4359
MDZ-EW1-5.0															X		LV4360
MDZ-SW1-0.3-0.8						X	X	X	X	X							LV4361
MDZ-SW2-0.3-0.8	C459576-03-01					X	X		X								LV4367
MDZ-SW2-1.0-2.0															X		LV4368

REQUESTED BY: (Please Sign & Print) D. McKeown	DATE: (YYYY/MM/DD) 2015/03/10	TIME: (HH:MM) 08:00
RECEIVED BY: (Please Sign & Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)

Maxxam Analytics Inc

PWGSC - MAXXAM ADDITIONAL ANALYSIS REQUEST RECORD

Consultant Name: SLR Consulting

Project Name: Wilmer Marsh

Contact Name: David McKeown

PWGSC Project Manager: Brad Klaver

Consultant Project #: 219.05112.00010

Task Authorization #: PO# 700315471

Maxxam Job #: B518966

(Please complete this form on a per job basis - i.e. one form per original Maxxam Job#)

TURNAROUND TIME		
Standard	(5 days)	☐
Rush	(3 days)	☑
	(2 days)	☐
	(1 day)	☐
	(same day)	☐
Date Required :		

Maxxam Location:

Applicable Guidelines (please specify): CCME AL/RL

LAB USE ONLY

Original COC analysis completed a invoiced at time of add-on (circle o

YES NO

(if yes original coc in invoice pack for reference only)

New Maxxam Job # (if applic

ADDITIONAL ANALYSIS REQUEST

CLIENT SAMPLE ID	Original COC #	LAB ID	Matrix	SAMPLING DATE (YY/MM/DD)	SAMPLING Time HH:MM	CCME Metals / pH	CCME PAH	CCME BTEX + F1	CCME F2 - F4	Grain Size					Hold	Sample previously submitted on hold (Y/N)	SPECIAL INSTRUCTIONS
MDZ-DUP-B	C459576-03-01		Soil	15/03/04											X	Y	LVU369
MDZ-SW3-0.3-0.8	↓		↓	↓		X										↓	LVU370
MDZ-SW3-1.0-2.0															X		LVU371
MDZ-SW3-2.0-3.0						X	X	X	X	X							LVU372
MDZ-SW4-0.3-0.8						X	X	X	X	X							LVU373
MDZ-SW4-1.0-2.0															X		LVU374
MDZ-SW4-2.0-3.0						X	X	X	X	X							LVU375
MDZ-DUP-C	↓					X											LVU376
MDZ-SW5-0.3-0.8	C459576-04-01														X		LVU377
MDZ-SW5-1.0-2.0	↓					X	X	X	X	X							LVU378
MDZ-SW5-2.0-3.0	↓		↓	↓											X	↓	LVU379

REQUESTED BY: (Please Sign & Print) D.McK D. McKeown	DATE: (YYYY/MM/DD) 2015/03/10	TIME: (HH:MM) 08:00
RECEIVED BY: (Please Sign & Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)

B518966

Maxxam Analytics Inc

PWGSC - MAXXAM ADDITIONAL ANALYSIS REQUEST RECORD

Consultant Name: SLR Consulting

Contact Name: Lindsay Paterson

Consultant Project #: 219.05112.00010

Maxxam Job #: B518966

(Please complete this form on a per job basis - i.e. one form per original Maxxam Job#)

Project Name: Wilmer Marsh

PWGSC Project Manager: Brad Klaver

Task Authorization #: 70031547

Maxxam Location:

TURNAROUND TIME		
Standard	(5 days)	☐
Rush	(3 days)	☒
	(2 days)	☐
	(1 day)	☐
	(same day)	☐
Date Required :		

Applicable Guidelines (please specify): CCME AL

LAB USE ONLY

Original COC analysis completed and invoiced at time of add-on (circle one)

YES NO

(if yes original coc in invoice package is for reference only)

New Maxxam Job # (if applicable)

ADDITIONAL ANALYSIS REQUEST

CLIENT SAMPLE ID	Original COC #	LAB ID	Matrix	SAMPLING DATE (YY/MM/DD)	SAMPLING Time HH:MM	Total metals/pH									Sample previously submitted on hold (Y/N)	SPECIAL INSTRUCTIONS
MDZ-EW2-0.3-0.8			SOIL	15/03/04		X									Y	
MDZ-EW2-2.0						X									Y	
MDZ-EW1-1.0-2.0						X									Y	
MDZ-EW1-2.0-3.0						X									Y	
MDZ-EW1-4.0-5.0						X									Y	
MDZ-EW1-5.0						X									Y	
MDZ SW2-1.0-2.0.						X									Y	
MDZ-DUP-B						X									Y	
MDZ-SW3-1.0-2.0						X									Y	
MDZ-SW4-1.0-2.0						X									Y	
MDZ-SW5-0.3-0.8						X									Y	
MDZ-SW5-2.0-3.0						X									Y	

REQUESTED BY: (Please Sign & Print) L. Paterson	DATE: (YYYY/MM/DD) 2015/03/25	TIME: (HH:MM) 14:34
RECEIVED BY: (Please Sign & Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)

COR FCD-00106 / 1-0

Maxxam Analytics Inc

PWGSC - MAXXAM ADDITIONAL ANALYSIS REQUEST RECORD

Consultant Name: SLR Consulting
Contact Name: Lindsay Paterson
Consultant Project #: 219.05112.00010
Maxxam Job #: B518966 / B518971
(Please complete this form on a per job basis - i.e. one form per original Maxxam Job#)

Project Name: Wilmer Marsh
PWGSC Project Manager: Brad Klaver
Task Authorization #: 70031547/
Maxxam Location:

TURNAROUND TIME		
Standard	(5 days)	☐
Rush	(3 days)	☒
	(2 days)	☐
	(1 day)	☐
	(same day)	☐
Date Required :		

Applicable Guidelines (please specify): BC HWR/AB Class II

LAB USE ONLY
Original COC analysis completed and invoiced at time of add-on (circle one)
YES NO
(if yes original coc in invoice package is for reference only)
New Maxxam Job # (if applicable)

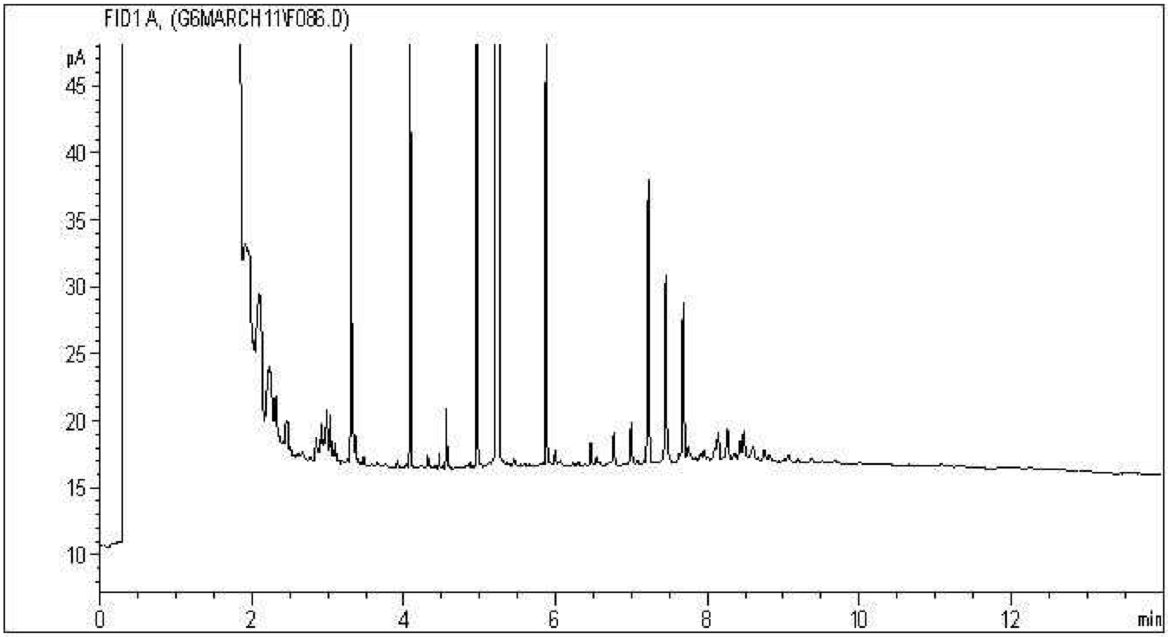
CLIENT SAMPLE ID	Original COC #	LAB ID	Matrix	SAMPLING DATE (YY/MM/DD)	SAMPLING Time HH:MM	TCLP Metals										Sample previously submitted on hold (Y/N)	SPECIAL INSTRUCTIONS
B518966																	
MD2-EW1-03-0.8			SOIL	15/03/04		X										N	
MD2-SW2-03-0.8			SOIL	15/03/04		X										N	
B518971																	
MD2-NW5-B6-3.0			SOIL	15/03/05		✓										N	

REQUESTED BY: (Please Sign & Print) L. Paterson	DATE: (YYYY/MM/DD) 2015/03/25	TIME: (HH:MM) 15:49
RECEIVED BY: (Please Sign & Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)

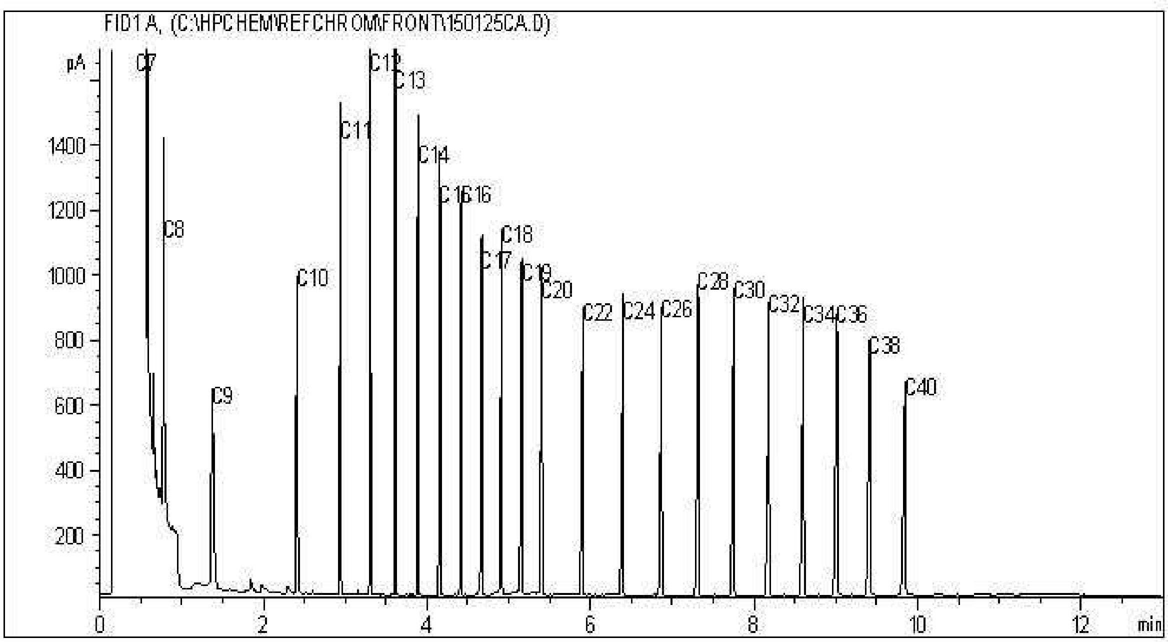
COR FCD-00106 / 1-0

1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



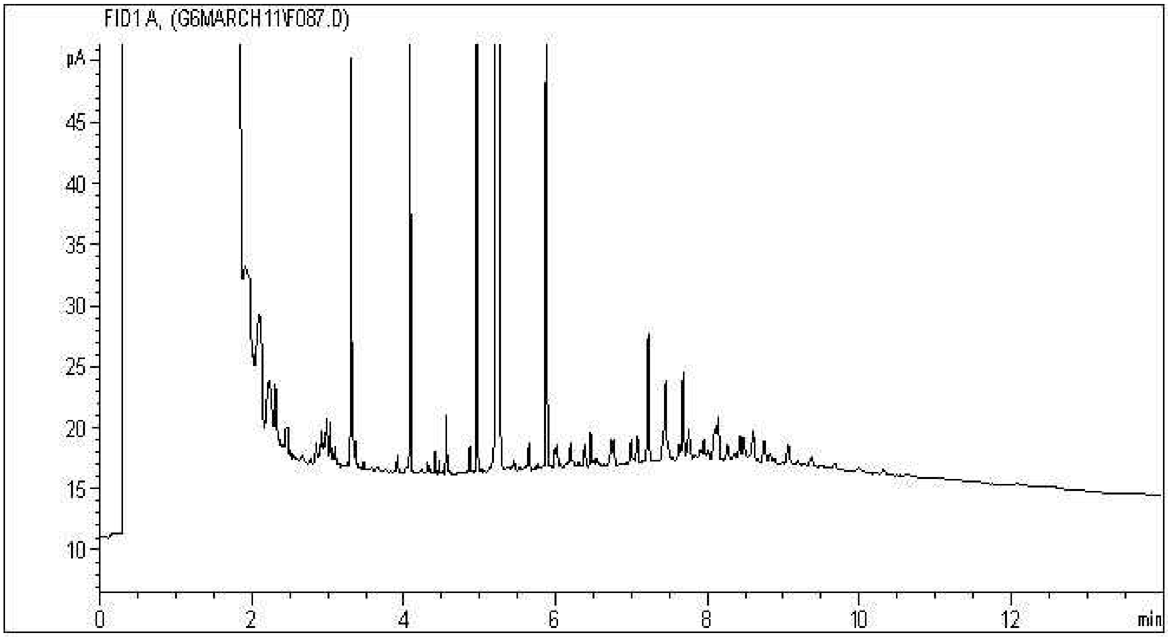
Carbon Range Distribution - Reference Chromatogram



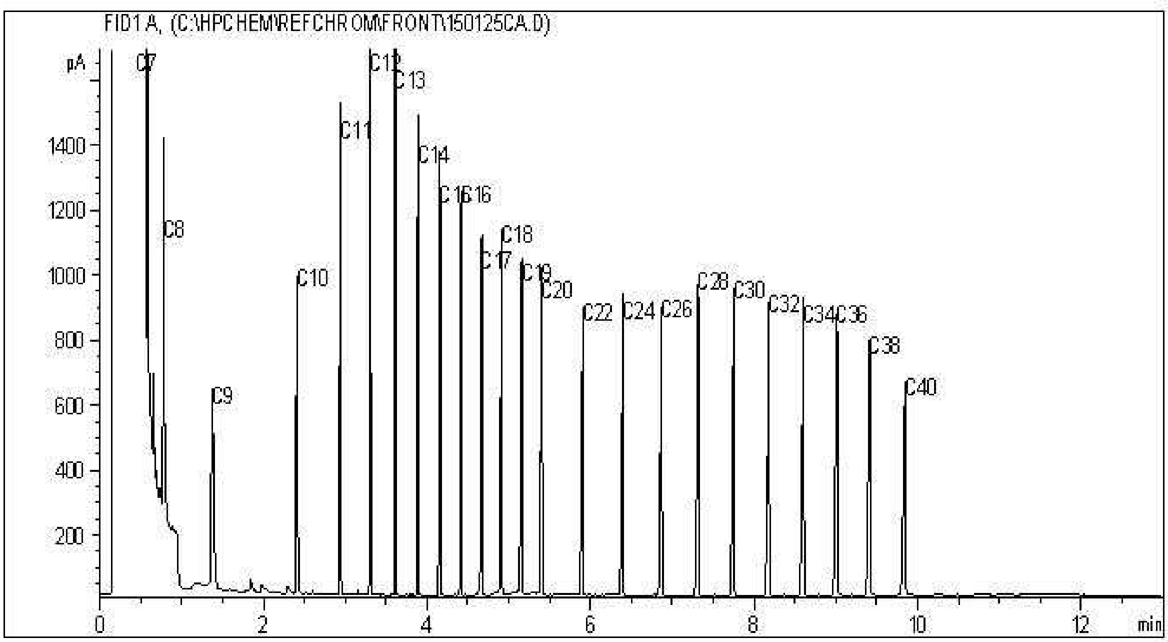
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



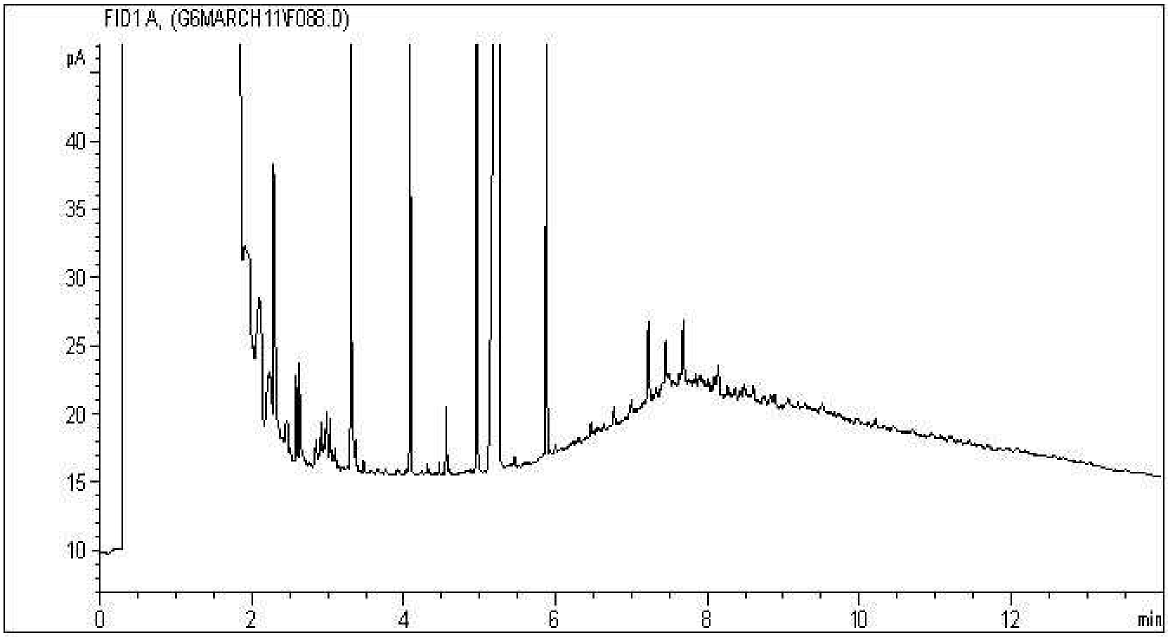
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

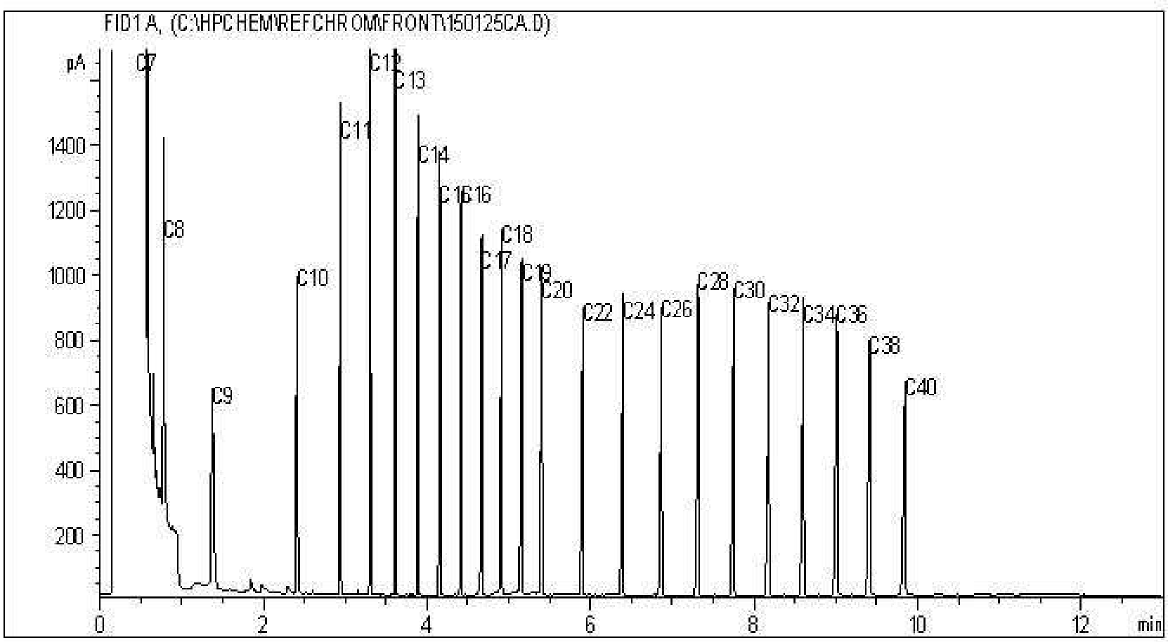
Maxxam Job #: B518966
Report Date: 2015/03/30
Maxxam Sample: LV4361

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: WILMER MARSH
Client ID: MDZ-SW1-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



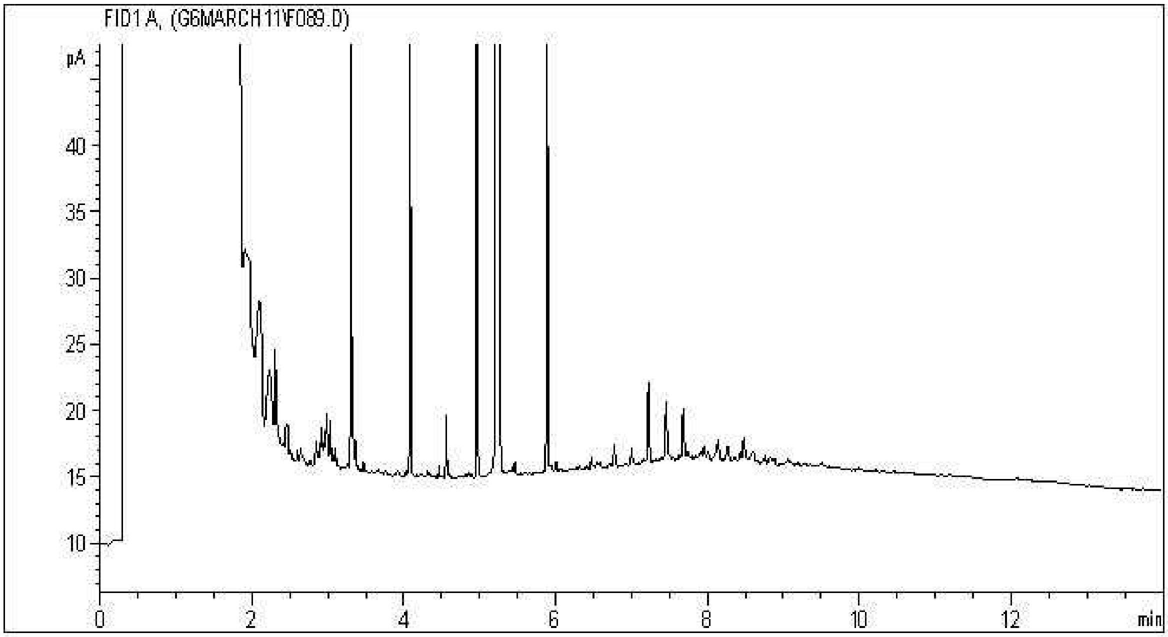
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

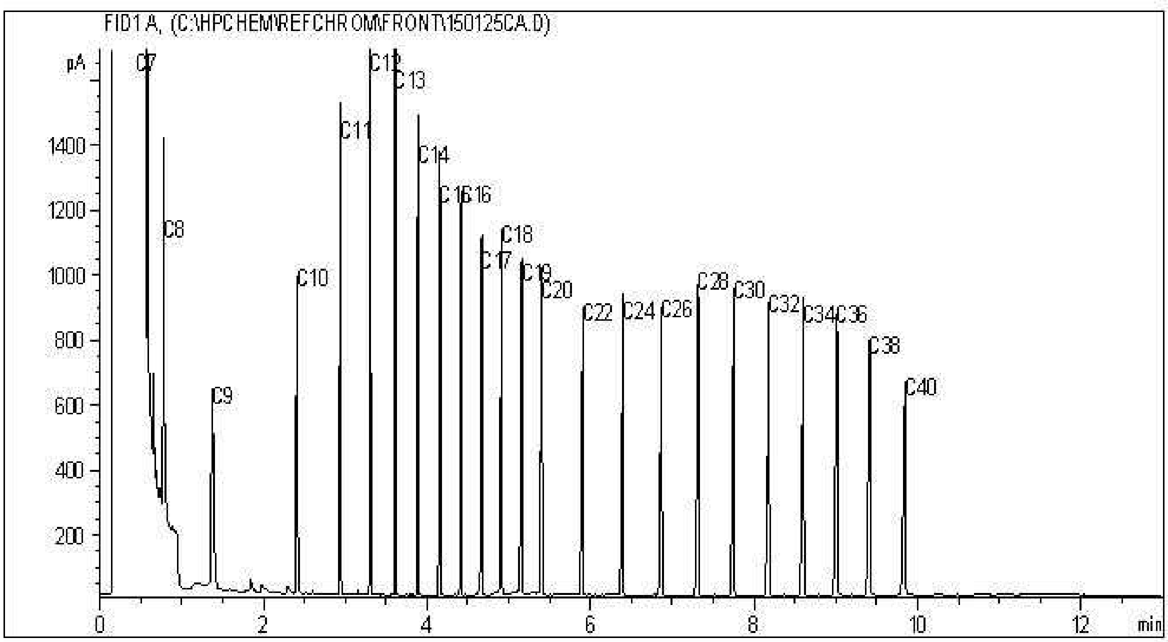
Maxxam Job #: B518966
Report Date: 2015/03/30
Maxxam Sample: LV4367

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: WILMER MARSH
Client ID: MDZ-SW2-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



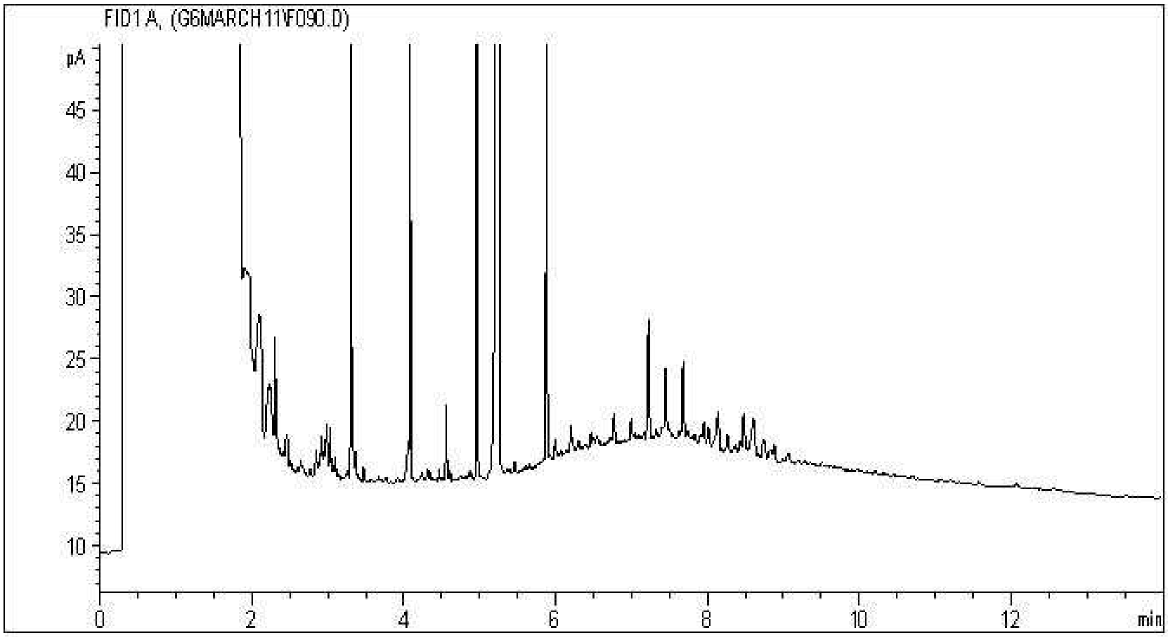
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

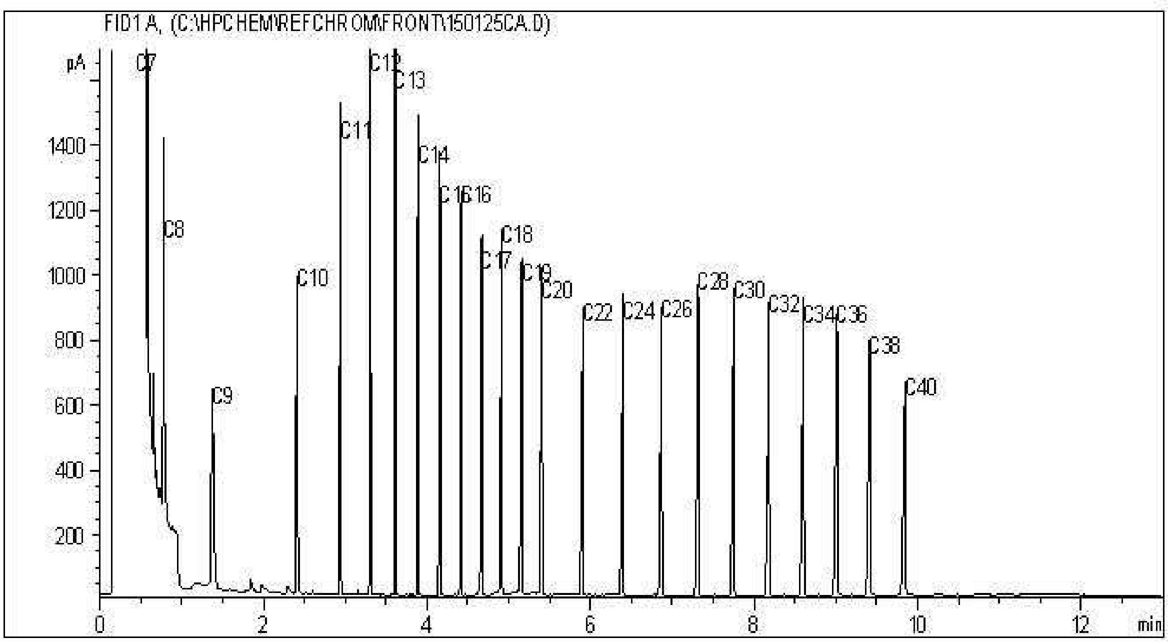
Maxxam Job #: B518966
Report Date: 2015/03/30
Maxxam Sample: LV4372

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: WILMER MARSH
Client ID: MDZ-SW3-2.0-3.0

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



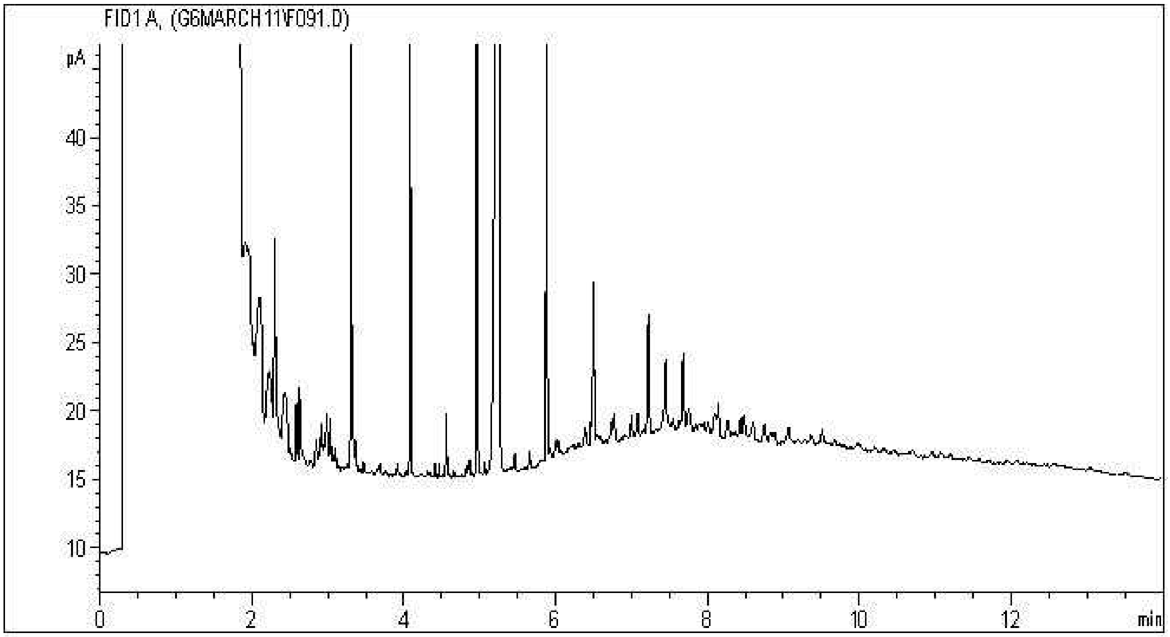
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

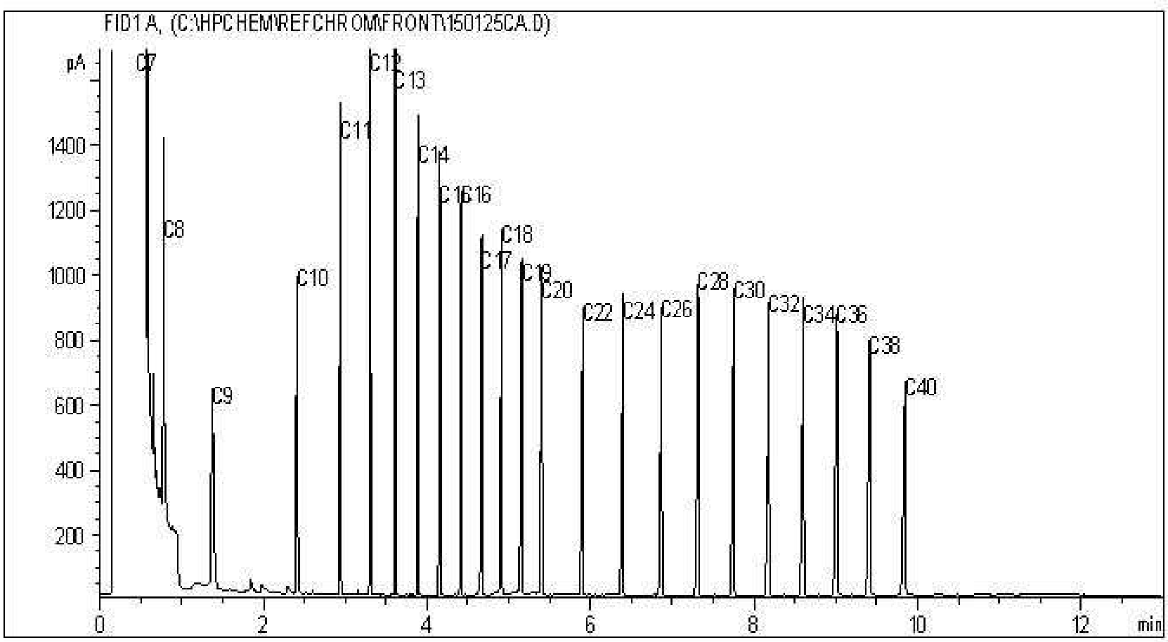
Maxxam Job #: B518966
Report Date: 2015/03/30
Maxxam Sample: LV4373

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: WILMER MARSH
Client ID: MDZ-SW4-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



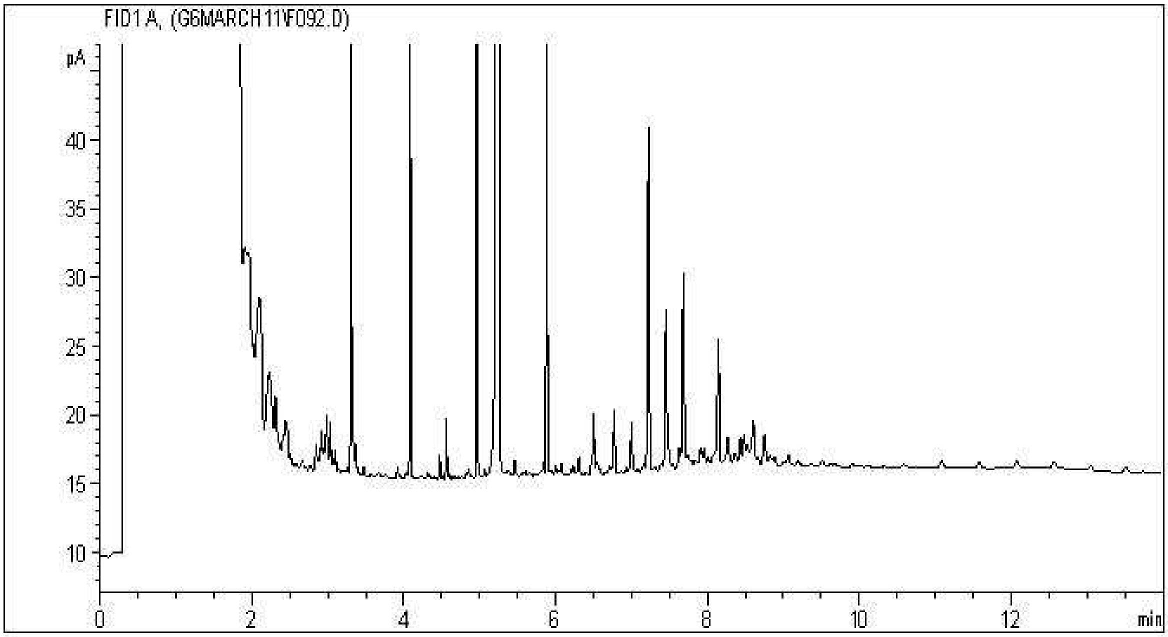
Carbon Range Distribution - Reference Chromatogram



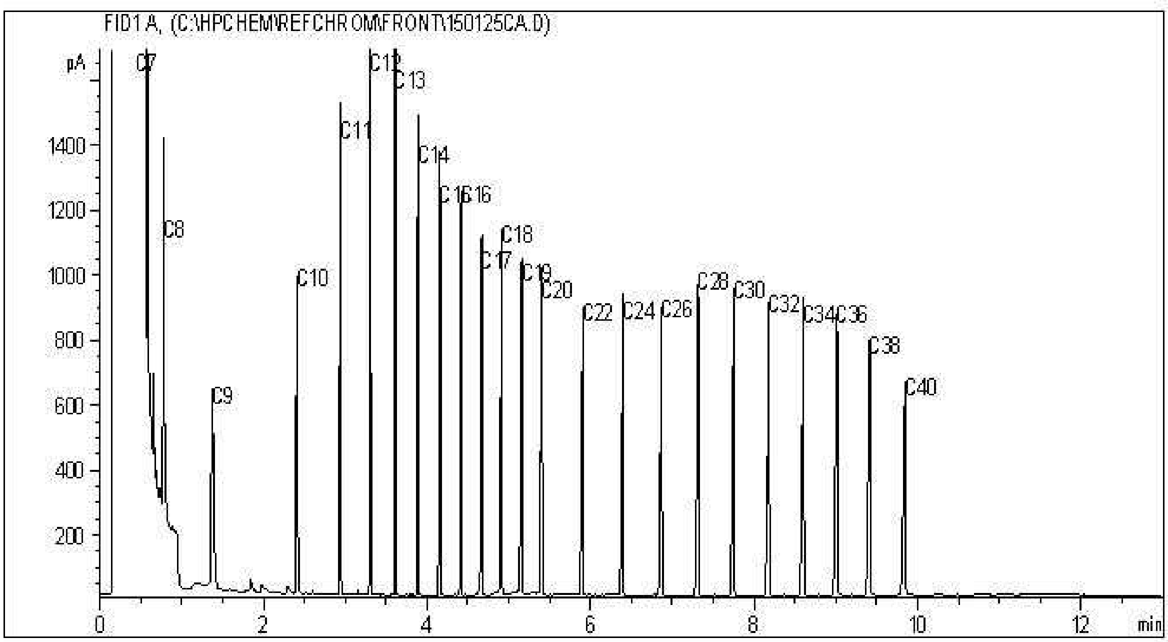
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



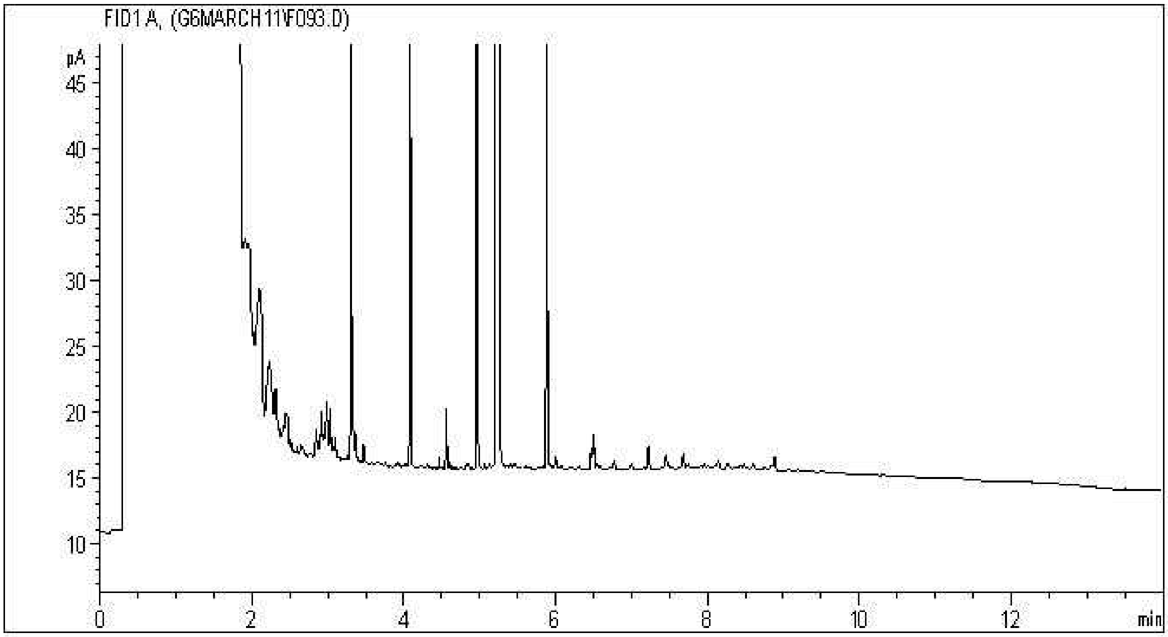
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

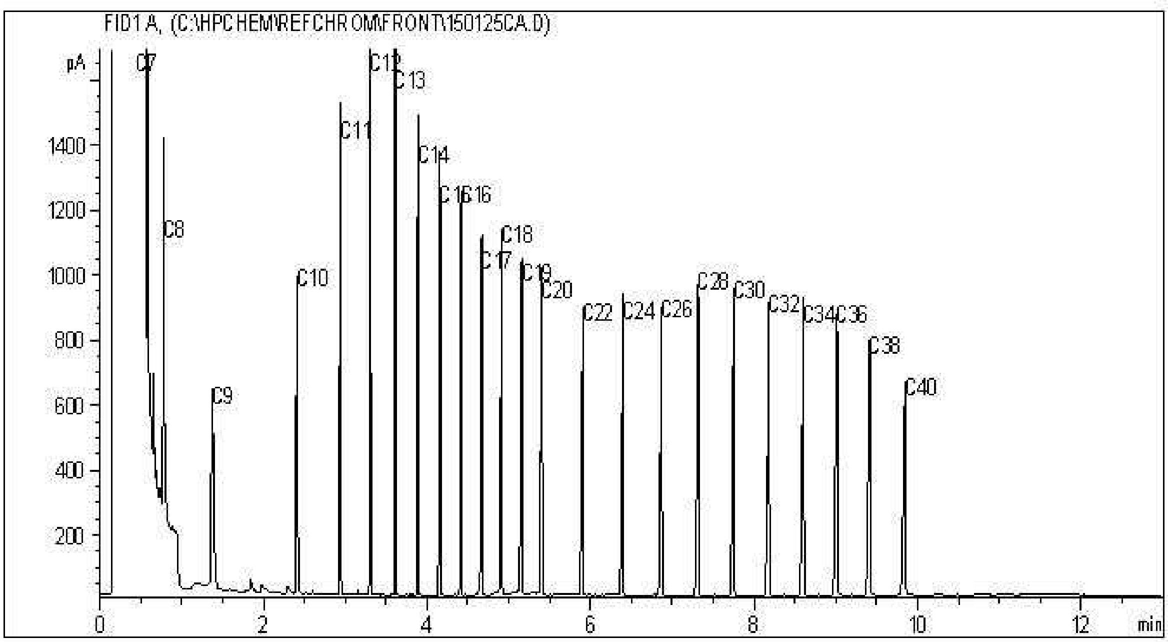
Maxxam Job #: B518966
Report Date: 2015/03/30
Maxxam Sample: LV4378

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.0010
Site Reference: WILMER MARSH
Client ID: MDZ-SW5-1.0-2.0

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: 700315471
Your Project #: 219.05112.00010
Site Location: WILMER MARSH

Attention:Lindsay Paterson
SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Your C.O.C. #: 458524-05-01, 459576-05-01, 458524-07-01

Report Date: 2015/03/30
Report #: R1837452
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B518971
Received: 2015/03/09, 11:00

Sample Matrix: Soil
Samples Received: 24

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE LH VH F1 in Soil - Field Pres.	12	N/A	2015/03/12	BBY8SOP-00010	EPA 8260c R3 m
Volatile F1-BTEX	12	N/A	2015/03/12	BBY WI-00033	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (1)	13	2015/03/10	2015/03/11	BBY8SOP-00030	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil) (1)	2	2015/03/10	2015/03/13	BBY8SOP-00030	CCME PHC-CWS
Elements by ICPMS (total)	17	2015/03/11	2015/03/12	BBY7SOP-00001	EPA 6020a R1 m
Elements by ICPMS (total)	6	2015/03/27	2015/03/27	BBY7SOP-00001	EPA 6020a R1 m
Elements by ICPMS (total)	1	2015/03/27	2015/03/28	BBY7SOP-00001	EPA 6020a R1 m
Metals - TCLP	1	2015/03/26	2015/03/28	BBY7SOP-00001	EPA 6020a R1 m
Particulate Mesh 200	12	N/A	2015/03/13	BBY6SOP-00039	Carter 2nd ed 55.4
Moisture	15	N/A	2015/03/11	BBY8SOP-00017	OMOE E3139 3.1 m
PAH in Soil by GC/MS (SIM) - CCME	15	2015/03/10	2015/03/11	BBY8SOP-00022	EPA 8270d R4 m
Benzo[a]pyrene Equivalency	15	N/A	2015/03/12	BBY WI-00033	Auto Calc
Total LMW, HMW, Total PAH Calc	15	N/A	2015/03/12	BBY WI-00033	Auto Calc
pH (2:1 DI Water Extract)	17	2015/03/11	2015/03/11	BBY6SOP-00028	BCMOE BCLM Mar2005 m
pH (2:1 DI Water Extract)	7	2015/03/27	2015/03/27	BBY6SOP-00028	BCMOE BCLM Mar2005 m
TCLP pH Measurements	1	N/A	2015/03/27	BBY7SOP-00005	EPA 1311 R1992

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

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

(1) The method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory; all deviations were justified and validated and are made available upon request; the chromatogram descends to baseline by the retention time of nC50 unless otherwise indicated; all QC criteria met; individual hydrocarbons (nC10, nC16, nC34) are within 10% of their average response factor; linearity is within 15%.

Your P.O. #: 700315471
Your Project #: 219.05112.00010
Site Location: WILMER MARSH

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Your C.O.C. #: 458524-05-01, 459576-05-01, 458524-07-01

Report Date: 2015/03/30
Report #: R1837452
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B518971
Received: 2015/03/09, 11:00

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Samantha Fregien, Project Manager
Email: SFregien@maxxam.ca
Phone# (604)639-8418
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B518971
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		LV4387	LV4389	LV4390	LV4391	LV4392		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/05	2015/03/05		
COC Number		458524-05-01	458524-05-01	458524-05-01	458524-05-01	458524-05-01		
	Units	**MDZ-NW1-0.3-0.8**	**MDZ-NW1-5.5-6.5**	**MDZ-NW1-B1-8.0**	**MDZ-NWA-B2-7.0**	**MDZ-NW-2-0.3-0.8**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	10	7832583
F3 (C16-C34 Hydrocarbons)	mg/kg	<10	<10	<10	23	<10	10	7832583
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	14	<10	10	7832583
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	7832583
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	114	118	120	113	117		7832583

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		LV4393	LV4395	LV4413	LV4415	LV4416		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/05	2015/03/05		
COC Number		458524-05-01	458524-05-01	459576-05-01	459576-05-01	459576-05-01		
	Units	**MDZ-NW2-4.0-5.0**	**MDZ-NW3-0.3-0.8**	**MDZ-NW4-0.3-0.8**	**MDZ-NW4-B5-5.0**	**MDZ-NW5-0.3-0.8**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	10	7832583
F3 (C16-C34 Hydrocarbons)	mg/kg	16	14	<10	18	<10	10	7832583
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	11	<10	<10	15	10	7832583
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	7832583
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	116	114	94	100	100		7832583

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		LV4418	LV4420	LV4424	LV4425	LV4426		
Sampling Date		2015/03/05	2015/03/07	2015/03/05	2015/03/05	2015/03/05		
COC Number		459576-05-01	459576-05-01	458524-07-01	458524-07-01	458524-07-01		
	Units	**MDZ-NW5-B6-3.0**	**MDZ-NW6-2.0-3.0**	**MDZ-NW7-0.3-0.8**	**MDZ-DUP-D**	**MDZ-DUP-E**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	10	7832583
F3 (C16-C34 Hydrocarbons)	mg/kg	25	<10	<10	<10	<10	10	7832583
F4 (C34-C50 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	10	7832583
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	7832583
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	114	113	118	118	114		7832583

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B518971
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

PARTICLE SIZE DISTRIBUTION ANALYSIS (SOIL)

Maxxam ID		LV4387	LV4390	LV4391	LV4392	LV4413		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/05	2015/03/05		
COC Number		458524-05-01	458524-05-01	458524-05-01	458524-05-01	459576-05-01		
	Units	**MDZ-NW1-0.3-0.8**	**MDZ-NW1-B1-8.0**	**MDZ-NWA-B2-7.0**	**MDZ-NW-2-0.3-0.8**	**MDZ-NW4-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties								
200 mesh (>.075 mm)	%	18.1	8.62	16.1	18.9	26.7	0.10	7834948
200 mesh (<.075 mm)	%	82.0	91.4	83.9	81.1	73.3	0.10	7834948
RDL = Reportable Detection Limit								

Maxxam ID		LV4415	LV4416	LV4418	LV4420	LV4424		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/07	2015/03/05		
COC Number		459576-05-01	459576-05-01	459576-05-01	459576-05-01	458524-07-01		
	Units	**MDZ-NW4-B5-5.0**	**MDZ-NW5-0.3-0.8**	**MDZ-NW5-B6-3.0**	**MDZ-NW6-2.0-3.0**	**MDZ-NW7-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties								
200 mesh (>.075 mm)	%	11.5	31.2	12.1	14.3	26.4	0.10	7834948
200 mesh (<.075 mm)	%	88.5	68.8	87.9	85.7	73.6	0.10	7834948
RDL = Reportable Detection Limit								

Maxxam ID		LV4425	LV4426		
Sampling Date		2015/03/05	2015/03/05		
COC Number		458524-07-01	458524-07-01		
	Units	**MDZ-DUP-D**	**MDZ-DUP-E**	**RDL**	**QC Batch**
Physical Properties					
200 mesh (>.075 mm)	%	12.3	25.9	0.10	7834948
200 mesh (<.075 mm)	%	87.7	74.1	0.10	7834948
RDL = Reportable Detection Limit					

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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

PHYSICAL TESTING (SOIL)

Maxxam ID		LV4387	LV4389	LV4390	LV4391	LV4392		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/05	2015/03/05		
COC Number		458524-05-01	458524-05-01	458524-05-01	458524-05-01	458524-05-01		
	Units	**MDZ-NW1-0.3-0.8**	**MDZ-NW1-5.5-6.5**	**MDZ-NW1-B1-8.0**	**MDZ-NWA-B2-7.0**	**MDZ-NW-2-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	7.7	2.8	4.0	4.2	6.7	0.30	7832037
RDL = Reportable Detection Limit								

Maxxam ID		LV4393	LV4395	LV4413	LV4415	LV4416		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/05	2015/03/05		
COC Number		458524-05-01	458524-05-01	459576-05-01	459576-05-01	459576-05-01		
	Units	**MDZ-NW2-4.0-5.0**	**MDZ-NW3-0.3-0.8**	**MDZ-NW4-0.3-0.8**	**MDZ-NW4-B5-5.0**	**MDZ-NW5-0.3-0.8**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	3.4	8.3	4.5	7.3	7.4	0.30	7832037
RDL = Reportable Detection Limit								

Maxxam ID		LV4418	LV4420	LV4424	LV4425	LV4426		
Sampling Date		2015/03/05	2015/03/07	2015/03/05	2015/03/05	2015/03/05		
COC Number		459576-05-01	459576-05-01	458524-07-01	458524-07-01	458524-07-01		
	Units	**MDZ-NW5-B6-3.0**	**MDZ-NW6-2.0-3.0**	**MDZ-NW7-0.3-0.8**	**MDZ-DUP-D**	**MDZ-DUP-E**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	5.6	2.3	5.6	4.4	4.5	0.30	7832037
RDL = Reportable Detection Limit								

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Client Project #: 219.05112.00010
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Sampler Initials: MM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		LV4418	
Sampling Date		2015/03/05	
COC Number		459576-05-01	
	Units	**MDZ-NW5-B6-3.0**	**QC Batch**
TCLP Extraction Procedure			
Initial pH of Sample	pH	9.47	7847788
pH after HCl	pH	5.52	7847788
Final pH of Leachate	pH	6.23	7847788
pH of Leaching Fluid	pH	2.91	7847788

Maxxam Job #: B518971
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Sampler Initials: MM

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LV4387	LV4390	LV4391	LV4392		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/05		
COC Number		458524-05-01	458524-05-01	458524-05-01	458524-05-01		
	Units	**MDZ-NW1-0.3-0.8**	**MDZ-NW1-B1-8.0**	**MDZ-NWA-B2-7.0**	**MDZ-NW-2-0.3-0.8**	**RDL**	**QC Batch**
Calculated Parameters							
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	10	7832020
Volatiles							
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	7833295
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7833295
Toluene	mg/kg	<0.020	0.15	<0.020	<0.020	0.020	7833295
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7833295
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7833295
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7833295
Styrene	mg/kg	<0.030	<0.030	<0.030	<0.030	0.030	7833295
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7833295
(C6-C10)	mg/kg	<10	<10	<10	<10	10	7833295
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	107	106	108	106		7833295
4-Bromofluorobenzene (sur.)	%	101	100	101	99		7833295
D10-ETHYLBENZENE (sur.)	%	94	96	95	97		7833295
D4-1,2-Dichloroethane (sur.)	%	98	98	100	98		7833295
RDL = Reportable Detection Limit							

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Maxxam Job #: B518971
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SLR CONSULTING (CANADA) LTD
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Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LV4413	LV4415	LV4416	LV4418		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/05		
COC Number		459576-05-01	459576-05-01	459576-05-01	459576-05-01		
	Units	**MDZ-NW4-0.3-0.8**	**MDZ-NW4-B5-5.0**	**MDZ-NW5-0.3-0.8**	**MDZ-NW5-B6-3.0**	**RDL**	**QC Batch**
Calculated Parameters							
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	10	7832020
Volatiles							
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	7833295
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7833295
Toluene	mg/kg	<0.020	<0.020	<0.020	0.047	0.020	7833295
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7833295
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7833295
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7833295
Styrene	mg/kg	<0.030	<0.030	<0.030	<0.030	0.030	7833295
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7833295
(C6-C10)	mg/kg	<10	<10	<10	<10	10	7833295
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	108	106	106	107		7833295
4-Bromofluorobenzene (sur.)	%	98	99	99	100		7833295
D10-ETHYLBENZENE (sur.)	%	90	89	94	89		7833295
D4-1,2-Dichloroethane (sur.)	%	98	96	96	99		7833295
RDL = Reportable Detection Limit							

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Maxxam Job #: B518971
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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		LV4420	LV4424	LV4425	LV4426		
Sampling Date		2015/03/07	2015/03/05	2015/03/05	2015/03/05		
COC Number		459576-05-01	458524-07-01	458524-07-01	458524-07-01		
	Units	**MDZ-NW6-2.0-3.0**	**MDZ-NW7-0.3-0.8**	**MDZ-DUP-D**	**MDZ-DUP-E**	**RDL**	**QC Batch**
Calculated Parameters							
F1 (C6-C10) - BTEX	mg/kg	<10	<10	<10	<10	10	7832020
Volatiles							
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	7833295
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7833295
Toluene	mg/kg	<0.020	0.056	<0.020	<0.020	0.020	7833295
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7833295
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7833295
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7833295
Styrene	mg/kg	<0.030	<0.030	<0.030	<0.030	0.030	7833295
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	0.040	7833295
(C6-C10)	mg/kg	<10	<10	<10	<10	10	7833295
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	107	106	106	105		7833295
4-Bromofluorobenzene (sur.)	%	100	99	100	99		7833295
D10-ETHYLBENZENE (sur.)	%	88	96	93	95		7833295
D4-1,2-Dichloroethane (sur.)	%	98	96	98	98		7833295
RDL = Reportable Detection Limit							

Maxxam Job #: B518971
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4387			LV4388			LV4389		
Sampling Date		2015/03/05			2015/03/05			2015/03/05		
COC Number		458524-05-01			458524-05-01			458524-05-01		
	Units	**MDZ-NW1-0.3-0.8**	**RDL**	**QC Batch**	**MDZ-NW1-4.0-5.0**	**RDL**	**QC Batch**	**MDZ-NW1-5.5-6.5**	**RDL**	**QC Batch**
Physical Properties										
Soluble (2:1) pH	pH	9.00	N/A	7832381	8.85	N/A	7848915	8.99	N/A	7832381
Total Metals by ICPMS										
Total Aluminum (Al)	mg/kg	7050	100	7832379	8090	100	7848906	8770	100	7832379
Total Antimony (Sb)	mg/kg	0.29	0.10	7832379	0.44	0.10	7848906	0.33	0.10	7832379
Total Arsenic (As)	mg/kg	4.51	0.50	7832379	5.67	0.50	7848906	5.62	0.50	7832379
Total Barium (Ba)	mg/kg	99.3	0.10	7832379	118	0.10	7848906	82.6	0.10	7832379
Total Beryllium (Be)	mg/kg	<0.40	0.40	7832379	<0.40	0.40	7848906	<0.40	0.40	7832379
Total Bismuth (Bi)	mg/kg	0.10	0.10	7832379	0.43	0.10	7848906	0.11	0.10	7832379
Total Cadmium (Cd)	mg/kg	0.113	0.050	7832379	0.201	0.050	7848906	0.102	0.050	7832379
Total Calcium (Ca)	mg/kg	64900	100	7832379	71600	100	7848906	84900	100	7832379
Total Chromium (Cr)	mg/kg	11.5	1.0	7832379	16.4	1.0	7848906	15.8	1.0	7832379
Total Cobalt (Co)	mg/kg	6.79	0.30	7832379	8.18	0.30	7848906	8.90	0.30	7832379
Total Copper (Cu)	mg/kg	13.3	0.50	7832379	15.7	0.50	7848906	14.4	0.50	7832379
Total Iron (Fe)	mg/kg	16800	100	7832379	19900	100	7848906	21100	100	7832379
Total Lead (Pb)	mg/kg	8.68	0.10	7832379	18.0	0.10	7848906	9.00	0.10	7832379
Total Lithium (Li)	mg/kg	15.1	5.0	7832379	18.8	5.0	7848906	21.2	5.0	7832379
Total Magnesium (Mg)	mg/kg	16400	100	7832379	20000	100	7848906	20000	100	7832379
Total Manganese (Mn)	mg/kg	383	0.20	7832379	415	1.0	7848906	453	0.20	7832379
Total Mercury (Hg)	mg/kg	<0.050	0.050	7832379	0.065	0.050	7848906	<0.050	0.050	7832379
Total Molybdenum (Mo)	mg/kg	0.48	0.10	7832379	0.43	0.10	7848906	0.50	0.10	7832379
Total Nickel (Ni)	mg/kg	16.2	0.80	7832379	20.5	0.80	7848906	20.5	0.80	7832379
Total Phosphorus (P)	mg/kg	514	10	7832379	584	10	7848906	596	10	7832379
Total Potassium (K)	mg/kg	609	100	7832379	669	100	7848906	721	100	7832379
Total Selenium (Se)	mg/kg	<0.50	0.50	7832379	<0.50	0.50	7848906	<0.50	0.50	7832379
Total Silver (Ag)	mg/kg	<0.050	0.050	7832379	<0.050	0.050	7848906	<0.050	0.050	7832379
Total Sodium (Na)	mg/kg	<100	100	7832379	198	100	7848906	123	100	7832379
Total Strontium (Sr)	mg/kg	162	0.10	7832379	187	0.10	7848906	233	0.10	7832379
Total Thallium (Tl)	mg/kg	<0.050	0.050	7832379	<0.050	0.050	7848906	<0.050	0.050	7832379
Total Tin (Sn)	mg/kg	0.26	0.10	7832379	1.17	0.10	7848906	<0.10	0.10	7832379
Total Titanium (Ti)	mg/kg	65.7	1.0	7832379	80.2	1.0	7848906	90.6	1.0	7832379
Total Uranium (U)	mg/kg	0.470	0.050	7832379	0.538	0.050	7848906	0.696	0.050	7832379
Total Vanadium (V)	mg/kg	8.7	2.0	7832379	10.0	2.0	7848906	11.4	2.0	7832379
Total Zinc (Zn)	mg/kg	36.0	1.0	7832379	76.0	1.0	7848906	39.8	1.0	7832379
Total Zirconium (Zr)	mg/kg	1.62	0.50	7832379	0.89	0.50	7848906	1.59	0.50	7832379

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B518971
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4390	LV4391	LV4392	LV4393		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/05		
COC Number		458524-05-01	458524-05-01	458524-05-01	458524-05-01		
	Units	**MDZ-NW1-B1-8.0**	**MDZ-NWA-B2-7.0**	**MDZ-NW-2-0.3-0.8**	**MDZ-NW2-4.0-5.0**	**RDL**	**QC Batch**
Physical Properties							
Soluble (2:1) pH	pH	8.58	8.59	9.09	8.57	N/A	7832381
Total Metals by ICPMS							
Total Aluminum (Al)	mg/kg	8110	8280	6840	8800	100	7832379
Total Antimony (Sb)	mg/kg	0.92	0.64	0.47	0.59	0.10	7832379
Total Arsenic (As)	mg/kg	5.70	4.96	5.09	5.40	0.50	7832379
Total Barium (Ba)	mg/kg	98.1	99.9	99.7	108	0.10	7832379
Total Beryllium (Be)	mg/kg	<0.40	<0.40	<0.40	<0.40	0.40	7832379
Total Bismuth (Bi)	mg/kg	0.12	0.13	0.11	0.14	0.10	7832379
Total Cadmium (Cd)	mg/kg	0.447	0.431	0.167	0.544	0.050	7832379
Total Calcium (Ca)	mg/kg	72000	73900	62600	78800	100	7832379
Total Chromium (Cr)	mg/kg	15.4	15.5	11.4	17.6	1.0	7832379
Total Cobalt (Co)	mg/kg	7.83	7.92	6.71	8.55	0.30	7832379
Total Copper (Cu)	mg/kg	21.1	24.9	14.0	23.3	0.50	7832379
Total Iron (Fe)	mg/kg	22600	20700	16900	23500	100	7832379
Total Lead (Pb)	mg/kg	22.9	26.5	12.5	43.6	0.10	7832379
Total Lithium (Li)	mg/kg	18.6	18.7	16.0	20.2	5.0	7832379
Total Magnesium (Mg)	mg/kg	16300	16600	16300	17500	100	7832379
Total Manganese (Mn)	mg/kg	418	437	355	473	0.20	7832379
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7832379
Total Molybdenum (Mo)	mg/kg	0.73	0.65	0.53	0.92	0.10	7832379
Total Nickel (Ni)	mg/kg	20.6	20.7	16.5	22.8	0.80	7832379
Total Phosphorus (P)	mg/kg	545	581	477	578	10	7832379
Total Potassium (K)	mg/kg	710	752	590	809	100	7832379
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	0.50	7832379
Total Silver (Ag)	mg/kg	<0.050	<0.050	<0.050	0.104	0.050	7832379
Total Sodium (Na)	mg/kg	135	138	<100	137	100	7832379
Total Strontium (Sr)	mg/kg	184	188	160	204	0.10	7832379
Total Thallium (Tl)	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7832379
Total Tin (Sn)	mg/kg	3.96	4.23	0.29	6.50	0.10	7832379
Total Titanium (Ti)	mg/kg	73.0	79.2	61.9	83.3	1.0	7832379
Total Uranium (U)	mg/kg	0.543	0.580	0.537	0.582	0.050	7832379
Total Vanadium (V)	mg/kg	9.9	9.4	9.7	10.7	2.0	7832379
Total Zinc (Zn)	mg/kg	198	122	41.1	139	1.0	7832379
Total Zirconium (Zr)	mg/kg	0.96	1.03	1.40	1.00	0.50	7832379

RDL = Reportable Detection Limit
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Maxxam Job #: B518971
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4394			LV4395			LV4396		
Sampling Date		2015/03/05			2015/03/05			2015/03/05		
COC Number		458524-05-01			458524-05-01			458524-05-01		
	Units	**MDZ-NW2-B3-6.5**	**RDL**	**QC Batch**	**MDZ-NW3-0.3-0.8**	**RDL**	**QC Batch**	**MDZ-NW3-4.0-5.0**	**RDL**	**QC Batch**
Physical Properties										
Soluble (2:1) pH	pH	8.50	N/A	7848915	8.64	N/A	7832381	9.21	N/A	7848915
Total Metals by ICPMS										
Total Aluminum (Al)	mg/kg	8090	100	7848906	7540	100	7832379	7280	100	7848906
Total Antimony (Sb)	mg/kg	0.77	0.10	7848906	0.96	0.10	7832379	0.39	0.10	7848906
Total Arsenic (As)	mg/kg	6.38	0.50	7848906	5.18	0.50	7832379	5.83	0.50	7848906
Total Barium (Ba)	mg/kg	116	0.10	7848906	139	0.10	7832379	111	0.10	7848906
Total Beryllium (Be)	mg/kg	<0.40	0.40	7848906	<0.40	0.40	7832379	<0.40	0.40	7848906
Total Bismuth (Bi)	mg/kg	0.13	0.10	7848906	0.12	0.10	7832379	0.11	0.10	7848906
Total Cadmium (Cd)	mg/kg	1.39	0.050	7848906	0.455	0.050	7832379	0.129	0.050	7848906
Total Calcium (Ca)	mg/kg	83300	100	7848906	68100	100	7832379	62400	100	7848906
Total Chromium (Cr)	mg/kg	18.0	1.0	7848906	14.3	1.0	7832379	13.4	1.0	7848906
Total Cobalt (Co)	mg/kg	9.02	0.30	7848906	7.95	0.30	7832379	7.46	0.30	7848906
Total Copper (Cu)	mg/kg	24.2	0.50	7848906	17.9	0.50	7832379	14.9	0.50	7848906
Total Iron (Fe)	mg/kg	25900	100	7848906	18900	100	7832379	16500	100	7848906
Total Lead (Pb)	mg/kg	38.3	0.10	7848906	34.6	0.10	7832379	9.90	0.10	7848906
Total Lithium (Li)	mg/kg	19.6	5.0	7848906	17.2	5.0	7832379	15.4	5.0	7848906
Total Magnesium (Mg)	mg/kg	18700	100	7848906	16400	100	7832379	19600	100	7848906
Total Manganese (Mn)	mg/kg	471	1.0	7848906	431	0.20	7832379	375	1.0	7848906
Total Mercury (Hg)	mg/kg	0.055	0.050	7848906	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Molybdenum (Mo)	mg/kg	0.71	0.10	7848906	0.58	0.10	7832379	0.40	0.10	7848906
Total Nickel (Ni)	mg/kg	31.7	0.80	7848906	18.7	0.80	7832379	17.2	0.80	7848906
Total Phosphorus (P)	mg/kg	650	10	7848906	606	10	7832379	531	10	7848906
Total Potassium (K)	mg/kg	863	100	7848906	758	100	7832379	768	100	7848906
Total Selenium (Se)	mg/kg	<0.50	0.50	7848906	<0.50	0.50	7832379	<0.50	0.50	7848906
Total Silver (Ag)	mg/kg	0.082	0.050	7848906	0.081	0.050	7832379	<0.050	0.050	7848906
Total Sodium (Na)	mg/kg	183	100	7848906	<100	100	7832379	139	100	7848906
Total Strontium (Sr)	mg/kg	190	0.10	7848906	175	0.10	7832379	165	0.10	7848906
Total Thallium (Tl)	mg/kg	<0.050	0.050	7848906	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Tin (Sn)	mg/kg	7.43	0.10	7848906	3.14	0.10	7832379	0.26	0.10	7848906
Total Titanium (Ti)	mg/kg	75.7	1.0	7848906	81.0	1.0	7832379	75.5	1.0	7848906
Total Uranium (U)	mg/kg	0.563	0.050	7848906	0.493	0.050	7832379	0.533	0.050	7848906
Total Vanadium (V)	mg/kg	10.5	2.0	7848906	10.1	2.0	7832379	9.3	2.0	7848906
Total Zinc (Zn)	mg/kg	180	1.0	7848906	117	1.0	7832379	54.4	1.0	7848906
Total Zirconium (Zr)	mg/kg	0.89	0.50	7848906	1.50	0.50	7832379	1.27	0.50	7848906

RDL = Reportable Detection Limit
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Maxxam Job #: B518971
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4412	LV4413			LV4414		
Sampling Date		2015/03/05	2015/03/05			2015/03/05		
COC Number		459576-05-01	459576-05-01			459576-05-01		
	Units	**MDZ-NW3-B4-6.0**	**MDZ-NW4-0.3-0.8**	**RDL**	**QC Batch**	**MDZ-NW4-2.0-3.0**	**RDL**	**QC Batch**
Physical Properties								
Soluble (2:1) pH	pH	8.49	8.99	N/A	7832381	8.56	N/A	7848915
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	7920	7210	100	7832379	8440	100	7848906
Total Antimony (Sb)	mg/kg	0.95	0.35	0.10	7832379	0.62	0.10	7848906
Total Arsenic (As)	mg/kg	5.63	4.95	0.50	7832379	6.27	0.50	7848906
Total Barium (Ba)	mg/kg	126	110	0.10	7832379	113	0.10	7848906
Total Beryllium (Be)	mg/kg	<0.40	<0.40	0.40	7832379	<0.40	0.40	7848906
Total Bismuth (Bi)	mg/kg	0.12	0.11	0.10	7832379	0.13	0.10	7848906
Total Cadmium (Cd)	mg/kg	1.34	0.166	0.050	7832379	0.390	0.050	7848906
Total Calcium (Ca)	mg/kg	65800	60900	100	7832379	80400	100	7848906
Total Chromium (Cr)	mg/kg	15.3	12.7	1.0	7832379	17.7	1.0	7848906
Total Cobalt (Co)	mg/kg	7.88	7.35	0.30	7832379	9.38	0.30	7848906
Total Copper (Cu)	mg/kg	25.2	15.0	0.50	7832379	19.3	0.50	7848906
Total Iron (Fe)	mg/kg	22800	17600	100	7832379	21100	100	7848906
Total Lead (Pb)	mg/kg	31.4	11.3	0.10	7832379	32.0	0.10	7848906
Total Lithium (Li)	mg/kg	17.7	16.4	5.0	7832379	18.9	5.0	7848906
Total Magnesium (Mg)	mg/kg	15700	14900	100	7832379	19600	100	7848906
Total Manganese (Mn)	mg/kg	455	408	0.20	7832379	471	1.0	7848906
Total Mercury (Hg)	mg/kg	<0.050	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Molybdenum (Mo)	mg/kg	0.97	0.49	0.10	7832379	0.55	0.10	7848906
Total Nickel (Ni)	mg/kg	21.2	17.5	0.80	7832379	21.0	0.80	7848906
Total Phosphorus (P)	mg/kg	565	515	10	7832379	643	10	7848906
Total Potassium (K)	mg/kg	806	698	100	7832379	908	100	7848906
Total Selenium (Se)	mg/kg	<0.50	<0.50	0.50	7832379	<0.50	0.50	7848906
Total Silver (Ag)	mg/kg	0.090	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Sodium (Na)	mg/kg	193	<100	100	7832379	258	100	7848906
Total Strontium (Sr)	mg/kg	168	153	0.10	7832379	200	0.10	7848906
Total Thallium (Tl)	mg/kg	<0.050	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Tin (Sn)	mg/kg	6.08	0.17	0.10	7832379	5.25	0.10	7848906
Total Titanium (Ti)	mg/kg	76.8	69.9	1.0	7832379	90.4	1.0	7848906
Total Uranium (U)	mg/kg	0.524	0.473	0.050	7832379	0.555	0.050	7848906
Total Vanadium (V)	mg/kg	9.9	9.9	2.0	7832379	10.8	2.0	7848906
Total Zinc (Zn)	mg/kg	187	44.7	1.0	7832379	100	1.0	7848906
Total Zirconium (Zr)	mg/kg	1.31	1.43	0.50	7832379	0.92	0.50	7848906

RDL = Reportable Detection Limit
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Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4415	LV4416			LV4417		
Sampling Date		2015/03/05	2015/03/05			2015/03/05		
COC Number		459576-05-01	459576-05-01			459576-05-01		
	Units	**MDZ-NW4-B5-5.0**	**MDZ-NW5-0.3-0.8**	**RDL**	**QC Batch**	**MDZ-NW5-1.0-2.0**	**RDL**	**QC Batch**
Physical Properties								
Soluble (2:1) pH	pH	8.64	8.72	N/A	7832381	9.16	N/A	7848915
Total Metals by ICPMS								
Total Aluminum (Al)	mg/kg	8070	6370	100	7832379	7640	100	7848906
Total Antimony (Sb)	mg/kg	0.71	0.70	0.10	7832379	0.34	0.10	7848906
Total Arsenic (As)	mg/kg	5.42	6.73	0.50	7832379	5.23	0.50	7848906
Total Barium (Ba)	mg/kg	108	115	0.10	7832379	99.5	0.10	7848906
Total Beryllium (Be)	mg/kg	<0.40	<0.40	0.40	7832379	<0.40	0.40	7848906
Total Bismuth (Bi)	mg/kg	0.12	0.10	0.10	7832379	0.11	0.10	7848906
Total Cadmium (Cd)	mg/kg	0.370	0.331	0.050	7832379	0.115	0.050	7848906
Total Calcium (Ca)	mg/kg	73500	62600	100	7832379	85300	100	7848906
Total Chromium (Cr)	mg/kg	16.2	12.7	1.0	7832379	15.1	1.0	7848906
Total Cobalt (Co)	mg/kg	8.27	7.47	0.30	7832379	7.90	0.30	7848906
Total Copper (Cu)	mg/kg	20.7	19.3	0.50	7832379	29.5	0.50	7848906
Total Iron (Fe)	mg/kg	24000	23000	100	7832379	21500	100	7848906
Total Lead (Pb)	mg/kg	23.1	22.4	0.10	7832379	11.3	0.10	7848906
Total Lithium (Li)	mg/kg	18.9	14.6	5.0	7832379	18.2	5.0	7848906
Total Magnesium (Mg)	mg/kg	16700	14700	100	7832379	18900	100	7848906
Total Manganese (Mn)	mg/kg	457	410	0.20	7832379	405	1.0	7848906
Total Mercury (Hg)	mg/kg	<0.050	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Molybdenum (Mo)	mg/kg	1.00	0.79	0.10	7832379	0.42	0.10	7848906
Total Nickel (Ni)	mg/kg	21.9	18.5	0.80	7832379	18.3	0.80	7848906
Total Phosphorus (P)	mg/kg	565	533	10	7832379	573	10	7848906
Total Potassium (K)	mg/kg	781	566	100	7832379	677	100	7848906
Total Selenium (Se)	mg/kg	<0.50	<0.50	0.50	7832379	<0.50	0.50	7848906
Total Silver (Ag)	mg/kg	0.062	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Sodium (Na)	mg/kg	216	<100	100	7832379	<100	100	7848906
Total Strontium (Sr)	mg/kg	194	159	0.10	7832379	192	0.10	7848906
Total Thallium (Tl)	mg/kg	<0.050	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Tin (Sn)	mg/kg	5.09	24.4	0.10	7832379	0.59	0.10	7848906
Total Titanium (Ti)	mg/kg	71.5	56.5	1.0	7832379	77.9	1.0	7848906
Total Uranium (U)	mg/kg	0.566	0.475	0.050	7832379	0.569	0.050	7848906
Total Vanadium (V)	mg/kg	10.0	8.5	2.0	7832379	9.4	2.0	7848906
Total Zinc (Zn)	mg/kg	100	107	1.0	7832379	46.0	1.0	7848906
Total Zirconium (Zr)	mg/kg	1.06	1.05	0.50	7832379	0.80	0.50	7848906

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Report Date: 2015/03/30

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Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4418	LV4419	LV4420			LV4421		
Sampling Date		2015/03/05	2015/03/07	2015/03/07			2015/03/07		
COC Number		459576-05-01	459576-05-01	459576-05-01			459576-05-01		
	Units	**MDZ-NW5-B6-3.0**	**MDZ-NW6-0.3-0.8**	**MDZ-NW6-2.0-3.0**	**RDL**	**QC Batch**	**MDZ-NW6-B7-5.0**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH	8.53	8.43	8.97	N/A	7832381	8.75	N/A	7848915
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	8270	7000	6770	100	7832379	8030	100	7848906
Total Antimony (Sb)	mg/kg	0.72	0.30	0.36	0.10	7832379	0.40	0.10	7848906
Total Arsenic (As)	mg/kg	5.25	4.97	4.62	0.50	7832379	5.47	0.50	7848906
Total Barium (Ba)	mg/kg	111	87.2	89.5	0.10	7832379	99.6	0.10	7848906
Total Beryllium (Be)	mg/kg	<0.40	<0.40	<0.40	0.40	7832379	<0.40	0.40	7848906
Total Bismuth (Bi)	mg/kg	0.13	0.12	0.11	0.10	7832379	0.12	0.10	7848906
Total Cadmium (Cd)	mg/kg	0.456	0.103	0.166	0.050	7832379	0.178	0.050	7848906
Total Calcium (Ca)	mg/kg	74400	81700	72300	100	7832379	77100	100	7848906
Total Chromium (Cr)	mg/kg	15.4	12.8	13.1	1.0	7832379	15.4	1.0	7848906
Total Cobalt (Co)	mg/kg	8.06	7.40	7.06	0.30	7832379	8.14	0.30	7848906
Total Copper (Cu)	mg/kg	64.3	14.2	14.2	0.50	7832379	37.9	0.50	7848906
Total Iron (Fe)	mg/kg	20200	17500	17800	100	7832379	19400	100	7848906
Total Lead (Pb)	mg/kg	29.0	8.48	11.1	0.10	7832379	13.7	0.10	7848906
Total Lithium (Li)	mg/kg	19.0	16.8	16.5	5.0	7832379	17.3	5.0	7848906
Total Magnesium (Mg)	mg/kg	16000	14900	16500	100	7832379	19400	100	7848906
Total Manganese (Mn)	mg/kg	461	387	388	0.20	7832379	412	1.0	7848906
Total Mercury (Hg)	mg/kg	0.059	<0.050	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Molybdenum (Mo)	mg/kg	0.69	0.47	0.53	0.10	7832379	0.40	0.10	7848906
Total Nickel (Ni)	mg/kg	21.2	18.1	17.8	0.80	7832379	19.3	0.80	7848906
Total Phosphorus (P)	mg/kg	614	556	540	10	7832379	577	10	7848906
Total Potassium (K)	mg/kg	794	736	539	100	7832379	718	100	7848906
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	0.50	7832379	<0.50	0.50	7848906
Total Silver (Ag)	mg/kg	0.057	<0.050	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Sodium (Na)	mg/kg	143	265	152	100	7832379	213	100	7848906
Total Strontium (Sr)	mg/kg	198	193	198	0.10	7832379	187	0.10	7848906
Total Thallium (Tl)	mg/kg	<0.050	<0.050	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Tin (Sn)	mg/kg	4.55	0.20	1.44	0.10	7832379	0.83	0.10	7848906
Total Titanium (Ti)	mg/kg	74.4	56.2	65.4	1.0	7832379	80.8	1.0	7848906
Total Uranium (U)	mg/kg	0.581	0.435	0.569	0.050	7832379	0.560	0.050	7848906
Total Vanadium (V)	mg/kg	10.6	9.6	8.9	2.0	7832379	9.7	2.0	7848906
Total Zinc (Zn)	mg/kg	138	36.5	57.5	1.0	7832379	1360	1.0	7848906
Total Zirconium (Zr)	mg/kg	1.08	1.08	2.43	0.50	7832379	0.77	0.50	7848906

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B518971
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		LV4424	LV4425	LV4426			LV4427		
Sampling Date		2015/03/05	2015/03/05	2015/03/05			2015/03/07		
COC Number		458524-07-01	458524-07-01	458524-07-01			458524-05-01		
	Units	**MDZ-NW7-0.3-0.8**	**MDZ-DUP-D**	**MDZ-DUP-E**	**RDL**	**QC Batch**	**MDZ-DUP-F**	**RDL**	**QC Batch**
Physical Properties									
Soluble (2:1) pH	pH	9.02	8.57	8.89	N/A	7832381	8.71	N/A	7848915
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	6850	7580	6260	100	7832379	8090	100	7848906
Total Antimony (Sb)	mg/kg	0.35	0.52	0.35	0.10	7832379	0.44	0.10	7848906
Total Arsenic (As)	mg/kg	5.14	5.07	4.62	0.50	7832379	5.52	0.50	7848906
Total Barium (Ba)	mg/kg	105	97.2	101	0.10	7832379	108	0.10	7848906
Total Beryllium (Be)	mg/kg	<0.40	<0.40	<0.40	0.40	7832379	<0.40	0.40	7848906
Total Bismuth (Bi)	mg/kg	0.10	0.11	0.10	0.10	7832379	0.12	0.10	7848906
Total Cadmium (Cd)	mg/kg	0.136	0.454	0.152	0.050	7832379	0.180	0.050	7848906
Total Calcium (Ca)	mg/kg	61700	71400	57100	100	7832379	83900	100	7848906
Total Chromium (Cr)	mg/kg	11.6	15.1	11.4	1.0	7832379	15.3	1.0	7848906
Total Cobalt (Co)	mg/kg	7.02	7.92	6.74	0.30	7832379	7.99	0.30	7848906
Total Copper (Cu)	mg/kg	14.0	23.7	13.8	0.50	7832379	19.5	0.50	7848906
Total Iron (Fe)	mg/kg	16400	21700	16000	100	7832379	21000	100	7848906
Total Lead (Pb)	mg/kg	8.36	24.8	10.9	0.10	7832379	14.3	0.10	7848906
Total Lithium (Li)	mg/kg	15.3	18.4	14.5	5.0	7832379	18.5	5.0	7848906
Total Magnesium (Mg)	mg/kg	16200	15600	13500	100	7832379	19400	100	7848906
Total Manganese (Mn)	mg/kg	368	430	378	0.20	7832379	410	1.0	7848906
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	0.050	7832379	0.051	0.050	7848906
Total Molybdenum (Mo)	mg/kg	0.51	0.96	0.50	0.10	7832379	0.44	0.10	7848906
Total Nickel (Ni)	mg/kg	16.7	20.5	16.0	0.80	7832379	18.9	0.80	7848906
Total Phosphorus (P)	mg/kg	500	554	491	10	7832379	572	10	7848906
Total Potassium (K)	mg/kg	598	669	578	100	7832379	712	100	7848906
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	0.50	7832379	<0.50	0.50	7848906
Total Silver (Ag)	mg/kg	<0.050	0.060	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Sodium (Na)	mg/kg	<100	125	<100	100	7832379	203	100	7848906
Total Strontium (Sr)	mg/kg	170	190	145	0.10	7832379	196	0.10	7848906
Total Thallium (Tl)	mg/kg	<0.050	<0.050	<0.050	0.050	7832379	<0.050	0.050	7848906
Total Tin (Sn)	mg/kg	0.14	3.72	0.17	0.10	7832379	1.34	0.10	7848906
Total Titanium (Ti)	mg/kg	74.8	67.7	57.3	1.0	7832379	69.4	1.0	7848906
Total Uranium (U)	mg/kg	0.512	0.543	0.442	0.050	7832379	0.571	0.050	7848906
Total Vanadium (V)	mg/kg	9.3	10.3	9.0	2.0	7832379	9.7	2.0	7848906
Total Zinc (Zn)	mg/kg	36.0	120	41.1	1.0	7832379	68.2	1.0	7848906
Total Zirconium (Zr)	mg/kg	1.44	0.92	1.37	0.50	7832379	0.83	0.50	7848906

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Job #: B518971
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
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Sampler Initials: MM

TCLP METALS (SOIL)

Maxxam ID		LV4418		
Sampling Date		2015/03/05		
COC Number		459576-05-01		
	Units	**MDZ-NW5-B6-3.0**	**RDL**	**QC Batch**
Metals				
LEACHATE Antimony (Sb)	mg/L	<0.10	0.10	7849573
LEACHATE Arsenic (As)	mg/L	<0.10	0.10	7849573
LEACHATE Barium (Ba)	mg/L	1.11	0.10	7849573
LEACHATE Beryllium (Be)	mg/L	<0.10	0.10	7849573
LEACHATE Boron (B)	mg/L	<0.10	0.10	7849573
LEACHATE Cadmium (Cd)	mg/L	<0.10	0.10	7849573
LEACHATE Chromium (Cr)	mg/L	<0.10	0.10	7849573
LEACHATE Cobalt (Co)	mg/L	<0.10	0.10	7849573
LEACHATE Copper (Cu)	mg/L	<0.10	0.10	7849573
LEACHATE Iron (Fe)	mg/L	<0.50	0.50	7849573
LEACHATE Lead (Pb)	mg/L	<0.10	0.10	7849573
LEACHATE Mercury (Hg)	mg/L	<0.0020	0.0020	7849573
LEACHATE Molybdenum (Mo)	mg/L	<0.10	0.10	7849573
LEACHATE Nickel (Ni)	mg/L	<0.10	0.10	7849573
LEACHATE Selenium (Se)	mg/L	<0.10	0.10	7849573
LEACHATE Silver (Ag)	mg/L	<0.10	0.10	7849573
LEACHATE Thallium (Tl)	mg/L	<0.10	0.10	7849573
LEACHATE Uranium (U)	mg/L	<0.10	0.10	7849573
LEACHATE Vanadium (V)	mg/L	<0.10	0.10	7849573
LEACHATE Zinc (Zn)	mg/L	0.76	0.10	7849573
LEACHATE Zirconium (Zr)	mg/L	<0.10	0.10	7849573
RDL = Reportable Detection Limit				

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Client Project #: 219.05112.00010
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Your P.O. #: 700315471
Sampler Initials: MM

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LV4387	LV4389	LV4390	LV4391		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/05		
COC Number		458524-05-01	458524-05-01	458524-05-01	458524-05-01		
	Units	**MDZ-NW1-0.3-0.8**	**MDZ-NW1-5.5-6.5**	**MDZ-NW1-B1-8.0**	**MDZ-NWA-B2-7.0**	**RDL**	**QC Batch**
Calculated Parameters							
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.31	0.31	0.31	0.10	7830848
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	<0.10	<0.10	0.10	7830848
Polycyclic Aromatics							
Naphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7832585
2-Methylnaphthalene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7832585
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7832585
Fluorene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Phenanthrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	7832585
Fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Benzo(a)anthracene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Chrysene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Benzo(a)pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7832585
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7832585
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7832585
Low Molecular Weight PAH`s	mg/kg	0.093	<0.050	<0.050	<0.050	0.050	7830849
High Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7830849
Total PAH	mg/kg	0.093	<0.050	<0.050	<0.050	0.050	7830849
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	106	109	105	110		7832585
D8-ACENAPHTHYLENE (sur.)	%	108	108	103	108		7832585
D8-NAPHTHALENE (sur.)	%	101	105	102	104		7832585
TERPHENYL-D14 (sur.)	%	116	120	115	117		7832585
RDL = Reportable Detection Limit							

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Maxxam Job #: B518971
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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LV4392	LV4393	LV4395	LV4413		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/05		
COC Number		458524-05-01	458524-05-01	458524-05-01	459576-05-01		
	Units	**MDZ-NW-2-0.3-0.8**	**MDZ-NW2-4.0-5.0**	**MDZ-NW3-0.3-0.8**	**MDZ-NW4-0.3-0.8**	**RDL**	**QC Batch**
Calculated Parameters							
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.31	0.31	0.31	0.10	7830848
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	<0.10	<0.10	0.10	7830848
Polycyclic Aromatics							
Naphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7832585
2-Methylnaphthalene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7832585
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7832585
Fluorene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Phenanthrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Anthracene	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	7832585
Fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Benzo(a)anthracene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Chrysene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Benzo(a)pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7832585
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7832585
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7832585
Low Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7830849
High Molecular Weight PAH`s	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7830849
Total PAH	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7830849
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	103	105	101	103		7832585
D8-ACENAPHTHYLENE (sur.)	%	101	103	99	103		7832585
D8-NAPHTHALENE (sur.)	%	99	101	98	92		7832585
TERPHENYL-D14 (sur.)	%	106	114	105	113		7832585
RDL = Reportable Detection Limit							

Maxxam Job #: B518971
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CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LV4415	LV4416	LV4418	LV4420		
Sampling Date		2015/03/05	2015/03/05	2015/03/05	2015/03/07		
COC Number		459576-05-01	459576-05-01	459576-05-01	459576-05-01		
	Units	**MDZ-NW4-B5-5.0**	**MDZ-NW5-0.3-0.8**	**MDZ-NW5-B6-3.0**	**MDZ-NW6-2.0-3.0**	**RDL**	**QC Batch**
Calculated Parameters							
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.31	0.95	0.31	0.10	7830848
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	0.10	<0.10	0.10	7830848
Polycyclic Aromatics							
Naphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7832585
2-Methylnaphthalene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	7832585
Acenaphthene	mg/kg	<0.0050	<0.0050	0.0098	<0.0050	0.0050	7832585
Fluorene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Phenanthrene	mg/kg	<0.020	<0.020	0.079	<0.020	0.020	7832585
Anthracene	mg/kg	<0.0040	<0.0040	0.020	<0.0040	0.0040	7832585
Fluoranthene	mg/kg	<0.020	<0.020	0.078	<0.020	0.020	7832585
Pyrene	mg/kg	<0.020	<0.020	0.089	<0.020	0.020	7832585
Benzo(a)anthracene	mg/kg	<0.020	<0.020	0.058	<0.020	0.020	7832585
Chrysene	mg/kg	<0.020	<0.020	0.066	<0.020	0.020	7832585
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	0.064	<0.020	0.020	7832585
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	0.036	<0.020	0.020	7832585
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	7832585
Benzo(a)pyrene	mg/kg	<0.020	<0.020	0.060	<0.020	0.020	7832585
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7832585
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7832585
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7832585
Low Molecular Weight PAH`s	mg/kg	<0.050	<0.050	0.11	<0.050	0.050	7830849
High Molecular Weight PAH`s	mg/kg	<0.050	<0.050	0.42	<0.050	0.050	7830849
Total PAH	mg/kg	<0.050	<0.050	0.52	<0.050	0.050	7830849
Surrogate Recovery (%)							
D10-ANTHRACENE (sur.)	%	91	100	100	99		7832585
D8-ACENAPHTHYLENE (sur.)	%	94	100	98	98		7832585
D8-NAPHTHALENE (sur.)	%	99	92	91	90		7832585
TERPHENYL-D14 (sur.)	%	89	93	109	115		7832585
RDL = Reportable Detection Limit							

Maxxam Job #: B518971
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Sampler Initials: MM

CCME PAH IN SOIL BY GC-MS (SOIL)

Maxxam ID		LV4424	LV4425	LV4426		
Sampling Date		2015/03/05	2015/03/05	2015/03/05		
COC Number		458524-07-01	458524-07-01	458524-07-01		
	Units	**MDZ-NW7-0.3-0.8**	**MDZ-DUP-D**	**MDZ-DUP-E**	**RDL**	**QC Batch**
Calculated Parameters						
Index of Additive Cancer Risk(IARC)	N/A	0.31	0.43	0.31	0.10	7830848
Benzo[a]pyrene equivalency	N/A	<0.10	<0.10	<0.10	0.10	7830848
Polycyclic Aromatics						
Naphthalene	mg/kg	<0.010	<0.010	<0.010	0.010	7832585
2-Methylnaphthalene	mg/kg	<0.020	<0.020	<0.020	0.020	7832585
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	7832585
Acenaphthene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	7832585
Fluorene	mg/kg	<0.020	<0.020	<0.020	0.020	7832585
Phenanthrene	mg/kg	<0.020	0.049	<0.020	0.020	7832585
Anthracene	mg/kg	<0.0040	0.011	<0.0040	0.0040	7832585
Fluoranthene	mg/kg	<0.020	0.052	<0.020	0.020	7832585
Pyrene	mg/kg	<0.020	0.053	<0.020	0.020	7832585
Benzo(a)anthracene	mg/kg	<0.020	0.021	<0.020	0.020	7832585
Chrysene	mg/kg	<0.020	0.024	<0.020	0.020	7832585
Benzo(b&j)fluoranthene	mg/kg	<0.020	0.022	<0.020	0.020	7832585
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	<0.020	0.020	7832585
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	0.020	7832585
Benzo(a)pyrene	mg/kg	<0.020	<0.020	<0.020	0.020	7832585
Indeno(1,2,3-cd)pyrene	mg/kg	<0.050	<0.050	<0.050	0.050	7832585
Dibenz(a,h)anthracene	mg/kg	<0.050	<0.050	<0.050	0.050	7832585
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	0.050	7832585
Low Molecular Weight PAH`s	mg/kg	<0.050	0.061	<0.050	0.050	7830849
High Molecular Weight PAH`s	mg/kg	<0.050	0.17	<0.050	0.050	7830849
Total PAH	mg/kg	<0.050	0.23	<0.050	0.050	7830849
Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	105	103	105		7832585
D8-ACENAPHTHYLENE (sur.)	%	104	102	103		7832585
D8-NAPHTHALENE (sur.)	%	103	102	109		7832585
TERPHENYL-D14 (sur.)	%	115	113	114		7832585
RDL = Reportable Detection Limit						

GENERAL COMMENTS

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

Package 1	2.3°C
Package 2	11.3°C
Package 3	11.7°C

[Revision V2R 2015/03/30 SF] Added 7 Metals and 1 TCLP-Metals

Results relate only to the items tested.

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Maxxam Job #: B518971
Report Date: 2015/03/30

QUALITY ASSURANCE REPORT

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7832583	O-TERPHENYL (sur.)	2015/03/11	101	50 - 130	102	50 - 130	133 (1)					
7832585	D10-ANTHRACENE (sur.)	2015/03/11	100	60 - 130	109	60 - 130	120	%				
7832585	D8-ACENAPHTHYLENE (sur.)	2015/03/11	98	50 - 130	108	50 - 130	118	%				
7832585	D8-NAPHTHALENE (sur.)	2015/03/11	99	50 - 130	105	50 - 130	117	%				
7832585	TERPHENYL-D14 (sur.)	2015/03/11	108	60 - 130	117	60 - 130	131 (2)					
7833295	1,4-Difluorobenzene (sur.)	2015/03/12	104	70 - 130	107	70 - 130	107	%				
7833295	4-Bromofluorobenzene (sur.)	2015/03/12	99	70 - 130	101	70 - 130	99	%				
7833295	D10-ETHYLBENZENE (sur.)	2015/03/12	100	50 - 130	79	50 - 130	82	%				
7833295	D4-1,2-Dichloroethane (sur.)	2015/03/12	100	70 - 130	98	70 - 130	95	%				
7832037	Moisture	2015/03/11					<0.30	%	0	20		
7832379	Total Aluminum (Al)	2015/03/12					<100	mg/kg	6.0	35	105	70 - 130
7832379	Total Antimony (Sb)	2015/03/12	98	75 - 125	95	75 - 125	<0.10	mg/kg	NC	30	105	70 - 130
7832379	Total Arsenic (As)	2015/03/12	101	75 - 125	91	75 - 125	<0.50	mg/kg	4.3	30	92	70 - 130
7832379	Total Barium (Ba)	2015/03/12	NC	75 - 125	95	75 - 125	<0.10	mg/kg	1.7	35	99	70 - 130
7832379	Total Beryllium (Be)	2015/03/12	107	75 - 125	98	75 - 125	<0.40	mg/kg	NC	30		
7832379	Total Bismuth (Bi)	2015/03/12					<0.10	mg/kg	NC	30		
7832379	Total Cadmium (Cd)	2015/03/12	100	75 - 125	95	75 - 125	<0.050	mg/kg	NC	30	101	70 - 130
7832379	Total Calcium (Ca)	2015/03/12					<100	mg/kg	1.8	30	90	70 - 130
7832379	Total Chromium (Cr)	2015/03/12	102	75 - 125	95	75 - 125	<1.0	mg/kg	4.2	30	106	70 - 130
7832379	Total Cobalt (Co)	2015/03/12	99	75 - 125	97	75 - 125	<0.30	mg/kg	7.3	30	93	70 - 130
7832379	Total Copper (Cu)	2015/03/12	100	75 - 125	99	75 - 125	<0.50	mg/kg	0.27	30	92	70 - 130
7832379	Total Iron (Fe)	2015/03/12					<100	mg/kg	3.8	30	90	70 - 130
7832379	Total Lead (Pb)	2015/03/12	97	75 - 125	95	75 - 125	<0.10	mg/kg	5.8	35	97	70 - 130
7832379	Total Lithium (Li)	2015/03/12	109	75 - 125	96	75 - 125	<5.0	mg/kg	NC	30		
7832379	Total Magnesium (Mg)	2015/03/12					<100	mg/kg	4.7	30	93	70 - 130
7832379	Total Manganese (Mn)	2015/03/12	NC	75 - 125	96	75 - 125	<0.20	mg/kg	3.4	30	96	70 - 130
7832379	Total Mercury (Hg)	2015/03/12	93	75 - 125	91	75 - 125	<0.050	mg/kg	NC	35	118	70 - 130
7832379	Total Molybdenum (Mo)	2015/03/12	110	75 - 125	98	75 - 125	<0.10	mg/kg	NC	35	114	70 - 130
7832379	Total Nickel (Ni)	2015/03/12	105	75 - 125	96	75 - 125	<0.80	mg/kg	4.7	30	98	70 - 130
7832379	Total Phosphorus (P)	2015/03/12					<10	mg/kg	4.0	30	87	70 - 130
7832379	Total Potassium (K)	2015/03/12					<100	mg/kg	7.9	35		

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7832379	Total Selenium (Se)	2015/03/12	102	75 - 125	94	75 - 125	<0.50	mg/kg	NC	30		
7832379	Total Silver (Ag)	2015/03/12	99	75 - 125	97	75 - 125	<0.050	mg/kg	NC	35		
7832379	Total Sodium (Na)	2015/03/12					<100	mg/kg	NC	35		
7832379	Total Strontium (Sr)	2015/03/12	NC	75 - 125	97	75 - 125	<0.10	mg/kg	2.9	35	101	70 - 130
7832379	Total Thallium (Tl)	2015/03/12	99	75 - 125	93	75 - 125	<0.050	mg/kg	NC	30	95	70 - 130
7832379	Total Tin (Sn)	2015/03/12	97	75 - 125	93	75 - 125	<0.10	mg/kg	NC	35		
7832379	Total Titanium (Ti)	2015/03/12	NC	75 - 125	93	75 - 125	<1.0	mg/kg	9.6	35	107	70 - 130
7832379	Total Uranium (U)	2015/03/12	100	75 - 125	93	75 - 125	<0.050	mg/kg	6.3	30	102	70 - 130
7832379	Total Vanadium (V)	2015/03/12	100	75 - 125	94	75 - 125	<2.0	mg/kg	NC	30	102	70 - 130
7832379	Total Zinc (Zn)	2015/03/12	NC	75 - 125	96	75 - 125	<1.0	mg/kg	1.9	30	91	70 - 130
7832379	Total Zirconium (Zr)	2015/03/12					<0.50	mg/kg	NC	30		
7832381	Soluble (2:1) pH	2015/03/11			101	97 - 103			0.56	N/A		
7832583	F2 (C10-C16 Hydrocarbons)	2015/03/11	97	50 - 130	97	70 - 130	<10	mg/kg	NC	40		
7832583	F3 (C16-C34 Hydrocarbons)	2015/03/11	100	50 - 130	102	70 - 130	<10	mg/kg	NC	40		
7832583	F4 (C34-C50 Hydrocarbons)	2015/03/11	101	50 - 130	104	70 - 120	<10	mg/kg	NC	40		
7832583	Reached Baseline at C50	2015/03/11							NC	50		
7832585	2-Methylnaphthalene	2015/03/11	94	40 - 130	100	50 - 130	<0.020	mg/kg	NC	50		
7832585	Acenaphthene	2015/03/11	95	40 - 130	102	50 - 130	<0.0050	mg/kg	NC	50		
7832585	Acenaphthylene	2015/03/11	94	40 - 130	102	50 - 130	<0.0050	mg/kg	NC	50		
7832585	Anthracene	2015/03/11	96	40 - 130	103	60 - 130	<0.0040	mg/kg	NC	50		
7832585	Benzo(a)anthracene	2015/03/11	93	40 - 130	100	60 - 130	<0.020	mg/kg	NC	50		
7832585	Benzo(a)pyrene	2015/03/11	98	40 - 130	103	60 - 130	<0.020	mg/kg	NC	50		
7832585	Benzo(b&j)fluoranthene	2015/03/11	93	40 - 130	100	60 - 130	<0.020	mg/kg	NC	50		
7832585	Benzo(b)fluoranthene	2015/03/11	93	40 - 130	100	60 - 130	<0.020	mg/kg	NC	20		
7832585	Benzo(g,h,i)perylene	2015/03/11	94	40 - 130	97	60 - 130	<0.050	mg/kg	NC	50		
7832585	Benzo(k)fluoranthene	2015/03/11	89	40 - 130	93	60 - 130	<0.020	mg/kg	NC	50		
7832585	Chrysene	2015/03/11	98	40 - 130	103	60 - 130	<0.020	mg/kg	NC	50		
7832585	Dibenz(a,h)anthracene	2015/03/11	95	40 - 130	99	60 - 130	<0.050	mg/kg	NC	50		
7832585	Fluoranthene	2015/03/11	100	40 - 130	108	60 - 130	<0.020	mg/kg	NC	50		
7832585	Fluorene	2015/03/11	95	40 - 130	103	50 - 130	<0.020	mg/kg	NC	50		
7832585	Indeno(1,2,3-cd)pyrene	2015/03/11	96	40 - 130	99	60 - 130	<0.050	mg/kg	NC	50		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7832585	Naphthalene	2015/03/11	94	40 - 130	99	50 - 130	<0.010	mg/kg	NC	50		
7832585	Phenanthrene	2015/03/11	93	40 - 130	102	60 - 130	<0.020	mg/kg	NC	50		
7832585	Pyrene	2015/03/11	94	40 - 130	101	60 - 130	<0.020	mg/kg	NC	50		
7833295	(C6-C10)	2015/03/12			98	60 - 140	<10	mg/kg				
7833295	Benzene	2015/03/12	84	60 - 140	87	60 - 140	<0.0050	mg/kg	NC (3)	40		
7833295	Ethylbenzene	2015/03/12	85	60 - 140	92	60 - 140	<0.010	mg/kg	NC	40		
7833295	m & p-Xylene	2015/03/12	88	60 - 140	86	60 - 140	<0.040	mg/kg	NC	40		
7833295	Methyl-tert-butylether (MTBE)	2015/03/12					<0.10	mg/kg	NC	40		
7833295	o-Xylene	2015/03/12	81	60 - 140	89	60 - 140	<0.040	mg/kg	NC	40		
7833295	Styrene	2015/03/12					<0.030	mg/kg	NC	40		
7833295	Toluene	2015/03/12	88	60 - 140	85	60 - 140	<0.020	mg/kg	NC	40		
7833295	Xylenes (Total)	2015/03/12					<0.040	mg/kg	NC	40		
7834948	200 mesh (<.075 mm)	2015/03/13							0.67	35		
7834948	200 mesh (>.075 mm)	2015/03/13							3.9	35		
7847788	Final pH of Leachate	2015/03/27					4.97	pH	0	N/A		
7847788	Initial pH of Sample	2015/03/27					4.97	pH	0.12	N/A		
7847788	pH after HCl	2015/03/27							0.64	N/A		
7847788	pH of Leaching Fluid	2015/03/27					4.97	pH	0	N/A		
7848906	Total Aluminum (Al)	2015/03/27					<100	mg/kg	0.84	35	100	70 - 130
7848906	Total Antimony (Sb)	2015/03/27	96	75 - 125	97	75 - 125	<0.10	mg/kg	NC	30	100	70 - 130
7848906	Total Arsenic (As)	2015/03/27	98	75 - 125	95	75 - 125	<0.50	mg/kg	1.5	30	102	70 - 130
7848906	Total Barium (Ba)	2015/03/27	NC	75 - 125	97	75 - 125	<0.10	mg/kg	4.6	35	100	70 - 130
7848906	Total Beryllium (Be)	2015/03/27	98	75 - 125	96	75 - 125	<0.40	mg/kg	NC	30		
7848906	Total Bismuth (Bi)	2015/03/27					<0.10	mg/kg	NC	30		
7848906	Total Cadmium (Cd)	2015/03/27	94	75 - 125	94	75 - 125	<0.050	mg/kg	NC	30	90	70 - 130
7848906	Total Calcium (Ca)	2015/03/27					<100	mg/kg	14	30	96	70 - 130
7848906	Total Chromium (Cr)	2015/03/27	98	75 - 125	101	75 - 125	<1.0	mg/kg	1.5	30	113	70 - 130
7848906	Total Cobalt (Co)	2015/03/27	96	75 - 125	102	75 - 125	<0.30	mg/kg	2.9	30	97	70 - 130
7848906	Total Copper (Cu)	2015/03/27	91	75 - 125	100	75 - 125	<0.50	mg/kg	1.6	30	90	70 - 130
7848906	Total Iron (Fe)	2015/03/27					<100	mg/kg	16	30	95	70 - 130
7848906	Total Lead (Pb)	2015/03/27	90	75 - 125	93	75 - 125	<0.10	mg/kg	18	35	95	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7848906	Total Lithium (Li)	2015/03/27	99	75 - 125	96	75 - 125	<5.0	mg/kg	NC	30		
7848906	Total Magnesium (Mg)	2015/03/27					<100	mg/kg	2.2	30	98	70 - 130
7848906	Total Manganese (Mn)	2015/03/27	NC	75 - 125	100	75 - 125	1.3, RDL=1.0 (4)	mg/kg	2.0	30	98	70 - 130
7848906	Total Mercury (Hg)	2015/03/27	92	75 - 125	93	75 - 125	<0.050	mg/kg	NC	35	90	70 - 130
7848906	Total Molybdenum (Mo)	2015/03/27	108	75 - 125	96	75 - 125	<0.10	mg/kg	NC	35	99	70 - 130
7848906	Total Nickel (Ni)	2015/03/27	94	75 - 125	102	75 - 125	<0.80	mg/kg	3.1	30	95	70 - 130
7848906	Total Phosphorus (P)	2015/03/27					<10	mg/kg	0.87	30	92	70 - 130
7848906	Total Potassium (K)	2015/03/27					<100	mg/kg	1.0	35		
7848906	Total Selenium (Se)	2015/03/27	97	75 - 125	100	75 - 125	<0.50	mg/kg	NC	30		
7848906	Total Silver (Ag)	2015/03/27	95	75 - 125	98	75 - 125	<0.050	mg/kg	NC	35		
7848906	Total Sodium (Na)	2015/03/27					<100	mg/kg	NC	35		
7848906	Total Strontium (Sr)	2015/03/27	NC	75 - 125	99	75 - 125	<0.10	mg/kg	0.56	35	98	70 - 130
7848906	Total Thallium (Tl)	2015/03/27	94	75 - 125	92	75 - 125	<0.050	mg/kg	NC	30	89	70 - 130
7848906	Total Tin (Sn)	2015/03/27	97	75 - 125	98	75 - 125	<0.10	mg/kg	23	35		
7848906	Total Titanium (Ti)	2015/03/27	NC	75 - 125	95	75 - 125	<1.0	mg/kg	4.3	35	108	70 - 130
7848906	Total Uranium (U)	2015/03/27	96	75 - 125	91	75 - 125	<0.050	mg/kg	0.69	30	99	70 - 130
7848906	Total Vanadium (V)	2015/03/27	97	75 - 125	99	75 - 125	<2.0	mg/kg	NC	30	103	70 - 130
7848906	Total Zinc (Zn)	2015/03/27	NC	75 - 125	98	75 - 125	<1.0	mg/kg	19	30	90	70 - 130
7848906	Total Zirconium (Zr)	2015/03/27					<0.50	mg/kg	NC	30		
7848915	Soluble (2:1) pH	2015/03/27			100	97 - 103			0	N/A		
7849573	LEACHATE Antimony (Sb)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Arsenic (As)	2015/03/28			109	75 - 125	<0.10	mg/L				
7849573	LEACHATE Barium (Ba)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Beryllium (Be)	2015/03/28			107	75 - 125	<0.10	mg/L				
7849573	LEACHATE Boron (B)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Cadmium (Cd)	2015/03/28			102	75 - 125	<0.10	mg/L				
7849573	LEACHATE Chromium (Cr)	2015/03/28			114	75 - 125	<0.10	mg/L				
7849573	LEACHATE Cobalt (Co)	2015/03/28			112	75 - 125	<0.10	mg/L				
7849573	LEACHATE Copper (Cu)	2015/03/28			114	75 - 125	<0.10	mg/L				
7849573	LEACHATE Iron (Fe)	2015/03/28					<0.50	mg/L				

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
7849573	LEACHATE Lead (Pb)	2015/03/28			105	75 - 125	<0.10	mg/L				
7849573	LEACHATE Mercury (Hg)	2015/03/28					<0.0020	mg/L				
7849573	LEACHATE Molybdenum (Mo)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Nickel (Ni)	2015/03/28			115	75 - 125	<0.10	mg/L				
7849573	LEACHATE Selenium (Se)	2015/03/28			103	75 - 125	<0.10	mg/L				
7849573	LEACHATE Silver (Ag)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Thallium (Tl)	2015/03/28					<0.10	mg/L				
7849573	LEACHATE Uranium (U)	2015/03/28			101	75 - 125	<0.10	mg/L				
7849573	LEACHATE Vanadium (V)	2015/03/28			111	75 - 125	<0.10	mg/L				
7849573	LEACHATE Zinc (Zn)	2015/03/28			111	75 - 125	<0.10	mg/L				
7849573	LEACHATE Zirconium (Zr)	2015/03/28					<0.10	mg/L				

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Surrogate recovery exceeds acceptance criteria (high recovery).

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(3) RDL raised due to sample matrix interference.

(4) RDL raised due to blank contamination/carry over, results more than 20 times higher.

Maxxam Job #: B518971
Report Date: 2015/03/30

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Location: WILMER MARSH
Your P.O. #: 700315471
Sampler Initials: MM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Andy Lu, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam

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4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-Free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

Chain Of Custody Record

Page 1 of 3

INVOICE TO:		Report Information		Project Information	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI	Company Name	#28604 SLR CONSULTING (CANADA) LTD	Quotation #	B50110
Contact Name	Brad Klaver	Contact Name	Lindsay P, Dave M, Lab Data	P.O. #	
Address	641-800 BURRARD STREET	Address	200-1475 Ellis Street	Project #	219.05112.00010
	VANCOUVER BC V6Z 2V8		Kelowna BC V1Y 2A3	Project Name	
Phone	(604) 775-9349 Fax: (604) 775-6645	Phone	(250) 762-7202 Fax:	Site #	Wilmer Marsh
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca	Email	lpaterson@slrconsulting.com	Sampled By	

Laboratory Use Only

Maxxam Job #	Bottle Order #:
B518971	458524
Chain Of Custody Record	Project Manager
C#458524-05-01	Crystal Ireland

Regulatory Criteria:

- [X] CSR
- [X] CCME
- [ ] BC Water Quality
- [ ] Other ______

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [X] Date Required: ______
Rush Confirmation Number: ______ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil, PAHs	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)	PAHs	# of Bottles	Comments
1	LV4387	MDZ-NW1-0.3-0.8	15/03/05	12:05	Soil												5	All samples shipped on hold.
2	LV4388	MDZ-NW1-4.0-5.0															2	
3	LV4389	MDZ-NW1-5.5-6.5															2	
4	LV4390	MDZ-NW1-B1-8.0															5	
5	LV4391	MDZ-NWA-B2-7.0															5	
6	LV4392	MDZ-NW2-0.3-0.8															5	
7	LV4393	MDZ-NW2-4.0-5.0															2	
8	LV4394	MDZ-NW2-B3-6.5															2	
9	LV4395	MDZ-NW3-0.3-0.8															2	
10	LV4396	MDZ-NW3-4.0-5.0															5	

B518971

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Matthew Coady	15/03/07	18:00	Laurel Bertrier	2015/03/09	11:00	

Lab Use Only		
Time Sensitive [ ]	Temperature (°C) on Receipt: 2,2,3 / 11,11,12 / 11,12,12	Custody Seal Intact on Cooler? N/A [ ] Yes [ ] No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

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4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-Free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

Chain Of Custody Record

Page 2 of 3

INVOICE TO:	
Company Name	#1756 PUBLIC WORKS AND GOVERNMENT SERVI
Contact Name	Brad Klaver
Address	641- 800 BURRARD STREET VANCOUVER BC V6Z 2V8
Phone	(604) 775-9349 Fax: (604) 775-6645
Email	Bradley.Klaver@pwgsc-tpsgc.gc.ca

Report Information	
Company Name	#28804 SLR CONSULTING (CANADA) LTD
Contact Name	Lindsay P, Dave M, Lab Data
Address	200-1475 Ellis Street Kelowna BC V1Y 2A3
Phone	(250) 762-7202 Fax:
Email	lpaterson@slrconsulting.com

Project Information	
Quotation #	B50110
P.O. #	700315471
Project #	219.05112.0010
Project Name	
Site #	WILMER MARSH
Sampled By	

Laboratory Use Only	
Maxxam Job #	Bottle Order #:
B518971	459576
Chain Of Custody Record	Project Manager
C#459576-05-01	Samantha Fregien

Regulatory Criteria:

- [x] CSR
- [x] CCME
- [ ] BC Water Quality
- [ ] Other ____________

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY ☐ 2 Day ☐ 3 Day ☒ Date Required: ______ ☐
Rush Confirmation Number: ______ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)	PAHs	# of Bottles	Comments
1	LV4412	MDZ-NW3-B4-6.0	15/03/05	12:05	Soil												2	(All SAMPLES shipped on hold)
2	LV4413	MDZ-NW4-0.3-0.8															5	
3	LV4414	MDZ-NW4-2.0-3.0															2	
4	LV4415	MDZ-NW4-B5-5.0															5	
5	LV4416	MDZ-NW5-0.3-0.8															5	
6	LV4417	MDZ-NW5-1.0-2.0															2	
7	LV4418	MDZ-NW5-B6-3.0															5	
8	LV4419	MDZ-NW6-0.3-0.8	15/03/07														2	
9	LV4420	MDZ-NW6-2.0-3.0	15/03/07														5	
10	LV4421	MDZ-NW6-B7-5.0	15/03/07														2	

B518971

* * RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Mathew Coutley	15/03/08	18:00	Laurel Berthier	2015/03/09	11:00	

Lab Use Only		
Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
☐	2,2,3/11,11,12	☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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1,1,2,12

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Chain Of Custody Record — Page 3 of 3

INVOICE TO:
Company Name: #1756 PUBLIC WORKS AND GOVERNMENT SERVI
Contact Name: Brad Klaver
Address: 641-800 BURRARD STREET, VANCOUVER BC V6Z 2V8
Phone: (604) 775-9349 Fax: (604) 775-6645
Email: Bradley.Klaver@pwgsc-tpsgc.gc.ca

Report Information
Company Name: #28804 SLR CONSULTING (CANADA) LTD
Contact Name: Lindsay P, Dave M, Lab Data
Address: 200-1475 Ellis Street, Kelowna BC V1Y 2A3
Phone: (250) 762-7202 Fax:
Email: lpaterson@slrconsulting.com

Project Information
Quotation #: B50110
P.O. #:
Project #: 219.05112.00010
Project Name: Delliner Marsh
Site #:
Sampled By: MC

Laboratory Use Only
Maxxam Job #: B518971
Bottle Order #: 456524
Chain Of Custody Record: C#456524-07-01
Project Manager: Crystal Ireland

Regulatory Criteria: [X] CSR [X] CCME [ ] BC Water Quality [ ] Other

Special Instructions:

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects
Regular (Standard) TAT: [ ]
(will be applied if Rush TAT is not specified).
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [X] Date Required: [ ]
Rush Confirmation Number: (call lab for #)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y/N)	TCLP BTEX, TCLP PAHs, TCLP Metals	SWOG, Flashpoint	Elemental Sulphur (Calgary)	Free Liquid (Paint filter)	CCME BTEX/F1-F24 in Soil, PAHs	CSR/CCME Metals in Soil	VPH	Extractable Petroleum Hydrocarbons (EPH)	Grain Size (75um)	PAHs	# of Bottles	Comments
1	LV4424	MD2-~~NW4~~-03-03	15/03/05	12:05	Soil											5		All samples shipped on hold
2	LV4425	MD2-DUP-D	↓	↓	↓											5		
3	LV4426	MD2-DUP-E	↓													5		
4	LV4427	MD2-DUP-F	15/03/07	↓	↓											2		
5																		
6																		
7																		
8																		
9																		
10																		

B518971

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Mothu Coady	15/03/09	19:00	Laurel Berthier	2015/03/09	11:00	

Lab Use Only
Time Sensitive: [ ]
Temperature (°C) on Receipt: 2,2,3 / 1,1,1 / 1,1,2
Custody Seal Intact on Cooler? [ ] Yes [ ] No — NA

1,1,2 / 1,1,2

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

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Maxxam Analytics Inc

PWGSC - MAXXAM ADDITIONAL ANALYSIS REQUEST RECORD

Consultant Name: SLR Consulting
Contact Name: David McKeown
Consultant Project #: 219.05112.00010
Maxxam Job #: B518971
(Please complete this form on a per job basis - i.e. one form per original)

Project Name: Wilmer Marsh
PWGSC Project Manager: Brad Klaver
Task Authorization #: PO # 70031547 I
Maxxam Location:

TURNAROUND TIME		
Standard	(5 days)	☐
Rush	(3 days)	☑
	(2 days)	☐
	(1 day)	☐
	(same day)	☐
Date Required :		

B518971

Applicable Guidelines (please specify): CCME AL/RL

LAB USE ONLY
Original COC analysis completed and invoiced at time of add-on (circle one)
YES NO
(If yes original coc in invoice package is for reference only)
New Maxxam Job # (If applicable)

ADDITIONAL ANALYSIS REQUEST

CLIENT SAMPLE ID	Original COC #	LAB ID	Matrix	SAMPLING DATE (YY/MM/DD)	SAMPLING Time HH:MM	CCME Metals/pH	CCME PAH	CCME BTEX+F1	CCME F2-F4	Grain Size					Hold	Sample previously submitted on hold (Y/N)	SPECIAL INSTRUCTIONS
MDZ-NW1-0.3-0.8	C458524-05-01		Soil	15/03/05		X	X	X	X	X						Y	LV4387
MDZ-NW1-4.0-5.0															X		LV4388
MDZ-NW1-5.5-6.5						X	X		X								LV4389
MDZ-NW1-B1-8.0						X	X	X	X	X							LV4390
MDZ-NWA-B2-7.0						X	X	X	X	X							LV4391
MDZ-NW2-0.3-0.8						X	X	X	X	X							LV4392
MDZ-NW2-4.0-5.0						X	X		X								LV4393
MDZ-NW2-B3-6.5															X		LV4394
MDZ-NW3-0.3-0.8						X	X		X								LV4395
MDZ-NW3-4.0-5.0															X		LV4396
MDZ-NW3-B4-6.0	C459576-05-01					X											~~LV4397~~ LV4412
MDZ-NW4-0.3-0.8						X	X	X	X	X							LV4413

REQUESTED BY: (Please Sign & Print) DMcK D.McKeown	DATE: (YYYY/MM/DD) 2015/03/10	TIME: (HH:MM) 08:00
RECEIVED BY: (Please Sign & Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)

Maxxam Analytics Inc

PWGSC - MAXXAM ADDITIONAL ANALYSIS REQUEST RECORD

Consultant Name: SLR Consulting

Contact Name: David McKeown

Consultant Project #: 219.05112.00010

Maxxam Job #: B518971

(Please complete this form on a per job basis - i.e. one form per original M

Project Name: Wilmer Marsh

PWGSC Project Manager: Brad Klaver

Task Authorization #: PO# 70031547I

Maxxam Location:

TURNAROUND TIME		
Standard	(5 days)	☐
Rush	(3 days)	☑
	(2 days)	☐
	(1 day)	☐
	(same day)	☐
Date Required :		

B518971

Applicable Guidelines (please specify):

LAB USE ONLY

Original COC analysis completed and invoiced at time of add-on (circle one)

YES NO

(if yes original coc in invoice package is for reference only)

New Maxxam Job # (if applicable)

CLIENT SAMPLE ID	Original COC #	LAB ID	Matrix	SAMPLING DATE (YY/MM/DD)	SAMPLING Time HH:MM	CCME Metals/pH	CCME PAH	CCME BTEX+F1	CCME F2-F4	Grain Size					Hold	Sample previously submitted on hold (Y/N)	SPECIAL INSTRUCTIONS
MDZ-NW4-2.0-3.0	C459576-05-01		Soil	15/03/05											X	Y	LV4414
MDZ-NW4-B5-5.0						X	X	X	X	X							LV4415
MDZ-NW5-0.3-0.8						X	X	X	X	X							LV4416
MDZ-NW5-1.0-2.0															X		LV4417
MDZ-NW5-B6-3.0						X	X	X	X	X							LV4418
MDZ-NW6-0.3-0.8				15/03/07		X											LV4419
MDZ-NW6-2.0-3.0						X	X	X	X	X							LV4420
MDZ-NW6-B7-5.0															X		LV4421
MDZ-NW7-0.3-0.8	C458524-07-01			15/03/05		X	X	X	X	X							LV4424
MDZ-DUP-D						X	X	X	X	X							LV4425
MDZ-DUP-E						X	X	X	X	X							LV4426
MDZ-DUP-F				15/03/07											X		LV4427

REQUESTED BY: (Please Sign & Print) D. McKeown	DATE: (YYYY/MM/DD) 2015/03/10	TIME: (HH:MM) 08:00
RECEIVED BY: (Please Sign & Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)

Maxxam Analytics Inc

PWGSC - MAXXAM ADDITIONAL ANALYSIS REQUEST RECORD

Page 1 of 1

Consultant Name: SLR Consulting

Contact Name: Lindsay Paterson

Consultant Project #: 219.05112.00010

Maxxam Job #: B518966 / B518971

(Please complete this form on a per job basis - i.e. one form per original Maxxam Job#)

Project Name: Wilmer Marsh

PWGSC Project Manager: Brad Klaver

Task Authorization #: 70031547 1

Maxxam Location:

TURNAROUND TIME		
Standard	(5 days)	☐
Rush	(3 days)	☒
	(2 days)	☐
	(1 day)	☐
	(same day)	☐
Date Required :		

Applicable Guidelines (please specify): BC HWR/AB Class II

ADDITIONAL ANALYSIS REQUEST

LAB USE ONLY
Original COC analysis completed and invoiced at time of add-on (circle one)
YES NO
(if yes original coc in invoice package is for reference only)
New Maxxam Job # (if applicable)

CLIENT SAMPLE ID	Original COC #	LAB ID	Matrix	SAMPLING DATE (YY/MM/DD)	SAMPLING Time HH:MM	TCLP Metals									Sample previously submitted on hold (Y/N)	SPECIAL INSTRUCTIONS
B518966																
MDZ-EW1-03-0.8			SOIL	15/03/04		X									N	
MDZ-SW2-03-0.8			SOIL	15/03/04		X									N	
B518971																
MDZ-NW5-B6-3.0			SOIL	15/03/05		X									N	

REQUESTED BY: (Please Sign & Print) L Paterson [signature]	DATE: (YYYY/MM/DD) 2015/03/25	TIME: (HH:MM) 15:49
RECEIVED BY: (Please Sign & Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)

COR FCD-00106 / 1-0

1

Maxxam Analytics Inc

PWGSC - MAXXAM ADDITIONAL ANALYSIS REQUEST RECORD

Page 2 of 2

Consultant Name: SLR Consulting

Contact Name: Lindsay Paterson

Consultant Project #: 219.05112.00010

Maxxam Job #: B518971

(Please complete this form on a per job basis - i.e. one form per original Maxxam Job#)

Project Name: Wilmer marsh

PWGSC Project Manager: Brad Klaver

Task Authorization #: 70031547I

Maxxam Location:

TURNAROUND TIME		
Standard	(5 days)	☐
Rush	(3 days)	☒
	(2 days)	☐
	(1 day)	☐
	(same day)	☐
Date Required :		

Applicable Guidelines (please specify): CCME AL

LAB USE ONLY

Original COC analysis completed and invoiced at time of add-on (circle one)

YES NO

(if yes original coc in invoice package is for reference only)

New Maxxam Job # (if applicable)

CLIENT SAMPLE ID	Original COC #	LAB ID	Matrix	SAMPLING DATE (YY/MM/DD)	SAMPLING Time HH:MM	ADDITIONAL ANALYSIS REQUEST: Total metals/pH									Sample previously submitted on hold (Y/N)	SPECIAL INSTRUCTIONS
MD2-NW1-4.0-5.0			SOIL	15/03/05		X									Y	
MD2-NW2-B3-6.5						X									Y	
MD2-NW3-4.0-5.0						X									Y	
MD2-NW4-20-30						X									Y	
MD2-NW5-1.0-2.0						X									Y	
MD2-NW6-B7-5.0						X									Y	
MD2-DUP-F						X									Y	

REQUESTED BY: (Please Sign & Print) L Paterson	DATE: (YYYY/MM/DD) 2015/03/25	TIME: (HH:MM) 14:34
RECEIVED BY: (Please Sign & Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)

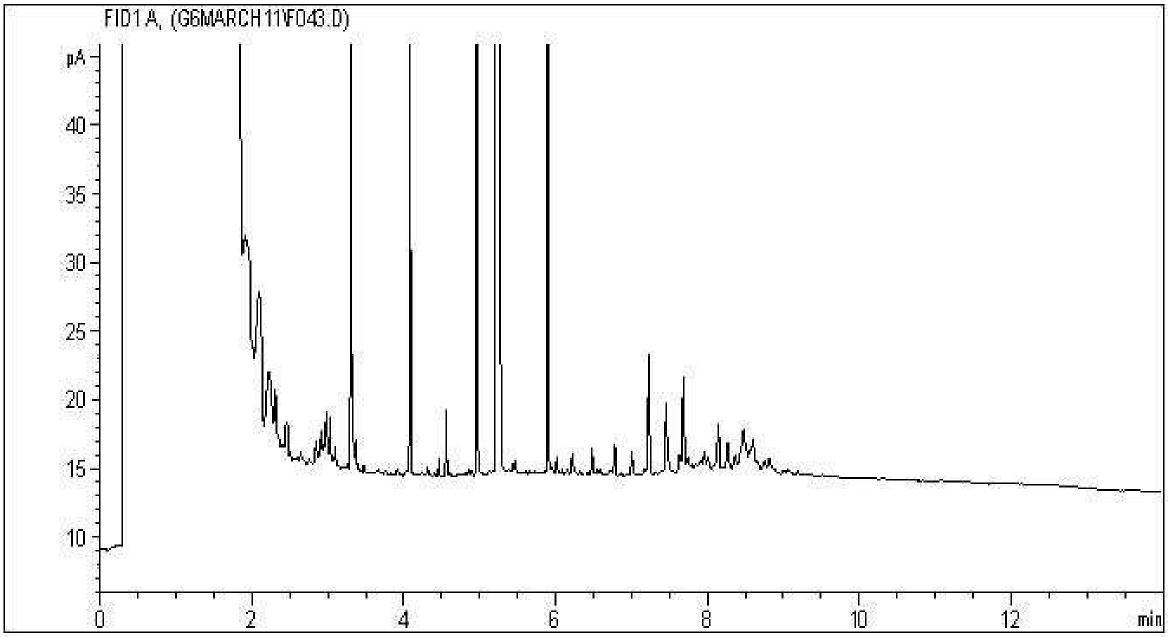
COR FCD-00106 / 1-0

1

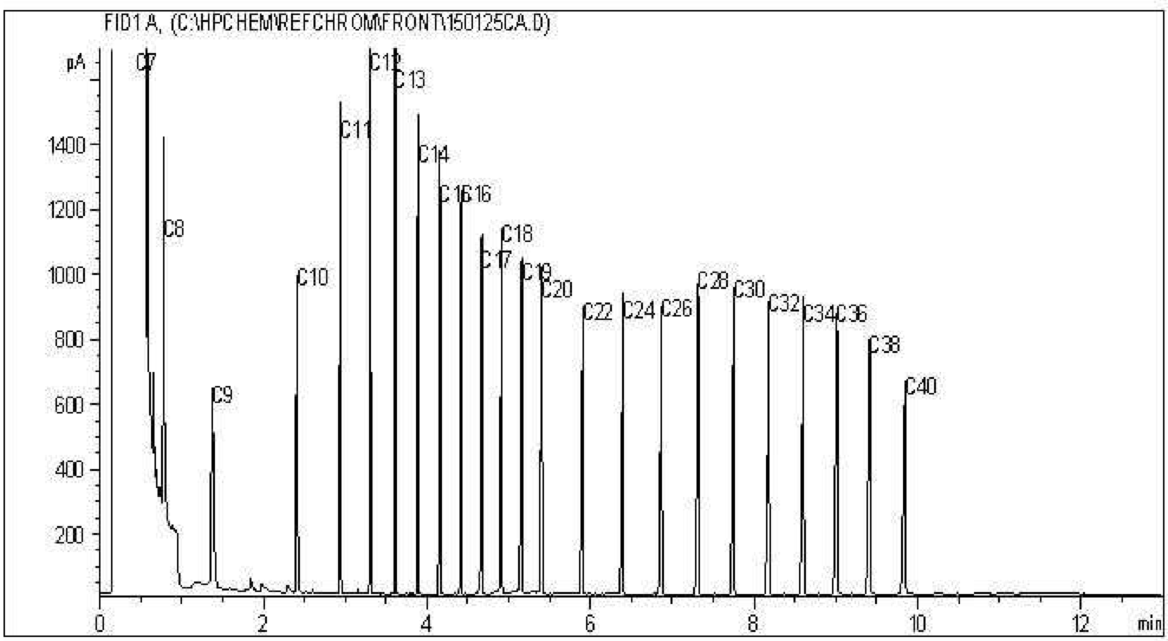
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4387

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-NW1-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



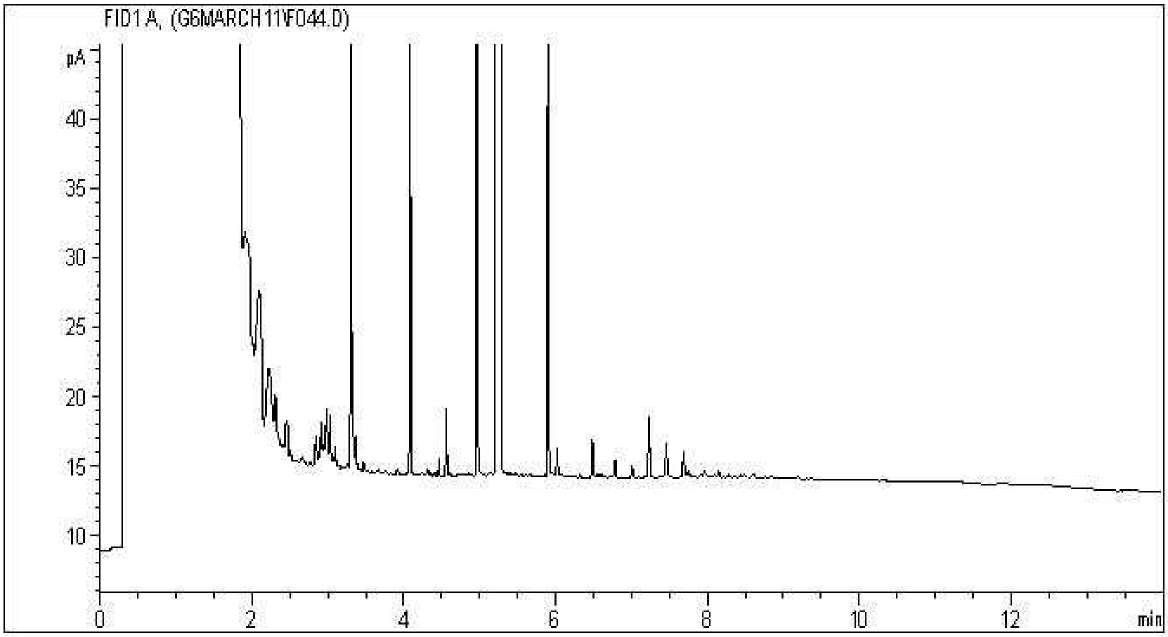
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

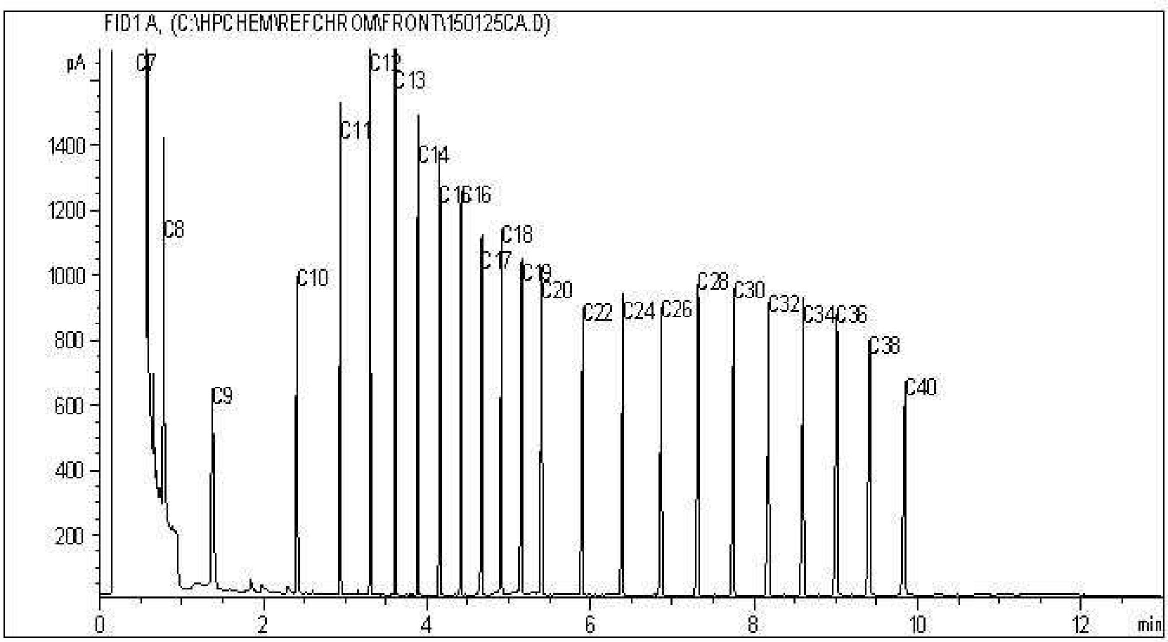
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4389

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-NW1-5.5-6.5

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



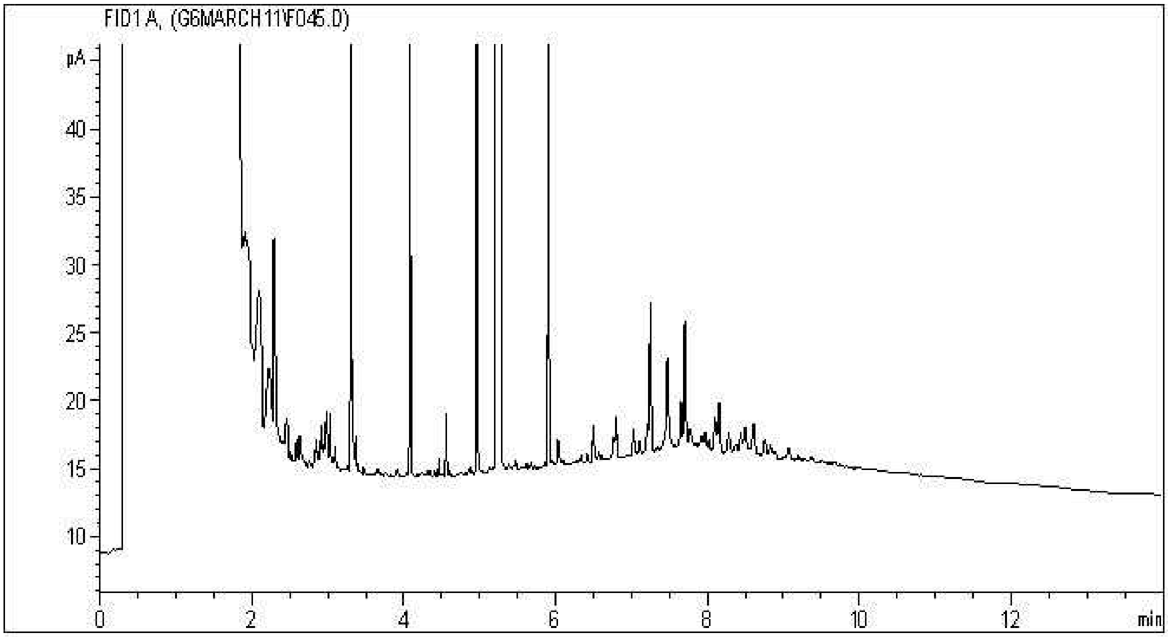
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

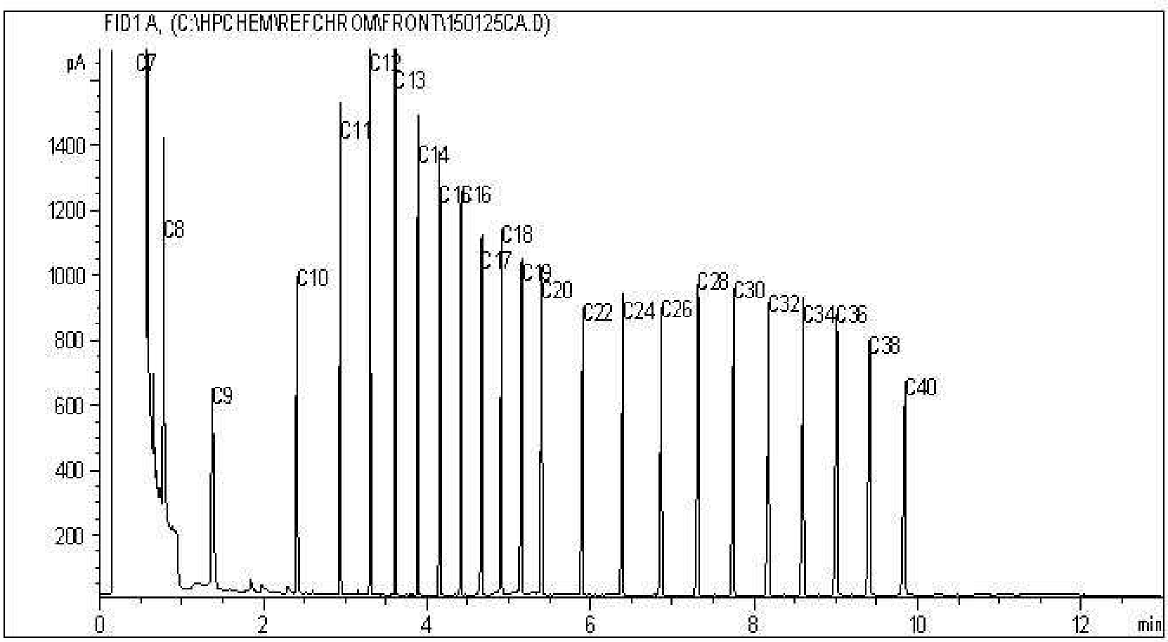
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4390

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-NW1-B1-8.0

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



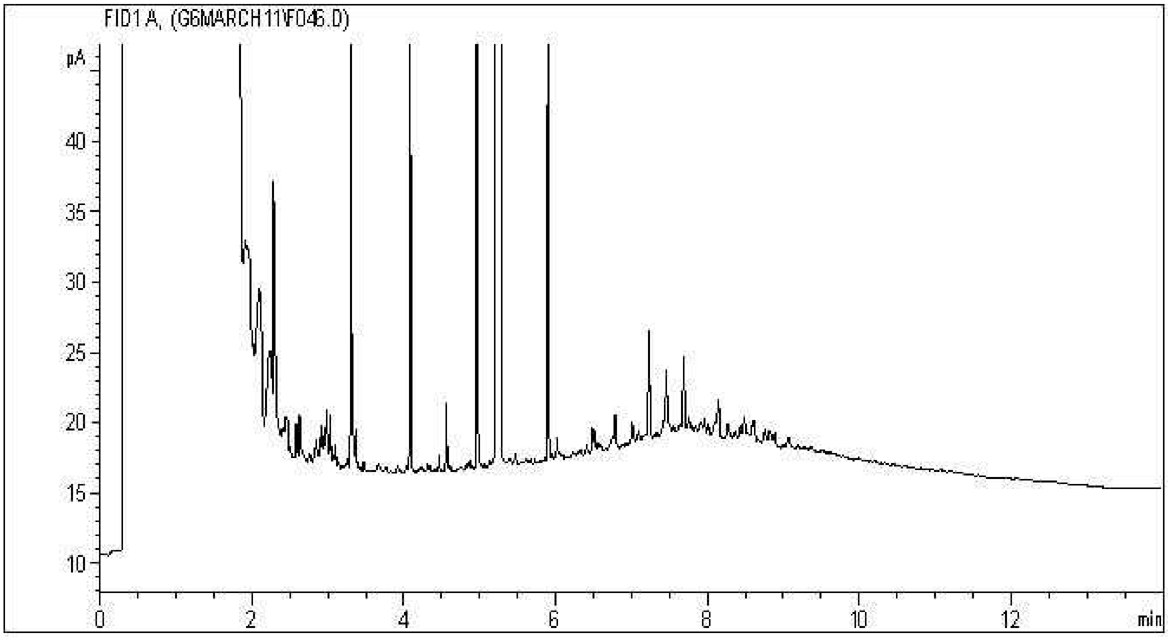
Carbon Range Distribution - Reference Chromatogram



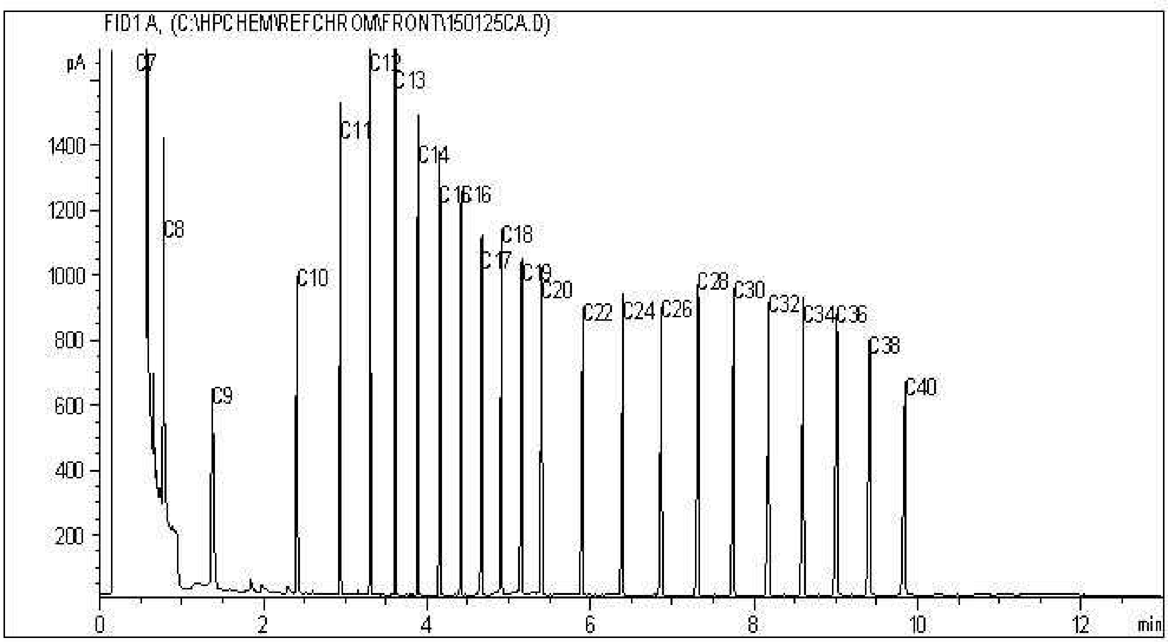
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



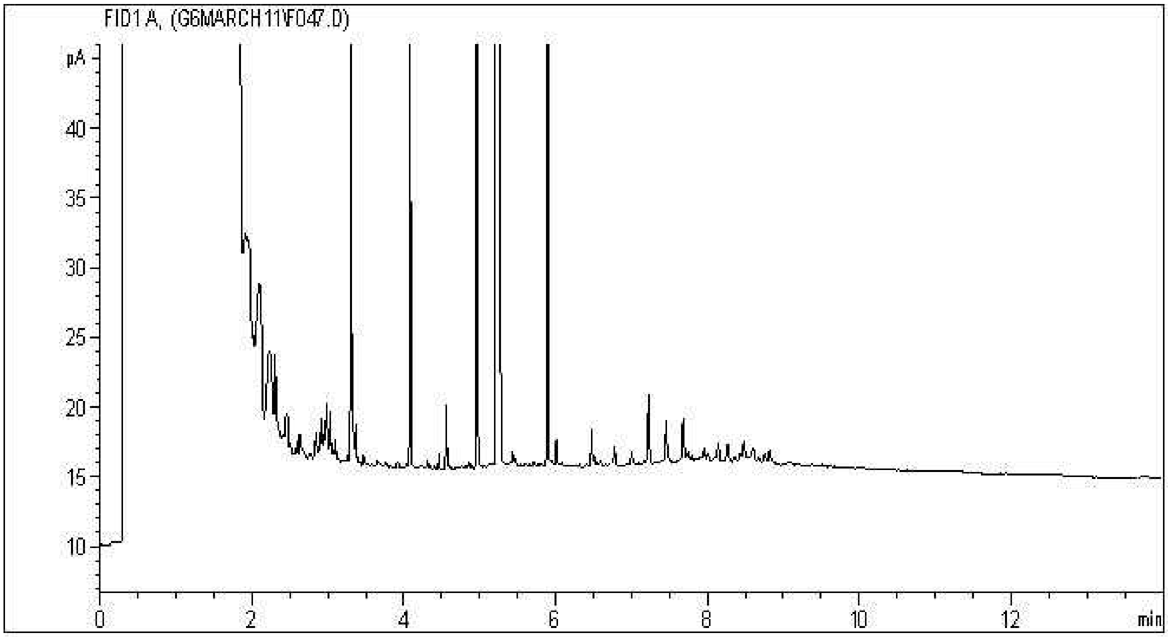
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

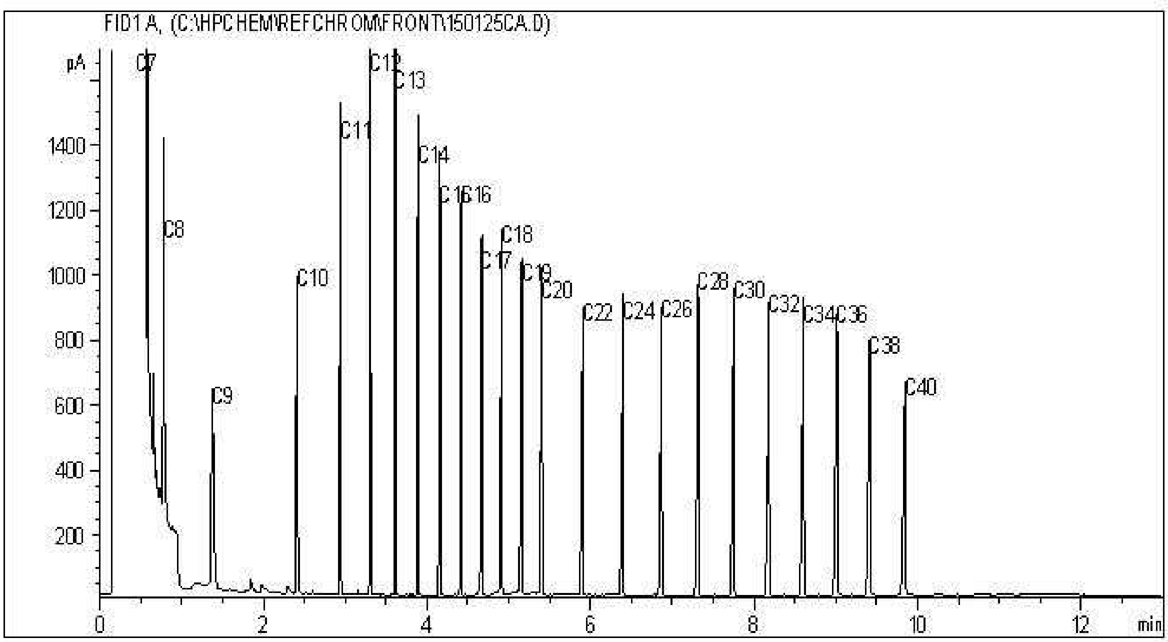
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4392

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-NW-2-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



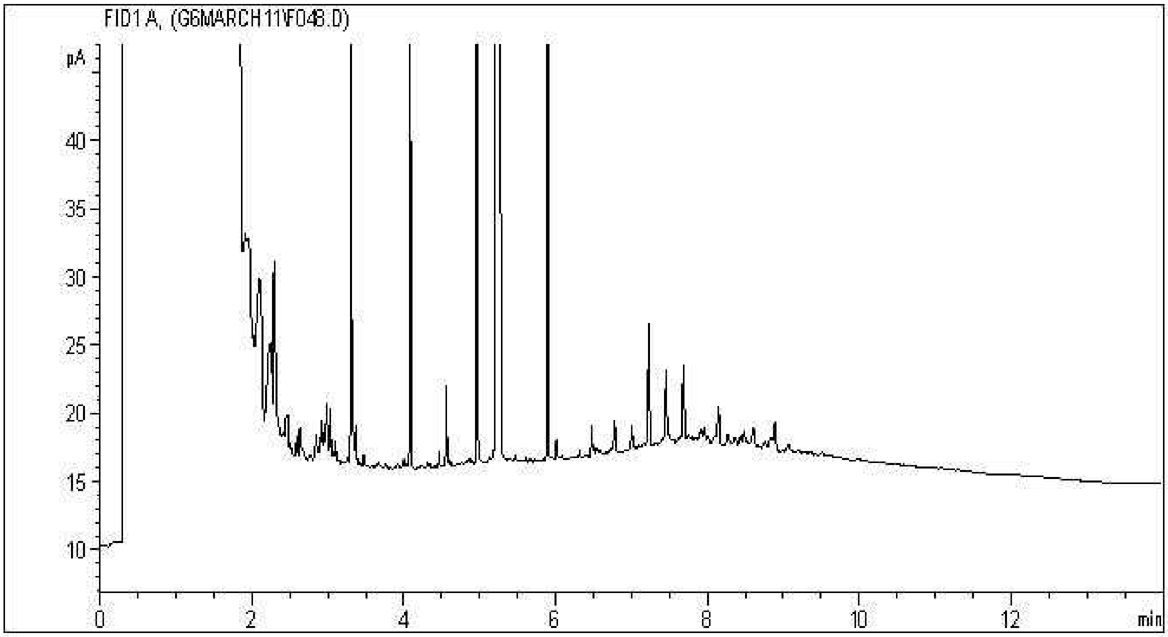
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

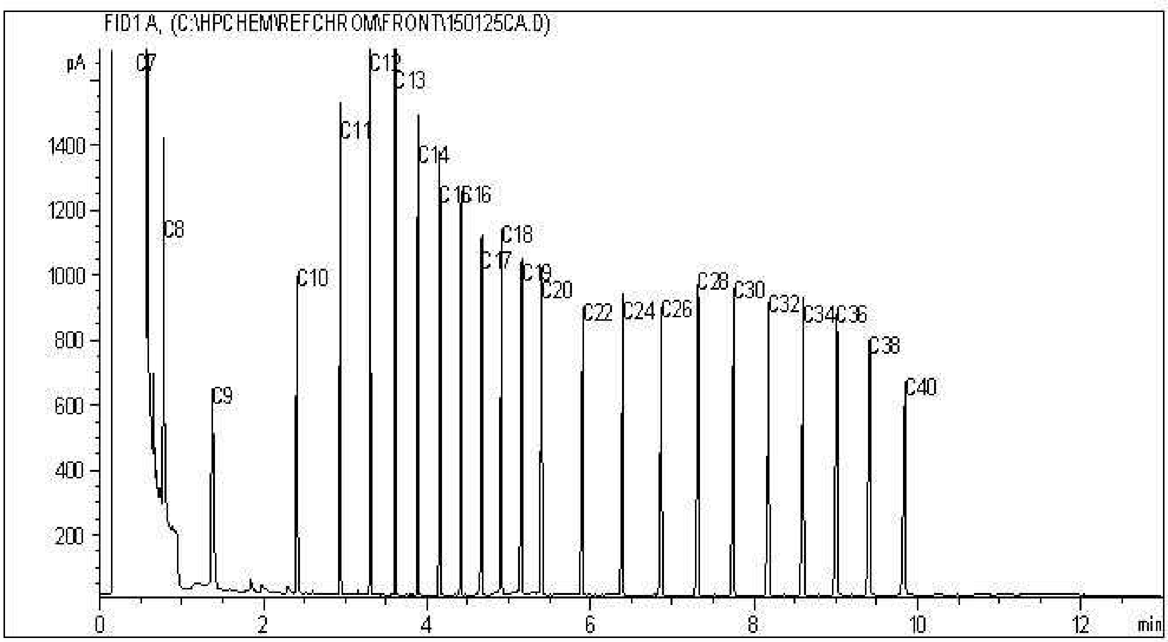
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4393

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-NW2-4.0-5.0

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



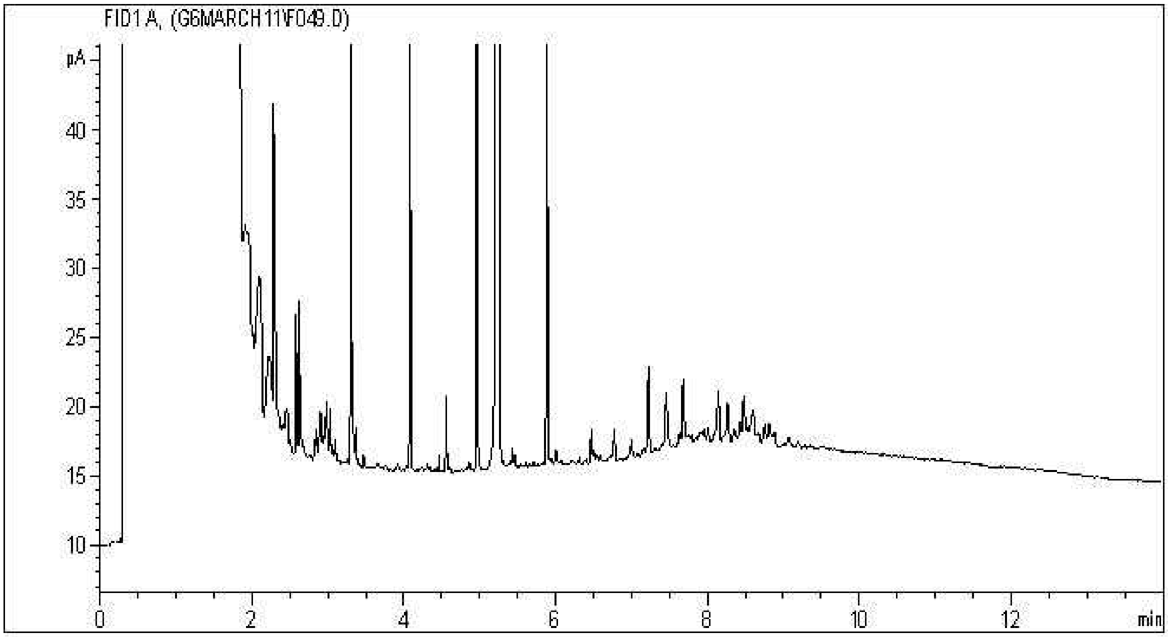
Carbon Range Distribution - Reference Chromatogram



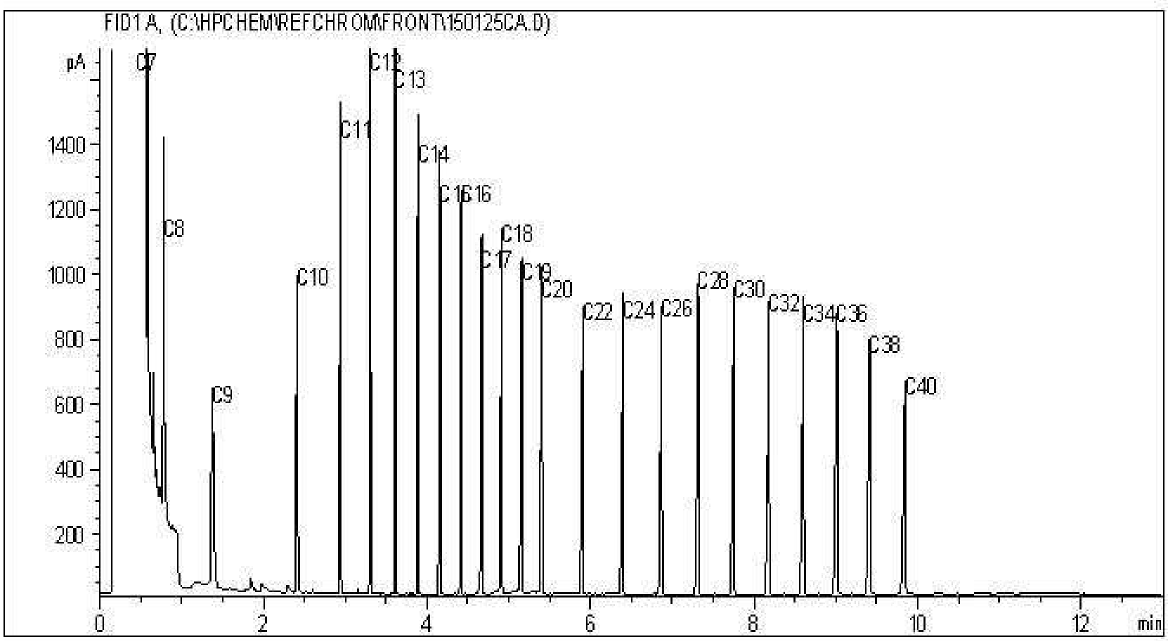
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



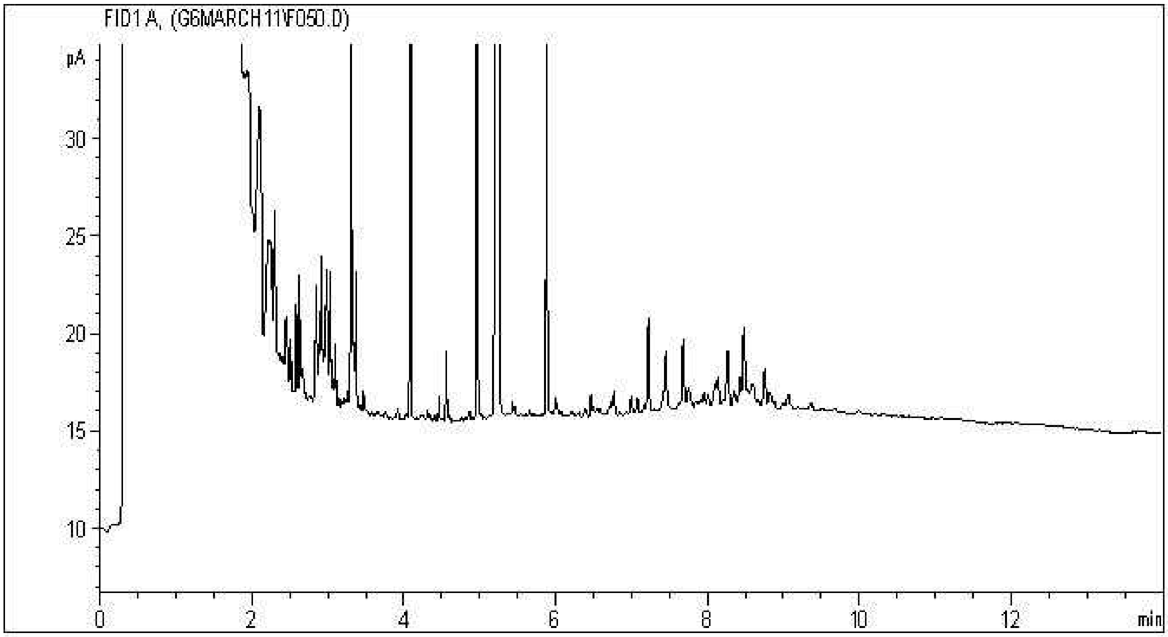
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

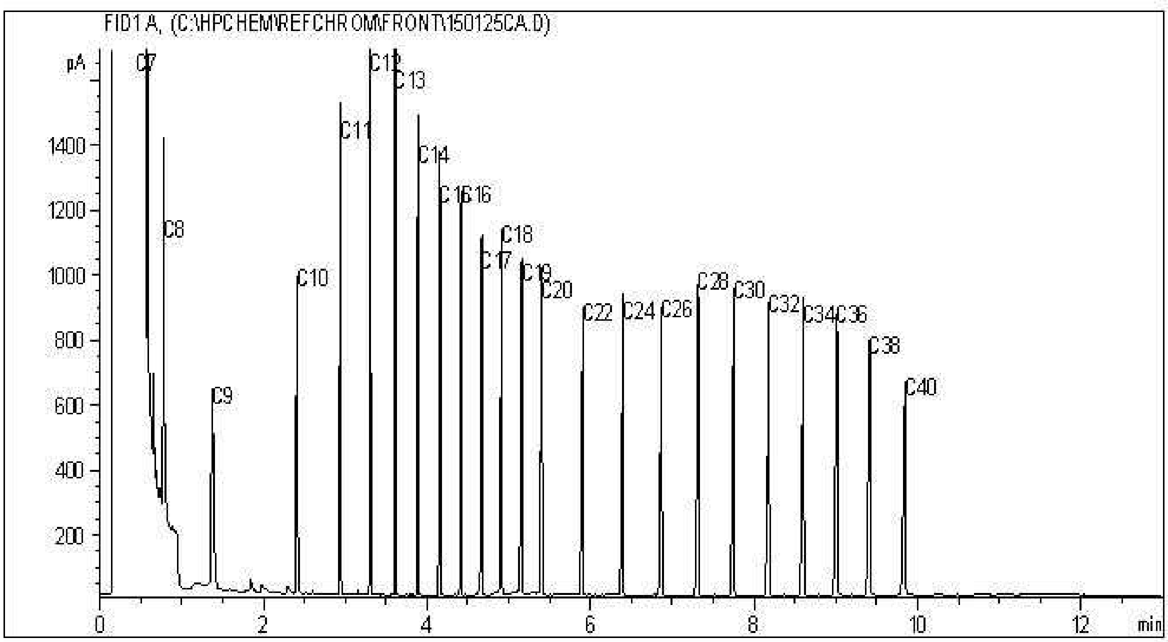
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4413

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-NW4-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



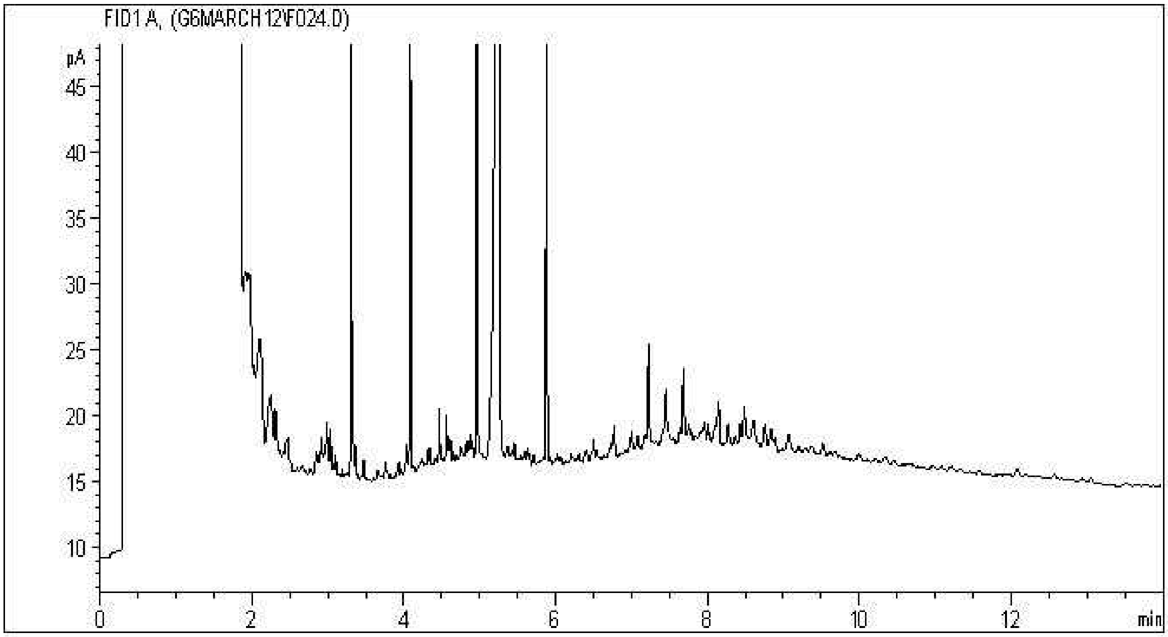
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

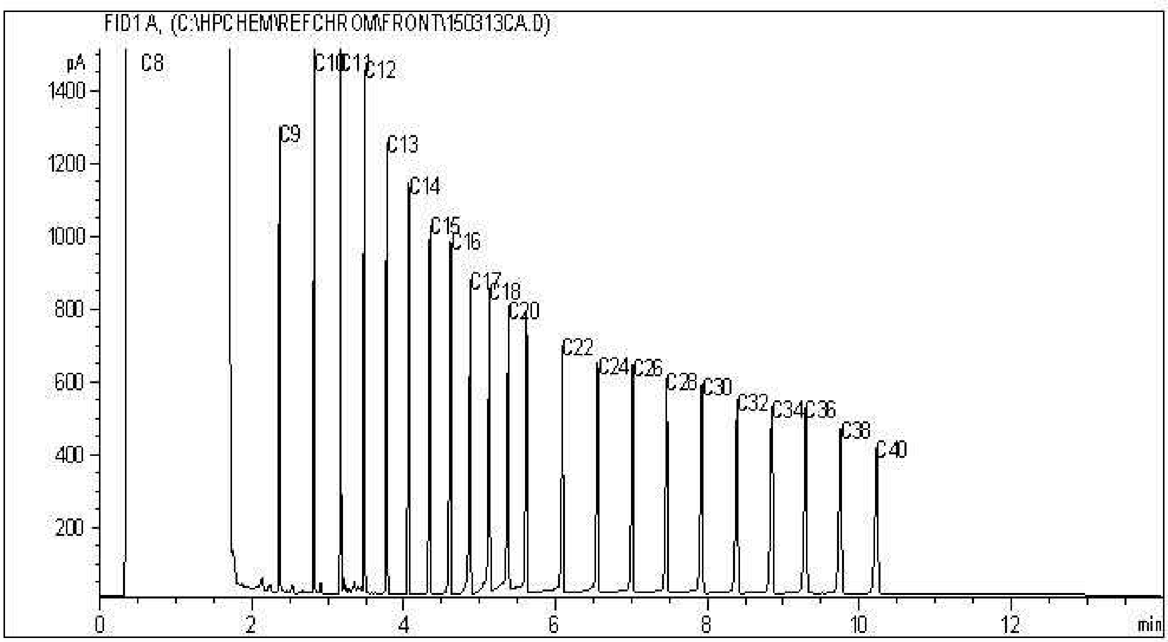
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4415

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-NW4-B5-5.0

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



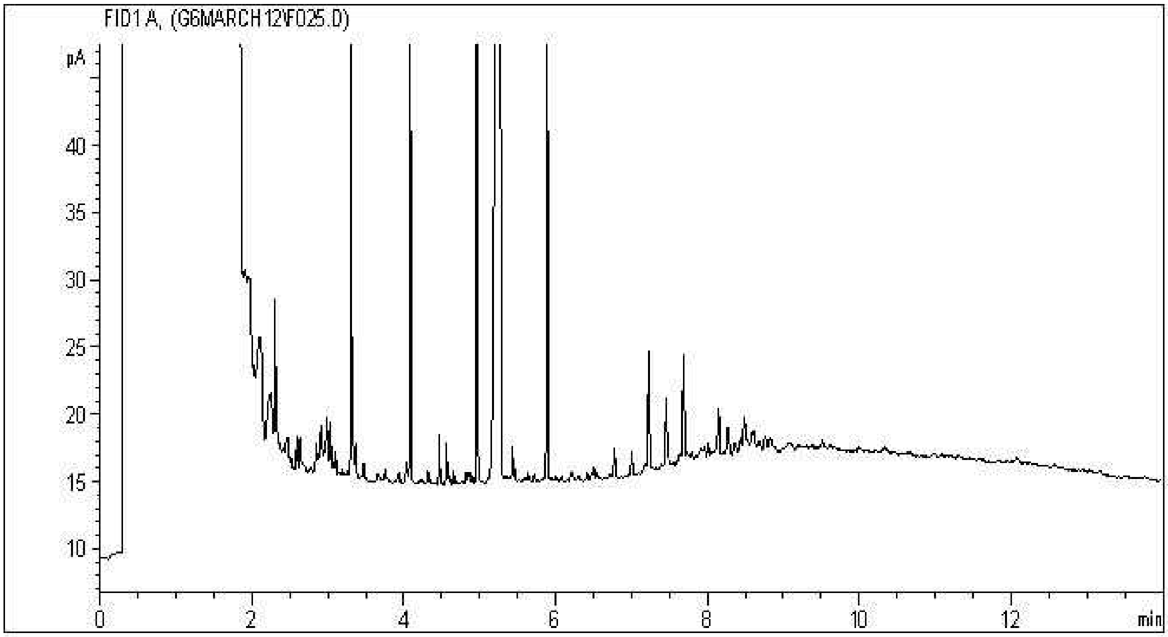
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

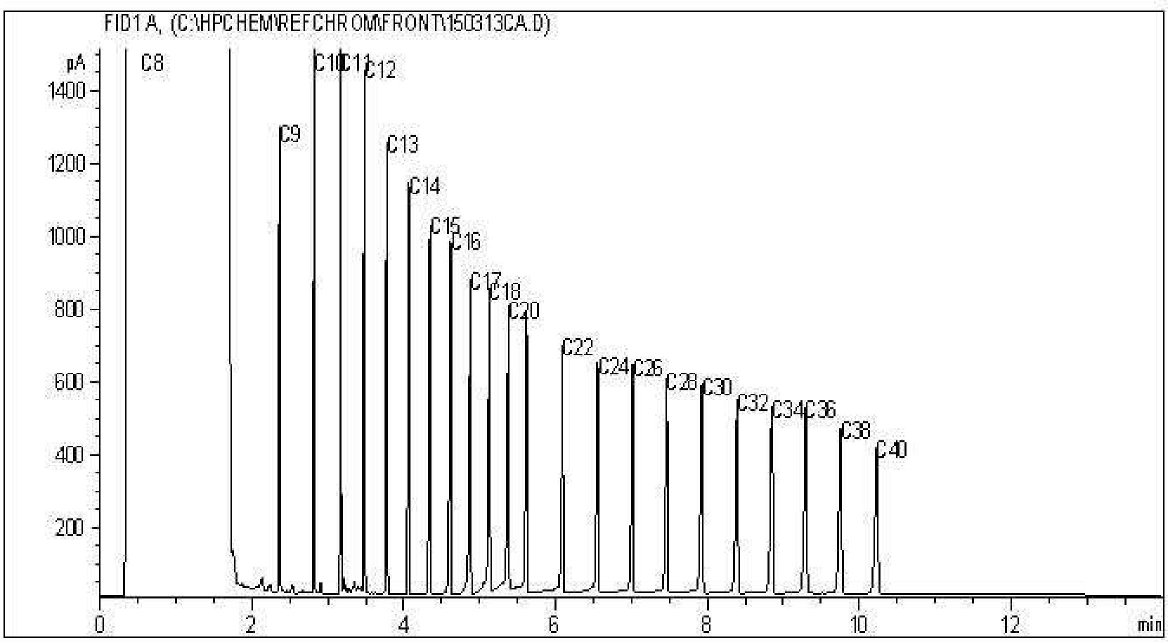
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4416

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-NW5-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



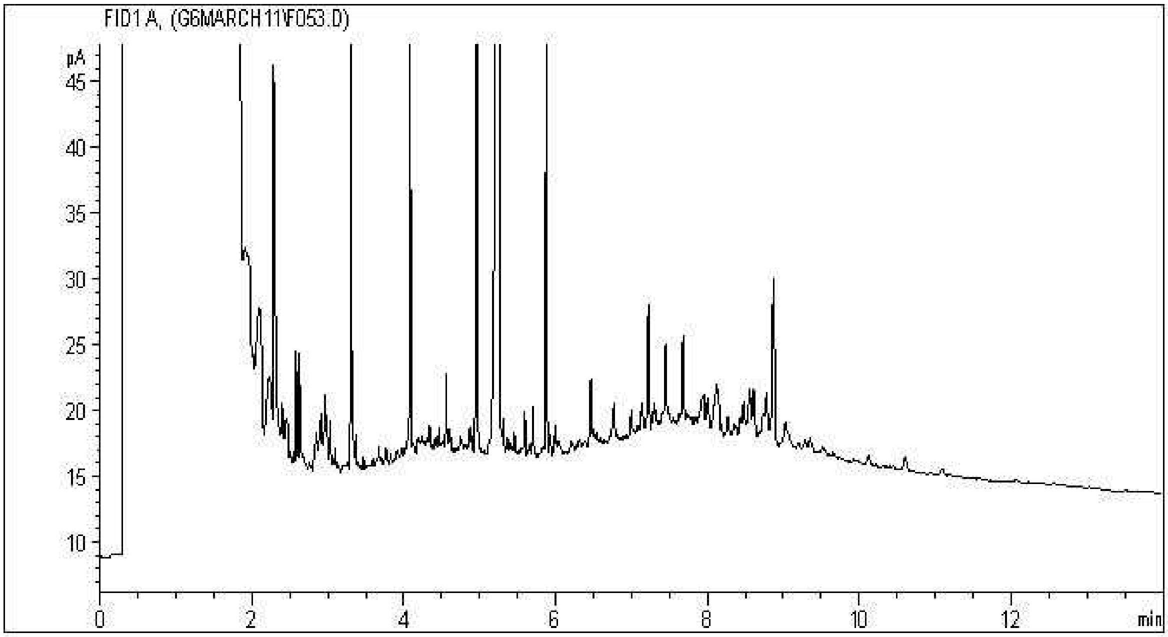
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

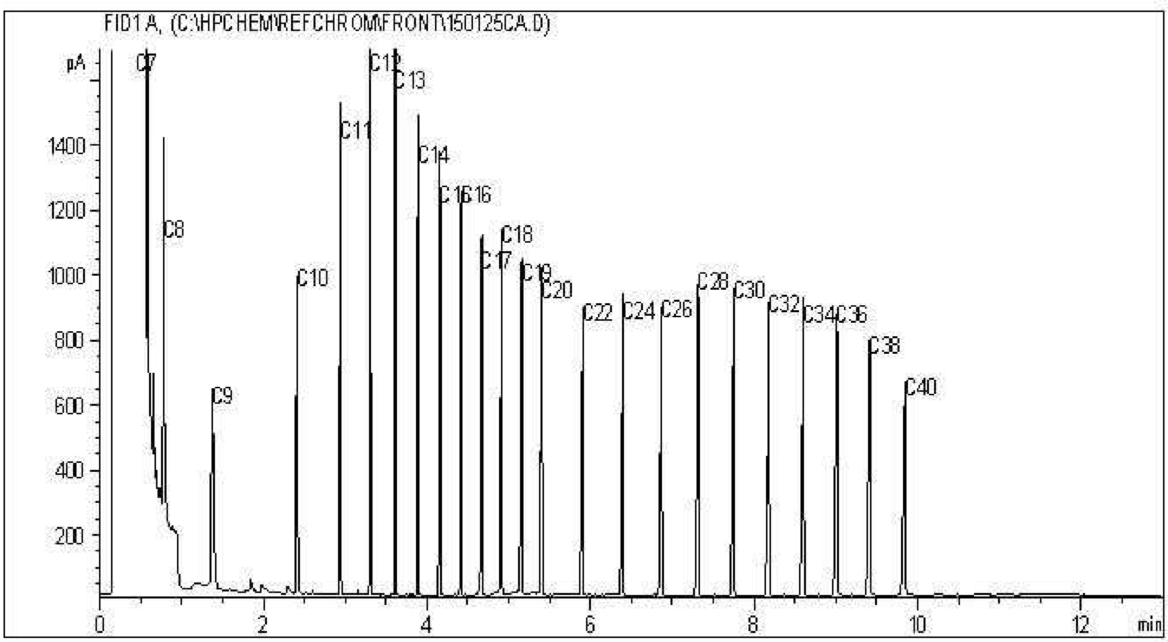
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4418

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-NW5-B6-3.0

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



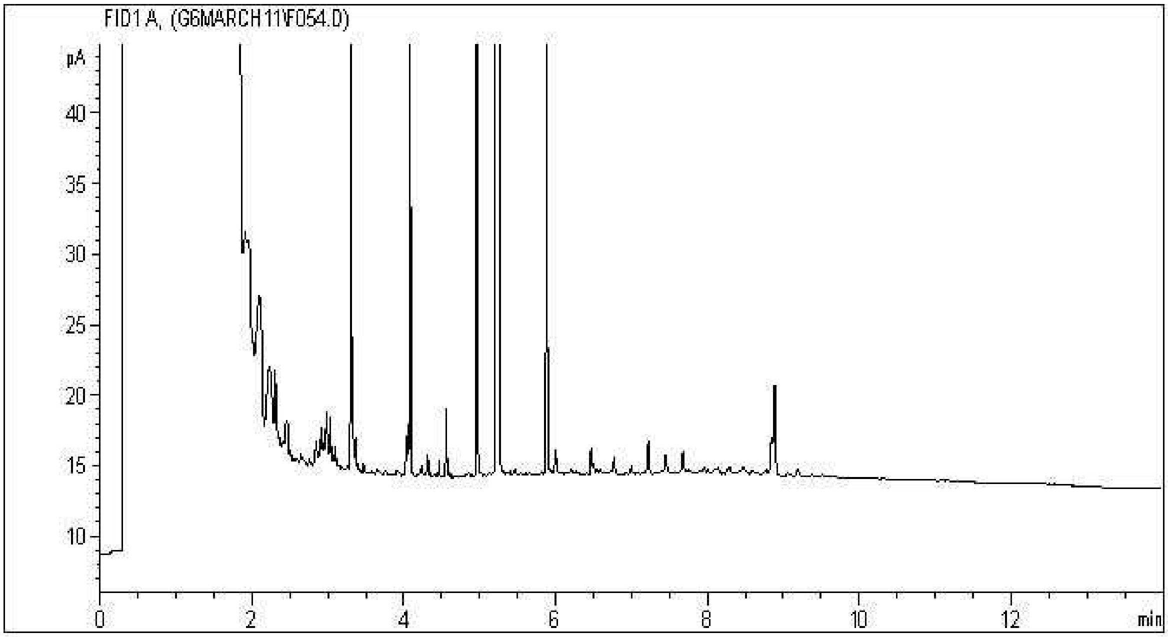
Carbon Range Distribution - Reference Chromatogram



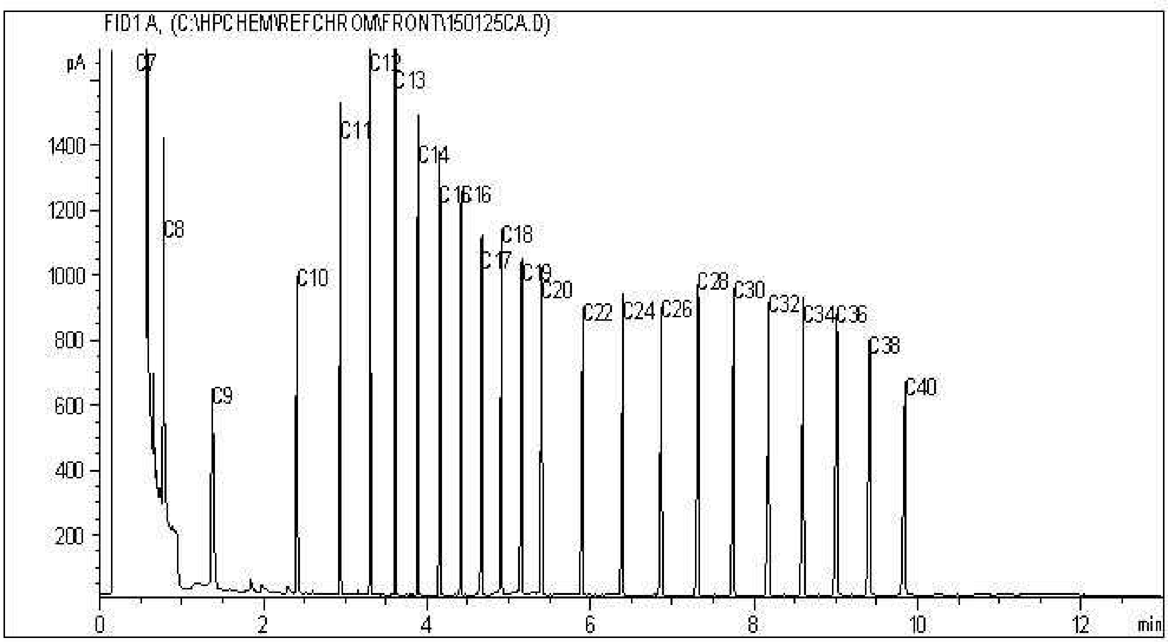
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



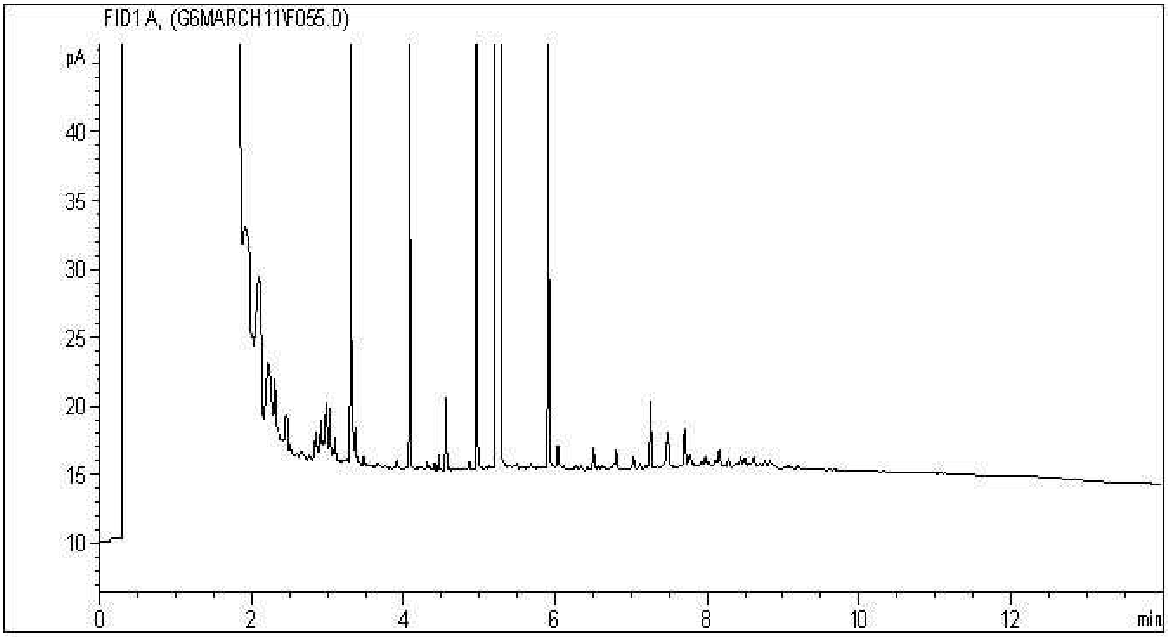
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

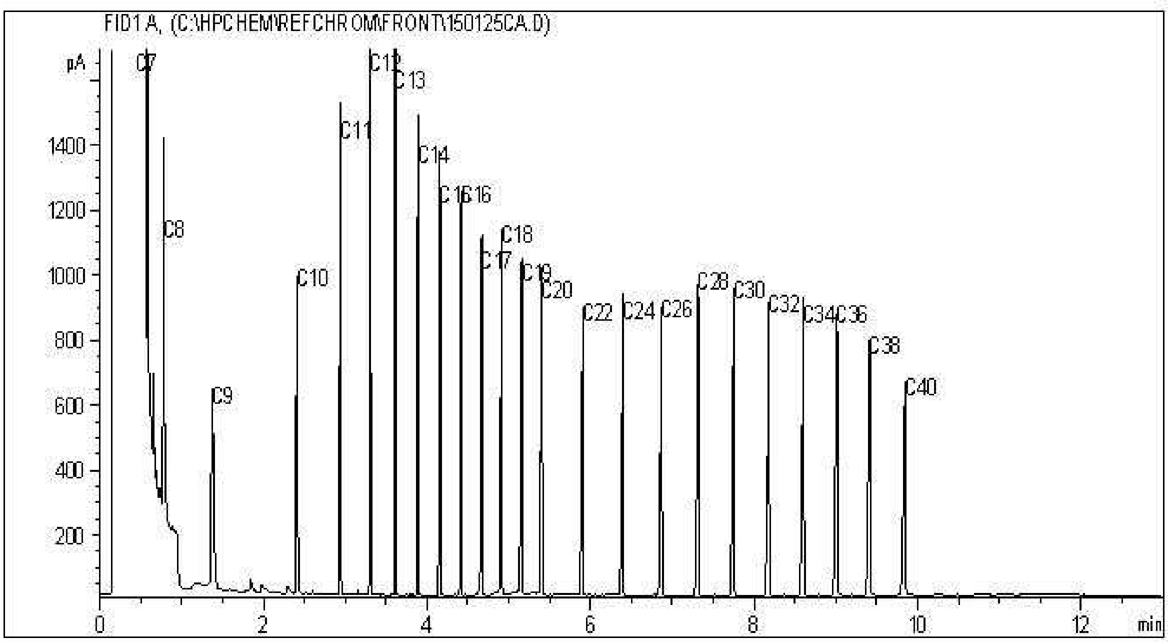
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4424

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-NW7-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



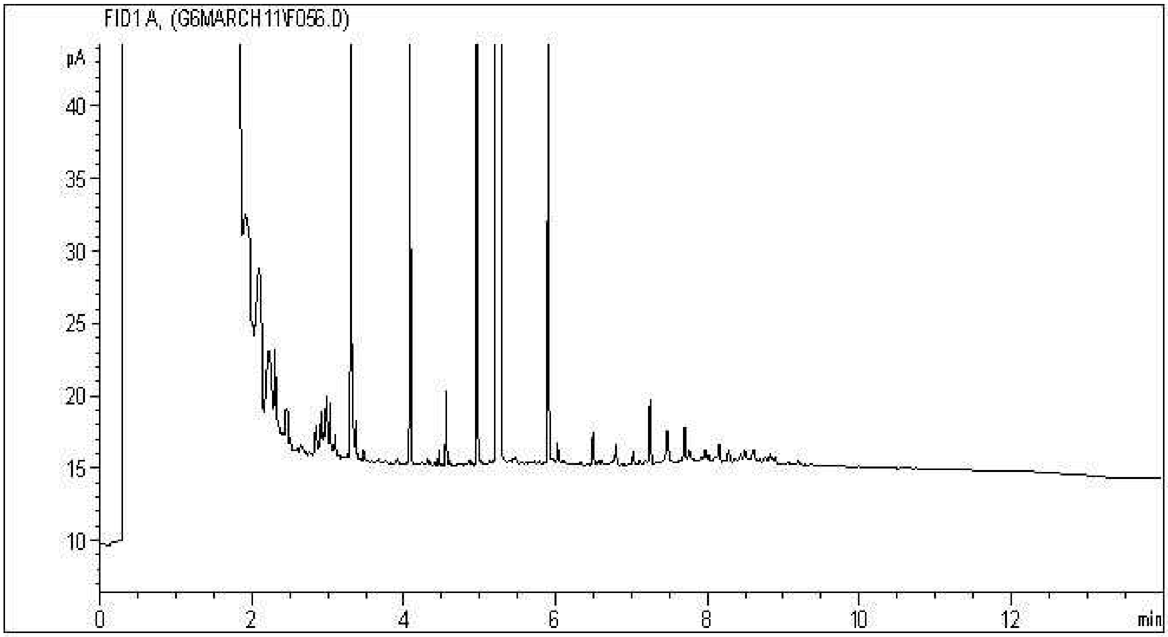
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

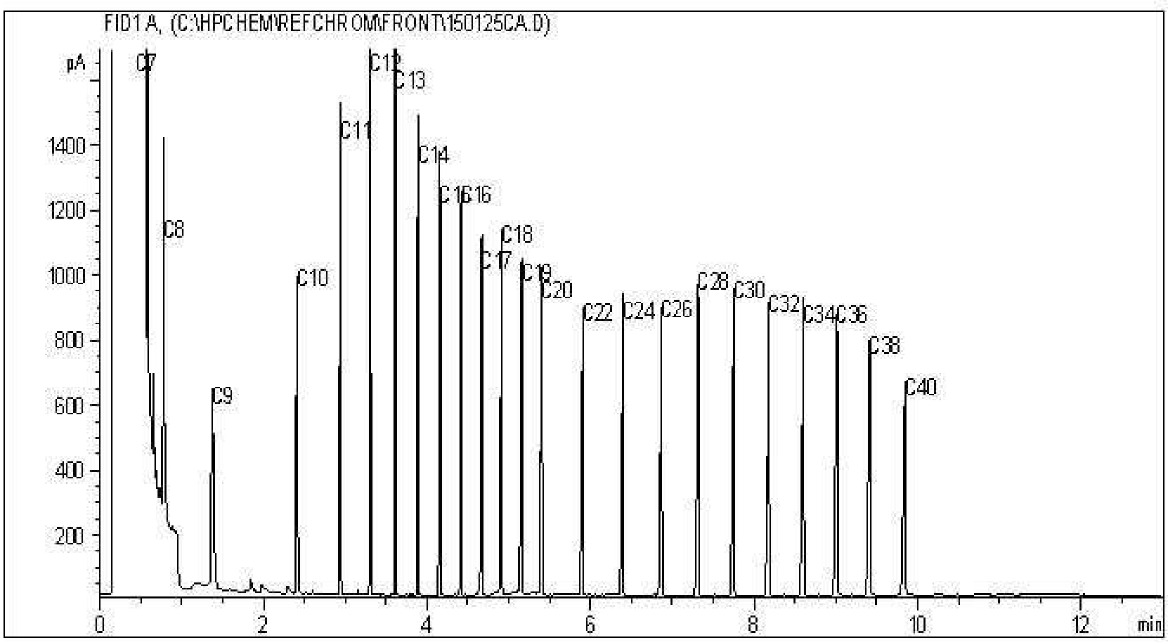
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4424 Lab-Dup

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-NW7-0.3-0.8

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



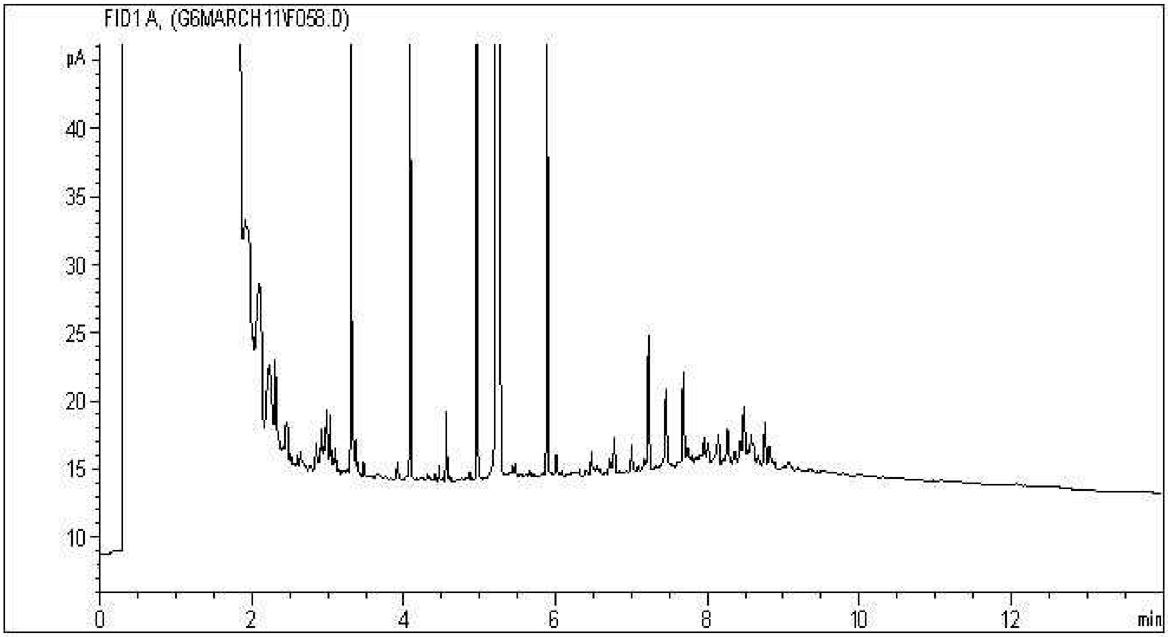
Carbon Range Distribution - Reference Chromatogram



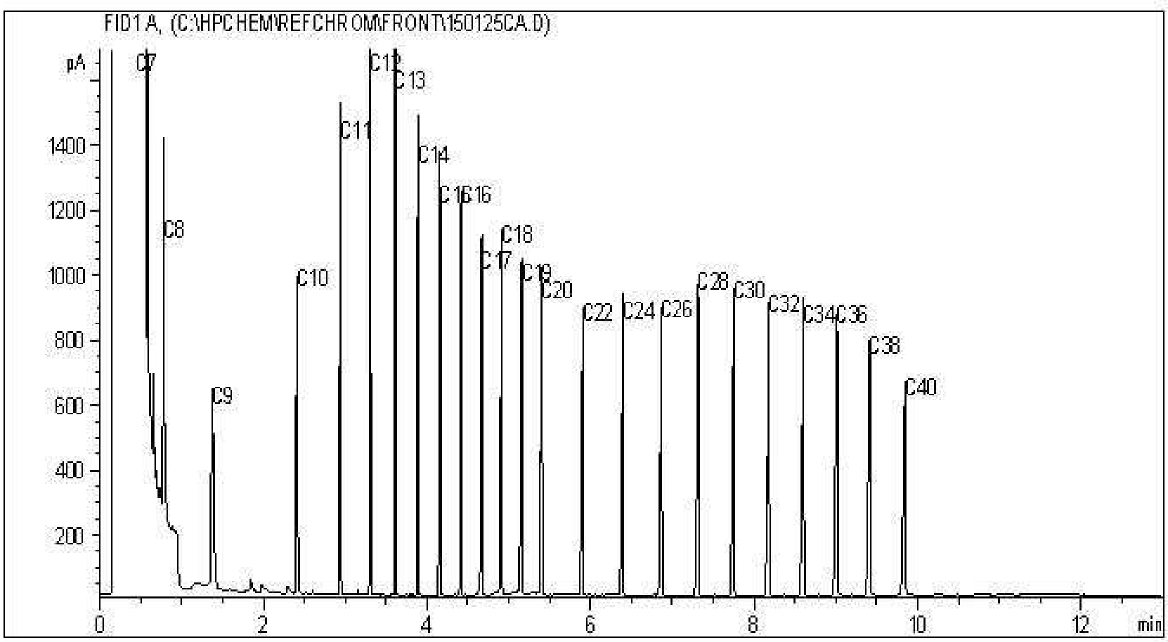
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



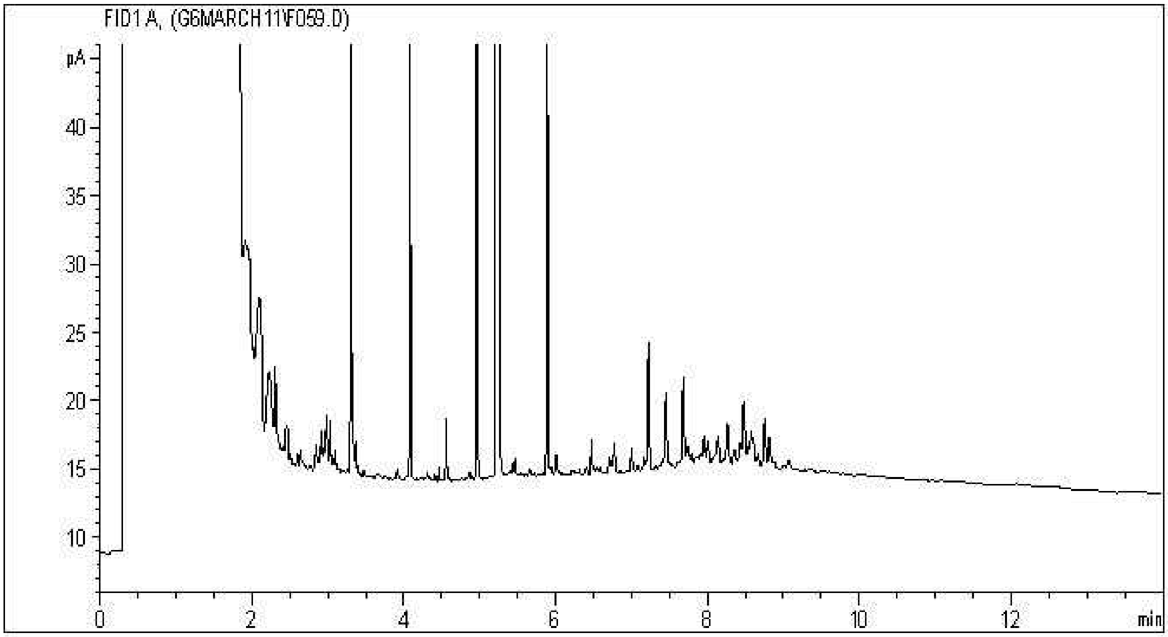
TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

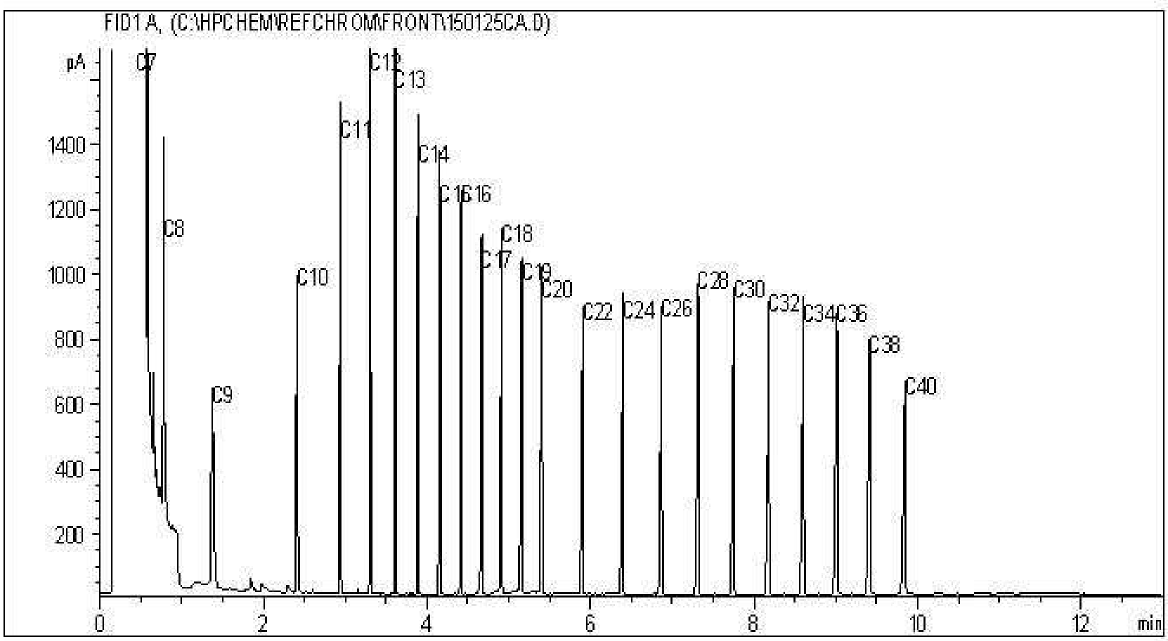
Maxxam Job #: B518971
Report Date: 2015/03/30
Maxxam Sample: LV4426

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00010
Site Reference: WILMER MARSH
Client ID: MDZ-DUP-E

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

QA/QC - Wilmer Lab Reports from January to March 2015										
Lab Report #	Area of Impact	Sample Locations (IDs) or lab id	Analysis	RDL	Surrogate Recoveries	Matrix Spike	Spiked Blank	Method Blanks	Lab RPDs	Comments
B506951	TP15 samples from AI3 and MDZ	TP15-4-0.5-1	Leachable Terphenyl-D14 (sur.)	ok	Recovery for this parameter outside of control limits	ok	ok	ok	ok	Overall quality control for analysis meets acceptability criteria
		TP15-4-1-2	Leachable Terphenyl-D14 (sur.)	ok	Recovery for this parameter outside of control limits	ok	ok	ok	ok	Overall quality control for analysis meets acceptability criteria
		TP15-5-1-2	Leachable Terphenyl-D14 (sur.)	ok	Recovery for this parameter outside of control limits	ok	ok	ok	ok	Overall quality control for analysis meets acceptability criteria
		TP15-2-0.5-1	Benzene	raised to 0.0058 mg/kg from 0.005 due to matrix interference	ok	ok	ok	ok	ok	OK - < guideline/standards of 0.0068 mg/kg
		7796931	Leachate Quinoline	ok	ok	ok	% recovery = 148% which is greater than the QA/QC limits of 50 - 130	ok	ok	Overall quality control for analysis meets acceptability criteria
B508332V2R	MDZ Testpit E and W limit walls	MDZ-WA-1.0-2.0 Rework 1	--	raised to 0.0060 mg/kg from 0.005 due to matrix interference	ok	ok	ok	ok	ok	OK - < guideline/standards of 0.0068 mg/kg
B508345V2R	AI3 Confirmatory samples	All analytical results are okay except method vials leaked in transport	--	ok	ok	ok	ok	ok	ok	Not on lab report but some methonol leaked in transit - may have impacted BETX/F1 results
B510759V2R	MDZ and Burrow fill Testpits	All samples OK	--	ok	ok	ok	ok	ok	ok	--
B513126	AI3 BETX samples	A3-SS3	BETX/F1	raised due to sample volume used for analysis	ok	ok	ok	ok	ok	MDL used for for ethylbenzene (0.02 mg/kg) > than the applicable guideline 0.018 mg/kg. All other raised MDL area acceptable (< applicable standards)
		A3-SS2	Benzene	raised due to 0.010 mg/kg from 0.005 due to matrix interference	ok	ok	ok	ok	ok	ok - < than guideline of 0.0068 mg/kg
B518966	MDZ March 4 confirmatory samples	All samples OK	ok	ok	ok	ok	ok	ok	ok	--
B518971	MDZ March 5 confirmatory samples	All samples OK	ok	ok	ok	ok	ok	o-terphenyl (sur.) 133 > than QC limits (50-130) due to high recovery	ok	ok - overall quality acceptable
								terphenyl-D14 (sur.) 131 > than QC limits (50-130) is outside of control limits - overall quality acceptable		ok - overall quality acceptable

APPENDIX O
FCSI Input Form

2014/2015 Site Works Summary
Former Refuse Site – Wilmer Marsh Unit
SLR Project No.: 219.05112.00010

Federal Contaminated Sites Inventory Input Form

CONTAMINATED SITE TOMBSTONE DATA	
Federal Site Identifier	FCSI# 16096079
Property Number	DFRP # 16096
Latitude (Assessor)	50º 33' 0.78" N
Longitude (Assessor)	116º 4' 16.82" W
Estimated Cubic Meters Contaminated (Assessor)	Shoreline = 0 Marsh = 0 (debris) Uplands = 0 Trail = 1230 (contaminated soil and debris) Total = 1230
Estimated Hectares Contaminated (Assessor)	Shoreline = 0 Marsh = 0 Uplands = 0 Trail =0.2 Total = 0.2
Estimated Tons Contaminated (Assessor)	Shoreline = 0 Marsh = 0 (minor small debris assumed to remain) Uplands = 0 Trail = 1480 (assumed density of 1.2t/cubic metre) Total = 1480

CONTAMINATED SITE MANAGEMENT	
The approach used to manage the contaminated site project. Every site has one or more management types.	
Management Type (Assessor)	1) Remediation (debris and contamination removal) 2) Periodic monitoring (confirmatory sampling) 3) Additional assessment (risk assessment)

CONTAMINANT AND MEDIUM	
Contaminant Type (Assessor)	*The contaminant associated with a specific medium. A medium may have one or more contaminant types.* 11. PHCs (petroleum hydrocarbons) 13. PAHs (polycyclic aromatic hydrocarbons) 02. Heavy metals 21. Metal, metalloid, organometallic
Contaminant Medium Type (Assessor)	*The medium associated with a particular contaminant.* 1) Surface water (metals) 2) Sediment (metals, PAHs) 3) Surface soil (PHCs, PAHs, metals)

CONTAMINATED SITE FISCAL YEAR	
Fiscal Year	2014-2015
CCME Classification type (Assessor)	*The classification defined by the National Classification System of the Canadian Council of Ministers of the Environment.* Class type 1) Action required AEC 1 – Class 1 – High priority for action
CCME National Classification System Score (Assessor)	*The score of the site based on the version of the Federal Contaminated Sites Accelerated Action Plan (FCSAAP) program.* AEC 1 score 71.0, certainty 63% (not updated in 2014-2015)
FCSAAP National Classification System Score	*The score of the site based on the version of the CCME NCS protocol developed by the Environment Canada for the Federal Contaminated Sites Accelerated Action Plan (FCSAAP) program.*
Last Step Completed	01-Identify suspect sites 02-Historical review 03-Initial testing program 04-Classify contaminated site using the CCME NCS 05-Detailed testing program 06-Reclassify the site using the CCME NCS 07-Develop remediation/risk management strategy **08-Implement remediation/risk management strategy** 09-Confirmatory Sampling and Final Reporting 10-Long-term monitoring (optional)
Planned Completion Date for Step 7 (EC Officer)	The date planned for completion of step 7 of the ten step process.
Planned Completion Date for Step 8 (EC Officer)	The date planned for completion of step 8 of the ten step process.
Planned Completion Date for Step 9 (EC Officer)	The date planned for completion of step 9 of the ten step process.
Next Fiscal Year Budget (EC Officer)	The total expenditure planned for the site for the next fiscal year.
Estimate Quality (EC Officer)	I - Indicative S - Substantive
Opening Liability (EC Officer)	The opening liability for the site for the fiscal year being reported. This applies only to class 1 sites; class 2 sites; and also to class I sites if it is known that the government is likely obligated to remediate the site. This should always equal the closing liability of the previous year if a liability was booked for that year.

(Accounting) Liability (Assessor)	Based on complete excavation of debris remaining in the MDZ, restoration, post-remedial monitoring and HHERA: Total $1,857,891 Based on no additional debris removal/excavation but including installation of protective soil cap over residual debris/contamination, restoration, post-remedial monitoring and HHERA Total $686,610 Based on no additional debris removal/excavation but including soil toxicity testing, restoration, post-remedial monitoring and HHERA Total $520,659
(Accounting) Contingent Liability (Assessor)	No contingency included in above liabilities
Total Assessment Expenditure (EC Officer)	Total expenditure on assessment activities for the site during the fiscal year reported.
Total Remediation Expenditure (EC Officer)	Total expenditure on remediation activities for the site during the fiscal year reported.
Closing Liability (EC Officer)	The closing liability for the site for the fiscal year being reported. This applies only to class 1 sites; class 2 sites; and also to class 1 sites if it is known that the government is likely obligated to remediate the site.
Total Adjustment (EC Officer)	The total adjustment made to the closing liability (other than the expenditure reducing liability). The Total Adjustment may be a positive or negative number. NOTE (Closing Liability) = (Opening Liability) – (Total Expenditure Reducing Liability) + (Total Adjustment)
Reason For Adjustment Text (EC Officer)	If the opening liability less the total expenditure reducing liability is not equal to the closing liability, provide a brief description of the reason for the adjustment. NOTE: This field will not be published and may be supplied in either official language.
Actual Cubic Meters Remediated (Assessor)	4294
Actual Hectares Remediated (Assessor)	*0.15*
Actual Tons Remediated (Assessor)	*5023 metric tonnes*

global environmental solutions

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Calgary, AB T2W 4X9
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Fax: (403) 263-7906

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Grande Prairie, AB T8V 2V5
Canada
Tel: (780) 513-6819
Fax: (780) 513-6821

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Kamloops, BC V2C 1G1
Canada
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Fax: (250) 374-8656

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Kelowna, BC V1Y 2A3
Canada
Tel: (250) 762-7202
Fax: (250) 763-7303

Markham, ON
200 - 300 Town Centre Blvd
Markham, ON L3R 5Z6
Canada
Tel: (905) 415-7248
Fax: (905) 415-1019

Nanaimo, BC
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Nanaimo, BC V9V 1N1
Canada
Tel: (250) 390-5050
Fax: (250) 390-5042

Prince George, BC
1586 Ogilvie Street
Prince George, BC V2N 1W9
Canada
Tel: (250) 562-4452
Fax: (250) 562-4458

Regina, SK
1048 Winnipeg Street
Regina, SK S4R 8P8
Canada
Tel: (306) 525-4690
Fax (306) 525-4691

Saskatoon, SK
620-3530 Millar Avenue
Saskatoon, SK S7P 0B6
Canada
Tel: (306) 374-6800
Fax: (306) 374-6077

Vancouver, BC (Head Office)
200-1620 West 8th Avenue
Vancouver, BC V6J 1V4
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Tel: (604) 738-2500
Fax: (604) 738-2508

Victoria, BC
6-40 Cadillac Avenue
Victoria, BC V8Z 1T2
Canada
Tel: (250) 475-9595
Fax: (250) 475-9596

Winnipeg, MB
1353 Kenaston Boulevard
Winnipeg, MB R3P 2P2
Canada
Tel: (204) 477-1848
Fax: (204) 475-1649

Whitehorse, YT
6131 6th Avenue
Whitehorse, YT Y1A 1N2
Canada

Yellowknife, NT
Unit 44, 5022 49 Street
Yellowknife, NT X1A 3R8
Canada
Tel: (867) 765-5695

Excavation Feasibility and Slope Stability Assessment
Wilmer Marsh Unit, Columbia National Wildlife Refuge
Wilmer, BC

Prepared For: SLR Consulting (Canada) Ltd
1475 Ellis Street, Suite 200
Kelowna, BC V1Y 2A3

Prepared By: VAST Resource Solutions Inc.
PO Box 538
Cranbrook, BC
V1C 4J1

March, 2016

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TABLE OF FIGURES

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March 30, 2016 VAST File: 16.0019.00

SLR Consulting (Canada) Ltd
1475 Ellis Street, Suite 200
Kelowna, BC V1Y 2A3

Attn: Lindsay Paterson, Project Manager, SLR Consulting (Canada) Ltd.

Re: Excavation Feasibility and Slope Stability Assessment, Wilmer Marsh Unit, Columbia National Wildlife Refuge - Wilmer, BC

Dear Ms Paterson:

This report presents the findings of a subsurface investigation, an excavation feasibility assessment, a slope stability assessment, and recommendations for the historic dump site located within the Wilmer Marsh Unit of the Columbia National Wildlife Refuge in Wilmer, BC.

This assessment was completed as waste debris (fill) was not completely removed from the site after the 2015 excavation program due to slope stability concerns. It was determined that removing additional material required further analysis to ensure the stability of the slope was not compromised.

The objectives of this assessment were:

- To describe and classify the soil and estimate the strength parameters to be used in slope stability analyses;
- To analyze the current slope stability and determine the effects of additional excavation and debris removal on slope stability based on a conceptual excavation approach;
- To estimate the volume of debris and disturbed soil that remains on top of native in situ soil; and
- To provide a conceptual excavation approach required to remove the remaining debris and soil based on the slope stability analyses and estimated depths of remaining debris.

This project was approved in January, 2015 by Ms. Lindsay Paterson, Project Manager, SLR Consulting (Canada) Ltd (SLR).

1.0 STUDY AREA

The former dump site is situated within the Wilmer Marsh Unit of the Columbia National Wildlife Refuge, located approximately one (1) kilometer north of Wilmer, BC. The study area is accessed from West Side Road (Figure 1).

The study area is uninhabited with no residential dwellings or utility/transportation corridors.

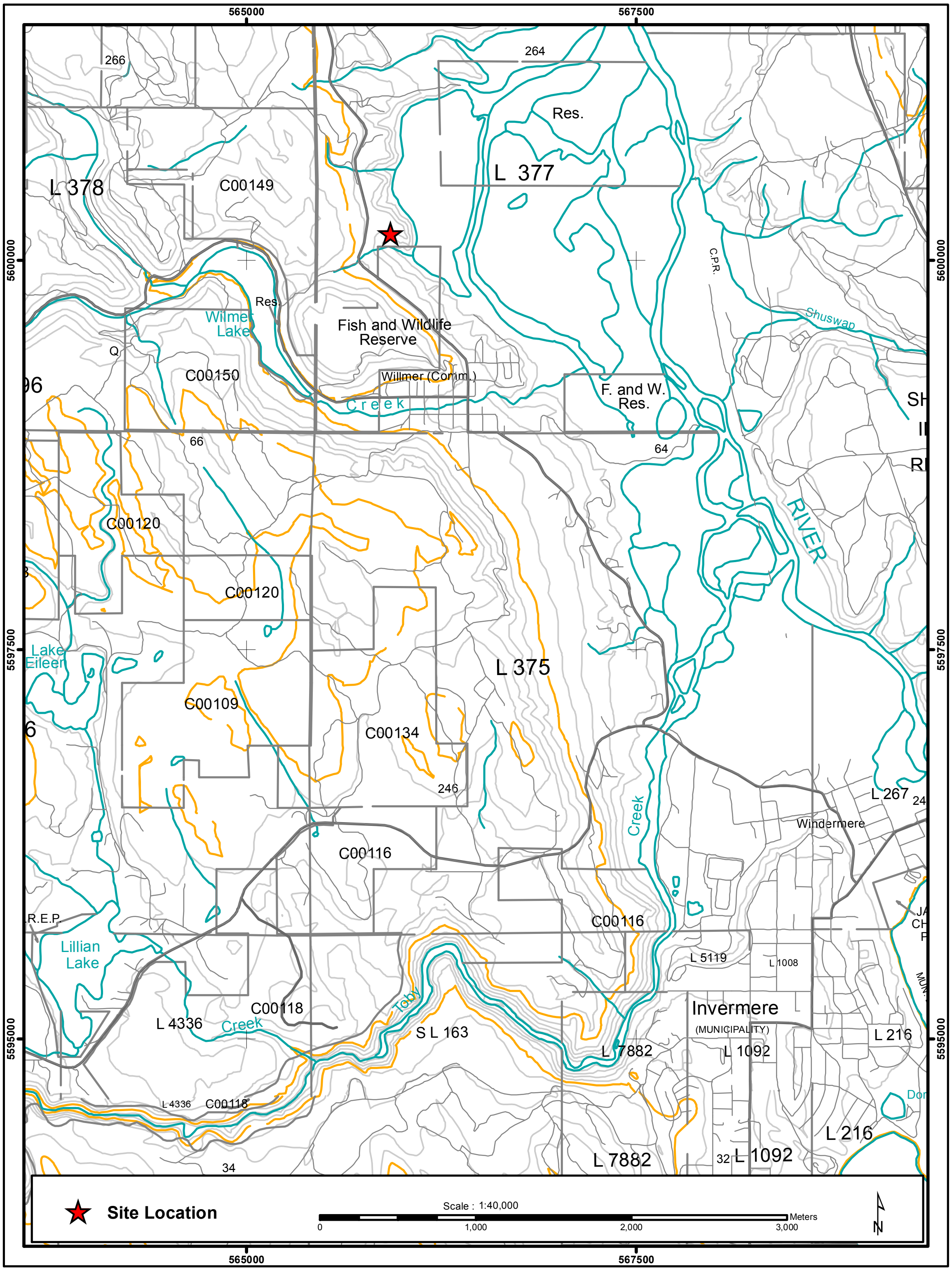


Figure 1: Location Map

2.0 BACKGROUND AND CURRENT SITE CONDITIONS

An estimated 3500 tonnes of debris and associated contaminated soil was removed from the former waste site between January and March 2015. Upon completion, test pitting was conducted by SLR to estimate the remaining depth of debris above the native soil (Appendix E).

Due to the potential for slope instability and other project constraints, all debris and soil within the Main Debris Zone (MDZ) could not be removed during the 2015 project period (Clarke Geoscience Ltd., 2015). The site was recontoured and hand seeded with a native grass seed blend. Following seeding, an erosion control blanket (coconut-straw mat; Nilex SC32BD) was laid out across all exposed soil surfaces. The main access trail was reclaimed (decompacted and recontoured) with organics (i.e. coarse woody debris) laid on top to assist with surface runoff and erosion control. Cross ditches were constructed to drain surface water off the reclaimed trail.

3.0 METHODOLOGY

3.1 References

This assessment was conducted by field examination of areas of interest within and adjacent to the former waste dump site. Reference was made to soils maps, geology maps, geotechnical design manuals, soil laboratory analyses, published soil strength parameters, figures provided by SLR, and reports prepared by Clarke Geoscience Ltd. (CGL). Aerial images from Google Earth©™ were used for reconnaissance level evaluation of the project site.

The soil was classified using the Unified Soil Classification System.

3.2 Field Assessment

The site assessment was completed on February 25, 2015 by Evan Kleindienst, P.Eng./R.P.F. of VAST Resource Solutions Inc (VAST) in the company of Ms. Jennifer Clarke, M.Sc., P.Geo. of Clarke Geoscience Ltd., Ms. Kalina Noel, R.P.Bio. of SLR, and Mr. Rick Hardy, Construction and Excavation Contractor.

The site investigation comprised of a sub-surface evaluation by test drilling at one site located on the upper terrace above the Main Debris Zone. One borehole was advanced to a depth of 25.0m (82.5ft).

Drilling was conducted with a hollow stem auger mounted on a Fraste tracked drill rig. Standard Penetration Tests (SPT) were conducted at 0.75m (2.5ft) intervals every 1.5m (5ft) or more. Drilling and Standard Penetration Tests were completed by Owen's Drilling. The borehole was backfilled with cuttings and topped with Bentonite chips. The borehole log is in Appendix B.

A Simmons Edeco Pilcon Hand Vane Tester was used to estimate the in situ shear strength.

A total station was used to survey eleven (11) cross sections within the area that contained remaining debris. These cross sections were used to analyse the slope stability. A topographic survey was also completed within and adjacent to the project site.

Soil samples were visually classified and hand textured. Select samples were submitted to Artech Consulting Ltd. for analysis of grain size distributions (sieve analysis) and Atterberg Limits. Laboratory results are in Appendix C.

3.3 Slope Stability

Slope stability analyses were completed throughout the area of remaining debris. Stability analyses were conducted using Limit Equilibrium software (Slope/W) by Geostudio 2012. Analyses were completed using the Bishop Method.

Slope geometry is based on 11 surveyed slope profile lines, labelled A to K, but only 7 were used to examine the conceptual excavation effects on slope stability. These 7 profiles, labelled E to K, were surveyed where the estimated debris remained. These slope profile lines were overlaid onto SLR's estimates of debris areas and corresponding depths to generate the cross sections used during the analyses. Profiles A to D were assumed have been surveyed where debris did not exist or had been removed in 2015. These profiles are illustrated in Appendix D.

A deep ground water table, well below the base of the debris has been assumed.

The natural ground slope of the area of concern was estimated to range from 75-80% or less, based on field observations using a clinometer, a surveyed natural slope profile line, and engineering judgement.

Assigned material properties were determined by visual examination, laboratory analysis, hand texturing, SPT data from drilling, engineering judgment, and published values of similar soils. A range of soil strength parameters were examined during the analysis. Circular failure surfaces and specific slip surface geometry were evaluated. Drained vs undrained analyses were examined and compared and used to evaluate short term stability (during excavation) vs long term stability.

4.0 PHYSIOGRAPHY

4.1 Geomorphic Process

Natural geomorphic processes observed within and adjacent to the study area consist of gullying, debris slides, and natural weathering of in-situ soil.

Post glacial gullying has occurring within the glaciolacustrine deposits. These gullies are dry and contain no running surface water. Gullies have steep sidewalls (70-90%) and extend downslope towards the wetland/valley bottom.

Evidence of surficial debris slides was observed within the study area at locations where a veneer of soil and debris covers the native ground slopes, creating oversteepened slopes (>80-100%). These debris slides exist upslope of the area that was previous excavated (Appendix A). These shallow debris slides are approximately 1.0-4.0 m wide, 10-15 long, and 0.5 m deep. The slide material settled downslope where ground slopes are slightly less than the natural slope (~80%).

The natural weathering of in-situ soil was observed as rills.

4.2 Topography

The study area is located on the western edge of the Purcell Mountain Range, within the Rocky Mountain Trench, upslope of the Columbia River and its wetlands. The upper elevations of the study area consist of a flat glaciolacustrine terrace with slopes that range from 0-3%. The mid to lower elevations consist of slopes that range from as little as 5-25% to as steep as 25-100% or more that descend towards the south, east, and north directions. Gullies, formed during glacial downwasting, initiate from this terrace and adjacent similar terraces to the south and north. The elevation ranges from 864 m on the terrace to 826 m at the lowest extent of the project site.

The study area contains a larger dry gully that trends in a west to east direction towards the wetland. The existing dump site was interpreted to be one of these gullies that initiated on the terrace, but was filled with debris. The 2015 excavation revealed this gully, but the natural shape can only be extrapolated from adjacent undisturbed gullies.

This old dump site is located on a southern aspect.

4.3 Bedrock Geology

Bedrock was not encountered within the depth of drill borehole (25.0m/82ft).

4.4 Surficial Soils

The following describes the soils encountered during the assessment and during drilling. See Appendix B for borehole log.

4.4.1 Native Soil Stratigraphy

Surficial soils are described below and soil properties are summarized in Table 1.

Very Low Plastic Silt Topsoil

The surficial soil consists of approximately 0.2 m /8 inch of topsoil, consisting of soft to firm, tan, dry, fine grained silt with little clay and fine sand. This material is comprised of organics, roots, and waste debris such as glass, metal, and plastic.

Very Low Plastic Silt with some Clay and little Sand

Surficial soil below the topsoil material, from approximately 0.2 m (8 inch) to 25.0 m (82 ft) consists of very low plastic, tan, stiff to very stiff, varved, dry silt with little clay and sand. This material is classified as ML.

Selected samples were submitted for laboratory analysis of Atterberg limits and grain size distribution (hydrometer) to assist with the classification. Soil laboratory results are in Appendix C.

This very low plastic silt material is inferred as glacio-lacustrine in origin.

4.4.2 Summary of Native Soil Properties

Table 1 below summarizes the properties of the native soil described above.

Table 1: Summary of Native Soil Properties

Material	Angle of Internal Friction	Estimated Cohesion *	Estimated Dry Unit Weight
Very Low plastic Silt with little Clay and Sand (ML)	30°	25 kPa	20 kN/m^3

*Estimated cohesion based on field vane shear test.

4.4.3 Native Soil Intermixed with Debris (Fill)

The depth of the remaining debris intermixed with native soil fill varies across the study area has been estimated by SLR (Appendix E) and ranges from 0.5 m to 3.0 m. The soil consists of unconsolidated very low plastic silt as described in 4.4.1. intermixed with glass, plastic, and metal. The consistency ranged from Very Soft to Firm. The Very Soft unconsolidated material was assumed to have been free dumped from the upper terrace and settled on the steeper slopes below as a sliver fill with depths ranging from 0.5 m to 1.0 m. Where debris depths were greater than 1.0 m, material was more consolidated (firm). This consolidation was assumed, but not confirmed, to be a result of historic machine traffic pushing debris and soil to lower elevations.

Two small surficial debris slides have occurred within the thin sliver fill that was free dumped from the upper terrace (Appendix A). These slides were approximately 10.0 – 15.0 m long, 1.0-4.0 m wide and 0.5 m deep. Material settled downslope where the ground slope decreased enough to hold the material (~80% or less).

Table 2 below summarizes the properties of the fill soil described above.

Table 2: Summary of Fill Soil Properties

Material	Angle of Internal Friction	Estimated Cohesion *	Estimated Dry Unit Weight
Very Low plastic Silt with little Clay and Sand (ML) intermixed with debris	0°	5 kPa	18 kN/m^3

*Estimated cohesion based on field vane shear test and engineering judgement.

4.5 Groundwater

The ground water table was not observed in the test borehole. No seeps or creeks were observed downslope of the study area. The Columbia Wetland is approximately 60 m below the top of the test borehole.

5.0 DISCUSSION

The following sections describe several options for excavating and removing the remaining debris (fill) from the site and the effects of this excavation on slope stability. This report is not an excavation plan. It is assumed that the actual excavation plan will be determined by the selected contractor and approved by a Professional Engineer or Geoscientist prior to the commencement of excavation and debris removal.

Additional options using different machines may be determined during the excavation planning phase. However, the stability must be analysed prior to the commencement of excavation. The depth of the remaining debris over native soil has been estimated by SLR. These estimated depths have been used within the slope stability analyses.

5.1 Slope Stability

The Global Stability Analyses examined the current stability of the slope within the area where debris remained after the 2015 excavation program and compared results with a conceptual excavation plan where skid trails were constructed to remove the remaining debris. Stability analysis results are summarized in Table 3 below and illustrated in Appendix D.

The depth of debris (fill) above native soil was assumed to range from approximately 0.5 m (1 ft 7 inches) to 3.0 m (9 ft 8 inches) below the existing ground surface. The area above the SLR estimated region containing 0.0-0.5 m depth was expanded to the top of the terrace by the undersigned based on ocular estimates taken during the field visit. The deepest estimated depths were used during the stability analyses. An additional 1.0 m depth of fill was added to cross sections I and J where the debris was estimated to be clean. Based on visual observations and judgment, the undersigned assumed a deeper depth compared to SLR's estimates.

The recommended range of Factors of Safety (FOS) for Global Stability for this site, considering the geotechnical engineering practise requirements against landslide, is 1.3 to 1.5. The FOS is the ratio between the resisting forces to the driving forces for the evaluated slope profile. A FOS of less than or equal to 1 would represent an unstable slope. FOS greater than 1 indicates an increasing confidence of a stable slope. In this instance, where the existing slope is a natural slope overlain by disturbed soil and debris, and no dwelling or infrastructure exist downslope, the less stringent objective of maintaining or creating conditions for a modest improvement, or absence of adverse effects on Global Stability, is judged appropriate.

By applying the range of soil strength parameters described in Table 1 and 2 above to the conceptual final post excavation slope and not reclaiming/recontouring the full bench constructed trails , the Factor of Safety was calculated to be 1.3 or higher and the Global Stability of the site is judged to be acceptable and considered stable. Applying the same parameters to the existing slope, given the estimated depths of remaining debris, the Factor of Safety for the slope was calculated to be 1.4 and higher with failure slip surfaces within the depth of remaining fill deposit and within the native in situ soil. If the debris is not removed, small surficial debris slides can be expected to occur over time, similar to the ones identified during the field assessment and described in Section 4.1, especially if the actual depths are greater than the estimated depths.

Table 3: Summary of Global Stability

Slope Profile	Factor of Safety – Leaving Debris	Factor of Safety Removing Debris	Comments
E	1.4	1.4	Critical slip surface for post excavation is outside the excavation zone.
F	1.3	1.4	Critical slip surface for post excavation is outside the excavation zone.
G	1.4	1.4	Critical slip surface for post excavation is outside the excavation zone.
H	1.5	1.4	Critical slip surface for post excavation is outside the excavation zone.
I	1.7	1.6	Critical slip surface for post excavation is outside the excavation zone.
J	1.4	1.7	Critical for pre excavation is within the fill deposit. Critical slip surface for post excavation starts at the toe of the cut slope.
K	1.7	2.1	Critical slip surface for pre excavation is below the excavation zone. Critical slip surface for post excavation starts at the toe of the cut slope.

5.2 Option 1 – Remove all Remaining Debris

The following section describes a conceptual excavation approach and the resulting influence on slope stability assuming all of the estimated volume of debris was excavated and removed from the site. For the purposes of this analysis, a Volvo EC160D excavator with a maximum reach of 8.9 m/ 29.5 ft, a cleanup bucket, and a full bench constructed trail width of 4.0 m / 13.1 ft was used.

A top down approach will be required to ensure that unconsolidated debris and soil material is removed from the upper elevations before removing material at lower elevations. This will ensure that material at the toe of the slope is not removed, potentially compromising the stability while machines are working below.

The final reclaimed ground slope used in the analyses after all the debris has been removed was estimated to be approximately 80%, or 1.25H:1V or less.

Based on the above excavator specifications, trail width, and final design ground slope, the following conceptual excavation scenario was used to model the final design slope and analyze the slope stability based on these steps. All excavated debris will be removed off site with either a dump truck (on the upper flat terrace) or a tracked marooka (on the steeper grades).

1. Starting at the top, the excavator will sit on the upper crest/terrace and reach down the slope and remove the 0.5 m veneer of debris and soil from the upper 8-9 metres of the slope;
2. Full bench (4.0 m wide) trails would be constructed across the slope at the downslope extent of debris removal (point 1 above), at approximately 90.0 m relative elevation, which is approximately 8-9 m downslope from the crest of the hill. The second lower trail was modeled at approximately 80.0 m relative elevation, at the downslope extent of the debris removal from the upper constructed trail;
3. A third trail could be constructed as required at lower elevations to facilitate the excavation and removal of debris. Full bench construction into native in situ soil was used in the slope stability model and would represent a conservative (i.e. the most unstable) approach because over steepened cut slopes would be generated. Full bench cut slopes used during stability analyses were 200% / 0.5H:1V.

Separating and stock piling native uncontaminated soil removed during full bench construction will require onsite supervision, a stockpile location, and a reclamation plan for replacing the material. Additional soil handling will be required, will increase the cost, and therefore, may not be desired.

An alternate option would be to remove all the excavated full bench native material from the site and reclaim the trails by pulling down the cutslope to approximately 80%/1.25H:1V and placing this material on the trail surface as toe support and recontouring. This approach would result in higher Factors of Safety and overall increased stability. Reclamation plans must be discussed prior to the excavation phase and approved by a Professional Engineer or Geoscientist.

Depending on the grade of the final lower trail, two excavators might be required. The lower one would bail the material to the second located at a higher elevation, which would place into the marooka (or similar haul truck).

Removing all the debris and disturbing the entire slope will result in a large area of exposed soil that will be susceptible to surface erosion. Erosion control and mitigation must be implemented after excavation is completed.

Based on the above approach that includes full excavation and full bench trail construction for one or more trails, no trail reclamation and/or recontouring, a conservative approach is provided and deep seated long term and short term slope failures are not expected to occur. Even though this conceptual excavation approach has been used to model the slope stability, minimizing full bench construction by using a combination of balanced cut and fill and partial bench construction where practical would add additional factors of safety to the long term and short term stability of the slope.

5.3 Option 2 – Leave the Remaining Debris

Based on the estimated depth of the remaining debris sitting on top of native soil and using a range of soil strength parameters, the current condition of the study area is considered stable on a global scale. The 7 slope profiles had a global factor of safety greater than 1.4.

Leaving the remaining debris could result in future small debris slides within the unconsolidated debris material, but catastrophic global failures are not expected.

5.4 Estimate of Excavated Soil and Debris (Fill)

The amount of debris and soil remaining as a veneer to blanket deposit over native soil is estimated to be approximately 1,500 m^3. This estimate is based on depths provided by SLR the added area by the undersigned containing 0.5 m of debris, combined with the topographic and slope profile surveys completed by VAST.

An estimate of 1,000 m^3 of native soil will be removed if full bench trail construction is implemented. This volume is based on two 50 m long trails, 4.0 m wide, 0.5H:1V /200% cutslopes, and an 80% ground slope.

6.0 RECOMMENDATIONS

The following recommendations for future debris removal at the Wilmer site are provided:

- Excavation and removal of all the estimated remaining debris and contaminated soil (estimated at 1,500 m^3) can commence under the supervision of a Professional Engineer or Geoscientist. The excavation plan must employ a "Top Down" approach;
- The final excavation and reclamation plans must be approved by a Professional Engineer or Geoscientist prior to the commencement debris removal;
- Machines and workers on the ground must not work below slopes containing debris and unconsolidated soil material (non-native) overlying native soils that are greater than 85%/40 degrees/1H:1.17V. These slopes must assessed by the supervising Professional during excavation;
- Based on the slope stability analyses and provided all recommendations within this report are adhered to, full bench trail construction can occur. Reclamation plans should consider recontouring by either pulling down the cut slope to reduce the slope or by hauling non contaminated material back onto the trail to increase the toe support. Reclamation will add increase the Factors of Safety and overall long term stability. Final reclamation techniques may incorporate a series of small terraces and benches across the project site and a final overall design ground slope of approximately 80% 1.25H:1V or less. Full bench cut slopes should not exceed 200% / 0.5:1 (H:V). Small cut slope slumping and surface erosion could occur over time on cut slopes that are constructed at the 200% and not reclaimed/recontoured;
- If significant rain (or snow melt) occurs during the excavation process, excavation must stop until a Professional Engineer or Geoscientist has assessed the site and deemed the conditions safe to proceed;
- Post excavation monitoring to assess the slope stability should be conducted for several years after completion (i.e. annually for 5 years or until the slope is confirmed stable); and
- All newly exposed soil will require erosion control measures to minimize erosion from wind and/or surface run off and must be completed immediately after construction;

7.0 CLOSURE

This report has been prepared in accordance with generally accepted engineering practices in British Columbia. No other warranty, express or implied is made.

Services provided by VAST Resource Solutions Inc. for this report have been conducted in a manner consistent with the level of skill, care and competence ordinarily exercised by members of the profession currently practicing under similar conditions and like circumstances in the same jurisdiction in which the services were provided. Professional judgment has been applied in developing the recommendations in this report.

The conclusions and/or recommendations provided in this report do not relieve the client or their agents or representatives of the responsibility to comply with applicable Acts, regulations, bylaws and/or decisions of any authorities that have jurisdiction under an enactment.

Assessments of soils and rock characteristics are based on interpretation of one drill borehole and hand dug test pits. Variability (even over short distances) is inherent in geological features, and actual ground conditions encountered may vary from those identified.

In order to properly understand the suggestions, recommendations and opinions expressed within this report, reference must be made to the whole report. We cannot be responsible for the use of portions of the report by any party without reference to the whole report.

This report is prepared for the specific site assessed, whether it is a development, a building, or a design objective that was described to us by the client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed within the report are only valid to the extent that there has been no material alteration to, or variation from any of the said descriptions provided to us, unless we have been specifically requested by the client to review and revise the report in light of such alteration or variation.

The information and opinions expressed in the report, or any document forming part of the report, are for the sole benefit of the client. No other party may use or rely upon the report or any portion thereof without our written consent. We will consent to any reasonable request by the client to approve the use of this report by other parties as “approved users”. The contents of the report remain our copyright property and we authorize the client and approved users to make copies of the report only in such quantities as are reasonably necessary for the use of the report by those parties. The client and approved users may not give, lend, sell or otherwise make the report, or any portion thereof, available to any party without our written permission. Any use which a third party makes of the report, or any portion thereof, is the sole responsibility of such third parties. We accept no responsibility for damages suffered by any third party resulting for the unauthorized use of the report.

In the event that conditions vary from those interpreted for this assessment, we reserve the right to re-inspect the foundation conditions and amend our recommendations accordingly. The author reserves the right to amend this report if additional information becomes available.

The report is based on, and limited by, circumstances, conditions and information available at the time the work was completed. The recommendations of this report are based in part on information provided by others. VAST Resource Solutions Inc. believes this information is accurate but cannot guarantee or warrant its accuracy or completeness.

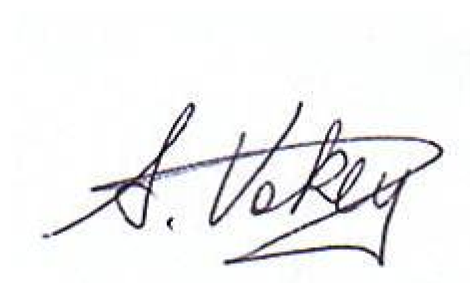
The information presented in this report was acquired, compiled and interpreted exclusively for SLR Consulting (Canada) Ltd. and Government of Canada Public Works for the purposes described in this report. VAST Resource Solutions Inc. does not accept any responsibility for the use of this report, in whole or in part, for any purpose other than intended or to any third party for use whatsoever.

This document has been digitally signed and sealed and certified by the author. Hard copies of the report can be produced upon request.

Yours truly,

Prepared By

Review By:



Evan Kleindienst, P.Eng., RPF
Project Engineer (Principal)

Shawn Vokey, P.Eng.
Senior Engineer (Principal)

P:\16.0019.00\Wilmer Marsh Feasibility Study\Report\Excavation_Feasibility_wilmer_final.doc

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Unified Soil Classification System.

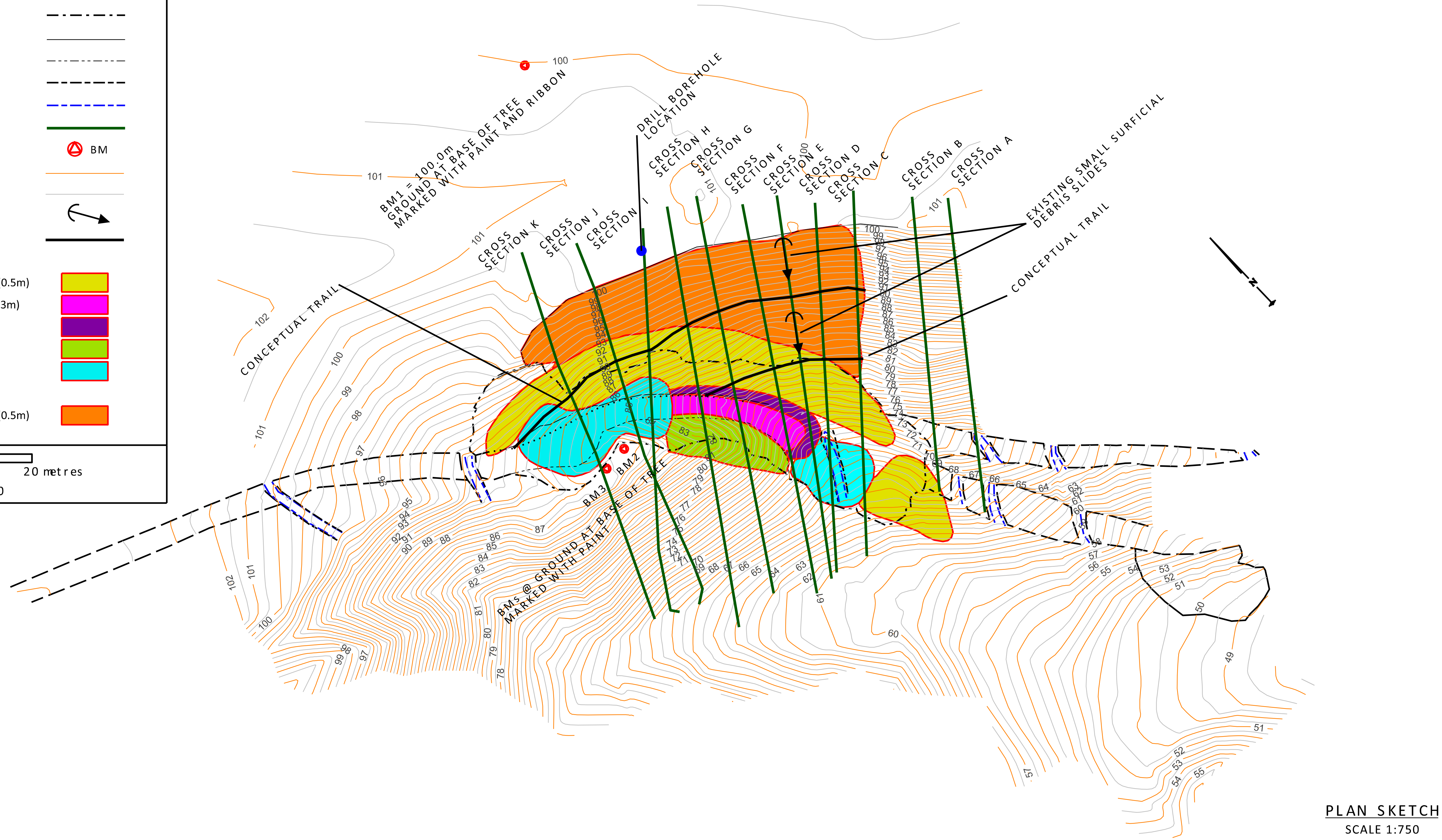
APPENDIX A: PROJECT SITE MAP

LEGEND:

ROAD EDGE	
ROAD EDGE (EXCAVATED)	
EDGE OF 2015 EXCAVATION	
TOP OF BANK	
TOE OF CUT	
TOP OF CROSS DITCH	
BOTTOM OF CROSS DITCH	
CROSS SECTION	
BENCHMARK	BM
1.0m INTERVAL CONTOUR	
0.5m INTERVAL CONTOUR	
DEBRIS SLIDE	
CONCEPTUAL TRAIL LOCATION	
BASED ON SLR ESTIMATES:	
MINIMAL SURFACE DEBRIS (0.5m)	
LARGE METALLIC DEBRIS (1-3m)	
DEBRIS (1-2m)	
DEBRIS (SMALL 0.5-1.0m)	
CLEAN	
BASED ON VAST ESTIMATE:	
MINIMAL SURFACE DEBRIS (0.5m)	

0 10 20 metres

SCALE 1 : 750



PLAN SKETCH

SCALE 1:750

SLR

VAST RESOURCE SOLUTIONS

FILE:16.0019.00_TOPO_SURVEY.S01

ISSUED FOR CONSTRUCTION:	DATE:	N/A
REVISION:		
ISSUED FOR APPROVAL:	DATE:	N/A
REVIEW:	DATE:	N/A
DRAWING: DM	DATE:	MAR 06/15
DESIGN:	DATE:	N/A
FIELD DATA: CR/DM	DATE:	MAR 05/15

PROJECT SITE MAP

SHEET 1/1

16.0019.00

WILMER MARSH

2016 TOPO SURVEY

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

APPENDIX B: DRILL LOG

BORING NUMBER Wilmer-VAST-BH1

Vast Resource Solutions

CLIENT SLR Consulting (Canada) Ltd
PROJECT NAME Wilmer Marsh Unit - Excavation Feasibility and Slope Stability Ass
PROJECT NUMBER 16.0019.00
PROJECT LOCATION Wilmer, BC
DATE STARTED 25-2-16 **COMPLETED** 25-2-06
GROUND ELEVATION 2833 ft 2833 **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Owen's Drilling
GROUND WATER LEVELS:
DRILLING METHOD Odex Drill and SPT
AT TIME OF DRILLING --- No Free Water
LOGGED BY Darin Lindsay **CHECKED BY** Evan Kleindienst
AT END OF DRILLING --- No Free Water
NOTES Borehole sealed with cuttings and Bentonite Chips
AFTER DRILLING --- No Free Water

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				Top soil mixed with waste debris such as glass, plastic, and metal	ML		0.2 SILT, (ML) tan, fine grained, dry, soft to firm, homogeneous, very low plasticity 2832.8
							SILT, (ML) tan, fine grained, dry, stiff to very stiff, homogeneous, very low plasticity
5	AU						
	SPT	94	4-4-6 (10)				
10				Fines = 23%			
	SPT	94	3-5-6 (11)	Fines = 41%			
15							
				Fines = 23%	ML		
	SPT	83	10-13-18 (31)				
20							
	SPT	94	13-10-12 (22)				
25							
	SPT	100	8-9-11 (20)				
30							
	SPT	89	10-12-15 (27)				
35							

(Continued Next Page)

CLIENT SLR Consulting (Canada) Ltd

PROJECT NAME Wilmer Marsh Unit - Excavation Feasibility and Slope Stability Ass

PROJECT NUMBER 16.0019.00

PROJECT LOCATION Wilmer, BC

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
35					ML		SILT, (ML) tan, fine grained, dry, stiff to very stiff, homogeneous, very low plasticity *(continued)*
	SPT	106	7-8-11 (19)				
40							
	SPT	89	6-7-8 (15)				
45							
	SPT	100	7-7-10 (17)				
50							
55							
	SPT	100	8-10-12 (22)				
60							
65							
	SPT	100	8-11-14 (25)				
70							
75							

(Continued Next Page)

CLIENT SLR Consulting (Canada) Ltd

PROJECT NAME Wilmer Marsh Unit - Excavation Feasibility and Slope Stability Ass

PROJECT NUMBER 16.0019.00

PROJECT LOCATION Wilmer, BC

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
75							SILT, (ML) tan, fine grained, dry, stiff to very stiff, homogeneous, very low plasticity *(continued)*
80					ML		
	SPT	100	10-13-18 (31)	Water Table was not encountered within the depth of drilling			83.5 — 2749.5
							Bottom of borehole at 83.5 feet.

APPENDIX C: SOIL LAB ANALYSIS

ARTECH CONSULTING LTD

MATERIALS TESTING AND INSPECTION SERVICES
229 Industrial Road F, Cranbrook, BC V1C 6N4
Ph: 250/489-1940; Fax: 250/489-1667;
Email: info@artechconsulting.ca

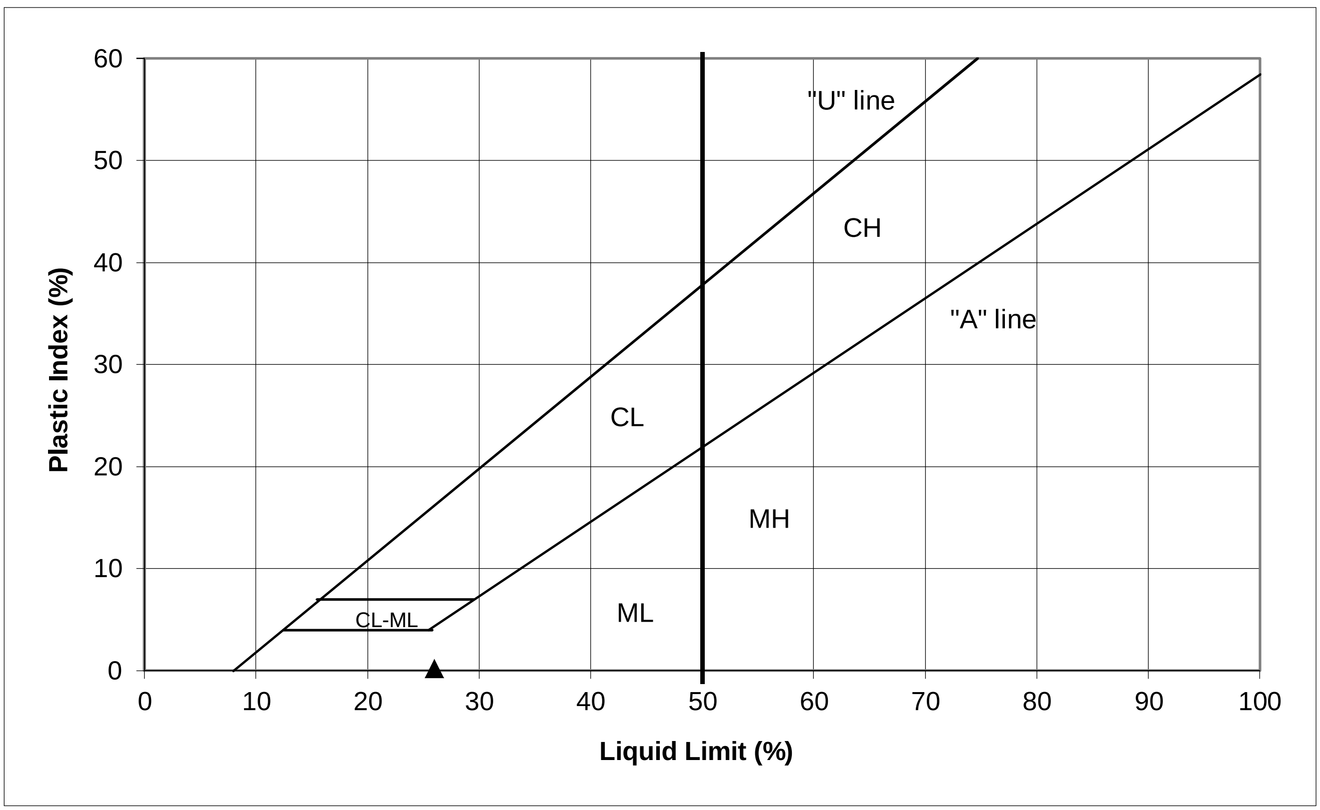
ATTERBERG LIMITS REPORT

Lab No: S16-096

Project: Wilmer
Region: Invermere, BC
Sampling Details: Sample provided by VAST March 10, 2016

Date: March 16, 2016
File: 2016-06

Sample	Soil Classification (USCS)	Sample Moisture %	Liquid Limit %	Plastic Limit %	Plasticity Index %
DH1 - S5 (27' - 28'6")	ML	4.9	26	26	0



Tested in accordance with ASTM D4318-00 Methods for the determination of liquid limits, plastic limits and plasticity indices of soils

Reports: VAST Resource Solutions
c.c:

Report Date: March 16, 2016
Per:

ARTECH CONSULTING LTD

MATERIALS TESTING AND INSPECTION SERVICES
229 Industrial Road F, Cranbrook, BC V1C 6N4
Ph: 250/489-1940; Fax: 250/489-1667;
Email: info@artechconsulting.ca

GRADATION REPORT

Lab No: S16-097

Project: Wilmer

Our File: 2016-06

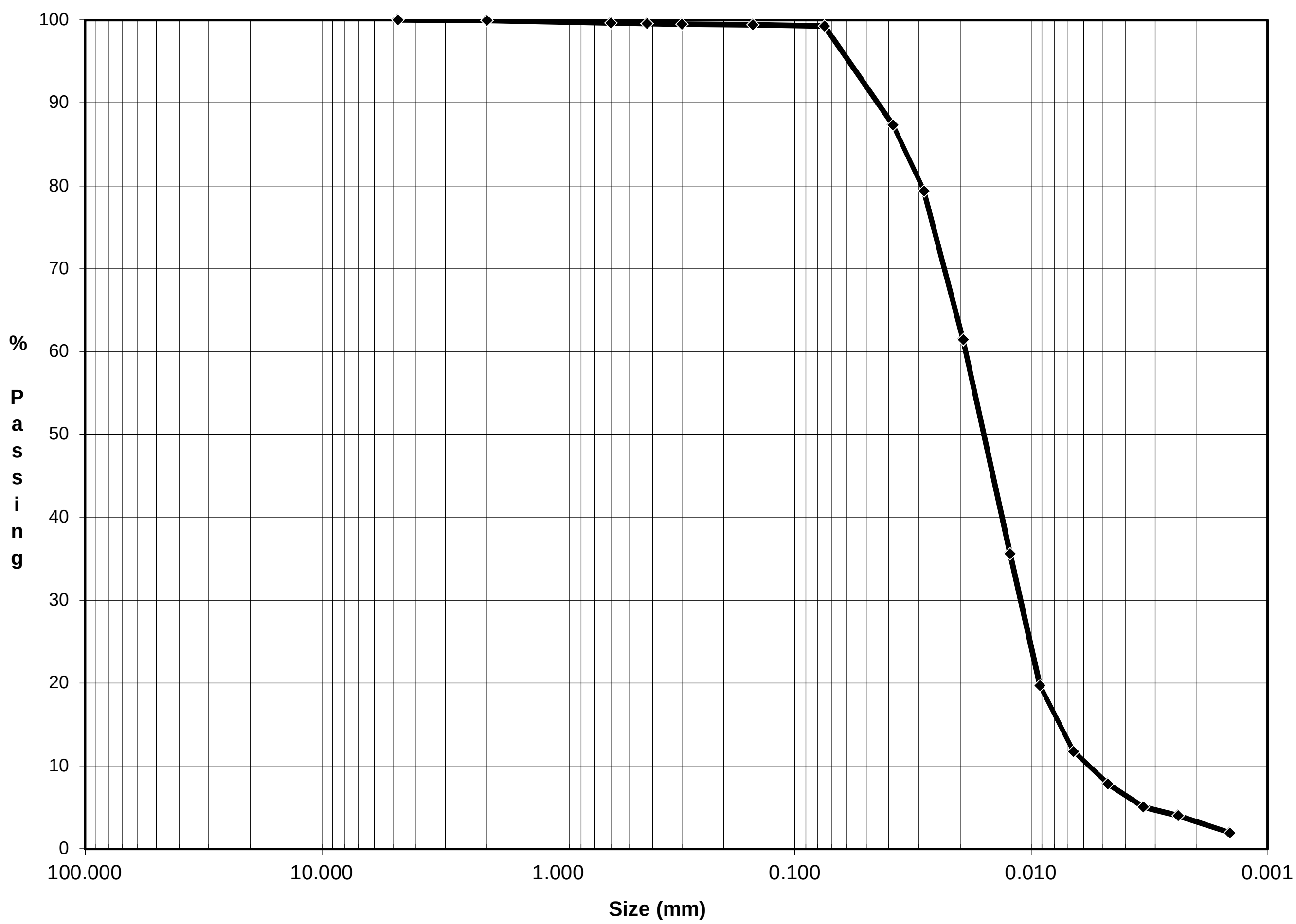
Sampling details: DH1-S12

Region: Invermere, BC

Material type: Silt with a trace of clay

Sieve Size	% Passing	Classification	Sieve Size	% Passing	Classification
37.5		Gravel	0.0123	35.6	Silt
19.0		Gravel	0.0092	19.7	Silt
4.75	100.0	Coarse Sand	0.0066	11.7	Silt
2.00	99.9	Medium Sand	0.0047	7.8	Silt/Clay
0.420	99.6	Fine Sand	0.0034	5.1	Silt/Clay
0.075	99.3	Silt	0.0024	4.0	Clay
0.0283	79.4	Silt	0.0014	1.9	Clay

% PASSING VS GRAIN SIZE



Tested in accordance with ASTM C136, C117, D422 (washed gradation and hydrometer)

Moisture Content of Sample(%): 3.5

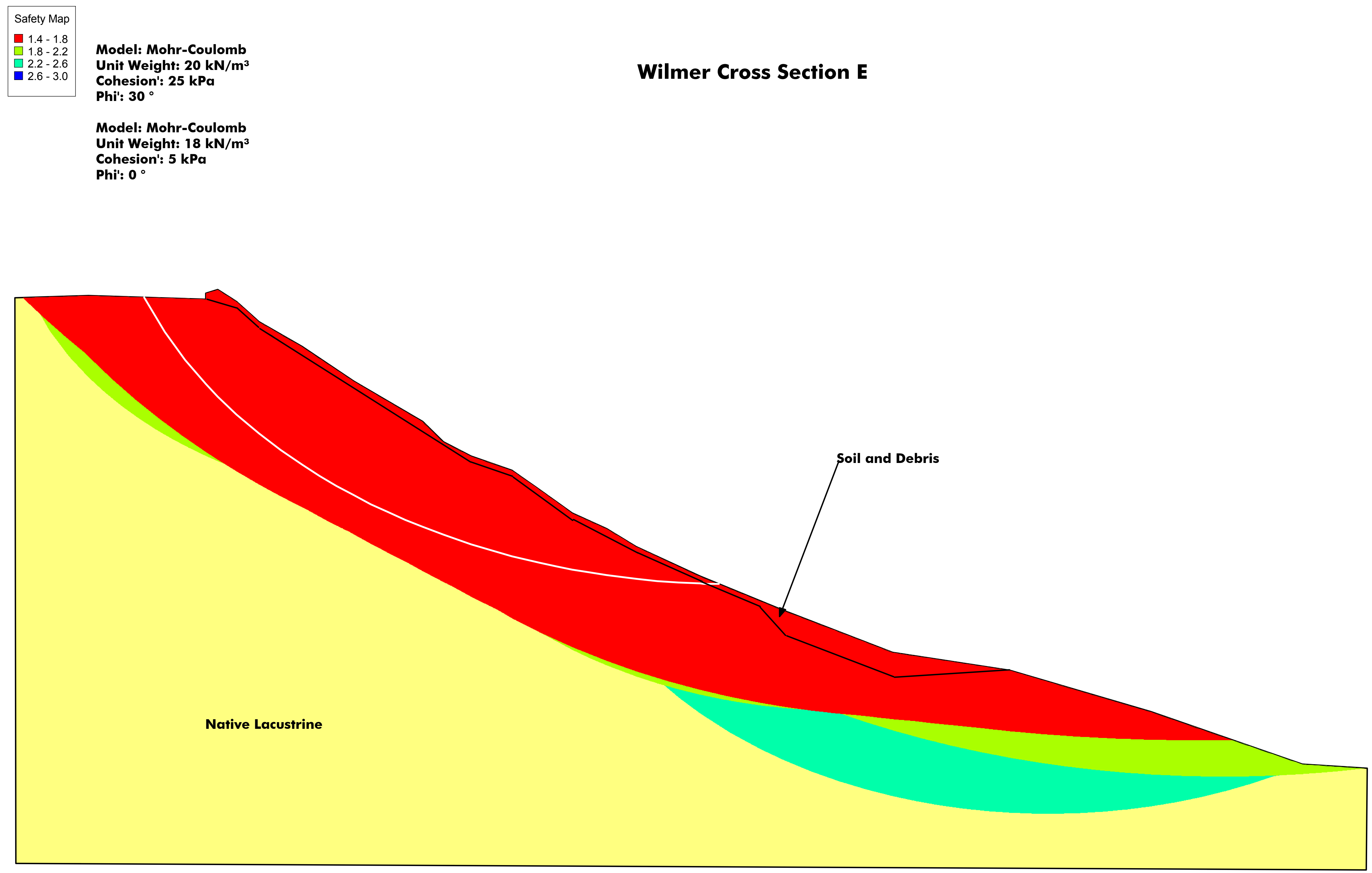
Reports: VAST Resource Solution - Evan Kleindienst

c.c:

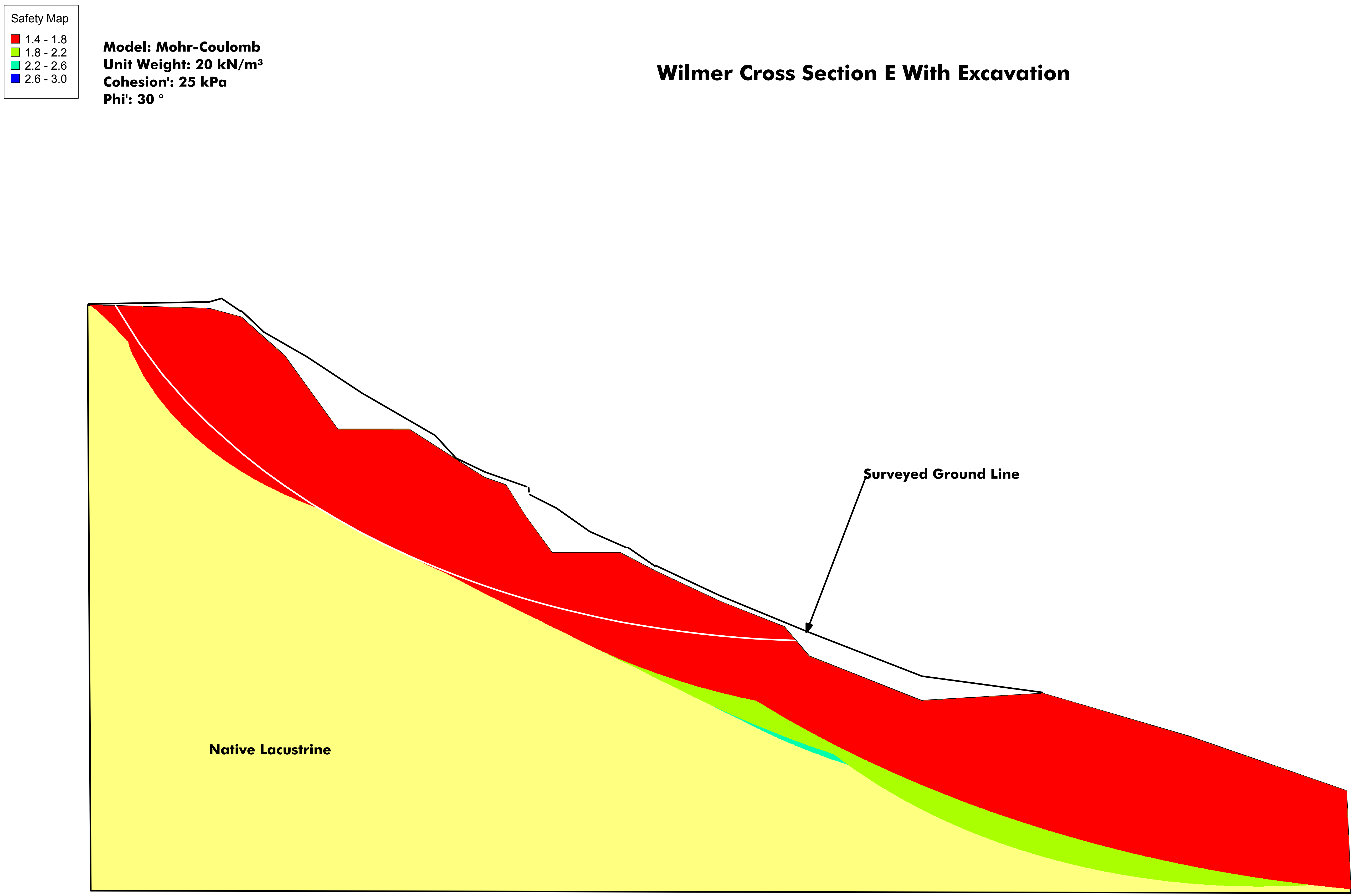
Report Date: March 16, 2016

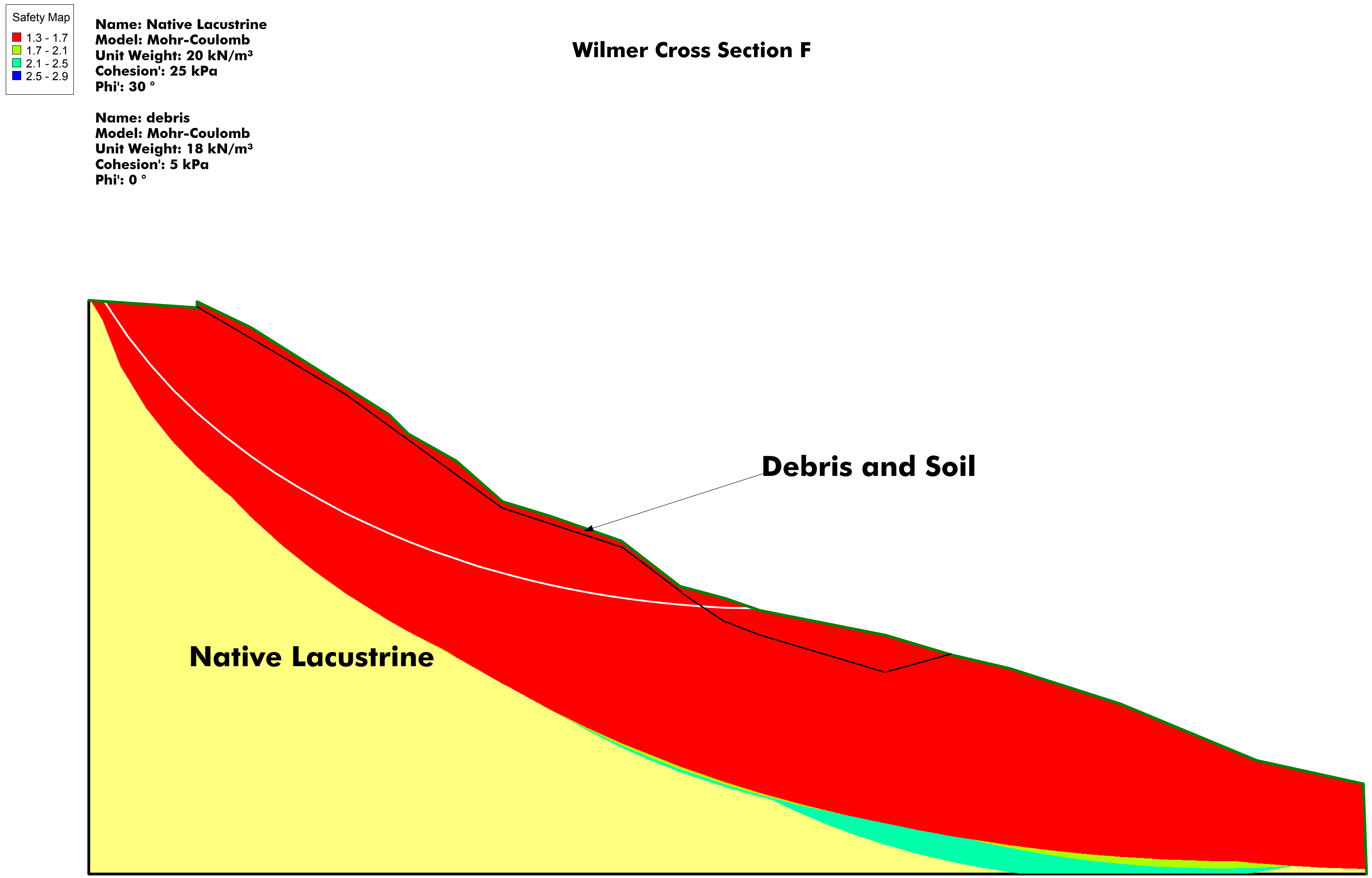
Per:

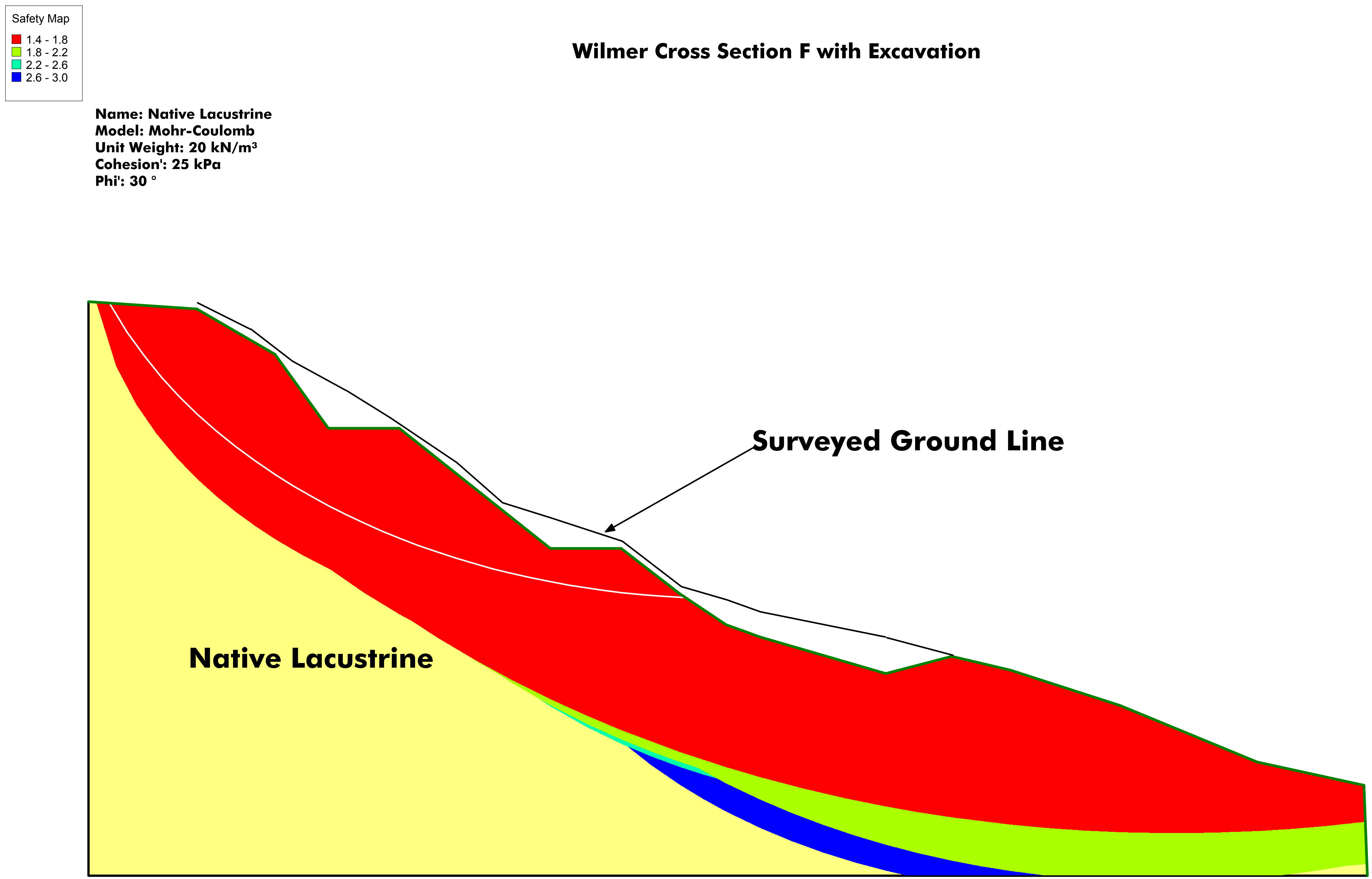
APPENDIX D: SLOPE STABILITY ANALYSES

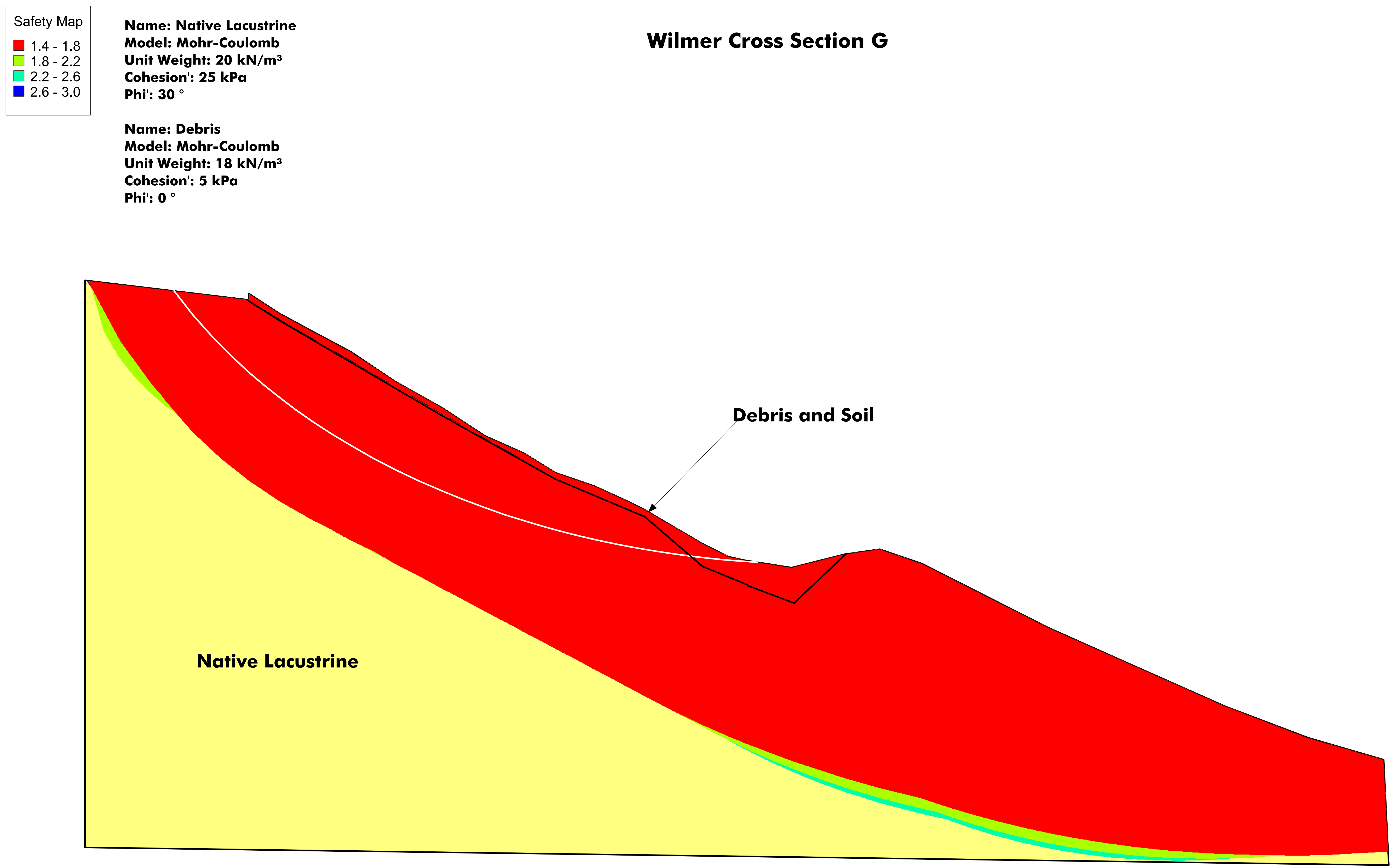


Safety Map
1.4 - 1.8
1.8 - 2.2
2.2 - 2.6
2.6 - 3.0
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion': 5 kPa
Phi': 0 °
Wilmer Cross Section E
Soil and Debris
Native Lacustrine

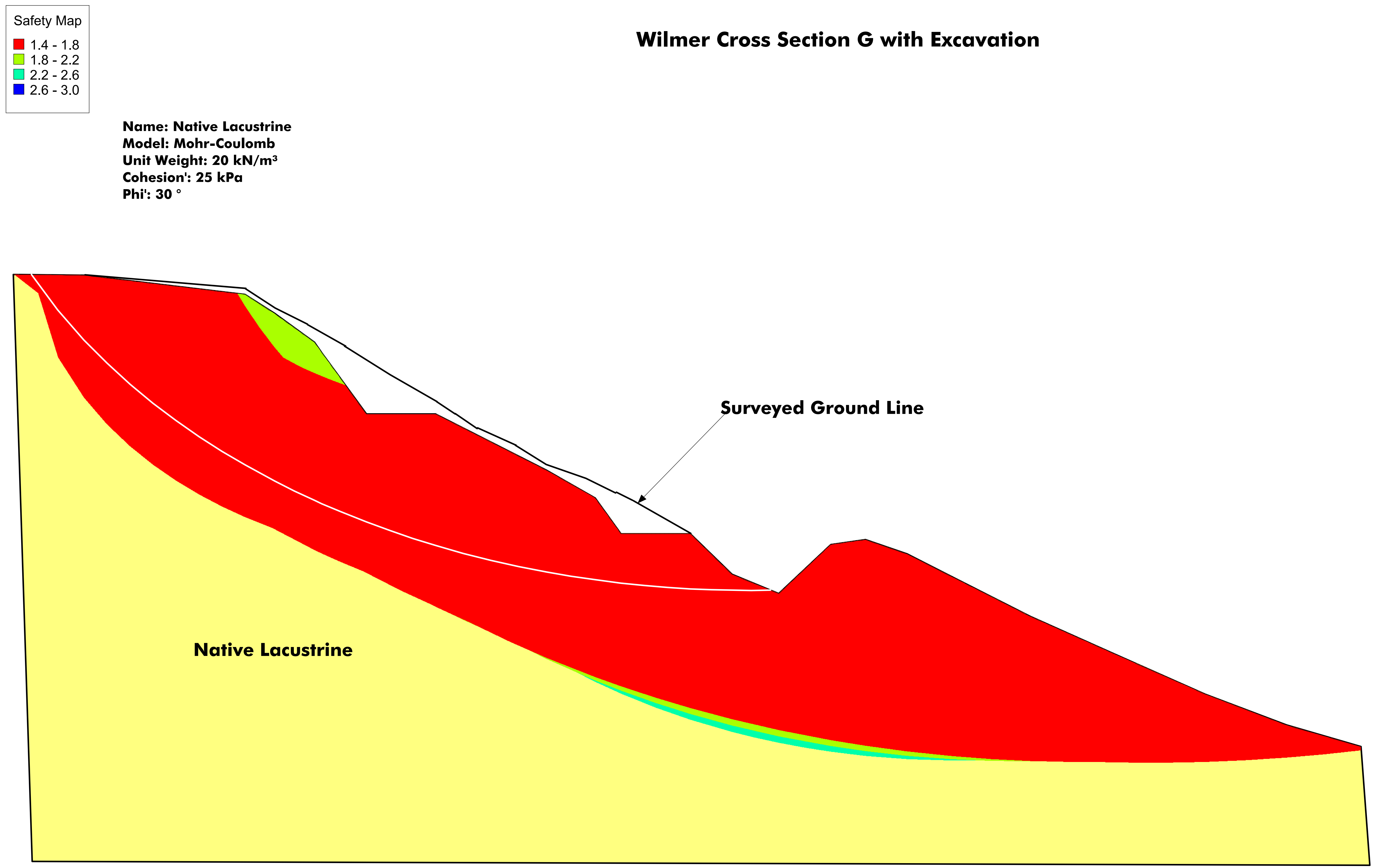

Safety Map
1.4 - 1.8
1.8 - 2.2
2.2 - 2.6
2.6 - 3.0
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Wilmer Cross Section E With Excavation
Surveyed Ground Line
Native Lacustrine

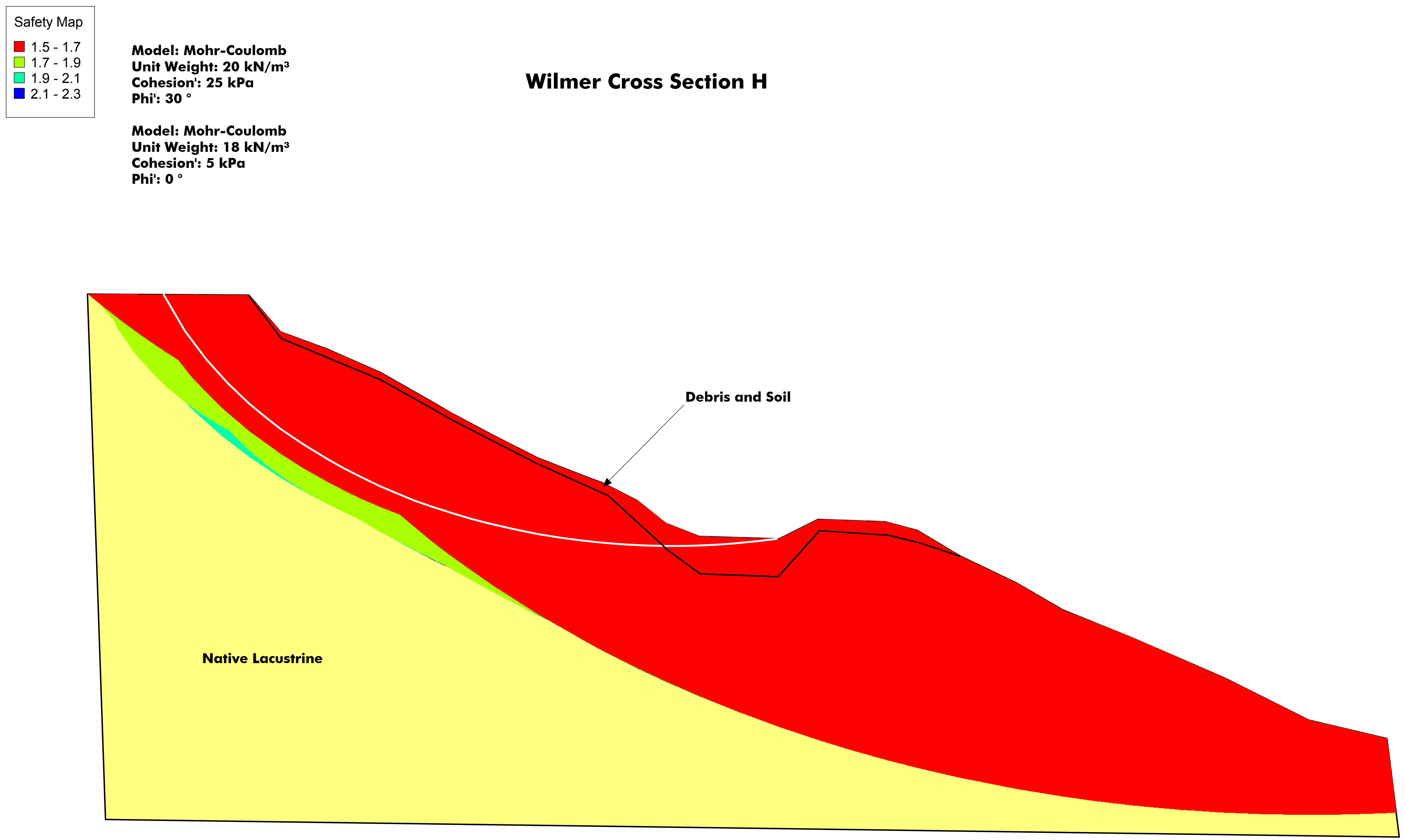

Safety Map
1.3 - 1.7
1.7 - 2.1
2.1 - 2.5
2.5 - 2.9
Name: Native Lacustrine
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Name: debris
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion': 5 kPa
Phi': 0 °
Wilmer Cross Section F
Debris and Soil
Native Lacustrine

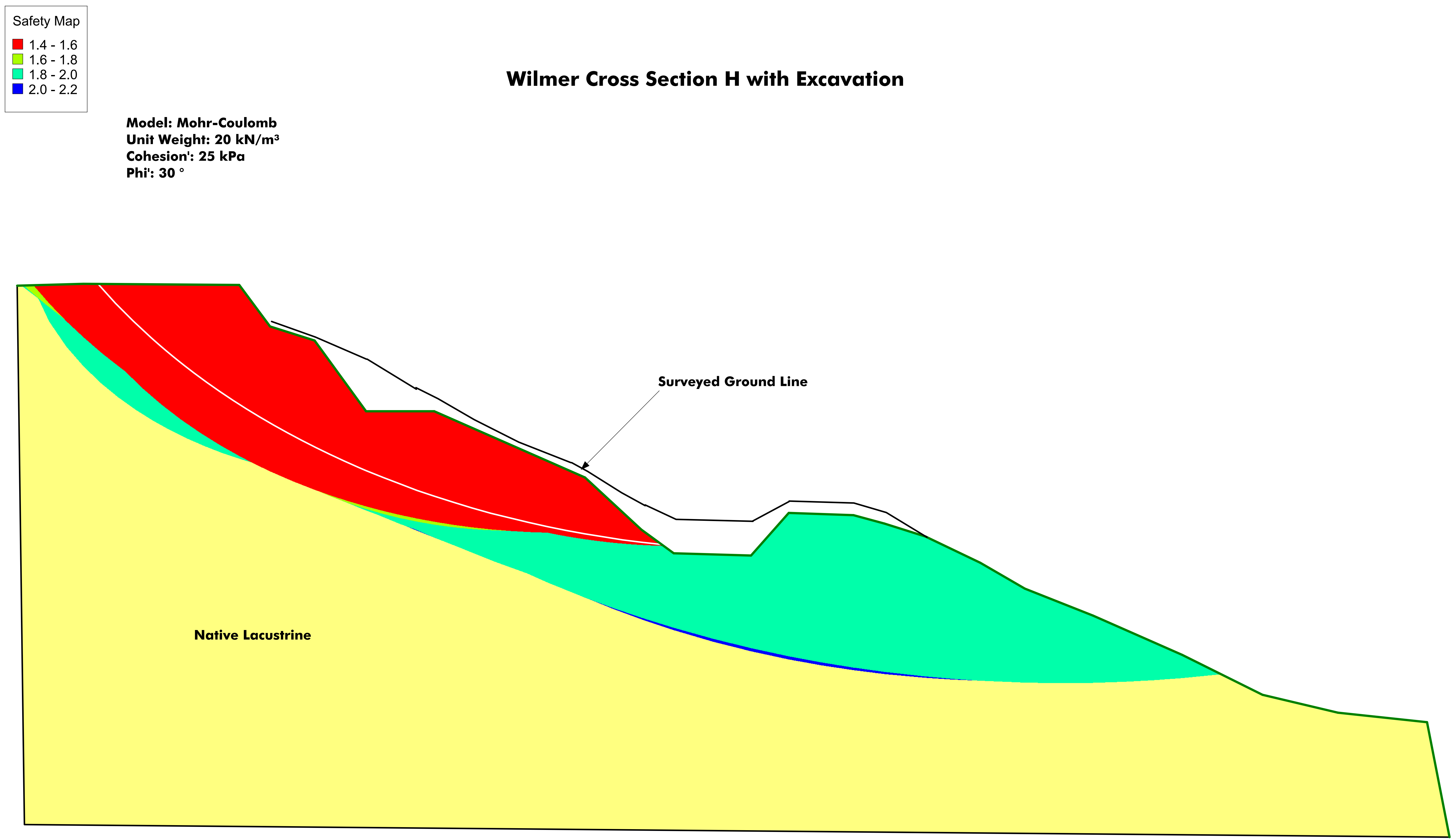

Safety Map
1.4 - 1.8
1.8 - 2.2
2.2 - 2.6
2.6 - 3.0
Wilmer Cross Section F with Excavation
Name: Native Lacustrine
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Surveyed Ground Line
Native Lacustrine

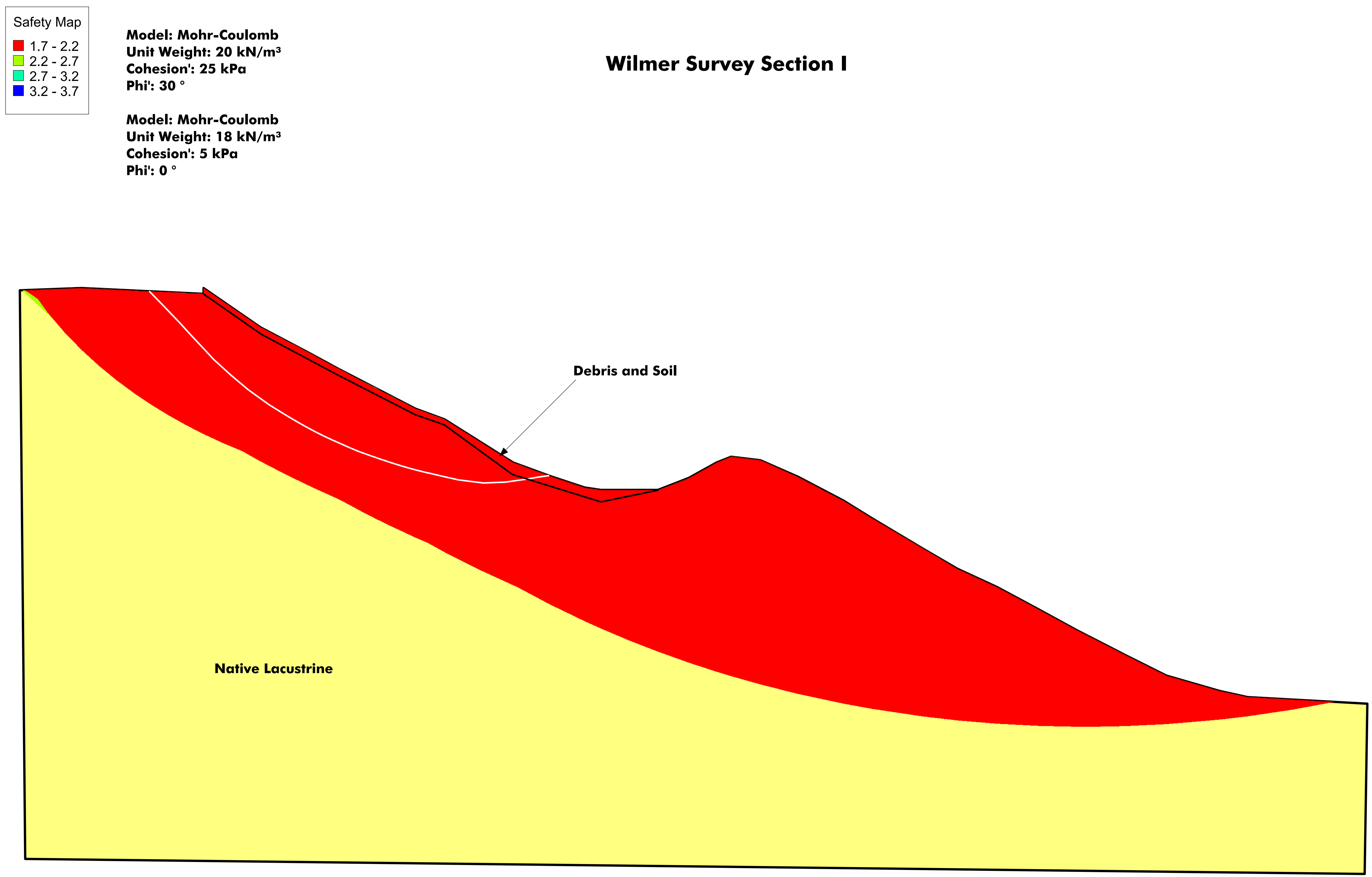


Safety Map
1.4 - 1.8
1.8 - 2.2
2.2 - 2.6
2.6 - 3.0
Name: Native Lacustrine
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Name: Debris
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion': 5 kPa
Phi': 0 °
Wilmer Cross Section G
Debris and Soil
Native Lacustrine

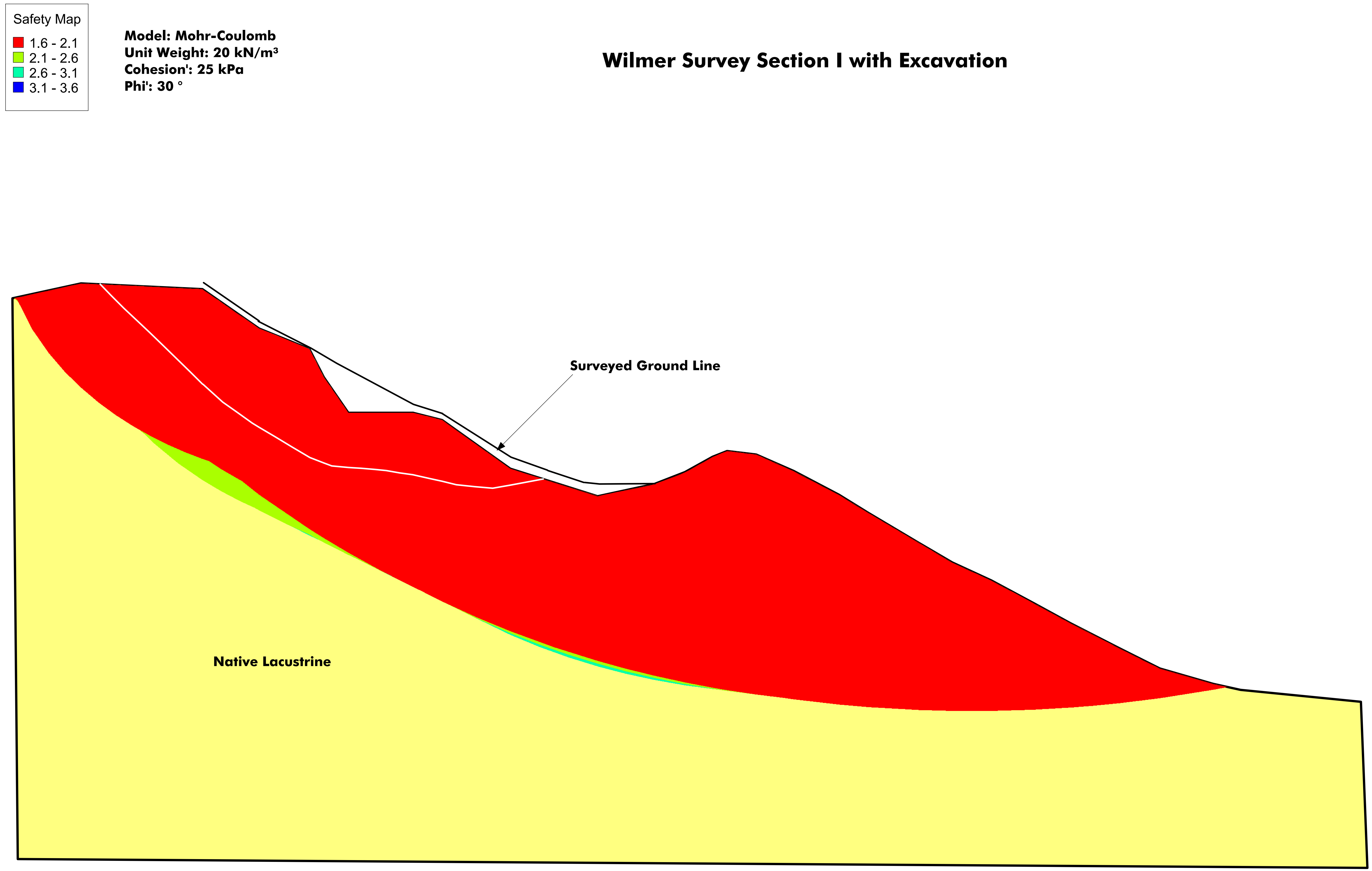

Safety Map
1.4 - 1.8
1.8 - 2.2
2.2 - 2.6
2.6 - 3.0
Wilmer Cross Section G with Excavation
Name: Native Lacustrine
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Surveyed Ground Line
Native Lacustrine


Safety Map
1.5 - 1.7
1.7 - 1.9
1.9 - 2.1
2.1 - 2.3
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion': 5 kPa
Phi': 0 °
Wilmer Cross Section H
Debris and Soil
Native Lacustrine


Safety Map
1.4 - 1.6
1.6 - 1.8
1.8 - 2.0
2.0 - 2.2
Wilmer Cross Section H with Excavation
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Surveyed Ground Line
Native Lacustrine



Safety Map
1.7 - 2.2
2.2 - 2.7
2.7 - 3.2
3.2 - 3.7
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion': 5 kPa
Phi': 0 °
Wilmer Survey Section I
Debris and Soil
Native Lacustrine


Safety Map
1.6 - 2.1
2.1 - 2.6
2.6 - 3.1
3.1 - 3.6
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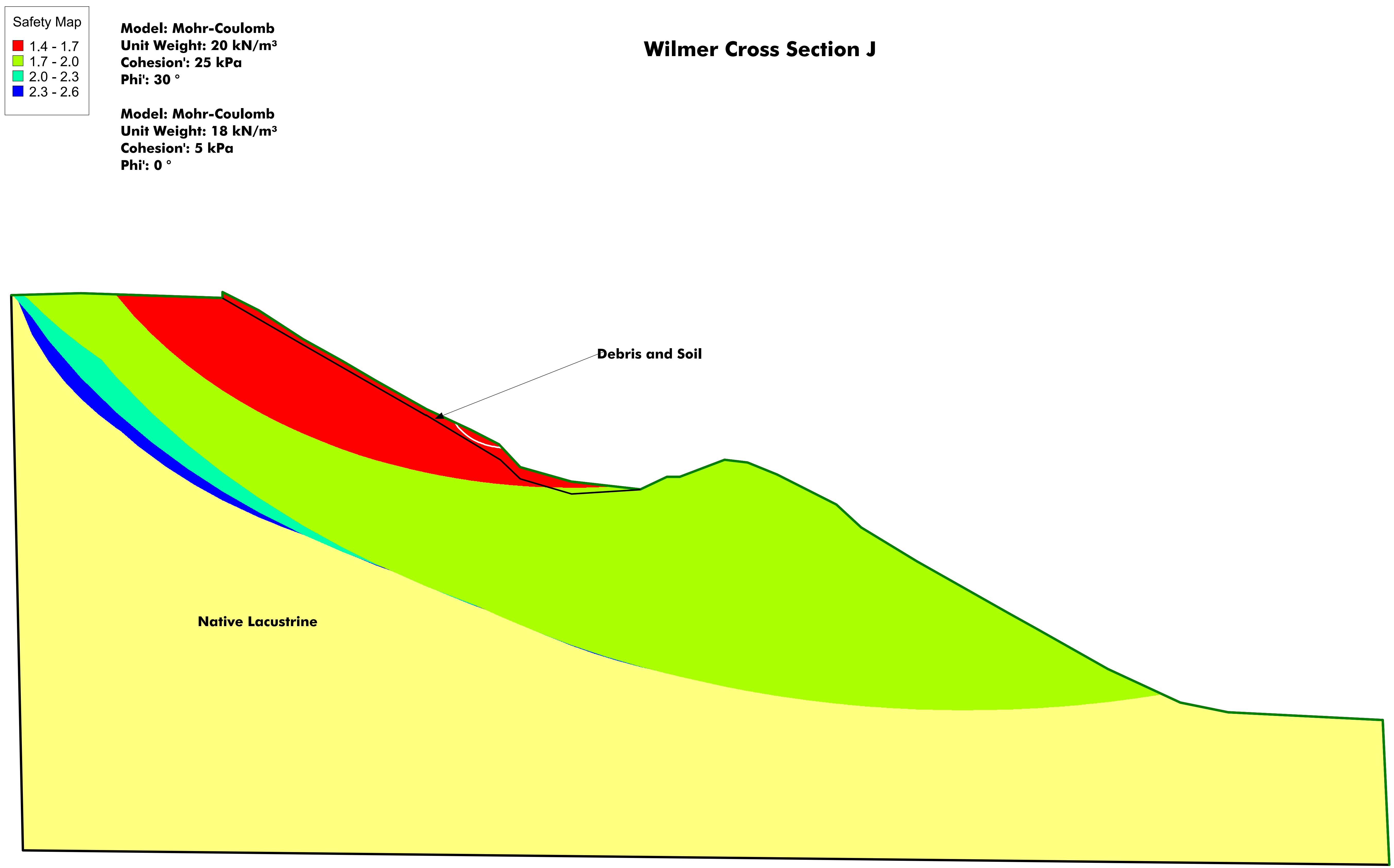
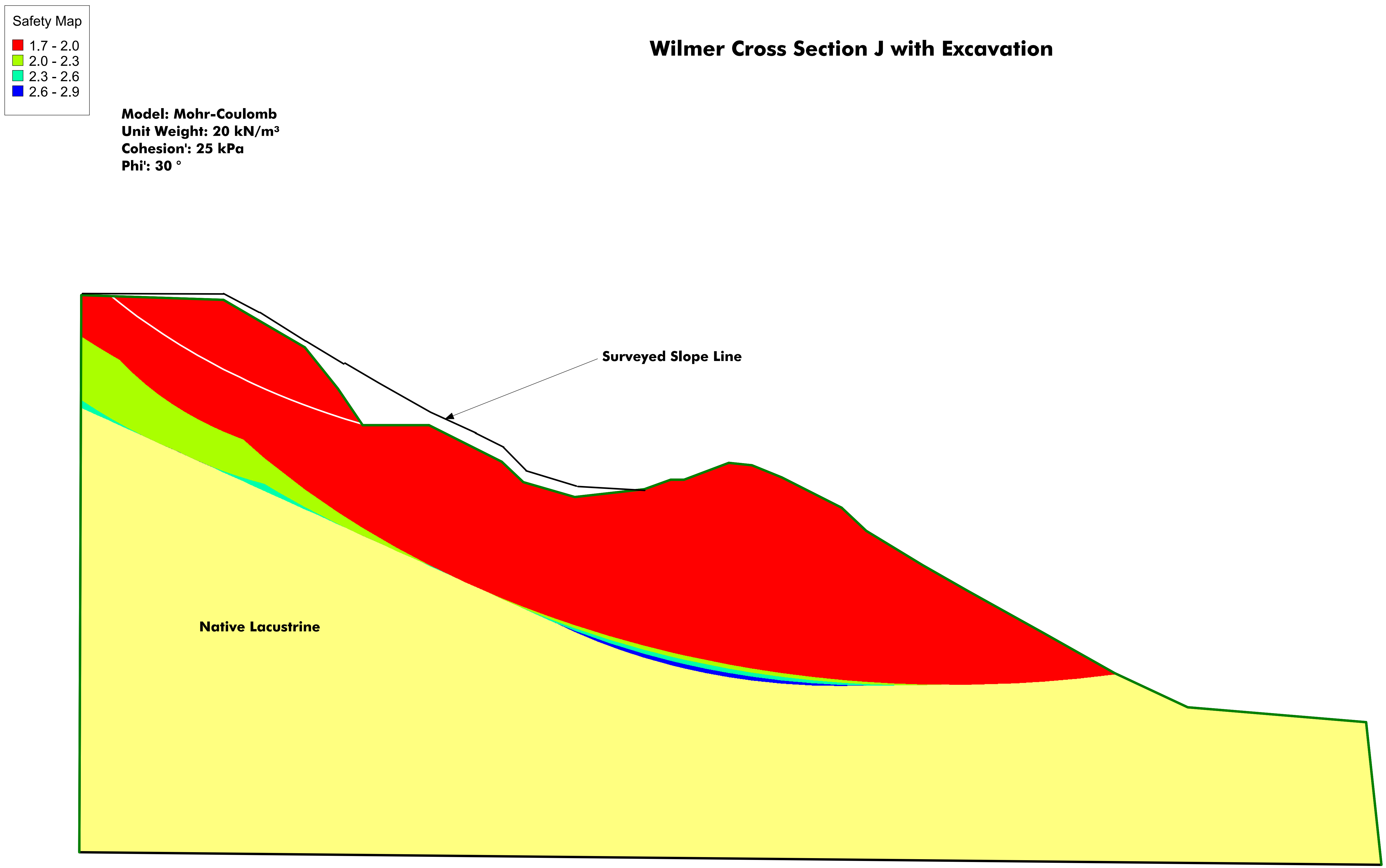
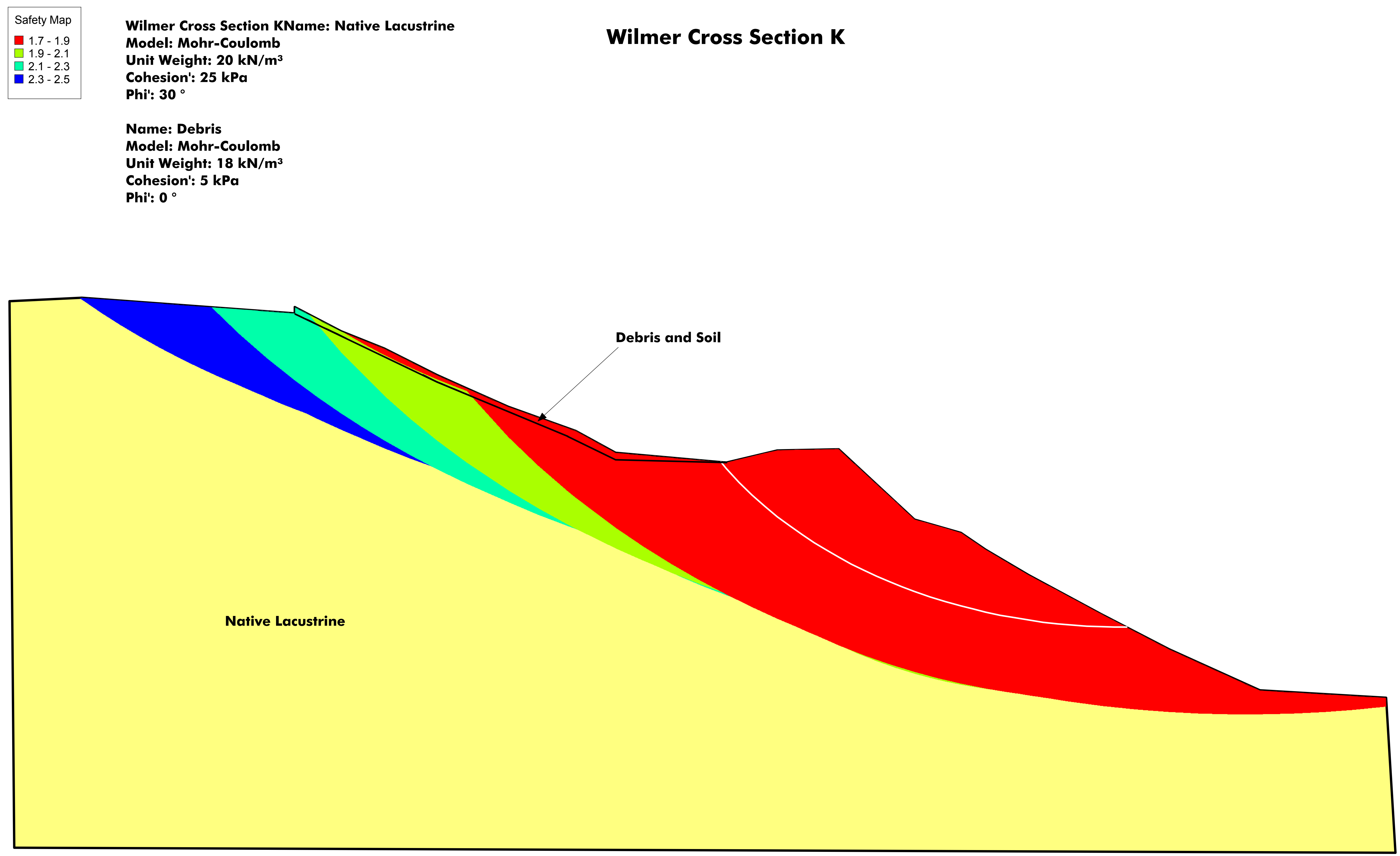
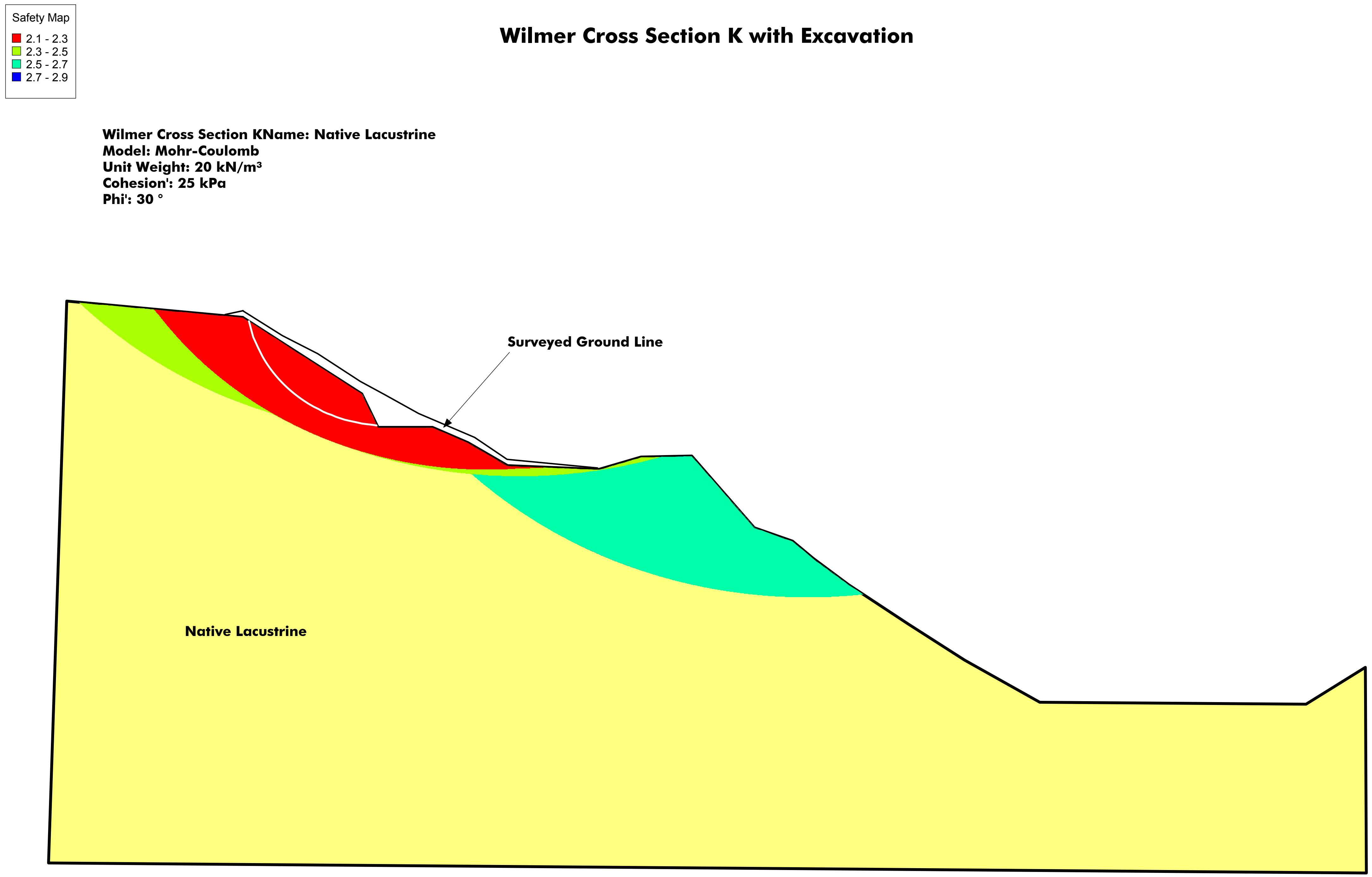
Cohesion': 25 kPa
Phi': 30 °
Wilmer Survey Section I with Excavation
Surveyed Ground Line
Native Lacustrine


Safety Map
1.4 - 1.7
1.7 - 2.0
2.0 - 2.3
2.3 - 2.6
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion': 5 kPa
Phi': 0 °
Wilmer Cross Section J
Debris and Soil
Native Lacustrine


Safety Map
1.7 - 2.0
2.0 - 2.3
2.3 - 2.6
2.6 - 2.9
Wilmer Cross Section J with Excavation
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Surveyed Slope Line
Native Lacustrine


Safety Map
1.7 - 1.9
1.9 - 2.1
2.1 - 2.3
2.3 - 2.5
Wilmer Cross Section KName: Native Lacustrine
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Name: Debris
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion': 5 kPa
Phi': 0 °
Wilmer Cross Section K
Debris and Soil
Native Lacustrine


Safety Map
2.1 - 2.3
2.3 - 2.5
2.5 - 2.7
2.7 - 2.9
Wilmer Cross Section K with Excavation
Wilmer Cross Section KName: Native Lacustrine
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 25 kPa
Phi': 30 °
Surveyed Ground Line
Native Lacustrine

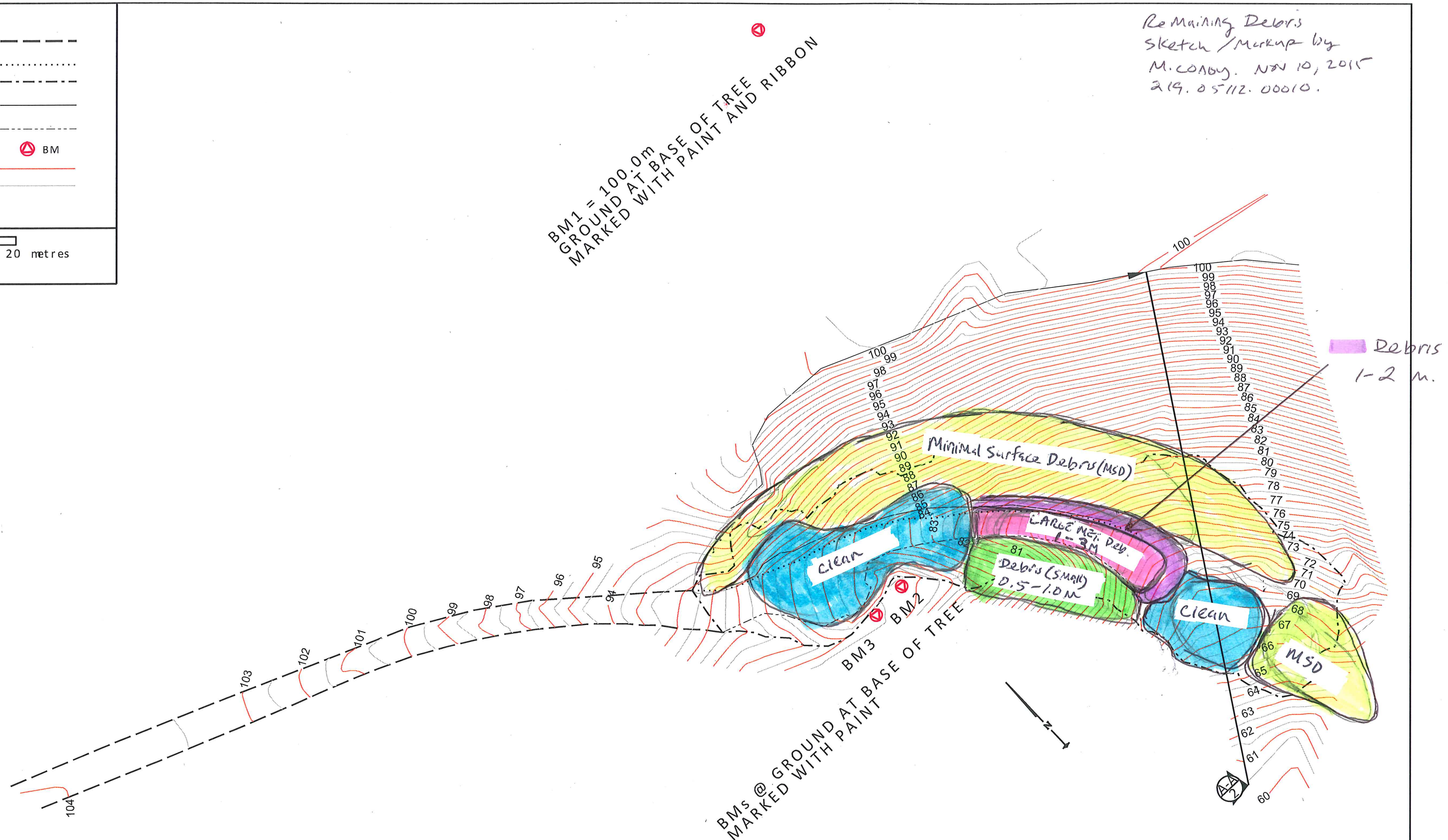
APPENDIX E: SLR MAP SHOWING AREA AND DEPTH OF REMAINING DEBRIS

LEGEND:

ROAD EDGE	
ROAD EDGE (EXCAVATED)	
EDGE OF EXCAVATION	
TOP OF BANK	
TOE OF CUT	
BENCHMARK	BM
1.0m INTERVAL CONTOUR	
0.5m INTERVAL CONTOUR	

0 10 20 metres

SCALE 1 : 500



PLAN SKETCH
SCALE 1:500

VAST RESOURCE SOLUTIONS	ISSUED FOR CONSTRUCTION:	DATE: N/ A	TOPO SURVEY	SHEET 1/2
	REVISION:		15. 0026. 00	BRAUN GEOTECHNICAL LTD.
	ISSUED FOR APPROVAL:	DATE: N/ A	WILMER MARSH	Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada
	REVIEW:	DATE: N/ A	PRE-BACKFILL SURVEY	
	DRAWING: DM	DATE: MAR 06/15		
	DESIGN:	DATE: N/ A		
FILE:15.0026.00_TOPO_SURVEY.S01	FIELD DATA: CR/DM	DATE: MAR 05/15		

October 23, 2015

CGL Project No. 14-0107

SLR Consulting (Canada) Ltd.
1475 Ellis Street, Suite 200
Kelowna, B.C.
V1Y 2A3

Attention: Lindsay Paterson, Project Manager

Dear Ms. Paterson,

RE: Site Inspection and Future Geotechnical Considerations
Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC
(SLR Project No. 219.05112.00010, Task 0005)

On September 21, 2015, Clarke Geoscience Ltd. (CGL) was retained by SLR Consulting (Canada) Ltd. (SLR) to attend a site meeting at the Wilmer Marsh site, located near Invermere, BC. The purpose of the site meeting was to conduct a site inspection and to participate in a video teleconference call to discuss plans for future remediation work at the site.

Site observations are noted below and geotechnical aspects to be considered for planning future excavation work are provided.

Background

A remediation and restoration program was conducted at the former waste site between January and March 2015. During this period, over 3500 tonnes of debris and associated contaminated soil were removed from the site. Due to the slope steepness and the fine-textured glaciolacustrine silts, a geotechnical assessment was conducted prior to undertaking the excavation and on-site geotechnical monitoring was undertaken during the excavation activities.

Due to the potential for slope instability and other project constraints, all debris and soil within the Main Debris Zone could not be removed during the 2015 project period. Further excavation is required to access remaining debris located at the base of the steep silt bluff. Geotechnical considerations for future excavation and recommendations for excavation planning are presented here.

Site Observations

A site inspection was completed on September 21, 2015 by Jennifer Clarke (CGL), together with Lindsay Paterson (SLR) and Kalina Noel (SLR). Site observations are summarized as follows and photographs are attached:

- Following site recontouring, the site was hand-seeded with a native grass seed blend. Grasses (both native and non-native) have germinated across a large part (approx. 50%) of the site, with greater success on north aspects versus south aspects;

- Following seeding, an erosion control blanket (coconut-straw mat; Nilex SC32BD) was installed across exposed soil surfaces. In general, the fabric appears to have functioned well over the first 6 month period;

- It was observed that several panels of erosion control fabric were wind blown, exposing small areas of bare soil. Additional staking on the affected panels, and on panels that appear vulnerable to wind exposure, is recommended to provide additional support; and,

- There was no evidence of erosion occurring underneath the installed fabric. However, there are some areas where the fabric is not in direct contact with the underlying soil due to draping effects on some of the steeper slope sections. For future work, it is noted that the fabric functions best when installed on slopes less than 1H:1V in steepness. Additional staking to improve contact with underlying soils is recommended for the panels that are draping.

Geotechnical Considerations for Future Excavation

Based on observations made during the 2015 excavation program, SLR estimates that approximately 1,230 m^3 of debris and associated soil remains buried. Before the site was regraded and backfilled, the approximate depth and horizontal extent of remaining debris was estimated by SLR. Much of the remaining debris remains embedded into the toe of the north wall and south wall area near the wildlife tree.

To excavate the remaining material, some geotechnical aspects to consider include:

- Based on observed slope instability (tension cracks in north wall of excavation) there is a concern that additional excavation will destabilize the slope;

- To access buried debris along, and at the toe of, the north slope the excavation would likely entail working from the top-down in benches. To access material at the toe, the benches would extend into the top of the slope, resulting in a partial loss of the upper plateau. Detailed excavation planning will be required to ensure site safety and long-term geotechnical stability;

- Excavation along the north slope would disturb existing grass vegetation and, depending on the strategy, it is unclear whether the slope could be revegetated. It is possible that the slope would evolve into a near vertical silt bluff. Restoration planning should include requirements for regrading and/or backfilling.

Recommendations for an Excavation Feasibility Assessment

It is recommended that an excavation feasibility assessment be completed as part of the future works plan. The results of the feasibility assessment would be a useful first step in planning future excavation activity and could be incorporated into the contractor tender specifications.

An excavation feasibility assessment should include:

- A detailed topographic survey of the site (1 m contour interval) and cross-sections across the slope (at least 3) through the proposed excavation section. Surveying may be done using a total station approach, or may be suited to airborne photogrammetry or LiDAR.

- Collect soil samples (at least 5) by hand auger and conduct material testing to obtain parameters for stability analysis (including, but not necessarily limited to, grain size, density, specific weight).

- Complete a slope stability analysis for different excavation scenarios to determine the feasibility and approach for accessing and removing buried debris.

Results from the feasibility assessment would be used in the preparation of a detailed engineered excavation plan, which could be a specified contract requirement. It is recommended that, prior to undertaking the excavation work, an excavation plan be prepared, reviewed, and surveyed prior to any work moving forward. The plan should provide details regarding methodology and approach and should provide limits for safety and for slope stability.

If you have any questions or comments, please do not hesitate to contact the undersigned at 250-826-4367.

Respectfully submitted,

CLARKE GEOSCIENCE LTD.

PROFESSIONAL
PROVINCE
OF
J.A. CLARKE
25319
BRITISH
COLUMBIA
GEOSCIENTIST

Jennifer Clarke

CAC
10/23/15

Jennifer Clarke, M.Sc., P.Geo.
Geotechnical Consultant

Attachments:
Photographs 1 to 2

Photo 1: View of Main Debris Zone to the west from the top of the slope (Sept. 21, 2015)

Photo 2: View of the Main Debris Zone to the west from the bottom of the slope. Note panels of fabric on the south side of the slope that have been wind blown (Sept. 21, 2015)

March 31, 2016

CGL Project No. 15-0105

SLR Consulting (Canada) Ltd.
1475 Ellis Street, Suite 200
Kelowna, B.C.
V1Y 2A3

Attention: Lindsay Paterson, Project Manager

RE: Geotechnical Review Summary
Excavation Feasibility and Slope Stability Assessment
Wilmer Marsh Unit, Columbia National Wildlife Refuge, Wilmer, BC
(SLR Project No. 219.05112.00010, Task 0005)

Dear Ms. Paterson,

Clarke Geoscience Ltd. (CGL) was retained by SLR Consulting (Canada) Ltd. (SLR) to attend a site meeting at the Wilmer Marsh site, located near Invermere, BC. The purpose of the site meeting was to consult with and observe the geotechnical drilling investigation being conducted by VAST Resource Solutions Inc. (VAST), based out of Cranbrook, BC.

CGL provided an on-site presence during the investigation and completed a peer review of the geotechnical analysis and report. A summary of work completed is provided for documentation purposes.

Site Visit

A site visit was completed on February 25, 2016 by Jennifer Clarke (CGL), together with Kalina Noel (SLR), and Evan Kleindienst (VAST). Three other personnel from VAST were present on-site to provide drilling supervision and to conduct topographic surveying. In addition, construction contractor Rick Hardy was on-site to provide opinions regarding excavation approach considerations.

A single borehole was advanced 25 m (82.5 ft) from the top of the terrace near the slope crest. Standard penetration tests were done at intervals and soil samples were collected for lab analysis to assist in determining strength parameters. Groundwater was not encountered during the drilling program.

Summary of Excavation Feasibility and Slope Stability Assessment

Using surveyed topography, borehole data, and analyzed soil strength parameters, VAST completed slope stability analyses for seven (7) cross-sections of the study slope. Post-excavation scenarios used SLR estimates of the extent and depth of remaining debris. With respect to those estimates, an additional area of shallow (0.5 m) debris was extended to the crest of the slope, and 1.0 m depth was added to an area adjacent to the trees, to provide contingency to the post-excavation stability analysis completed by VAST.

The slope stability analysis concludes the following:
- In its existing state, and on a large scale, the slope is considered stable;
- The stability analyses for the existing slope finds that large-scale catastrophic failures are not expected. However, small, shallow debris slides within the remaining unconsolidated debris material are expected to occur in the future;
- Slope stability was analyzed for a post-excavation scenario, where all remaining debris (est. 1,500 m^3) is removed using an approach that assumes the construction of several full-bench trails to access buried debris. This excavation approach will generate an additional estimated 1,000 m^3 of soil for handling and management.
- The post-excavation slope is considered stable. The results indicate that the excavation will not compromise the stability of the slope and that the slope will remain stable on a large-scale.
- By removing the surficial debris, the likelihood of future shallow debris slides is reduced.

Recommendations for future debris removal are provided in the VAST report and include the following main points:
- To access buried debris, excavation should proceed in a top-down approach under the supervision of a Professional Engineer or Geoscientist;
- Detailed engineered excavation plans and site reclamation plans should be prepared for future work;
- Operational safety guidelines for working on or below the steep slopes are provided; and,
- Post-excavation site monitoring and erosion control measures are recommended.

Conclusion
The excavation feasibility and slope stability assessment forms a useful first step in future excavation planning and may be incorporated into contractor tender specification documents.

Once a decision has been made whether to proceed or not, it is recommended that a full excavation plan, approved by a Professional Engineer or Geoscientist, be requested of the selected contractor. Full-bench cuts into the slope were assumed for the feasibility assessment. However, the chosen excavation approach may vary based on the contractors innovation, use of specialized equipment, or ability to manage large volumes of soil. Excavation plans should allow for contingency based on the current uncertainty regarding the volume and extent of debris remaining on site.

Respectfully submitted,

CLARKE GEOSCIENCE LTD.

Jennifer Clarke, M.Sc., P.Geo.
Director

cc. Evan Kleindienst, P.Eng./RPF, VAST Resource Solutions Inc.

17 August 2016

Bradley Klaver - Environmental Specialist
Public Services and Procurement Canada
Environmental Services, Pacific Region
219 – 800 Burrard Street
Vancouver, BC V6Z 0B9

By email: Bradley.Klaver@pwgsc-tpsgc.gc.ca

Project No.: 219.05112.00013

***RE: 2016 TEST PITTING INVESTIGATION
WILMER MARSH UNIT, COLUMBIA NATIONAL WILDLIFE AREA***

SLR Consulting (Canada) Ltd. (SLR) conducted a test pitting program at the historical refuse site in the Wilmer Marsh Unit of the Columbia National Wildlife Area (the Site) on June 28 and 29, 2016. The test pitting program was conducted to confirm depths of debris remaining at targeted locations, thickness of residual debris, and potentially contaminated soil on the northern/upper slope. The program also included collection of soil samples from the proposed excavation area for analysis of typical parameters required by soil disposal facilities. Test pitting was achieved using an all-terrain excavating unit (SPIDEX All-Terrain Excavating) with the geotechnical assistance of Clarke Geoscience Ltd. (CGL). The samples were submitted to Maxxam Analytics (Maxxam) in Calgary, Alberta on June 29, 2016.

The work was completed under the Remediation Consultant Task Authorization Contract (TAC) EZ 897-160027/001/PWY. A permit to conduct the work was obtained from Canadian Wildlife Service (CWS) prior to the work (CWS permit BC-16-0036). Prior to test pitting, SLR conducted environmental monitoring activities to review the Site for presence of species at risk (SAR) and any provincially sensitive species in the vicinity of the field activities. The results of SLR's Environmental Monitor's inspections have been detailed separately in a letter report dated July 13, 2016.

1.0 FIELD OBSERVATIONS

Depth to native soil varied across the slope with the greatest quantities of residual debris overlying native soil located in test pits TP16-12 (approximately 2.5 m of debris and disturbed soil overlying native soil) and TP16-15 (approximately 2.0 m of debris and disturbed soil overlying native soil). A summary of test pit observations and depths to native soil is provided in Table 1 (attached). A test pit location plan is provided as Drawing 1.

On the upper portion of the slope, debris presence was largely minimal but the soils were observed to be disturbed (unconsolidated) and susceptible to surficial failures/slumping upon disturbance. The depths of these disturbed soils on the upper slope varied depending on terrain (evidently deeper where "humps" present on the slope).

The disturbed material noted at TP16-20 is anticipated to reflect the backfilling which occurred in this area following the 2015 remediation program due to geotechnical concerns. Native soil was encountered during the 2015 remedial excavation to the northwest of TP16-20.

The disturbed material noted at TP16-9 and TP16-11 is also anticipated to reflect backfilling which occurred in these areas following the 2015 remediation program. Native soil was encountered during the 2015 remedial excavation to the southeast of TP16-9 and TP16-11.

It is also noted that native soil was encountered along the southern/southwestern extent of the 2015 remedial excavation.

Based on the above assumed boundaries to the extent of debris as well as the depths observed within the test pits, SLR has estimated that the amount of debris and disturbed soil remaining in the trail area overlying the native soil is approximately 1,500 cubic metres. This amount is generally consistent with volumes previously estimated following the 2015 remediation program and with volumes assumed in the completion of the Excavation Feasibility and Slope Stability Assessment completed by VAST Resource Solutions Inc. (VAST) in 2016.

2.0 IN SITU CHEMISTRY RESULTS

Soil samples were collected at select test pits and disturbed soil/fill materials and underlying native soil were analysed for various analytical parameters by Maxxam. The following sections detail the results for the disturbed soil/fill materials and for the underlying native soil samples. The Maxxam lab certificates have been attached for reference.

2.1 Fill Results

The disturbed soil/fill materials were analysed for contaminants of concern (COC) as well as for parameters which are anticipated to be required by potential soil disposal facilities including:

- Benzene, ethylbenzene, toluene, xylenes (BETX)
- Leachable BETX
- Volatile petroleum hydrocarbons (VPH)
- Light and heavy extractable petroleum hydrocarbons (LEPH/HEPH)
- Polycyclic aromatic hydrocarbons (PAH)
- Leachable PAH
- Total metals
- Leachable metals
- pH
- Flash Point
- Paint Filter
- Elemental Sulfur
- Special waste oil and grease (SWOG)

The results for the disturbed soil/fill samples are presented in Tables 2 through 8. Tables 2 through 4 present various results in comparison to the CSR Schedule 7 Column II soil standards (levels considered by the Regional District of East Kootenay to represent non-contaminated soil for disposal at the district's landfills). Tables 5 through 8 present various results in comparison to the Hazardous Waste Regulation standards (levels considered by the local regional district to represent contaminated soil which is prohibited from disposal at the district's landfills).

The analytical results indicate that concentrations of select metals (i.e. cadmium, zinc) exceed the CSR Schedule 7 Column II soil standards; concentrations of other COCs are below the CSR Schedule 7 standards. Concentrations of all parameters are below the Hazardous Waste Regulation standards.

2.2 Native Soil Results

The native soil samples were analysed for COCs including:

- BETX
- Canadian Council of Ministers of the Environment (CCME) Petroleum Hydrocarbon (PHC) Fractions F1 to F4
- PAH
- Total metals
- pH

The results for the native soil samples are presented in Tables 9 through 11 and are presented in comparison to the CCME agricultural land use (AL) soil quality guidelines and the Canada-Wide Standards for Petroleum Hydrocarbons in Soil.

The analytical results indicate that concentrations of metals, petroleum hydrocarbon constituents and polycyclic aromatic hydrocarbons are all below the applicable standards. Multiple samples of the native soil had pH levels exceeding the CCME soil quality guideline; however, based on historical pH data from the area (i.e. background location within the National Wildlife Area) as well as the geologic and climatic setting of the Site, the reported pH levels are expected to represent background conditions.

2.3 Quality Assurance/Quality Control

Two stages of quality assurance and quality control (QA/QC) were completed for the test pitting investigation: one by Maxxam and the other by SLR.

The soil samples were analyzed by Maxxam, a Canadian Association for Laboratory Accreditation recognized laboratory that uses Ministry of Environment recognized methods to conduct laboratory analyses. As conveyed by the laboratory, method blanks, control standards samples, certified reference material standards, method spikes, replicates, duplicates and instrument blanks are routinely analyzed as part of their QA/QC programs. Copies of the laboratory reports have been attached.

QA/QC procedures performed during the field program by SLR included the collection and analysis of blind field duplicates. SLR collected two blind field duplicate soil samples (i.e. Dup 16-1/TP16-7N and Dup 16-2/TP16-18F) to verify the reproducibility of the laboratory analyses and to demonstrate that the field sampling techniques utilized by SLR personnel are capable of yielding reproducible results. The relative percent difference (RPD – the absolute difference between the two values, divided by the mean) of duplicate analyses is used to evaluate the sample result variability. Where the concentration of a parameter is less than five times the laboratory method detection limit, the results are less precise and the RPD is not calculated. If the RPD for a sample and its duplicate do not meet SLR's RPD acceptance criteria for the parameters analyzed, an explanation is required to qualify the difference in values.

The target RPDs for SLR blind field duplicate soil samples are summarized in the table below.

SLR's Blind Field Duplicate RPD Thresholds

Analytes	Soil/Sediment
Petroleum Hydrocarbons	<80%
PAHs	<100%
Metals	<60%

The RPDs for the duplicate soil samples were all within the above acceptance criteria.

3.0 LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SLR for Public Services and Procurement Canada and completed in compliance with Contract Number EZ897-160027/001/PWY. Under the Public Services and Procurement Canada Remediation Consultant TAC Contract Number EZ897-160027/001/PWY), Public Services and Procurement Canada has the exclusive right to copy and redistribute this report.

This report has been prepared for specific application to this site and site conditions existing at the time work for the report was completed. Any conclusions or recommendations made in this report reflect SLR's professional opinion based on limited investigations including: visual observation of the site, surface and subsurface investigation at discrete locations and depths, and laboratory analysis of specific chemical parameters. The results cannot be extended to previous or future site conditions, portions of the site that were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters and materials that were not addressed. Substances other than those addressed by the investigation may exist within the site; and substances addressed by the investigation may exist in areas of the site not investigated in concentrations that differ from those reported. SLR does not warranty information from third party sources used in the development of investigations and subsequent reporting.

Nothing in this report is intended to constitute or provide a legal opinion. SLR expresses no warranty to the accuracy of laboratory methodologies and analytical results. SLR makes no representation as to the requirements of compliance with environmental laws, rules, regulations or policies established by federal, provincial or local government bodies. Revisions to the regulatory standards referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary.

Public Services and Procurement Canada may submit this report to the British Columbia Ministry of Environment and/or related British Columbia or federal environmental regulatory authorities or persons for review and comment purposes.

4.0 CLOSING

If there are any questions or concerns regarding the above, please feel free to contact the undersigned at your convenience.

Yours sincerely,
SLR Consulting (Canada) Ltd.

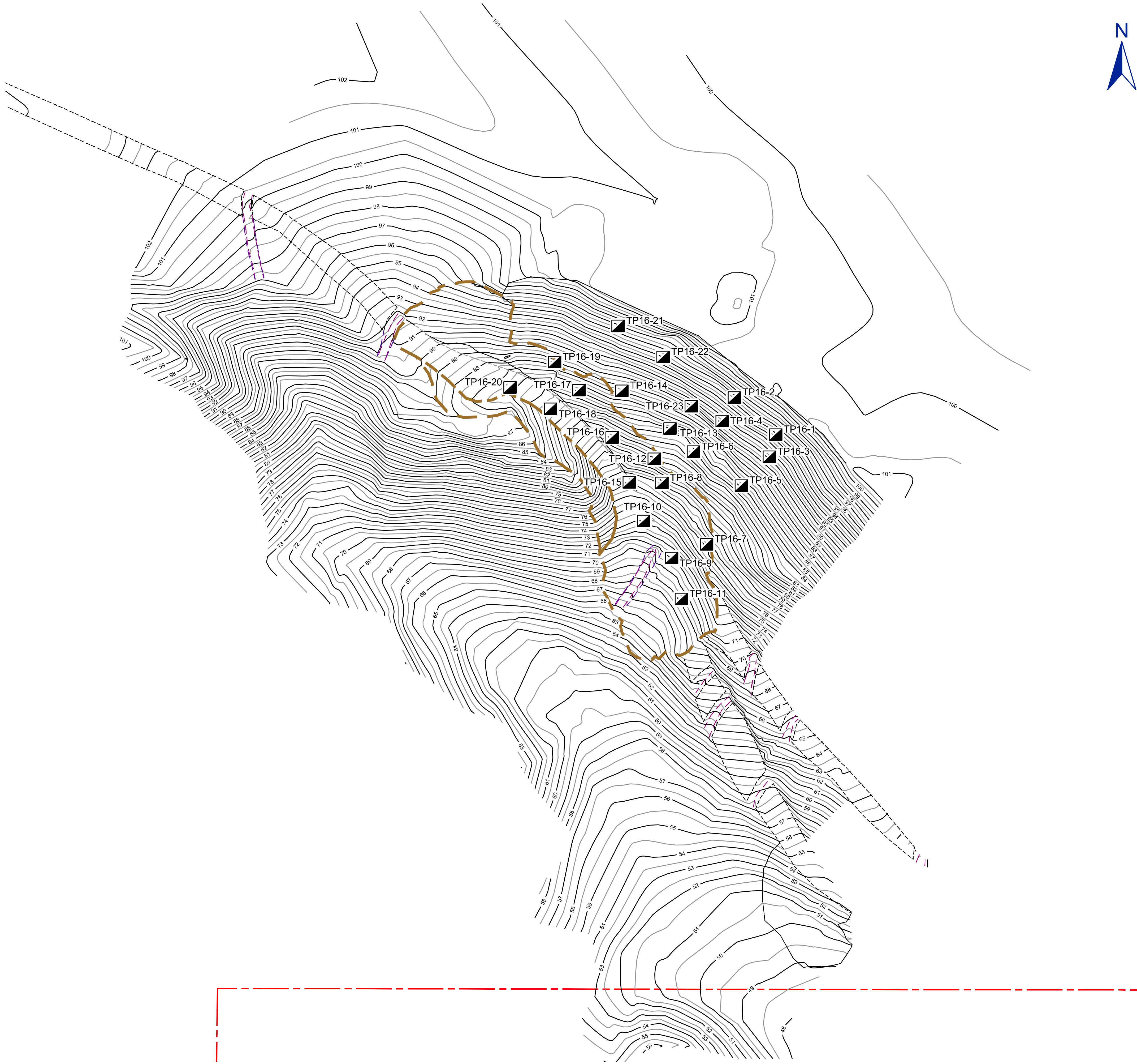
By Email

Lindsay Paterson, MSc, PAg
Soil Scientist

Enc Drawing 1 – Test Pit Location Plan
Tables 1 through 11
Maxxam Laboratory Certificates

LP/lp

219.05112.00013.PWGSC.Wilmer.2016TPresults.Aug2016.docx



NOTES:
REFERENCED FROM: VAST 16.0019.00_2016_TOPO_SURVEY FILES AND SITE RECONNAISSANCE INFORMATION.

LEGEND:

- PROVINCIAL - FEDERAL BOUNDARY
- APPROXIMATE LIMITS OF 2014 - 2015 REMEDIAL EXCAVATION
- TP TEST PIT LOCATION
- ROAD EDGE
- FORMER ROAD EDGE (EXCAVATED)
- TOP OF BANK
- TOE OF CUT
- TOP OF CROSS DITCH
- BOTTOM OF CROSS DITCH
- 100 1.0 m INTERVAL CONTOUR
- 0.5 m INTERVAL CONTOUR

0 5 10 20 30 40 m
SCALE 1:750
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.

PSPC
WILMER MARSH UNIT COLUMBIA NWA
WILMER, BRITISH COLUMBIA

2016 TEST PITTING INVESTIGATION

TEST PIT LOCATION PLAN

Date: August 29, 2016	Drawing No. 1
Project No. 219.05112.00013	

SLR
global environmental solutions

Cadfile name: S_219-05112-00013-A4.dwg

TABLE 1: JUNE 2016 TEST PIT OBSERVATIONS

Location	Northing	Easting	Estimated distance to crest of hill (slope length) (m)	Depth to native soil (m) below surface grade	Test Pit Observations
TP16-1	5600189.46	565936.37	8	0.1	minor debris
TP16-2	5600196.39	565928.64	8	0.25	minor debris
TP16-3	5600185.32	565935.19	14	0-0.5	minor debris
TP16-4	5600192.01	565926.35	13	0.5-0.7	minor debris (depth of fill varies due to humped topography)
TP16-5	5600179.94	565929.95	21	0.2	minor debris
TP16-6	5600186.27	565921	22	0.5-0.7	minor debris
TP16-7	5600168.95	565923.44	38	1.5	debris present
TP16-8	5600180.45	565915.1	34	1.2	debris present
TP16-9	5600166.42	565916.9	45	0-0.2	disturbed soil only
TP16-10	5600173.34	565911.68	43	0.7-0.8	debris present
TP16-11	5600158.77	565918.73	46	0.3	disturbed soil only
TP16-12	5600184.94	565913.66	28	2.5	extensive debris, particularly at 1.2-2.5 m depth
TP16-13	5600190.61	565916.61	21	1.3	disturbed soil mainly, limited debris
TP16-14	5600197.66	565907.62	21	1.2	disturbed soil, minor debris
TP16-15	5600180.56	565909	36	2	extensive debris present, but less than TP16-12
TP16-16	5600188.94	565905.79	32	1-1.2	debris present
TP16-17	5600197.79	565899.61	23	1	disturbed soil mainly, limited debris
TP16-18	5600194.28	565894.28	28	1.2	disturbed soil and debris present
TP16-19	5600203.01	565895.04	18	0.8	disturbed soil, very little debris
TP16-20	5600198.27	565886.7	26	1.5	disturbed soil, limited debris, 2015 backfill of gully
TP16-21	5600209.76	565906.91	5	0.9	disturbed soil, minor debris
TP16-22	5600203.96	565915.32	10	0.2	disturbed soil, minor debris
TP16-23	5600194.77	565920.59	15	0.5-1.3	depth variation due to slumping of fill soils into humps on slope (native is 0.5 m from surrounding grade but 1.3 m from grade of hump).

TABLE 2: SOIL ANALYTICAL RESULTS - METALS PARAMETERS (mg/kg)

Sample ID	Date	pH	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium (total)	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Tin	Uranium	Vanadium	Zinc
TP16-7F	28-Jun-2016	8.14	< 0.50	5.8	100	< 0.40	0.12	13	7.4	15	12	< 0.050	< 0.40	17	< 0.50	< 0.20	< 0.10	1.1	0.41	9.6	45
TP16-8F	28-Jun-2016	8.23	0.63	6.3	120	< 0.40	0.51	17	7.8	20	47	< 0.050	0.69	20	< 0.50	< 0.20	< 0.10	7.3	0.50	9.7	110
TP16-10F	28-Jun-2016	7.98	1.7	11	210	< 0.40	**2.7**	33	11	46	96	< 0.050	2.1	33	< 0.50	< 0.20	< 0.10	18	0.49	13	**640**
TP16-12F	28-Jun-2016	8.03	0.91	6.3	130	< 0.40	0.83	18	8.3	28	48	< 0.050	0.65	23	< 0.50	< 0.20	< 0.10	9.4	0.49	10	**420**
TP16-15F	28-Jun-2016	8.15	< 0.50	5.7	73	< 0.40	0.17	15	7.6	14	10	< 0.050	< 0.40	19	< 0.50	< 0.20	< 0.10	< 1.0	0.38	9.6	50
TP16-16F	28-Jun-2016	8.78	< 0.50	5.7	96	< 0.40	0.062	15	7.8	13	7.8	< 0.050	< 0.40	19	< 0.50	< 0.20	< 0.10	< 1.0	0.66	9.9	36
TP16-18F	28-Jun-2016	8.39	0.50	5.3	98	< 0.40	0.19	15	7.9	17	16	< 0.050	0.43	19	< 0.50	< 0.20	< 0.10	1.1	0.52	9.7	69
DUP16-2 (DUP TP16-18F)	28-Jun-2016	8.26	< 0.50	5.3	96	< 0.40	0.24	15	7.7	17	15	< 0.050	< 0.40	18	< 0.50	< 0.20	< 0.10	1.3	0.47	9.8	77
TP16-20F	29-Jun-2016	8.32	< 0.50	5.8	79	< 0.40	0.056	18	8.8	15	8.3	< 0.050	0.41	22	< 0.50	< 0.20	< 0.10	< 1.0	0.68	11	43
CSR NL		ns	20	15	400	4	1.5	60	50	90	100	15	10	100	3	20	ns	50	16	200	150
RPD (%)																					
DUP16-2 (DUP TP16-18F)	28-Jun-2016	2	nc	0	2	nc	nc	0	3	0	6	nc	nc	5	nc	nc	nc	nc	nc	1	11

Notes:
mg/kg - milligrams per dry kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
DUP - blind field duplicate
RPD (%) - relative percent difference; maximum acceptable difference is 60%
nc - RPD not calculated for non-detect results or results within 5x of the detection limit
Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land

TABLE 3: SOIL ANALYTICAL RESULTS - PETROLEUM HYDROCARBON CONSTITUENTS AND MTBE (mg/kg)

Sample ID	Date	Benzene	Ethylbenzene	Toluene	Xylenes	Total BTEX	VPHs	LEPHs	HEPHs
TP16-7F	28-Jun-2016	< 0.015	< 0.030	< 0.060	< 0.040	< 0.15	<21	< 100	< 100
TP16-8F	28-Jun-2016	< 0.015	< 0.030	< 0.060	< 0.040	<0.15	<21	< 100	< 100
TP16-10F	28-Jun-2016	< 0.015	< 0.030	< 0.060	< 0.040	<0.15	<21	< 100	< 100
TP16-12F	28-Jun-2016	< 0.015	< 0.030	< 0.060	< 0.040	<0.15	<21	< 100	< 100
TP16-15F	28-Jun-2016	< 0.015	< 0.030	< 0.060	< 0.040	<0.15	<21	< 100	< 100
TP16-16F	28-Jun-2016	< 0.015	< 0.030	< 0.060	< 0.040	<0.15	<21	< 100	< 100
TP16-18F	28-Jun-2016	< 0.015	< 0.030	< 0.060	< 0.040	<0.15	< 21	< 100	< 100
DUP16-2 (DUP TP16-18F)	28-Jun-2016	< 0.015	< 0.030	< 0.060	< 0.040	<0.15	< 21	< 100	< 100
TP16-20F	29-Jun-2016	< 0.015	< 0.030	< 0.060	< 0.040	<0.15	< 21	< 100	< 100
CSR NL		0.04	1	1.5	5	1000*	200	1000	1000
RPD (%)									
DUP16-2 (DUP TP16-18F)	28-Jun-2016	nc	nc	nc	nc	nc	nc	nc	nc

Notes:
mg/kg - milligrams per kilogram
HSVL (ppmv) - headspace vapour level (parts per million by volume)
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
VPHs - volatile petroleum hydrocarbons (C6-10), excluding benzene, ethylbenzene, toluene, xylenes
EPHs - extractable petroleum hydrocarbons
LEPHs - light extractable petroleum hydrocarbons (C10-19), excluding specific polycyclic aromatic hydrocarbon parameters
HEPHs - heavy extractable petroleum hydrocarbons (C19-32), excluding specific polycyclic aromatic hydrocarbon parameters
ns - no standard listed
DUP - blind field duplicate
RPD (%) - relative percent difference; maximum acceptable difference is 80%
nc - RPD not calculated for non-detect results or results within 5x of the detection limit
Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land
* - Regional District of East Kootenay level above which soil is prohibited for disposal at the district's landfills

TABLE 4: SOIL ANALYTICAL RESULTS - PAH PARAMETERS (mg/kg)

Sample ID	Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b&j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene
TP16-7F	28-Jun-2016	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.010	< 0.010
TP16-8F	28-Jun-2016	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.013	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.010	< 0.010
TP16-10F	28-Jun-2016	< 0.010	< 0.010	< 0.010	0.012	< 0.010	0.013	< 0.020	< 0.010	0.014	< 0.020	0.021	< 0.010	< 0.020	< 0.010	< 0.010	0.026	0.021
TP16-12F	28-Jun-2016	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.010	< 0.010
TP16-15F	28-Jun-2016	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.010	< 0.010
TP16-16F	28-Jun-2016	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.010	< 0.010
TP16-18F	28-Jun-2016	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.010	< 0.010
DUP16-2 (DUP TP16-18F)	28-Jun-2016	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.010	< 0.010
TP16-20F	29-Jun-2016	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	< 0.010	< 0.010
CSR NL		ns	ns	ns	1	1	1	ns	1	ns	1	ns	ns	1	ns	5	5	10
RPD (%)																		
DUP16-2 (DUP TP16-18F)	28-Jun-2016	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

Notes:
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
DUP - blind field duplicate
RPD (%) - relative percent difference; maximum acceptable difference is 100%
nc - RPD not calculated for non-detect results or results within 5x of the detection limit
Exceeds CSR NL: BC Contaminated Sites Regulation, Schedule 7, Standards Triggering Contaminated Soil Relocation Agreements, Soil Relocation to Nonagricultural Land

TABLE 5: LEACHATE ANALYTICAL RESULTS - METALS PARAMETERS (mg/L)

Sample ID	Date	pH	Antimony Leachable	Arsenic Leachable	Barium Leachable	Beryllium Leachable	Boron Leachable	Cadmium Leachable	Chromium Leachable	Cobalt Leachable	Copper Leachable	Iron Leachable	Lead Leachable	Mercury Leachable	Nickel Leachable	Selenium Leachable	Silver Leachable	Thallium Leachable	Uranium Leachable	Vanadium Leachable	Zinc Leachable
TP16-7F	28-Jun-2016	8.14	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.10	< 0.50	< 1.0	< 1.0	4.6	< 0.50	< 0.020	< 0.50	< 0.10	< 0.50	< 0.50	< 0.20	< 1.0	< 1.0
TP16-8F	28-Jun-2016	8.23	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.10	< 0.50	< 1.0	< 1.0	4.9	< 0.50	< 0.020	< 0.50	< 0.10	< 0.50	< 0.50	< 0.20	< 1.0	1.4
TP16-10F	28-Jun-2016	7.98	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.10	< 0.50	< 1.0	< 1.0	9.9	< 0.50	< 0.020	< 0.50	< 0.10	< 0.50	< 0.50	< 0.20	< 1.0	2.9
TP16-12F	28-Jun-2016	8.03	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.10	< 0.50	< 1.0	< 1.0	10	< 0.50	< 0.020	< 0.50	< 0.10	< 0.50	< 0.50	< 0.20	< 1.0	2.4
TP16-15F	28-Jun-2016	8.15	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.10	< 0.50	< 1.0	< 1.0	9.6	< 0.50	< 0.020	< 0.50	< 0.10	< 0.50	< 0.50	< 0.20	< 1.0	< 1.0
TP16-16F	28-Jun-2016	8.78	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.10	< 0.50	< 1.0	< 1.0	10	< 0.50	< 0.020	< 0.50	< 0.10	< 0.50	< 0.50	< 0.20	< 1.0	< 1.0
TP16-18F	28-Jun-2016	8.39	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.10	< 0.50	< 1.0	< 1.0	4.8	< 0.50	< 0.020	< 0.50	< 0.10	< 0.50	< 0.50	< 0.20	< 1.0	< 1.0
DUP16-2 (DUP TP16-18F)	28-Jun-2016	8.26	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.10	< 0.50	< 1.0	< 1.0	4.8	< 0.50	< 0.020	< 0.50	< 0.10	< 0.50	< 0.50	< 0.20	< 1.0	1.1
TP16-20F	29-Jun-2016	8.32	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.10	< 0.50	< 1.0	< 1.0	9.6	< 0.50	< 0.020	< 0.50	< 0.10	< 0.50	< 0.50	< 0.20	< 1.0	< 1.0
HWR		ns	ns	2.5	100	ns	500	0.5	5	ns	100	ns	5	0.1	ns	1	5	ns	10	ns	500
RPD (%)																					
DUP16-2 (DUP TP16-18F)	28-Jun-2016	2	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

Notes:
mg/L - milligrams per liter
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
DUP - blind field duplicate
RPD (%) - relative percent difference; maximum acceptable difference is 60%
nc - RPD not calculated for non-detect results or results within 5x of the detection limit
Exceeds HWR: Table 1: Leachate Quality Standards in the Hazardous Waste Regulation

TABLE 6: LEACHATE ANALYTICAL RESULTS - PAH PARAMETERS (µg/L)

Sample ID	Date	Acenaphthene Leachable	Acenaphthylene Leachable	Acridine Leachable	Anthracene Leachable	Benzo(a)anthracene Leachable	Benzo(a)pyrene Leachable	Benzo(b&j)fluoranthene Leachable	Benzo(g,h,i)perylene Leachable	Benzo(k)fluoranthene Leachable	Chrysene Leachable	Dibenzo(a,h)anthracene Leachable	Fluoranthene Leachable	Fluorene Leachable	Indeno(1,2,3-c,d)pyrene Leachable	2-Methylnaphthalene Leachable	Naphthalene Leachable	Phenanthrene Leachable	Pyrene Leachable	Quinoline Leachable
TP16-7F	28-Jun-2016	<0.1	<0.1	<0.2	<0.05	<0.05	<0.05	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.2
TP16-8F	28-Jun-2016	<0.1	<0.1	<0.2	<0.05	<0.05	<0.05	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.2
TP16-10F	28-Jun-2016	<0.1	<0.1	<0.2	<0.05	<0.05	<0.05	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.2
TP16-12F	28-Jun-2016	<0.1	<0.1	<0.2	<0.05	<0.05	<0.05	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.2
TP16-15F	28-Jun-2016	<0.1	<0.1	<0.2	<0.05	<0.05	<0.05	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.2
TP16-16F	28-Jun-2016	<0.1	<0.1	<0.2	<0.05	<0.05	<0.05	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.2
TP16-18F	28-Jun-2016	<0.1	<0.1	<0.2	<0.05	<0.05	<0.05	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.2
DUP16-2 (DUP TP16-18F)	28-Jun-2016	<0.1	<0.1	<0.2	<0.05	<0.05	<0.05	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.2
TP16-20F	29-Jun-2016	<0.1	<0.1	<0.2	<0.05	<0.05	<0.05	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.2
HWR		ns	ns	ns	ns	ns	1	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
RPD (%)																				
DUP16-2 (DUP TP16-18F)	28-Jun-2016	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

Notes:
µg/L - micrograms per litre
PAH - polycyclic aromatic hydrocarbons
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
DUP - blind field duplicate
RPD (%) - relative percent difference; maximum acceptable difference is 100%
nc - RPD not calculated for non-detect results or results within 5x of the detection limit
Exceeds HWR: Table 1: Leachate Quality Standards in the Hazardous Waste Regulation

TABLE 7: LEACHATE ANALYTICAL RESULTS - PETROLEUM HYDROCARBON CONSTITUENTS AND MTBE (mg/L)

Sample ID	Date	Benzene Leachable	Ethylbenzene Leachable	Toluene Leachable	m,p-Xylene Leachable	o-Xylene Leachable	Xylene Leachable	MTBE
TP16-7F	28-Jun-2016	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	---
TP16-8F	28-Jun-2016	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	---
TP16-10F	28-Jun-2016	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	---
TP16-12F	28-Jun-2016	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	---
TP16-15F	28-Jun-2016	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	---
TP16-16F	28-Jun-2016	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	---
TP16-18F	28-Jun-2016	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	< 0.30
DUP16-2 (DUP TP16-18F)	28-Jun-2016	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	< 0.30
TP16-20F	29-Jun-2016	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	< 0.30
HWR		0.5	0.24	2.4	ns	ns	30	ns
RPD (%)								
DUP16-2 (DUP TP16-18F)	28-Jun-2016	nc	nc	nc	nc	nc	nc	nc

Notes:
mg/L - milligrams per litre
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
MTBE - methyl tertiary-butyl ether
ns - no standard listed
DUP - blind field duplicate
RPD (%) - relative percent difference; maximum acceptable difference is 80%
nc - RPD not calculated for non-detect results or results within 5x of the detection limit
Exceeds HWR: Table 1: Leachate Quality Standards in the Hazardous Waste Regulation

TABLE 8: SOIL ANALYTICAL RESULTS - GENERAL WASTE PARAMETERS

Sample ID	Date	Closed Cup Flash Point (°C)	Free Liquid	Elemental Sulphur (mg/kg)	Soluble (1:1) pH	Leachable Initial pH of Sample	Leachable pH after HCl	Leachable Final pH of Leachate	Hazardous Waste Oil (%)
TP16-7F	28-Jun-2016	>61	Pass	<100	8.14	9.40	3.80	6.29	<0.50
TP16-8F	28-Jun-2016	>61	Pass	<100	8.23	9.63	4.72	6.32	<0.50
TP16-10F	28-Jun-2016	>61	Pass	170	7.98	9.30	4.61	6.61	<0.50
TP16-12F	28-Jun-2016	>61	Pass	<100	8.03	9.13	2.93	6.20	<0.50
TP16-15F	28-Jun-2016	>61	Pass	140	8.15	9.31	2.51	6.19	<0.50
TP16-16F	28-Jun-2016	>61	Pass	<100	8.78	9.50	2.93	6.18	<0.50
TP16-18F	28-Jun-2016	>61	Pass	<100	8.39	9.57	2.97	6.30	<0.50
DUP16-2 (DUP TP16-18F)	28-Jun-2016	>61	Pass	<100	8.26	9.38	3.72	6.30	<0.50
TP16-20F	29-Jun-2016	>61	Pass	100	8.32	9.40	3.31	6.26	<0.50
HWR		> 75*	Pass*	500*	>2.0 and < 12.5*	ns	ns	ns	3
DUP16-2 (DUP TP16-18F)	28-Jun-2016	nc	nc	nc	2	2	22	0	nc

Notes:
mg/kg - milligrams per kilogram
°C - degrees celcius
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
DUP - blind field duplicate
nc - RPD not calculated for non-detect results or results within 5x of the detection limit
Exceeds HWR: Table 1: Leachate Quality Standards in the Hazardous Waste Regulation
* - Regional District of East Kootenay level above which soil is prohibited for disposal at the district's landfills

TABLE 9: SOIL ANALYTICAL RESULTS - PETROLEUM HYDROCARBON CONSTITUENTS (mg/kg)

Sample ID	Date	Depth (m)	Benzene	Ethylbenzene	Toluene	Xylenes	F1 (C6-10)	F2 (C10-16)	F3 (C16-34)	F4 (C34-50+)
TP16-7N	28-Jun-2016	1.5	< 0.013	< 0.025	< 0.050	< 0.10	31	< 10	< 50	< 50
DUP16-1 (DUP TP16-7N)	28-Jun-2016	1.5	< 0.013	< 0.025	< 0.050	< 0.10	< 30	< 10	< 50	< 50
TP16-8N	28-Jun-2016	1.2	< 0.013	< 0.025	< 0.050	< 0.10	< 30	< 10	< 50	< 50
TP16-10N	28-Jun-2016	0.8	< 0.013	< 0.025	< 0.050	< 0.10	< 30	< 10	< 50	< 50
TP16-12N	28-Jun-2016	2.5	< 0.013	< 0.025	< 0.050	< 0.10	< 30	< 10	< 50	< 50
TP16-15N	28-Jun-2016	2	< 0.013	< 0.025	< 0.050	< 0.10	< 30	< 10	< 50	< 50
TP16-16N	28-Jun-2016	1.2	< 0.013	< 0.025	< 0.050	< 0.10	< 30	< 10	< 50	< 50
TP16-18N	28-Jun-2016	1.2	< 0.0050	< 0.010	< 0.020	< 0.040	< 12	< 10	< 50	< 50
TP16-20N	29-Jun-2016	1.5	< 0.018	< 0.036	< 0.072	< 0.14	< 43	< 10	< 50	< 50
CCME ALfgs			0.0068	0.018	0.08	2.4	ns	ns	ns	ns
CCME ALml			ns	ns	ns	ns	800	1000	3500	10000
CCME ALescf			ns	ns	ns	ns	210	150	1300	5600
CCME ALgwf			ns	ns	ns	ns	170	230	ns	ns
CCME ALvsf			ns	ns	ns	ns	610	3100	ns	ns
CCME ALvbf			ns	ns	ns	ns	710	3600	ns	ns
CCME ALdcf			ns	ns	ns	ns	12000	6800	15000	21000
RPD (%)										
DUP16-1 (DUP TP16-7N)	28-Jun-2016	1.5	nc	nc	nc	nc	nc	nc	nc	nc

Notes:
m - metres
mg/kg - milligrams per kilogram
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
F1 (C6-C10) excludes BTEX - benzene, toulene, ethylybenzene, xylene
MTBE - methyl tert-butyl ether
ns - no standard listed
DUP - blind field duplicate
RPD (%) - relative percent difference; maximum acceptable difference is 80%
nc - RPD not calculated for non-detect results or results within 5x of the detection limit
Exceeds CCME ALfgs: CCME Canadian Soil Quality Guidelines for BTEX, Agricultural Fine-grained Subsoil (10-5 incremental risk guideline)
Exceeds CCME ALml: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Management Limit
Exceeds CCME ALescf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Eco Soil Contact
Exceeds CCME ALgwf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Protection of Potable GW
Exceeds CCME ALvsf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Vapour Inhalation (indoor, slab-on-grade)
Exceeds CCME ALvbf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Vapour Inhalation (indoor, basement)
Exceeds CCME ALdcf: CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, Tier 1 Levels for PHC fractions(F1-F4) for Agricultural Fine-grained surface soil, Direct Contact

TABLE 10: SOIL ANALYTICAL RESULTS - METALS PARAMETERS (mg/kg)

Sample ID	Date	Depth (m)	pH	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium (total)	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Tin	Uranium	Vanadium	Zinc
TP16-7N	28-Jun-2016	1.5	**8.66**	< 0.50	6.5	110	< 0.40	0.068	17	9.5	15	9.6	< 0.050	0.45	22	< 0.50	< 0.20	< 0.10	< 1.0	0.85	11	39
DUP16-1 (DUP TP16-7N)	28-Jun-2016	1.5	**8.82**	< 0.50	6.3	98	< 0.40	0.068	16	9.0	15	9.0	< 0.050	< 0.40	21	< 0.50	< 0.20	< 0.10	< 1.0	0.72	10	38
TP16-8N	28-Jun-2016	1.2	**9.15**	< 0.50	5.2	87	< 0.40	0.070	16	8.4	13	8.4	< 0.050	< 0.40	20	< 0.50	< 0.20	< 0.10	< 1.0	0.51	10	41
TP16-10N	28-Jun-2016	0.8	**8.45**	< 0.50	6.3	84	< 0.40	0.057	16	9.2	15	8.6	< 0.050	< 0.40	21	< 0.50	< 0.20	< 0.10	< 1.0	0.47	11	39
TP16-12N	28-Jun-2016	2.5	**8.02**	< 0.50	6.2	75	< 0.40	0.082	21	10	15	9.0	< 0.050	0.43	26	< 0.50	< 0.20	< 0.10	< 1.0	0.57	13	49
TP16-15N	28-Jun-2016	2	**8.49**	< 0.50	6.3	62	< 0.40	0.058	17	8.8	15	8.5	< 0.050	< 0.40	22	< 0.50	< 0.20	< 0.10	< 1.0	0.43	11	40
TP16-16N	28-Jun-2016	1.2	7.92	< 0.50	5.7	73	< 0.40	< 0.050	18	8.8	14	8.2	< 0.050	< 0.40	22	< 0.50	< 0.20	< 0.10	< 1.0	0.53	11	43
TP16-18N	28-Jun-2016	1.2	**9.16**	< 0.50	5.4	83	< 0.40	0.055	14	7.3	13	7.5	< 0.050	< 0.40	17	< 0.50	< 0.20	< 0.10	< 1.0	0.57	8.9	34
TP16-20N	29-Jun-2016	1.5	**8.19**	< 0.50	5.5	87	< 0.40	0.055	15	8.0	15	7.7	< 0.050	< 0.40	19	< 0.50	< 0.20	< 0.10	< 1.0	0.52	10	36
CCME AL			>6<8	20	12	750	4	1.4	64	40	63	70	6.6	5	45	1	20	1	5	23	130	200
RPD (%)																						
DUP16-1 (DUP TP16-7N)	28-Jun-2016	1.5	2	nc	3	4	nc	nc	6	5	0	6	nc	nc	5	nc	nc	nc	nc	nc	10	3

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
DUP - blind field duplicate
RPD (%) - relative percent difference; maximum acceptable difference is 60%
nc - RPD not calculated for non-detect results or results within 5x of the detection limit
Exceeds CCME AL: CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Agricultural

TABLE 11: SOIL ANALYTICAL RESULTS - PAH PARAMETERS (mg/kg)

Sample ID	Date	Depth (m)	Acenaphthene	Acenaphthylene	Acridine	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b+j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Benzo(a)pyrene Total Potency Equivalents	Index of Additive Cancer Risk
TP16-7N	28-Jun-2016	1.5	< 0.005	< 0.005	< 0.01	< 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.1	<0.2
DUP16-1 (DUP TP16-7N)	28-Jun-2016	1.5	< 0.005	< 0.005	< 0.01	< 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.1	<0.2
TP16-8N	28-Jun-2016	1.2	< 0.005	< 0.005	< 0.01	< 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.1	<0.2
TP16-10N	28-Jun-2016	0.8	< 0.005	< 0.005	< 0.01	< 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.1	<0.2
TP16-12N	28-Jun-2016	2.5	< 0.005	< 0.005	< 0.01	< 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.1	<0.2
TP16-15N	28-Jun-2016	2	< 0.005	< 0.005	< 0.01	< 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.1	<0.2
TP16-16N	28-Jun-2016	1.2	< 0.005	< 0.005	< 0.01	< 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.1	<0.2
TP16-18N	28-Jun-2016	1.2	< 0.005	< 0.005	< 0.01	< 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.1	<0.2
TP16-20N	29-Jun-2016	1.5	< 0.005	< 0.005	< 0.01	< 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.1	<0.2
CCME TPE/IACR			ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	5.3	1
CCME ALpw			ns	ns	ns	ns	See IACR	See IACR	See IACR	See IACR	See IACR	See IACR	See IACR	ns	ns	See IACR	ns	ns	ns	ns	ns	ns	ns
CCME ALdh			ns	ns	ns	ns	See TPE	See TPE	See TPE	See TPE	See TPE	See TPE	See TPE	ns	ns	See TPE	ns	ns	ns	ns	ns	ns	ns
CCME ALsc			ns	ns	ns	2.5	ns	20	ns	ns	ns	ns	ns	50	ns	ns	ns	ns	ns	ns	ns	ns	ns
CCME ALi			21.5	ns	ns	61.5	6.2	0.6	6.2	ns	6.2	6.2	ns	15.4	15.4	ns	ns	8.8	43	7.7	ns	ns	ns
CCME ALfl			0.28	320	ns	ns	ns	8800	ns	ns	ns	ns	ns	ns	0.25	ns	ns	0.013	0.046	ns	ns	ns	ns
CCME ALi			ns	ns	ns	ns	0.1	ns	0.1	ns	0.1	ns	0.1	ns	ns	0.1	ns	ns	0.1	0.1	ns	ns	ns
CCME ALe			ns	ns	ns	2.5	ns	20	ns	ns	ns	ns	ns	50	ns	ns	ns	0.6	ns	ns	ns	ns	ns
RPD (%)																							
DUP16-1 (DUP TP16-7N)	28-Jun-2016	1.5	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

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
TPE - Benzo(a)pyrene Total Potency Equivalents
IACR - Index of Additive Cancer Risk
ns - no standard/guideline listed
DUP - blind field duplicate
RPD (%) - relative percent difference; maximum acceptable difference is 100%
nc - RPD not calculated for non-detect results or results within 5x of the detection limit
Exceeds CCME TPE/IACR: CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - TPE and IACR Calculations
Exceeds CCME ALpw: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Human Health guidelines, Protection of Potable Water
Exceeds CCME ALdh: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Human Health guidelines, Direct Contact
Exceeds CCME ALsc: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Soil Contact
Exceeds CCME ALi: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Soil and Food Ingestion
Exceeds CCME ALfl: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Protection of Freshwater Life
Exceeds CCME ALi: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Interim Soil Quality Criteria (CCME 1991)
Exceeds CCME ALe: CCME Canadian Soil Quality Guidelines for PAH, Agricultural, Environmental Health guidelines, Environmental Health

Success Through Science®

Your P.O. #: KEL1958
Your Project #: 219.05112.00013
Your C.O.C. #: C#498319-02-01, C#498319-03-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2016/07/15
Report #: R2216675
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B652780
Received: 2016/06/29, 16:06

Sample Matrix: Soil
Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Boron (Hot Water Soluble)	3	2016/07/05	2016/07/05	AB SOP-00034 / AB SOP-00042	EPA 200.7 CFR 2012 m
BTEX in Leachates by HS GC/MS/FID (2)	2	2016/07/05	2016/07/06	AB SOP-00039	EPA 8260C m
BTEX/MTBE LH VH F1 in Soil - Field Pres. (1, 3)	6	N/A	2016/07/13	BBY8SOP-00010,	EPA 8260c R3 m
BTEX/MTBE LH VH F1 in Soil - Field Pres. (1, 3)	2	N/A	2016/07/15	BBY8SOP-00010,	EPA 8260c R3 m
BC Hydrocarbons in Soil by GC/FID	2	2016/07/03	2016/07/06	CAL SOP-00239	BCMOE EPH s 12/00
EPH less PAH in Soil By GC/FID	2	N/A	2016/07/07	CAL SOP-00239	Auto Calc
Elemental Sulphur	2	2016/07/06	2016/07/07	CAL SOP-00018	CJSS65:811-813,1985m
Volatile F1-BTEX (1)	6	N/A	2016/07/14	BBY WI-00033	Auto Calc
Volatile F1-BTEX (1)	2	N/A	2016/07/15	BBY WI-00033	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (4)	1	2016/07/02	2016/07/05	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS m
Flash Point	2	N/A	2016/07/01	AB SOP-00062	ASTM D3828-12A/A m
ICPMS Metals on TCLP Leachate (2)	2	2016/07/05	2016/07/06	AB SOP-00015 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Soils	3	2016/07/04	2016/07/06	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Moisture	3	N/A	2016/07/01	AB SOP-00002	CCME PHC-CWS m
Moisture	13	N/A	2016/07/08	AB SOP-00002	CCME PHC-CWS m
Benzo[a]pyrene Equivalency	1	N/A	2016/07/06	AB SOP-00003	Auto Calc
PAH in Leachates by GC/MS (2)	2	2016/07/05	2016/07/05	AB SOP-00003,	EPA 8270d m
PAH in Soil by GC/MS	1	2016/07/02	2016/07/06	AB SOP-00036 / AB SOP-00003	EPA 3540C/8270D m
PAH in Soil by GC/MS	2	2016/07/03	2016/07/06	AB SOP-00003 AB SOP-00036	EPA 8270d m
Total LMW, HMW, Total PAH Calc	2	N/A	2016/07/07	AB SOP-00003	Auto Calc
Free Liquid (Paint filter)	2	N/A	2016/07/01	AB SOP-00047	EPA 9095B R2 m
TCLP pH Measurements	2	2016/07/04	2016/07/05	AB SOP-00015 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:2 Extract)	3	2016/07/06	2016/07/06	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Your P.O. #: KEL1958
Your Project #: 219.05112.00013
Your C.O.C. #: C#498319-02-01, C#498319-03-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2016/07/15
Report #: R2216675
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B652780
Received: 2016/06/29, 16:06

Sample Matrix: Soil
Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
pH @25C (1:1 extract, solid waste)	2	2016/07/02	2016/07/02	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Special Waste Oil and Grease (1)	2	N/A	2016/07/07	BBY8SOP-00008	BCMOE BCLM Mar 2005
Volatile HC-BTEX	2	2016/06/29	2016/07/08	CAL SOP-00240	Auto Calc
Volatile HC-BTEX	6	2016/07/07	2016/07/09	CAL SOP-00240	Auto Calc
BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID	2	2016/06/30	2016/07/07	CAL SOP-00240	BC MELP VH 2007
BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID	6	2016/07/07	2016/07/07	CAL SOP-00240	BC MELP VH 2007

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

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

(1) This test was performed by Maxxam Vancouver
(2) Samples were extracted as per EPA 1311 unless otherwise noted in the report.
(3) The extraction date for VOC, BTEX, VH, or F1 samples that are field preserved with methanol equals the date sampled, unless otherwise stated.
(4) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Carmen McKay, Project Manager
Email: CMcKay@maxxam.ca
Phone# (403)219-3683
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B652780
Report Date: 2016/07/15

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

AT1 BTEX AND F1-F4 IN SOIL (VIALS)

Maxxam ID		OY1292		
Sampling Date		2016/06/28 17:00		
COC Number		C#498319-02-01		
	UNITS	TP16-18N	RDL	QC Batch
Physical Properties				
Moisture	%	5.7	0.30	8317063
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	ND	10	8317386
F3 (C16-C34 Hydrocarbons)	mg/kg	ND	50	8317386
F4 (C34-C50 Hydrocarbons)	mg/kg	ND	50	8317386
Reached Baseline at C50	mg/kg	Yes		8317386
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	86		8317386
RDL = Reportable Detection Limit ND = Not detected				

BC LEPH/HEPH PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OY1293	OY1294		
Sampling Date		2016/06/28 17:00	2016/06/28 17:00		
COC Number		C#498319-02-01	C#498319-02-01		
	UNITS	**TP16-18F**	**DUP16-2**	**RDL**	**QC Batch**
Physical Properties					
Moisture	%	8.7	7.3	0.30	8317063
Polycyclic Aromatics					
Acenaphthene	mg/kg	ND	ND	0.010	8317385
Acenaphthylene	mg/kg	ND	ND	0.010	8317385
Anthracene	mg/kg	ND	ND	0.010	8317385
Benzo(a)anthracene	mg/kg	ND	ND	0.010	8317385
Benzo(b&j)fluoranthene	mg/kg	ND	ND	0.010	8317385
Benzo(k)fluoranthene	mg/kg	ND	ND	0.010	8317385
Benzo(g,h,i)perylene	mg/kg	ND	ND	0.020	8317385
Benzo(a)pyrene	mg/kg	ND	ND	0.010	8317385
Chrysene	mg/kg	ND	ND	0.010	8317385
Dibenz(a,h)anthracene	mg/kg	ND	ND	0.020	8317385
Fluoranthene	mg/kg	ND	ND	0.010	8317385
Fluorene	mg/kg	ND	ND	0.010	8317385
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	0.020	8317385
2-Methylnaphthalene	mg/kg	ND	ND	0.010	8317385
Naphthalene	mg/kg	ND	ND	0.010	8317385
Phenanthrene	mg/kg	ND	ND	0.010	8317385
Pyrene	mg/kg	ND	ND	0.010	8317385
Low Molecular Weight PAH`s	mg/kg	ND	ND	0.010	8315526
High Molecular Weight PAH`s	mg/kg	ND	ND	0.020	8315526
Total PAH	mg/kg	ND	ND	0.020	8315526
Ext. Pet. Hydrocarbon					
EPH (C10-C19)	mg/kg	ND	ND	100	8317375
EPH (C19-C32)	mg/kg	ND	ND	100	8317375
LEPH (C10-C19 less PAH)	mg/kg	ND	ND	100	8315525
HEPH (C19-C32 less PAH)	mg/kg	ND	ND	100	8315525
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	100	102		8317375
D10-ANTHRACENE (sur.)	%	89	92		8317385
D8-ACENAPHTHYLENE (sur.)	%	83	86		8317385

RDL = Reportable Detection Limit
ND = Not detected

Maxxam Job #: B652780
Report Date: 2016/07/15

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

BC LEPH/HEPH PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OY1293	OY1294		
Sampling Date		2016/06/28 17:00	2016/06/28 17:00		
COC Number		C#498319-02-01	C#498319-02-01		
	UNITS	**TP16-18F**	**DUP16-2**	**RDL**	**QC Batch**
D8-NAPHTHALENE (sur.)	%	85	88		8317385
TERPHENYL-D14 (sur.)	%	92	95		8317385
RDL = Reportable Detection Limit					

Maxxam Job #: B652780
Report Date: 2016/07/15

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Your P.O. #: KEL1958
Sampler Initials: KN

BC BTEX/VPH IN SOIL (SOIL)

Maxxam ID		OY1293	OY1294		OY1295	OY1297		
Sampling Date		2016/06/28 17:00	2016/06/28 17:00		2016/06/28 16:00	2016/06/28 15:30		
COC Number		C#498319-02-01	C#498319-02-01		C#498319-02-01	C#498319-02-01		
	UNITS	TP16-18F	DUP16-2	QC Batch	TP16-16F	TP16-15F	RDL	QC Batch
Volatiles								
Xylenes (Total)	mg/kg	ND	ND	8315546	ND	ND	0.040	8322539
VH C6-C10	mg/kg	ND	ND	8315546	ND	ND	21	8322539
Methyl-tert-butylether (MTBE)	mg/kg	ND	ND	8318152	ND	ND	0.30	8318152
VPH (VH6 to 10 - BTEX)	mg/kg	ND	ND	8315546	ND	ND	21	8322539
Benzene	mg/kg	ND	ND	8318152	ND	ND	0.015	8318152
Toluene	mg/kg	ND	ND	8318152	ND	ND	0.060	8318152
Ethylbenzene	mg/kg	ND	ND	8318152	ND	ND	0.030	8318152
m & p-Xylene	mg/kg	ND	ND	8318152	ND	ND	0.12	8318152
o-Xylene	mg/kg	ND	ND	8318152	ND	ND	0.12	8318152
Styrene	mg/kg	ND	ND	8318152	ND	ND	0.090	8318152
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	92	113	8318152	101	120		8318152
4-Bromofluorobenzene (sur.)	%	102	106	8318152	108	112		8318152
D10-ETHYLBENZENE (sur.)	%	95	104	8318152	97	111		8318152
D4-1,2-Dichloroethane (sur.)	%	107	120	8318152	105	124		8318152

RDL = Reportable Detection Limit
ND = Not detected

Maxxam Job #: B652780
Report Date: 2016/07/15

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Sampler Initials: KN

BC BTEX/VPH IN SOIL (SOIL)

Maxxam ID		OY1299	OY1302	OY1304	OY1306		
Sampling Date		2016/06/28 14:00	2016/06/28 12:00	2016/06/28 11:15	2016/06/28 11:30		
COC Number		C#498319-02-01	C#498319-03-01	C#498319-03-01	C#498319-03-01		
	UNITS	TP16-12F	TP16-10F	TP16-7F	TP16-8F	RDL	QC Batch
Volatiles							
Xylenes (Total)	mg/kg	ND	ND	ND	ND	0.040	8322539
VH C6-C10	mg/kg	ND	ND	ND	ND	21	8322539
Methyl-tert-butylether (MTBE)	mg/kg	ND	ND	ND	ND	0.30	8318152
VPH (VH6 to 10 - BTEX)	mg/kg	ND	ND	ND	ND	21	8322539
Benzene	mg/kg	ND	ND	ND	ND	0.015	8318152
Toluene	mg/kg	ND	ND	ND	ND	0.060	8318152
Ethylbenzene	mg/kg	ND	ND	ND	ND	0.030	8318152
m & p-Xylene	mg/kg	ND	ND	ND	ND	0.12	8318152
o-Xylene	mg/kg	ND	ND	ND	ND	0.12	8318152
Styrene	mg/kg	ND	ND	ND	ND	0.090	8318152
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	102	102	102	96		8318152
4-Bromofluorobenzene (sur.)	%	99	100	101	96		8318152
D10-ETHYLBENZENE (sur.)	%	96	100	101	100		8318152
D4-1,2-Dichloroethane (sur.)	%	105	103	103	96		8318152

RDL = Reportable Detection Limit
ND = Not detected

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Report Date: 2016/07/15

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

BASIC CLASS II LANDFILL PACKAGE (SOIL)

Maxxam ID		OY1293	OY1294		
Sampling Date		2016/06/28 17:00	2016/06/28 17:00		
COC Number		C#498319-02-01	C#498319-02-01		
	UNITS	TP16-18F	DUP16-2	RDL	QC Batch
Soluble Parameters					
Soluble (1:1) pH	pH	8.39	8.26	N/A	8317085
Physical Properties					
Closed Cup Flash Point	deg. C	>61	>61	N/A	8317023
Free Liquid	N/A	PASS	PASS	N/A	8317024
Elements					
Leachable Antimony (Sb)	mg/L	ND	ND	1.0	8320083
Leachable Arsenic (As)	mg/L	ND	ND	0.50	8320083
Leachable Barium (Ba)	mg/L	ND	ND	1.0	8320083
Leachable Beryllium (Be)	mg/L	ND	ND	0.50	8320083
Leachable Boron (B)	mg/L	ND	ND	1.0	8320083
Leachable Cadmium (Cd)	mg/L	ND	ND	0.10	8320083
Leachable Chromium (Cr)	mg/L	ND	ND	0.50	8320083
Leachable Cobalt (Co)	mg/L	ND	ND	1.0	8320083
Leachable Copper (Cu)	mg/L	ND	ND	1.0	8320083
Leachable Iron (Fe)	mg/L	4.8	4.8	1.0	8320083
Leachable Lead (Pb)	mg/L	ND	ND	0.50	8320083
Leachable Mercury (Hg)	mg/L	ND	ND	0.020	8320083
Leachable Nickel (Ni)	mg/L	ND	ND	0.50	8320083
Leachable Selenium (Se)	mg/L	ND	ND	0.10	8320083
Leachable Silver (Ag)	mg/L	ND	ND	0.50	8320083
Leachable Thallium (Tl)	mg/L	ND	ND	0.50	8320083
Leachable Uranium (U)	mg/L	ND	ND	0.20	8320083
Leachable Vanadium (V)	mg/L	ND	ND	1.0	8320083
Leachable Zinc (Zn)	mg/L	ND	1.1	1.0	8320083
Leachable Zirconium (Zr)	mg/L	ND	ND	1.0	8320083
Volatiles					
Leachable (ZH) Benzene	ug/L	ND	ND	10	8320183
Leachable (ZH) Toluene	ug/L	ND	ND	10	8320183
Leachable (ZH) Ethylbenzene	ug/L	ND	ND	10	8320183
Leachable (ZH) o-Xylene	ug/L	ND	ND	10	8320183

RDL = Reportable Detection Limit
N/A = Not Applicable
ND = Not detected

BASIC CLASS II LANDFILL PACKAGE (SOIL)

Maxxam ID		OY1293	OY1294		
Sampling Date		2016/06/28 17:00	2016/06/28 17:00		
COC Number		C#498319-02-01	C#498319-02-01		
	UNITS	TP16-18F	DUP16-2	RDL	QC Batch
Leachable (ZH) m & p-Xylene	ug/L	ND	ND	20	8320183
Leachable (ZH) Xylenes (Total)	ug/L	ND	ND	20	8320183
Surrogate Recovery (%)					
Leachable (ZH) 1,4-Difluorobenzene (sur.)	%	104	105		8320183
Leachable (ZH) 4-Bromofluorobenzene (sur.)	%	96	96		8320183
Leachable (ZH) D4-1,2-Dichloroethane (sur.)	%	103	109		8320183

RDL = Reportable Detection Limit
ND = Not detected

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Maxxam Job #: B652780
Report Date: 2016/07/15

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Sampler Initials: KN

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		OY1292	OY1293	OY1294		
Sampling Date		2016/06/28 17:00	2016/06/28 17:00	2016/06/28 17:00		
COC Number		C#498319-02-01	C#498319-02-01	C#498319-02-01		
	UNITS	TP16-18N	TP16-18F	DUP16-2	RDL	QC Batch
Elements						
Soluble (Hot water) Boron (B)	mg/kg	0.12	0.20	0.23	0.10	8319459
Soluble Parameters						
Soluble (2:1) pH	pH	9.16	8.48	8.35	N/A	8320580
Elements						
Total Antimony (Sb)	mg/kg	ND	0.50	ND	0.50	8318821
Total Arsenic (As)	mg/kg	5.4	5.3	5.3	1.0	8318821
Total Barium (Ba)	mg/kg	83	98	96	1.0	8318821
Total Beryllium (Be)	mg/kg	ND	ND	ND	0.40	8318821
Total Cadmium (Cd)	mg/kg	0.055	0.19	0.24	0.050	8318821
Total Chromium (Cr)	mg/kg	14	15	15	1.0	8318821
Total Cobalt (Co)	mg/kg	7.3	7.9	7.7	0.50	8318821
Total Copper (Cu)	mg/kg	13	17	17	1.0	8318821
Total Lead (Pb)	mg/kg	7.5	16	15	0.50	8318821
Total Mercury (Hg)	mg/kg	ND	ND	ND	0.050	8318821
Total Molybdenum (Mo)	mg/kg	ND	0.43	ND	0.40	8318821
Total Nickel (Ni)	mg/kg	17	19	18	1.0	8318821
Total Selenium (Se)	mg/kg	ND	ND	ND	0.50	8318821
Total Silver (Ag)	mg/kg	ND	ND	ND	0.20	8318821
Total Thallium (Tl)	mg/kg	ND	ND	ND	0.10	8318821
Total Tin (Sn)	mg/kg	ND	1.1	1.3	1.0	8318821
Total Uranium (U)	mg/kg	0.57	0.52	0.47	0.20	8318821
Total Vanadium (V)	mg/kg	8.9	9.7	9.8	1.0	8318821
Total Zinc (Zn)	mg/kg	34	69	77	10	8318821

RDL = Reportable Detection Limit
N/A = Not Applicable
ND = Not detected

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Maxxam Job #: B652780
Report Date: 2016/07/15

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		OY1293	OY1294	OY1295	OY1296	OY1297		
Sampling Date		2016/06/28 17:00	2016/06/28 17:00	2016/06/28 16:00	2016/06/28 16:00	2016/06/28 15:30		
COC Number		C#498319-02-01	C#498319-02-01	C#498319-02-01	C#498319-02-01	C#498319-02-01		
	UNITS	**TP16-18F**	**DUP16-2**	**TP16-16F**	**TP16-16N**	**TP16-15F**	**RDL**	**QC Batch**
Elemental Analysis								
Sulphur (Elemental & Polysulphide)	mg/kg	ND	ND				100	8320970
Misc. Inorganics								
Leachable Initial pH of Sample	pH	9.57	9.38				N/A	8318475
Leachable pH after HCl	pH	2.97	3.72				N/A	8318475
Leachable Final pH of Leachate	pH	6.30	6.30				N/A	8318475
OIL & GREASE								
Hazardous Waste Oil	%	ND	ND				0.50	8321419
Physical Properties								
Moisture	%			2.7	2.1	4.3	0.30	8323922

RDL = Reportable Detection Limit
ND = Not detected

Maxxam ID		OY1298	OY1299	OY1300	OY1301	OY1302		
Sampling Date		2016/06/28 15:30	2016/06/28 14:00	2016/06/28 14:00	2016/06/28 11:15	2016/06/28 12:00		
COC Number		C#498319-02-01	C#498319-02-01	C#498319-02-01	C#498319-02-01	C#498319-03-01		
	UNITS	**TP16-15N**	**TP16-12F**	**TP16-12N**	**DUP16-1**	**TP16-10F**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	2.0	6.8	7.7	3.0	5.9	0.30	8323922

RDL = Reportable Detection Limit

Maxxam ID		OY1303	OY1304	OY1305	OY1306	OY1307		
Sampling Date		2016/06/28 12:00	2016/06/28 11:15	2016/06/28 11:15	2016/06/28 11:30	2016/06/28 11:30		
COC Number		C#498319-03-01	C#498319-03-01	C#498319-03-01	C#498319-03-01	C#498319-03-01		
	UNITS	**TP16-10N**	**TP16-7F**	**TP16-7N**	**TP16-8F**	**TP16-8N**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	3.0	6.1	2.5	3.8	5.7	0.30	8323922

RDL = Reportable Detection Limit

Maxxam Job #: B652780
Report Date: 2016/07/15

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Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		OY1292	OY1293	OY1294		
Sampling Date		2016/06/28 17:00	2016/06/28 17:00	2016/06/28 17:00		
COC Number		C#498319-02-01	C#498319-02-01	C#498319-02-01		
	UNITS	**TP16-18N**	**TP16-18F**	**DUP16-2**	**RDL**	**QC Batch**
Polycyclic Aromatics						
Acenaphthene	mg/kg	ND			0.0050	8317377
Leachable Acenaphthylene	ug/L		ND	ND	0.10	8319408
Benzo[a]pyrene equivalency	mg/kg	ND			0.10	8315542
Acenaphthylene	mg/kg	ND			0.0050	8317377
Acridine	mg/kg	ND			0.010	8317377
Leachable Acenaphthene	ug/L		ND	ND	0.10	8319408
Anthracene	mg/kg	ND			0.0040	8317377
Leachable Acridine	ug/L		ND	ND	0.20	8319408
Benzo(a)anthracene	mg/kg	ND			0.0050	8317377
Leachable Anthracene	ug/L		ND	ND	0.050	8319408
Benzo(b&j)fluoranthene	mg/kg	ND			0.0050	8317377
Leachable Benzo(a)anthracene	ug/L		ND	ND	0.050	8319408
Benzo(k)fluoranthene	mg/kg	ND			0.0050	8317377
Leachable Benzo(b&j)fluoranthene	ug/L		ND	ND	0.10	8319408
Benzo(g,h,i)perylene	mg/kg	ND			0.0050	8317377
Benzo(c)phenanthrene	mg/kg	ND			0.0050	8317377
Leachable Benzo(k)fluoranthene	ug/L		ND	ND	0.10	8319408
Benzo(a)pyrene	mg/kg	ND			0.0050	8317377
Leachable Benzo(g,h,i)perylene	ug/L		ND	ND	0.050	8319408
Leachable Benzo(c)phenanthrene	ug/L		ND	ND	0.050	8319408
Benzo[e]pyrene	mg/kg	ND			0.0050	8317377
Leachable Benzo(a)pyrene	ug/L		ND	ND	0.050	8319408
Chrysene	mg/kg	ND			0.0050	8317377
Leachable Benzo[e]pyrene	ug/L		ND	ND	0.050	8319408
Dibenz(a,h)anthracene	mg/kg	ND			0.0050	8317377
Leachable Chrysene	ug/L		ND	ND	0.050	8319408
Leachable Dibenz(a,h)anthracene	ug/L		ND	ND	0.050	8319408
Fluoranthene	mg/kg	ND			0.0050	8317377
Fluorene	mg/kg	ND			0.0050	8317377
Leachable Fluorene	ug/L		ND	ND	0.050	8319408
Indeno(1,2,3-cd)pyrene	mg/kg	ND			0.0050	8317377

RDL = Reportable Detection Limit
ND = Not detected

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Maxxam Job #: B652780
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Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		OY1292	OY1293	OY1294		
Sampling Date		2016/06/28 17:00	2016/06/28 17:00	2016/06/28 17:00		
COC Number		C#498319-02-01	C#498319-02-01	C#498319-02-01		
	UNITS	TP16-18N	TP16-18F	DUP16-2	RDL	QC Batch
Leachable Fluoranthene	ug/L		ND	ND	0.050	8319408
2-Methylnaphthalene	mg/kg	ND			0.0050	8317377
Leachable Indeno(1,2,3-cd)pyrene	ug/L		ND	ND	0.10	8319408
Naphthalene	mg/kg	ND			0.0050	8317377
Leachable 2-Methylnaphthalene	ug/L		ND	ND	0.10	8319408
Phenanthrene	mg/kg	ND			0.0050	8317377
Leachable Naphthalene	ug/L		ND	ND	0.10	8319408
Perylene	mg/kg	ND			0.0050	8317377
Leachable Phenanthrene	ug/L		ND	ND	0.050	8319408
Pyrene	mg/kg	ND			0.0050	8317377
Leachable Perylene	ug/L		ND	ND	0.050	8319408
Quinoline	mg/kg	ND			0.010	8317377
Leachable Pyrene	ug/L		ND	ND	0.050	8319408
Leachable Quinoline	ug/L		ND	ND	0.20	8319408
Surrogate Recovery (%)						
Leachable D10-ANTHRACENE (sur.)	%		106	106		8319408
Leachable D8-ACENAPHTHYLENE (sur.)	%		93	88		8319408
Leachable D8-NAPHTHALENE (sur.)	%		72	62		8319408
Leachable TERPHENYL-D14 (sur.)	%		98	97		8319408
D10-ANTHRACENE (sur.)	%	92				8317377
D8-ACENAPHTHYLENE (sur.)	%	89				8317377
D8-NAPHTHALENE (sur.)	%	88				8317377
TERPHENYL-D14 (sur.)	%	92				8317377

RDL = Reportable Detection Limit
ND = Not detected

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Maxxam Job #: B652780
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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		OY1292			OY1296	OY1298		
Sampling Date		2016/06/28 17:00			2016/06/28 16:00	2016/06/28 15:30		
COC Number		C#498319-02-01			C#498319-02-01	C#498319-02-01		
	UNITS	**TP16-18N**	**RDL**	**QC Batch**	**TP16-16N**	**TP16-15N**	**RDL**	**QC Batch**
Calculated Parameters								
F1 (C6-C10) - BTEX	mg/kg	ND	12	8327962	ND	ND	30	8327962
Volatiles								
Methyl-tert-butylether (MTBE)	mg/kg	ND	0.10	8328428	ND	ND	0.20	8330643
Benzene	mg/kg	ND	0.0050	8328428	ND	ND	0.010	8330643
Toluene	mg/kg	ND	0.020	8328428	ND	ND	0.040	8330643
Ethylbenzene	mg/kg	ND	0.010	8328428	ND	ND	0.020	8330643
m & p-Xylene	mg/kg	ND	0.040	8328428	ND	ND	0.080	8330643
o-Xylene	mg/kg	ND	0.040	8328428	ND	ND	0.080	8330643
Styrene	mg/kg	ND	0.030	8328428	ND	ND	0.060	8330643
Xylenes (Total)	mg/kg	ND	0.040	8328428	ND	ND	0.080	8330643
F1 (C6-C10)	mg/kg	ND	10	8328428	ND	ND	20	8330643
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	103		8328428	105	105		8330643
4-Bromofluorobenzene (sur.)	%	99		8328428	112	114		8330643
D10-ETHYLBENZENE (sur.)	%	89		8328428	99	97		8330643
D4-1,2-Dichloroethane (sur.)	%	104		8328428	109	109		8330643

RDL = Reportable Detection Limit
ND = Not detected

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Maxxam Job #: B652780
Report Date: 2016/07/15

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		OY1300	OY1301	OY1303	OY1305	OY1307		
Sampling Date		2016/06/28 14:00	2016/06/28 11:15	2016/06/28 12:00	2016/06/28 11:15	2016/06/28 11:30		
COC Number		C#498319-02-01	C#498319-02-01	C#498319-03-01	C#498319-03-01	C#498319-03-01		
	UNITS	**TP16-12N**	**DUP16-1**	**TP16-10N**	**TP16-7N**	**TP16-8N**	**RDL**	**QC Batch**
Calculated Parameters								
F1 (C6-C10) - BTEX	mg/kg	ND	ND	ND	31	ND	30	8327962
Volatiles								
Methyl-tert-butylether (MTBE)	mg/kg	ND	ND	ND	ND	ND	0.10	8328428
Benzene	mg/kg	ND	ND	ND	ND	ND	0.0050	8328428
Toluene	mg/kg	ND	ND	ND	ND	ND	0.020	8328428
Ethylbenzene	mg/kg	ND	ND	ND	ND	ND	0.010	8328428
m & p-Xylene	mg/kg	ND	ND	ND	ND	ND	0.040	8328428
o-Xylene	mg/kg	ND	ND	ND	ND	ND	0.040	8328428
Styrene	mg/kg	ND	ND	ND	ND	ND	0.030	8328428
Xylenes (Total)	mg/kg	ND	ND	ND	ND	ND	0.040	8328428
F1 (C6-C10)	mg/kg	ND	ND	ND	ND	ND	10	8328428
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	102	99	100	103	99		8328428
4-Bromofluorobenzene (sur.)	%	102	98	98	100	97		8328428
D10-ETHYLBENZENE (sur.)	%	89	87	90	93	86		8328428
D4-1,2-Dichloroethane (sur.)	%	106	102	104	109	104		8328428

RDL = Reportable Detection Limit
ND = Not detected

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Client Project #: 219.05112.00013
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Sampler Initials: KN

GENERAL COMMENTS

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

Package 1	5.7°C

Version 3: Report reissued with reanalyzed results and lower detection limits for BTEX/F1 on the following samples:
TP16-16N
TP16-15N

Version 2: Report reissued with reanalyzed results and lower detection limits for BTEX/F1 on the following samples:
TP16-18N
TP16-12N
Dup16-1
TP16-10N
TP16-7N
TP16-8N

Sample OY1296-01 : Detection limits raised due to insufficient sample volume.

Sample OY1298-01 : Detection limits raised due to insufficient sample volume.

BC BTEX/VPH IN SOIL (SOIL) Comments

Sample OY1293-01 BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID: Detection limits raised based on sample weight used for analysis.
Sample OY1294-01 BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID: Detection limits raised based on sample weight used for analysis.
Sample OY1295-01 BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID: Detection limits raised based on sample weight used for analysis.
Sample OY1297-01 BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID: Detection limits raised based on sample weight used for analysis.
Sample OY1299-01 BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID: Detection limits raised based on sample weight used for analysis.
Sample OY1302-01 BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID: Detection limits raised based on sample weight used for analysis.
Sample OY1304-01 BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID: Detection limits raised based on sample weight used for analysis.
Sample OY1306-01 BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID: Detection limits raised based on sample weight used for analysis.

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL) Comments

Matrix Spike BTEX/MTBE LH VH F1 in Soil - Field Pres.: extracted in Calgary 4g 20ml Meoh 4ppm Ethylbenzen d10
Sample OY1296-01 BTEX/MTBE LH VH F1 in Soil - Field Pres.: extracted in Calgary 4g 20ml Meoh 4ppm Ethylbenzen d10
Sample OY1298-01 BTEX/MTBE LH VH F1 in Soil - Field Pres.: extracted in Calgary 4g 20ml Meoh 4ppm Ethylbenzen d10

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317375	O-TERPHENYL (sur.)	2016/07/06	95	50 - 130	96	50 - 130	105	%			102	50 - 130
8317377	D10-ANTHRACENE (sur.)	2016/07/05	74	50 - 130	88	50 - 130	90	%				
8317377	D8-ACENAPHTHYLENE (sur.)	2016/07/05	70	50 - 130	80	50 - 130	84	%				
8317377	D8-NAPHTHALENE (sur.)	2016/07/05	73	50 - 130	80	50 - 130	88	%				
8317377	TERPHENYL-D14 (sur.)	2016/07/05	75	50 - 130	86	50 - 130	93	%				
8317385	D10-ANTHRACENE (sur.)	2016/07/06	87	60 - 130	95	60 - 130	95	%				
8317385	D8-ACENAPHTHYLENE (sur.)	2016/07/06	83	50 - 130	92	50 - 130	90	%				
8317385	D8-NAPHTHALENE (sur.)	2016/07/06	84	50 - 130	92	50 - 130	92	%				
8317385	TERPHENYL-D14 (sur.)	2016/07/06	87	60 - 130	96	60 - 130	100	%				
8317386	O-TERPHENYL (sur.)	2016/07/05	84	50 - 130	85	50 - 130	93	%				
8318152	1,4-Difluorobenzene (sur.)	2016/07/07			95	60 - 140	95	%				
8318152	4-Bromofluorobenzene (sur.)	2016/07/07			94	60 - 140	98	%				
8318152	D10-ETHYLBENZENE (sur.)	2016/07/07			102	60 - 130	103	%				
8318152	D4-1,2-Dichloroethane (sur.)	2016/07/07			106	60 - 140	99	%				
8319408	Leachable D10-ANTHRACENE (sur.)	2016/07/05	105	50 - 130	106	50 - 130	104	%				
8319408	Leachable D8-ACENAPHTHYLENE (sur.)	2016/07/05	91	50 - 130	88	50 - 130	89	%				
8319408	Leachable D8-NAPHTHALENE (sur.)	2016/07/05	63	50 - 130	57	50 - 130	67	%				
8319408	Leachable TERPHENYL-D14 (sur.)	2016/07/05	90	50 - 130	96	50 - 130	95	%				
8320183	Leachable (ZH) 1,4-Difluorobenzene (sur.)	2016/07/06	104	70 - 130	105	70 - 130	104	%				
8320183	Leachable (ZH) 4-Bromofluorobenzene (sur.)	2016/07/06	93	70 - 130	96	70 - 130	97	%				
8320183	Leachable (ZH) D4-1,2-Dichloroethane (sur.)	2016/07/06	109	70 - 130	107	70 - 130	108	%				
8328428	1,4-Difluorobenzene (sur.)	2016/07/13	99	60 - 140	101	60 - 140	103	%				
8328428	4-Bromofluorobenzene (sur.)	2016/07/13	102	60 - 140	102	60 - 140	99	%				
8328428	D10-ETHYLBENZENE (sur.)	2016/07/13	97	60 - 130	89	60 - 130	101	%				
8328428	D4-1,2-Dichloroethane (sur.)	2016/07/13	102	60 - 140	101	60 - 140	106	%				
8330643	1,4-Difluorobenzene (sur.)	2016/07/15	104	60 - 140	107	60 - 140	104	%				
8330643	4-Bromofluorobenzene (sur.)	2016/07/15	121	60 - 140	111	60 - 140	110	%				
8330643	D10-ETHYLBENZENE (sur.)	2016/07/15	94	60 - 130	87	60 - 130	97	%				
8330643	D4-1,2-Dichloroethane (sur.)	2016/07/15	103	60 - 140	107	60 - 140	107	%				
8317023	Closed Cup Flash Point	2016/07/01							NC	35		

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Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317063	Moisture	2016/07/01					ND, RDL=0.30	%	6.4	20		
8317085	Soluble (1:1) pH	2016/07/02			100	97 - 103			0.71	N/A	100	98 - 102
8317375	EPH (C10-C19)	2016/07/06	83	50 - 130	85	50 - 130	ND, RDL=100	mg/kg	NC	50	106	50 - 130
8317375	EPH (C19-C32)	2016/07/06	79	50 - 130	80	50 - 130	ND, RDL=100	mg/kg	NC	50	101	50 - 130
8317377	2-Methylnaphthalene	2016/07/05	73	50 - 130	81	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Acenaphthene	2016/07/05	71	50 - 130	78	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Acenaphthylene	2016/07/05	69	50 - 130	78	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Acridine	2016/07/05	51	50 - 130	60	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317377	Anthracene	2016/07/05	72	50 - 130	85	50 - 130	ND, RDL=0.0040	mg/kg	NC	50		
8317377	Benzo(a)anthracene	2016/07/05	79	50 - 130	94	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Benzo(a)pyrene	2016/07/05	74	50 - 130	92	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Benzo(b&j)fluoranthene	2016/07/05	77	50 - 130	91	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Benzo(c)phenanthrene	2016/07/05	75	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Benzo(g,h,i)perylene	2016/07/05	73	50 - 130	87	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Benzo(k)fluoranthene	2016/07/05	69	50 - 130	83	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Benzo[e]pyrene	2016/07/05	73	50 - 130	87	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Chrysene	2016/07/05	75	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Dibenz(a,h)anthracene	2016/07/05	79	50 - 130	92	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317377	Fluoranthene	2016/07/05	76	50 - 130	90	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Fluorene	2016/07/05	76	50 - 130	83	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Indeno(1,2,3-cd)pyrene	2016/07/05	78	50 - 130	93	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Naphthalene	2016/07/05	71	50 - 130	79	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Perylene	2016/07/05	76	50 - 130	92	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Phenanthrene	2016/07/05	77	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Pyrene	2016/07/05	75	50 - 130	89	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317377	Quinoline	2016/07/05	104	50 - 130	105	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	2-Methylnaphthalene	2016/07/06	87	50 - 130	93	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Acenaphthene	2016/07/06	83	50 - 130	89	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Acenaphthylene	2016/07/06	84	50 - 130	90	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Anthracene	2016/07/06	87	60 - 130	92	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(a)anthracene	2016/07/06	94	60 - 130	101	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(a)pyrene	2016/07/06	90	60 - 130	98	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(b&j)fluoranthene	2016/07/06	91	60 - 130	99	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(g,h,i)perylene	2016/07/06	85	60 - 130	95	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Benzo(k)fluoranthene	2016/07/06	83	60 - 130	90	60 - 130	ND, RDL=0.010	mg/kg	NC	50		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317385	Chrysene	2016/07/06	89	60 - 130	96	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Dibenz(a,h)anthracene	2016/07/06	92	60 - 130	101	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Fluoranthene	2016/07/06	91	60 - 130	97	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Fluorene	2016/07/06	88	50 - 130	95	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Indeno(1,2,3-cd)pyrene	2016/07/06	91	60 - 130	102	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Naphthalene	2016/07/06	85	50 - 130	91	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Phenanthrene	2016/07/06	90	60 - 130	96	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Pyrene	2016/07/06	89	60 - 130	95	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317386	F2 (C10-C16 Hydrocarbons)	2016/07/05	83	50 - 130	84	70 - 130	ND, RDL=10	mg/kg	NC	50		
8317386	F3 (C16-C34 Hydrocarbons)	2016/07/05	86	50 - 130	86	70 - 130	ND, RDL=50	mg/kg	NC	50		
8317386	F4 (C34-C50 Hydrocarbons)	2016/07/05	83	50 - 130	84	70 - 130	ND, RDL=50	mg/kg	NC	50		
8318152	Benzene	2016/07/07			110	70 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8318152	Ethylbenzene	2016/07/07			110	70 - 130	ND, RDL=0.010	mg/kg	NC	50		
8318152	m & p-Xylene	2016/07/07			114	70 - 130	ND, RDL=0.040	mg/kg	NC	50		
8318152	Methyl-tert-butylether (MTBE)	2016/07/07			87	70 - 130	ND, RDL=0.10	mg/kg	NC	50		
8318152	o-Xylene	2016/07/07			112	70 - 130	ND, RDL=0.040	mg/kg	NC	50		
8318152	Styrene	2016/07/07			116	70 - 130	ND, RDL=0.030	mg/kg	NC	50		
8318152	Toluene	2016/07/07			115	70 - 130	ND, RDL=0.020	mg/kg	NC	50		
8318475	Leachable Final pH of Leachate	2016/07/05			100	97 - 103						

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			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8318475	Leachable Initial pH of Sample	2016/07/05			100	97 - 103						
8318475	Leachable pH after HCl	2016/07/05			99	97 - 103						
8318821	Total Antimony (Sb)	2016/07/06	85	75 - 125	93	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8318821	Total Arsenic (As)	2016/07/06	99	75 - 125	97	75 - 125	ND, RDL=1.0	mg/kg	1.6	35	96	53 - 147
8318821	Total Barium (Ba)	2016/07/06	NC	75 - 125	98	75 - 125	ND, RDL=1.0	mg/kg	7.0	35	99	80 - 119
8318821	Total Beryllium (Be)	2016/07/06	108	75 - 125	101	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8318821	Total Cadmium (Cd)	2016/07/06	100	75 - 125	95	75 - 125	ND, RDL=0.050	mg/kg	7.3	35		
8318821	Total Chromium (Cr)	2016/07/06	NC	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	3.5	35	107	59 - 141
8318821	Total Cobalt (Co)	2016/07/06	99	75 - 125	95	75 - 125	ND, RDL=0.50	mg/kg	4.4	35	98	58 - 142
8318821	Total Copper (Cu)	2016/07/06	NC	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	2.9	35	100	83 - 117
8318821	Total Lead (Pb)	2016/07/06	95	75 - 125	93	75 - 125	ND, RDL=0.50	mg/kg	0.55	35	100	79 - 121
8318821	Total Mercury (Hg)	2016/07/06	102	75 - 125	105	75 - 125	ND, RDL=0.050	mg/kg	NC	35		
8318821	Total Molybdenum (Mo)	2016/07/06	102	75 - 125	94	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8318821	Total Nickel (Ni)	2016/07/06	NC	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	4.6	35	102	79 - 121
8318821	Total Selenium (Se)	2016/07/06	99	75 - 125	98	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8318821	Total Silver (Ag)	2016/07/06	100	75 - 125	95	75 - 125	ND, RDL=0.20	mg/kg	NC	35		
8318821	Total Thallium (Tl)	2016/07/06	92	75 - 125	96	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8318821	Total Tin (Sn)	2016/07/06	103	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	NC	35		
8318821	Total Uranium (U)	2016/07/06	86	75 - 125	91	75 - 125	ND, RDL=0.20	mg/kg	3.9	35		
8318821	Total Vanadium (V)	2016/07/06	NC	75 - 125	95	75 - 125	ND, RDL=1.0	mg/kg	5.9	35	107	79 - 121
8318821	Total Zinc (Zn)	2016/07/06	NC	75 - 125	95	75 - 125	ND, RDL=10	mg/kg	5.5	35	102	79 - 121
8319408	Leachable 2-Methylnaphthalene	2016/07/05	83	50 - 130	63	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Acenaphthene	2016/07/05	91	50 - 130	77	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Acenaphthylene	2016/07/05	96	50 - 130	86	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Acridine	2016/07/05	94	50 - 130	99	50 - 130	ND, RDL=0.20	ug/L	NC	40		
8319408	Leachable Anthracene	2016/07/05	100	50 - 130	97	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Benzo(a)anthracene	2016/07/05	106	50 - 130	110	50 - 130	ND, RDL=0.050	ug/L	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

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Client Project #: 219.05112.00013
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			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8319408	Leachable Benzo(a)pyrene	2016/07/05	110	50 - 130	114	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Benzo(b&j)fluoranthene	2016/07/05	105	50 - 130	111	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Benzo(c)phenanthrene	2016/07/05	95	50 - 130	96	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Benzo(g,h,i)perylene	2016/07/05	109	50 - 130	115	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Benzo(k)fluoranthene	2016/07/05	101	50 - 130	104	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Benzo[e]pyrene	2016/07/05	100	50 - 130	104	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Chrysene	2016/07/05	99	50 - 130	103	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Dibenz(a,h)anthracene	2016/07/05	126	50 - 130	128	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Fluoranthene	2016/07/05	116	50 - 130	119	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Fluorene	2016/07/05	102	50 - 130	92	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Indeno(1,2,3-cd)pyrene	2016/07/05	117	50 - 130	124	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Naphthalene	2016/07/05	80	50 - 130	73	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Perylene	2016/07/05	108	50 - 130	111	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Phenanthrene	2016/07/05	104	50 - 130	99	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Pyrene	2016/07/05	114	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Quinoline	2016/07/05	108	50 - 130	108	50 - 130	ND, RDL=0.20	ug/L	NC	40		
8319459	Soluble (Hot water) Boron (B)	2016/07/05	97	75 - 125	96	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8320083	Leachable Antimony (Sb)	2016/07/05	92	75 - 125	93	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Arsenic (As)	2016/07/05	97	75 - 125	97	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Barium (Ba)	2016/07/05	NC	75 - 125	94	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Beryllium (Be)	2016/07/05	95	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		

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			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8320083	Leachable Boron (B)	2016/07/05	94	75 - 125	91	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Cadmium (Cd)	2016/07/05	96	75 - 125	97	80 - 120	ND, RDL=0.10	mg/L	NC	35		
8320083	Leachable Chromium (Cr)	2016/07/05	93	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Cobalt (Co)	2016/07/05	91	75 - 125	93	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Copper (Cu)	2016/07/05	92	75 - 125	97	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Iron (Fe)	2016/07/05	NC	75 - 125	102	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Lead (Pb)	2016/07/05	90	75 - 125	93	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Mercury (Hg)	2016/07/05	107	75 - 125	110	80 - 120	ND, RDL=0.020	mg/L	NC	35		
8320083	Leachable Nickel (Ni)	2016/07/05	92	75 - 125	94	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Selenium (Se)	2016/07/05	99	75 - 125	103	80 - 120	ND, RDL=0.10	mg/L	NC	35		
8320083	Leachable Silver (Ag)	2016/07/05	94	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Thallium (Tl)	2016/07/05	93	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Uranium (U)	2016/07/05	91	75 - 125	92	80 - 120	ND, RDL=0.20	mg/L	NC	35		
8320083	Leachable Vanadium (V)	2016/07/05	98	75 - 125	98	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Zinc (Zn)	2016/07/05	90	75 - 125	93	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Zirconium (Zr)	2016/07/05	110	75 - 125	108	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320183	Leachable (ZH) Benzene	2016/07/06	92	70 - 130	89	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) Ethylbenzene	2016/07/06	90	70 - 130	87	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) m & p-Xylene	2016/07/06	89	70 - 130	84	70 - 130	ND, RDL=20	ug/L	NC	50		
8320183	Leachable (ZH) o-Xylene	2016/07/06	87	70 - 130	86	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) Toluene	2016/07/06	87	70 - 130	85	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) Xylenes (Total)	2016/07/06					ND, RDL=20	ug/L	NC	50		
8320580	Soluble (2:1) pH	2016/07/06			100	97 - 103			1.2	N/A	102	98 - 102
8320970	Sulphur (Elemental & Polysulphide)	2016/07/07			104	75 - 125	ND, RDL=100	mg/kg	NC	35	103	75 - 125
8321419	Hazardous Waste Oil	2016/07/07	96	65 - 135	97	65 - 135	ND, RDL=0.50	%	NC	35		
8328428	Benzene	2016/07/13	97	60 - 140	103	60 - 140	ND, RDL=0.0050	mg/kg	NC	40		
8328428	Ethylbenzene	2016/07/13	108	60 - 140	109	60 - 140	ND, RDL=0.010	mg/kg	NC	40		
8328428	F1 (C6-C10)	2016/07/13			85	60 - 140	ND, RDL=10	mg/kg				

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8328428	m & p-Xylene	2016/07/13	106	60 - 140	108	60 - 140	ND, RDL=0.040	mg/kg	NC	40		
8328428	Methyl-tert-butylether (MTBE)	2016/07/13					ND, RDL=0.10	mg/kg	NC	40		
8328428	o-Xylene	2016/07/13	106	60 - 140	107	60 - 140	ND, RDL=0.040	mg/kg	NC	40		
8328428	Styrene	2016/07/13					ND, RDL=0.030	mg/kg	NC	40		
8328428	Toluene	2016/07/13	101	60 - 140	104	60 - 140	ND, RDL=0.020	mg/kg	NC	40		
8328428	Xylenes (Total)	2016/07/13					ND, RDL=0.040	mg/kg	NC	40		
8330643	Benzene	2016/07/15	99	60 - 140	100	60 - 140	ND, RDL=0.0050	mg/kg	NC	40		
8330643	Ethylbenzene	2016/07/15	103	60 - 140	100	60 - 140	ND, RDL=0.010	mg/kg	NC	40		
8330643	F1 (C6-C10)	2016/07/15			94	60 - 140	ND, RDL=10	mg/kg				
8330643	m & p-Xylene	2016/07/15	102	60 - 140	98	60 - 140	ND, RDL=0.040	mg/kg	NC	40		
8330643	Methyl-tert-butylether (MTBE)	2016/07/15					ND, RDL=0.10	mg/kg				
8330643	o-Xylene	2016/07/15	101	60 - 140	97	60 - 140	ND, RDL=0.040	mg/kg	NC	40		
8330643	Styrene	2016/07/15					ND, RDL=0.030	mg/kg	NC	40		
8330643	Toluene	2016/07/15	95	60 - 140	95	60 - 140	ND, RDL=0.020	mg/kg	NC	40		

Maxxam Job #: B652780
Report Date: 2016/07/15

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8330643	Xylenes (Total)	2016/07/15					ND, RDL=0.040	mg/kg	3.0	40		

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Maxxam Job #: B652780
Report Date: 2016/07/15

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Andy Lu, Ph.D., P.Chem., Scientific Specialist

Luba Shymushovska, B.Sc., QP, Senior Analyst, Organics

Michael Sheppard, B.Sc., P. Biol., QP, Senior Scientific Specialist, Organics

Harry (Peng) Liang, Senior Analyst

Rob Reinert, B.Sc., Scientific Specialist

Jingyuan Song, Organics – Senior Analyst

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC

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VALIDATION SIGNATURE PAGE(CONT'D)

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-Free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

1442 Chain Of Custody Record

Page 1 of 2

INVOICE TO:	
Company Name	#17775 SLR CONSULTING (CANADA) LTD
Contact Name	Lindsay Paterson
Address	200-1475 Ellis Street
	Kelowna BC V1Y 2A3
Phone	(250) 762-7202 Fax: (250) 374-8656
Email	lpaterson@slrconsulting.com, analytical@slrconsulting.

Report Information	
Company Name	
Contact Name	Lindsay Paterson
Address	
Phone	(250) 762-7202 Fax: (250) 374-8656
Email	lpaterson@slrconsulting.com, analytical@slrconsulting.c

Project Information	
Quotation #	B51186
P.O. #	KEL1958
Project #	219.05112.00013
Project Name	
Site #	
Sampled By	KN/LP.

Laboratory Use Only

Maxxam Job #	Bottle Order #:
	498319
Chain Of Custody Record	Project Manager
C#498319-02-01	Letitia Prefontaine

Regulatory Criteria:

- [X] CSR AL
- [X] CCME AL
- [ ] BC Water Quality
- [X] Other Albertz Landfill.

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10ºC) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: [X]

(will be applied if Rush TAT is not specified):

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: ______ [ ]

Rush Confirmation Number: ______ *(call lab for #)*

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	Basic Class II Landfill Package	Elemental Sulfur	Special Waste Oil and Grease	TCLP PAHs	CSR BTEX/VPH in Soil - Field Preserved	LEPH & HEPH, EPH with PAH for CSR in Soil	CSR/CCME Metals in Soil	CCME F2-F4	CCME PAH	CCME BTEX/F1 Field preserved.	# of Bottles	Comments
1	99451 / 99500	TP 16-18 N	6/28/16	500pm	SOIL								X	X	X	X	10	
2	99476 / 99464	TP16-18 F	6/28/16	500pm	SOIL		X	X	X	X	X	X	X				10	
3	99439 / 99488	DUP 16-2	6/28/16	500pm	SOIL		X	X	X	X	X	X	X				10	
4	97826 / 97873.	TP16-16F	6/28/16	400pm	SOIL						X						2	
5	97871 / 97838	TP16-16N	6/28/16	400pm	SOIL											X	2	
6	97825 / 97813	TP16-15F	6/28/16	330pm	SOIL						X						2	
7	97837 / 97849.	TP16-15N	6/28/16	330pm	SOIL											X	2	
8	97802 / 97861	TP16-12F	6/28/16	200pm	SOIL						X						2	
9	97872 / 97860	TP16-12N	6/28/16	200pm	SOIL											X	2	
10	97810 / 97834	DUP 16-1	6/28/16	1115AM	SOIL											X	2	

29-Jun-16 16:06
Letitia Prefontaine
B652780
HT4 INS-0023

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
L.Paterson / L. Paterson	16/06/29	1200pm	Jasbirjit Kaur JASBIRJIT KAUR	2016/06/29	16:06	2	[ ]	7/4/6	[ ] Yes [X] No

Lab Use Only

White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation o/a Maxxam Analytics

ICE - YES

Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-Free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

Chain Of Custody Record

Page 2 of 2

INVOICE TO:

Company Name: #17775 SLR CONSULTING (CANADA) LTD
Contact Name: Lindsay Paterson
Address: 200-1475 Ellis Street, Kelowna BC V1Y 2A3
Phone: (250) 762-7202 Fax: (250) 374-8656
Email: lpaterson@slrconsulting.com, analytical@slrconsulting.

Report Information

Company Name:
Contact Name: Lindsay Paterson
Address:
Phone: (250) 762-7202 Fax: (250) 374-8656
Email: lpaterson@slrconsulting.com, analytical@slrconsulting.c

Project Information

Quotation #: B51186
P.O. #: KEL1958
Project #: 219.05112.00013
Project Name:
Site #:
Sampled By: KN/LP

Laboratory Use Only

Maxxam Job #:
Bottle Order #: 498319
Chain Of Custody Record: C#498319-03-01
Project Manager: Letitia Prefontaine

Regulatory Criteria:
- [x] CSR AL
- [x] CCME AL
- [ ] BC Water Quality
- [x] Other Albert Landfill

Special Instructions:

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: [x]
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: ______ [ ]
Rush Confirmation Number: ______ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	Basic Class II Landfill Package	Elemental Sulfur	Special Waste Oil and Grease	TCLP PAHs	CSR BTEX/VPH in Soil - Field Preserved	LEPH & HEPH, EPH with PAH for CSR in Soil	CSR/CCME Metals in Soil	CCME BTEX/F1 Field Preserved			# of Bottles	Comments
1	97814 / 97824	TP16-10F	6/28/16	1200 PM	SOIL						X						2	
2	97836 / 97859	TP16-10N	6/28/16	1200 PM	SOIL									X			2	
3	97835 / 97822	TP 16-7F	6/28/16	1115 AM	SOIL						X						2	
4	97858 / 97846	TP 16-7 N	6/28/16	1115 AM	SOIL									X			2	
5	97812 / 97870	TP16-8F	6/28/16	1130 AM	SOIL						X						2	
6	97823 / 97811	TP16-8N	6/28/16	1130 AM	SOIL									X			2	
7																		
8																		
9																		
10																		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
L. Paterson	16/06/29	12 PM	JASBIRJIT KAUR	2016/06/29	16:06	0

Lab Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
[ ]	7/4/6 ICE-YES	[ ] Yes [x] No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: KEL1958
Your Project #: 219.05112.00013
Your C.O.C. #: c#498319-05-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2016/07/08
Report #: R2212410
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B652781
Received: 2016/06/29, 16:02

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Boron (Hot Water Soluble)	1	2016/07/05	2016/07/05	AB SOP-00034 / AB SOP-00042	EPA 200.7 CFR 2012 m
Boron (Hot Water Soluble)	1	2016/07/07	2016/07/07	AB SOP-00034 / AB SOP-00042	EPA 200.7 CFR 2012 m
Boron (Hot Water Soluble)	3	2016/07/07	2016/07/08	AB SOP-00034 / AB SOP-00042	EPA 200.7 CFR 2012 m
BTEX in Leachates by HS GC/MS/FID (2)	2	2016/07/05	2016/07/06	AB SOP-00039	EPA 8260C m
BC Hydrocarbons in Soil by GC/FID	2	2016/07/04	2016/07/06	CAL SOP-00239	BCMOE EPH s 12/00
EPH less PAH in Soil By GC/FID	2	N/A	2016/07/07	CAL SOP-00239	Auto Calc
Elemental Sulphur	2	2016/07/06	2016/07/07	CAL SOP-00018	CJSS65:811-813,1985m
CCME Hydrocarbons (F2-F4 in soil) (3)	3	2016/07/03	2016/07/06	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS m
Flash Point	2	N/A	2016/07/04	AB SOP-00062	ASTM D3828-12A/A m
ICPMS Metals on TCLP Leachate (2)	2	2016/07/05	2016/07/06	AB SOP-00015 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Soils	1	2016/07/05	2016/07/06	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Soils	1	2016/07/07	2016/07/07	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Soils	3	2016/07/07	2016/07/08	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Moisture	5	N/A	2016/07/04	AB SOP-00002	CCME PHC-CWS m
Benzo[a]pyrene Equivalency	3	N/A	2016/07/07	AB SOP-00003	Auto Calc
PAH in Leachates by GC/MS (2)	2	2016/07/05	2016/07/05	AB SOP-00003,	EPA 8270d m
PAH in Soil by GC/MS	3	2016/07/03	2016/07/06	AB SOP-00036 / AB SOP-00003	EPA 3540C/8270D m
PAH in Soil by GC/MS	2	2016/07/04	2016/07/06	AB SOP-00003 AB SOP-00036	EPA 8270d m
Total LMW, HMW, Total PAH Calc	2	N/A	2016/07/07	AB SOP-00003	Auto Calc
Free Liquid (Paint filter)	2	N/A	2016/07/04	AB SOP-00047	EPA 9095B R2 m
TCLP pH Measurements	2	2016/07/04	2016/07/05	AB SOP-00015 / AB SOP-00006	SM 22 4500 H+B m

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Your P.O. #: KEL1958
Your Project #: 219.05112.00013
Your C.O.C. #: c#498319-05-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2016/07/08
Report #: R2212410
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B652781
Received: 2016/06/29, 16:02

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
pH @25C (1:2 Extract)	1	2016/07/06	2016/07/06	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:2 Extract)	1	2016/07/07	2016/07/07	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:2 Extract)	3	2016/07/08	2016/07/08	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:1 extract, solid waste)	2	2016/07/05	2016/07/05	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Special Waste Oil and Grease (1)	2	N/A	2016/07/07	BBY8SOP-00008	BCMOE BCLM Mar 2005

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

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

(1) This test was performed by Maxxam Vancouver
(2) Samples were extracted as per EPA 1311 unless otherwise noted in the report.
(3) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Carmen McKay, Project Manager
Email: CMcKay@maxxam.ca
Phone# (403)219-3683
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B652781
Report Date: 2016/07/08

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

AT1 F2-F4 (SOIL)

Maxxam ID		OY1309	OY1311	OY1312		
Sampling Date		2016/06/28 11:15	2016/06/28 11:30	2016/06/28 11:15		
COC Number		c#498319-05-01	c#498319-05-01	c#498319-05-01		
	UNITS	**TP16-7N**	**TP16-8N**	**DUP16-1**	**RDL**	**QC Batch**
Physical Properties						
Moisture	%	2.5	5.7	3.0	0.30	8318823
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/kg	ND	ND	ND	10	8317618
F3 (C16-C34 Hydrocarbons)	mg/kg	ND	ND	ND	50	8317618
F4 (C34-C50 Hydrocarbons)	mg/kg	ND	ND	ND	50	8317618
Reached Baseline at C50	mg/kg	Yes	Yes	Yes		8317618
Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	72	74	77		8317618

RDL = Reportable Detection Limit
ND = Not detected

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B652781
Report Date: 2016/07/08

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

BC LEPH/HEPH PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OY1308	OY1310		
Sampling Date		2016/06/28 11:15	2016/06/28 11:30		
COC Number		c#498319-05-01	c#498319-05-01		
	UNITS	TP16-7F	TP16-8F	RDL	QC Batch
Physical Properties					
Moisture	%	6.1	3.8	0.30	8318823
Polycyclic Aromatics					
Acenaphthene	mg/kg	ND	ND	0.010	8317385
Acenaphthylene	mg/kg	ND	ND	0.010	8317385
Anthracene	mg/kg	ND	ND	0.010	8317385
Benzo(a)anthracene	mg/kg	ND	ND	0.010	8317385
Benzo(b&j)fluoranthene	mg/kg	ND	0.013	0.010	8317385
Benzo(k)fluoranthene	mg/kg	ND	ND	0.010	8317385
Benzo(g,h,i)perylene	mg/kg	ND	ND	0.020	8317385
Benzo(a)pyrene	mg/kg	ND	ND	0.010	8317385
Chrysene	mg/kg	ND	ND	0.010	8317385
Dibenz(a,h)anthracene	mg/kg	ND	ND	0.020	8317385
Fluoranthene	mg/kg	ND	ND	0.010	8317385
Fluorene	mg/kg	ND	ND	0.010	8317385
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	0.020	8317385
2-Methylnaphthalene	mg/kg	ND	ND	0.010	8317385
Naphthalene	mg/kg	ND	ND	0.010	8317385
Phenanthrene	mg/kg	ND	ND	0.010	8317385
Pyrene	mg/kg	ND	ND	0.010	8317385
Low Molecular Weight PAH`s	mg/kg	ND	ND	0.010	8315526
High Molecular Weight PAH`s	mg/kg	ND	ND	0.020	8315526
Total PAH	mg/kg	ND	ND	0.020	8315526
Ext. Pet. Hydrocarbon					
EPH (C10-C19)	mg/kg	ND	ND	100	8317375
EPH (C19-C32)	mg/kg	ND	ND	100	8317375
LEPH (C10-C19 less PAH)	mg/kg	ND	ND	100	8315525
HEPH (C19-C32 less PAH)	mg/kg	ND	ND	100	8315525
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	100	102		8317375
D10-ANTHRACENE (sur.)	%	89	88		8317385
D8-ACENAPHTHYLENE (sur.)	%	86	85		8317385

RDL = Reportable Detection Limit
ND = Not detected

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BC LEPH/HEPH PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OY1308	OY1310		
Sampling Date		2016/06/28 11:15	2016/06/28 11:30		
COC Number		c#498319-05-01	c#498319-05-01		
	UNITS	**TP16-7F**	**TP16-8F**	**RDL**	**QC Batch**
D8-NAPHTHALENE (sur.)	%	88	87		8317385
TERPHENYL-D14 (sur.)	%	91	89		8317385
RDL = Reportable Detection Limit					

Maxxam Job #: B652781
Report Date: 2016/07/08

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Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

BASIC CLASS II LANDFILL PACKAGE (SOIL)

Maxxam ID		OY1308	OY1310		
Sampling Date		2016/06/28 11:15	2016/06/28 11:30		
COC Number		c#498319-05-01	c#498319-05-01		
	UNITS	**TP16-7F**	**TP16-8F**	**RDL**	**QC Batch**
Soluble Parameters					
Soluble (1:1) pH	pH	8.14	8.23	N/A	8319557
Physical Properties					
Closed Cup Flash Point	deg. C	>61	>61	N/A	8318392
Free Liquid	N/A	PASS	PASS	N/A	8318394
Elements					
Leachable Antimony (Sb)	mg/L	ND	ND	1.0	8320083
Leachable Arsenic (As)	mg/L	ND	ND	0.50	8320083
Leachable Barium (Ba)	mg/L	ND	ND	1.0	8320083
Leachable Beryllium (Be)	mg/L	ND	ND	0.50	8320083
Leachable Boron (B)	mg/L	ND	ND	1.0	8320083
Leachable Cadmium (Cd)	mg/L	ND	ND	0.10	8320083
Leachable Chromium (Cr)	mg/L	ND	ND	0.50	8320083
Leachable Cobalt (Co)	mg/L	ND	ND	1.0	8320083
Leachable Copper (Cu)	mg/L	ND	ND	1.0	8320083
Leachable Iron (Fe)	mg/L	4.6	4.9	1.0	8320083
Leachable Lead (Pb)	mg/L	ND	ND	0.50	8320083
Leachable Mercury (Hg)	mg/L	ND	ND	0.020	8320083
Leachable Nickel (Ni)	mg/L	ND	ND	0.50	8320083
Leachable Selenium (Se)	mg/L	ND	ND	0.10	8320083
Leachable Silver (Ag)	mg/L	ND	ND	0.50	8320083
Leachable Thallium (Tl)	mg/L	ND	ND	0.50	8320083
Leachable Uranium (U)	mg/L	ND	ND	0.20	8320083
Leachable Vanadium (V)	mg/L	ND	ND	1.0	8320083
Leachable Zinc (Zn)	mg/L	ND	1.4	1.0	8320083
Leachable Zirconium (Zr)	mg/L	ND	ND	1.0	8320083
Volatiles					
Leachable (ZH) Benzene	ug/L	ND	ND	10	8320183
Leachable (ZH) Toluene	ug/L	ND	ND	10	8320183
Leachable (ZH) Ethylbenzene	ug/L	ND	ND	10	8320183
Leachable (ZH) o-Xylene	ug/L	ND	ND	10	8320183

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ND = Not detected

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Maxxam Job #: B652781
Report Date: 2016/07/08

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Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

BASIC CLASS II LANDFILL PACKAGE (SOIL)

Maxxam ID		OY1308	OY1310		
Sampling Date		2016/06/28 11:15	2016/06/28 11:30		
COC Number		c#498319-05-01	c#498319-05-01		
	UNITS	TP16-7F	TP16-8F	RDL	QC Batch
Leachable (ZH) m & p-Xylene	ug/L	ND	ND	20	8320183
Leachable (ZH) Xylenes (Total)	ug/L	ND	ND	20	8320183
Surrogate Recovery (%)					
Leachable (ZH) 1,4-Difluorobenzene (sur.)	%	103	104		8320183
Leachable (ZH) 4-Bromofluorobenzene (sur.)	%	96	98		8320183
Leachable (ZH) D4-1,2-Dichloroethane (sur.)	%	106	107		8320183

RDL = Reportable Detection Limit
ND = Not detected

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Maxxam Job #: B652781
Report Date: 2016/07/08

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Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		OY1308		OY1309		OY1310		
Sampling Date		2016/06/28 11:15		2016/06/28 11:15		2016/06/28 11:30		
COC Number		c#498319-05-01		c#498319-05-01		c#498319-05-01		
	UNITS	**TP16-7F**	**QC Batch**	**TP16-7N**	**QC Batch**	**TP16-8F**	**RDL**	**QC Batch**
Elements								
Soluble (Hot water) Boron (B)	mg/kg	0.31	8319459	0.16	8322907	0.69	0.10	8322033
Soluble Parameters								
Soluble (2:1) pH	pH	8.11	8320580	8.66	8323956	8.40	N/A	8322116
Elements								
Total Antimony (Sb)	mg/kg	ND	8319349	ND	8322903	0.63	0.50	8322051
Total Arsenic (As)	mg/kg	5.8	8319349	6.5	8322903	6.3	1.0	8322051
Total Barium (Ba)	mg/kg	100	8319349	110	8322903	120	1.0	8322051
Total Beryllium (Be)	mg/kg	ND	8319349	ND	8322903	ND	0.40	8322051
Total Cadmium (Cd)	mg/kg	0.12	8319349	0.068	8322903	0.51	0.050	8322051
Total Chromium (Cr)	mg/kg	13	8319349	17	8322903	17	1.0	8322051
Total Cobalt (Co)	mg/kg	7.4	8319349	9.5	8322903	7.8	0.50	8322051
Total Copper (Cu)	mg/kg	15	8319349	15	8322903	20	1.0	8322051
Total Lead (Pb)	mg/kg	12	8319349	9.6	8322903	47	0.50	8322051
Total Mercury (Hg)	mg/kg	ND	8319349	ND	8322903	ND	0.050	8322051
Total Molybdenum (Mo)	mg/kg	ND	8319349	0.45	8322903	0.69	0.40	8322051
Total Nickel (Ni)	mg/kg	17	8319349	22	8322903	20	1.0	8322051
Total Selenium (Se)	mg/kg	ND	8319349	ND	8322903	ND	0.50	8322051
Total Silver (Ag)	mg/kg	ND	8319349	ND	8322903	ND	0.20	8322051
Total Thallium (Tl)	mg/kg	ND	8319349	ND	8322903	ND	0.10	8322051
Total Tin (Sn)	mg/kg	1.1	8319349	ND	8322903	7.3	1.0	8322051
Total Uranium (U)	mg/kg	0.41	8319349	0.85	8322903	0.50	0.20	8322051
Total Vanadium (V)	mg/kg	9.6	8319349	11	8322903	9.7	1.0	8322051
Total Zinc (Zn)	mg/kg	45	8319349	39	8322903	110	10	8322051

RDL = Reportable Detection Limit
N/A = Not Applicable
ND = Not detected

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Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		OY1311	OY1312		
Sampling Date		2016/06/28 11:30	2016/06/28 11:15		
COC Number		c#498319-05-01	c#498319-05-01		
	UNITS	TP16-8N	DUP16-1	RDL	QC Batch
Elements					
Soluble (Hot water) Boron (B)	mg/kg	0.15	0.11	0.10	8322907
Soluble Parameters					
Soluble (2:1) pH	pH	9.15	8.82	N/A	8323956
Elements					
Total Antimony (Sb)	mg/kg	ND	ND	0.50	8322903
Total Arsenic (As)	mg/kg	5.2	6.3	1.0	8322903
Total Barium (Ba)	mg/kg	87	98	1.0	8322903
Total Beryllium (Be)	mg/kg	ND	ND	0.40	8322903
Total Cadmium (Cd)	mg/kg	0.070	0.068	0.050	8322903
Total Chromium (Cr)	mg/kg	16	16	1.0	8322903
Total Cobalt (Co)	mg/kg	8.4	9.0	0.50	8322903
Total Copper (Cu)	mg/kg	13	15	1.0	8322903
Total Lead (Pb)	mg/kg	8.4	9.0	0.50	8322903
Total Mercury (Hg)	mg/kg	ND	ND	0.050	8322903
Total Molybdenum (Mo)	mg/kg	ND	ND	0.40	8322903
Total Nickel (Ni)	mg/kg	20	21	1.0	8322903
Total Selenium (Se)	mg/kg	ND	ND	0.50	8322903
Total Silver (Ag)	mg/kg	ND	ND	0.20	8322903
Total Thallium (Tl)	mg/kg	ND	ND	0.10	8322903
Total Tin (Sn)	mg/kg	ND	ND	1.0	8322903
Total Uranium (U)	mg/kg	0.51	0.72	0.20	8322903
Total Vanadium (V)	mg/kg	10	10	1.0	8322903
Total Zinc (Zn)	mg/kg	41	38	10	8322903

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Report Date: 2016/07/08

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RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		OY1308	OY1310		
Sampling Date		2016/06/28 11:15	2016/06/28 11:30		
COC Number		c#498319-05-01	c#498319-05-01		
	UNITS	TP16-7F	TP16-8F	RDL	QC Batch
Elemental Analysis					
Sulphur (Elemental & Polysulphide)	mg/kg	ND	ND	100	8320970
Misc. Inorganics					
Leachable Initial pH of Sample	pH	9.40	9.63	N/A	8318475
Leachable pH after HCl	pH	3.80	4.72	N/A	8318475
Leachable Final pH of Leachate	pH	6.29	6.32	N/A	8318475
OIL & GREASE					
Hazardous Waste Oil	%	ND	ND	0.50	8321419

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ND = Not detected
N/A = Not Applicable

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Maxxam Job #: B652781
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SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		OY1308	OY1309	OY1310	OY1311		
Sampling Date		2016/06/28 11:15	2016/06/28 11:15	2016/06/28 11:30	2016/06/28 11:30		
COC Number		c#498319-05-01	c#498319-05-01	c#498319-05-01	c#498319-05-01		
	UNITS	TP16-7F	TP16-7N	TP16-8F	TP16-8N	RDL	QC Batch
Polycyclic Aromatics							
Acenaphthene	mg/kg		ND		ND	0.0050	8317622
Leachable Acenaphthylene	ug/L	ND		ND		0.10	8319408
Benzo[a]pyrene equivalency	mg/kg		ND		ND	0.10	8315471
Acenaphthylene	mg/kg		ND		ND	0.0050	8317622
Acridine	mg/kg		ND		ND	0.010	8317622
Leachable Acenaphthene	ug/L	ND		ND		0.10	8319408
Anthracene	mg/kg		ND		ND	0.0040	8317622
Leachable Acridine	ug/L	ND		ND		0.20	8319408
Benzo(a)anthracene	mg/kg		ND		ND	0.0050	8317622
Leachable Anthracene	ug/L	ND		ND		0.050	8319408
Benzo(b&j)fluoranthene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo(a)anthracene	ug/L	ND		ND		0.050	8319408
Benzo(k)fluoranthene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo(b&j)fluoranthene	ug/L	ND		ND		0.10	8319408
Benzo(g,h,i)perylene	mg/kg		ND		ND	0.0050	8317622
Benzo(c)phenanthrene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo(k)fluoranthene	ug/L	ND		ND		0.10	8319408
Benzo(a)pyrene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo(g,h,i)perylene	ug/L	ND		ND		0.050	8319408
Leachable Benzo(c)phenanthrene	ug/L	ND		ND		0.050	8319408
Benzo[e]pyrene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo(a)pyrene	ug/L	ND		ND		0.050	8319408
Chrysene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo[e]pyrene	ug/L	ND		ND		0.050	8319408
Dibenz(a,h)anthracene	mg/kg		ND		ND	0.0050	8317622
Leachable Chrysene	ug/L	ND		ND		0.050	8319408
Leachable Dibenz(a,h)anthracene	ug/L	ND		ND		0.050	8319408
Fluoranthene	mg/kg		ND		ND	0.0050	8317622
Fluorene	mg/kg		ND		ND	0.0050	8317622
Leachable Fluorene	ug/L	ND		ND		0.050	8319408
Indeno(1,2,3-cd)pyrene	mg/kg		ND		ND	0.0050	8317622

RDL = Reportable Detection Limit
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Sampler Initials: KN

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		OY1308	OY1309	OY1310	OY1311		
Sampling Date		2016/06/28 11:15	2016/06/28 11:15	2016/06/28 11:30	2016/06/28 11:30		
COC Number		c#498319-05-01	c#498319-05-01	c#498319-05-01	c#498319-05-01		
	UNITS	**TP16-7F**	**TP16-7N**	**TP16-8F**	**TP16-8N**	**RDL**	**QC Batch**
Leachable Fluoranthene	ug/L	ND		ND		0.050	8319408
2-Methylnaphthalene	mg/kg		ND		ND	0.0050	8317622
Leachable Indeno(1,2,3-cd)pyrene	ug/L	ND		ND		0.10	8319408
Naphthalene	mg/kg		ND		ND	0.0050	8317622
Leachable 2-Methylnaphthalene	ug/L	ND		ND		0.10	8319408
Phenanthrene	mg/kg		ND		ND	0.0050	8317622
Leachable Naphthalene	ug/L	ND		ND		0.10	8319408
Perylene	mg/kg		ND		ND	0.0050	8317622
Leachable Phenanthrene	ug/L	ND		ND		0.050	8319408
Pyrene	mg/kg		ND		ND	0.0050	8317622
Leachable Perylene	ug/L	ND		ND		0.050	8319408
Quinoline	mg/kg		ND		ND	0.010	8317622
Leachable Pyrene	ug/L	ND		ND		0.050	8319408
Leachable Quinoline	ug/L	ND		ND		0.20	8319408
Surrogate Recovery (%)							
Leachable D10-ANTHRACENE (sur.)	%	104		100			8319408
Leachable D8-ACENAPHTHYLENE (sur.)	%	85		90			8319408
Leachable D8-NAPHTHALENE (sur.)	%	55		71			8319408
Leachable TERPHENYL-D14 (sur.)	%	94		58			8319408
D10-ANTHRACENE (sur.)	%		71		68		8317622
D8-ACENAPHTHYLENE (sur.)	%		66		65		8317622
D8-NAPHTHALENE (sur.)	%		69		66		8317622
TERPHENYL-D14 (sur.)	%		70		70		8317622

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ND = Not detected

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Maxxam Job #: B652781
Report Date: 2016/07/08

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Sampler Initials: KN

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		OY1312		
Sampling Date		2016/06/28 11:15		
COC Number		c#498319-05-01		
	UNITS	DUP16-1	RDL	QC Batch
Polycyclic Aromatics				
Acenaphthene	mg/kg	ND	0.0050	8317622
Benzo[a]pyrene equivalency	mg/kg	ND	0.10	8315471
Acenaphthylene	mg/kg	ND	0.0050	8317622
Acridine	mg/kg	ND	0.010	8317622
Anthracene	mg/kg	ND	0.0040	8317622
Benzo(a)anthracene	mg/kg	ND	0.0050	8317622
Benzo(b&j)fluoranthene	mg/kg	ND	0.0050	8317622
Benzo(k)fluoranthene	mg/kg	ND	0.0050	8317622
Benzo(g,h,i)perylene	mg/kg	ND	0.0050	8317622
Benzo(c)phenanthrene	mg/kg	ND	0.0050	8317622
Benzo(a)pyrene	mg/kg	ND	0.0050	8317622
Benzo[e]pyrene	mg/kg	ND	0.0050	8317622
Chrysene	mg/kg	ND	0.0050	8317622
Dibenz(a,h)anthracene	mg/kg	ND	0.0050	8317622
Fluoranthene	mg/kg	ND	0.0050	8317622
Fluorene	mg/kg	ND	0.0050	8317622
Indeno(1,2,3-cd)pyrene	mg/kg	ND	0.0050	8317622
2-Methylnaphthalene	mg/kg	ND	0.0050	8317622
Naphthalene	mg/kg	ND	0.0050	8317622
Phenanthrene	mg/kg	ND	0.0050	8317622
Perylene	mg/kg	ND	0.0050	8317622
Pyrene	mg/kg	ND	0.0050	8317622
Quinoline	mg/kg	ND	0.010	8317622
Surrogate Recovery (%)				
D10-ANTHRACENE (sur.)	%	70		8317622
D8-ACENAPHTHYLENE (sur.)	%	67		8317622
D8-NAPHTHALENE (sur.)	%	68		8317622
TERPHENYL-D14 (sur.)	%	72		8317622

RDL = Reportable Detection Limit
ND = Not detected

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GENERAL COMMENTS

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

Package 1	6.3°C

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317375	O-TERPHENYL (sur.)	2016/07/06	95	50 - 130	96	50 - 130	105	%			102	50 - 130
8317385	D10-ANTHRACENE (sur.)	2016/07/06	87	60 - 130	95	60 - 130	95	%				
8317385	D8-ACENAPHTHYLENE (sur.)	2016/07/06	83	50 - 130	92	50 - 130	90	%				
8317385	D8-NAPHTHALENE (sur.)	2016/07/06	84	50 - 130	92	50 - 130	92	%				
8317385	TERPHENYL-D14 (sur.)	2016/07/06	87	60 - 130	96	60 - 130	100	%				
8317618	O-TERPHENYL (sur.)	2016/07/06	88	50 - 130	92	50 - 130	96	%				
8317622	D10-ANTHRACENE (sur.)	2016/07/06	88	50 - 130	96	50 - 130	92	%				
8317622	D8-ACENAPHTHYLENE (sur.)	2016/07/06	81	50 - 130	89	50 - 130	87	%				
8317622	D8-NAPHTHALENE (sur.)	2016/07/06	81	50 - 130	88	50 - 130	85	%				
8317622	TERPHENYL-D14 (sur.)	2016/07/06	85	50 - 130	91	50 - 130	90	%				
8319408	Leachable D10-ANTHRACENE (sur.)	2016/07/05	105	50 - 130	106	50 - 130	104	%				
8319408	Leachable D8-ACENAPHTHYLENE (sur.)	2016/07/05	91	50 - 130	88	50 - 130	89	%				
8319408	Leachable D8-NAPHTHALENE (sur.)	2016/07/05	63	50 - 130	57	50 - 130	67	%				
8319408	Leachable TERPHENYL-D14 (sur.)	2016/07/05	90	50 - 130	96	50 - 130	95	%				
8320183	Leachable (ZH) 1,4-Difluorobenzene (sur.)	2016/07/06	104	70 - 130	105	70 - 130	104	%				
8320183	Leachable (ZH) 4-Bromofluorobenzene (sur.)	2016/07/06	93	70 - 130	96	70 - 130	97	%				
8320183	Leachable (ZH) D4-1,2-Dichloroethane (sur.)	2016/07/06	109	70 - 130	107	70 - 130	108	%				
8317375	EPH (C10-C19)	2016/07/06	83	50 - 130	85	50 - 130	ND, RDL=100	mg/kg	NC	50	106	50 - 130
8317375	EPH (C19-C32)	2016/07/06	79	50 - 130	80	50 - 130	ND, RDL=100	mg/kg	NC	50	101	50 - 130
8317385	2-Methylnaphthalene	2016/07/06	87	50 - 130	93	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Acenaphthene	2016/07/06	83	50 - 130	89	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Acenaphthylene	2016/07/06	84	50 - 130	90	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Anthracene	2016/07/06	87	60 - 130	92	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(a)anthracene	2016/07/06	94	60 - 130	101	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(a)pyrene	2016/07/06	90	60 - 130	98	60 - 130	ND, RDL=0.010	mg/kg	NC	50		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317385	Benzo(b&j)fluoranthene	2016/07/06	91	60 - 130	99	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(g,h,i)perylene	2016/07/06	85	60 - 130	95	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Benzo(k)fluoranthene	2016/07/06	83	60 - 130	90	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Chrysene	2016/07/06	89	60 - 130	96	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Dibenz(a,h)anthracene	2016/07/06	92	60 - 130	101	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Fluoranthene	2016/07/06	91	60 - 130	97	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Fluorene	2016/07/06	88	50 - 130	95	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Indeno(1,2,3-cd)pyrene	2016/07/06	91	60 - 130	102	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Naphthalene	2016/07/06	85	50 - 130	91	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Phenanthrene	2016/07/06	90	60 - 130	96	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Pyrene	2016/07/06	89	60 - 130	95	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317618	F2 (C10-C16 Hydrocarbons)	2016/07/06	91	50 - 130	93	70 - 130	ND, RDL=10	mg/kg	NC	50		
8317618	F3 (C16-C34 Hydrocarbons)	2016/07/06	95	50 - 130	93	70 - 130	ND, RDL=50	mg/kg	NC	50		
8317618	F4 (C34-C50 Hydrocarbons)	2016/07/06	89	50 - 130	99	70 - 130	ND, RDL=50	mg/kg	NC	50		
8317622	2-Methylnaphthalene	2016/07/06	82	50 - 130	86	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Acenaphthene	2016/07/06	78	50 - 130	82	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Acenaphthylene	2016/07/06	78	50 - 130	83	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Acridine	2016/07/06	59	50 - 130	65	50 - 130	ND, RDL=0.010	mg/kg	NC	50		

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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317622	Anthracene	2016/07/06	81	50 - 130	86	50 - 130	ND, RDL=0.0040	mg/kg	NC	50		
8317622	Benzo(a)anthracene	2016/07/06	79	50 - 130	85	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(a)pyrene	2016/07/06	81	50 - 130	87	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(b&j)fluoranthene	2016/07/06	84	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(c)phenanthrene	2016/07/06	77	50 - 130	81	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(g,h,i)perylene	2016/07/06	84	50 - 130	90	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(k)fluoranthene	2016/07/06	78	50 - 130	84	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo[e]pyrene	2016/07/06	81	50 - 130	80	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Chrysene	2016/07/06	81	50 - 130	79	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Dibenz(a,h)anthracene	2016/07/06	90	50 - 130	95	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Fluoranthene	2016/07/06	85	50 - 130	89	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Fluorene	2016/07/06	81	50 - 130	87	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Indeno(1,2,3-cd)pyrene	2016/07/06	84	50 - 130	89	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Naphthalene	2016/07/06	80	50 - 130	83	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Perylene	2016/07/06	88	50 - 130	92	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Phenanthrene	2016/07/06	83	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Pyrene	2016/07/06	84	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		

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QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317622	Quinoline	2016/07/06	103	50 - 130	102	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8318392	Closed Cup Flash Point	2016/07/04							NC	35		
8318475	Leachable Final pH of Leachate	2016/07/05			100	97 - 103						
8318475	Leachable Initial pH of Sample	2016/07/05			100	97 - 103						
8318475	Leachable pH after HCl	2016/07/05			99	97 - 103						
8318823	Moisture	2016/07/04					ND, RDL=0.30	%	1.4	20		
8319349	Total Antimony (Sb)	2016/07/07	91	75 - 125	92	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8319349	Total Arsenic (As)	2016/07/07	99	75 - 125	98	75 - 125	ND, RDL=1.0	mg/kg	6.6	35	99	53 - 147
8319349	Total Barium (Ba)	2016/07/07	NC	75 - 125	98	75 - 125	ND, RDL=1.0	mg/kg	4.7	35	102	80 - 119
8319349	Total Beryllium (Be)	2016/07/07	108	75 - 125	101	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8319349	Total Cadmium (Cd)	2016/07/07	97	75 - 125	93	75 - 125	ND, RDL=0.050	mg/kg	6.2	35		
8319349	Total Chromium (Cr)	2016/07/07	NC	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	13	35	101	59 - 141
8319349	Total Cobalt (Co)	2016/07/07	96	75 - 125	94	75 - 125	ND, RDL=0.50	mg/kg	8.5	35	97	58 - 142
8319349	Total Copper (Cu)	2016/07/07	91	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	7.1	35	98	83 - 117
8319349	Total Lead (Pb)	2016/07/07	89	75 - 125	91	75 - 125	ND, RDL=0.50	mg/kg	9.3	35	102	79 - 121
8319349	Total Mercury (Hg)	2016/07/07	107	75 - 125	108	75 - 125	ND, RDL=0.050	mg/kg	NC	35		
8319349	Total Molybdenum (Mo)	2016/07/07	102	75 - 125	94	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8319349	Total Nickel (Ni)	2016/07/07	NC	75 - 125	102	75 - 125	ND, RDL=1.0	mg/kg	14	35	110	79 - 121
8319349	Total Selenium (Se)	2016/07/07	99	75 - 125	97	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8319349	Total Silver (Ag)	2016/07/07	97	75 - 125	95	75 - 125	ND, RDL=0.20	mg/kg	NC	35		
8319349	Total Thallium (Tl)	2016/07/07	95	75 - 125	95	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8319349	Total Tin (Sn)	2016/07/07	99	75 - 125	90	75 - 125	ND, RDL=1.0	mg/kg	NC	35		
8319349	Total Uranium (U)	2016/07/07	87	75 - 125	90	75 - 125	ND, RDL=0.20	mg/kg	12	35		
8319349	Total Vanadium (V)	2016/07/07	NC	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	5.3	35	105	79 - 121
8319349	Total Zinc (Zn)	2016/07/07	NC	75 - 125	95	75 - 125	ND, RDL=10	mg/kg	NC	35	99	79 - 121
8319408	Leachable 2-Methylnaphthalene	2016/07/05	83	50 - 130	63	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Acenaphthene	2016/07/05	91	50 - 130	77	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Acenaphthylene	2016/07/05	96	50 - 130	86	50 - 130	ND, RDL=0.10	ug/L	NC	40		

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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8319408	Leachable Acridine	2016/07/05	94	50 - 130	99	50 - 130	ND, RDL=0.20	ug/L	NC	40		
8319408	Leachable Anthracene	2016/07/05	100	50 - 130	97	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Benzo(a)anthracene	2016/07/05	106	50 - 130	110	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Benzo(a)pyrene	2016/07/05	110	50 - 130	114	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Benzo(b&j)fluoranthene	2016/07/05	105	50 - 130	111	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Benzo(c)phenanthrene	2016/07/05	95	50 - 130	96	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Benzo(g,h,i)perylene	2016/07/05	109	50 - 130	115	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Benzo(k)fluoranthene	2016/07/05	101	50 - 130	104	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Benzo[e]pyrene	2016/07/05	100	50 - 130	104	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Chrysene	2016/07/05	99	50 - 130	103	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Dibenz(a,h)anthracene	2016/07/05	126	50 - 130	128	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Fluoranthene	2016/07/05	116	50 - 130	119	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Fluorene	2016/07/05	102	50 - 130	92	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Indeno(1,2,3-cd)pyrene	2016/07/05	117	50 - 130	124	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Naphthalene	2016/07/05	80	50 - 130	73	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8319408	Leachable Perylene	2016/07/05	108	50 - 130	111	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Phenanthrene	2016/07/05	104	50 - 130	99	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Pyrene	2016/07/05	114	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8319408	Leachable Quinoline	2016/07/05	108	50 - 130	108	50 - 130	ND, RDL=0.20	ug/L	NC	40		
8319459	Soluble (Hot water) Boron (B)	2016/07/05	97	75 - 125	96	75 - 125	ND, RDL=0.10	mg/kg	NC	35		

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			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8319557	Soluble (1:1) pH	2016/07/05			100	97 - 103			0.13	N/A	101	98 - 102
8320083	Leachable Antimony (Sb)	2016/07/05	92	75 - 125	93	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Arsenic (As)	2016/07/05	97	75 - 125	97	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Barium (Ba)	2016/07/05	NC	75 - 125	94	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Beryllium (Be)	2016/07/05	95	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Boron (B)	2016/07/05	94	75 - 125	91	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Cadmium (Cd)	2016/07/05	96	75 - 125	97	80 - 120	ND, RDL=0.10	mg/L	NC	35		
8320083	Leachable Chromium (Cr)	2016/07/05	93	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Cobalt (Co)	2016/07/05	91	75 - 125	93	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Copper (Cu)	2016/07/05	92	75 - 125	97	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Iron (Fe)	2016/07/05	NC	75 - 125	102	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Lead (Pb)	2016/07/05	90	75 - 125	93	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Mercury (Hg)	2016/07/05	107	75 - 125	110	80 - 120	ND, RDL=0.020	mg/L	NC	35		
8320083	Leachable Nickel (Ni)	2016/07/05	92	75 - 125	94	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Selenium (Se)	2016/07/05	99	75 - 125	103	80 - 120	ND, RDL=0.10	mg/L	NC	35		
8320083	Leachable Silver (Ag)	2016/07/05	94	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Thallium (Tl)	2016/07/05	93	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8320083	Leachable Uranium (U)	2016/07/05	91	75 - 125	92	80 - 120	ND, RDL=0.20	mg/L	NC	35		
8320083	Leachable Vanadium (V)	2016/07/05	98	75 - 125	98	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Zinc (Zn)	2016/07/05	90	75 - 125	93	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320083	Leachable Zirconium (Zr)	2016/07/05	110	75 - 125	108	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8320183	Leachable (ZH) Benzene	2016/07/06	92	70 - 130	89	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) Ethylbenzene	2016/07/06	90	70 - 130	87	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) m & p-Xylene	2016/07/06	89	70 - 130	84	70 - 130	ND, RDL=20	ug/L	NC	50		
8320183	Leachable (ZH) o-Xylene	2016/07/06	87	70 - 130	86	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) Toluene	2016/07/06	87	70 - 130	85	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) Xylenes (Total)	2016/07/06					ND, RDL=20	ug/L	NC	50		
8320580	Soluble (2:1) pH	2016/07/06			100	97 - 103			1.2	N/A	102	98 - 102
8320970	Sulphur (Elemental & Polysulphide)	2016/07/07			104	75 - 125	ND, RDL=100	mg/kg	NC	35	103	75 - 125

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8321419	Hazardous Waste Oil	2016/07/07	96	65 - 135	97	65 - 135	ND, RDL=0.50	%	NC	35		
8322033	Soluble (Hot water) Boron (B)	2016/07/07	94	75 - 125	91	75 - 125	ND, RDL=0.10	mg/kg	9.5	35		
8322051	Total Antimony (Sb)	2016/07/07	82	75 - 125	102	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8322051	Total Arsenic (As)	2016/07/07	94	75 - 125	107	75 - 125	ND, RDL=1.0	mg/kg	0.83	35	94	53 - 147
8322051	Total Barium (Ba)	2016/07/07	NC	75 - 125	109	75 - 125	ND, RDL=1.0	mg/kg	2.9	35	98	80 - 119
8322051	Total Beryllium (Be)	2016/07/07	98	75 - 125	104	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8322051	Total Cadmium (Cd)	2016/07/07	96	75 - 125	106	75 - 125	ND, RDL=0.050	mg/kg	0.89	35		
8322051	Total Chromium (Cr)	2016/07/07	NC	75 - 125	103	75 - 125	ND, RDL=1.0	mg/kg	8.8	35	92	59 - 141
8322051	Total Cobalt (Co)	2016/07/07	92	75 - 125	103	75 - 125	ND, RDL=0.50	mg/kg	0.85	35	93	58 - 142
8322051	Total Copper (Cu)	2016/07/07	92	75 - 125	102	75 - 125	ND, RDL=1.0	mg/kg	6.9	35	95	83 - 117
8322051	Total Lead (Pb)	2016/07/07	89	75 - 125	102	75 - 125	ND, RDL=0.50	mg/kg	0.32	35	101	79 - 121
8322051	Total Mercury (Hg)	2016/07/07	103	75 - 125	115	75 - 125	ND, RDL=0.050	mg/kg	NC	35		
8322051	Total Molybdenum (Mo)	2016/07/07	97	75 - 125	105	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8322051	Total Nickel (Ni)	2016/07/07	NC	75 - 125	105	75 - 125	ND, RDL=1.0	mg/kg	7.7	35	98	79 - 121
8322051	Total Selenium (Se)	2016/07/07	93	75 - 125	104	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8322051	Total Silver (Ag)	2016/07/07	94	75 - 125	104	75 - 125	ND, RDL=0.20	mg/kg	NC	35		
8322051	Total Thallium (Tl)	2016/07/07	91	75 - 125	105	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8322051	Total Tin (Sn)	2016/07/07	100	75 - 125	106	75 - 125	ND, RDL=1.0	mg/kg	NC	35		
8322051	Total Uranium (U)	2016/07/07	85	75 - 125	100	75 - 125	ND, RDL=0.20	mg/kg	NC	35		
8322051	Total Vanadium (V)	2016/07/07	NC	75 - 125	104	75 - 125	ND, RDL=1.0	mg/kg	4.8	35	98	79 - 121
8322051	Total Zinc (Zn)	2016/07/07	NC	75 - 125	100	75 - 125	ND, RDL=10	mg/kg	2.0	35	94	79 - 121
8322116	Soluble (2:1) pH	2016/07/07			100	97 - 103			0.36	N/A	100	98 - 102
8322903	Total Antimony (Sb)	2016/07/08	96	75 - 125	92	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8322903	Total Arsenic (As)	2016/07/08	105	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	5.4	35	99	53 - 147
8322903	Total Barium (Ba)	2016/07/08	NC	75 - 125	92	75 - 125	ND, RDL=1.0	mg/kg	0.44	35	92	80 - 119
8322903	Total Beryllium (Be)	2016/07/08	103	75 - 125	95	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8322903	Total Cadmium (Cd)	2016/07/08	99	75 - 125	95	75 - 125	ND, RDL=0.050	mg/kg	NC	35		
8322903	Total Chromium (Cr)	2016/07/08	107	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	0.28	35	100	59 - 141

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Maxxam Job #: B652781
Report Date: 2016/07/08

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8322903	Total Cobalt (Co)	2016/07/08	101	75 - 125	93	75 - 125	ND, RDL=0.50	mg/kg	2.3	35	98	58 - 142
8322903	Total Copper (Cu)	2016/07/08	96	75 - 125	91	75 - 125	ND, RDL=1.0	mg/kg	2.4	35	98	83 - 117
8322903	Total Lead (Pb)	2016/07/08	97	75 - 125	94	75 - 125	ND, RDL=0.50	mg/kg	2.8	35	102	79 - 121
8322903	Total Mercury (Hg)	2016/07/08	112	75 - 125	109	75 - 125	ND, RDL=0.050	mg/kg	NC	35		
8322903	Total Molybdenum (Mo)	2016/07/08	110	75 - 125	98	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8322903	Total Nickel (Ni)	2016/07/08	100	75 - 125	91	75 - 125	ND, RDL=1.0	mg/kg	0.96	35	101	79 - 121
8322903	Total Selenium (Se)	2016/07/08	100	75 - 125	95	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8322903	Total Silver (Ag)	2016/07/08	98	75 - 125	95	75 - 125	ND, RDL=0.20	mg/kg	NC	35		
8322903	Total Thallium (Tl)	2016/07/08	101	75 - 125	97	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8322903	Total Tin (Sn)	2016/07/08	105	75 - 125	97	75 - 125	ND, RDL=1.0	mg/kg	NC	35		
8322903	Total Uranium (U)	2016/07/08	92	75 - 125	93	75 - 125	ND, RDL=0.20	mg/kg	NC	35		
8322903	Total Vanadium (V)	2016/07/08	110	75 - 125	92	75 - 125	ND, RDL=1.0	mg/kg	2.6	35	104	79 - 121
8322903	Total Zinc (Zn)	2016/07/08	NC	75 - 125	90	75 - 125	ND, RDL=10	mg/kg	NC	35	97	79 - 121
8322907	Soluble (Hot water) Boron (B)	2016/07/08	98	75 - 125	95	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8323956	Soluble (2:1) pH	2016/07/08			100	97 - 103			0.11	N/A	100	98 - 102

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B652781
Report Date: 2016/07/08

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Andy Lu, Ph.D., P.Chem., Scientific Specialist

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Harry (Peng) Liang, Senior Analyst

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-Free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

1443

Chain Of Custody Record

Page 1 of 1

INVOICE TO:		Report Information		Project Information	
Company Name	#17775 SLR CONSULTING (CANADA) LTD	Company Name		Quotation #	B51186
Contact Name	Lindsay Paterson	Contact Name	Lindsay Paterson	P.O. #	KEL1958
Address	200-1475 Ellis Street	Address		Project #	219.05112.00013
	Kelowna BC V1Y 2A3			Project Name	
Phone	(250) 762-7202 Fax: (250) 374-8656	Phone	(250) 762-7202 Fax: (250) 374-8656	Site #	
Email	lpaterson@slrconsulting.com, analytical@slrconsulting.	Email	lpaterson@slrconsulting.com, analytical@slrconsulting.c	Sampled By	KN/LP

Laboratory Use Only

Maxxam Job #	Bottle Order #:
	498319
Chain Of Custody Record	Project Manager
C#498319-05-01	Letitia Prefontaine

Regulatory Criteria:

- [x] CSR AL
- [x] CCME AL
- [ ] BC Water Quality
- [x] Other Alberta Landfill

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	Basic Class II Landfill Package	Elemental Sulfur	Special Waste Oil and Grease	TCLP PAHs	CSR BTEX/VPH in Soil - Field Preserved	LEPH & HEPH, EPH with PAH for CSR in Soil	CSR/CCME Metals in Soil	CCME F2-F4	CCME PAH		# of Bottles	Comments
1		TP16-7F	6/28/16	1115AM	SOIL		X	X	X	X		X	X				8	
2		TP16-7N	6/28/16	1115AM	SOIL								X	X	X		8	
3		TP16-8F	6/28/16	1130 AM	SOIL		X	X	X	X		X	X				8	
4		TP16-8N	6/28/16	1130AM	SOIL								X	X	X		8	
5		DUP16-1	6/28/16	1115AM	SOIL								X	X	X		8	
6																		
7																		
8																		
9																		
10																		

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: [x]

(will be applied if Rush TAT is not specified):

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: ______ [ ]

Rush Confirmation Number: ______ *(call lab for #)*

29-Jun-16 16:02
Letitia Prefontaine
B652781
NB6 INS-0077

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Lindsay Paterson	16/06/29	1200pm	Jasbirjit Kaur JASBIRJIT KAUR	2016/06/29	16:02	8

Lab Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
[ ]	7/6/6 ICE-YES	[ ] Yes [x] No

White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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Success Through Science®

Your P.O. #: KEL1958
Your Project #: 219.05112.00013
Your C.O.C. #: C#498319-04-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2016/07/07
Report #: R2211683
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B652792
Received: 2016/06/29, 16:01

Sample Matrix: Soil
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Boron (Hot Water Soluble)	4	2016/07/05	2016/07/05	AB SOP-00034 / AB SOP-00042	EPA 200.7 CFR 2012 m
BTEX in Leachates by HS GC/MS/FID (2)	2	2016/07/05	2016/07/06	AB SOP-00039	EPA 8260C m
BC Hydrocarbons in Soil by GC/FID	2	2016/07/04	2016/07/07	CAL SOP-00239	BCMOE EPH s 12/00
EPH less PAH in Soil By GC/FID	2	N/A	2016/07/07	CAL SOP-00239	Auto Calc
Elemental Sulphur	2	2016/07/06	2016/07/07	CAL SOP-00018	CJSS65:811-813,1985m
CCME Hydrocarbons (F2-F4 in soil) (3)	2	2016/07/03	2016/07/06	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS m
Flash Point	2	N/A	2016/07/03	AB SOP-00062	ASTM D3828-12A/A m
ICPMS Metals on TCLP Leachate (2)	2	2016/07/06	2016/07/07	AB SOP-00015 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Soils	3	2016/07/04	2016/07/06	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Soils	1	2016/07/05	2016/07/06	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Moisture	4	N/A	2016/07/04	AB SOP-00002	CCME PHC-CWS m
Benzo[a]pyrene Equivalency	2	N/A	2016/07/07	AB SOP-00003	Auto Calc
PAH in Leachates by GC/MS (2)	2	2016/07/06	2016/07/07	AB SOP-00003,	EPA 8270d m
PAH in Soil by GC/MS	2	2016/07/03	2016/07/06	AB SOP-00036 / AB SOP-00003	EPA 3540C/8270D m
PAH in Soil by GC/MS	2	2016/07/04	2016/07/06	AB SOP-00003 AB SOP-00036	EPA 8270d m
Total LMW, HMW, Total PAH Calc	2	N/A	2016/07/07	AB SOP-00003	Auto Calc
Free Liquid (Paint filter)	2	N/A	2016/07/03	AB SOP-00047	EPA 9095B R2 m
TCLP pH Measurements	2	2016/07/05	2016/07/06	AB SOP-00015 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:2 Extract)	4	2016/07/06	2016/07/06	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:1 extract, solid waste)	2	2016/07/05	2016/07/05	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Special Waste Oil and Grease (1)	2	N/A	2016/07/07	BBY8SOP-00008	BCMOE BCLM Mar 2005

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Your P.O. #: KEL1958
Your Project #: 219.05112.00013
Your C.O.C. #: C#498319-04-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2016/07/07
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Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B652792
Received: 2016/06/29, 16:01

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

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

(1) This test was performed by Maxxam Vancouver
(2) Samples were extracted as per EPA 1311 unless otherwise noted in the report.
(3) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Carmen McKay, Project Manager
Email: CMcKay@maxxam.ca
Phone# (403)219-3683
==

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Maxxam Job #: B652792
Report Date: 2016/07/07

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

AT1 F2-F4 (SOIL)

Maxxam ID		OY1352	OY1354		
Sampling Date		2016/06/28 15:30	2016/06/28 16:00		
COC Number		C#498319-04-01	C#498319-04-01		
	UNITS	TP16-15N	TP16-16N	RDL	QC Batch
Physical Properties					
Moisture	%	2.0	2.1	0.30	8317706
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/kg	ND	ND	10	8317618
F3 (C16-C34 Hydrocarbons)	mg/kg	ND	ND	50	8317618
F4 (C34-C50 Hydrocarbons)	mg/kg	ND	ND	50	8317618
Reached Baseline at C50	mg/kg	Yes	Yes		8317618
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	76	70		8317618

RDL = Reportable Detection Limit
ND = Not detected

Maxxam Job #: B652792
Report Date: 2016/07/07

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

BC LEPH/HEPH PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OY1351	OY1353		
Sampling Date		2016/06/28 15:30	2016/06/28 16:00		
COC Number		C#498319-04-01	C#498319-04-01		
	UNITS	TP16-15F	TP16-16F	RDL	QC Batch
Physical Properties					
Moisture	%	4.3	2.7	0.30	8317706
Polycyclic Aromatics					
Acenaphthene	mg/kg	ND	ND	0.010	8317385
Acenaphthylene	mg/kg	ND	ND	0.010	8317385
Anthracene	mg/kg	ND	ND	0.010	8317385
Benzo(a)anthracene	mg/kg	ND	ND	0.010	8317385
Benzo(b&j)fluoranthene	mg/kg	ND	ND	0.010	8317385
Benzo(k)fluoranthene	mg/kg	ND	ND	0.010	8317385
Benzo(g,h,i)perylene	mg/kg	ND	ND	0.020	8317385
Benzo(a)pyrene	mg/kg	ND	ND	0.010	8317385
Chrysene	mg/kg	ND	ND	0.010	8317385
Dibenz(a,h)anthracene	mg/kg	ND	ND	0.020	8317385
Fluoranthene	mg/kg	ND	ND	0.010	8317385
Fluorene	mg/kg	ND	ND	0.010	8317385
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	0.020	8317385
2-Methylnaphthalene	mg/kg	ND	ND	0.010	8317385
Naphthalene	mg/kg	ND	ND	0.010	8317385
Phenanthrene	mg/kg	ND	ND	0.010	8317385
Pyrene	mg/kg	ND	ND	0.010	8317385
Low Molecular Weight PAH`s	mg/kg	ND	ND	0.010	8315526
High Molecular Weight PAH`s	mg/kg	ND	ND	0.020	8315526
Total PAH	mg/kg	ND	ND	0.020	8315526
Ext. Pet. Hydrocarbon					
EPH (C10-C19)	mg/kg	ND	ND	100	8317375
EPH (C19-C32)	mg/kg	ND	ND	100	8317375
LEPH (C10-C19 less PAH)	mg/kg	ND	ND	100	8315525
HEPH (C19-C32 less PAH)	mg/kg	ND	ND	100	8315525
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	102	102		8317375
D10-ANTHRACENE (sur.)	%	90	92		8317385
D8-ACENAPHTHYLENE (sur.)	%	85	88		8317385

RDL = Reportable Detection Limit
ND = Not detected

Maxxam Job #: B652792
Report Date: 2016/07/07

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

BC LEPH/HEPH PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OY1351	OY1353		
Sampling Date		2016/06/28 15:30	2016/06/28 16:00		
COC Number		C#498319-04-01	C#498319-04-01		
	UNITS	TP16-15F	TP16-16F	RDL	QC Batch
D8-NAPHTHALENE (sur.)	%	88	90		8317385
TERPHENYL-D14 (sur.)	%	92	93		8317385
RDL = Reportable Detection Limit					

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Maxxam Job #: B652792
Report Date: 2016/07/07

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

BASIC CLASS II LANDFILL PACKAGE (SOIL)

Maxxam ID		OY1351	OY1353		
Sampling Date		2016/06/28 15:30	2016/06/28 16:00		
COC Number		C#498319-04-01	C#498319-04-01		
	UNITS	TP16-15F	TP16-16F	RDL	QC Batch
Soluble Parameters					
Soluble (1:1) pH	pH	8.15	8.78	N/A	8319557
Physical Properties					
Closed Cup Flash Point	deg. C	>61	>61	N/A	8317601
Free Liquid	N/A	PASS	PASS	N/A	8317602
Elements					
Leachable Antimony (Sb)	mg/L	ND	ND	1.0	8321421
Leachable Arsenic (As)	mg/L	ND	ND	0.50	8321421
Leachable Barium (Ba)	mg/L	ND	ND	1.0	8321421
Leachable Beryllium (Be)	mg/L	ND	ND	0.50	8321421
Leachable Boron (B)	mg/L	ND	ND	1.0	8321421
Leachable Cadmium (Cd)	mg/L	ND	ND	0.10	8321421
Leachable Chromium (Cr)	mg/L	ND	ND	0.50	8321421
Leachable Cobalt (Co)	mg/L	ND	ND	1.0	8321421
Leachable Copper (Cu)	mg/L	ND	ND	1.0	8321421
Leachable Iron (Fe)	mg/L	9.6	10	1.0	8321421
Leachable Lead (Pb)	mg/L	ND	ND	0.50	8321421
Leachable Mercury (Hg)	mg/L	ND	ND	0.020	8321421
Leachable Nickel (Ni)	mg/L	ND	ND	0.50	8321421
Leachable Selenium (Se)	mg/L	ND	ND	0.10	8321421
Leachable Silver (Ag)	mg/L	ND	ND	0.50	8321421
Leachable Thallium (Tl)	mg/L	ND	ND	0.50	8321421
Leachable Uranium (U)	mg/L	ND	ND	0.20	8321421
Leachable Vanadium (V)	mg/L	ND	ND	1.0	8321421
Leachable Zinc (Zn)	mg/L	ND	ND	1.0	8321421
Leachable Zirconium (Zr)	mg/L	ND	ND	1.0	8321421
Volatiles					
Leachable (ZH) Benzene	ug/L	ND	ND	10	8320183
Leachable (ZH) Toluene	ug/L	ND	ND	10	8320183
Leachable (ZH) Ethylbenzene	ug/L	ND	ND	10	8320183
Leachable (ZH) o-Xylene	ug/L	ND	ND	10	8320183

RDL = Reportable Detection Limit
N/A = Not Applicable
ND = Not detected

BASIC CLASS II LANDFILL PACKAGE (SOIL)

Maxxam ID		OY1351	OY1353		
Sampling Date		2016/06/28 15:30	2016/06/28 16:00		
COC Number		C#498319-04-01	C#498319-04-01		
	UNITS	**TP16-15F**	**TP16-16F**	**RDL**	**QC Batch**
Leachable (ZH) m & p-Xylene	ug/L	ND	ND	20	8320183
Leachable (ZH) Xylenes (Total)	ug/L	ND	ND	20	8320183
Surrogate Recovery (%)					
Leachable (ZH) 1,4-Difluorobenzene (sur.)	%	105	104		8320183
Leachable (ZH) 4-Bromofluorobenzene (sur.)	%	96	96		8320183
Leachable (ZH) D4-1,2-Dichloroethane (sur.)	%	106	107		8320183

RDL = Reportable Detection Limit
ND = Not detected

Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B652792
Report Date: 2016/07/07

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		OY1351		OY1352		OY1353	OY1354		
Sampling Date		2016/06/28 15:30		2016/06/28 15:30		2016/06/28 16:00	2016/06/28 16:00		
COC Number		C#498319-04-01		C#498319-04-01		C#498319-04-01	C#498319-04-01		
	UNITS	TP16-15F	QC Batch	TP16-15N	QC Batch	TP16-16F	TP16-16N	RDL	QC Batch
Elements									
Soluble (Hot water) Boron (B)	mg/kg	ND	8319459	ND	8319459	ND	ND	0.10	8319459
Soluble Parameters									
Soluble (2:1) pH	pH	7.92	8320580	8.49	8320580	8.59	7.92	N/A	8320580
Elements									
Total Antimony (Sb)	mg/kg	ND	8318821	ND	8319349	ND	ND	0.50	8318821
Total Arsenic (As)	mg/kg	5.7	8318821	6.3	8319349	5.7	5.7	1.0	8318821
Total Barium (Ba)	mg/kg	73	8318821	62	8319349	96	73	1.0	8318821
Total Beryllium (Be)	mg/kg	ND	8318821	ND	8319349	ND	ND	0.40	8318821
Total Cadmium (Cd)	mg/kg	0.17	8318821	0.058	8319349	0.062	ND	0.050	8318821
Total Chromium (Cr)	mg/kg	15	8318821	17	8319349	15	18	1.0	8318821
Total Cobalt (Co)	mg/kg	7.6	8318821	8.8	8319349	7.8	8.8	0.50	8318821
Total Copper (Cu)	mg/kg	14	8318821	15	8319349	13	14	1.0	8318821
Total Lead (Pb)	mg/kg	10	8318821	8.5	8319349	7.8	8.2	0.50	8318821
Total Mercury (Hg)	mg/kg	ND	8318821	ND	8319349	ND	ND	0.050	8318821
Total Molybdenum (Mo)	mg/kg	ND	8318821	ND	8319349	ND	ND	0.40	8318821
Total Nickel (Ni)	mg/kg	19	8318821	22	8319349	19	22	1.0	8318821
Total Selenium (Se)	mg/kg	ND	8318821	ND	8319349	ND	ND	0.50	8318821
Total Silver (Ag)	mg/kg	ND	8318821	ND	8319349	ND	ND	0.20	8318821
Total Thallium (Tl)	mg/kg	ND	8318821	ND	8319349	ND	ND	0.10	8318821
Total Tin (Sn)	mg/kg	ND	8318821	ND	8319349	ND	ND	1.0	8318821
Total Uranium (U)	mg/kg	0.38	8318821	0.43	8319349	0.66	0.53	0.20	8318821
Total Vanadium (V)	mg/kg	9.6	8318821	11	8319349	9.9	11	1.0	8318821
Total Zinc (Zn)	mg/kg	50	8318821	40	8319349	36	43	10	8318821

RDL = Reportable Detection Limit
ND = Not detected
N/A = Not Applicable

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Maxxam Job #: B652792
Report Date: 2016/07/07

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		OY1351	OY1353		
Sampling Date		2016/06/28 15:30	2016/06/28 16:00		
COC Number		C#498319-04-01	C#498319-04-01		
	UNITS	**TP16-15F**	**TP16-16F**	**RDL**	**QC Batch**
Elemental Analysis					
Sulphur (Elemental & Polysulphide)	mg/kg	140	ND	100	8320970
Misc. Inorganics					
Leachable Initial pH of Sample	pH	9.31	9.50	N/A	8320033
Leachable pH after HCl	pH	2.51	2.93	N/A	8320033
Leachable Final pH of Leachate	pH	6.19	6.18	N/A	8320033
OIL & GREASE					
Hazardous Waste Oil	%	ND	ND	0.50	8321419

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Maxxam Job #: B652792
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SLR CONSULTING (CANADA) LTD
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Sampler Initials: KN

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		OY1351	OY1352	OY1353	OY1354		
Sampling Date		2016/06/28 15:30	2016/06/28 15:30	2016/06/28 16:00	2016/06/28 16:00		
COC Number		C#498319-04-01	C#498319-04-01	C#498319-04-01	C#498319-04-01		
	UNITS	TP16-15F	TP16-15N	TP16-16F	TP16-16N	RDL	QC Batch
Polycyclic Aromatics							
Acenaphthene	mg/kg		ND		ND	0.0050	8317622
Leachable Acenaphthylene	ug/L	ND		ND		0.10	8320638
Benzo[a]pyrene equivalency	mg/kg		ND		ND	0.10	8315542
Acenaphthylene	mg/kg		ND		ND	0.0050	8317622
Acridine	mg/kg		ND		ND	0.010	8317622
Leachable Acenaphthene	ug/L	ND		ND		0.10	8320638
Anthracene	mg/kg		ND		ND	0.0040	8317622
Leachable Acridine	ug/L	ND		ND		0.20	8320638
Benzo(a)anthracene	mg/kg		ND		ND	0.0050	8317622
Leachable Anthracene	ug/L	ND		ND		0.050	8320638
Benzo(b&j)fluoranthene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo(a)anthracene	ug/L	ND		ND		0.050	8320638
Benzo(k)fluoranthene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo(b&j)fluoranthene	ug/L	ND		ND		0.10	8320638
Benzo(g,h,i)perylene	mg/kg		ND		ND	0.0050	8317622
Benzo(c)phenanthrene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo(k)fluoranthene	ug/L	ND		ND		0.10	8320638
Benzo(a)pyrene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo(g,h,i)perylene	ug/L	ND		ND		0.050	8320638
Leachable Benzo(c)phenanthrene	ug/L	ND		ND		0.050	8320638
Benzo[e]pyrene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo(a)pyrene	ug/L	ND		ND		0.050	8320638
Chrysene	mg/kg		ND		ND	0.0050	8317622
Leachable Benzo[e]pyrene	ug/L	ND		ND		0.050	8320638
Dibenz(a,h)anthracene	mg/kg		ND		ND	0.0050	8317622
Leachable Chrysene	ug/L	ND		ND		0.050	8320638
Leachable Dibenz(a,h)anthracene	ug/L	ND		ND		0.050	8320638
Fluoranthene	mg/kg		ND		ND	0.0050	8317622
Fluorene	mg/kg		ND		ND	0.0050	8317622
Leachable Fluorene	ug/L	ND		ND		0.050	8320638
Indeno(1,2,3-cd)pyrene	mg/kg		ND		ND	0.0050	8317622

RDL = Reportable Detection Limit
ND = Not detected

Maxxam Job #: B652792
Report Date: 2016/07/07

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		OY1351	OY1352	OY1353	OY1354		
Sampling Date		2016/06/28 15:30	2016/06/28 15:30	2016/06/28 16:00	2016/06/28 16:00		
COC Number		C#498319-04-01	C#498319-04-01	C#498319-04-01	C#498319-04-01		
	UNITS	TP16-15F	TP16-15N	TP16-16F	TP16-16N	RDL	QC Batch
Leachable Fluoranthene	ug/L	ND		ND		0.050	8320638
2-Methylnaphthalene	mg/kg		ND		ND	0.0050	8317622
Leachable Indeno(1,2,3-cd)pyrene	ug/L	ND		ND		0.10	8320638
Naphthalene	mg/kg		ND		ND	0.0050	8317622
Leachable 2-Methylnaphthalene	ug/L	ND		ND		0.10	8320638
Phenanthrene	mg/kg		ND		ND	0.0050	8317622
Leachable Naphthalene	ug/L	ND		ND		0.10	8320638
Perylene	mg/kg		ND		ND	0.0050	8317622
Leachable Phenanthrene	ug/L	ND		ND		0.050	8320638
Pyrene	mg/kg		ND		ND	0.0050	8317622
Leachable Perylene	ug/L	ND		ND		0.050	8320638
Quinoline	mg/kg		ND		ND	0.010	8317622
Leachable Pyrene	ug/L	ND		ND		0.050	8320638
Leachable Quinoline	ug/L	ND		ND		0.20	8320638
Surrogate Recovery (%)							
Leachable D10-ANTHRACENE (sur.)	%	110		113			8320638
Leachable D8-ACENAPHTHYLENE (sur.)	%	99		99			8320638
Leachable D8-NAPHTHALENE (sur.)	%	87		85			8320638
Leachable TERPHENYL-D14 (sur.)	%	111		113			8320638
D10-ANTHRACENE (sur.)	%		74		65		8317622
D8-ACENAPHTHYLENE (sur.)	%		70		64		8317622
D8-NAPHTHALENE (sur.)	%		72		66		8317622
TERPHENYL-D14 (sur.)	%		73		67		8317622

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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
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GENERAL COMMENTS

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

Package 1	4.7°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317375	O-TERPHENYL (sur.)	2016/07/06	95	50 - 130	96	50 - 130	105	%			102	50 - 130
8317385	D10-ANTHRACENE (sur.)	2016/07/06	87	60 - 130	95	60 - 130	95	%				
8317385	D8-ACENAPHTHYLENE (sur.)	2016/07/06	83	50 - 130	92	50 - 130	90	%				
8317385	D8-NAPHTHALENE (sur.)	2016/07/06	84	50 - 130	92	50 - 130	92	%				
8317385	TERPHENYL-D14 (sur.)	2016/07/06	87	60 - 130	96	60 - 130	100	%				
8317618	O-TERPHENYL (sur.)	2016/07/06	88	50 - 130	92	50 - 130	96	%				
8317622	D10-ANTHRACENE (sur.)	2016/07/06	88	50 - 130	96	50 - 130	92	%				
8317622	D8-ACENAPHTHYLENE (sur.)	2016/07/06	81	50 - 130	89	50 - 130	87	%				
8317622	D8-NAPHTHALENE (sur.)	2016/07/06	81	50 - 130	88	50 - 130	85	%				
8317622	TERPHENYL-D14 (sur.)	2016/07/06	85	50 - 130	91	50 - 130	90	%				
8320183	Leachable (ZH) 1,4-Difluorobenzene (sur.)	2016/07/06	104	70 - 130	105	70 - 130	104	%				
8320183	Leachable (ZH) 4-Bromofluorobenzene (sur.)	2016/07/06	93	70 - 130	96	70 - 130	97	%				
8320183	Leachable (ZH) D4-1,2-Dichloroethane (sur.)	2016/07/06	109	70 - 130	107	70 - 130	108	%				
8320638	Leachable D10-ANTHRACENE (sur.)	2016/07/07	111	50 - 130	112	50 - 130	113	%				
8320638	Leachable D8-ACENAPHTHYLENE (sur.)	2016/07/07	99	50 - 130	101	50 - 130	101	%				
8320638	Leachable D8-NAPHTHALENE (sur.)	2016/07/07	87	50 - 130	90	50 - 130	87	%				
8320638	Leachable TERPHENYL-D14 (sur.)	2016/07/07	111	50 - 130	113	50 - 130	113	%				
8317375	EPH (C10-C19)	2016/07/06	83	50 - 130	85	50 - 130	ND, RDL=100	mg/kg	NC	50	106	50 - 130
8317375	EPH (C19-C32)	2016/07/06	79	50 - 130	80	50 - 130	ND, RDL=100	mg/kg	NC	50	101	50 - 130
8317385	2-Methylnaphthalene	2016/07/06	87	50 - 130	93	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Acenaphthene	2016/07/06	83	50 - 130	89	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Acenaphthylene	2016/07/06	84	50 - 130	90	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Anthracene	2016/07/06	87	60 - 130	92	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(a)anthracene	2016/07/06	94	60 - 130	101	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(a)pyrene	2016/07/06	90	60 - 130	98	60 - 130	ND, RDL=0.010	mg/kg	NC	50		

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Maxxam Job #: B652792
Report Date: 2016/07/07

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317385	Benzo(b&j)fluoranthene	2016/07/06	91	60 - 130	99	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(g,h,i)perylene	2016/07/06	85	60 - 130	95	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Benzo(k)fluoranthene	2016/07/06	83	60 - 130	90	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Chrysene	2016/07/06	89	60 - 130	96	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Dibenz(a,h)anthracene	2016/07/06	92	60 - 130	101	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Fluoranthene	2016/07/06	91	60 - 130	97	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Fluorene	2016/07/06	88	50 - 130	95	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Indeno(1,2,3-cd)pyrene	2016/07/06	91	60 - 130	102	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Naphthalene	2016/07/06	85	50 - 130	91	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Phenanthrene	2016/07/06	90	60 - 130	96	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Pyrene	2016/07/06	89	60 - 130	95	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317601	Closed Cup Flash Point	2016/07/03							NC	35		
8317618	F2 (C10-C16 Hydrocarbons)	2016/07/06	91	50 - 130	93	70 - 130	ND, RDL=10	mg/kg	NC	50		
8317618	F3 (C16-C34 Hydrocarbons)	2016/07/06	95	50 - 130	93	70 - 130	ND, RDL=50	mg/kg	NC	50		
8317618	F4 (C34-C50 Hydrocarbons)	2016/07/06	89	50 - 130	99	70 - 130	ND, RDL=50	mg/kg	NC	50		
8317622	2-Methylnaphthalene	2016/07/06	82	50 - 130	86	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Acenaphthene	2016/07/06	78	50 - 130	82	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Acenaphthylene	2016/07/06	78	50 - 130	83	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317622	Acridine	2016/07/06	59	50 - 130	65	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317622	Anthracene	2016/07/06	81	50 - 130	86	50 - 130	ND, RDL=0.0040	mg/kg	NC	50		
8317622	Benzo(a)anthracene	2016/07/06	79	50 - 130	85	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(a)pyrene	2016/07/06	81	50 - 130	87	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(b&j)fluoranthene	2016/07/06	84	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(c)phenanthrene	2016/07/06	77	50 - 130	81	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(g,h,i)perylene	2016/07/06	84	50 - 130	90	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(k)fluoranthene	2016/07/06	78	50 - 130	84	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo[e]pyrene	2016/07/06	81	50 - 130	80	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Chrysene	2016/07/06	81	50 - 130	79	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Dibenz(a,h)anthracene	2016/07/06	90	50 - 130	95	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Fluoranthene	2016/07/06	85	50 - 130	89	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Fluorene	2016/07/06	81	50 - 130	87	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Indeno(1,2,3-cd)pyrene	2016/07/06	84	50 - 130	89	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Naphthalene	2016/07/06	80	50 - 130	83	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Perylene	2016/07/06	88	50 - 130	92	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Phenanthrene	2016/07/06	83	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317622	Pyrene	2016/07/06	84	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Quinoline	2016/07/06	103	50 - 130	102	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317706	Moisture	2016/07/04					ND, RDL=0.30	%	1.3	20		
8318821	Total Antimony (Sb)	2016/07/06	85	75 - 125	93	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8318821	Total Arsenic (As)	2016/07/06	99	75 - 125	97	75 - 125	ND, RDL=1.0	mg/kg	1.6	35	96	53 - 147
8318821	Total Barium (Ba)	2016/07/06	NC	75 - 125	98	75 - 125	ND, RDL=1.0	mg/kg	7.0	35	99	80 - 119
8318821	Total Beryllium (Be)	2016/07/06	108	75 - 125	101	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8318821	Total Cadmium (Cd)	2016/07/06	100	75 - 125	95	75 - 125	ND, RDL=0.050	mg/kg	7.3	35		
8318821	Total Chromium (Cr)	2016/07/06	NC	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	3.5	35	107	59 - 141
8318821	Total Cobalt (Co)	2016/07/06	99	75 - 125	95	75 - 125	ND, RDL=0.50	mg/kg	4.4	35	98	58 - 142
8318821	Total Copper (Cu)	2016/07/06	NC	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	2.9	35	100	83 - 117
8318821	Total Lead (Pb)	2016/07/06	95	75 - 125	93	75 - 125	ND, RDL=0.50	mg/kg	0.55	35	100	79 - 121
8318821	Total Mercury (Hg)	2016/07/06	102	75 - 125	105	75 - 125	ND, RDL=0.050	mg/kg	NC	35		
8318821	Total Molybdenum (Mo)	2016/07/06	102	75 - 125	94	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8318821	Total Nickel (Ni)	2016/07/06	NC	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	4.6	35	102	79 - 121
8318821	Total Selenium (Se)	2016/07/06	99	75 - 125	98	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8318821	Total Silver (Ag)	2016/07/06	100	75 - 125	95	75 - 125	ND, RDL=0.20	mg/kg	NC	35		
8318821	Total Thallium (Tl)	2016/07/06	92	75 - 125	96	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8318821	Total Tin (Sn)	2016/07/06	103	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	NC	35		
8318821	Total Uranium (U)	2016/07/06	86	75 - 125	91	75 - 125	ND, RDL=0.20	mg/kg	3.9	35		
8318821	Total Vanadium (V)	2016/07/06	NC	75 - 125	95	75 - 125	ND, RDL=1.0	mg/kg	5.9	35	107	79 - 121
8318821	Total Zinc (Zn)	2016/07/06	NC	75 - 125	95	75 - 125	ND, RDL=10	mg/kg	5.5	35	102	79 - 121
8319349	Total Antimony (Sb)	2016/07/07	91	75 - 125	92	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8319349	Total Arsenic (As)	2016/07/07	99	75 - 125	98	75 - 125	ND, RDL=1.0	mg/kg	6.6	35	99	53 - 147
8319349	Total Barium (Ba)	2016/07/07	NC	75 - 125	98	75 - 125	ND, RDL=1.0	mg/kg	4.7	35	102	80 - 119
8319349	Total Beryllium (Be)	2016/07/07	108	75 - 125	101	75 - 125	ND, RDL=0.40	mg/kg	NC	35		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8319349	Total Cadmium (Cd)	2016/07/07	97	75 - 125	93	75 - 125	ND, RDL=0.050	mg/kg	6.2	35		
8319349	Total Chromium (Cr)	2016/07/07	NC	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	13	35	101	59 - 141
8319349	Total Cobalt (Co)	2016/07/07	96	75 - 125	94	75 - 125	ND, RDL=0.50	mg/kg	8.5	35	97	58 - 142
8319349	Total Copper (Cu)	2016/07/07	91	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	7.1	35	98	83 - 117
8319349	Total Lead (Pb)	2016/07/07	89	75 - 125	91	75 - 125	ND, RDL=0.50	mg/kg	9.3	35	102	79 - 121
8319349	Total Mercury (Hg)	2016/07/07	107	75 - 125	108	75 - 125	ND, RDL=0.050	mg/kg	NC	35		
8319349	Total Molybdenum (Mo)	2016/07/07	102	75 - 125	94	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8319349	Total Nickel (Ni)	2016/07/07	NC	75 - 125	102	75 - 125	ND, RDL=1.0	mg/kg	14	35	110	79 - 121
8319349	Total Selenium (Se)	2016/07/07	99	75 - 125	97	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8319349	Total Silver (Ag)	2016/07/07	97	75 - 125	95	75 - 125	ND, RDL=0.20	mg/kg	NC	35		
8319349	Total Thallium (Tl)	2016/07/07	95	75 - 125	95	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8319349	Total Tin (Sn)	2016/07/07	99	75 - 125	90	75 - 125	ND, RDL=1.0	mg/kg	NC	35		
8319349	Total Uranium (U)	2016/07/07	87	75 - 125	90	75 - 125	ND, RDL=0.20	mg/kg	12	35		
8319349	Total Vanadium (V)	2016/07/07	NC	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	5.3	35	105	79 - 121
8319349	Total Zinc (Zn)	2016/07/07	NC	75 - 125	95	75 - 125	ND, RDL=10	mg/kg	NC	35	99	79 - 121
8319459	Soluble (Hot water) Boron (B)	2016/07/05	97	75 - 125	96	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8319557	Soluble (1:1) pH	2016/07/05			100	97 - 103			0.13	N/A	101	98 - 102
8320033	Leachable Final pH of Leachate	2016/07/06			100	97 - 103			0.81	N/A		
8320033	Leachable Initial pH of Sample	2016/07/06			100	97 - 103			0.82	N/A		
8320033	Leachable pH after HCl	2016/07/06			100	97 - 103			1.8	N/A		
8320183	Leachable (ZH) Benzene	2016/07/06	92	70 - 130	89	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) Ethylbenzene	2016/07/06	90	70 - 130	87	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) m & p-Xylene	2016/07/06	89	70 - 130	84	70 - 130	ND, RDL=20	ug/L	NC	50		
8320183	Leachable (ZH) o-Xylene	2016/07/06	87	70 - 130	86	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) Toluene	2016/07/06	87	70 - 130	85	70 - 130	ND, RDL=10	ug/L	NC	50		
8320183	Leachable (ZH) Xylenes (Total)	2016/07/06					ND, RDL=20	ug/L	NC	50		
8320580	Soluble (2:1) pH	2016/07/06			100	97 - 103			1.2	N/A	102	98 - 102
8320638	Leachable 2-Methylnaphthalene	2016/07/07	96	50 - 130	98	50 - 130	ND, RDL=0.10	ug/L	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8320638	Leachable Acenaphthene	2016/07/07	96	50 - 130	99	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Acenaphthylene	2016/07/07	96	50 - 130	99	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Acridine	2016/07/07	95	50 - 130	98	50 - 130	ND, RDL=0.20	ug/L	NC	40		
8320638	Leachable Anthracene	2016/07/07	98	50 - 130	101	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(a)anthracene	2016/07/07	113	50 - 130	118	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(a)pyrene	2016/07/07	110	50 - 130	118	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(b&j)fluoranthene	2016/07/07	113	50 - 130	119	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Benzo(c)phenanthrene	2016/07/07	104	50 - 130	108	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(g,h,i)perylene	2016/07/07	115	50 - 130	122	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(k)fluoranthene	2016/07/07	114	50 - 130	119	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Benzo[e]pyrene	2016/07/07	107	50 - 130	114	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Chrysene	2016/07/07	113	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Dibenz(a,h)anthracene	2016/07/07	127	50 - 130	123	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Fluoranthene	2016/07/07	111	50 - 130	118	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Fluorene	2016/07/07	101	50 - 130	106	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Indeno(1,2,3-cd)pyrene	2016/07/07	111	50 - 130	120	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Naphthalene	2016/07/07	95	50 - 130	96	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Perylene	2016/07/07	111	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Phenanthrene	2016/07/07	105	50 - 130	108	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Pyrene	2016/07/07	110	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	40		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8320638	Leachable Quinoline	2016/07/07	103	50 - 130	105	50 - 130	ND, RDL=0.20	ug/L	NC	40		
8320970	Sulphur (Elemental & Polysulphide)	2016/07/07			104	75 - 125	ND, RDL=100	mg/kg	NC	35	103	75 - 125
8321419	Hazardous Waste Oil	2016/07/07	96	65 - 135	97	65 - 135	ND, RDL=0.50	%	NC	35		
8321421	Leachable Antimony (Sb)	2016/07/07	99	75 - 125	101	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Arsenic (As)	2016/07/07	100	75 - 125	98	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Barium (Ba)	2016/07/07	89	75 - 125	97	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Beryllium (Be)	2016/07/07	99	75 - 125	98	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Boron (B)	2016/07/07	NC	75 - 125	99	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Cadmium (Cd)	2016/07/07	97	75 - 125	99	80 - 120	ND, RDL=0.10	mg/L	NC	35		
8321421	Leachable Chromium (Cr)	2016/07/07	95	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Cobalt (Co)	2016/07/07	95	75 - 125	94	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Copper (Cu)	2016/07/07	93	75 - 125	95	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Iron (Fe)	2016/07/07	NC	75 - 125	103	80 - 120	ND, RDL=1.0	mg/L	8.7	35		
8321421	Leachable Lead (Pb)	2016/07/07	90	75 - 125	91	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Mercury (Hg)	2016/07/07	106	75 - 125	106	80 - 120	ND, RDL=0.020	mg/L	NC	35		
8321421	Leachable Nickel (Ni)	2016/07/07	95	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Selenium (Se)	2016/07/07	98	75 - 125	100	80 - 120	ND, RDL=0.10	mg/L	NC	35		
8321421	Leachable Silver (Ag)	2016/07/07	94	75 - 125	96	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Thallium (Tl)	2016/07/07	91	75 - 125	93	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Uranium (U)	2016/07/07	93	75 - 125	94	80 - 120	ND, RDL=0.20	mg/L	NC	35		
8321421	Leachable Vanadium (V)	2016/07/07	99	75 - 125	99	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Zinc (Zn)	2016/07/07	92	75 - 125	94	80 - 120	ND, RDL=1.0	mg/L	NC	35		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8321421	Leachable Zirconium (Zr)	2016/07/07	107	75 - 125	106	80 - 120	ND, RDL=1.0	mg/L	NC	35		

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Maxxam Job #: B652792
Report Date: 2016/07/07

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Harry (Peng) Liang, Senior Analyst

Rob Reinert, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

Maxxam A Bureau Veritas Group Company

Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-Free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

1444

Chain Of Custody Record

Page 1 of 1

INVOICE TO:		Report Information		Project Information	
Company Name	#17775 SLR CONSULTING (CANADA) LTD	Company Name		Quotation #	B51186
Contact Name	Lindsay Paterson	Contact Name	Lindsay Paterson	P.O. #	KEL1958
Address	200-1475 Ellis Street	Address		Project #	219.05112.00013
	Kelowna BC V1Y 2A3			Project Name	
Phone	(250) 762-7202 Fax: (250) 374-8656	Phone	(250) 762-7202 Fax: (250) 374-8656	Site #	
Email	lpaterson@slrconsulting.com, analytical@slrconsulting.	Email	lpaterson@slrconsulting.com, analytical@slrconsulting.c	Sampled By	KN/LP

Laboratory Use Only

Maxxam Job #	Bottle Order #:
	498319
Chain Of Custody Record	Project Manager
C#498319-04-01	Letitia Prefontaine

Regulatory Criteria:

- [X] CSR AL
- [X] CCME AL
- [ ] BC Water Quality
- [X] Other Alberta Landfill

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	Basic Class II Landfill Package	Elemental Sulfur	Special Waste Oil and Grease	TCLP PAHs	CSR BTEX/VPH in Soil - Field Preserved	LEPH & HEPH, EPH with PAH for CSR in Soil	CSR/CCME Metals in Soil	CCME F2-F4	CCME PAH		# of Bottles	Comments
1		TP16-15 F	6/28/16	330pm	SOIL		X	X	X	X		X	X				8	
2		TP16-15N	6/28/16	330pm	SOIL								X	X	X		8	
3		TP16-16 F	6/28/16	400pm	SOIL		X	X	X	X		X	X				8	
4		TP16-16N	6/28/16	400pm	SOIL								X	X	X		8	
5																		
6																		
7																		
8																		
9																		
10																		

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: [X]

(will be applied if Rush TAT is not specified):

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: ______ [ ]

Rush Confirmation Number: ______ *(call lab for #)*

29-Jun-16 16:01
Letitia Prefontaine
B652792
HT4 INS-0023

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
L Paterson / L Paterson	16/06/29	1200PM	Jasbirjit Kaur JASBIRJIT KAUR	2016/06/29	16:01	16	[ ]	6/4/4	[ ] Yes [X] No

Lab Use Only

White: Maxxam Yellow: Client

ICE -YES

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation o/a Maxxam Analytics

Success Through Science®

Your P.O. #: KEL1958
Your Project #: 219.05112.00013
Your C.O.C. #: c#498319-01-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2016/07/07
Report #: R2211685
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B652797
Received: 2016/06/29, 16:08

Sample Matrix: Soil
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Boron (Hot Water Soluble)	4	2016/07/05	2016/07/05	AB SOP-00034 / AB SOP-00042	EPA 200.7 CFR 2012 m
BTEX in Leachates by HS GC/MS/FID (2)	2	2016/07/06	2016/07/07	AB SOP-00039	EPA 8260C m
BC Hydrocarbons in Soil by GC/FID	2	2016/07/04	2016/07/07	CAL SOP-00239	BCMOE EPH s 12/00
EPH less PAH in Soil By GC/FID	2	N/A	2016/07/07	CAL SOP-00239	Auto Calc
Elemental Sulphur	2	2016/07/06	2016/07/07	CAL SOP-00018	CJSS65:811-813,1985m
CCME Hydrocarbons (F2-F4 in soil) (3)	2	2016/07/03	2016/07/06	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS m
Flash Point	2	N/A	2016/07/01	AB SOP-00062	ASTM D3828-12A/A m
ICPMS Metals on TCLP Leachate (2)	2	2016/07/06	2016/07/07	AB SOP-00015 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Soils	4	2016/07/04	2016/07/06	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Moisture	4	N/A	2016/07/04	AB SOP-00002	CCME PHC-CWS m
Benzo[a]pyrene Equivalency	2	N/A	2016/07/07	AB SOP-00003	Auto Calc
PAH in Leachates by GC/MS (2)	2	2016/07/06	2016/07/07	AB SOP-00003,	EPA 8270d m
PAH in Soil by GC/MS	2	2016/07/03	2016/07/06	AB SOP-00036 / AB SOP-00003	EPA 3540C/8270D m
PAH in Soil by GC/MS	2	2016/07/04	2016/07/06	AB SOP-00003 AB SOP-00036	EPA 8270d m
Total LMW, HMW, Total PAH Calc	2	N/A	2016/07/07	AB SOP-00003	Auto Calc
Free Liquid (Paint filter)	2	N/A	2016/07/01	AB SOP-00047	EPA 9095B R2 m
TCLP pH Measurements	2	2016/07/05	2016/07/06	AB SOP-00015 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:2 Extract)	4	2016/07/06	2016/07/06	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:1 extract, solid waste)	2	2016/07/05	2016/07/05	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Special Waste Oil and Grease (1)	2	N/A	2016/07/07	BBY8SOP-00008	BCMOE BCLM Mar 2005

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Your P.O. #: KEL1958
Your Project #: 219.05112.00013
Your C.O.C. #: c#498319-01-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2016/07/07
Report #: R2211685
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B652797
Received: 2016/06/29, 16:08

(1) This test was performed by Maxxam Vancouver
(2) Samples were extracted as per EPA 1311 unless otherwise noted in the report.
(3) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Carmen McKay, Project Manager
Email: CMcKay@maxxam.ca
Phone# (403)219-3683
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B652797
Report Date: 2016/07/07

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: LP

AT1 F2-F4 (SOIL)

Maxxam ID		OY1373	OY1375		
Sampling Date		2016/06/28 12:00	2016/06/28 14:00		
COC Number		c#498319-01-01	c#498319-01-01		
	UNITS	TP16-10N	TP16-12N	RDL	QC Batch
Physical Properties					
Moisture	%	3.0	7.7	0.30	8317706
Ext. Pet. Hydrocarbon					
F2 (C10-C16 Hydrocarbons)	mg/kg	ND	ND	10	8317618
F3 (C16-C34 Hydrocarbons)	mg/kg	ND	ND	50	8317618
F4 (C34-C50 Hydrocarbons)	mg/kg	ND	ND	50	8317618
Reached Baseline at C50	mg/kg	Yes	Yes		8317618
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	76	70		8317618

RDL = Reportable Detection Limit
ND = Not detected

Maxxam Job #: B652797
Report Date: 2016/07/07

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: LP

BC LEPH/HEPH PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OY1374	OY1376		
Sampling Date		2016/06/28 12:00	2016/06/28 14:00		
COC Number		c#498319-01-01	c#498319-01-01		
	UNITS	TP16-10F	TP16-12F	RDL	QC Batch
Physical Properties					
Moisture	%	5.9	6.8	0.30	8317706
Polycyclic Aromatics					
Acenaphthene	mg/kg	ND	ND	0.010	8317385
Acenaphthylene	mg/kg	ND	ND	0.010	8317385
Anthracene	mg/kg	ND	ND	0.010	8317385
Benzo(a)anthracene	mg/kg	0.012	ND	0.010	8317385
Benzo(b&j)fluoranthene	mg/kg	0.013	ND	0.010	8317385
Benzo(k)fluoranthene	mg/kg	ND	ND	0.010	8317385
Benzo(g,h,i)perylene	mg/kg	ND	ND	0.020	8317385
Benzo(a)pyrene	mg/kg	ND	ND	0.010	8317385
Chrysene	mg/kg	0.014	ND	0.010	8317385
Dibenz(a,h)anthracene	mg/kg	ND	ND	0.020	8317385
Fluoranthene	mg/kg	0.021	ND	0.010	8317385
Fluorene	mg/kg	ND	ND	0.010	8317385
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	0.020	8317385
2-Methylnaphthalene	mg/kg	ND	ND	0.010	8317385
Naphthalene	mg/kg	ND	ND	0.010	8317385
Phenanthrene	mg/kg	0.026	ND	0.010	8317385
Pyrene	mg/kg	0.021	ND	0.010	8317385
Low Molecular Weight PAH`s	mg/kg	0.026	ND	0.010	8315526
High Molecular Weight PAH`s	mg/kg	0.081	ND	0.020	8315526
Total PAH	mg/kg	0.11	ND	0.020	8315526
Ext. Pet. Hydrocarbon					
EPH (C10-C19)	mg/kg	ND	ND	100	8317375
EPH (C19-C32)	mg/kg	ND	ND	100	8317375
LEPH (C10-C19 less PAH)	mg/kg	ND	ND	100	8315525
HEPH (C19-C32 less PAH)	mg/kg	ND	ND	100	8315525
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	99	99		8317375
D10-ANTHRACENE (sur.)	%	86	88		8317385
D8-ACENAPHTHYLENE (sur.)	%	84	85		8317385
RDL = Reportable Detection Limit ND = Not detected					

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Sampler Initials: LP

BC LEPH/HEPH PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OY1374	OY1376		
Sampling Date		2016/06/28 12:00	2016/06/28 14:00		
COC Number		c#498319-01-01	c#498319-01-01		
	UNITS	TP16-10F	TP16-12F	RDL	QC Batch
D8-NAPHTHALENE (sur.)	%	85	88		8317385
TERPHENYL-D14 (sur.)	%	87	89		8317385

RDL = Reportable Detection Limit

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Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: LP

BASIC CLASS II LANDFILL PACKAGE (SOIL)

Maxxam ID		OY1374	OY1376		
Sampling Date		2016/06/28 12:00	2016/06/28 14:00		
COC Number		c#498319-01-01	c#498319-01-01		
	UNITS	**TP16-10F**	**TP16-12F**	**RDL**	**QC Batch**
Soluble Parameters					
Soluble (1:1) pH	pH	7.98	8.03	N/A	8319557
Physical Properties					
Closed Cup Flash Point	deg. C	>61	>61	N/A	8317023
Free Liquid	N/A	PASS	PASS	N/A	8317024
Elements					
Leachable Antimony (Sb)	mg/L	ND	ND	1.0	8321421
Leachable Arsenic (As)	mg/L	ND	ND	0.50	8321421
Leachable Barium (Ba)	mg/L	ND	ND	1.0	8321421
Leachable Beryllium (Be)	mg/L	ND	ND	0.50	8321421
Leachable Boron (B)	mg/L	ND	ND	1.0	8321421
Leachable Cadmium (Cd)	mg/L	ND	ND	0.10	8321421
Leachable Chromium (Cr)	mg/L	ND	ND	0.50	8321421
Leachable Cobalt (Co)	mg/L	ND	ND	1.0	8321421
Leachable Copper (Cu)	mg/L	ND	ND	1.0	8321421
Leachable Iron (Fe)	mg/L	9.9	10	1.0	8321421
Leachable Lead (Pb)	mg/L	ND	ND	0.50	8321421
Leachable Mercury (Hg)	mg/L	ND	ND	0.020	8321421
Leachable Nickel (Ni)	mg/L	ND	ND	0.50	8321421
Leachable Selenium (Se)	mg/L	ND	ND	0.10	8321421
Leachable Silver (Ag)	mg/L	ND	ND	0.50	8321421
Leachable Thallium (Tl)	mg/L	ND	ND	0.50	8321421
Leachable Uranium (U)	mg/L	ND	ND	0.20	8321421
Leachable Vanadium (V)	mg/L	ND	ND	1.0	8321421
Leachable Zinc (Zn)	mg/L	2.9	2.4	1.0	8321421
Leachable Zirconium (Zr)	mg/L	ND	ND	1.0	8321421
Volatiles					
Leachable (ZH) Benzene	ug/L	ND	ND	10	8321331
Leachable (ZH) Toluene	ug/L	ND	ND	10	8321331
Leachable (ZH) Ethylbenzene	ug/L	ND	ND	10	8321331
Leachable (ZH) o-Xylene	ug/L	ND	ND	10	8321331

RDL = Reportable Detection Limit
N/A = Not Applicable
ND = Not detected

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Sampler Initials: LP

BASIC CLASS II LANDFILL PACKAGE (SOIL)

Maxxam ID		OY1374	OY1376		
Sampling Date		2016/06/28 12:00	2016/06/28 14:00		
COC Number		c#498319-01-01	c#498319-01-01		
	UNITS	**TP16-10F**	**TP16-12F**	**RDL**	**QC Batch**
Leachable (ZH) m & p-Xylene	ug/L	ND	ND	20	8321331
Leachable (ZH) Xylenes (Total)	ug/L	ND	ND	20	8321331
Surrogate Recovery (%)					
Leachable (ZH) 1,4-Difluorobenzene (sur.)	%	107	108		8321331
Leachable (ZH) 4-Bromofluorobenzene (sur.)	%	97	97		8321331
Leachable (ZH) D4-1,2-Dichloroethane (sur.)	%	79	78		8321331

RDL = Reportable Detection Limit
ND = Not detected

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Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: LP

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		OY1373		OY1374		OY1375	OY1376		
Sampling Date		2016/06/28 12:00		2016/06/28 12:00		2016/06/28 14:00	2016/06/28 14:00		
COC Number		c#498319-01-01		c#498319-01-01		c#498319-01-01	c#498319-01-01		
	UNITS	TP16-10N	QC Batch	TP16-10F	QC Batch	TP16-12N	TP16-12F	RDL	QC Batch
Elements									
Soluble (Hot water) Boron (B)	mg/kg	ND	8319459	0.69	8319446	ND	0.39	0.10	8319459
Soluble Parameters									
Soluble (2:1) pH	pH	8.45	8320580	7.92	8320580	8.02	8.00	N/A	8320580
Elements									
Total Antimony (Sb)	mg/kg	ND	8318821	1.7	8318821	ND	0.91	0.50	8318821
Total Arsenic (As)	mg/kg	6.3	8318821	11	8318821	6.2	6.3	1.0	8318821
Total Barium (Ba)	mg/kg	84	8318821	210	8318821	75	130	1.0	8318821
Total Beryllium (Be)	mg/kg	ND	8318821	ND	8318821	ND	ND	0.40	8318821
Total Cadmium (Cd)	mg/kg	0.057	8318821	2.7	8318821	0.082	0.83	0.050	8318821
Total Chromium (Cr)	mg/kg	16	8318821	33	8318821	21	18	1.0	8318821
Total Cobalt (Co)	mg/kg	9.2	8318821	11	8318821	10	8.3	0.50	8318821
Total Copper (Cu)	mg/kg	15	8318821	46	8318821	15	28	1.0	8318821
Total Lead (Pb)	mg/kg	8.6	8318821	96	8318821	9.0	48	0.50	8318821
Total Mercury (Hg)	mg/kg	ND	8318821	ND	8318821	ND	ND	0.050	8318821
Total Molybdenum (Mo)	mg/kg	ND	8318821	2.1	8318821	0.43	0.65	0.40	8318821
Total Nickel (Ni)	mg/kg	21	8318821	33	8318821	26	23	1.0	8318821
Total Selenium (Se)	mg/kg	ND	8318821	ND	8318821	ND	ND	0.50	8318821
Total Silver (Ag)	mg/kg	ND	8318821	ND	8318821	ND	ND	0.20	8318821
Total Thallium (Tl)	mg/kg	ND	8318821	ND	8318821	ND	ND	0.10	8318821
Total Tin (Sn)	mg/kg	ND	8318821	18	8318821	ND	9.4	1.0	8318821
Total Uranium (U)	mg/kg	0.47	8318821	0.49	8318821	0.57	0.49	0.20	8318821
Total Vanadium (V)	mg/kg	11	8318821	13	8318821	13	10	1.0	8318821
Total Zinc (Zn)	mg/kg	39	8318821	640	8318821	49	420	10	8318821

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RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		OY1374	OY1376		
Sampling Date		2016/06/28 12:00	2016/06/28 14:00		
COC Number		c#498319-01-01	c#498319-01-01		
	UNITS	TP16-10F	TP16-12F	RDL	QC Batch
Elemental Analysis					
Sulphur (Elemental & Polysulphide)	mg/kg	170	ND	100	8320970
Misc. Inorganics					
Leachable Initial pH of Sample	pH	9.30	9.13	N/A	8320033
Leachable pH after HCl	pH	4.61	2.93	N/A	8320033
Leachable Final pH of Leachate	pH	6.61	6.20	N/A	8320033
OIL & GREASE					
Hazardous Waste Oil	%	ND	ND	0.50	8321419

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Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: LP

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		OY1373	OY1374	OY1375	OY1376		
Sampling Date		2016/06/28 12:00	2016/06/28 12:00	2016/06/28 14:00	2016/06/28 14:00		
COC Number		c#498319-01-01	c#498319-01-01	c#498319-01-01	c#498319-01-01		
	UNITS	TP16-10N	TP16-10F	TP16-12N	TP16-12F	RDL	QC Batch
Polycyclic Aromatics							
Acenaphthene	mg/kg	ND		ND		0.0050	8317622
Leachable Acenaphthylene	ug/L		ND		ND	0.10	8320638
Benzo[a]pyrene equivalency	mg/kg	ND		ND		0.10	8315542
Acenaphthylene	mg/kg	ND		ND		0.0050	8317622
Acridine	mg/kg	ND		ND		0.010	8317622
Leachable Acenaphthene	ug/L		ND		ND	0.10	8320638
Anthracene	mg/kg	ND		ND		0.0040	8317622
Leachable Acridine	ug/L		ND		ND	0.20	8320638
Benzo(a)anthracene	mg/kg	ND		ND		0.0050	8317622
Leachable Anthracene	ug/L		ND		ND	0.050	8320638
Benzo(b&j)fluoranthene	mg/kg	ND		ND		0.0050	8317622
Leachable Benzo(a)anthracene	ug/L		ND		ND	0.050	8320638
Benzo(k)fluoranthene	mg/kg	ND		ND		0.0050	8317622
Leachable Benzo(b&j)fluoranthene	ug/L		ND		ND	0.10	8320638
Benzo(g,h,i)perylene	mg/kg	ND		ND		0.0050	8317622
Benzo(c)phenanthrene	mg/kg	ND		ND		0.0050	8317622
Leachable Benzo(k)fluoranthene	ug/L		ND		ND	0.10	8320638
Benzo(a)pyrene	mg/kg	ND		ND		0.0050	8317622
Leachable Benzo(g,h,i)perylene	ug/L		ND		ND	0.050	8320638
Leachable Benzo(c)phenanthrene	ug/L		ND		ND	0.050	8320638
Benzo[e]pyrene	mg/kg	ND		ND		0.0050	8317622
Leachable Benzo(a)pyrene	ug/L		ND		ND	0.050	8320638
Chrysene	mg/kg	ND		ND		0.0050	8317622
Leachable Benzo[e]pyrene	ug/L		ND		ND	0.050	8320638
Dibenz(a,h)anthracene	mg/kg	ND		ND		0.0050	8317622
Leachable Chrysene	ug/L		ND		ND	0.050	8320638
Leachable Dibenz(a,h)anthracene	ug/L		ND		ND	0.050	8320638
Fluoranthene	mg/kg	ND		ND		0.0050	8317622
Fluorene	mg/kg	ND		ND		0.0050	8317622
Leachable Fluorene	ug/L		ND		ND	0.050	8320638
Indeno(1,2,3-cd)pyrene	mg/kg	ND		ND		0.0050	8317622

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Sampler Initials: LP

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		OY1373	OY1374	OY1375	OY1376		
Sampling Date		2016/06/28 12:00	2016/06/28 12:00	2016/06/28 14:00	2016/06/28 14:00		
COC Number		c#498319-01-01	c#498319-01-01	c#498319-01-01	c#498319-01-01		
	UNITS	**TP16-10N**	**TP16-10F**	**TP16-12N**	**TP16-12F**	**RDL**	**QC Batch**
Leachable Fluoranthene	ug/L		ND		ND	0.050	8320638
2-Methylnaphthalene	mg/kg	ND		ND		0.0050	8317622
Leachable Indeno(1,2,3-cd)pyrene	ug/L		ND		ND	0.10	8320638
Naphthalene	mg/kg	ND		ND		0.0050	8317622
Leachable 2-Methylnaphthalene	ug/L		ND		ND	0.10	8320638
Phenanthrene	mg/kg	ND		ND		0.0050	8317622
Leachable Naphthalene	ug/L		ND		ND	0.10	8320638
Perylene	mg/kg	ND		ND		0.0050	8317622
Leachable Phenanthrene	ug/L		ND		ND	0.050	8320638
Pyrene	mg/kg	ND		ND		0.0050	8317622
Leachable Perylene	ug/L		ND		ND	0.050	8320638
Quinoline	mg/kg	ND		ND		0.010	8317622
Leachable Pyrene	ug/L		ND		ND	0.050	8320638
Leachable Quinoline	ug/L		ND		ND	0.20	8320638
Surrogate Recovery (%)							
Leachable D10-ANTHRACENE (sur.)	%		111		112		8320638
Leachable D8-ACENAPHTHYLENE (sur.)	%		101		101		8320638
Leachable D8-NAPHTHALENE (sur.)	%		84		85		8320638
Leachable TERPHENYL-D14 (sur.)	%		110		112		8320638
D10-ANTHRACENE (sur.)	%	74		64			8317622
D8-ACENAPHTHYLENE (sur.)	%	70		63			8317622
D8-NAPHTHALENE (sur.)	%	71		65			8317622
TERPHENYL-D14 (sur.)	%	75		68			8317622

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GENERAL COMMENTS

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

Package 1	6.7°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: LP

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317375	O-TERPHENYL (sur.)	2016/07/06	95	50 - 130	96	50 - 130	105	%			102	50 - 130
8317385	D10-ANTHRACENE (sur.)	2016/07/06	87	60 - 130	95	60 - 130	95	%				
8317385	D8-ACENAPHTHYLENE (sur.)	2016/07/06	83	50 - 130	92	50 - 130	90	%				
8317385	D8-NAPHTHALENE (sur.)	2016/07/06	84	50 - 130	92	50 - 130	92	%				
8317385	TERPHENYL-D14 (sur.)	2016/07/06	87	60 - 130	96	60 - 130	100	%				
8317618	O-TERPHENYL (sur.)	2016/07/06	88	50 - 130	92	50 - 130	96	%				
8317622	D10-ANTHRACENE (sur.)	2016/07/06	88	50 - 130	96	50 - 130	92	%				
8317622	D8-ACENAPHTHYLENE (sur.)	2016/07/06	81	50 - 130	89	50 - 130	87	%				
8317622	D8-NAPHTHALENE (sur.)	2016/07/06	81	50 - 130	88	50 - 130	85	%				
8317622	TERPHENYL-D14 (sur.)	2016/07/06	85	50 - 130	91	50 - 130	90	%				
8320638	Leachable D10-ANTHRACENE (sur.)	2016/07/07	111	50 - 130	112	50 - 130	113	%				
8320638	Leachable D8-ACENAPHTHYLENE (sur.)	2016/07/07	99	50 - 130	101	50 - 130	101	%				
8320638	Leachable D8-NAPHTHALENE (sur.)	2016/07/07	87	50 - 130	90	50 - 130	87	%				
8320638	Leachable TERPHENYL-D14 (sur.)	2016/07/07	111	50 - 130	113	50 - 130	113	%				
8321331	Leachable (ZH) 1,4-Difluorobenzene (sur.)	2016/07/07	103	70 - 130	103	70 - 130	105	%				
8321331	Leachable (ZH) 4-Bromofluorobenzene (sur.)	2016/07/07	101	70 - 130	98	70 - 130	98	%				
8321331	Leachable (ZH) D4-1,2-Dichloroethane (sur.)	2016/07/07	78	70 - 130	79	70 - 130	78	%				
8317023	Closed Cup Flash Point	2016/07/01							NC	35		
8317375	EPH (C10-C19)	2016/07/06	83	50 - 130	85	50 - 130	ND, RDL=100	mg/kg	NC	50	106	50 - 130
8317375	EPH (C19-C32)	2016/07/06	79	50 - 130	80	50 - 130	ND, RDL=100	mg/kg	NC	50	101	50 - 130
8317385	2-Methylnaphthalene	2016/07/06	87	50 - 130	93	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Acenaphthene	2016/07/06	83	50 - 130	89	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Acenaphthylene	2016/07/06	84	50 - 130	90	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Anthracene	2016/07/06	87	60 - 130	92	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(a)anthracene	2016/07/06	94	60 - 130	101	60 - 130	ND, RDL=0.010	mg/kg	NC	50		

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QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: LP

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317385	Benzo(a)pyrene	2016/07/06	90	60 - 130	98	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(b&j)fluoranthene	2016/07/06	91	60 - 130	99	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(g,h,i)perylene	2016/07/06	85	60 - 130	95	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Benzo(k)fluoranthene	2016/07/06	83	60 - 130	90	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Chrysene	2016/07/06	89	60 - 130	96	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Dibenz(a,h)anthracene	2016/07/06	92	60 - 130	101	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Fluoranthene	2016/07/06	91	60 - 130	97	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Fluorene	2016/07/06	88	50 - 130	95	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Indeno(1,2,3-cd)pyrene	2016/07/06	91	60 - 130	102	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Naphthalene	2016/07/06	85	50 - 130	91	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Phenanthrene	2016/07/06	90	60 - 130	96	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Pyrene	2016/07/06	89	60 - 130	95	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317618	F2 (C10-C16 Hydrocarbons)	2016/07/06	91	50 - 130	93	70 - 130	ND, RDL=10	mg/kg	NC	50		
8317618	F3 (C16-C34 Hydrocarbons)	2016/07/06	95	50 - 130	93	70 - 130	ND, RDL=50	mg/kg	NC	50		
8317618	F4 (C34-C50 Hydrocarbons)	2016/07/06	89	50 - 130	99	70 - 130	ND, RDL=50	mg/kg	NC	50		
8317622	2-Methylnaphthalene	2016/07/06	82	50 - 130	86	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Acenaphthene	2016/07/06	78	50 - 130	82	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Acenaphthylene	2016/07/06	78	50 - 130	83	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317622	Acridine	2016/07/06	59	50 - 130	65	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317622	Anthracene	2016/07/06	81	50 - 130	86	50 - 130	ND, RDL=0.0040	mg/kg	NC	50		
8317622	Benzo(a)anthracene	2016/07/06	79	50 - 130	85	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(a)pyrene	2016/07/06	81	50 - 130	87	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(b&j)fluoranthene	2016/07/06	84	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(c)phenanthrene	2016/07/06	77	50 - 130	81	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(g,h,i)perylene	2016/07/06	84	50 - 130	90	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(k)fluoranthene	2016/07/06	78	50 - 130	84	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo[e]pyrene	2016/07/06	81	50 - 130	80	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Chrysene	2016/07/06	81	50 - 130	79	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Dibenz(a,h)anthracene	2016/07/06	90	50 - 130	95	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Fluoranthene	2016/07/06	85	50 - 130	89	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Fluorene	2016/07/06	81	50 - 130	87	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Indeno(1,2,3-cd)pyrene	2016/07/06	84	50 - 130	89	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Naphthalene	2016/07/06	80	50 - 130	83	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Perylene	2016/07/06	88	50 - 130	92	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Phenanthrene	2016/07/06	83	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		

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Maxxam Job #: B652797
Report Date: 2016/07/07

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: LP

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317622	Pyrene	2016/07/06	84	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Quinoline	2016/07/06	103	50 - 130	102	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317706	Moisture	2016/07/04					ND, RDL=0.30	%	1.3	20		
8318821	Total Antimony (Sb)	2016/07/06	85	75 - 125	93	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8318821	Total Arsenic (As)	2016/07/06	99	75 - 125	97	75 - 125	ND, RDL=1.0	mg/kg	1.6	35	96	53 - 147
8318821	Total Barium (Ba)	2016/07/06	NC	75 - 125	98	75 - 125	ND, RDL=1.0	mg/kg	7.0	35	99	80 - 119
8318821	Total Beryllium (Be)	2016/07/06	108	75 - 125	101	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8318821	Total Cadmium (Cd)	2016/07/06	100	75 - 125	95	75 - 125	ND, RDL=0.050	mg/kg	7.3	35		
8318821	Total Chromium (Cr)	2016/07/06	NC	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	3.5	35	107	59 - 141
8318821	Total Cobalt (Co)	2016/07/06	99	75 - 125	95	75 - 125	ND, RDL=0.50	mg/kg	4.4	35	98	58 - 142
8318821	Total Copper (Cu)	2016/07/06	NC	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	2.9	35	100	83 - 117
8318821	Total Lead (Pb)	2016/07/06	95	75 - 125	93	75 - 125	ND, RDL=0.50	mg/kg	0.55	35	100	79 - 121
8318821	Total Mercury (Hg)	2016/07/06	102	75 - 125	105	75 - 125	ND, RDL=0.050	mg/kg	NC	35		
8318821	Total Molybdenum (Mo)	2016/07/06	102	75 - 125	94	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8318821	Total Nickel (Ni)	2016/07/06	NC	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	4.6	35	102	79 - 121
8318821	Total Selenium (Se)	2016/07/06	99	75 - 125	98	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8318821	Total Silver (Ag)	2016/07/06	100	75 - 125	95	75 - 125	ND, RDL=0.20	mg/kg	NC	35		
8318821	Total Thallium (Tl)	2016/07/06	92	75 - 125	96	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8318821	Total Tin (Sn)	2016/07/06	103	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	NC	35		
8318821	Total Uranium (U)	2016/07/06	86	75 - 125	91	75 - 125	ND, RDL=0.20	mg/kg	3.9	35		
8318821	Total Vanadium (V)	2016/07/06	NC	75 - 125	95	75 - 125	ND, RDL=1.0	mg/kg	5.9	35	107	79 - 121
8318821	Total Zinc (Zn)	2016/07/06	NC	75 - 125	95	75 - 125	ND, RDL=10	mg/kg	5.5	35	102	79 - 121
8319446	Soluble (Hot water) Boron (B)	2016/07/05	107	75 - 125	102	75 - 125	ND, RDL=0.10	mg/kg	16	35		
8319459	Soluble (Hot water) Boron (B)	2016/07/05	97	75 - 125	96	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8319557	Soluble (1:1) pH	2016/07/05			100	97 - 103			0.13	N/A	101	98 - 102
8320033	Leachable Final pH of Leachate	2016/07/06			100	97 - 103			0.81	N/A		
8320033	Leachable Initial pH of Sample	2016/07/06			100	97 - 103			0.82	N/A		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8320033	Leachable pH after HCl	2016/07/06			100	97 - 103			1.8	N/A		
8320580	Soluble (2:1) pH	2016/07/06			100	97 - 103			1.2	N/A	102	98 - 102
8320638	Leachable 2-Methylnaphthalene	2016/07/07	96	50 - 130	98	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Acenaphthene	2016/07/07	96	50 - 130	99	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Acenaphthylene	2016/07/07	96	50 - 130	99	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Acridine	2016/07/07	95	50 - 130	98	50 - 130	ND, RDL=0.20	ug/L	NC	40		
8320638	Leachable Anthracene	2016/07/07	98	50 - 130	101	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(a)anthracene	2016/07/07	113	50 - 130	118	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(a)pyrene	2016/07/07	110	50 - 130	118	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(b&j)fluoranthene	2016/07/07	113	50 - 130	119	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Benzo(c)phenanthrene	2016/07/07	104	50 - 130	108	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(g,h,i)perylene	2016/07/07	115	50 - 130	122	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(k)fluoranthene	2016/07/07	114	50 - 130	119	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Benzo[e]pyrene	2016/07/07	107	50 - 130	114	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Chrysene	2016/07/07	113	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Dibenz(a,h)anthracene	2016/07/07	127	50 - 130	123	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Fluoranthene	2016/07/07	111	50 - 130	118	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Fluorene	2016/07/07	101	50 - 130	106	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Indeno(1,2,3-cd)pyrene	2016/07/07	111	50 - 130	120	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Naphthalene	2016/07/07	95	50 - 130	96	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Perylene	2016/07/07	111	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	40		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8320638	Leachable Phenanthrene	2016/07/07	105	50 - 130	108	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Pyrene	2016/07/07	110	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Quinoline	2016/07/07	103	50 - 130	105	50 - 130	ND, RDL=0.20	ug/L	NC	40		
8320970	Sulphur (Elemental & Polysulphide)	2016/07/07			104	75 - 125	ND, RDL=100	mg/kg	NC	35	103	75 - 125
8321331	Leachable (ZH) Benzene	2016/07/07	85	70 - 130	85	70 - 130	ND, RDL=10	ug/L	NC	50		
8321331	Leachable (ZH) Ethylbenzene	2016/07/07	92	70 - 130	90	70 - 130	ND, RDL=10	ug/L	NC	50		
8321331	Leachable (ZH) m & p-Xylene	2016/07/07	98	70 - 130	95	70 - 130	ND, RDL=20	ug/L	NC	50		
8321331	Leachable (ZH) o-Xylene	2016/07/07	98	70 - 130	94	70 - 130	ND, RDL=10	ug/L	NC	50		
8321331	Leachable (ZH) Toluene	2016/07/07	87	70 - 130	86	70 - 130	ND, RDL=10	ug/L	NC	50		
8321331	Leachable (ZH) Xylenes (Total)	2016/07/07					ND, RDL=20	ug/L	NC	50		
8321419	Hazardous Waste Oil	2016/07/07	96	65 - 135	97	65 - 135	ND, RDL=0.50	%	NC	35		
8321421	Leachable Antimony (Sb)	2016/07/07	99	75 - 125	101	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Arsenic (As)	2016/07/07	100	75 - 125	98	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Barium (Ba)	2016/07/07	89	75 - 125	97	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Beryllium (Be)	2016/07/07	99	75 - 125	98	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Boron (B)	2016/07/07	NC	75 - 125	99	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Cadmium (Cd)	2016/07/07	97	75 - 125	99	80 - 120	ND, RDL=0.10	mg/L	NC	35		
8321421	Leachable Chromium (Cr)	2016/07/07	95	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Cobalt (Co)	2016/07/07	95	75 - 125	94	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Copper (Cu)	2016/07/07	93	75 - 125	95	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Iron (Fe)	2016/07/07	NC	75 - 125	103	80 - 120	ND, RDL=1.0	mg/L	8.7	35		
8321421	Leachable Lead (Pb)	2016/07/07	90	75 - 125	91	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Mercury (Hg)	2016/07/07	106	75 - 125	106	80 - 120	ND, RDL=0.020	mg/L	NC	35		
8321421	Leachable Nickel (Ni)	2016/07/07	95	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Selenium (Se)	2016/07/07	98	75 - 125	100	80 - 120	ND, RDL=0.10	mg/L	NC	35		
8321421	Leachable Silver (Ag)	2016/07/07	94	75 - 125	96	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Thallium (Tl)	2016/07/07	91	75 - 125	93	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Uranium (U)	2016/07/07	93	75 - 125	94	80 - 120	ND, RDL=0.20	mg/L	NC	35		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8321421	Leachable Vanadium (V)	2016/07/07	99	75 - 125	99	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Zinc (Zn)	2016/07/07	92	75 - 125	94	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Zirconium (Zr)	2016/07/07	107	75 - 125	106	80 - 120	ND, RDL=1.0	mg/L	NC	35		

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone (403) 291-3077 Fax (403) 291-9468

Maxxam Job #: B652797
Report Date: 2016/07/07

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: LP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Harry (Peng) Liang, Senior Analyst

Rob Reinert, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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1445

Chain Of Custody Record

Page 1 of 1

INVOICE TO:	
Company Name	#17775 SLR CONSULTING (CANADA) LTD
Contact Name	Lindsay Paterson
Address	200-1475 Ellis Street
	Kelowna BC V1Y 2A3
Phone	(250) 762-7202 Fax: (250) 374-8656
Email	lpaterson@slrconsulting.com, analytical@slrconsulting.

Report Information	
Company Name	[illegible]
Contact Name	Lindsay Paterson
Address	
Phone	(250) 762-7202 Fax: (250) 374-8656
Email	lpaterson@slrconsulting.com, analytical@slrconsulting.c

Project Information	
Quotation #	B51186
P.O. #	KEL1958
Project #	219.05112.00013
Project Name	
Site #	
Sampled By	LP/KN

Laboratory Use Only	
Maxxam Job #	Bottle Order #: 498319
Chain Of Custody Record: C#498319-01-01	Project Manager: Letitia Prefontaine

Regulatory Criteria:

- [X] CSR AL
- [X] CCME AL
- [ ] BC Water Quality
- [X] Other Alberta Landfill.

Special Instructions:

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: [X]

(will be applied if Rush TAT is not specified):

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: ____ [ ]

Rush Confirmation Number: ____ *(call lab for #)*

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled (m/d/y)	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	Basic Class II Landfill Package	Elemental Sulfur	Special Waste Oil and Grease	TCLP PAHs	CSR BTEX/VPH in Soil - Field Preserved	LEPH & HEPH, EPH with PAH for CSR in Soil	CSR/CCME Metals in Soil	[illegible]	CCME F2-F4.	CCME PAH.	# of Bottles	Comments
1	[illegible]	TP16-10N	6/28/16	12:00pm	SOIL								X		X	X	8	
2	[illegible]	TP16-10F	6/28/16	12:00pm	SOIL		X	X	X	X	[illegible]	X	X				8	
3	[illegible]	TP16-12N	6/28/16	2:00pm	SOIL								X		X	X	8	
4		TP16-12F	6/28/16	2:00pm	SOIL		X	X	X	X	[illegible]	X	X				8	
5																		
6																		Plus 16 empty
7																		soil jars.
8																		
9																		
10																		

29-Jun-16 16:08
Letitia Prefontaine
B652797
NB6 INS-0001
ORN

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
LPaterson / [signature]	16/06/29	12:00pm	[signature] JASBIRJIT KAUR	2016/06/29	16:08	16

Lab Use Only		
Time Sensitive [ ]	Temperature (°C) on Receipt: 7/6/7	Custody Seal Intact on Cooler? [ ] Yes [X] No

White: Maxxam Yellow: Client

ICE - YES

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation o/a Maxxam Analytics

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Success Through Science®

Your P.O. #: KEL1958
Your Project #: 219.05112.00013
Your C.O.C. #: C#498319-06-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2016/07/14
Report #: R2215575
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B652802
Received: 2016/06/29, 16:09

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Boron (Hot Water Soluble)	2	2016/07/05	2016/07/05	AB SOP-00034 / AB SOP-00042	EPA 200.7 CFR 2012 m
BTEX in Leachates by HS GC/MS/FID (2)	1	2016/07/06	2016/07/07	AB SOP-00039	EPA 8260C m
BTEX/MTBE LH VH F1 in Soil - Field Pres. (1, 3)	1	N/A	2016/07/13	BBY8SOP-00010,	EPA 8260c R3 m
BC Hydrocarbons in Soil by GC/FID	1	2016/07/04	2016/07/07	CAL SOP-00239	BCMOE EPH s 12/00
EPH less PAH in Soil By GC/FID	1	N/A	2016/07/07	CAL SOP-00239	Auto Calc
Elemental Sulphur	1	2016/07/06	2016/07/07	CAL SOP-00018	CJSS65:811-813,1985m
Volatile F1-BTEX (1)	1	N/A	2016/07/14	BBY WI-00033	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (4)	1	2016/07/03	2016/07/06	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS m
Flash Point	1	N/A	2016/07/01	AB SOP-00062	ASTM D3828-12A/A m
ICPMS Metals on TCLP Leachate (2)	1	2016/07/06	2016/07/07	AB SOP-00015 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Soils	2	2016/07/04	2016/07/06	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Moisture	2	N/A	2016/07/04	AB SOP-00002	CCME PHC-CWS m
Benzo[a]pyrene Equivalency	1	N/A	2016/07/07	AB SOP-00003	Auto Calc
PAH in Leachates by GC/MS (2)	1	2016/07/06	2016/07/07	AB SOP-00003,	EPA 8270d m
PAH in Soil by GC/MS	1	2016/07/03	2016/07/06	AB SOP-00036 / AB SOP-00003	EPA 3540C/8270D m
PAH in Soil by GC/MS	1	2016/07/04	2016/07/06	AB SOP-00003 AB SOP-00036	EPA 8270d m
Total LMW, HMW, Total PAH Calc	1	N/A	2016/07/07	AB SOP-00003	Auto Calc
Free Liquid (Paint filter)	1	N/A	2016/07/01	AB SOP-00047	EPA 9095B R2 m
TCLP pH Measurements	1	2016/07/05	2016/07/06	AB SOP-00015 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:2 Extract)	2	2016/07/06	2016/07/06	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
pH @25C (1:1 extract, solid waste)	1	2016/07/05	2016/07/05	AB SOP-00033 / AB SOP-00006	SM 22 4500 H+B m
Special Waste Oil and Grease (1)	1	N/A	2016/07/07	BBY8SOP-00008	BCMOE BCLM Mar 2005
Volatile HC-BTEX	1	2016/06/29	2016/07/08	CAL SOP-00240	Auto Calc

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Your P.O. #: KEL1958
Your Project #: 219.05112.00013
Your C.O.C. #: C#498319-06-01

Attention:Lindsay Paterson

SLR CONSULTING (CANADA) LTD
200-1475 Ellis Street
Kelowna, BC
CANADA V1Y 2A3

Report Date: 2016/07/14
Report #: R2215575
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B652802
Received: 2016/06/29, 16:09

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID	1	2016/06/30	2016/07/07	CAL SOP-00240	BC MELP VH 2007

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

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

(1) This test was performed by Maxxam Vancouver
(2) Samples were extracted as per EPA 1311 unless otherwise noted in the report.
(3) The extraction date for VOC, BTEX, VH, or F1 samples that are field preserved with methanol equals the date sampled, unless otherwise stated.
(4) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Carmen McKay, Project Manager
Email: CMcKay@maxxam.ca
Phone# (403)219-3683
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B652802
Report Date: 2016/07/14

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

AT1 BTEX AND F1-F4 IN SOIL (VIALS)

Maxxam ID		OY1395		
Sampling Date		2016/06/29 09:30		
COC Number		C#498319-06-01		
	UNITS	TP16-20N	RDL	QC Batch
Physical Properties				
Moisture	%	3.1	0.30	8318823
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	ND	10	8317618
F3 (C16-C34 Hydrocarbons)	mg/kg	ND	50	8317618
F4 (C34-C50 Hydrocarbons)	mg/kg	ND	50	8317618
Reached Baseline at C50	mg/kg	Yes		8317618
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	74		8317618

RDL = Reportable Detection Limit
ND = Not detected

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Maxxam Job #: B652802
Report Date: 2016/07/14

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

BC LEPH/HEPH PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OY1396		
Sampling Date		2016/06/29 09:30		
COC Number		C#498319-06-01		
	UNITS	**TP16-20F**	**RDL**	**QC Batch**
Physical Properties				
Moisture	%	5.6	0.30	8318823
Polycyclic Aromatics				
Acenaphthene	mg/kg	ND	0.010	8317385
Acenaphthylene	mg/kg	ND	0.010	8317385
Anthracene	mg/kg	ND	0.010	8317385
Benzo(a)anthracene	mg/kg	ND	0.010	8317385
Benzo(b&j)fluoranthene	mg/kg	ND	0.010	8317385
Benzo(k)fluoranthene	mg/kg	ND	0.010	8317385
Benzo(g,h,i)perylene	mg/kg	ND	0.020	8317385
Benzo(a)pyrene	mg/kg	ND	0.010	8317385
Chrysene	mg/kg	ND	0.010	8317385
Dibenz(a,h)anthracene	mg/kg	ND	0.020	8317385
Fluoranthene	mg/kg	ND	0.010	8317385
Fluorene	mg/kg	ND	0.010	8317385
Indeno(1,2,3-cd)pyrene	mg/kg	ND	0.020	8317385
2-Methylnaphthalene	mg/kg	ND	0.010	8317385
Naphthalene	mg/kg	ND	0.010	8317385
Phenanthrene	mg/kg	ND	0.010	8317385
Pyrene	mg/kg	ND	0.010	8317385
Low Molecular Weight PAH`s	mg/kg	ND	0.010	8315526
High Molecular Weight PAH`s	mg/kg	ND	0.020	8315526
Total PAH	mg/kg	ND	0.020	8315526
Ext. Pet. Hydrocarbon				
EPH (C10-C19)	mg/kg	ND	100	8317375
EPH (C19-C32)	mg/kg	ND	100	8317375
LEPH (C10-C19 less PAH)	mg/kg	ND	100	8315525
HEPH (C19-C32 less PAH)	mg/kg	ND	100	8315525
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	101		8317375
D10-ANTHRACENE (sur.)	%	94		8317385
D8-ACENAPHTHYLENE (sur.)	%	91		8317385

RDL = Reportable Detection Limit
ND = Not detected

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Maxxam Job #: B652802
Report Date: 2016/07/14

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Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

BC LEPH/HEPH PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		OY1396		
Sampling Date		2016/06/29 09:30		
COC Number		C#498319-06-01		
	UNITS	**TP16-20F**	**RDL**	**QC Batch**
D8-NAPHTHALENE (sur.)	%	92		8317385
TERPHENYL-D14 (sur.)	%	96		8317385
RDL = Reportable Detection Limit				

Maxxam Job #: B652802
Report Date: 2016/07/14

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Your P.O. #: KEL1958
Sampler Initials: KN

BC BTEX/VPH IN SOIL (SOIL)

Maxxam ID		OY1396		
Sampling Date		2016/06/29 09:30		
COC Number		C#498319-06-01		
	UNITS	TP16-20F	RDL	QC Batch
Volatiles				
Xylenes (Total)	mg/kg	ND	0.040	8315546
VH C6-C10	mg/kg	ND	21	8315546
Methyl-tert-butylether (MTBE)	mg/kg	ND	0.30	8318152
VPH (VH6 to 10 - BTEX)	mg/kg	ND	21	8315546
Benzene	mg/kg	ND	0.015	8318152
Toluene	mg/kg	ND	0.060	8318152
Ethylbenzene	mg/kg	ND	0.030	8318152
m & p-Xylene	mg/kg	ND	0.12	8318152
o-Xylene	mg/kg	ND	0.12	8318152
Styrene	mg/kg	ND	0.090	8318152
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	97		8318152
4-Bromofluorobenzene (sur.)	%	98		8318152
D10-ETHYLBENZENE (sur.)	%	99		8318152
D4-1,2-Dichloroethane (sur.)	%	103		8318152

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Maxxam Job #: B652802
Report Date: 2016/07/14

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

BASIC CLASS II LANDFILL PACKAGE (SOIL)

Maxxam ID		OY1396		
Sampling Date		2016/06/29 09:30		
COC Number		C#498319-06-01		
	UNITS	TP16-20F	RDL	QC Batch
Soluble Parameters				
Soluble (1:1) pH	pH	8.32	N/A	8319557
Physical Properties				
Closed Cup Flash Point	deg. C	>61	N/A	8317023
Free Liquid	N/A	PASS	N/A	8317024
Elements				
Leachable Antimony (Sb)	mg/L	ND	1.0	8321421
Leachable Arsenic (As)	mg/L	ND	0.50	8321421
Leachable Barium (Ba)	mg/L	ND	1.0	8321421
Leachable Beryllium (Be)	mg/L	ND	0.50	8321421
Leachable Boron (B)	mg/L	ND	1.0	8321421
Leachable Cadmium (Cd)	mg/L	ND	0.10	8321421
Leachable Chromium (Cr)	mg/L	ND	0.50	8321421
Leachable Cobalt (Co)	mg/L	ND	1.0	8321421
Leachable Copper (Cu)	mg/L	ND	1.0	8321421
Leachable Iron (Fe)	mg/L	9.6	1.0	8321421
Leachable Lead (Pb)	mg/L	ND	0.50	8321421
Leachable Mercury (Hg)	mg/L	ND	0.020	8321421
Leachable Nickel (Ni)	mg/L	ND	0.50	8321421
Leachable Selenium (Se)	mg/L	ND	0.10	8321421
Leachable Silver (Ag)	mg/L	ND	0.50	8321421
Leachable Thallium (Tl)	mg/L	ND	0.50	8321421
Leachable Uranium (U)	mg/L	ND	0.20	8321421
Leachable Vanadium (V)	mg/L	ND	1.0	8321421
Leachable Zinc (Zn)	mg/L	ND	1.0	8321421
Leachable Zirconium (Zr)	mg/L	ND	1.0	8321421
Volatiles				
Leachable (ZH) Benzene	ug/L	ND	10	8321331
Leachable (ZH) Toluene	ug/L	ND	10	8321331
Leachable (ZH) Ethylbenzene	ug/L	ND	10	8321331
Leachable (ZH) o-Xylene	ug/L	ND	10	8321331

RDL = Reportable Detection Limit
N/A = Not Applicable
ND = Not detected

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BASIC CLASS II LANDFILL PACKAGE (SOIL)

Maxxam ID		OY1396		
Sampling Date		2016/06/29 09:30		
COC Number		C#498319-06-01		
	UNITS	**TP16-20F**	**RDL**	**QC Batch**
Leachable (ZH) m & p-Xylene	ug/L	ND	20	8321331
Leachable (ZH) Xylenes (Total)	ug/L	ND	20	8321331
Surrogate Recovery (%)				
Leachable (ZH) 1,4-Difluorobenzene (sur.)	%	107		8321331
Leachable (ZH) 4-Bromofluorobenzene (sur.)	%	98		8321331
Leachable (ZH) D4-1,2-Dichloroethane (sur.)	%	79		8321331

RDL = Reportable Detection Limit
ND = Not detected

Maxxam Job #: B652802
Report Date: 2016/07/14

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

CSR/CCME METALS IN SOIL (SOIL)

Maxxam ID		OY1395	OY1396		
Sampling Date		2016/06/29 09:30	2016/06/29 09:30		
COC Number		C#498319-06-01	C#498319-06-01		
	UNITS	**TP16-20N**	**TP16-20F**	**RDL**	**QC Batch**
Elements					
Soluble (Hot water) Boron (B)	mg/kg	ND	ND	0.10	8319459
Soluble Parameters					
Soluble (2:1) pH	pH	8.19	8.44	N/A	8320580
Elements					
Total Antimony (Sb)	mg/kg	ND	ND	0.50	8318821
Total Arsenic (As)	mg/kg	5.5	5.8	1.0	8318821
Total Barium (Ba)	mg/kg	87	79	1.0	8318821
Total Beryllium (Be)	mg/kg	ND	ND	0.40	8318821
Total Cadmium (Cd)	mg/kg	0.055	0.056	0.050	8318821
Total Chromium (Cr)	mg/kg	15	18	1.0	8318821
Total Cobalt (Co)	mg/kg	8.0	8.8	0.50	8318821
Total Copper (Cu)	mg/kg	15	15	1.0	8318821
Total Lead (Pb)	mg/kg	7.7	8.3	0.50	8318821
Total Mercury (Hg)	mg/kg	ND	ND	0.050	8318821
Total Molybdenum (Mo)	mg/kg	ND	0.41	0.40	8318821
Total Nickel (Ni)	mg/kg	19	22	1.0	8318821
Total Selenium (Se)	mg/kg	ND	ND	0.50	8318821
Total Silver (Ag)	mg/kg	ND	ND	0.20	8318821
Total Thallium (Tl)	mg/kg	ND	ND	0.10	8318821
Total Tin (Sn)	mg/kg	ND	ND	1.0	8318821
Total Uranium (U)	mg/kg	0.52	0.68	0.20	8318821
Total Vanadium (V)	mg/kg	10	11	1.0	8318821
Total Zinc (Zn)	mg/kg	36	43	10	8318821

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Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		OY1396		
Sampling Date		2016/06/29 09:30		
COC Number		C#498319-06-01		
	UNITS	**TP16-20F**	**RDL**	**QC Batch**
Elemental Analysis				
Sulphur (Elemental & Polysulphide)	mg/kg	100	100	8320970
Misc. Inorganics				
Leachable Initial pH of Sample	pH	9.40	N/A	8320033
Leachable pH after HCl	pH	3.31	N/A	8320033
Leachable Final pH of Leachate	pH	6.26	N/A	8320033
OIL & GREASE				
Hazardous Waste Oil	%	ND	0.50	8321419

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ND = Not detected

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Maxxam A Bureau Veritas Group Company

Maxxam Job #: B652802
Report Date: 2016/07/14

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		OY1395	OY1396		
Sampling Date		2016/06/29 09:30	2016/06/29 09:30		
COC Number		C#498319-06-01	C#498319-06-01		
	UNITS	TP16-20N	TP16-20F	RDL	QC Batch
Polycyclic Aromatics					
Acenaphthene	mg/kg	ND		0.0050	8317622
Leachable Acenaphthylene	ug/L		ND	0.10	8320638
Benzo[a]pyrene equivalency	mg/kg	ND		0.10	8315542
Acenaphthylene	mg/kg	ND		0.0050	8317622
Acridine	mg/kg	ND		0.010	8317622
Leachable Acenaphthene	ug/L		ND	0.10	8320638
Anthracene	mg/kg	ND		0.0040	8317622
Leachable Acridine	ug/L		ND	0.20	8320638
Benzo(a)anthracene	mg/kg	ND		0.0050	8317622
Leachable Anthracene	ug/L		ND	0.050	8320638
Benzo(b&j)fluoranthene	mg/kg	ND		0.0050	8317622
Leachable Benzo(a)anthracene	ug/L		ND	0.050	8320638
Benzo(k)fluoranthene	mg/kg	ND		0.0050	8317622
Leachable Benzo(b&j)fluoranthene	ug/L		ND	0.10	8320638
Benzo(g,h,i)perylene	mg/kg	ND		0.0050	8317622
Benzo(c)phenanthrene	mg/kg	ND		0.0050	8317622
Leachable Benzo(k)fluoranthene	ug/L		ND	0.10	8320638
Benzo(a)pyrene	mg/kg	ND		0.0050	8317622
Leachable Benzo(g,h,i)perylene	ug/L		ND	0.050	8320638
Leachable Benzo(c)phenanthrene	ug/L		ND	0.050	8320638
Benzo[e]pyrene	mg/kg	ND		0.0050	8317622
Leachable Benzo(a)pyrene	ug/L		ND	0.050	8320638
Chrysene	mg/kg	ND		0.0050	8317622
Leachable Benzo[e]pyrene	ug/L		ND	0.050	8320638
Dibenz(a,h)anthracene	mg/kg	ND		0.0050	8317622
Leachable Chrysene	ug/L		ND	0.050	8320638
Leachable Dibenz(a,h)anthracene	ug/L		ND	0.050	8320638
Fluoranthene	mg/kg	ND		0.0050	8317622
Fluorene	mg/kg	ND		0.0050	8317622
Leachable Fluorene	ug/L		ND	0.050	8320638
Indeno(1,2,3-cd)pyrene	mg/kg	ND		0.0050	8317622
RDL = Reportable Detection Limit ND = Not detected					

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Maxxam Job #: B652802
Report Date: 2016/07/14

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

SEMIVOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		OY1395	OY1396		
Sampling Date		2016/06/29 09:30	2016/06/29 09:30		
COC Number		C#498319-06-01	C#498319-06-01		
	UNITS	**TP16-20N**	**TP16-20F**	**RDL**	**QC Batch**
Leachable Fluoranthene	ug/L		ND	0.050	8320638
2-Methylnaphthalene	mg/kg	ND		0.0050	8317622
Leachable Indeno(1,2,3-cd)pyrene	ug/L		ND	0.10	8320638
Naphthalene	mg/kg	ND		0.0050	8317622
Leachable 2-Methylnaphthalene	ug/L		ND	0.10	8320638
Phenanthrene	mg/kg	ND		0.0050	8317622
Leachable Naphthalene	ug/L		ND	0.10	8320638
Perylene	mg/kg	ND		0.0050	8317622
Leachable Phenanthrene	ug/L		ND	0.050	8320638
Pyrene	mg/kg	ND		0.0050	8317622
Leachable Perylene	ug/L		ND	0.050	8320638
Quinoline	mg/kg	ND		0.010	8317622
Leachable Pyrene	ug/L		ND	0.050	8320638
Leachable Quinoline	ug/L		ND	0.20	8320638
Surrogate Recovery (%)					
Leachable D10-ANTHRACENE (sur.)	%		113		8320638
Leachable D8-ACENAPHTHYLENE (sur.)	%		98		8320638
Leachable D8-NAPHTHALENE (sur.)	%		85		8320638
Leachable TERPHENYL-D14 (sur.)	%		113		8320638
D10-ANTHRACENE (sur.)	%	68			8317622
D8-ACENAPHTHYLENE (sur.)	%	66			8317622
D8-NAPHTHALENE (sur.)	%	69			8317622
TERPHENYL-D14 (sur.)	%	70			8317622
RDL = Reportable Detection Limit ND = Not detected					

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Maxxam Job #: B652802
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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

CCME BTEX/F1IN SOIL - FIELD PRESERVED (SOIL)

Maxxam ID		OY1395		
Sampling Date		2016/06/29 09:30		
COC Number		C#498319-06-01		
	UNITS	**TP16-20N**	**RDL**	**QC Batch**
Calculated Parameters				
F1 (C6-C10) - BTEX	mg/kg	ND	43	8327962
Volatiles				
Methyl-tert-butylether (MTBE)	mg/kg	ND	0.10	8328428
Benzene	mg/kg	ND	0.0050	8328428
Toluene	mg/kg	ND	0.020	8328428
Ethylbenzene	mg/kg	ND	0.010	8328428
m & p-Xylene	mg/kg	ND	0.040	8328428
o-Xylene	mg/kg	ND	0.040	8328428
Styrene	mg/kg	ND	0.030	8328428
Xylenes (Total)	mg/kg	ND	0.040	8328428
F1 (C6-C10)	mg/kg	ND	10	8328428
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	98		8328428
4-Bromofluorobenzene (sur.)	%	98		8328428
D10-ETHYLBENZENE (sur.)	%	94		8328428
D4-1,2-Dichloroethane (sur.)	%	108		8328428

RDL = Reportable Detection Limit
ND = Not detected

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GENERAL COMMENTS

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

Package 1	12.7°C

Version 2: Report reissued with reanalyzed results and lower detection limits for BTEX/F1 on sample TP16-20N.

BC BTEX/VPH IN SOIL (SOIL) Comments

Sample OY1396-02 BTEX/MTBE/Styrene/VPH in Soil GC/MS/FID: Detection limits raised based on sample weight used for analysis.

Results relate only to the items tested.

Maxxam Job #: B652802
Report Date: 2016/07/14

QUALITY ASSURANCE REPORT

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317375	O-TERPHENYL (sur.)	2016/07/06	95	50 - 130	96	50 - 130	105	%			102	50 - 130
8317385	D10-ANTHRACENE (sur.)	2016/07/06	87	60 - 130	95	60 - 130	95	%				
8317385	D8-ACENAPHTHYLENE (sur.)	2016/07/06	83	50 - 130	92	50 - 130	90	%				
8317385	D8-NAPHTHALENE (sur.)	2016/07/06	84	50 - 130	92	50 - 130	92	%				
8317385	TERPHENYL-D14 (sur.)	2016/07/06	87	60 - 130	96	60 - 130	100	%				
8317618	O-TERPHENYL (sur.)	2016/07/06	88	50 - 130	92	50 - 130	96	%				
8317622	D10-ANTHRACENE (sur.)	2016/07/06	88	50 - 130	96	50 - 130	92	%				
8317622	D8-ACENAPHTHYLENE (sur.)	2016/07/06	81	50 - 130	89	50 - 130	87	%				
8317622	D8-NAPHTHALENE (sur.)	2016/07/06	81	50 - 130	88	50 - 130	85	%				
8317622	TERPHENYL-D14 (sur.)	2016/07/06	85	50 - 130	91	50 - 130	90	%				
8318152	1,4-Difluorobenzene (sur.)	2016/07/07			95	60 - 140	95	%				
8318152	4-Bromofluorobenzene (sur.)	2016/07/07			94	60 - 140	98	%				
8318152	D10-ETHYLBENZENE (sur.)	2016/07/07			102	60 - 130	103	%				
8318152	D4-1,2-Dichloroethane (sur.)	2016/07/07			106	60 - 140	99	%				
8320638	Leachable D10-ANTHRACENE (sur.)	2016/07/07	111	50 - 130	112	50 - 130	113	%				
8320638	Leachable D8-ACENAPHTHYLENE (sur.)	2016/07/07	99	50 - 130	101	50 - 130	101	%				
8320638	Leachable D8-NAPHTHALENE (sur.)	2016/07/07	87	50 - 130	90	50 - 130	87	%				
8320638	Leachable TERPHENYL-D14 (sur.)	2016/07/07	111	50 - 130	113	50 - 130	113	%				
8321331	Leachable (ZH) 1,4-Difluorobenzene (sur.)	2016/07/07	103	70 - 130	103	70 - 130	105	%				
8321331	Leachable (ZH) 4-Bromofluorobenzene (sur.)	2016/07/07	101	70 - 130	98	70 - 130	98	%				
8321331	Leachable (ZH) D4-1,2-Dichloroethane (sur.)	2016/07/07	78	70 - 130	79	70 - 130	78	%				
8328428	1,4-Difluorobenzene (sur.)	2016/07/13	99	60 - 140	101	60 - 140	103	%				
8328428	4-Bromofluorobenzene (sur.)	2016/07/13	102	60 - 140	102	60 - 140	99	%				
8328428	D10-ETHYLBENZENE (sur.)	2016/07/13	97	60 - 130	89	60 - 130	101	%				
8328428	D4-1,2-Dichloroethane (sur.)	2016/07/13	102	60 - 140	101	60 - 140	106	%				
8317023	Closed Cup Flash Point	2016/07/01							NC	35		
8317375	EPH (C10-C19)	2016/07/06	83	50 - 130	85	50 - 130	ND, RDL=100	mg/kg	NC	50	106	50 - 130
8317375	EPH (C19-C32)	2016/07/06	79	50 - 130	80	50 - 130	ND, RDL=100	mg/kg	NC	50	101	50 - 130
8317385	2-Methylnaphthalene	2016/07/06	87	50 - 130	93	50 - 130	ND, RDL=0.010	mg/kg	NC	50		

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Maxxam Job #: B652802
Report Date: 2016/07/14

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317385	Acenaphthene	2016/07/06	83	50 - 130	89	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Acenaphthylene	2016/07/06	84	50 - 130	90	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Anthracene	2016/07/06	87	60 - 130	92	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(a)anthracene	2016/07/06	94	60 - 130	101	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(a)pyrene	2016/07/06	90	60 - 130	98	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(b&j)fluoranthene	2016/07/06	91	60 - 130	99	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Benzo(g,h,i)perylene	2016/07/06	85	60 - 130	95	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Benzo(k)fluoranthene	2016/07/06	83	60 - 130	90	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Chrysene	2016/07/06	89	60 - 130	96	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Dibenz(a,h)anthracene	2016/07/06	92	60 - 130	101	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Fluoranthene	2016/07/06	91	60 - 130	97	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Fluorene	2016/07/06	88	50 - 130	95	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Indeno(1,2,3-cd)pyrene	2016/07/06	91	60 - 130	102	60 - 130	ND, RDL=0.020	mg/kg	NC	50		
8317385	Naphthalene	2016/07/06	85	50 - 130	91	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Phenanthrene	2016/07/06	90	60 - 130	96	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317385	Pyrene	2016/07/06	89	60 - 130	95	60 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317618	F2 (C10-C16 Hydrocarbons)	2016/07/06	91	50 - 130	93	70 - 130	ND, RDL=10	mg/kg	NC	50		

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QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317618	F3 (C16-C34 Hydrocarbons)	2016/07/06	95	50 - 130	93	70 - 130	ND, RDL=50	mg/kg	NC	50		
8317618	F4 (C34-C50 Hydrocarbons)	2016/07/06	89	50 - 130	99	70 - 130	ND, RDL=50	mg/kg	NC	50		
8317622	2-Methylnaphthalene	2016/07/06	82	50 - 130	86	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Acenaphthene	2016/07/06	78	50 - 130	82	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Acenaphthylene	2016/07/06	78	50 - 130	83	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Acridine	2016/07/06	59	50 - 130	65	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8317622	Anthracene	2016/07/06	81	50 - 130	86	50 - 130	ND, RDL=0.0040	mg/kg	NC	50		
8317622	Benzo(a)anthracene	2016/07/06	79	50 - 130	85	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(a)pyrene	2016/07/06	81	50 - 130	87	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(b&j)fluoranthene	2016/07/06	84	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(c)phenanthrene	2016/07/06	77	50 - 130	81	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(g,h,i)perylene	2016/07/06	84	50 - 130	90	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo(k)fluoranthene	2016/07/06	78	50 - 130	84	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Benzo[e]pyrene	2016/07/06	81	50 - 130	80	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Chrysene	2016/07/06	81	50 - 130	79	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Dibenz(a,h)anthracene	2016/07/06	90	50 - 130	95	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Fluoranthene	2016/07/06	85	50 - 130	89	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8317622	Fluorene	2016/07/06	81	50 - 130	87	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Indeno(1,2,3-cd)pyrene	2016/07/06	84	50 - 130	89	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Naphthalene	2016/07/06	80	50 - 130	83	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Perylene	2016/07/06	88	50 - 130	92	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Phenanthrene	2016/07/06	83	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Pyrene	2016/07/06	84	50 - 130	88	50 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8317622	Quinoline	2016/07/06	103	50 - 130	102	50 - 130	ND, RDL=0.010	mg/kg	NC	50		
8318152	Benzene	2016/07/07			110	70 - 130	ND, RDL=0.0050	mg/kg	NC	50		
8318152	Ethylbenzene	2016/07/07			110	70 - 130	ND, RDL=0.010	mg/kg	NC	50		
8318152	m & p-Xylene	2016/07/07			114	70 - 130	ND, RDL=0.040	mg/kg	NC	50		
8318152	Methyl-tert-butylether (MTBE)	2016/07/07			87	70 - 130	ND, RDL=0.10	mg/kg	NC	50		
8318152	o-Xylene	2016/07/07			112	70 - 130	ND, RDL=0.040	mg/kg	NC	50		
8318152	Styrene	2016/07/07			116	70 - 130	ND, RDL=0.030	mg/kg	NC	50		
8318152	Toluene	2016/07/07			115	70 - 130	ND, RDL=0.020	mg/kg	NC	50		
8318821	Total Antimony (Sb)	2016/07/06	85	75 - 125	93	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8318821	Total Arsenic (As)	2016/07/06	99	75 - 125	97	75 - 125	ND, RDL=1.0	mg/kg	1.6	35	96	53 - 147
8318821	Total Barium (Ba)	2016/07/06	NC	75 - 125	98	75 - 125	ND, RDL=1.0	mg/kg	7.0	35	99	80 - 119
8318821	Total Beryllium (Be)	2016/07/06	108	75 - 125	101	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8318821	Total Cadmium (Cd)	2016/07/06	100	75 - 125	95	75 - 125	ND, RDL=0.050	mg/kg	7.3	35		

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			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8318821	Total Chromium (Cr)	2016/07/06	NC	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	3.5	35	107	59 - 141
8318821	Total Cobalt (Co)	2016/07/06	99	75 - 125	95	75 - 125	ND, RDL=0.50	mg/kg	4.4	35	98	58 - 142
8318821	Total Copper (Cu)	2016/07/06	NC	75 - 125	96	75 - 125	ND, RDL=1.0	mg/kg	2.9	35	100	83 - 117
8318821	Total Lead (Pb)	2016/07/06	95	75 - 125	93	75 - 125	ND, RDL=0.50	mg/kg	0.55	35	100	79 - 121
8318821	Total Mercury (Hg)	2016/07/06	102	75 - 125	105	75 - 125	ND, RDL=0.050	mg/kg	NC	35		
8318821	Total Molybdenum (Mo)	2016/07/06	102	75 - 125	94	75 - 125	ND, RDL=0.40	mg/kg	NC	35		
8318821	Total Nickel (Ni)	2016/07/06	NC	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	4.6	35	102	79 - 121
8318821	Total Selenium (Se)	2016/07/06	99	75 - 125	98	75 - 125	ND, RDL=0.50	mg/kg	NC	35		
8318821	Total Silver (Ag)	2016/07/06	100	75 - 125	95	75 - 125	ND, RDL=0.20	mg/kg	NC	35		
8318821	Total Thallium (Tl)	2016/07/06	92	75 - 125	96	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8318821	Total Tin (Sn)	2016/07/06	103	75 - 125	94	75 - 125	ND, RDL=1.0	mg/kg	NC	35		
8318821	Total Uranium (U)	2016/07/06	86	75 - 125	91	75 - 125	ND, RDL=0.20	mg/kg	3.9	35		
8318821	Total Vanadium (V)	2016/07/06	NC	75 - 125	95	75 - 125	ND, RDL=1.0	mg/kg	5.9	35	107	79 - 121
8318821	Total Zinc (Zn)	2016/07/06	NC	75 - 125	95	75 - 125	ND, RDL=10	mg/kg	5.5	35	102	79 - 121
8318823	Moisture	2016/07/04					ND, RDL=0.30	%	1.4	20		
8319459	Soluble (Hot water) Boron (B)	2016/07/05	97	75 - 125	96	75 - 125	ND, RDL=0.10	mg/kg	NC	35		
8319557	Soluble (1:1) pH	2016/07/05			100	97 - 103			0.13	N/A	101	98 - 102
8320033	Leachable Final pH of Leachate	2016/07/06			100	97 - 103			0.81	N/A		
8320033	Leachable Initial pH of Sample	2016/07/06			100	97 - 103			0.82	N/A		
8320033	Leachable pH after HCl	2016/07/06			100	97 - 103			1.8	N/A		
8320580	Soluble (2:1) pH	2016/07/06			100	97 - 103			1.2	N/A	102	98 - 102
8320638	Leachable 2-Methylnaphthalene	2016/07/07	96	50 - 130	98	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Acenaphthene	2016/07/07	96	50 - 130	99	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Acenaphthylene	2016/07/07	96	50 - 130	99	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Acridine	2016/07/07	95	50 - 130	98	50 - 130	ND, RDL=0.20	ug/L	NC	40		
8320638	Leachable Anthracene	2016/07/07	98	50 - 130	101	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(a)anthracene	2016/07/07	113	50 - 130	118	50 - 130	ND, RDL=0.050	ug/L	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8320638	Leachable Benzo(a)pyrene	2016/07/07	110	50 - 130	118	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(b&j)fluoranthene	2016/07/07	113	50 - 130	119	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Benzo(c)phenanthrene	2016/07/07	104	50 - 130	108	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(g,h,i)perylene	2016/07/07	115	50 - 130	122	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Benzo(k)fluoranthene	2016/07/07	114	50 - 130	119	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Benzo[e]pyrene	2016/07/07	107	50 - 130	114	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Chrysene	2016/07/07	113	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Dibenz(a,h)anthracene	2016/07/07	127	50 - 130	123	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Fluoranthene	2016/07/07	111	50 - 130	118	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Fluorene	2016/07/07	101	50 - 130	106	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Indeno(1,2,3-cd)pyrene	2016/07/07	111	50 - 130	120	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Naphthalene	2016/07/07	95	50 - 130	96	50 - 130	ND, RDL=0.10	ug/L	NC	40		
8320638	Leachable Perylene	2016/07/07	111	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Phenanthrene	2016/07/07	105	50 - 130	108	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Pyrene	2016/07/07	110	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	40		
8320638	Leachable Quinoline	2016/07/07	103	50 - 130	105	50 - 130	ND, RDL=0.20	ug/L	NC	40		
8320970	Sulphur (Elemental & Polysulphide)	2016/07/07			104	75 - 125	ND, RDL=100	mg/kg	NC	35	103	75 - 125
8321331	Leachable (ZH) Benzene	2016/07/07	85	70 - 130	85	70 - 130	ND, RDL=10	ug/L	NC	50		
8321331	Leachable (ZH) Ethylbenzene	2016/07/07	92	70 - 130	90	70 - 130	ND, RDL=10	ug/L	NC	50		
8321331	Leachable (ZH) m & p-Xylene	2016/07/07	98	70 - 130	95	70 - 130	ND, RDL=20	ug/L	NC	50		
8321331	Leachable (ZH) o-Xylene	2016/07/07	98	70 - 130	94	70 - 130	ND, RDL=10	ug/L	NC	50		

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Your P.O. #: KEL1958
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			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8321331	Leachable (ZH) Toluene	2016/07/07	87	70 - 130	86	70 - 130	ND, RDL=10	ug/L	NC	50		
8321331	Leachable (ZH) Xylenes (Total)	2016/07/07					ND, RDL=20	ug/L	NC	50		
8321419	Hazardous Waste Oil	2016/07/07	96	65 - 135	97	65 - 135	ND, RDL=0.50	%	NC	35		
8321421	Leachable Antimony (Sb)	2016/07/07	99	75 - 125	101	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Arsenic (As)	2016/07/07	100	75 - 125	98	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Barium (Ba)	2016/07/07	89	75 - 125	97	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Beryllium (Be)	2016/07/07	99	75 - 125	98	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Boron (B)	2016/07/07	NC	75 - 125	99	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Cadmium (Cd)	2016/07/07	97	75 - 125	99	80 - 120	ND, RDL=0.10	mg/L	NC	35		
8321421	Leachable Chromium (Cr)	2016/07/07	95	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Cobalt (Co)	2016/07/07	95	75 - 125	94	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Copper (Cu)	2016/07/07	93	75 - 125	95	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Iron (Fe)	2016/07/07	NC	75 - 125	103	80 - 120	ND, RDL=1.0	mg/L	8.7	35		
8321421	Leachable Lead (Pb)	2016/07/07	90	75 - 125	91	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Mercury (Hg)	2016/07/07	106	75 - 125	106	80 - 120	ND, RDL=0.020	mg/L	NC	35		
8321421	Leachable Nickel (Ni)	2016/07/07	95	75 - 125	95	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Selenium (Se)	2016/07/07	98	75 - 125	100	80 - 120	ND, RDL=0.10	mg/L	NC	35		
8321421	Leachable Silver (Ag)	2016/07/07	94	75 - 125	96	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Thallium (Tl)	2016/07/07	91	75 - 125	93	80 - 120	ND, RDL=0.50	mg/L	NC	35		
8321421	Leachable Uranium (U)	2016/07/07	93	75 - 125	94	80 - 120	ND, RDL=0.20	mg/L	NC	35		
8321421	Leachable Vanadium (V)	2016/07/07	99	75 - 125	99	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Zinc (Zn)	2016/07/07	92	75 - 125	94	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8321421	Leachable Zirconium (Zr)	2016/07/07	107	75 - 125	106	80 - 120	ND, RDL=1.0	mg/L	NC	35		
8328428	Benzene	2016/07/13	97	60 - 140	103	60 - 140	ND, RDL=0.0050	mg/kg	NC	40		
8328428	Ethylbenzene	2016/07/13	108	60 - 140	109	60 - 140	ND, RDL=0.010	mg/kg	NC	40		
8328428	F1 (C6-C10)	2016/07/13			85	60 - 140	ND, RDL=10	mg/kg				
8328428	m & p-Xylene	2016/07/13	106	60 - 140	108	60 - 140	ND, RDL=0.040	mg/kg	NC	40		

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A Bureau Veritas Group Company

Maxxam Job #: B652802
Report Date: 2016/07/14

QUALITY ASSURANCE REPORT(CONT'D)

SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8328428	Methyl-tert-butylether (MTBE)	2016/07/13					ND, RDL=0.10	mg/kg	NC	40		
8328428	o-Xylene	2016/07/13	106	60 - 140	107	60 - 140	ND, RDL=0.040	mg/kg	NC	40		
8328428	Styrene	2016/07/13					ND, RDL=0.030	mg/kg	NC	40		
8328428	Toluene	2016/07/13	101	60 - 140	104	60 - 140	ND, RDL=0.020	mg/kg	NC	40		
8328428	Xylenes (Total)	2016/07/13					ND, RDL=0.040	mg/kg	NC	40		

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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SLR CONSULTING (CANADA) LTD
Client Project #: 219.05112.00013
Your P.O. #: KEL1958
Sampler Initials: KN

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Dennis Ngondu, B.Sc., P.Chem., QP, Supervisor, Organics

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

Michael Sheppard, B.Sc., P. Biol., QP, Senior Scientific Specialist, Organics

Harry (Peng) Liang, Senior Analyst

Rob Reinert, B.Sc., Scientific Specialist

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Chain Of Custody Record

Page 1 of 1

INVOICE TO:	
Company Name	#17775 SLR CONSULTING (CANADA) LTD
Contact Name	Lindsay Paterson
Address	200-1475 Ellis Street, Kelowna BC V1Y 2A3
Phone	(250) 762-7202 Fax: (250) 374-8656
Email	lpaterson@slrconsulting.com, analytical@slrconsulting.

Report Information	
Company Name	
Contact Name	Lindsay Paterson
Address	
Phone	(250) 762-7202 Fax: (250) 374-8656
Email	lpaterson@slrconsulting.com, analytical@slrconsulting.c

Project Information	
Quotation #	B51186
P.O. #	KEL1958
Project #	219.05112.00013
Project Name	
Site #	
Sampled By	KN/LP

Laboratory Use Only	
Maxxam Job #	Bottle Order #: 498319
Chain Of Custody Record: C#498319-06-01	Project Manager: Letitia Prefontaine

Regulatory Criteria:
- [x] CSR AL
- [x] CCME AL
- [ ] BC Water Quality
- [x] Other Albert Landfill

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10ºC) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: [X]
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
1 DAY [ ] 2 Day [ ] 3 Day [ ] Date Required: ______ [ ]
Rush Confirmation Number: ______ (call lab for #)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

#	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	Basic Class II Landfill Package	Elemental Sulfur	Special Waste Oil and Grease	TCLP PAHs	CSR BTEX/VPH in Soil - Field Preserved	LEPH & HEPH, EPH with PAH for CSR in Soil	CSR/CCME Metals in Soil	CCME BTEX/F1 Field Preserved	CCME F2-F4	CCME PAH	# of Bottles	Comments
1	99452 / 99440	TP 16-20 N	6/29/16	930 Am	SOIL								X	X	X	X	10	
2	99465 / 99477	TP 16-20 F	6/29/16	930 Am	SOIL		X	X	X	X	X	X	X				10	29-Jun-16 16:09 Letitia Prefontaine B652802 HT4 INS-0050
3																		
4																		
5																		
6																		70 empty jars
7																		
8																		
9																		
10																		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
L. Paterson	16/06/29	1200pm	JASBIRJIT KAUR	2016/06/29	16:09	70

Lab Use Only		
Time Sensitive	Temperature (ºC) on Receipt	Custody Seal Intact on Cooler?
[ ]	14/12/12	[ ] Yes [X] No

ICE - YES

White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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