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ḰEL,SET (Reay) Creek – Victoria International Airport
North Saanich, BC

Confirmation of Remediation
Public Services and Procurement Canada
(on behalf of Transport Canada)

March 2020
SLR Project No.: 205.03892.00005

CONFIRMATION OF REMEDIATION

ŕEL,SET (REAY) CREEK - VICTORIA INTERNATIONAL AIRPORT

NORTH SAANICH, BC

SLR Project No.: 205.03892.00005

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EXECUTIVE SUMMARY

On behalf of Transport Canada (TC), Public Services and Procurement Canada (PSPC) retained SLR Consulting (Canada) Ltd. (SLR) to provide environmental field supervision and monitoring services during the remediation of select portions (reaches) of ḰEL,SET (Reay) Creek located on Victoria International Airport property (the "Site").

The objective of the remediation project was to remove historic contaminated sediment within upstream reaches of ḰEL,SET (Reay) Creek, namely Reach 1A, Reach 1B, Reach 1C, Reach 3 and Reach 4. The remedial targets selected were the BC Contaminated Sites Regulation (CSR) Freshwater Sediment Standards for Sensitive Use (SedFS) and/or the BC Protocol 4 regional background soil quality estimates where applicable. The project objectives also included the restoration of the remedial areas and associated surrounding areas.

The contract for the remediation project was awarded to Tervita Corporation (teamed with Aggregate Environmental Services) on August 7, 2019.

The field portion of the remediation project was conducted between August 12 and November 7, 2019. Prior to remedial excavation activities, fish exclusion nets were installed around the remediation work areas. In accordance with permits and project specifications, fish and wildlife salvages were completed within the work areas. All species that were captured were released at a suitable location outside of the remedial work area.

Approximately 187 m^3 of sediment was removed during remedial excavations. Excavated sediments were transferred to a temporary stockpile management area before being transported off-site for disposal at a permitted facility.

Confirmatory samples were collected at the limits of the excavations and submitted for laboratory analysis. Confirmatory samples generally met the selected remedial targets, which were the BC CSR SedFS and/or the BC Protocol 4 regional background soil quality estimates. Five samples exceeded the CSR SedFS and required additional excavation to address residual contamination. Following the review of analytical results of the confirmatory samples, the creek beds were backfilled to pre-excavation depths with approximately 504.2 tonnes of imported sands and gravel.

The downstream extent of Reach 4 was additionally excavated by 0.4 m on the west wall to address contamination in an initial confirmatory sample. The analytical results for the additional confirmatory sample were below the BC CSR SedFS standards for all parameters analyzed. However, there was visual hydrocarbon staining, strong odour and wood debris along the west wall; therefore, additional investigation may be warranted and is recommended.

Excavation water removed during excavation was pumped into holding tanks, sampled and discharged to the sanitary sewer in accordance with permits obtained by the Contractor.

Approximately 923 tonnes of sediment, including existing stockpiles (approximately 470 tonnes) from previous creek excavation work for the Victoria Airport Authority (VAA) Detention Pond Project, and 9 bin truck loads of plant material and non-contaminated debris were removed from the Site and transported off-site for disposal at approved facilities.

Following remedial excavation and backfilling, the riparian areas where vegetation removal occurred were physically restored and planted with native species. Additionally, all disturbed areas outside of the creek and riparian boundaries were hydroseeded with a grass seed blend.

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1.0 INTRODUCTION

On behalf of Transport Canada (TC), Public Services and Procurement Canada (PSPC) retained SLR Consulting (Canada) Ltd. (SLR) to provide environmental field supervision, monitoring and construction documentation during a remediation project for upstream reaches of ḰEL,SET (Reay) Creek located within the boundaries of the Victoria International Airport (VIA) in North Saanich, BC (known as the “Site”) (see Drawing 1).

The most viable remedial option for areas within the Site had been previously determined to include physical removal of impacted sediments within select areas of ḰEL,SET (Reay) Creek through excavation followed by site restoration to reinstate creek sections. Impacted sediments were removed from the Site and disposed at an off-site permitted facility.

The work was completed under the PSPC Remediation Consulting Task Authorization Contract EZ897-170838/001/PWY (Task Authorization 700461459).

1.1 Project Objective

The objectives of the remedial activities were to reduce potential environmental effects associated with historic contamination resulting from past practices at VIA and to reduce liabilities associated with this historic contamination. The remedial targets selected were the BC CSR SedFS and BC Protocol 4 regional background soil quality estimates.

The objective of this confirmation of remediation report is to provide confirmation of the remediated areas of ḰEL,SET (Reay) Creek in Reach 1A, Reach 1B, Reach 1C, eastern section of Reach 3 and Reach 4 (see Drawing 2).

2.0 PROJECT BACKGROUND

The upstream reaches of ḰEL,SET (Reay) Creek are located within the boundaries of the VIA. The land has been used as an airport since approximately the 1940s and prior to that time was part of a large agricultural property on the west side of Canora Road. The downstream portion of ḰEL,SET (Reay) Creek was initially treed and became part of an agricultural property on the east side of Canora Road in the late 1940s. The ḰEL,SET (Reay) Creek Pond is directly east of Canora Road. The pond is believed to have been established in the early 1950s through creation of a dam structure which has since undergone upgrades and currently impounds and collects sediment from upstream areas of ḰEL,SET (Reay) Creek.

Transport Canada (TC) owns the VIA property; therefore, the property is under federal jurisdiction. TC operated VIA from 1939 to January 1997. After which, the Victoria Airport Authority (VAA) took over responsibility for the management, operation and development of the VIA property under a long-term signed lease agreement. ḰEL,SET (Reay) Creek exits the VIA property through a culvert under Canora Road, where it flows to ḰEL,SET (Reay) Creek Pond that is situated within the Town of Sidney. ḰEL,SET (Reay) Creek flows southeast from ḰEL,SET (Reay) Creek Pond, over the dam outlet structure, through a forested park area toward a culvert below the Patricia Bay Highway, that is situated within the District of North Saanich. ḰEL,SET (Reay) Creek then flows under the Highway and enters privately owned land, before discharging to the marine environment at Bazan Bay (Drawing 1).

Historical activities at the airport and on surrounding lands have caused contamination of ḰEL,SET (Reay) Creek and ḰEL,SET (Reay) Creek Pond sediments. Historically, sediment

contamination in the upstream section of ḰEL,SET (Reay) Creek (i.e. on VIA property) contained various contaminants of concern, including and predominantly metals. The contamination of the creek sediment and water are presumed to be the result of industrial inputs to the creek via storm water outfalls.

Numerous environmental investigations and localized remediation projects have been completed at the Site since 1994. The results of these investigations and remediation projects were summarized in a Phase I Environmental Site Assessment (ESA) completed by SLR in March 2017. Based on the results of the Phase I ESA, SLR completed a Phase II ESA involving the sampling and analysis of soil, groundwater, surface water and sediment in the upper reaches of ḰEL,SET (Reay) Creek (i.e. areas within the VIA property). The results of the Phase II ESA, in conjunction with the historical analytical results for the Site, were incorporated into a Draft Remedial Options Analysis (ROA) completed by SLR in September 2017 for VIA property and ḰEL,SET (Reay) Creek Pond immediately downstream. The purpose of the ROA was to develop and assess possible remedial approaches for the Site, which included do-nothing, risk assessment, contaminated sediment removal and pond restoration, and sediment removal with dam removal and creek restoration.

2.1 Site Description - Upper ḰEL,SET (Reay) Creek (Reaches 1 to 4)

The upper portion of ḰEL,SET (Reay) Creek is located on VIA property and extends from the headwaters located south of the East Camp area and flows in a southeast direction for approximately 450 m to 500 m to a culvert under Canora Road. Upper ḰEL,SET (Reay) Creek, which includes a tributary channel, has been segregated into six sub-reaches to allow for proper assessment and determination of appropriate remedial actions. Details of each reach are outlined below and are shown in Drawing 2.

Reach 1A is a segregated, 130 m section of the historic channel that is presently known as the “former channel”. Reach 1A is connected from the main channel via two gates / dam structures with flow-controllers and is currently used to receive stormwater through several outfalls that drain surface water from the nearby East Camp. Reach 1A also provides emergency control and storage capacity in the event of spill events as the channel can be isolated by closing the flow control gates at both the upstream and downstream ends of the reach. Prior to remediation, this channel was used as a water quality improvement linear wetland/retention pond with instream vegetation consisting primarily of reed canarygrass (*Phalaris arundinacea*). The riparian vegetation in Reach 1A consisted of numerous groves of mature native shrubs and deciduous trees. Several large patches of Himalayan blackberry (*Rubus armeniacus*), a prolific invasive species, existed along the north bank of Reach 1A (Photo 1), as well as on the vegetated berm that separates Reach 1A from Reach 1B.

Reach 1B is a 190 m stretch known as the “bypass channel” and was constructed in 2012 to allow the creek headwaters to bypass Reach 1A – former channel. ḰEL,SET (Reay) Creek headwaters daylight at the upstream end of Reach 1B and originate from airside runway and other airport drainage routes. Rip rap armouring was placed along the stream channel at the headwaters and along the outer edges of the creek meanders to limit erosion during higher flows anticipated in fall and spring seasons. Coconut and straw mattings were placed, stapled and staked along the length of the new channel side-slopes to reduce erosion and sedimentation potential and to facilitate establishment of vegetative cover. Three riffle structures were installed within the new channel to diversify flow patterns and to reduce the potential for channel erosion while also providing habitat diversity and potential support for spawning areas in the future. Instream aquatic vegetation consisted mainly of duckweed (*Lemnaceae* sp.) and common cattail (*Typha latifolia)*

(Photo 2); sedges and rushes were also populated in areas of lower flow within Reach 1B. Riparian vegetation matured since its installation in 2012 and consists mainly of red alder (*Alnus rubra*) and willow (*Salix sp.)* shrubs that were planted along the south bank edge.

Reach 1C, also known as the “connector channel” begins at the terminus of the bypass channel and flows approximately 95 m to the southeast towards the detention pond. This portion of ḰEL,SET (Reay) Creek was previously described as a sinuous channel with a steeper gradient and is separated into two halves by a culvert underneath a gravel access road. To the west of the access road, red alder trees line the stream edge and large patches of Himalayan blackberry existed on both north and south sides of the bank. To the east of the access road, several larger red alder and western redcedar (*Thuja plicata*) trees as well as native shrubs line the channel. Reach 1C terminates at a culvert that runs into Reach 2.

Reach 2 (also referred to as the “detention pond”) is situated along the north-eastern edge of a newly constructed detention pond located within VIA property. The 5,000 m^3 detention pond was constructed in 2017/2018 along this reach to help control stormwater flows within the ḰEL,SET (Reay) Creek drainage system. At the downstream end of the detention pond, an outlet structure has been constructed that provides a controlled rate of water discharge aimed at reducing peak flows in downstream areas to mitigate flooding and soil erosion and improve aquatic habitat. The previous channel along the detention pond was excavated of all potentially contaminated sediments and the new channel has been lined with rounded gravels and cobbles. Removed sediments were stockpiled for future transport and disposal. During low flows, the creek channel maintains flow to downstream areas. Higher flow events back up at the outlet weir and inundate the pond area which slowly draws down to alleviate large pulses of flow during storm events. Riparian vegetation was retained along the northern bank of the creek, while the southern bank is reserved for the detention pond; therefore, limiting larger shrubs and trees that could provide shade to this reach.

Reach 3 is described as the “tributary channel” that flows adjacent to the BC Aviation Museum and confluences with ḰEL,SET (Reay) Creek channel south of Norseman Road at the upstream portion of Reach 4. Aqua-Tex (2004) suggested that Reach 3 may be the original upper channel of ḰEL,SET (Reay) Creek; however, much of this section of creek is currently a channelized ditch and the upstream sections are devoid of riparian vegetation (likely due to its proximity to airport runways and associated limitations to the acceptable height of vegetation) leading from the airport terminal building toward the museum. Some shrub and taller deciduous trees exist toward the eastern section of Reach 3 beyond the BC Aviation Museum and toward its confluence with Reach 4. These trees provide shade and leaf litter input into this reach of ḰEL,SET (Reay) Creek.

Reach 4 is the connector channel that connects Reaches 2 and 3 and then flows toward the Canora Road culvert. Tall riparian vegetation surrounds this section of the creek, including several red alder, black cottonwood (*Populus balsamifera*), and Douglas fir (*Pseudotsuga menziesii*) trees (Photo 3).

In general, contamination on VIA property consists mainly of metals in soil, sediment and surface water, related to historical industrial activities at the VIA. Additionally, select hydrocarbons were also contaminants observed on the VIA property. The contamination is related to industrial activities, including metals plating, machining, and other aircraft-related maintenance activities. There have been several smaller scale remedial excavations in localized areas of the creek and adjacent lands and the creek was realigned in 2012, the original channel being used as a water quality improvement linear wetland/retention pond.

2.2 Summary of Previous Environmental Assessments

Several reports, assessments and investigations have been undertaken throughout the ḰEL,SET (Reay) Creek system over the past several years. The following previous studies have been reviewed during the remedial planning phases of the ḰEL,SET (Reay) Creek Remediation Project to provide context and information regarding current conditions within ḰEL,SET (Reay) Creek:

- Victoria International Airport Environmental Baseline Study - M.M. Dillon Ltd., 1994;
- Subsurface Soils Investigation - Environmental Design Solutions Ltd. (EDSL), 2003;
- Reay Creek Watershed – Proper Functioning Condition Assessment - Aqua-Tex, 2004;
- Assessment of Metal Contamination and Fish Kills in Reay Creek at Victoria International Airport - Environmental Solutions Partnership, Royal Roads University (undated, approximately 2005);
- Investigation of Recent Fish Kills (March 2003 and November 2004) in Reay Creek - Global Environmental Management Systems Ltd, 2005;
- Reay Creek Assessment Study - MB Laboratories, September 2005;
- Site Inspection, Navair Lease Property, Victoria International Airport, BC - Franz Environmental Inc., 2006;
- Detailed Site Investigation (DSI), Hangar 17-39, Victoria Airport, Sydney, BC - Franz Environmental Inc., 2006;
- Airfield Tributary Storm Drain Remediation Program Summary - Bethell Associates Ltd., 2007;
- Lower Airfield Ditch Remediation - Bethell Associates Ltd., 2008;
- Upper Airfield Ditch Remediation - Bethell Associates Ltd., 2008;
- Reay Creek Pond Remediation Study - Justin Robinson and Rachelle Sarrazin, 2010;
- Reay Creek Channel Rehabilitation - SLR, 2012;
- Reay Creek Remediation Project Summary - SLR, 2012;
- Sediment and Water Sampling Results, Reay Creek Hydraulic Oil Spill - SLR, 2012;
- Reay Creek Dam, Sidney, BC Geotechnical Inspection and Assessment - Thurber Engineering Ltd., 2013;
- Underground Services Condition Survey at Victoria International Airport - Kerr Wood Leidal, 2014;
- Environmental Consulting Services - Viking Air Spill Support - SLR, 2015;
- Plating Shop Spill Response, Viking Air Facility, Victoria International Airport, Sidney, BC - Arcadis, 2015;
- Reay Creek Sediment Sampling Results - Viking Air Spill Support – SLR, 2015;
- Sampling and Analysis of Reay Creek Pond Sediments - SLR, 2015;
- Reay Creek Side Channel Sediment Removal – SLR, 2015;
- An Investigation of Reay Creek Pond - Macdonald and Bruce, 2015;
- Technical memorandum - Reay Creek Preliminary Stormwater Impact Assessment - Kerr Wood Leidal, 2015;
- Data Gap Analyses Reay Creek Pond – SLR, 2016;
- Reay Creek Sediment and Soil Investigation - 2016 Stormwater Management Plan Design – SLR, 2016;
- Phase II Environmental Site Assessment - Reay Creek (on Victoria Airport Lands) – SLR, 2017;
- 2017 Preliminary Remedial Options Analysis Report – Reay Creek – SLR, 2017;
- Reay Creek Remediation – Archaeological Overview Assessment. Millennia Research Limited. 2018;

- Supplemental Sediment Sampling and Probing – Reay Creek (on Airport Lands) – SLR, 2019; and
- Environmental Mitigation Strategy – Reay Creek – SLR, 2019.

Summaries of the most pertinent studies are included in the Remedial Action Plan (RAP) completed in March 2019 (SLR, 2019a).

3.0 SCOPE OF WORK

SLR provided planning and tender phase services as well as construction phase services for the ḰEL,SET (Reay) Creek Remediation Project on VIA property in accordance with the proposals submitted to PSPC on April 16, 2019 and June 11, 2019, respectively. The scope of work included four main tasks: preliminary planning, creek remediation, site restoration, and reporting.

The remediation plan for Reaches 1 to 4 included full removal of creek sediments to depths ranging from 0.15 to 1.0 m within all areas of the creek upstream of Canora Road except for Reach 3 where only partial removal along the eastern extent was planned and Reach 2 where creek sediments have already been removed as part of the VAA Detention Pond Project. Drawing 2 shows the remedial areas for Reaches 1 to 4. The preliminary remediation plan was anticipated to involve excavation, removal and off-site disposal of approximately 477 m^3 of contaminated sediment from the Site that exceeded the BC Contaminated Sites Regulation (CSR) Freshwater Sediment Standards for Sensitive Use (SedFS). Following excavation, creek areas were backfilled with clean sands and gravels and contoured.

All areas disturbed as a result of construction activities (including access routes and staging areas) were restored and re-vegetated post construction.

3.1 Task 1 – Preliminary Planning

Refinement of remedial areas, detailed design, and logistical support for the remediation project prior to the development of the remediation specification were performed by SLR as part of the preliminary planning stages of the project. Task 1 included permitting assistance, tender specifications development, tender phase services prior to contract award, and review of contractor submittals.

3.2 Task 2 – Site Remediation

Task 2 included the Contractor preparing the Site for the remediation including channel isolation, fish salvage (performed by SLR), clearing and grubbing for access areas, removal of invasive plant species, implementation of sediment and erosion controls, set up of laydown areas and utility clearance. Activities such as channel isolation and fish salvage were conducted within the reduced risk timing window for instream works on Vancouver Island (August 15 to September 15), taking into consideration the presence of cutthroat trout within upper reaches of the creek. Following site preparation, the Contractor conducted remedial excavation work within the creek and other associated activates such as dewatering, stockpiling of excavated sediment in the pre-determined stockpile management area (SMA) and disposal of contaminated sediment. Four stockpiles from the VAA Detention Pond Project conducted in 2017/2018 were stored within the SMA and their removal was incorporated into the Contractor transport and disposal responsibilities.

SLR's activities under this task included field supervision of the remediation project and the provision of environmental monitoring services related to environmental protection measures, fish and wildlife, as well as Species-at-Risk (SAR) and other sensitive species potentially occurring at the Site.

SLR's field supervisor and environmental monitor were on-site for the duration of the project. In addition, an archeological monitor was contracted through SLR for excavation activities during the project. Tseycum First Nation provided at least one archeological monitor on-site for the duration of the excavation portion of the project.

Field supervision duties performed by SLR included:

- Preparing a project-specific Health and Safety Plan (HASP);
- Attending meetings (health and safety (H&S), project progress, etc.);
- Reviewing site preparation activities (temporary site infrastructure set up, invasive species removal);
- Collecting excavation limit samples;
- Monitoring excavation volumes;
- Monitoring imported fill volumes;
- Verifying discharge water quality;
- Reviewing water and soil/sediment chemistry data;
- Monitoring site reinstatement (grading, contouring, erosion control features);
- Monitoring riparian restoration (hydroseeding and planting of shrubs, sedges, rushes, etc.);
- Reviewing Contractor's compliance with the Environmental Protection Plan (EPP);
- Monitoring Contractor's compliance with the DFO and BC Wildlife Act permits as well as other conditions outlined in the tender specification documents;
- Monitoring Contractor's traffic control;
- Monitoring Contractor cleaning and decontamination activities;
- Providing daily project updates; and
- Completing closeout inspections.

Environmental monitoring duties preformed by SLR included:

- Monitoring trees requiring removal or pruning;
- Delineating protective zones surrounding retained trees as required;
- Monitoring site preparation activities (temporary site infrastructure set up, invasive species removal);
- Installation of fish exclusion nets;
- Completing fish and wildlife salvage activities prior to and during the remediation activities;
- Reviewing Contractor's compliance with the EPP;
- Monitoring Contractor's compliance with the DFO and BC Wildlife Act permits as well as other conditions outlined in the tender specification documents;
- Monitoring site reinstatement (grading, contouring, erosion control features);
- Verifying daily completion of excavation and physical restoration activities in the creek;
- Notifying the Departmental Representative (DR) of any observed or anticipated adverse impacts to sensitive species;

- Advising the Contractor 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.);
- Attending meetings (H&S, project progress, etc.);
- Providing daily project updates; and
- Completing closeout inspections.

Conformance to the engineered design for the remedial works was also monitored by Kerr Wood Leidal Associates (KWL) under contract to SLR.

The SLR field supervisor and environmental monitor provided a daily summary of the previous day's activities and proposed activities in an email to PSPC and TC at the beginning of each day. Formal daily reports were uploaded to the on-line PSPC document and file sharing service (Central Collab). The reports included details of the work performed, samples collected, on-site and off-site soil/sediment movement, backfill import, water management, unit price table quantities accrued daily, fish and wildlife salvage, erosion and sediment control, other environmental monitoring observations and photos. Copies of SLR's daily reports are included in Appendix A.

Project management activities completed by SLR included:

- Reviewing Contractor pre-work submittals;
- Coordinating activities with environmental monitors and field supervisors;
- Liaising with the Contractor and PSPC to schedule project activities;
- Attending meetings (H&S, pre-construction kickoff, project progress, etc.);
- Providing daily project updates to PSPC;
- Reviewing Contractor's analytical data for imported backfill material;
- Reviewing and providing advice for dewatering methods;
- Reviewing analytical data and quality assurance/quality control (QA/QC) metrics; and
- Completing project invoicing.

3.3 Task 3 – Site Restoration and Planting

Task 3 included restoring creek channel elevations and backfilling creek excavation areas with clean substrates where appropriate and in accordance with the design as well as re-planting of disturbed areas to re-establish vegetation and support fish and wildlife habitat. SLR reviewed all Contractor work to verify the restoration and planting work was conducted in accordance with the design and contract requirements. Task 3 was split into two restoration activities: instream restoration and upland restoration. Instream restoration commenced immediately following excavation and confirmatory sampling and within the in-water works window (i.e., within the reduced risk timing window for instream works). Upland restoration and vegetation planting was completed following remedial activities and in periods of favourable environmental conditions from increased precipitation events (i.e., fall).

3.4 Task 4 – Reporting

Documentation of the remedial activities and final site conditions was completed in this task. This report documents the field observations and analytical results from the remediation project and provides a summary of the final site conditions.

4.0 REGULATORY CONTEXT

The VIA property is federally owned, and therefore falls under federal regulatory jurisdiction. The property is not strictly subject to provincial legislation and regulations, municipal by-laws, or other such requirements for onsite activities. However, SLR understands that it is the federal government's intention to use provincial and local laws and regulations as guidelines for assessment and remedial purposes where appropriate. Furthermore, following discussions with TC, it was determined the most appropriate screening criteria for ḰEL,SET (Reay) Creek would be the provincial standards for consistency with remedial objectives and targets established for downstream areas including ḰEL,SET (Reay) Creek Pond (see Section 7.2.1). Accordingly, the BC CSR is considered a guideline for assessment and remedial purposes at ḰEL,SET (Reay) Creek.

4.1 Federal Guidelines

The CCME Sediment Quality Guidelines for the Protection of Freshwater Aquatic Life are the federal guidelines for sediment. Both the PEL (Probable Effect Level) and the ISQG (Interim Sediment Quality Guidelines) can be applied to sediment quality data at the Site. The PELs are concentrations above which adverse effects to organisms are believed to occur frequently. The ISQGs are considered to be analogous to Threshold Effect Levels, contaminant concentrations below which adverse effects to organisms are believed to rarely occur. The presentation of both values allows the relative magnitude of contaminant concentrations to be meaningfully assessed.

4.2 BC Standards

CSR Schedule 3.4 Generic Numerical Sediment Standards for aquatic life use (Province of British Columbia, 2019) are intended to protect sediment-dwelling species from unacceptable effects that may be associated with exposure to contaminated sediments at typical and sensitive sites. Concentration standards for substances of potential concern are provided for freshwater sediments. In this report, these standards are abbreviated as SedFS for sensitive freshwater sediments and SedFT for typical freshwater sites. "Sensitive sediment use" is defined in BC Ministry of Environment & Climate Change Strategy (ENV) Procedure 8, which states that sensitive sediment use means the use of a site containing sediment as habitat for sensitive components of freshwater aquatic ecosystems (Schedule 3.4, CSR). As such, sensitive site standards (SedFS) are considered as remedial objectives at this Site.

Provisions exist in the BC CSR (Section 11(3)) for considering background concentration standards for sediments. However, requirements for determining background sediment quality have not yet been specified in a Protocol, so using alternative numerical standards to those prescribed in Schedule 3.4 of the BC CSR is not currently possible.

4.3 Remedial Objectives for the Project

Federal sediment quality guidelines are applicable at ḰEL,SET (Reay) Creek within the VIA; however, due to planned remedial activities in downstream areas within lands under Provincial jurisdiction and preference for consistency in the remedial targets, BC CSR Schedule 3.4 Generic Numerical Sediment Standards for the protection of freshwater environments were selected at ḰEL,SET (Reay) Creek. Further, ḰEL,SET (Reay) Creek and immediately downstream areas are consistent with the definition of a sensitive site and the SedFS have thus been used for assessment and remedial planning purposes.

5.0 PRELIMINARY PLANNING

The following additional work was needed to be completed prior to development of tender specifications and issuing a contract:

- Completion of detailed remedial design by the design engineering consultant;
- Finalization of the Environmental Mitigation Strategy (EMS);
- Submissions to permitting agencies. The following permit submissions were required:
    - Submission of a DFO Request for Project Review form with accompanying information;
    - BC Water Sustainability Act Change Approval authorization (i.e., notification for changes in and about a stream);
    - BC Wildlife Act permit for fish salvage work (Scientific Fish Collection Permit; managed through FrontCounterBC); and
    - BC Wildlife Act general permit for incidental wildlife encounters and relocations (managed through FrontCounterBC).

Once the above investigations and permitting submissions were completed, detailed project specifications were developed to conduct the tendering process to select and engage the remediation Contractor.

Once the remediation Contractor had been selected, the Contractor was required to complete the following prior to initiation of remedial works:

- Health and safety program;
- EPP including:
    - environmental protection;
    - sediment and erosion control plan;
    - water management plan; and
    - spill response plan.
- Construction work plan including excavation plan;
- Project schedule;
- Transportation management plan;
- Disposal facility details and contaminated materials handling and disposal plan;
- Backfill source and quality information; and
- Security clearances and documents as appropriate for the Site (i.e., working within controlled access airside portions of the airport).

Appendix B provides the preliminary planning documents for the project, including the remediation plan, EPP and schedule.

5.1 Permitting Assistance

Several environmental permits, approvals, and notifications were required to support the implementation of the remedial activities. SLR provided support to PSPC and TC during the permitting process for the project. Details of the required federal and provincial permits, approvals and notifications are provided in the following sections. Copies of relevant regulatory permits and approvals are included in Appendix C.

5.1.1 DFO Letter of Advice

On April 26, 2019, SLR provided a submission package detailing site preparation, excavation, backfilling and site reinstatement components to TC for submission to DFO. The submission package included a completed Request for Project Review Form and appended information including the EMS, 90% design drawings, and representative site photographs.

Following review of the submitted information, DFO provided a Letter of Advice (19-HPAC-00337) indicating the contaminated site remediation of ḰEL,SET (Reay) Creek within the VIA would not result in serious harm to fish or prohibited effects on listed aquatic species at risk. The following conditions were included with the Letter of Advice:

- Instream works, undertakings and/or activities should occur between August 15 and September 15 wherever Cutthroat Trout presence is expected;
- It is the proponent's responsibility to avoid causing serious harm to fish and avoid prohibited effects on listed aquatic species at risk, any part of their critical habitat or the residences of their individuals; and
- Notification prior to the start of the project is to be made at least 10 days in advance.

Notification of the start of the project was made to DFO by SLR on July 26, 2019.

As the project progressed, construction delays required completion of instream works beyond the identified work window of September 15. Follow-up email communication was submitted to DFO on September 10, 2019, to request an extension to the instream work window to September 30, 2019 to allow completion of the project. The request was accompanied with details of mitigation measures that were to be implemented and monitoring activities that were to be performed to verify that serious harm to fish or effects to aquatic species at risk would not result from the project. DFO responded to indicate instream work could be conducted outside the recommended work window, provided the work does not contravene the Fisheries Act prohibitions.

On September 26, 2019, TC provided a summary email to DFO outlining the successful completion of instream work which was concluded on September 20, 2019.

5.1.2 NAV Canada Land Use Permit

NAV Canada is responsible for assessing and approving all proposals for land use near airports and air navigation infrastructure prior to construction. Due to the proximity of remedial activities to runways and airport operations, a Land Use Proposal Form was completed and submitted to NAV Canada on May 23, 2019. A follow-up email was submitted on May 28, 2019 at the request of NAV Canada providing additional information on anticipated equipment and infrastructure heights associated with the project.

Approval of the remedial work was received from NAV Canada on June 12, 2019. Advanced notification of the start of construction was provided to NAV Canada by TC on July 11, 2019, which was followed by a Notice to Airmen (NOTAM) issued by NAV Canada covering departures from Runway 14 during the project duration with a description of machinery and workers that may be present within proximity to the runway.

5.1.3 Water Sustainability Act Section 11 Notification

SLR prepared an on-line submission through FrontCounterBC for notification of the ḰEL,SET (Reay) Creek Remediation Project at the VIA pursuant to Section 11 of the BC Water Sustainability Act for Changes In and About a Stream. The on-line submission included details of the project components with appended 90% design drawings and EMS and was completed on May 10, 2019. A response from the Ministry of Forests, Lands, Natural Resources Operations and Rural Development (MFLNRORD) Habitat Officer was received on June 4, 2019 (File No.: 1004527) indicating the project may proceed with the following conditions:

- Take appropriate erosion and sediment control measures;
- Have an Environmental Monitor onsite while doing instream work;
- Minimize the disturbance of riparian vegetation;
- Instream work is to be conducted in isolation of flowing water using pumps and check dams;
- All machinery used near streams should be in good mechanical condition and have spill kits onsite;
- Follow the environmental protection measures and the remediation plan included on the 90% Construction Design Drawings submitted with the Notification; and
- Work is to be conducted during the fish least risk window from June 15 to September 15, 2019.

As described above, construction delays required completion of instream works beyond the identified work window of September 15. SLR contacted the MFLNRORD Habitat Officer on September 9, 2019, via telephone call to request an extension to the instream work window to September 30 to allow completion of the project. The request was accompanied with details of mitigation measures that were to be implemented and monitoring activities that were to be performed to verify appropriate environmental protection. The requested extension was granted, and a confirmation email was provided on September 9, 2019 subject to the original conditions outlined above.

5.1.4 Scientific Fish Collection Permit

In anticipation of dewatering select areas of ḰEL,SET (Reay) Creek to facilitate the remedial excavations and the requirement to conduct fish salvage activities, an on-line application was submitted through FrontCounterBC for a scientific fish collection permit on May 9, 2019. A permit under the BC Wildlife Act (Permit No.: NA19-509175) was issued by MFLNRORD for the project on July 5, 2019.

5.1.5 General Wildlife Permit

Incidental wildlife encounters requiring salvage and potential relocation were also identified as a possibility during project activities. A general wildlife permit application under the BC Wildlife Act was prepared and submitted through the on-line FrontCounterBC system on May 5, 2019. The permit application included species with the potential to be encountered, relocation site, and a completed animal care form to identify and establish protocols for appropriate wildlife handling techniques and precautions. A permit (Permit No.: NA19-509659) was issued by MFLNRORD for the project on July 4, 2019.

5.2 Tender Specification

A specification for the remedial work was prepared by SLR and submitted to PSPC on June 12, 2019. Among other project information, the tender specification provided detail for contractors regarding the areas, contract requirements and sequence of remedial excavations, wildlife and SAR considerations, water management and restoration activities. A copy of the tender specification is included in Appendix D. The tender specification was posted on the Government of Canada's open procurement information service at https://buyandsell.gc.ca on July 12, 2019. A mandatory site bidder's meeting was held on July 23, 2019. SLR provided an overview of contract requirements and work areas during the site meeting. SLR also provided assistance answering bidder questions submitted to PSPC during the tender period.

5.3 Contract Award

The remediation project (Solicitation No. EZ897-200680/A) was awarded to Tervita Corporation (Tervita) on August 7, 2019.

5.4 Project Submittals

Per the tender specification, Tervita submitted to PSPC the following:

- A Master Plan/Project Schedule – detailing the various project tasks and the estimated start dates and completion dates;
- Health and Safety Documentation - including a site-specific HASP identifying anticipated hazards and emergency contact numbers, emergency procedures and emergency response plan, material safety data sheet information, WorksafeBC Notice of Project, utility locate information, 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 the project specifications and permits;
- A Site Layout Plan – drawings showing the locations of all site facilities including the site office, decontamination areas, SMA, water treatment plant (WTP), material laydown areas, sanitary facilities; parking; on-site hauling routes; muster point; exclusion areas; and means of ingress and egress to the Site;
- An Execution Plan – details on the equipment and procedures to be utilized during the excavation activities in the creek; and
- A Transportation and Disposal Plan – including names and credentials of the subcontractors transporting material generated during the project, names and locations of the disposal facilities to be used for the disposal of materials, barge seaworthiness and disposal facility permitting.

On behalf of TC and PSPC, 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.

All changes to the project schedule were discussed between Tervita, TC, PSPC and SLR during weekly progress meetings.

6.0 SITE REMEDIATION PROGRAM

The field portion of the remediation project was conducted between August 12 and November 7, 2019. All field work was conducted in accordance with the tender specifications, Tervita's Execution Plan, relevant permits, and SLR's standard field procedures.

Remedial excavation limits are shown on Drawing 2 which includes Reaches 1A, 1B, 1C and 4 as well as the eastern-most portion of Reach 3. Sediment removal included areas below the high-water mark within areas identified on the design drawings. Table A below outlines the excavation depths and anticipated volumes associated with each reach.

Table A: Sediment Remediation Areas and Anticipated Volumes per Reach

Reach	Estimated Remedial Area (m^2)	Estimated Excavation Depth (m)	Estimated Volume (m^3)
Reach 1A	377	0.60	226
Reach 1B	338	0.25	85
Reach 1C	216	0.15 - 1.0	102
Reach 3	178	0.15	27
Reach 4	184	0.20	37

Upon excavation, soils were temporarily stockpiled in the designated stockpiling area, south of the existing berm (Drawing 2). The excavated material was characterized based on *in-situ* sampling. Additional samples were collected by the contractor for toxicity characteristic leachate procedure (TCLP) analysis in order to confirm the absence of hazardous waste quality material and to facilitate disposal of the material at the permitted facilities.

The estimated volumes and the origin reach of the material entering the SMA was tracked and documented. Volumes of all soil/sediments entering the SMA were recorded to verify unit price table quantities related to excavation activities. Manifests were issued for each truck leaving the Site and scale records documented the tonnages of the disposed soil, sediment and refuse/debris to verify unit price table quantities related to waste material disposal.

Previously stockpiled material from the 2017/2018 VAA Detection Pond Project was also included under the current project for transport and disposal. Volumes and quality information for these existing stockpiles was included in the tender specification and is summarized in Table B below.

Table B: Estimated Volumes and Classification of Existing Stockpiles

Existing Stockpile	Estimated Volume (m^3)	Estimated Tonnage (tonnes)	Classification
STP 1	126	252	BC CSR IL+
STP 2	42	84	BC CSR IL+
STP 3	51	102	BC CSR RL+
STP 4	16	32	BC CSR RL+

Following removal of contaminated soils from creek beds, confirmatory samples were collected at the limits of the excavation and submitted for laboratory analyses. After confirmatory samples

were collected and data were reviewed, the excavation areas were backfilled with imported material and recontoured prior to re-introducing creek flows.

6.1 Health and Safety

Tervita was the prime contractor for this project and was, therefore, responsible for overall H&S at the Site. As the prime contractor, Tervita prepared a project-specific health and safety plan (HASP), conducted utility locates, conducted daily H&S tailgate meetings and reported all incidents to PSPC. The purpose of the daily H&S meetings was to discuss the activities for the day, to identify potential hazards associated with these activities and to identify ways to mitigate or eliminate these potential hazards. H&S issues were also reviewed on a weekly basis by the project team (PSPC, TC, Tervita and SLR) during the project progress meetings.

SLR also prepared a site-specific health and safety plan (HASP), which covered the scope of work and anticipated hazards relating to SLR specific tasks. Direct subcontractors to SLR were required to review and sign the HASP and participate in daily H&S tailgate meetings.

A commissionaire escort for all work within air-side areas of the VIA was also required. It was the responsibility of the Contractor to coordinate with VAA for the provision of appropriate commissionaire supervision of the works.

6.2 Site Preparation Activities

Site preparation activities commenced on August 12, 2019. The site preparation included tasks to meet the terms of the remedial specification, the contractor submittals and the site-specific regulations and permitting (NAV Canada approval, DFO Letter of Advice, Fish Collection permit, Water Sustainability Act and BC Wildlife Act permitting). Permits are provided in Appendix C.

The site preparation included the following:

- Fish and aquatic species salvage (including amphibians);
- Channel isolation, dewatering and diversion to allow work in the dry;
- Site clearing and grubbing:
    - Some shrub and small tree clearing was required within Reaches 1A and 1C;
    - Reach 1B required minimal clearing. The large Garry oak tree (*Quercus garryana*) adjacent to Reach 1B was protected from remedial activities;
    - Reaches 3 and 4 did not require clearing;
    - The Contractor minimized disturbance to existing trees and vegetation wherever possible; they used hand tools within root zones of significant trees and low impact equipment was used to reduce overall project impacts; and
    - Consultation with a professional arborist (provided by Contractor) to determine extents of tree clearing and to keep disturbance to a minimum.
- Installation of sediment and erosion control measures;
- Contractor site set-up including Contractor facilities;
- Mobilization of equipment and materials to site;
- Set up of laydown areas and temporary sediment stockpile locations (ground liners, water collection and treatment equipment as required, etc.); and
- Identification and protection of underground and overhead utilities prior to initiating work (Contractor).

Nesting bird surveys were not conducted prior to clearing and grubbing since these activities occurred outside the regional nesting period for lower Vancouver Island. The regional nesting period occurs from late March to mid-August (Government of Canada, 2018), therefore nesting activity was not anticipated during the project timeline.

The site kick-off meeting for the remediation project was completed on August 27, 2019. Representatives from PSPC, TC, Tervita, and SLR (along with sub-contractors) were in attendance to discuss the main tasks for successful completion of the project.

6.3 Pre-Construction Fish and Wildlife Salvage

Between August 12 and 15, 2019, SLR conducted a pre-construction fish and wildlife salvage. Fish stop nets were installed as site exclusion barriers in Reaches 1A, 1B and 1C (Photo 4) on August 12, 2019, and in Reaches 3 and 4 on August 14, 2019. Fish encountered within isolation zones were collected using a Halltech HT-2000 Backpack Electrofishing unit. SLR staff involved in the salvage were certified as Backpack Electrofishing Crew Leads. Minnow traps were also set overnight as an additional method to collect fish within select isolation zones. Biological information was collected from captured fish including species, length and life stage where applicable (Photos 5 and 6). Species captured included 540 threespine stickleback (*Gasterosteus aculeatus*), 33 cutthroat trout (*Oncorhynchus clarkii clarkii*) and 4 coho salmon (*Oncorhynchus kisutch*). Incidental wildlife salvage was completed during fish salvage activities; one red-legged frog (*Rana aurora)* tadpole was salvaged. All encountered fish and wildlife were relocated to similar habitat, just downstream of the ḰEL,SET (Reay) Creek Dam. Table C below summarizes all species caught and relocated during the pre-construction fish and wildlife salvage.

Table C: Summary of Fish & Wildlife Species Caught and Relocated During Pre-Construction Salvage

Reach Captured	Common Name	Scientific Name	Number of Individuals Salvaged
Reach 1A	Threespine stickleback	*Gasterosteus aculeatus*	4
Reach 1B	Threespine stickleback	*Gasterosteus aculeatus*	116
	Cutthroat trout	*Oncorhynchus clarkii clarkii*	12
	Coho salmon	*Oncorhynchus kisutch*	2
	Red-legged frog	*Rana aurora*	1
Reach 1C	Threespine stickleback	*Gasterosteus aculeatus*	235
	Cutthroat trout	*Oncorhynchus clarkii clarkii*	20
	Coho salmon	*Oncorhynchus kisutch*	1
Reach 3	Threespine stickleback	*Gasterosteus aculeatus*	82
	Cutthroat trout	*Oncorhynchus clarkii clarkii*	1
	Coho salmon	*Oncorhynchus kisutch*	1
Reach 4	Threespine stickleback	*Gasterosteus aculeatus*	103
	Cutthroat trout	*Oncorhynchus clarkii clarkii*	9

Site conditions and limitations of standardized techniques caused difficulty in capturing small (<30 mm) threespine stickleback (Photo 7) during the preconstruction fish salvage. Fish salvage techniques are known to have a limited effectiveness on very small fish. There was also high

density of instream vegetation (Photo 2) in some areas which restricted netting capabilities. SLR contacted a MFLNRORD fisheries representative to ensure that due diligence had been exercised during the salvage; MFLNRORD was aware of the limitations of fish salvage techniques and it was indicated that effort should be made to capture as many remaining fish as possible during the construction phase. Details of fish salvage during construction are included in Section 6.4.

Due to unforeseen delays, the contractor did not begin onsite activities until August 26, 2019. SLR performed site visits on August 21 and 23, 2019 to examine the condition of the fish exclusion barriers. Debris such as sticks and leaf litter that accumulated in the nets were removed and exclusion nets were adjusted or stabilized as required. All exclusion barriers appeared in-tact and functioning during spot checks performed by SLR between salvage activities and the start of construction.

6.4 Fish and Wildlife Salvage During Construction

As previously mentioned, small stickleback fish were not all captured during the pre-construction fish salvage due to limitations with standard salvage equipment and techniques. During the construction period, SLR used dip-netting techniques to capture fish as water levels in remedial areas decreased during dewatering. Incidental wildlife salvage occurred as needed throughout the construction phase of the project in accordance with the Best Management Practices for Amphibian and Reptile Salvages in British Columbia (MFLNRORD, 2016).

Species captured during the construction phase included 1024 threespine stickleback, 6 cutthroat trout, 1 red-legged frog (Photo 8), 2 pacific treefrog (*Pseudacris regilla)*, 1 signal crayfish (*Pacifastacus leniusculus)* and 1 eastern cottontail (*Sylvilagus floridanus).* Table D below summarizes all species salvaged during the construction phase of the Project.

All encountered fish and wildlife were relocated to similar habitat downstream of the ḰEL,SET (Reay) Creek Dam, with exception of the eastern cottontail which was relocated to the Detention Pond area. Appropriate handling procedures were followed in accordance with permits.

Table D: Summary of Fish & Wildlife Species Salvaged During Construction

Reach Captured	Common Name	Scientific Name	Number of Individuals Salvaged
Reach 1A	Pacific treefrog	*Pseudacris regilla*	1
Reach 1B	Threespine stickleback	*Gasterosteus aculeatus*	176
Reach 1B/1C[1]	Threespine stickleback	*Gasterosteus aculeatus*	122
Reach 1C	Threespine stickleback	*Gasterosteus aculeatus*	178
	Pacific treefrog	*Pseudacris regilla*	1
Reach 3	Threespine stickleback	*Gasterosteus aculeatus*	58
Reach 3/4[1]	Threespine stickleback	*Gasterosteus aculeatus*	323
Reach 4	Threespine stickleback	*Gasterosteus aculeatus*	169
	Cutthroat trout	*Oncorhynchus clarkii clarkii*	8
	Red-legged frog	*Rana aurora*	1
	Signal crayfish	*Pacifastacus leniusculus*	1
Stockpile Area	Eastern cottontail	*Sylvilagus floridanus*	1

Notes:
[1]Fish salvage activities included two different reaches at once, thus origin reach could not be differentiated.

Routine inspections of installed block nets were completed throughout the construction phase of the project, and debris was cleared out as needed to maintain isolation of the work areas.

A major rain event occurred on September 12, 2019 which caused general accumulation of debris in all fish exclusion nets and damage to the net in Reach 4. The damage to the net at the bottom of Reach 4 occurred overnight and caused a breach in site isolation; on the morning of September 13, 2019 all fish nets were inspected, cleaned and reinstated where applicable. The breach in site isolation allowed fish species including threespine stickleback and cutthroat trout to re-populate Reach 4. Additional dewatering and dip-netting was completed to capture fish that had re-populated the area.

All fish exclusion barriers were removed September 19, 2019, after in-water works were complete.

6.5 Equipment Mobilization and Site Set-Up

Tervita mobilized a site trailer, storage container, light stand generator, portapotty, skid steer and two excavators (EX308E and EX303.5E) to the Site on August 26, 2019. The site trailer was connected to the light stand generator for electricity and provided office and meeting space for Tervita, PSPC, SLR and subcontractors. The trailer was equipped with H&S supplies, first aid supplies and a wash station.

On August 29 and August 31, 2019, Tervita mobilized the water treatment equipment, including flocculation tanks, sand filtration media, activated carbon filters and two 5000 gallon holding tanks. The water treatment system was not setup for the duration of project; however, both holding tanks were used.

On August 29 and September 6, 2019, Tervita created containment cells in the SMA to stockpile the contaminated sediments. Tervita used the material from the existing stockpiles (SP1, SP2 and SP3) to create berms for the west and east walls of the containment cell. The large uncontaminated soil berm adjacent to the SMA on its north side was used as the north wall of the containment cell. The containment cells were lined with 60 mil polyethylene liner. The containment cells were created with a slight grade to the north to capture water where it could be pumped to the holding tanks for future treatment or discharge.

6.6 Invasive Plant Removal

Between August 27 and August 31, 2019, Tervita cleared the Site of invasive Himalayan blackberry using an excavator in Reach 1A and Reach 1C (Photo 9). The cleared blackberry was loaded into steel bins for off-site disposal at Metchosin Properties' Goldstream Heights Fill Site Facility, Langford, BC. Invasive plant removal was overseen by the Environmental Monitors.

6.7 Site Clearing and Grubbing

Site clearing and grubbing within remedial access locations was completed in the site preparation phase. Several remedial access locations were required to access the creek areas. The remedial access locations were determined by the Contractor and approved by the PSPC DR prior to initiation of clearing and grubbing (see Drawings 4A and 4B).

Reach 1A required additional clearing and grubbing due to unforeseen accessibility and excavator maneuverability issues within the creek bed. In order to remove contaminated sediment to

required depths, a higher number of riparian shrubs along the north creek bank were cleared than was initially anticipated in Reach 1A.

No removal of designated or significant trees was required during the project. Select limbs of trees in Reach 1A and 1C required pruning under the direction of the Contractor's certified arborist; however, all trees were retained within riparian areas.

6.8 Environmental Controls

SLR personnel as well as the Contractor's qualified environmental professional (QEP); South Island Environmental (SIE), were onsite to conduct environmental monitoring during the remediation program to verify compliance with the terms of the remedial program, the Contractor's EPP, EMS and any permitting obligations and requirements. The environmental monitor had the authority to halt construction activities in the event of imminent risk to the environment or significant non-compliance issues.

The Contractor was responsible for implementation of all necessary environmental controls prior to, and during, the remedial activities for the protection of environmental features and resources at and immediately adjacent to the Site.

Environmental protection measures including sediment and erosion control measures, spill contingency and response planning and equipment, dewatering and water bypass activities and other mitigation measures were inspected and documented as required. Additional details on environmental controls are included in SLR's daily summaries compiled in Appendix A.

A major rain event occurred on September 12, 2019; during which high water levels exceeded the capacity of water diversion infrastructure. Water breached over constructed dams and flooded into recently remediated and backfilled areas of the Site. SLR notified PSPC immediately of the rain event and flooding of the Site. Corrective actions were taken by the Contractor in order to maintain compliance with project requirements and permit conditions for instream work after the rain event. Additional de-watering was completed to the extent possible in select areas with sedimentation and erosion control mitigative measures in place.

6.8.1 Sedimentation and Erosion Control

During construction activities, it was the Contractor's responsibility to implement mitigation measures to limit potential sedimentation and erosion issues. Potential mitigation measures were outlined in the Contractor's EPP with the understanding that locations of erosion and sedimentation control measures would be determined in the field as needed. The following mitigation measures were implemented by the Contractor and observed by SLR monitors:

- Existing vegetation was retained where possible;
- Filter bags and socks (as well as fish screens) were placed around input and discharge hoses during dewatering;
- Instream work was conducted in dry conditions to the extent possible to reduce generation of turbid water;
- Haybales were placed within channels to slow down water flow and allow suspended particles to settle out (Photo 10);
- When works were completed, silt fencing was installed along stream channels down gradient from disturbed soils; and

- Granular material was placed within the stockpile area to reduce generation of fines from high traffic.

6.9 Water Diversion and Excavation Dewatering

Prior to excavation, channel isolation, flow diversion and dewatering occurred. Site isolation was achieved in Reach 1A by keeping the upstream sluice gate closed, in Reach 1B and Reach 1C by constructing a temporary diversion dam upstream of the remedial extent (Photo 11; Drawing 3A), in Reach 3 by opening the sluice gate on the tributary to divert water to the detention pond, and in Reach 4 by constructing a dam upstream of the remedial extent at the detention pond weir (Drawing 3B). Temporary dams were constructed using sandbags and poly liners.

In order to maintain flow downstream of temporary dams, the Contractor diverted the flow by placing a hose near the base of the dam to allow for passive flow of water to the downstream discharge point. The inlet of the pipe was positioned at such an elevation in the dam that there was enough grade to maintain constant passive flow. When this was not feasible, the Contractor used 2-inch pumps to maintain constant flow to downstream areas. The pumps were placed upstream of each dam with a float switch that periodically lowered the detained water level. In doing so, a constant flow of water was maintained downstream.

Dewatering of standing water in the reaches followed water diversion. Dewatering details are described below for the respective reaches.

Reach 1A

In Reach 1A, a deeper pool of standing water accumulated at the downstream extent, upstream of the inverted culvert. The sluice gate to the inverted culvert was left open and flow through was minimal to nil during the dewatering process. The lower elevation area at the downstream end of Reach 1A was used as a sump to collect standing water. Using two 2-inch submersible pumps (Photo 12), water was pumped to holding tanks or to downstream areas as appropriate. Since the gradient was minimal and there was a significant amount of vegetation in the creek, the flow to the downstream pool was minimal. Localized sumps were excavated throughout Reach 1A to further dewater. Prior to the excavation, the water was pumped to Reach 1C with sedimentation and erosion control. Once excavation commenced, the remaining water was pumped into Tank #2 (5,000 gallon capacity).

Reach 1B and Reach 1C

Upstream of the access road culvert in upper Reach 1C, a deeper pool upstream of the culvert was present. The pool was used as a sump to dewater the standing water in Reach 1B and in upper Reach 1C using a 2-inch submersible pump. Prior to the excavation, the water was pumped to lower Reach 1C with sedimentation and erosion control. Once excavation commenced, the remaining water was pumped into Tank #2. During excavation, the sediments were pushed from upstream to downstream to further assist in dewatering the excavation.

Reach 3

There was a significant gradient from the upstream to downstream length of Reach 3. Once the flow to Reach 3 was diverted to the detention pond via the sluice gate near the BC Aviation Museum, there were minimal dewatering activities required prior to the hydrovac excavation of Reach 3.

Reach 4

Dewatering of Reach 4 was conducted within isolated pools by installing submersible pumps with attached fish screens to allow dewatering to downstream pools and to the adjacent field as required.

During and Post Rain Event

A major rain event on September 12, 2019 caused water to flood into all reaches, some of which required further instream work (i.e., additional excavation in Reach 1A and Reach 4). De-watering occurred where possible using the methods described above. In Reach 4, complete de-watering was not feasible due to the large volume of water that continued to flood into the reach. However, the removal of contaminated sediment was completed prior to backfilling. The Contractor's QEP submitted a memo recommending the placement of backfill through the water column rather than completing additional dewatering prior to placement of clean backfill material (see Appendix E).

6.10 Remedial Excavation and Confirmatory Sampling Activities

Excavation activities involved standard equipment such as excavators, skid steer, and dump trucks for material transport in Reach 1A, Reach 1B and upper Reach 1C (Photo 13). For sensitive areas of the Site such as lower Reach 1C, Reach 3 and Reach 4, a hydrovac truck was used to remove contaminated sediments in and around the root structures of significant trees that were to be retained during the remediation (Photo 14). A total of 187 m^3 of metals-contaminated sediment (based on survey results) was removed from the creek sections.

SLR was present on-site for the duration of the remediation program to monitor, observe and document the remedial excavation works. This included filling out soil tracking documents and the collection of transportation manifests and disposal facility certificates in accordance with standard practices for the off-site removal of contaminated materials. The excavation works were undertaken during summer months within the reduced risk fisheries window from August 15 to September 15. Select activities, including additional excavations to address exceedances in initial confirmatory samples in Reach 1A and Reach 4 and backfilling of select areas, were performed beyond the September 15 window; however, prior approval from the applicable regulatory agencies was provided (see Section 5.1).

Archaeological monitoring was provided by a member of the local Tseycum First Nation.

Following excavation works and prior to backfilling activities, SLR collected confirmatory samples to determine the residual sediment quality within the excavated channels. Confirmatory samples were collected from the floor and sidewalls of the excavation approximately every 20 m. All confirmatory samples were collected to a depth of approximately 10 cm (Photo 15). The confirmatory samples were collected at a frequency consistent with the requirements outlined in BC ENV Technical Guidance Document 1: Site Characterization and Confirmatory Testing (BC ENV, 2009). The confirmatory samples were discrete samples; no composite samples were collected in the field or composited in the laboratory.

There were 88 confirmatory samples collected plus an additional 8 blind field duplicates (BFDs) from the excavation areas in Reaches 1 to 4. A QA/QC program was implemented to facilitate collection of representative samples throughout the confirmatory sampling program. The following QA/QC procedures were used during confirmatory sample collection, handling, identification and shipping:

- Sample containers used were supplied by the laboratory to minimize sample container contamination;
- Samples collected were placed 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 approximately 4 degrees Celsius (°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 encountered 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.

The analytical results provided information on the post-remediation site conditions prior to installation of backfill material and creek restoration activities. There were five initial confirmatory samples that exceeded the BC CSR SedFS standards (see Section 7); therefore, additional excavation and subsequent confirmatory sampling was required in those areas. All confirmatory sample locations are shown on Drawings 3A and 3B. A copy of SLR's Master Sample Tracker with confirmatory sample information along with all laboratory certificates of analysis (COA) are included in Appendix F.

Additional monitoring was conducted periodically by KWL to verify that the Contractor was adhering to the remedial design and that excavation limits were achieved in accordance with the contract.

6.11 Sediment Volumes

During excavation activities, SLR tracked the number of truck loads or skid steer loads of sediment transported to the SMA. In order to measure the volume of sediment excavated, each loaded tandem truck was assumed to carry 7 m^3 of sediment and each skid steer bucket to be 0.5 m^3. SLR also estimated the volume of sediment and water in a hydrovac truck to be 9.2 m^3 after it was filled with a typical load. SLR reconciled the number of cubic meters transported to the SMA at the end of each day. The SMA was also surveyed by WSP after all excavated sediment had been transported for temporary stockpiling; WSP survey files are attached in Appendix G.

The total volumes estimated by SLR were higher than the actual volumes transported offsite. This is likely due to partial loads of sediment transported to the SMA during site activities and unknown density of the sediment.

6.12 Sediment Stockpiling

Stockpiles of newly excavated sediment and the existing stockpile soils (Photo 16) were segregated from each other. All stockpiles were placed in the SMA on top of polyethylene liner as well as covered by liner (Photo 17) to protect against runoff and leaching in the event of precipitation, as well as to prevent mixing of stockpiles and wind-borne distribution of fine-grained contaminated sediments.

Stockpiles were numbered for identification purposes and stockpile locations were sketched on field site plans for tracking purposes. Volumes of each containment cell were surveyed by WSP under contract to Tervita.

6.13 Excavation Backfilling

Excavated areas within the creek base were backfilled to pre-excavation elevations using imported materials (Photos 18 and 19). Side slopes along the creek segments were graded to an approximate 2 Horizontal to 1 Vertical (2H:1V) slope. The specified backfill material was used along the channel bottoms to provide substrates suitable for fish and aquatic organisms. The backfill was clean, round, well graded granular material from naturally formed deposits of sand, gravel and cobbles, and free of any recycled material.

The Contractor completed analytical testing and sieve analysis on the backfill material prior to delivery to site and subsequent placement within the creek. Two backfill types were used for the project. Type 1 backfill consisted of rounded coarse sands and fine gravel and Type 2 backfill consisted of rounded coarse gravels. KWL also performed sieve testing on the Type 1 backfill material to verify Contractor results. Imported materials are further described in Section 7.4.

Multiple methods for backfill placement were used in different areas. In Reach 1A, Reach 1B and upper Reach 1C, an excavator was used to place backfill (Photo 20); in lower Reach 1C, Reach 3 and Reach 4 where access was limited, a slinger truck was used to place backfill (Photo 21). In all reaches, backfill was raked by hand to final conditions. Final backfill conditions in each reach are shown in Drawings 4A and 4B. A summary of backfill placed within each reach is shown in Table E below.

Table E: Summary of Backfill Placement by Reach

Reach	Type of Backfill	Approx. Backfill Depth (m)	Approx. Backfill Volume (m^3)	Method of Installation
1A	Type 1	0.60	105.3	Excavator & hand raking
1B	Type 1 (plus 450 mm rounded riprap for riffle features)	0.25-0.50*	75.3	Excavator & hand raking
Upper 1C	Type 1	0.5-1.0	***	Excavator & hand raking
Lower 1C	Type 2	0.15	11.4	Slinger truck & hand raking
3	Type 2	0.15	5.8	Slinger truck & hand raking
4	Type 2	0.20	5.7	Slinger truck & hand raking

Notes:

*includes backfill for 0.25m over-excavation in select locations

**backfill survey volumes provided for upper Reach 1C combined with Reach 1B.

6.14 Design Compliance

As previously mentioned, KWL performed regular site visits to verify that the Contractor was adhering to the remedial design and that requirements were achieved in accordance with the contract. KWL inspected each reach after excavation and backfill placement to confirm that the appropriate depths had been met. Overall, the Contractor was within compliance with the design throughout the project, with exception of a few minor instances which are described below.

On September 4, 2019 KWL noted that excavation of contaminated sediment in Reach 1B exceeded the 0.25 m excavation depth by an approximate additional 0.25 m. Due to the unconsolidated and wet nature of the sediment, the Contractor had difficulty removing solely the top 0.25 m. Overall, volumes of excavated sediment were below projected amounts and final volumes were still within contract allowances despite over-excavation in these select areas.

Additionally, during excavation in Reach 1B, the upstream and downstream slopes of riffles 3 and 4 (Drawing 2) were damaged by the Contractor. The riffles provided flow diversity within the channel of Reach 1B and therefore required reinstatement. Through field observations by SLR and KWL staff, it was determined that the body of the riffles and riffle crests remained in place. Repairs were made to the slopes of both riffles by the Contractor under direction from KWL (Photos 22 - 23). The document prepared by KWL including recommendations for riffle slope reinstatement is attached in Appendix A. Record drawings are included in Appendix K.

6.15 Water Discharge

The project QEP sampled the water in both holding tanks (Tank #1 and Tank #2). Analytical results indicated water quality within the holding tanks did not meet ambient water quality guidelines and, therefore, could not be discharged to the creek. Sanitary sewer discharge permits from Capitol Regional District (CRD) were subsequently obtained by the Contractor for each tank (Appendix C). Analytical results met the sanitary sewer limits for discharge of the stored water. Tank #2 was discharged to the sanitary sewer on September 18, 2019. Tank #1 was discharged to the sanitary sewer on October 30, 2019.

The water was pumped from the holding tanks to the sanitary sewer at a nearby manhole, adjacent to the pumphouse north of Reach 1A. Discharge water was monitored for flow rate to meet the permitting requirements. Some sludge remained in the bottom of Tank #1 after water was discharged and was removed via hydrovac truck on October 31, 2019. The material collected out of the bottom on Tank #1 was deposited at the Terrapure Environmental facility in Nanaimo.

Up to 9,000 gallons of water was discharged from the Site to the CRD sanitary system.

6.16 Site Mapping

Site mapping was completed by WSP under contract to Tervita. WSP surveyed the remedial areas prior to construction, post excavation and post backfill placement. WSP also surveyed the SMA after all excavated sediment had been stockpiled and the restoration planted areas after planting was complete. Survey data is provided in Appendix G.

SLR used a hand-held Trimble GeoXH Geoexplorer GPS unit to record the location of the confirmatory samples that were collected. Confirmatory sample locations are presented on Drawings 3A and 3B.

7.0 LABORATORY ANALYTICAL RESULTS

Following excavation works and prior to backfilling activities, SLR collected in-situ confirmatory samples to determine the residual sediment quality within the excavated channels. Confirmatory samples were collected from the floor and sidewalls of the excavation approximately every 20 m. All confirmatory samples collected by SLR were sent to AGAT Laboratories (AGAT) for analysis as per PSPC Task Authorization 700461459.

The Contractor's QEP (SIE), also collected samples during the construction phase of the project. The QEP collected samples of the imported backfill material, stockpile samples from existing stockpiles, and water samples from holding tanks. All samples collected by SIE were sent to ALS Laboratories (ALS) for analytical analysis.

SLR and KWL additionally collected water samples from holding tanks and samples of imported backfill material for QA/QC purposes.

The following sections summarize the analytical chemistry results for all samples collected by SLR, subcontractors and SIE.

7.1 Confirmatory Sediment Sampling

7.1.1 Analytical Schedule

Sediment samples collected from the final excavation limits were submitted to AGAT for analysis of metals, polycyclic aromatic hydrocarbons (PAHs), light extractible petroleum hydrocarbons/ heavy extractible petroleum hydrocarbons and extractible petroleum hydrocardons (LEPH/HEPH/EPH), petroleum hydrocarbon constituents (PHC) fractions F1-F4, volatile organic compounds (VOCs) and grain size. Table F summarizes the general analytical schedule and parameters analyzed for confirmatory sediment samples collected at the Site. The samples were submitted on a rush turnaround time in order to facilitate timely backfilling and restoration work.

Table F: Summary of Sediment Analyses

Type of Analysis	% Confirmatory Samples Analyzed	# BFDs Analyzed
Metals	All (88)	8
PAH	All (88)	8
LEPH/HEPH	~75% of all samples (66)	6
BTEX/F1-F4	~15% of all samples (14)	7
VOC	~15% of all samples (14)	7
Grain Size	~15% of all samples (16)	6

A Master Sample Tracker for all confirmatory samples collected by SLR and copies of the AGAT analytical reports are included in Appendix F.

7.1.2 Results – Comparison to Sediment Standards

Analytical results for confirmatory sediment samples collected from the limits of the excavations were compared to the BC CSR SedFS standards and are presented in Tables 1 through 4 with exceedances summarized on Drawings 3A and 3B.

7.1.2.1 *Metals*

Metals concentrations in confirmatory sediment samples were generally below the CSR SedFS with select exceptions as described below.

Excavated areas that showed an exceedance of sediment standards in the initial confirmatory sample were excavated further to remove residual contamination beyond the design excavation elevations. Additional confirmatory samples were collected from these areas to verify contamination had been removed. Metals parameters exceeding the standards are summarized in Table G below.

Table G: Summary of Metals Exceedances in Confirmatory Samples Relative to Sediment Standards

Parameter	Number of Exceedances	Maximum Concentration (µg/g)	BC CSR SedFS Standard (µg/g)
Cadmium	2	57.9	2.2
Chromium	4	533	56*
Zinc	1	216	1

* BC ENV Protocol 4 Vancouver Island Regional Soil Quality Estimate for Chromium = 65 µg/g

Concentrations of chromium in numerous confirmatory samples exceeded the BC CSR SedFS standards. However, the sediment at the base of the creek is expected to exhibit similar properties to the regional soil. Therefore, metals concentrations in sediments can be expected to show concentrations up to the BC Protocol 4 regional background soil quality estimate for Vancouver Island (ENV, 2019). Chromium concentrations in most of the samples that exceeded the BC CSR SedFS standard were less than the BC Protocol 4 regional background soil quality estimate for chromium (65 µg/g) (ENV, 2019).

Five initial confirmatory samples were found to have metals concentrations above the BC CSR SedFS standards and above the BC Protocol 4 regional background soil quality estimate. All locations were further excavated, re-sampled and delineated with additional confirmatory samples.

- Sample **CS19-011F_0.6-0.7** in Reach 1A exceeded the BC CSR SedFS standard for cadmium. The sample was taken from the floor of the excavation. After an additional 0.4-m-deep excavation along the creek bottom, extending 2.0 m upstream and 5.0 m downstream, vertical delineation was achieved with sample CS19-011F-01_1.0-1.1. The sample was delineated to the north with sample CS19-010NW_0.6-0.7, to the south with sample CS19-012SW_0.6-0.7, to the west with sample CS19-008F_0.6-0.7 and to the east with sample CS19-014F_0.6-0.7. Cadmium contamination at this location was deemed removed through the additional excavation and subsequent confirmatory samples meeting remedial targets;
- Samples **CS19-020F_0.6-0.7** and **CS19-020F-01_0.8-0.9** in Reach 1A exceeded the BC CSR SedFS standard and the BC Protocol 4 regional background soil quality estimate for chromium. The samples were taken from the floor of the excavation. After an additional 0.6-m-deep excavation along the creek bottom, extending 2.0 m upstream and 2.0 m downstream, vertical delineation was achieved with sample CS19-020F-02_1.2-1.3. The sample was delineated to the north with sample CS19-019NW_0.6-0.7, to the south with sample CS19-021SW_0.6-0.7, to the west with sample CS19-017F_0.6-0.7 and to the

east with sample CS19-041_0.2-0.3. Chromium contamination at this location was deemed removed through the additional excavation and subsequent confirmatory samples meeting remedial targets;

- Sample **CS19-059F_0.2-0.3** in Reach 3 exceeded the BC CSR SedFS standard and the BC Protocol 4 regional background soil quality estimate for chromium. The sample was taken from the floor of the excavation. An additional 0.2-m-deep excavation was conducted along the creek bottom, from the sample location to an extent of 2.0 m downstream. Sample CS19-059F-01_0.5-0.6, taken from the floor of the excavation, exceeded the BC CSR SedFS standard for chromium but was below Protocol 4 regional background soil quality estimate. Therefore, vertical delineation was achieved with sample CS19-059F-01_0.5-0.6. The sample was delineated to the north with sample CS19-058NW_0.2-0.3, to the south with sample CS19-060SW_0.2-0.3, to the east with sample CS19-062F_0.2-0.3 and was the western-most sample at the limit of excavation. Chromium contamination at this location was deemed removed through the additional excavation and subsequent confirmatory samples meeting remedial targets; and
- Sample **CS19-076WW_0.2-0.3** in Reach 4 exceeded the BC CSR SedFS standard for cadmium, chromium and zinc. The sample was taken from the wall of the excavation. After an additional 0.4-m-deep excavation into the west wall of the creek channel, extending 2.0 m upstream and 2.0 m downstream, delineation to the west was achieved with sample CS19-076WW-01_0.6-0.7. The sample was delineated vertically with sample CS19-075F_0.2-0.3, to the north with sample CS19-073F_0.2-0.3, to the east with sample CS19-074EW_0.2-0.3 and was the southern-most sample at the limit of excavation. Metals contamination at this location was deemed removed through the additional excavation and subsequent confirmatory samples meeting remedial targets:
    - However, during the additional wall excavation, there was visual hydrocarbon staining, strong odour and wood debris in select locations along the west wall of the creek (Photo 24). Analytical results were below the BC CSR SedFS standards for all parameters analyzed (including hydrocarbon parameters).

Sample CS19-062F-01_0.5-0.6 exceeded the BC CSR SedFS standard for chromium and was slightly above the BC Protocol 4 regional background soil concentration for chromium. However, the shallower sample CS19-062F_0.2-0.3 at the excavation depth did not exceed either standard for chromium; therefore, this area was not excavated further.

7.1.2.2 *PAH*

Analytical results for all confirmatory samples considered representative of current site conditions had PAH concentrations less than the BC CSR SedFS standards.

7.1.2.3 *Petroleum Hydrocarbons Constituents*

BTEX

Analytical results for all confirmatory samples considered representative of current site conditions had concentrations of BTEX less than the analytical detection limits. There are no BC CSR SedFS standards for BTEX parameters.

VOC

Analytical results for all confirmatory samples considered representative of current site conditions had concentrations of VOCs less than the analytical detection limits. There are no BC CSR SedFS standards for VOC parameters.

PHC Fractions & LEPH/HEPH

There are no standards for PHC fractions F1 through F4 or LEPH/HEPH under CSR SedFS standards. Analytical results indicated that most of the confirmatory samples considered representative of current site conditions had concentrations of PHC fractions F1 through F4 and LEPH/HEPH less than or generally near the analytical detection limits. Two samples, CS19-076WW_0.2-0.3 and CS19-077F-01_0.5-0.6 indicated presence of HEPH and PHC Fractions F3 and F4; however, levels were relatively low. As a benchmark comparison, concentrations were screened against the Canada-Wide Standards (CWS) for PHC in coarse-grained soils for Residential/Parkland (RL/PL) (most stringent soil standards). Results were below these soil standards for all samples.

7.1.2.4 *RPDs*

SLR collected and submitted 8 BFD samples which were analyzed for metals, PAHs and one or more of BTEX, PHC fractions F1-F4, LEPH/HEPH, VOCs and grain size.

Relative Percent Difference (RPD) values are presented in Tables 1 through 4 following the text. The RPD values were not calculated (nc) if the concentrations of one or both samples were less than five times the reported detection limit (RDL) due to the higher variability in results close to the RDL. Overall, RPD calculations were well within RPD thresholds and ranged from 0% to 39%, with the exception of one RPD calculation. BFD sample pair CS19-011F_0.6-0.7 and CS19-DUP2F_0.6-0.7 had an RPD value of 72% for one total metals parameter (chromium), which exceeded the metals RPD threshold of 45%. It is likely that the RPD discrepancy is due to sample heterogeneity for the select total metals parameter that does not meet RPD thresholds. The variability in the RPD calculation for chromium does not affect the analytical results for these BFD pairs and, most RPD calculations as well as the batch average RPD values were within acceptable criteria. Therefore, SLR considers the QA/QC calculations for RPD reliable for the purposes of this sampling program.

7.2 Stockpile Soil Sampling

The Contractor's QEP (SIE) sampled the existing stockpiles to obtain additional analytical data for disposal requirements associated with the disposal facility. SIE's field report including analytical results is included in Appendix H.

7.3 Stored Water Sampling

The Contractor's QEP (SIE) sampled stored water in two holding tanks to determine appropriate discharge options. The samples were sent to ALS for analysis. SIE's field report including analytical results is included in Appendix H. SLR took concurrent water samples from the two holding tanks for QA/QC purposes. The samples taken by SLR were submitted to AGAT for analysis and are included in Appendix F. Results exceeded the BC ambient water quality guidelines and, therefore, water could not be discharged back to the creek. Tervita obtained a CRD sewer discharge permit for disposal of the stored water to the sanitary system. Permits are provided in Appendix C.

7.4 Imported Materials

Three imported material types were imported to the Site during the project (Type 1 blend, Type 2 blend and riprap). All aggregate was imported from Lehigh Hanson Materials Ltd. (Lehigh). Type 1 blend was washed, rounded coarse sands and gravels (5mm 'birdseye'). Type 2 blend was washed, rounded, large gravels (60mm 'torpedo'). The Type 2 blend contained the same constituents as the Type 1 blend excluding the sand in order to provide a larger size blend for downstream creek sections that would be less susceptible to movement within the creek channel. The riprap consisted of approximately 300 mm to 450 mm washed, rounded boulders used for the riffle repairs.

Per the project tender specifications, the Contractor was responsible for providing "documentation of analytical testing of all imported gravel, backfill or other fill materials for review and approval by the Departmental Representative". SIE was retained by Tervita to assess the materials from Lehigh prior to import to the Site.

SIE reported that the Abbotsford Concrete Sand (washed), "Sechelt Sand" and "Sechelt 25mm Base" met requirements outlined in the specifications for imported fill materials. All samples were below the CCME residential use soil guidelines and were deemed acceptable for use at the Site.

Sieve analysis data were provided by Tervita for imported backfill samples. KWL also completed a grain size assessment of the Type 1 backfill blend for verification purposes. SLR's review of the laboratory data provided for the backfill samples confirmed that the samples met requirements outlined in the ḰEL,SET (Reay) Creek Remediation Specifications.

SLR was also provided with an historic acid rock drainage report completed by Golder Associates in February 2017 for the quarry in Sechelt from which the material originated. Analytical results indicated backfill material from the subject source site was not acid-generating and was acceptable for use at the Site. A copy of the report, along with all other documents pertaining to imported materials are included in Appendix E.

Approximately 504 tonnes of backfill was imported to the Site and placed in the creek where contaminated sediments were removed. Weigh scale tickets from Lehigh are included in Appendix E. The three material types were placed in different reaches of the creek as follows:

- Type 1 blend – Reach 1A, Reach 1B and upper Reach 1C;
- Type 2 blend – lower Reach 1C, Reach 3 and Reach 4; and
- Riprap – riffle reconstruction in Reach 1B.

Following a significant rainfall on September 12, 2019, all reaches were inundated with water. Lower Reach 1C, Reach 3 and Reach 4 had not yet been backfilled at that stage of the project. Considering the larger sized Type 2 backfill to be placed in these areas, the Contractor's QEP suggested that there would be less disturbance if backfill was placed through the water column in these select areas compared to dewatering the reaches a second time prior to placing backfill. A copy of a memo from SIE confirming the modified backfilling method is provided in Appendix E.

8.0 SOIL AND REFUSE TRANSPORT AND DISPOSAL

8.1 Authorized Disposal Facilities

Per Section 02 61 00 of the project tender specification, the Contractor was required to identify the facilities that would be used to treat and/or dispose of each of the categories of waste materials during the project. Requirements for the disposal facilities included the following:

- Must be an existing off-site facility located in Canada;
- Must be designed, constructed and operated to prevent any pollution from being caused by the facility outside the area of the facility from waste placed in or on land within the facility;
- Must 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, general refuse, construction/demolition waste or other material requiring disposal; and
- Must comply with applicable municipal zoning, bylaws and requirements.

The following facilities were approved by PSPC for the disposal of contaminated soil:

- Skway Disposal Facility in Chilliwack, BC – most of the sediment excavated at the Site was disposed at Skway; and
- Highwest Waste Recycler Ltd. in Victoria, BC.

The following facility was approved for the disposal of non-contaminated refuse, invasive plant material and non-invasive plant material:

- Metchosin Properties' Goldstream Heights Fill Site Facility.

8.2 Soil Transport

Upon PSPC approval of the disposal facilities, Tervita transported the sediment/soils off-site to one of the approved disposal facilities. Tervita used some of the drier material in the existing stockpiles to stabilize newly excavated wet material. Soil transport and disposal occurred between October 28 and November 7, 2019.

SLR provided oversight and tracked stockpiles as Tervita conducted loading and transport operations. Tervita provided each truck with a manifest for the soil being hauled. The trucks were then unloaded onto a barge for transport to the lower mainland where it was off-loaded into trucks at the receiving port and transported to the disposal facility. Tervita submitted weigh-scale tickets from the disposal facility to PSPC, which SLR cross-checked against soil volumes for accuracy. Soil disposal tonnages are presented in Appendix I.

After stockpile removal, a small amount of material remained on the eastern side of the SMA (Photo 25). This material did not originate from the current program and will be addressed by VAA separately.

8.3 Soil Disposal

The approximate tonnage of soils disposed off-site as documented through weigh-scale tickets at the point of disposal (included in Appendix I) is presented in Table H below.

Table H: Summary of Soil Disposal

Classification	Amount (tonnes)	Disposal Facility
BC CSR IL+	827.4	Skway
BC CSR RL+	80.3	Skway
BC CSR RL+	14.9	Highwest
TOTAL	**922.6**	

8.4 General Refuse Disposal

One bin load of general refuse from the Site was disposed at the Metchosin Properties' Goldstream Heights Fill Site Facility, Langford, BC.

8.5 Invasive Plant Material Disposal

All plant material from clearing and grubbing, including invasive plant material, was transported to the Metchosin Properties' Goldstream Heights Fill Site Facility, Langford, BC. A total of eight bin loads of material were transported for disposal.

9.0 SITE RESTORATION AND PLANTING

The Contractor was responsible for developing a Riparian Restoration Plan that followed BC Riparian Restoration Guidelines and Standards and prioritized the restoration of native riparian vegetation. The Riparian Restoration Plan was submitted to, and approved by, PSPC following review by SLR and prior to conducting restoration activities. Following completion of instream activities, disturbed slopes of the creek were restored, reseeded with native seed mix and plantings of native shrubs and trees were installed to provide additional vegetative cover along the creek banks and in disturbed areas along the riparian zones.

Final site conditions are displayed in Drawings 4A and 4B. Details on each aspect of site restoration and planting are described in the following subsections.

9.1 Physical Restoration Activities

Physical restoration activities completed by the Contractor included site preparation (i.e. levelling/grading) of riparian restoration areas located outside of the remedial excavation limits for planting of native vegetation. In addition, the Contractor restored all other disturbed areas through the application of hydroseed prior to demobilizing from the Site.

SLR noted that some additional work had been completed in Reach 1C during the gap between the construction phase of the Project and the site restoration phase. A retaining wall had been constructed to stabilize the steep slope on the downstream side of the culvert that runs under the access road (Photo 26). This work was completed through the VAA and is not related to the remedial works conducted under the TC/PSPC contract.

9.2 Erosion and Sedimentation Control Measures

Following levelling and grading activities, a grass seed blend was hydroseeded over the disturbed areas. Silt fences were installed adjacent to channels where vegetation had been removed to provide additional sedimentation and erosion control (Photo 27).

9.3 Native Species Planting

Planting was completed by Watershed Ecological Services Ltd. (WES) between October 28, 2019 and November 5, 2019 in select areas of Reaches 1A, 1B and 1C where plant removal occurred. No planting was required in remediated Reaches 3 and 4 as no plant removal or disturbance to riparian zones occurred in those areas.

A variety of tree and shrub species common to the Southern Vancouver Island Coastal Douglas Fir maritime zone were selected for planting in riparian restoration zones. The Contractor submitted a Restoration Plan prepared by WES, which indicated 1295 plants would be planted, including the following species:

- Red alder *(Alnus rubra)*;
- Trembling aspen *(Populus tremuloides)*;
- Twinberry *(Lonicera involucrata)*;
- Red elderberry *(Sambuca racemosa)*;
- Hookers willow *(Salix hookeriana)*;
- Pacific willow *(Salix lucida)*;
- Black hawthorn *(Crataegus douglasii)*;
- Pacific ninebark *(Physocarpus capitatus)*;
- Nootka rose *(Rosa nootkana)*;
- Indian plum *(Oemleria cerasiformis)*;
- Thimbleberry *(Rubus parviflorus)*;
- Hardhack *(Spirea douglasii)*;
- Common snowberry *(Symphoricarpos albus)*;
- Red osier dogwood *(Cornus sericea)*; and
- Western sword fern *(Polystichum munitum)*.

Trees and shrubs of various pot sizes were installed densely at 1-3 plants per square metre. In areas where Himalayan blackberry had been removed, plant species that cover thickly, have strong root systems and are drought tolerant were selected to mitigate the future spread of Himalayan blackberry. Leaf debris was used as mulch and was placed throughout planted areas; planted areas were surveyed and are shown on Drawing 4A.

Reach 1A: Revegetation occurred on both sides of the silt fencing (Photo 28) and included all species mentioned above, with the exception of trembling aspen and western sword fern.

Reach 1B: Planting occurred in select areas where vegetation removal was required for access (Photo 29). WES selected trembling aspen as a first choice for planting in these areas and indicated their installation would depend on availability. A wider variety of plant species from the list above was observed to be planted along Reach 1B than was originally indicated in the Restoration Plan. SLR observed planted red osier dogwood, common snowberry, pacific ninebark, black hawthorn, and other unidentified nursery plants along Reach 1B.

Reach 1C: Dense plantings of nootka rose and thimbleberry were installed where Himalayan blackberry removal occurred (Photo 30). Along lower Reach 1C, western sword fern was planted along the stream edge and bank (Photo 26). Other species such as red alder, red osier dogwood, red elderberry, nootka rose, thimbleberry, common snowberry and pacific ninebark were selected for planting along Reach 1C.

Reach 3 and Reach 4: Revegetation was not required.

Monitoring will be conducted by WES, who have an ongoing relationship with VAA which provides opportunity for site visits to assess the condition of the plantings. A warranty period of 1-year is required as part of the contract with 80% survivorship of plantings. The Restoration Plan prepared by WES is included in Appendix J.

10.0 CONCLUSIONS AND RECOMMENDATIONS

The remediation project of ḰEL,SET (Reay) Creek at the VIA was completed between August and November 2019. The objective of the remediation project was to remove contaminated sediment within the creek in Reach 1A, Reach 1B, Reach 1C, Reach 3 and Reach 4. The project objectives also included the restoration of the remedial and surrounding areas to provide suitable erosion control, riparian cover and habitat for local species.

Fish and wildlife species salvaged during both the pre-construction and construction phases, including 1,607 fish specimens and 6 specimens of other wildlife, were relocated to appropriate habitat outside of the project work area.

Approximately 922.6 tonnes of sediment/soil, 1 bin load of general refuse and 8 bin loads of invasive and other plant material were removed from the Site and transported off-site for disposal. Approximately 453 tonnes of sediment were removed during the subject remediation work and approximately 470 tonnes were removed and stockpiled by the VAA during the 2017 construction of the detention pond (removed from site for disposal during the subject remediation project).

Confirmatory samples collected from the limits of the excavations generally met the BC CSR SedFS standard and/or were below the BC Protocol 4 regional background soil concentrations. Initial confirmatory samples at the excavation limits exceeded the BC CSR SedFS standards and were above the BC Protocol 4 regional background soil concentrations in 5 sample locations. All these locations were excavated deeper and re-sampled to ensure a clean base was obtained and contamination removal could be confirmed.

At sample location CS19-062F, the confirmatory sample taken at the limits of excavation were within the BC CSR SedFS standard and were below the BC Protocol 4 regional background soil quality estimate. However, the sample taken deeper than the excavation extent (CS19-062F-01) exceeded the BC CSR SedFS and the BC Protocol 4 regional background soil concentration for chromium. However, the exceedance was only slightly higher than the BC Protocol 4 regional background soil concentration for chromium and therefore additional excavation and investigation of the noted exceedance is not considered warranted.

The downstream extent of Reach 4 was additionally excavated by 0.4 m on the west wall to address contamination in initial confirmatory sample CS19-076WW_0.2-0.3. The analytical results for additional confirmatory sample CS19-076WW-01_0.6-0.7 were below the BC CSR SedFS standards for all parameters analyzed. However, there was visual hydrocarbon staining, strong odour and wood debris along the west wall; therefore, additional investigation may be warranted and is recommended.

Following the review of the analytical results of the confirmatory samples, the creek beds were backfilled to pre-excavation depths with approximately 504 tonnes of imported sands and gravel.

Surface water removed prior to excavation was pumped downstream with sedimentation and erosion control; surface water removed during remediation activities was pumped to temporary storage tanks which were discharged to the sanitary sewer in accordance with obtained permits.

Following remedial excavation and backfilling, all disturbed areas were physically restored and were either planted with native vegetation or hydroseeded with a grass seed blend.

Overall, the project successfully removed 187 m^3 of metals-contaminated sediment from the selected remedial areas within ḰEL,SET (Reay) Creek at the VIA for disposal at the approved disposal facilities.

11.0 STATEMENT OF LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SLR for PSPC, hereafter referred to as the “Client”. It is intended for the sole and exclusive use of PSPC. The report has been prepared in accordance with the Scope of Work and agreement between SLR and the Client. Other than by the Client and as set out herein, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted unless payment for the work has been made in full and express written permission has been obtained from SLR.

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TABLES

Confirmation of Remediation
ḰEL,SET (Reay) Creek – Victoria International Airport
North Saanich, BC
SLR Project No.: 205.03892.00005

TABLE 1: CONFIRMATORY SAMPLE CHEMISTRY RESULTS - TOTAL METALS

Location Type	Sample Location	Sample Depth (mbg)	Sample Date	Sample ID	pH (lab)	aluminum	antimony	arsenic	barium	beryllium	bismuth	cadmium	calcium	chromium (III+VI)	cobalt	copper	iron	lead	lithium	magnesium	manganese	mercury	molybdenum	nickel	potassium	selenium	silver	sodium	strontium	thallium	tin	titanium	uranium	vanadium	zinc	zirconium	phosphorus
					Metals																																Inorganics
					pH_Units	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
Reported Detection Limit					0.1	10	0.1	0.1	0.5	0.1	0.5	0.01	10	1	0.1	0.2	10	0.1	0.5	10	1	0.01	0.2	0.5	5	0.1	0.5	5	1	0.1	0.2	1	0.2	1	1	0.1	5
Remedial Objective - BC CSR SedFS								11				2.2		56		120		57				0.3													200		
BC P4 Background Soil - Region 1 Vancouver Island						55000	$4^{\#1}$	$4^{\#1}$	250	0.7		0.95		$65^{\#2}$	30	100	70000	40			5000	$0.15^{\#3}$	$1^{\#1}$	50		$4^{\#1}$	$1^{\#1}$		100		$4^{\#1}$			200	150		
Reach 1A	CS19-001NW	0.6-0.7	2019-Aug-30	CS19-001NW_0.6-0.7	8.2	32,500	0.4	7.8	97.2	0.5	<0.5	0.2	14,200	55	19.7	56	46,100	7.2	27.4	14,500	729	0.08	0.5	53.1	2350	0.4	<0.5	1160	82	0.1	0.7	1720	0.5	100	88	9.2	549
	CS19-002F	0.6-0.7	2019-Aug-30	CS19-002F_0.6-0.7	8.3	31,400	0.3	8.3	92.6	0.5	<0.5	0.21	14,400	49	19.4	53.8	46,500	7.1	26.6	14,200	797	0.07	0.5	52.3	2570	0.6	<0.5	1160	78	<0.1	0.6	1690	0.4	95	85	8.5	572
	CS19-003SW	0.6-0.7	2019-Aug-30	CS19-003SW_0.6-0.7	8.2	29,300	0.4	6.4	93.1	0.5	<0.5	0.43	19,400	53	19.5	55	42,700	8.6	23.7	13,100	603	0.05	1.1	52.8	2570	0.4	<0.5	1280	84	<0.1	0.6	1690	0.5	98	127	8.9	572
	CS19-004NW	0.6-0.7	2019-Aug-30	CS19-004NW_0.6-0.7	8	31,000	0.3	6.7	88.4	0.5	<0.5	0.2	9860	55	19.5	55.2	46,100	7.8	27.1	13,900	722	0.06	0.3	53.2	2220	0.3	<0.5	1160	63	0.1	0.6	1580	0.4	97	93	7.7	518
	CS19-005F	0.6-0.7	2019-Aug-30	CS19-005F_0.6-0.7	8.2	30,400	0.3	9.1	85.8	0.5	<0.5	0.29	10,700	48	19.4	53.3	46,200	6.7	24.9	13,100	766	0.05	0.6	48.9	2290	0.2	<0.5	1340	74	<0.1	0.6	1660	0.4	95	78	8.1	540
	CS19-006SW	0.6-0.7	2019-Aug-30	CS19-006SW_0.6-0.7	8	32,900	0.4	7.1	96.2	0.5	<0.5	0.28	19,800	52	19.1	54.1	47,700	7.1	27.4	15,000	720	0.06	0.5	53.5	2410	0.4	<0.5	1190	78	<0.1	0.7	1710	0.4	96	85	9.6	536
	CS19-007NW	0.6-0.7	2019-Aug-30	CS19-007NW_0.6-0.7	8.1	33,100	0.3	8.1	99.1	0.5	<0.5	0.16	11,100	56	17	62.2	48,100	6.1	29.2	13,100	627	0.08	0.7	44.9	1650	0.2	<0.5	987	70	<0.1	0.6	1770	0.5	109	68	6.9	534
	CS19-008F	0.6-0.7	2019-Aug-30	CS19-008F_0.6-0.7	8.4	31,700	0.4	7.4	96	0.5	<0.5	0.25	15,900	56	19.2	57.2	46,400	6.5	28	14,300	668	0.07	0.5	51.8	2520	0.5	<0.5	1270	93	<0.1	0.7	1780	0.4	103	85	8.5	545
		0.6-0.7		CS19-DUP1F_0.6-0.7	8.5	30,200	0.4	7.6	88.1	0.5	<0.5	0.21	14,800	50	18	51.8	45,000	6.4	26.5	13,800	726	0.05	0.6	48.1	2270	0.3	<0.5	1140	78	<0.1	0.6	1620	0.4	95	79	9.7	535
	RPD (CS19-008F_0.6-0.7 & CS19-DUP1F_0.6-0.7)				1%	5%	NC	3%	9%	NC	NC	17%	7%	11%	6%	10%	3%	2%	6%	4%	8%	NC	NC	7%	10%	NC	NC	11%	18%	NC	NC	9%	NC	8%	7%	13%	2%
	CS19-009SW	0.6-0.7	2019-Aug-30	CS19-009SW_0.6-0.7	8.2	31,600	0.3	8.2	86.6	0.5	<0.5	0.25	12,600	52	18.4	55.2	46,600	6.2	27	13,800	587	0.07	0.6	45.9	2220	0.4	<0.5	1180	74	<0.1	0.6	1820	0.4	100	78	8	561
	CS19-010NW	0.6-0.7	2019-Aug-30	CS19-010NW_0.6-0.7	7.6	31,200	0.3	7.9	93.4	0.5	<0.5	0.18	10,600	53	19.3	52.7	44,600	7	27.3	13,300	775	0.06	0.3	50.2	1770	0.4	<0.5	995	65	<0.1	0.6	1570	0.4	98	78	7.3	476
	CS19-011F	0.6-0.7	2019-Aug-30	CS19-011F_0.6-0.7	7.7	30,400	0.3	7.3	82.4	0.5	<0.5	35	10,300	52	17.9	51.9	44,800	6.8	26.9	13,500	710	0.06	0.5	47.9	1900	0.3	<0.5	1200	58	<0.1	0.6	1670	0.4	96	80	7	535
		0.6-0.7		CS19-DUP2F_0.6-0.7	7.8	29,900	0.4	7.4	87.5	0.5	<0.5	16.5	10,500	51	18.2	52.9	45,200	6.8	25	13,500	691	0.07	0.5	47.6	1820	0.5	<0.5	1120	67	<0.1	0.6	1670	0.4	97	79	9.8	523
	RPD (CS19-011F_0.6-0.7 & CS19-DUP2F_0.6-0.7)				1%	2%	NC	1%	6%	NC	NC	72%	2%	2%	2%	2%	1%	0%	7%	0%	3%	15%	NC	1%	4%	NC	NC	7%	14%	NC	NC	0%	NC	1%	1%	33%	2%
	CS19-011F-01	1-1.1	2019-Sep-6	CS19-11F-01_1.0-1.1	7.9	30,200	0.2	7.5	77	0.5	<0.5	0.21	9910	56	20	57.1	42,500	6.4	25.1	12,700	641	0.04	0.7	50.5	2230	0.3	<0.5	1360	66	<0.1	0.5	1730	0.5	100	84	5.9	576
	CS19-012SW	0.6-0.7	2019-Aug-30	CS19-012SW_0.6-0.7	7.8	31,600	0.4	7.5	90.1	0.5	<0.5	0.44	10,700	53	19.2	55.8	47,500	6.8	26.5	14,400	666	0.06	0.4	52.1	2220	0.4	<0.5	1260	59	<0.1	0.6	1780	0.4	101	88	8.5	506
	CS19-013NW	0.6-0.7	2019-Aug-30	CS19-013NW_0.6-0.7	8.1	29,200	0.3	6.8	83.5	0.5	<0.5	0.22	14,000	51	17.1	51.7	42,500	6.3	25.7	13,100	599	0.07	0.5	45.4	1780	0.3	<0.5	1020	69	<0.1	0.6	1520	0.4	94	72	7.2	547
	CS19-014F	0.6-0.7	2019-Aug-30	CS19-014F_0.6-0.7	8.1	29,800	0.3	7	76.1	0.5	<0.5	0.23	10,900	53	17.6	56.2	41,500	5.6	22.7	12,600	656	0.07	0.9	40	1750	0.5	<0.5	1230	72	<0.1	0.5	1760	0.4	98	71	8.2	480
	CS19-015SW	0.6-0.7	2019-Aug-30	CS19-015SW_0.6-0.7	7.7	29,200	0.3	7.6	80.5	0.5	<0.5	0.26	10,600	49	18.2	55.9	42,500	5.9	24.2	12,800	603	0.06	0.5	45.3	1830	0.4	<0.5	1140	59	<0.1	0.6	1740	0.4	101	82	7.9	530
	CS19-016NW	0.6-0.7	2019-Aug-30	CS19-016NW_0.6-0.7	7.7	31,300	0.3	9.4	91.4	0.6	<0.5	0.17	10,000	56	19.9	60.2	47,900	5.8	30.4	12,100	1560	0.07	1.3	49.6	1510	0.5	<0.5	880	92	<0.1	0.5	1760	0.4	112	63	6.7	455
	CS19-017F	0.6-0.7	2019-Aug-30	CS19-017F_0.6-0.7	8.2	29,300	0.2	8.4	80.6	0.5	<0.5	0.28	10,800	51	19	54.1	45,300	6.6	26	12,500	512	0.05	1.5	46.6	2090	0.3	<0.5	1240	124	<0.1	0.6	1490	0.4	98	75	6.5	567
	CS19-018SW	0.6-0.7	2019-Aug-30	CS19-018SW_0.6-0.7	7.6	27,100	0.3	8.5	72.6	0.4	<0.5	0.17	10,400	47	16.2	50.8	39,300	4.9	22.4	11,300	567	0.05	0.5	40.2	1370	0.3	<0.5	1110	84	<0.1	0.5	1740	0.4	95	63	6.9	582
	CS19-019NW	0.6-0.7	2019-Aug-30	CS19-019NW_0.6-0.7	7.1	24,500	0.2	6.4	86.5	0.4	<0.5	0.16	5890	45	12.8	15.3	38,500	4.7	18.1	7210	556	0.1	1.1	24.4	820	0.4	<0.5	404	46	<0.1	0.5	1680	1	95	37	7.5	178
	CS19-020F	0.6-0.7	2019-Aug-30	CS19-020F_0.6-0.7	8.3	26,900	0.3	6.3	73.5	0.4	<0.5	0.23	10,500	93	16.4	49.8	38,100	4.8	21.9	10,900	562	0.06	0.7	40.6	1340	0.4	<0.5	1170	96	<0.1	0.5	1640	0.4	91	63	7.1	551
	CS19-020F-01	0.8-0.9	2019-Sep-6	CS19-20F-01_0.8-0.9	8.2	31,200	0.3	9.6	80.3	0.5	<0.5	0.24	10,600	99	22.8	57	44,000	6.8	24.4	12,100	734	0.04	0.8	52.2	2000	0.5	<0.5	1400	111	<0.1	0.5	1590	0.4	101	76	6.2	577
	CS19-020F-02	1.2-1.3	2019-Sep-18	CS19-020F-02_1.2-1.3	8.3	32,100	0.3	6.9	84.4	0.5	<0.5	0.18	10,600	50	17.5	51.9	44,300	6.5	29.2	13,000	642	0.06	0.8	48.5	2680	0.4	<0.5	1430	105	<0.1	0.6	1630	0.4	92	83	7	548
	CS19-021SW	0.6-0.7	2019-Aug-30	CS19-021SW_0.6-0.7	7.3	28,500	0.3	6.4	89.5	0.4	<0.5	0.16	9820	54	16.9	58.3	42,300	5.2	21.2	11,100	533	0.05	0.7	42.3	1040	0.3	<0.5	1030	90	<0.1	0.5	1600	0.3	108	58	7.6	398
Reach 1B	CS19-022NW	0.2-0.3	2019-Aug-31	CS19-022NW_0.2-0.3	8	32,100	0.3	7.1	94.6	0.5	<0.5	0.19	10,400	56	17.9	54.7	46,200	7.1	29.6	13,800	620	0.05	0.5	50.2	2220	0.6	<0.5	1170	71	<0.1	0.6	1540	0.4	101	86	6.6	539
	CS19-023F	0.2-0.3	2019-Aug-31	CS19-023F_0.2-0.3	8.1	29,700	0.3	8.2	81.3	0.5	<0.5	0.14	10,300	52	18.1	56.6	45,100	6	26.9	13,000	613	0.05	0.5	45.5	1970	0.5	<0.5	1250	65	<0.1	0.5	1600	0.4	103	79	6.1	554
		0.2-0.3		CS19-DUP3	8.1	30,200	0.3	7.5	80.6	0.5	<0.5	0.13	10,700	55	16.9	55	45,900	6.1	27.5	12,900	576	0.05	0.5	43.7	1970	0.6	<0.5	1210	64	<0.1	0.5	1670	0.4	103	79	5.5	549
	RPD (CS19-023F_0.2-0.3 & CS19-DUP3)				0%	2%	NC	9%	1%	NC	NC	7%	4%	6%	7%	3%	2%	2%	2%	1%	6%	NC	NC	4%	0%	NC	NC	3%	2%	NC	NC	4%	NC	0%	0%	10%	1%
	CS19-024SW	0.2-0.3	2019-Aug-31	CS19-024SW_0.2-0.3	7.9	31,800	0.3	9.2	97	0.5	<0.5	0.18	10,300	55	20.9	58	48,100	7.3	29	14,400	787	0.06	0.5	56	2300	0.3	<0.5	1270	67	<0.1	0.6	1590	0.4	104	90	7.3	555
	CS19-025NW	0.2-0.3	2019-Aug-31	CS19-025NW_0.2-0.3	7.8	31,100	0.3	5.9	83.8	0.5	<0.5	0.18	10,200	55	19.2	54.5	45,900	6.6	27.9	13,200	701	0.06	0.8	50.8	2280	0.3	<0.5	1110	80	<0.1	0.5	1500	0.4	99	82	6.9	562
	CS19-026F	0.2-0.3	2019-Aug-31	CS19-026F_0.2-0.3	8.2	30,000	0.3	8.2	77.3	0.5	<0.5	0.16	10,400	51	18.6	59	45,800	6	26.9	13,200	861	0.06	1.3	46.9	1980	0.5	<0.5	1190	74	<0.1	0.5	1590	0.4	102	77	6.2	503
	CS19-027SW	0.2-0.3	2019-Aug-31	CS19-027SW_0.2-0.3	8	31,700	0.3	8.5	89.5	0.5	<0.5	0.19	10,600	55	20.5	59	47,800	6.7	27.6	13,500	931	0.06	0.9	53.3	2400	0.5	<0.5	1280	77	<0.1	0.5	1570	0.4	105	87	6.7	589
	CS19-028NW	0.2-0.3	2019-Sep-3	CS19-028NW_0.2-0.3	7.7	31,400	0.3	7.8	88.5	0.5	<0.5	0.16	9730	57*	19.5	58.8	47,400	7	28.5	13,100	716	0.06	0.5	52	2170	0.4	<0.5	1150	60	<0.1	0.6	1540	0.4	105	91	6.8	561
	CS19-029F	0.2-0.3	2019-Sep-3	CS19-029F_0.2-0.3	7.6	30,300	0.3	7.9	83.3	0.5	<0.5	0.15	10,100	53	19.1	58.9	46,400	6.1	27.7	12,900	763	0.05	0.5	46.1	1900	1	<0.5	1160	60	<0.1	0.5	1690	0.4	105	81	6.4	574
	CS19-030SW	0.2-0.3	2019-Sep-3	CS19-030SW_0.2-0.3	7.9	32,600	0.3	8.4	96.9	0.6	<0.5	0.21	10,200	61*	19.7	60.9	49,300	7.2	29.9	13,700	784	0.06	0.5	56.2	2330	0.3	<0.5	1200	63	0.1	0.6	1660	0.5	110	98	7	543
	CS19-031 NW	0.2-0.3	2019-Sep-4	CS19-031 NW_0.2-0.3	8	32,900	0.3	8.1	88.6	0.5	<0.5	0.18	11,000	57*	19.1	57.1	45,800	6.3	29.2	13,900	731	0.07	0.5	48.6	2480	0.2	<0.5	1460	65	<0.1	0.6	1930	0.4	104	85	6.1	501
	CS19-032 F	0.2-0.3	2019-Sep-4	CS19-032 F_0.2-0.3	8	32,700	0.3	8.7	87.4	0.5	<0.5	0.21	11,700	53	20.3	60	48,000	5.7	27.5	13,700	735	0.06	0.4	48.1	2250	0.3	<0.5	1380	62	<0.1	0.5	2180	0.4	108	84	6.9	618
	CS19-033 SW	0.2-0.3	2019-Sep-4	CS19-033 SW_0.2-0.3	7.8	31,700	0.3	7.7	95.1	0.5	<0.5	0.19	10,800	51	18.8	57.4	44,700	6.2	27.6	12,900	680	0.06	0.5	49.3	2470	0.4	<0.5	1520	66	<0.1	0.6	2040	0.5	103	85	6.9	588
	CS19-034 NW	0.2-0.3	2019-Sep-4	CS19-034 NW_0.2-0.3	8	28,300	0.3	7.3	81.9	0.4	<0.5	0.18	10,600	52	15.6	53.2	40,300	5.2	24.3	12,800	567	0.06	0.5	40.5	1950	0.5	<0.5	1270	66	<0.1	0.5	1890	0.4	98	75	6.6	583
	CS19-035 F	0.2-0.3	2019-Sep-4	CS19-035 F_0.2-0.3	7.7	30,200	0.3	6.7	82.3	0.4	<0.5	0.18	10,900	57*	17.1	53.2	42,000	5.5	25.2	12,700	686	0.05	0.4	43.7	2090	0.6	<0.5	1190	62	<0.1	0.5	1910	0.4	96	75	6.6	620
	CS19-036 SW	0.2-0.3	2019-Sep-4	CS19-036 SW_0.2-0.3	8	30,500	0.3	8.4	83.4	0.5	<0.5	0.17	10,500	52	19.5	60.4	44,100	6	27.7	13,400	790	0.06	0.5	47.9	2020	0.2	<0.5	1270	57	<0.1	0.5	1780	0.4	103	84	6.1	631
	CS19-037 NW	0.2-0.3	2019-Sep-4	CS19-037 NW_0.2-0.3	7.8	31,200	0.3	8.3	77.7	0.5	<0.5	0.18	11,800	46	18.4	59.4	45,200	5.2	27.1	13,600	688	0.06	0.4	43.7	2080	0.1	<0.5	1410	60	<0.1	0.5	2050	0.4	100	77	5.4	671
	CS19-038 F	0.2-0.3	2019-Sep-4	CS19-038 F_0.2-0.3	7.8	28,600	0.3	6.8	78.9	0.4	<0.5	0.18	10,500	48	18.1	55.9	41,600	5.1	24	12,300	685	0.06	0.4	42.7	2010	0.3	<0.5	1210	59	<0.1	0.5	1830	0.4	96	77	6.8	613
		0.2-0.3		CS19-DUP4	7.8	29,700	0.3	8	80	0.4	<0.5	0.18	11,000	51	19.1	59.1	42,900	5.4	25.3	12,700	675	0.06	0.4	44.9	2050	0.3	<0.5	1210	61	<0.1	0.5	1970	0.4	103	80	7	656
	RPD (CS19-038 F_0.2-0.3 & CS19-DUP4)				0%	4%	NC	16%	1%	NC	NC	0%	5%	6%	5%	6%	3%	6%	5%	3%	1%	0%	NC	5%	2%	NC	NC	0%	3%	NC	NC	7%	NC	7%	4%	3%	7%
	CS19-039 SW	0.2-0.3	2019-Sep-4	CS19-039 SW_0.2-0.3	7.7	31,000	0.3	8.8	84.7	0.5	<0.5	0.18	10,800	51	19.3	58.1	43,700	5.9	27.2	13,100	759	0.07	0.4	47.7	2270	0.4	<0.5	1410	57	<0.1	0.5	1930	0.4	102	83	6	599
	CS19-040 NW	0.2-0.3	2019-Sep-4	CS19-040 NW_0.2-0.3	7.6	31,500	0.3	10.2	96.5	0.5	<0.5	0.18	10,200	56	20.1	38.5	47,000	6	28.9	12,800	987	0.05	2.3	50.9	2330	0.5	<0.5	1150	95	<0.1	0.6	1820	0.5	108	73	7.6	631
	CS19-041 F	0.2-0.3	2019-Sep-4	CS19-041 F_0.2-0.3	7.3	26,500	0.3	6.3	68.3	0.4	<0.5	0.16	10,400	46	16.2	48.1	37,900	4.6	21.2	11,100	612	0.05	1.1	39.1	1660	0.4	<0.5	1020	70	<0.1	0.5	1880	0.4	91	60	6.3	613
	CS19-042 SW	0.2-0.3	2019-Sep-4	CS19-042 SW	7.2	30,900	0.3	9.5	83.6	0.5	<0.5	0.18	11,700	54	18.2	57.2	43,900	5.2	26.7	12,900	658	0.07	0.7	44.7	1710	0.5	<0.5	1060	66	<0.1	0.5	2070	0.5	104	67	6.4	653
Reach 1C	CS19-043NW	1-1.1	9/5/2019	CS19-043_1.0-1.1	7.5	27,900	0.1	4.6	85.5	0.4	<0.5	0.19	6670	53	16.2	39.9	37,600	5	29.2	10,000	462	0.04	1.1	41.5	1560	0.2	<0.5	772	41	<0.1	0.5	1590	0.5	106	64	6.4	406
	CS19-044F	1-1.1	9/5/2019	CS19-044_1.0-1.1	7.8	28,600	0.2	8	97.5	0.4	<0.5	0.24	8020	54	20.1	56.7	39,100	5.2	26.8	11,700	465	0.05	0.8	50.8	1510	0.1	<0.5	957	50	<0.1	0.5	1500	0.6	99	68	5.7	684
	CS19-045SW	1-1.1	9/5/2019	CS19-045_1.0-1.1	7.4	27,400	0.2	8.9	86.1	0.4	<0.5	0.21	7630	55	21.3	54.1	37,600	5.2	24.3	9830	492	0.02	0.9	47.2	1190	0.1	<0.5	810	56	<0.1	0.5	1570	0.4	105	62	6.7	435
	CS19-046NW	1-1.1	9/5/2019	CS19-046_1.0-1.1	7.5	28,700	<0.1	5.6	109	0.5	<0.5	0.16	7280	54	16.3	38.8	37,500	5.4	28.1	10,400	598	0.02	0.8	43.8	1500	0.2	<0.5	751	49	<0.1	0.5	1440	0.4	97	66	6.4	405
	CS19-047F	1-1.1	9/5/2019	CS19-047_1.0-1.1	8.5	26,600	0.2	4.9	64.7	0.4	<0.5	0.19	8760	48	14.8	49.7	35,600	4.2	20.8	10,400	360	0.05	0.8	38.2	1360	0.1	<0.5	1070	55	<0.1	0.4	1570	0.5	90	59	4	548
	CS19-048SW	1-1.1	9/5/2019	CS19-048_1.0-1.1	7.8	28,900	0.2	8.6	83	0.5	<0.5	0.18	9000	54	19.2	61.5	40,000	5.2	25.2	11,600	510	0.05	0.7	48.1	1440	0.2	<0.5	898	55	<0.1	0.5	1590	0.4	108	68	5.6	534
	CS19-049 NW	0.2-0.3	2019-Sep-6	CS19-049 NW_0.2-0.3	7.1	29,900	0.3	5.9	83	0.5	<0.5	0.25	9380	54	18.2	55.1	43,700	6	23.5	12,600	560	0.06	0.5	46.1	1550	0.4	<0.5	940	62	<0.1	0.5	1590	0.4	100	78	4.9	589
	CS19-050 F	0.2-0.3	2019-Sep-6	CS19-050 F_0.2-0.3	7	30,700	0.2	8.3	100	0.5	<0.5	0.19	7790	57*	21.4	51.8	44,200	6.1	24.9	11,400	391	0.05	0.9	47.3	1490	0.4	<0.5	696	53	<0.1	0.5	1580	0.6	112	66	6.2	452
		0.2-0.3		CS19-DUP5	7.4	31,000	0.2	7	91.2	0.5	<0.5	0.24	7520	54	19.7	47.6	43,500	5.7	23.2	11,100	367	0.03	0.8	43.8	1400	0.4	<0.5	663	49	<0.1	0.5	1560	0.5	110	62	7.2	450
	RPD (CS19-050 F_0.2-0.3 & CS19-DUP5)				6%	1%	NC	17%	9%	NC	NC	23%	4%	NC	8%	8%	2%	7%	7%	3%	6%	NC	NC	8%	6%	NC	NC	5%	8%	NC	NC	1%	NC	2%	6%	15%	0%
	CS19-051 SW	0.2-0.3	2019-Sep-6	CS19-051 SW_0.2-0.3	6.7	26,000	0.1	4.2	90.8	0.4	<0.5	0.26	6210	45	14.4	27.3	37,200	5.2	19.4	8540	362	0.02	0.9	31	1090	0.3	<0.5	517	44	<0.1	0.5	1610	1.1	87	55	7.4	387
	CS19-052 NW	0.2-0.3	2019-Sep-6	CS19-052 NW_0.2-0.3	6.9	31,600	0.3	8.1	81.4	0.5	<0.5	0.25	9810	59*	21.6	65.8	43,500	6.7	28.3	13,400	521	0.05	0.6	53.8	1590	0.4	<0.5	898	56	<0.1	0.5	1690	0.4	111	77	6.8	514
	CS19-053 F	0.2-0.3	2019-Sep-6	CS19-053 F_0.2-0.3	7.5	28,800	0.2	7.5	71.9	0.4	<0.5	0.24	9570	57*	18.6	60.5	40,800	6	25.3	12,600	443	0.05	0.6	48.9	1870	0.3	<0.5	913	54	<0.1	0.5	1620	0.5	102	77	5.8	579
	CS19-054 SW	0.2-0.3	2019-Sep-6	CS19-054 SW_0.2-0.3	7.4	29,000	0.2	6.4	71.7	0.4	<0.5	0.22	9280	48	19.3	59.8	41,200	5.9	24.3	12,800	437	0.05	0.5	47.2	1960	0.3	<0.5	1050	52	<0.1	0.5	1540	0.4	96	79	4.7	615
	CS19-055 NW	0.2-0.3	2019-Sep-6	CS19-055 NW_0.2-0.3	7.5	25,600	0.2	6.3	58.3	0.4	<0.5	0.17	9120	43	16.9	50.2	36,800	4.8	20.7	10,800	451	0.03	0.5	39.9	1590	0.3	<0.5	876	47	<0.1	0.4	1610	0.4	92	67	4.9	592
	CS19-056 F	0.2-0.3	2019-Sep-6	CS19-056 F_0.2-0.3	8	23,400	0.2	5.3	48.9	0.3	<0.5	0.2	8990	40	14.4	45.2	35,100	4.4	18.3	9980	387	0.03	0.6	35.1	1430	0.4	<0.5	985	51	<0.1	0.4	1590	0.4	88	61	4	597
	CS19-057 SW	0.2-0.3	2019-Sep-6	CS19-057 SW_0.2-0.3	7.4	26,300	0.3	7.2	65.3	0.4	<0.5	0.24	9340	45	18.9	55.4	40,600	5.3	21.2	11,400	453	0.03	0.5	42.5	1700	0.3	<0.5	967	49	<0.1	0.4	1710	0.4	94	75	6.3	536

TABLE 1: CONFIRMATORY SAMPLE CHEMISTRY RESULTS - TOTAL METALS

					Metals																																Inorganics
					pH (lab)	aluminum	antimony	arsenic	barium	beryllium	bismuth	cadmium	calcium	chromium (III+VI)	cobalt	copper	iron	lead	lithium	magnesium	manganese	mercury	molybdenum	nickel	potassium	selenium	silver	sodium	strontium	thallium	tin	titanium	uranium	vanadium	zinc	zirconium	phosphorus
					pH_Units	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
Reported Detection Limit					0.1	10	0.1	0.1	0.5	0.1	0.5	0.01	10	1	0.1	0.2	10	0.1	0.5	10	1	0.01	0.2	0.5	5	0.1	0.5	5	1	0.1	0.2	1	0.2	1	1	0.1	5
Remedial Objective - BC CSR SedFS								11				2.2		56		120		57				0.3												200			
BC P4 Background Soil - Region 1 Vancouver Island						55000	4[#1]	4[#1]	250	0.7		0.95		65[#2]	30	100	70000	40			5000	0.15[#3]	1[#1]	50		4[#1]	1[#1]		100		4[#1]			200	150		
Location Type	Sample Location	Sample Depth (mbg)	Sample Date	Sample ID																																	
Reach 3	CS19-058NW	0.2-0.3	2019-Sep-9	CS19-058NW_0.2-0.3	7.3	32,200	0.4	8	104	0.5	<0.5	0.1	8550	60*	19.3	60	46,000	7.5	25.2	13,300	767	0.06	0.4	53	2360	0.2	<0.5	1260	53	<0.1	0.5	1630	0.5	109	98	4.2	522
	CS19-059F	0.2-0.3	2019-Sep-9	CS19-059F_0.2-0.3	7.4	33,600	0.3	9.2	106	0.5	<0.5	0.1	9050	67	21.4	62	47,500	7.9	25.9	13,600	1090	0.07	0.5	52	2310	0.3	<0.5	1270	55	<0.1	0.5	1640	0.6	118	101	5.3	558
	CS19-059F-01	0.5-0.6	2019-Sep-9	CS19-059F-01_0.5-0.6	7.2	29,400	0.3	6.2	93	0.5	<0.5	0.08	7670	59*	18	56	42,900	6.7	23.8	12,400	638	0.06	0.4	48.6	2040	0.2	<0.5	1040	40	<0.1	0.4	1470	0.5	105	90	4.5	544
	CS19-060SW	0.2-0.3	2019-Sep-9	CS19-060SW_0.2-0.3	7.3	29,600	0.3	5.8	88.1	0.5	<0.5	0.09	8470	59*	18.7	60	43,800	6.6	23.8	12,000	766	0.06	0.7	48.4	1820	0.2	<0.5	1210	50	<0.1	0.4	1440	0.5	108	95	4.5	549
	CS19-061NW	0.2-0.3	2019-Sep-9	CS19-061NW_0.2-0.3	7	28,500	0.2	6.8	66	0.5	<0.5	0.04	5760	55	20	45	40,300	5.2	21.8	9860	677	0.05	0.4	38.2	1460	0.3	<0.5	892	38	<0.1	0.4	1780	0.6	110	58	5.9	210
	CS19-062F	0.2-0.3	2019-Sep-9	CS19-062F_0.2-0.3	7	21,900	0.1	4.4	45.3	0.4	<0.5	0.04	4670	37	12.9	23.9	29,500	3.6	19	6990	362	0.03	0.5	23.2	1100	0.3	<0.5	713	30	<0.1	0.2	1510	0.7	77	38	4.6	224
	CS19-062F-01	0.5-0.6	2019-Sep-9	CS19-062F-01_0.5-0.6	7.2	36,400	0.3	8.2	107	0.6	<0.5	0.04	7030	68	21.4	72	50,300	7.4	25.8	12,400	813	0.08	0.5	56	1700	0.4	<0.5	913	52	<0.1	0.5	1410	0.8	123	72	5.7	313
	CS19-063SW	0.2-0.3	2019-Sep-9	CS19-063SW_0.2-0.3	6.9	22,300	0.2	4.7	51.5	0.4	<0.5	0.04	5340	42	15	29	31,800	4.6	18.8	8140	426	0.03	0.6	27.3	1020	0.3	<0.5	615	39	<0.1	0.3	1670	0.7	89	50	5.1	251
	CS19-064NW	0.2-0.3	2019-Sep-9	CS19-064NW_0.2-0.3	6.4	19,900	<0.1	3.2	71.4	0.4	<0.5	0.08	5180	37	10.5	21.8	25,600	4	17.5	6500	340	<0.01	0.4	23.6	1100	0.4	<0.5	543	29	<0.1	0.2	1210	1.1	73	69	1.7	478
	CS19-065F	0.2-0.3	2019-Sep-9	CS19-065F_0.2-0.3	6.6	24,100	<0.1	3.8	98.8	0.5	<0.5	0.11	6240	48	13.9	34	34,500	5.4	21.7	7950	514	0.01	0.6	30.9	1360	0.5	<0.5	597	37	<0.1	0.3	1410	2.2	94	70	4.3	511
		0.2-0.3		CS19-DUP6_0.2-0.3	6.9	25,200	0.1	4.4	106	0.5	<0.5	0.12	6540	52	15.1	44	36,600	5.4	21.4	8540	666	0.01	0.7	36	1490	0.5	<0.5	659	43	<0.1	0.3	1370	2.5	102	78	3.8	551
	RPD (CS19-065F_0.2-0.3 & CS19-DUP6_0.2-0.3)				4%	4%	NC	15%	7%	NC	NC	9%	5%	8%	8%	26%	6%	0%	1%	7%	26%	NC	NC	15%	9%	NC	NC	10%	15%	NC	NC	3%	13%	8%	11%	12%	8%
	CS19-065F-01	0.5-0.6	2019-Sep-9	CS19-065F-01_0.5-0.6	7	28,900	<0.1	3.1	120	0.6	<0.5	0.14	6910	55	13.2	53	37,500	6	32.9	10,000	419	0.02	0.5	44.6	1890	0.3	<0.5	729	49	<0.1	0.4	1440	1.4	92	94	6.4	442
	CS19-066SW	0.2-0.3	2019-Sep-9	CS19-066SW_0.2-0.3	7	27,400	0.1	4.7	120	0.5	<0.5	0.11	7030	52	13.8	43	39,300	5.9	23	9310	558	0.02	0.6	36.7	1780	0.5	<0.5	735	42	<0.1	0.4	1480	3	99	82	5.4	553
	CS19-067NW	0.2-0.3	2019-Sep-9	CS19-067NW_0.2-0.3	7.1	16,700	0.1	3.6	55.8	0.3	<0.5	0.05	5330	29	10.7	15.8	23,300	3.8	12.2	5920	293	0.02	0.8	20.4	649	0.3	<0.5	477	24	<0.1	0.3	1400	0.5	74	49	3.3	339
	CS19-068F	0.2-0.3	2019-Sep-9	CS19-068F_0.2-0.3	7.2	26,000	0.2	5.3	79.7	0.4	<0.5	0.04	6260	53	12.3	38	38,900	4.6	22.5	9160	566	0.07	1.3	34.3	1340	0.3	<0.5	732	43	<0.1	0.3	1310	0.5	106	50	5.1	330
	CS19-069SW	0.2-0.3	2019-Sep-9	CS19-069SW_0.2-0.3	6.9	30,800	0.3	8.2	119	0.5	<0.5	0.09	6810	59*	20.6	48	48,200	8	24.7	10,900	493	0.06	1.2	43.5	1510	0.3	<0.5	868	43	<0.1	0.4	1420	0.8	116	88	5.7	379
Reach 4	CS19-070WW	0.2-0.3	2019-Sep-10	CS19-070WW_0.2-0.3	5.7	35,800	0.2	4.3	196	0.6	<0.5	0.3	5460	48	18.5	45.4	33,700	13	23.7	6830	500	0.12	1.3	40.5	1100	0.4	<0.5	618	47	0.1	1.7	1190	1.3	86	118	3.3	783
	CS19-071F	0.2-0.3	2019-Sep-10	CS19-071F_0.2-0.3	6.2	26,100	0.2	6.5	134	0.5	<0.5	0.34	4990	38	20	34.9	34,400	6.4	16.9	5940	874	0.03	1.3	32.1	972	0.5	<0.5	519	35	<0.1	0.6	1060	0.9	86	76	3.2	607
		0.2-0.3		CS19-DUP8_0.2-0.3	6.3	25,300	0.2	4.4	131	0.5	<0.5	0.28	4900	37	17.6	33	34,200	6	17.1	5700	747	0.03	1.3	29.9	936	0.4	<0.5	474	35	<0.1	0.6	1040	0.9	80	72	4.3	590
	RPD (CS19-071F_0.2-0.3 & CS19-DUP8_0.2-0.3)				2%	3%	NC	39%	2%	NC	NC	19%	2%	3%	13%	6%	1%	6%	1%	4%	16%	NC	0%	7%	4%	NC	NC	9%	0%	NC	NC	2%	NC	7%	5%	29%	3%
	CS19-071F-01	0.5-0.6	2019-Sep-10	CS19-071F-01_0.5-0.6	6.2	33,000	0.2	7.3	162	0.6	<0.5	0.46	5420	48	30.6	43.1	47,600	7	25	8020	891	0.01	1.5	42	1280	0.6	<0.5	569	40	0.1	0.5	1260	1	117	86	3.6	624
	CS19-072EW	0.2-0.3	2019-Sep-10	CS19-072EW_0.2-0.3	6.1	29,600	0.2	4	157	0.6	<0.5	0.28	5190	41	15.9	39.5	31,300	8.2	19	6020	416	0.04	1	33.4	1010	0.4	<0.5	480	39	0.1	0.9	1110	1.1	79	94	3.6	629
	CS19-073WW	0.2-0.3	2019-Sep-10	CS19-073WW_0.2-0.3	6.4	26,900	0.2	3.8	145	0.5	<0.5	1.11	5010	46	19.4	35.1	31,200	9.4	17.8	6050	371	0.02	2.7	31.2	821	0.4	<0.5	470	38	<0.1	0.5	1050	1.2	81	87	3.1	491
	CS19-074F	0.2-0.3	2019-Sep-10	CS19-074F_0.2-0.3	7.3	32,200	0.3	7.7	114	0.5	<0.5	0.27	8790	56	22.1	57.6	48,800	7.2	27.9	14,300	484	0.06	1	52.2	2520	0.3	<0.5	1210	70	0.1	0.6	1680	0.5	103	93	7.7	546
		0.2-0.3		CS19-DUP7_0.2-0.3	7.5	32,200	0.3	7.1	115	0.5	<0.5	0.29	8590	57*	22.2	59.9	49,600	7.1	29	13,500	478	0.04	0.9	52.5	2440	0.3	<0.5	1190	71	<0.1	0.6	1620	0.5	104	94	8.4	592
	RPD (CS19-074F_0.2-0.3 & CS19-DUP7_0.2-0.3)				3%	0%	NC	8%	1%	NC	NC	7%	2%	2%	0%	4%	2%	1%	4%	6%	1%	NC	NC	1%	3%	NC	NC	2%	1%	NC	NC	4%	NC	1%	1%	9%	8%
	CS19-074F-01	0.5-0.6	2019-Sep-10	CS19-074F-01_0.5-0.6	7.8	33,700	0.3	6.7	113	0.6	<0.5	0.32	8900	58*	20.5	56.6	49,000	7.8	29.9	14,500	456	0.04	1.4	56.9	2930	0.2	<0.5	1340	80	0.1	0.7	1600	0.6	104	96	8.3	583
	CS19-075EW	0.2-0.3	2019-Sep-10	CS19-075EW_0.2-0.3	7.3	29,400	0.3	5.4	98.9	0.5	<0.5	0.24	8440	51	19.5	56.5	43,600	6.5	24.3	12,500	414	0.03	0.5	46.6	1830	0.2	<0.5	922	59	<0.1	0.6	1670	0.5	100	82	7.1	503
	CS19-076WW	0.2-0.3	2019-Sep-10	CS19-076WW_0.2-0.3	6.2	21,300	0.9	8.8	117	0.5	<0.5	57.9	5460	533	21.7	43.7	31,500	19.1	16.5	6780	396	0.03	1.5	32.2	906	0.2	<0.5	493	41	<0.1	0.8	1290	1.1	83	216	4.4	650
	CS19-076WW-01	0.6-0.7	2019-Sep-16	CS19-076WW-01_0.6-0.7	6.3	27,500	0.5	8.8	144	0.6	<0.5	0.83	7160	60*	26.4	58.2	43,800	10.1	21	10,200	460	0.05	1.1	44.7	1260	0.3	<0.5	814	50	0.1	2.4	1630	0.6	110	93	6.8	822
	CS19-077F	0.2-0.3	2019-Sep-10	CS19-077F_0.2-0.3	7.8	32,400	0.3	7.3	112	0.5	<0.5	0.45	8880	59*	19.9	56.4	46,900	7.2	28.7	13,800	550	0.03	1.3	57.1	2290	0.2	<0.5	1100	89	<0.1	0.7	1620	0.7	105	96	7	455
	CS19-077F-01	0.5-0.6	2019-Sep-16	CS19-077F-01_0.5-0.6	7.8	31,000	0.3	6.8	106	0.5	<0.5	0.26	8680	56	19.1	52.5	47,300	7.3	28.5	13,800	539	0.04	1.3	54.6	2500	0.3	<0.5	1090	89	<0.1	0.6	1430	0.6	99	87	7.6	592
	CS19-078EW	0.2-0.3	2019-Sep-10	CS19-078EW_0.2-0.3	7.6	30,800	0.3	6.8	112	0.5	<0.5	0.26	8220	56	19.3	50	45,200	6	25.4	12,300	705	0.02	0.9	45	1510	0.2	<0.5	836	62	<0.1	0.6	1580	0.5	106	70	6.6	447

Standards / Guidelines Descriptions:

• BC CSR SedFS:BC Contaminated Sites Regulation, Schedule 3.4, Generic Numerical Sediment Standards, Freshwater Sensitive Use

Standards / Guidelines Comments

#1:Regional estimate is one-halve the mean detection limit
#2:Chromium = total chromium
#3:Mercury = inorganic mercury

Notes:

* - value exceeds BC CSR SedFS but is below BC P4 Background Soil - Region 1 Vancouver Island
m - metres
mbg - metres below grade
< - less than reported detection limit
'-' - sample not analyzed for parameter indicated
formatting of cells indicates exceedances of like-formatted standards
where many exceedance formats are used, highlighted results reflect the least stringent standard/guideline exceeded
samples collected from the same location, date and depth interval are blind field duplicate / parent sample pairs
laboratory analytical reports detail detection limits, testing protocols and QA/QC procedures µg/g - micrograms per gram
RPD - relative percent difference
RPD calculation = absolute value of difference divided by average of results x 100%
NC - RPD not calculated
BOLD/UNDERLINED - RPD exceeds acceptance limits
• RPD calculations not performed where results are less than 5 times the reported detection limit
• acceptance limits for Soil are as follows: general hydrocarbons (60%), PAH - (75%), inorganics and metals (45% to 60%)

TABLE 2: CONFIRMATORY SAMPLE CHEMISTRY RESULTS - POLYCYCLIC AROMATIC HYDROCARBONS

					PAHs																						
Location Type	Sample Location	Sample Depth (mbg)	Sample Date	Sample ID	acenaphthylene	acenaphthene	anthracene	benz(a)anthracene	benzo(b)fluoranthene	benzo(b+j)fluoranthenes	benzo(g,h,i)perylene	benzo(j)fluoranthene	benzo(k)fluoranthene	benzo(a)pyrene	chrysene	dibenz(a,h)anthracene	fluoranthene	fluorene	indeno(1,2,3-cd)pyrene	methylnaphthalene, 1-	methylnaphthalene, 2-	naphthalene	phenanthrene	pyrene	quinoline	IACR (CCME Lab)	B(a)P TPE (Lab)
					µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	N/A	µg/g
Reported Detection Limit					0.005	0.005	0.004	0.03	0.02	0.05	0.05	0.02	0.02	0.03	0.05	0.005	0.01	0.02	0.02	0.005	0.005	0.005	0.02	0.01	0.05	0.6	0.05
Remedial Objective - BC CSR SedFS					0.08	0.055	0.15	0.24						0.48	0.53	0.084	1.5	0.089			0.12	0.24	0.32	0.54			
Reach 1A	CS19-001NW	0.6-0.7	2019-Aug-30	CS19-001NW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-002F	0.6-0.7	2019-Aug-30	CS19-002F_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-003SW	0.6-0.7	2019-Aug-30	CS19-003SW_0.6-0.7	<0.005	<0.005	0.005	<0.03	0.04	0.06	<0.05	0.02	0.02	0.03	<0.05	<0.005	0.09	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	0.07	<0.05	0.6	<0.05
	CS19-004NW	0.6-0.7	2019-Aug-30	CS19-004NW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-005F	0.6-0.7	2019-Aug-30	CS19-005F_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-006SW	0.6-0.7	2019-Aug-30	CS19-006SW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-007NW	0.6-0.7	2019-Aug-30	CS19-007NW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-008F	0.6-0.7	2019-Aug-30	CS19-008F_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
		0.6-0.7		CS19-DUP1F_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	RPD (CS19-008F_0.6-0.7 & CS19-DUP1F_0.6-0.7)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-009SW	0.6-0.7	2019-Aug-30	CS19-009SW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-010NW	0.6-0.7	2019-Aug-30	CS19-010NW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-011F	0.6-0.7	2019-Aug-30	CS19-011F_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
		0.6-0.7		CS19-DUP2F_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	RPD (CS19-011F_0.6-0.7 & CS19-DUP2F_0.6-0.7)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-011F-01	1-1.1	2019-Sep-6	CS19-11F-01_1.0-1.1	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-012SW	0.6-0.7	2019-Aug-30	CS19-012SW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-013NW	0.6-0.7	2019-Aug-30	CS19-013NW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-014F	0.6-0.7	2019-Aug-30	CS19-014F_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-015SW	0.6-0.7	2019-Aug-30	CS19-015SW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-016NW	0.6-0.7	2019-Aug-30	CS19-016NW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-017F	0.6-0.7	2019-Aug-30	CS19-017F_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-018SW	0.6-0.7	2019-Aug-30	CS19-018SW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-019NW	0.6-0.7	2019-Aug-30	CS19-019NW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-020F	0.6-0.7	2019-Aug-30	CS19-020F_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-020F-01	0.8-0.9	2019-Sep-6	CS19-20F-01_0.8-0.9	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-021SW	0.6-0.7	2019-Aug-30	CS19-021SW_0.6-0.7	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
Reach 1B	CS19-022NW	0.2-0.3	2019-Aug-31	CS19-022NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-023F	0.2-0.3	2019-Aug-31	CS19-023F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
		0.2-0.3		CS19-DUP3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	RPD (CS19-023F_0.2-0.3 & CS19-DUP3)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-024SW	0.2-0.3	2019-Aug-31	CS19-024SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-025NW	0.2-0.3	2019-Aug-31	CS19-025NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-026F	0.2-0.3	2019-Aug-31	CS19-026F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-027SW	0.2-0.3	2019-Aug-31	CS19-027SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-028NW	0.2-0.3	2019-Sep-3	CS19-028NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-029F	0.2-0.3	2019-Sep-3	CS19-029F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-030SW	0.2-0.3	2019-Sep-3	CS19-030SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-031 NW	0.2-0.3	2019-Sep-4	CS19-031 NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-032 F	0.2-0.3	2019-Sep-4	CS19-032 F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-033 SW	0.2-0.3	2019-Sep-4	CS19-033 SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-034 NW	0.2-0.3	2019-Sep-4	CS19-034 NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-035 F	0.2-0.3	2019-Sep-4	CS19-035 F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-036 SW	0.2-0.3	2019-Sep-4	CS19-036 SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-037 NW	0.2-0.3	2019-Sep-4	CS19-037 NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-038 F	0.2-0.3	2019-Sep-4	CS19-038 F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
		0.2-0.3		CS19-DUP4	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	RPD (CS19-038 F_0.2-0.3 & CS19-DUP4)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-039 SW	0.2-0.3	2019-Sep-4	CS19-039 SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-040 NW	0.2-0.3	2019-Sep-4	CS19-040 NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-041 F	0.2-0.3	2019-Sep-4	CS19-041 F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-042 SW	0.2-0.3	2019-Sep-4	CS19-042 SW	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
Reach 1C	CS19-043NW	1-1.1	9/5/2019	CS19-043_1.0-1.1	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-044F	1-1.1	9/5/2019	CS19-044_1.0-1.1	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-045SW	1-1.1	9/5/2019	CS19-045_1.0-1.1	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-046NW	1-1.1	9/5/2019	CS19-046_1.0-1.1	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-047F	1-1.1	9/5/2019	CS19-047_1.0-1.1	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-048SW	1-1.1	9/5/2019	CS19-048_1.0-1.1	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-049 NW	0.2-0.3	2019-Sep-6	CS19-049 NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-050 F	0.2-0.3	2019-Sep-6	CS19-050 F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
		0.2-0.3		CS19-DUP5	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	RPD (CS19-050 F_0.2-0.3 & CS19-DUP5)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-051 SW	0.2-0.3	2019-Sep-6	CS19-051 SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-052 NW	0.2-0.3	2019-Sep-6	CS19-052 NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-053 F	0.2-0.3	2019-Sep-6	CS19-053 F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-054 SW	0.2-0.3	2019-Sep-6	CS19-054 SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-055 NW	0.2-0.3	2019-Sep-6	CS19-055 NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-056 F	0.2-0.3	2019-Sep-6	CS19-056 F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-057 SW	0.2-0.3	2019-Sep-6	CS19-057 SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
Reach 3	CS19-058NW	0.2-0.3	2019-Sep-9	CS19-058NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-059F	0.2-0.3	2019-Sep-9	CS19-059F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-059F-01	0.5-0.6	2019-Sep-9	CS19-059F-01_0.5-0.6	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-060SW	0.2-0.3	2019-Sep-9	CS19-060SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	0.04	<0.01	<0.05	<0.6	<0.05
	CS19-061NW	0.2-0.3	2019-Sep-9	CS19-061NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-062F	0.2-0.3	2019-Sep-9	CS19-062F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-062F-01	0.5-0.6	2019-Sep-9	CS19-062F-01_0.5-0.6	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-063SW	0.2-0.3	2019-Sep-9	CS19-063SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-064NW	0.2-0.3	2019-Sep-9	CS19-064NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-065F	0.2-0.3	2019-Sep-9	CS19-065F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
		0.2-0.3		CS19-DUP6_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	RPD (CS19-065F_0.2-0.3 & CS19-DUP6_0.2-0.3)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-065F-01	0.5-0.6	2019-Sep-9	CS19-065F-01_0.5-0.6	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-066SW	0.2-0.3	2019-Sep-9	CS19-066SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-067NW	0.2-0.3	2019-Sep-9	CS19-067NW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-068F	0.2-0.3	2019-Sep-9	CS19-068F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-069SW	0.2-0.3	2019-Sep-9	CS19-069SW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
Reach 4	CS19-070WW	0.2-0.3	2019-Sep-10	CS19-070WW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-071F	0.2-0.3	2019-Sep-10	CS19-071F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
		0.2-0.3		CS19-DUP8_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	RPD (CS19-071F_0.2-0.3 & CS19-DUP8_0.2-0.3)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-071F-01	0.5-0.6	2019-Sep-10	CS19-071F-01_0.5-0.6	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-072EW	0.2-0.3	2019-Sep-10	CS19-072EW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-073WW	0.2-0.3	2019-Sep-10	CS19-073WW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	0.02	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	0.02	<0.05	<0.6	<0.05
	CS19-074F	0.2-0.3	2019-Sep-10	CS19-074F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
		0.2-0.3		CS19-DUP7_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	RPD (CS19-074F_0.2-0.3 & CS19-DUP7_0.2-0.3)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-074F-01	0.5-0.6	2019-Sep-10	CS19-074F-01_0.5-0.6	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-075EW	0.2-0.3	2019-Sep-10	CS19-075EW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-076WW	0.2-0.3	2019-Sep-10	CS19-076WW_0.2-0.3	0.016	<0.005	0.029	0.14	0.22	0.3	0.07	0.08	0.08	0.14	0.16	0.014	0.47	<0.02	0.06	0.005	<0.005	<0.005	0.08	0.4	<0.05	3.3	0.21
	CS19-076WW-01	0.6-0.7	2019-Sep-16	CS19-076WW-01_0.6-0.7	<0.005	<0.005	0.009	0.05	0.09	0.11	<0.05	0.02	0.03	0.05	<0.05	0.009	0.13	<0.02	0.02	<0.005	<0.005	<0.005	<0.02	0.1	<0.05	1.2	0.08
	CS19-077F	0.2-0.3	2019-Sep-10	CS19-077F_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-077F-01	0.5-0.6	2019-Sep-16	CS19-077F-01_0.5-0.6	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05
	CS19-078EW	0.2-0.3	2019-Sep-10	CS19-078EW_0.2-0.3	<0.005	<0.005	<0.004	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.03	<0.05	<0.005	<0.01	<0.02	<0.02	<0.005	<0.005	<0.005	<0.02	<0.01	<0.05	<0.6	<0.05

Standards / Guidelines Descriptions:

- BC CSR SedFS:BC Contaminated Sites Regulation, Schedule 3.4, Generic Numerical Sediment Standards, Freshwater Sensitive Use

Notes:

m - metres
mbg - metres below grade
< - less than reported detection limit
'-' - sample not analyzed for parameter indicated
formatting of cells indicates exceedances of like-formatted standards
where many exceedance formats are used, highlighted results reflect the least stringent standard/guideline exceeded
samples collected from the same location, date and depth interval are blind field duplicate / parent sample pairs
laboratory analytical reports detail detection limits, testing protocols and QA/QC procedures
µg/g - micrograms per gram
ns, ng - no standard or guideline listed
PAH - polycyclic aromatic hydrocarbons
B(a)P TPE (BC CSR)- benzo(a)pyrene toxicity potency equivalence; calculated by adding the concentrations of the following parameters multiplied by their TEF:
benz(a)anthracene[0.1], benzo(b+j)fluoranthene[0.1], benzo(k)fluoranthene[0.1], dibenzo(a,h)anthracene[1], indeno(1,2,3-cd)pyrene[0.1]
TEF - toxicity equivalent factor
RPD - relative percent difference
RPD calculation = absolute value of difference divided by average of results x 100%
NC - RPD not calculated
BOLD/UNDERLINED - RPD exceeds acceptance limits

- RPD calculations not performed where results are less than 5 times the reported detection limit
- acceptance limits for Soil are as follows: general hydrocarbons (60%), PAH - (75%), inorganics and metals (45% to 60%)

TABLE 3: CONFIRMATORY SAMPLE CHEMISTRY RESULTS - PHYSICAL PARAMETERS & PETROLEUM HYDROCARBONS

					Physical Parameters			Petroleum Hydrocarbons															
					% >75um	texture	moisture	benzene	toluene	ethylbenzene	xylene (o)	xylene (m & p)	total xylenes	styrene	methyl tert-butyl ether [MTBE]	EPHs10-19	LEPHs	EPHs19-32	HEPHs	F1 (C6-C10 less BTEX)	F1 (C6-C10)	F2 (C10-C16)	F3 (C16-C34)	F4 (C34-C50)
					%	N/A	%	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
Reported Detection Limit					1		0.5	0.005	0.05	0.01	0.02	0.02	0.05	0.05	0.1	20	20	20	20	10	10	20	20	20
Location Type	Sample Location	Sample Depth (mbg)	Sample Date	Sample ID																			
Reach 1A	CS19-004NW	0.6-0.7	2019-Aug-30	CS19-004NW_0.6-0.7	10	Fine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CS19-008F	0.6-0.7	2019-Aug-30	CS19-008F_0.6-0.7	30	Fine	23.2	<0.02	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.1	-	-	-	-	<10	<10	<20	<20	<20
		0.6-0.7		CS19-DUP1F_0.6-0.7	40	Fine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	RPD (CS19-008F_0.6-0.7 & CS19-DUP1F_0.6-0.7)				29%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-011F	0.6-0.7	2019-Aug-30	CS19-011F_0.6-0.7	-	-	22.9	<0.02	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.1	-	-	-	-	<10	<10	<20	<20	<20
		0.6-0.7		CS19-DUP2F_0.6-0.7	-	-	24.2	<0.02	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.1	-	-	-	-	<10	<10	<20	<20	<20
	RPD (CS19-011F_0.6-0.7 & CS19-DUP2F_0.6-0.7)				NC	NC	6%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-011F-01	1-1.1	2019-Sep-6	CS19-11F-01_1.0-1.1	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-014F	0.6-0.7	2019-Aug-30	CS19-014F_0.6-0.7	22	Fine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CS19-020F	0.6-0.7	2019-Aug-30	CS19-020F_0.6-0.7	17	Fine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CS19-020F-01	0.8-0.9	2019-Sep-6	CS19-20F-01_0.8-0.9	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
Reach 1B	CS19-022NW	0.2-0.3	2019-Aug-31	CS19-022NW_0.2-0.3	1	Fine	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-023F	0.2-0.3	2019-Aug-31	CS19-023F_0.2-0.3	6	Fine	20.3	<0.005	<0.05	<0.01	<0.02	<0.02	<0.05	<0.05	<0.1	<20	<20	<20	<20	<10	<10	<20	<20	<20
		0.2-0.3		CS19-DUP3	4	Fine	20.9	<0.005	<0.05	<0.01	<0.02	<0.02	<0.05	<0.05	<0.1	<20	<20	<20	<20	<10	<10	<20	<20	<20
	RPD (CS19-023F_0.2-0.3 & CS19-DUP3)				NC	NC	3%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-024SW	0.2-0.3	2019-Aug-31	CS19-024SW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-025NW	0.2-0.3	2019-Aug-31	CS19-025NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-026F	0.2-0.3	2019-Aug-31	CS19-026F_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-027SW	0.2-0.3	2019-Aug-31	CS19-027SW_0.2-0.3	-	-	22.6	<0.005	<0.05	<0.01	<0.02	<0.02	<0.05	<0.05	<0.1	<20	<20	<20	<20	<10	<10	<20	<20	<20
	CS19-028NW	0.2-0.3	2019-Sep-3	CS19-028NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-029F	0.2-0.3	2019-Sep-3	CS19-029F_0.2-0.3	10	Fine	20	<0.005	<0.05	<0.01	<0.02	<0.02	<0.05	<0.05	<0.1	<20	<20	<20	<20	<10	<10	<20	<20	<20
	CS19-030SW	0.2-0.3	2019-Sep-3	CS19-030SW_0.2-0.3	<1	Fine	22.6	<0.005	<0.05	<0.01	<0.02	<0.02	<0.05	<0.05	<0.1	<20	<20	<20	<20	<10	<10	<20	<20	<20
	CS19-031 NW	0.2-0.3	2019-Sep-4	CS19-031 NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-032 F	0.2-0.3	2019-Sep-4	CS19-032 F_0.2-0.3	15	Fine	19.3	<0.005	<0.05	<0.01	<0.02	<0.02	<0.05	<0.05	<0.1	<20	<20	<20	<20	<10	<10	<20	<20	<20
	CS19-033 SW	0.2-0.3	2019-Sep-4	CS19-033 SW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-034 NW	0.2-0.3	2019-Sep-4	CS19-034 NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-035 F	0.2-0.3	2019-Sep-4	CS19-035 F_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-036 SW	0.2-0.3	2019-Sep-4	CS19-036 SW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-037 NW	0.2-0.3	2019-Sep-4	CS19-037 NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-038 F	0.2-0.3	2019-Sep-4	CS19-038 F_0.2-0.3	12	Fine	18.9	<0.005	<0.05	<0.01	<0.02	<0.02	<0.05	<0.05	<0.1	<20	<20	<20	<20	<10	<10	<20	<20	<20
		0.2-0.3		CS19-DUP4	27	Fine	18.5	<0.005	<0.05	<0.01	<0.02	<0.02	<0.05	<0.05	<0.1	<20	<20	<20	<20	<10	<10	<20	<20	<20
	RPD (CS19-038 F_0.2-0.3 & CS19-DUP4)				77%	NC	2%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-039 SW	0.2-0.3	2019-Sep-4	CS19-039 SW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-040 NW	0.2-0.3	2019-Sep-4	CS19-040 NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-041 F	0.2-0.3	2019-Sep-4	CS19-041 F_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-042 SW	0.2-0.3	2019-Sep-4	CS19-042 SW	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
Reach 1C	CS19-043NW	1-1.1	9/5/2019	CS19-043_1.0-1.1				-	-	-	-	-	-	-		<20	<20	<20	<20	-	-	-	-	-
	CS19-044F	1-1.1	9/5/2019	CS19-044_1.0-1.1	6	Fine	20.8	<0.02	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05		<20	<20	<20	<20	<10	<10	<20	<20	<20
	CS19-045SW	1-1.1	9/5/2019	CS19-045_1.0-1.1				-	-	-	-	-	-	-		<20	<20	<20	<20	-	-	-	-	-
	CS19-046NW	1-1.1	9/5/2019	CS19-046_1.0-1.1				-	-	-	-	-	-	-		<20	<20	<20	<20	-	-	-	-	-
	CS19-047F	1-1.1	9/5/2019	CS19-047_1.0-1.1				-	-	-	-	-	-	-		<20	<20	<20	<20	-	-	-	-	-
	CS19-048SW	1-1.1	9/5/2019	CS19-048_1.0-1.1				-	-	-	-	-	-	-		<20	<20	<20	<20	-	-	-	-	-
	CS19-049 NW	0.2-0.3	2019-Sep-6	CS19-049 NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-050 F	0.2-0.3	2019-Sep-6	CS19-050 F_0.2-0.3	49	Fine	23.8	<0.005	<0.05	<0.01	<0.02	<0.02	<0.05	<0.05	<0.1	<20	<20	<20	<20	<10	<10	<20	<20	<20
		0.2-0.3		CS19-DUP5	33	Fine	21.6	<0.005	<0.05	<0.01	<0.02	<0.02	<0.05	<0.05	<0.1	<20	<20	<20	<20	<10	<10	<20	<20	<20
	RPD (CS19-050 F_0.2-0.3 & CS19-DUP5)				39%	NC	10%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-051 SW	0.2-0.3	2019-Sep-6	CS19-051 SW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-052 NW	0.2-0.3	2019-Sep-6	CS19-052 NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-053 F	0.2-0.3	2019-Sep-6	CS19-053 F_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-054 SW	0.2-0.3	2019-Sep-6	CS19-054 SW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-055 NW	0.2-0.3	2019-Sep-6	CS19-055 NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-056 F	0.2-0.3	2019-Sep-6	CS19-056 F_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-057 SW	0.2-0.3	2019-Sep-6	CS19-057 SW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
Reach 3	CS19-058NW	0.2-0.3	2019-Sep-9	CS19-058NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-059F	0.2-0.3	2019-Sep-9	CS19-059F_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-059F-01	0.5-0.6	2019-Sep-9	CS19-059F-01_0.5-0.6	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-060SW	0.2-0.3	2019-Sep-9	CS19-060SW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-061NW	0.2-0.3	2019-Sep-9	CS19-061NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-062F	0.2-0.3	2019-Sep-9	CS19-062F_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-062F-01	0.5-0.6	2019-Sep-9	CS19-062F-01_0.5-0.6	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-063SW	0.2-0.3	2019-Sep-9	CS19-063SW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-064NW	0.2-0.3	2019-Sep-9	CS19-064NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-065F	0.2-0.3	2019-Sep-9	CS19-065F_0.2-0.3	48	Fine	20.6	<0.02	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	-	<20	<20	<20	<20	<10	<10	<20	<20	47
		0.2-0.3		CS19-DUP6_0.2-0.3	46	Fine	21.2	<0.02	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	-	<20	<20	<20	<20	<10	<10	<20	<20	42
	RPD (CS19-065F_0.2-0.3 & CS19-DUP6_0.2-0.3)				4%	NC	3%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-065F-01	0.5-0.6	2019-Sep-9	CS19-065F-01_0.5-0.6	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-066SW	0.2-0.3	2019-Sep-9	CS19-066SW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-067NW	0.2-0.3	2019-Sep-9	CS19-067NW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-068F	0.2-0.3	2019-Sep-9	CS19-068F_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-069SW	0.2-0.3	2019-Sep-9	CS19-069SW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
Reach 4	CS19-070WW	0.2-0.3	2019-Sep-10	CS19-070WW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	41	41	-	-	-	-	-
	CS19-071F	0.2-0.3	2019-Sep-10	CS19-071F_0.2-0.3	Fine	Fine	23.4	<0.02	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	-	<20	<20	<20	<20	<10	<10	<20	<20	<20
		0.2-0.3		CS19-DUP8_0.2-0.3	-	-	22.9	<0.02	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	-	<20	<20	<20	<20	<10	<10	<20	<20	<20
	RPD (CS19-071F_0.2-0.3 & CS19-DUP8_0.2-0.3)				NC	NC	2%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-071F-01	0.5-0.6	2019-Sep-10	CS19-071F-01_0.5-0.6	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-072EW	0.2-0.3	2019-Sep-10	CS19-072EW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	43	43	-	-	-	-	-
	CS19-073WW	0.2-0.3	2019-Sep-10	CS19-073WW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	38	38	-	-	-	-	-
	CS19-074F	0.2-0.3	2019-Sep-10	CS19-074F_0.2-0.3	Fine	Fine	25.7	<0.02	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	-	<20	<20	<20	<20	<10	<10	<20	<20	<20
		0.2-0.3		CS19-DUP7_0.2-0.3	Fine	Fine	25.1	<0.02	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	-	<20	<20	<20	<20	<10	<10	<20	<20	<20
	RPD (CS19-074F_0.2-0.3 & CS19-DUP7_0.2-0.3)				NC	NC	2%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-074F-01	0.5-0.6	2019-Sep-10	CS19-074F-01_0.5-0.6	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-075EW	0.2-0.3	2019-Sep-10	CS19-075EW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-076WW	0.2-0.3	2019-Sep-10	CS19-076WW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	139	138	-	-	-	-	-
	CS19-077F	0.2-0.3	2019-Sep-10	CS19-077F_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-
	CS19-077F-01	0.5-0.6	2019-Sep-16	CS19-077F-01_0.5-0.6	63	Coarse	19.2	<0.005	<0.05	<0.01	<0.02	<0.02	<0.05	-	-	<20	<20	195	195	<10	<10	<20	296	167
	CS19-078EW	0.2-0.3	2019-Sep-10	CS19-078EW_0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	<20	<20	<20	<20	-	-	-	-	-

Notes:

m - metres

mbg - metres below grade

< - less than reported detection limit

'-' - sample not analyzed for parameter indicated

formatting of cells indicates exceedances of like-formatted standards

where many exceedance formats are used, highlighted results reflect the least stringent standard/guideline exceeded

samples collected from the same location, date and depth interval are blind field duplicate / parent sample pairs

laboratory analytical reports detail detection limits, testing protocols and QA/QC procedures

BTEX - benzene, toluene, ethylbenzene, xylenes

MTBE - methyl tert-butyl ether

RPD - relative percent difference

RPD calculation = absolute value of difference divided by average of results x 100%

NC - RPD not calculated

BOLD/UNDERLINED - RPD exceeds acceptance limits

• RPD calculations not performed where results are less than 5 times the reported detection limit

• acceptance limits for Soil are as follows: general hydrocarbons (60%), PAH - (75%), inorganics and metals (45% to 60%)

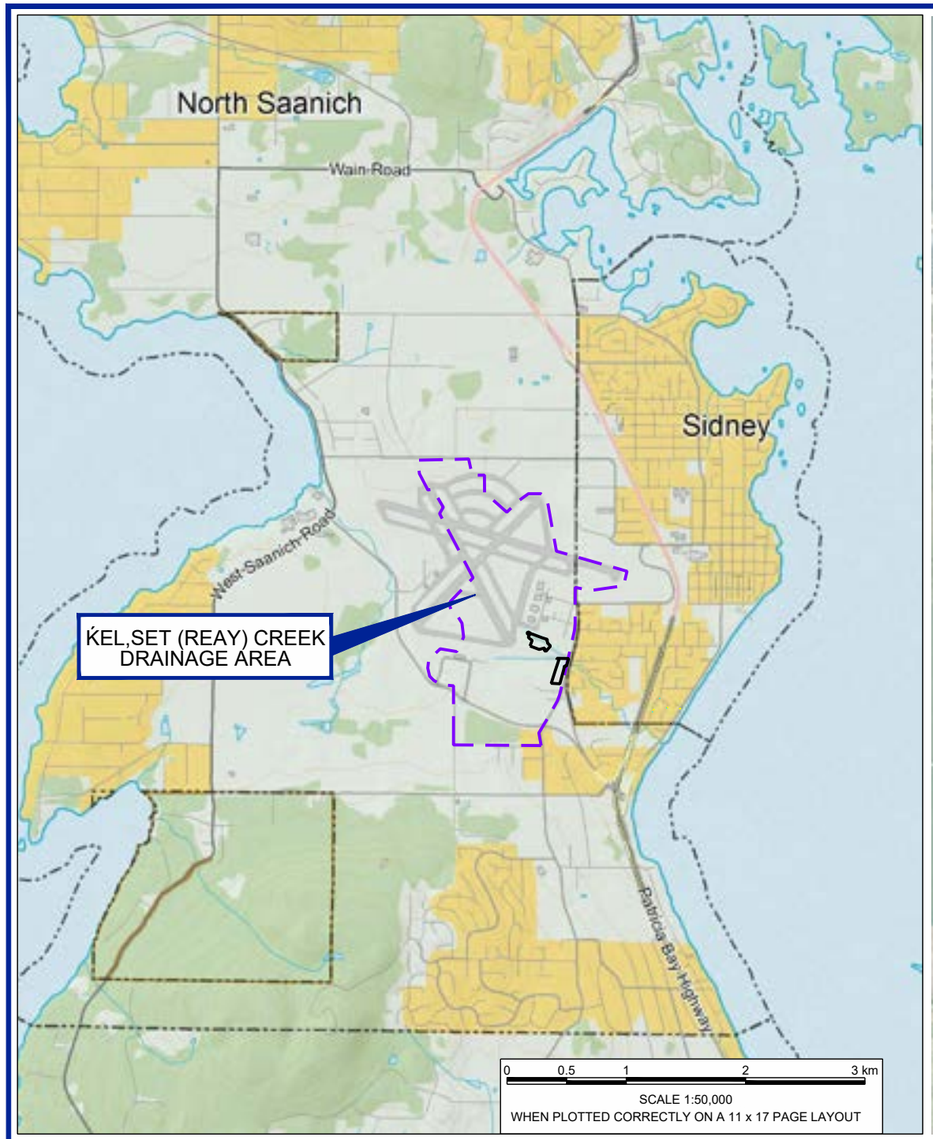
TABLE 4: CONFIRMATORY SAMPLE CHEMISTRY RESULTS - VOLATILE ORGANIC COMPOUNDS

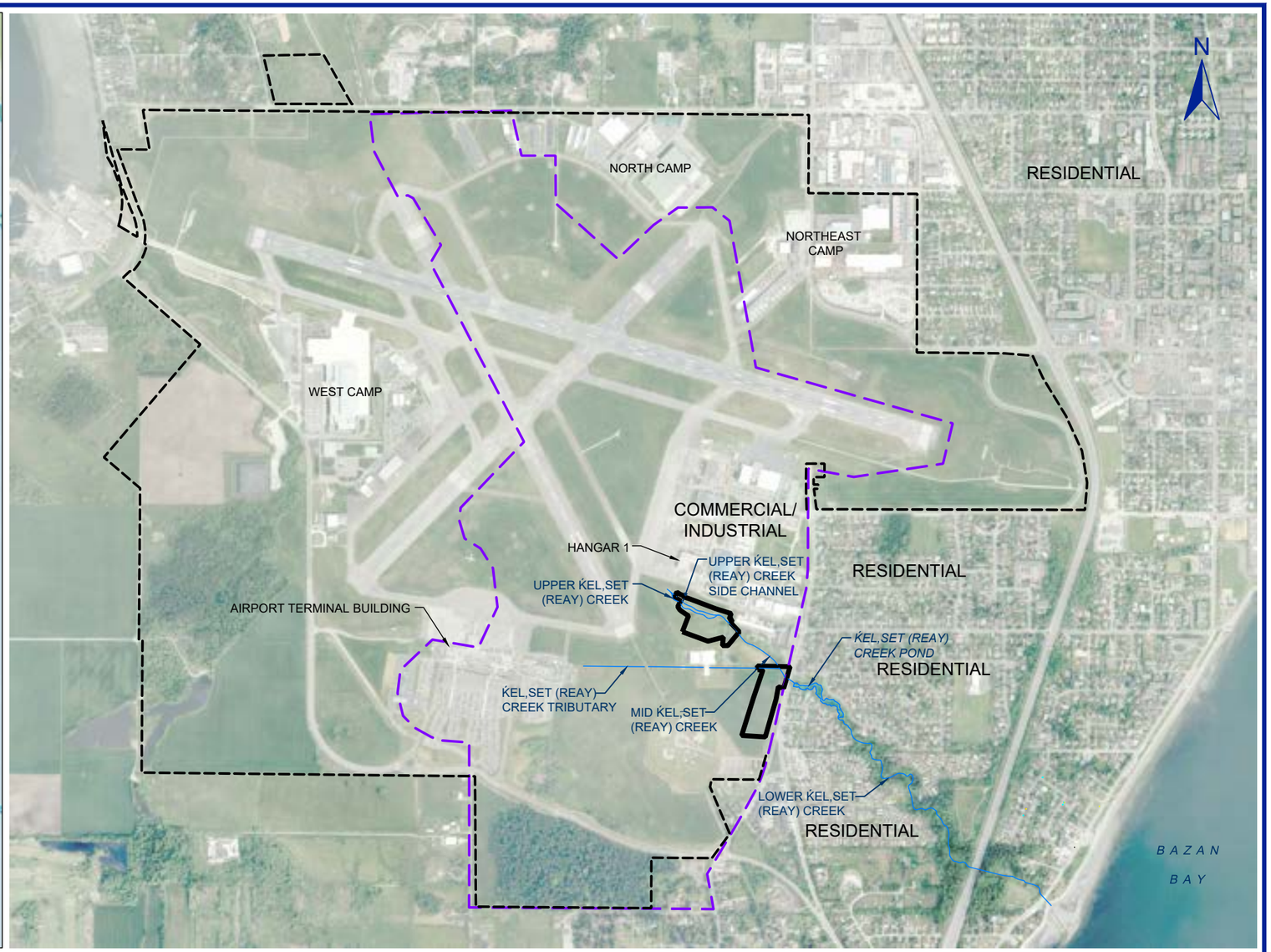
Location Type	Sample Location	Sample Depth (mbg)	Sample Date	Sample ID	VOCs acetone	bromodichloromethane	bromoform	bromomethane	carbon tetrachloride	chlorobenzene	dibromochloromethane [DBCM]	chloroethane	chloroform	chloromethane	dichloroethylene, 1,2-cis-	dichloropropene, cis-1,3-	dibromoethane, 1,2-	dichlorobenzene, 1,2-	dichlorobenzene, 1,3	dichlorobenzene, 1,4	dichloroethane, 1,1-	dichloroethane, 1,2-	dichloroethylene, 1,1-	dichloropropane, 1,2-	dichloropropene, 1,3- (cis + trans)	methyl-2-pentanone, 4-	tetrachloroethane, 1,1,1,2-	tetrachloroethane, 1,1,2,2-	trichlorobenzene, 1,2,4-	trichloroethane, 1,1,1-	trichloroethane, 1,1,2-	dichloromethane	methylethylketone[MEK]	tetrachloroethylene	dichloroethylene, 1,2-trans-	dichloropropene, trans-1,3-	trichloroethylene	trichlorofluoromethane	vinyl chloride
					µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
Reported Detection Limit					0.5	0.05	0.05	0.05	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.05	0.05	0.05	0.01	0.05	0.05
Reach 1A	CS19-008F	0.6-0.7	2019-Aug-30	CS19-008F_0.6-0.7	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	CS19-011F	0.6-0.7	2019-Aug-30	CS19-011F_0.6-0.7	<0.5	<0.05	0.16	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	0.01	<0.05	<0.05
		0.6-0.7		CS19-DUP2F_0.6-0.7	<0.5	<0.05	0.16	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	0.02	<0.05	<0.05
	RPD (CS19-011F_0.6-0.7 & CS19-DUP2F_0.6-0.7)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Reach 1B	CS19-023F	0.2-0.3	2019-Aug-31	CS19-023F_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
		0.2-0.3		CS19-DUP3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	RPD (CS19-023F_0.2-0.3 & CS19-DUP3)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-027SW	0.2-0.3	2019-Aug-31	CS19-027SW_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	CS19-029F	0.2-0.3	2019-Sep-3	CS19-029F_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	CS19-030SW	0.2-0.3	2019-Sep-3	CS19-030SW_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	CS19-032 F	0.2-0.3	2019-Sep-4	CS19-032 F_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	CS19-038 F	0.2-0.3	2019-Sep-4	CS19-038 F_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
		0.2-0.3		CS19-DUP4	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	RPD (CS19-038 F_0.2-0.3 & CS19-DUP4)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Reach 1C	CS19-044F	1-1.1	2019-Sep-5	CS19-044_1.0-1.1	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	CS19-050 F	0.2-0.3	2019-Sep-6	CS19-050 F_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
		0.2-0.3		CS19-DUP5	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	RPD (CS19-050 F_0.2-0.3 & CS19-DUP5)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Reach 3	CS19-065F	0.2-0.3	2019-Sep-9	CS19-065F_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
		0.2-0.3		CS19-DUP6_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	RPD (CS19-065F_0.2-0.3 & CS19-DUP6_0.2-0.3)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Reach 4	CS19-071F	0.2-0.3	2019-Sep-10	CS19-071F_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
		0.2-0.3		CS19-DUP8_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	RPD (CS19-071F_0.2-0.3 & CS19-DUP8_0.2-0.3)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-074F	0.2-0.3	2019-Sep-10	CS19-074F_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
		0.2-0.3		CS19-DUP7_0.2-0.3	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
	RPD (CS19-074F_0.2-0.3 & CS19-DUP7_0.2-0.3)				NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	CS19-077F-01	0.5-0.6	2019-Sep-16	CS19-077F-01_0.5-0.6	<0.5	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05

Notes:
m - metres
mbg - metres below grade
< - less than reported detection limit
'-' - sample not analyzed for parameter indicated
formatting of cells indicates exceedances of like-formatted standards
where many exceedance formats are used, highlighted results reflect the least stringent standard/guideline exceeded
samples collected from the same location, date and depth interval are blind field duplicate / parent sample pairs
laboratory analytical reports detail detection limits, testing protocols and QA/QC procedures
VOCs - volatile organic compounds
RPD - relative percent difference
RPD calculation = absolute value of difference divided by average of results x 100%
NC - RPD not calculated
BOLD/UNDERLINED - RPD exceeds acceptance limits
• RPD calculations not performed where results are less than 5 times the reported detection limit
• acceptance limits for Soil are as follows: general hydrocarbons (60%), PAH - (75%), inorganics and metals (45% to 60%)

DRAWINGS

Confirmation of Remediation
ḰEL,SET (Reay) Creek – Victoria International Airport
North Saanich, BC
SLR Project No.: 205.03892.00005





NOTES:
REFERENCED FROM CAPITAL REGIONAL DISTRICT WEB MAP SERVICE.
IMAGERY: © 2017 CAPITAL REGIONAL DISTRICT (IMAGE DATE: 2015).

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

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

LEGEND:
- VICTORIA AIRPORT
- ĆEL,SET (REAY) CREEK DRAINAGE AREA BOUNDARY
- SITE BOUNDARY

0 0.25 0.5 1.0 km
SCALE 1:15,000
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10 U

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

TRANSPORT CANADA
ĆEL,SET (REAY) CREEK
(ON VICTORIA AIRPORT LANDS)
SIDNEY, BC

ĆEL,SET (REAY) CREEK CONFIRMATION OF REMEDIATION (VICTORIA AIRPORT)

SITE LOCATION & SURROUNDING LAND USE

Date: March 31, 2020
Project No. 205.03892.00005
Drawing No. 1

SLR global environmental solutions

Cadfile name: S_205-03892-00005-A2.dwg

NOTES:
REFERENCED FROM CAPITAL REGIONAL DISTRICT WEB MAP SERVICE.
IMAGERY: © 2017 CAPITAL REGIONAL DISTRICT (IMAGE DATE: 2015).

LEGEND:

- PROPERTY BOUNDARY
- VICTORIA AIRPORT
- SUBJECT BOUNDARY
- LIMITS OF EXCAVATION

UTILITIES AND SYMBOLS

- O/H ELECTRICAL
- U/G ELECTRICAL
- U/G NATURAL GAS
- U/G SANITARY SEWER
- U/G STORM SEWER
- U/G WATER LINE
- U/G COMMON LINE

0 10 20 40 60 80 m

SCALE 1:1,250
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10 U

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TRANSPORT CANADA
ĆEL,SET (REAY) CREEK
(ON VICTORIA AIRPORT LANDS)
SIDNEY, BC

ĆEL,SET (REAY) CREEK CONFIRMATION OF REMEDIATION (VICTORIA AIRPORT)

SITE PLAN

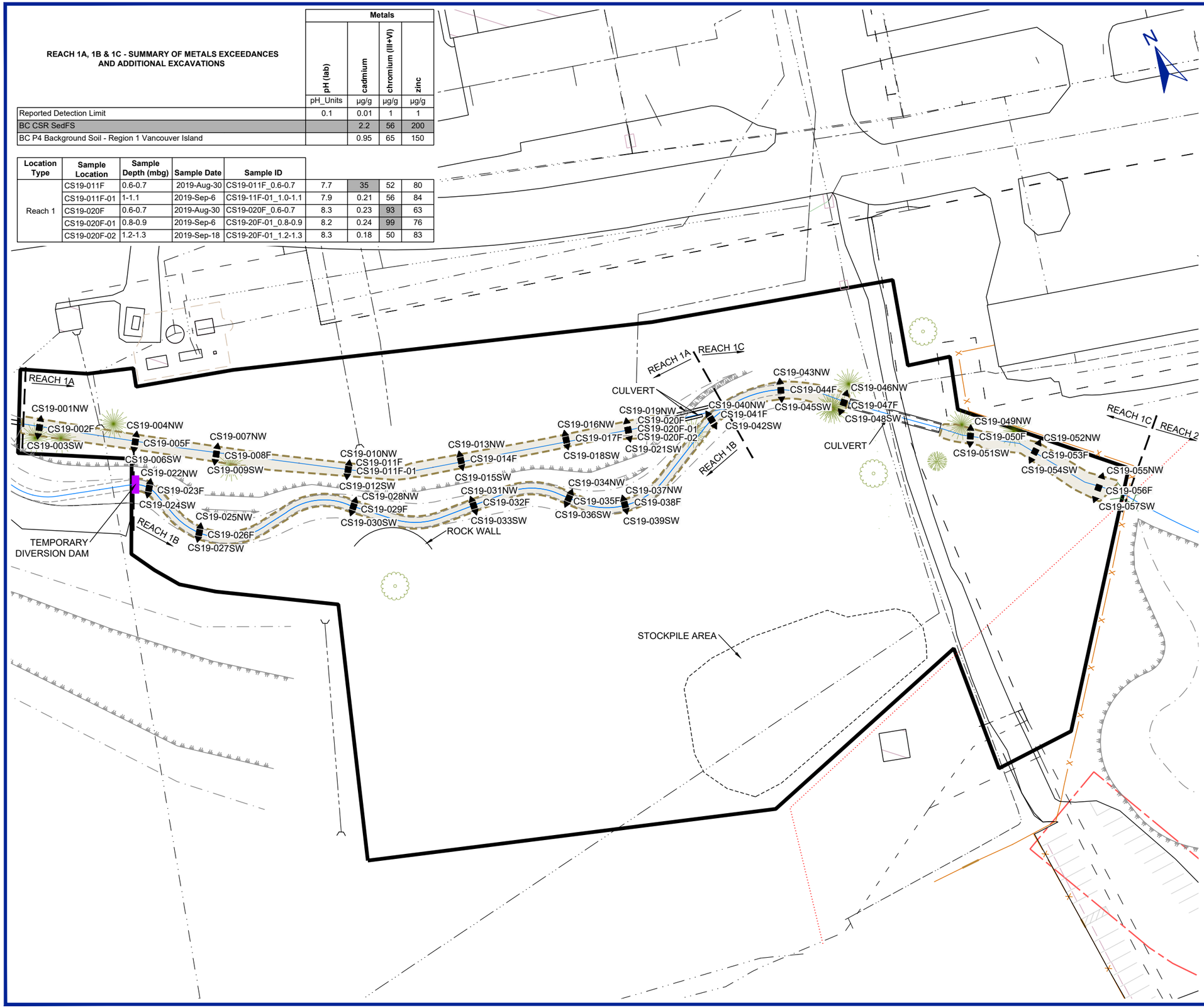
Date: March 31, 2020
Project No. 205.03892.00005
Drawing No. 2

SLR global environmental solutions

Cadfile name: S_205-03892-00005-A2.dwg

REACH 1A, 1B & 1C - SUMMARY OF METALS EXCEEDANCES AND ADDITIONAL EXCAVATIONS

Location Type	Sample Location	Sample Depth (mbg)	Sample Date	Sample ID	Metals			
					pH (lab)	cadmium	chromium (III+VI)	zinc
					pH_Units	µg/g	µg/g	µg/g
Reported Detection Limit					0.1	0.01	1	1
BC CSR SedFS						2.2	56	200
BC P4 Background Soil - Region 1 Vancouver Island						0.95	65	150
Reach 1	CS19-011F	0.6-0.7	2019-Aug-30	CS19-011F_0.6-0.7	7.7	35	52	80
	CS19-011F-01	1-1.1	2019-Sep-6	CS19-11F-01_1.0-1.1	7.9	0.21	56	84
	CS19-020F	0.6-0.7	2019-Aug-30	CS19-020F_0.6-0.7	8.3	0.23	93	63
	CS19-020F-01	0.8-0.9	2019-Sep-6	CS19-20F-01_0.8-0.9	8.2	0.24	99	76
	CS19-020F-02	1.2-1.3	2019-Sep-18	CS19-20F-01_1.2-1.3	8.3	0.18	50	83



NOTES:
REFERENCED FROM KERR WOOD LEIDAL CONSULTING ENGINEERS. PROJECT No. 2396-009, DRAWING No. C-100. DATE 2019-05-31.

LEGEND:

- PROPERTY BOUNDARY
- VICTORIA AIRPORT
- SUBJECT BOUNDARY
- TEMPORARY DIVERSION DAM
- LIMITS OF EXCAVATION
- SOIL SAMPLE, EXCAVATION BASE
- SOIL SAMPLE, EXCAVATION WALL

UTILITIES AND SYMBOLS

- O/H ELECTRICAL
- U/G ELECTRICAL
- U/G NATURAL GAS
- U/G SANITARY SEWER
- U/G STORM SEWER
- U/G WATER LINE
- U/G COMMON LINE

0 5 10 20 30 40 m

SCALE 1:750
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10 U

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TRANSPORT CANADA
ĆEL,SET (REAY) CREEK
(ON VICTORIA AIRPORT LANDS)
SIDNEY, BC

ĆEL,SET (REAY) CREEK CONFIRMATION OF REMEDIATION (VICTORIA AIRPORT)

CONFIRMATION SAMPLES REACH 1A, 1B AND 1C - COMPARISON TO SEDIMENT GUIDELINES

Date: March 31, 2020
Project No. 205.03892.00005
Drawing No. 3A

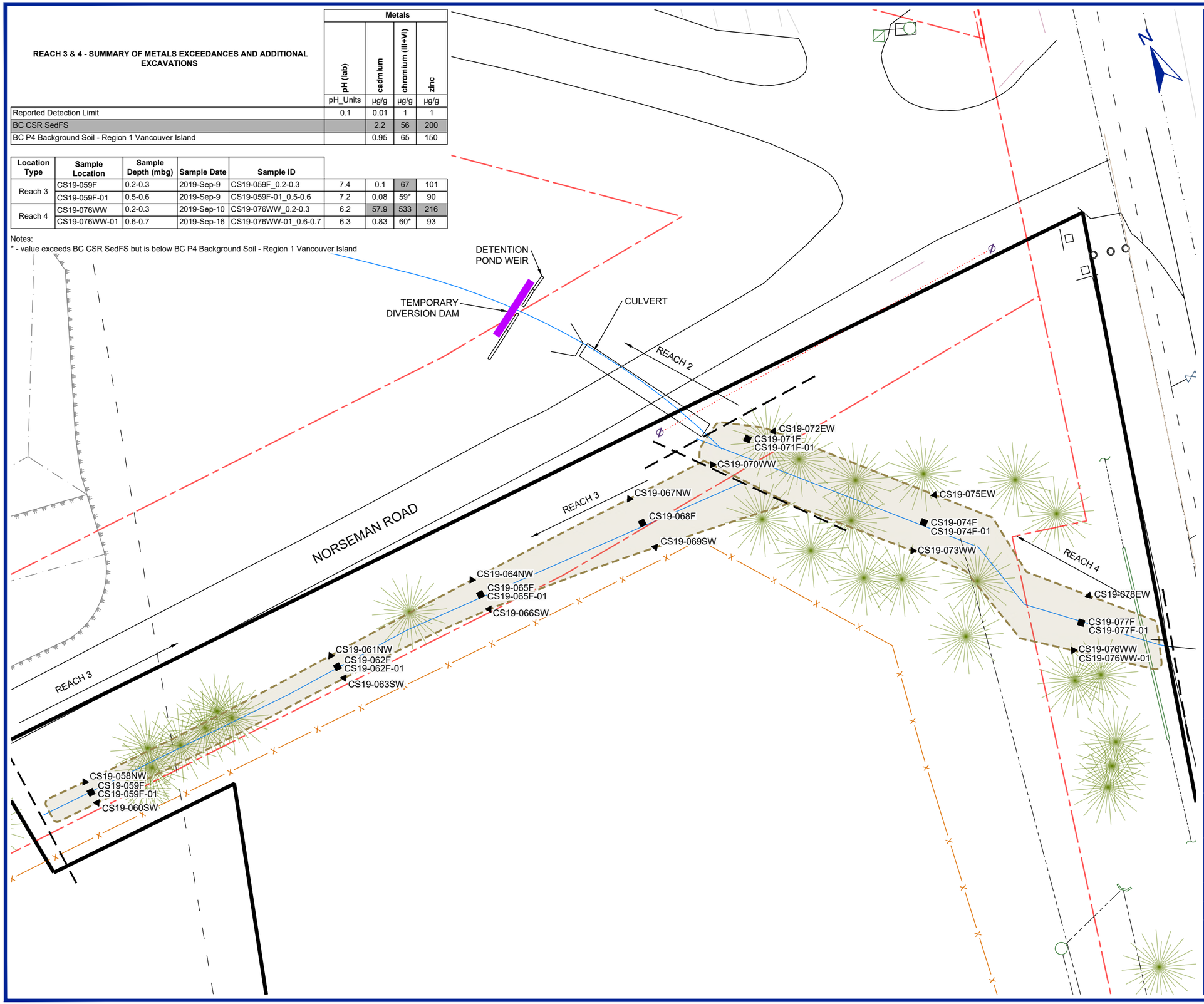
SLR global environmental solutions

Cadfile name: S_205-03892-00005-A2.dwg

REACH 3 & 4 - SUMMARY OF METALS EXCEEDANCES AND ADDITIONAL EXCAVATIONS

					Metals			
					pH (lab)	cadmium	chromium (III+VI)	zinc
					pH_Units	µg/g	µg/g	µg/g
Reported Detection Limit					0.1	0.01	1	1
BC CSR SedFS						2.2	56	200
BC P4 Background Soil - Region 1 Vancouver Island						0.95	65	150
Location Type	**Sample Location**	**Sample Depth (mbg)**	**Sample Date**	**Sample ID**				
Reach 3	CS19-059F	0.2-0.3	2019-Sep-9	CS19-059F_0.2-0.3	7.4	0.1	67	101
	CS19-059F-01	0.5-0.6	2019-Sep-9	CS19-059F-01_0.5-0.6	7.2	0.08	59*	90
Reach 4	CS19-076WW	0.2-0.3	2019-Sep-10	CS19-076WW_0.2-0.3	6.2	57.9	533	216
	CS19-076WW-01	0.6-0.7	2019-Sep-16	CS19-076WW-01_0.6-0.7	6.3	0.83	60*	93

Notes:
* - value exceeds BC CSR SedFS but is below BC P4 Background Soil - Region 1 Vancouver Island



NOTES:
REFERENCED FROM KERR WOOD LEIDAL CONSULTING ENGINEERS. PROJECT No. 2396-009, DRAWING No. C-201. DATE 2019-05-31.

LEGEND:
- PROPERTY BOUNDARY
- VICTORIA AIRPORT
- SUBJECT BOUNDARY
- TEMPORARY DIVERSION DAM
- LIMITS OF EXCAVATION
- SOIL SAMPLE, EXCAVATION BASE
- SOIL SAMPLE, EXCAVATION WALL

UTILITIES AND SYMBOLS
- O/H ELECTRICAL
- U/G ELECTRICAL
- U/G NATURAL GAS
- U/G SANITARY SEWER
- U/G STORM SEWER
- U/G WATER LINE
- U/G COMMON LINE

0 2.5 5 10 15 m

SCALE 1:300
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10 U

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TRANSPORT CANADA
ĆEL,SET (REAY) CREEK
(ON VICTORIA AIRPORT LANDS)
SIDNEY, BC

ĆEL,SET (REAY) CREEK CONFIRMATION OF REMEDIATION (VICTORIA AIRPORT)

CONFIRMATION SAMPLES REACH 3 AND 4 - COMPARISON TO SEDIMENT GUIDELINES

Date: March 31, 2020
Project No. 205.03892.00005
Drawing No. 3B

SLR global environmental solutions

Cadfile name: S_205-03892-00005-A2.dwg

PHOTO 1

PHOTO 2

PHOTO 6

PHOTO 7

PHOTO 10

PHOTO 3

PHOTO 4

PHOTO 5

PHOTO 8

PHOTO 9

NOTES:
REFERENCED FROM KERR WOOD LEIDAL CONSULTING ENGINEERS.
PROJECT No. 2396-009, DRAWING No. C-100. DATE 2019-05-31.

LEGEND:

- PROPERTY BOUNDARY
- VICTORIA AIRPORT
- SUBJECT BOUNDARY
- RESTORATION PLANTING AREAS
- LIMITS OF EXCAVATION
- 1 CAMERA LOCATION AND DIRECTION THUS

UTILITIES AND SYMBOLS
- O/H ELECTRICAL
- U/G ELECTRICAL
- U/G NATURAL GAS
- U/G SANITARY SEWER
- U/G STORM SEWER
- U/G WATER LINE
- U/G COMMON LINE

0 5 10 20 30 40 m

SCALE 1:750
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10 U

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TRANSPORT CANADA
ĆEL,SET (REAY) CREEK
(ON VICTORIA AIRPORT LANDS)
SIDNEY, BC

ĆEL,SET (REAY) CREEK CONFIRMATION OF REMEDIATION (VICTORIA AIRPORT)

FINAL SITE CONDITIONS - REACHES 1A, 1B AND 1C

Date: March 31, 2020
Project No. 205.03892.00005
Drawing No. 4A

SLR global environmental solutions

Cadfile name: S_205-03892-00005-A2.dwg

NOTES:
REFERENCED FROM KERR WOOD LEIDAL CONSULTING ENGINEERS.
PROJECT No. 2396-009, DRAWING No. C-201. DATE 2019-05-31.

LEGEND:

- PROPERTY BOUNDARY
- VICTORIA AIRPORT
- SUBJECT BOUNDARY
- LIMITS OF EXCAVATION

UTILITIES AND SYMBOLS
- O/H ELECTRICAL
- U/G ELECTRICAL
- U/G NATURAL GAS
- U/G SANITARY SEWER
- U/G STORM SEWER
- U/G WATER LINE
- U/G COMMON LINE

DETENTION POND WEIR

CULVERT

REACH 2

REACH 3

NORSEMAN ROAD

REACH 3

REACH 4

11

12

PHOTO 11

PHOTO 11

PHOTO 12

0 2.5 5 10 15 m

SCALE 1:300
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10 U

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TRANSPORT CANADA
ĆEL,SET (REAY) CREEK
(ON VICTORIA AIRPORT LANDS)
SIDNEY, BC

ĆEL,SET (REAY) CREEK CONFIRMATION OF REMEDIATION (VICTORIA AIRPORT)

FINAL SITE CONDITIONS - REACHES 3 AND 4

Date: March 31, 2020

Project No. 205.03892.00005

Drawing No. 4B

SLR global environmental solutions

Cadfile name: S_205-03892-00005-A2.dwg

PHOTOGRAPHS

Confirmation of Remediation
ḰEL,SET (Reay) Creek – Victoria International Airport
North Saanich, BC
SLR Project No.: 205.03892.00005

Photo 1: A large patch of Himalayan blackberry prior to removal on the north side of Reach 1A, looking east.

Photo 2: View of the Contractor running hoses during dewatering phase in Reach 1B. Instream vegetation in Reach 1B consisted primarily of duckweed and common cattail.

Photo 3: View looking downstream along Reach 4 prior to excavation. Larger trees and shrubs can be seen in the riparian area.

Photo 4: View looking east at the fish stop net installed downstream of Reach 1C excavation limit.

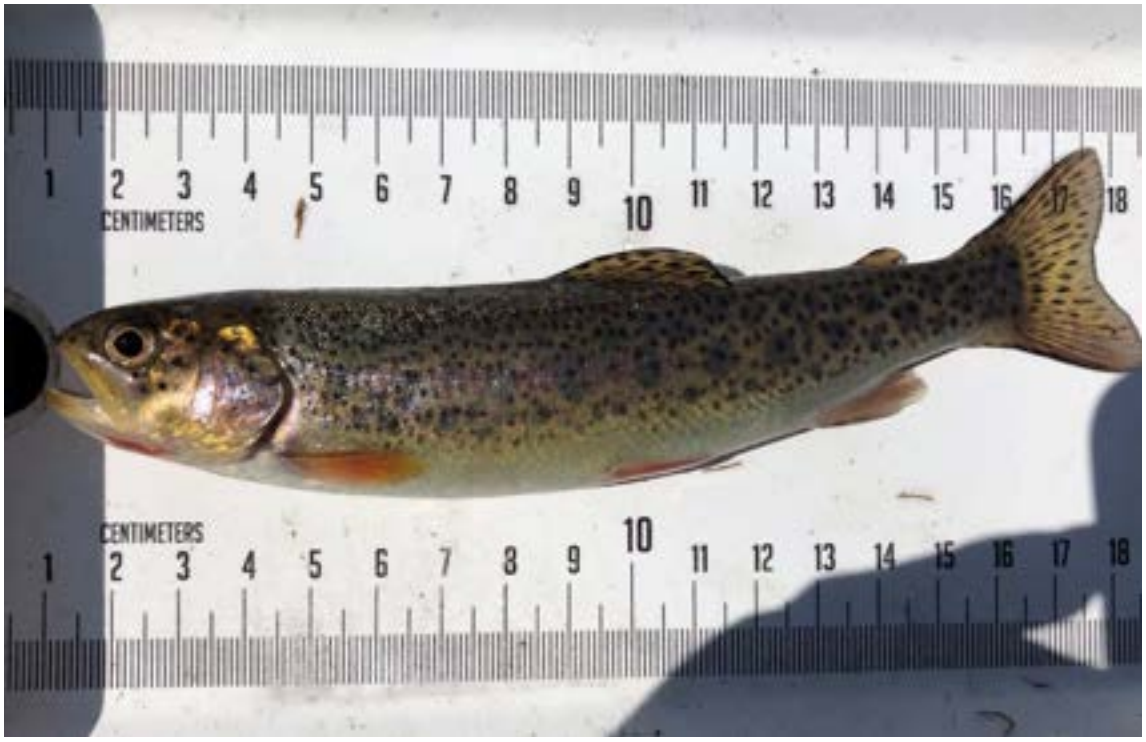

Photo 5: Cutthroat trout captured in Reach 4 during the pre-construction fish salvage.

Photo 6: Coho salmon captured in Reach 1C during the pre-construction fish salvage.

Photo 7: Threespine stickleback (<30mm) captured during construction phase fish salvage.

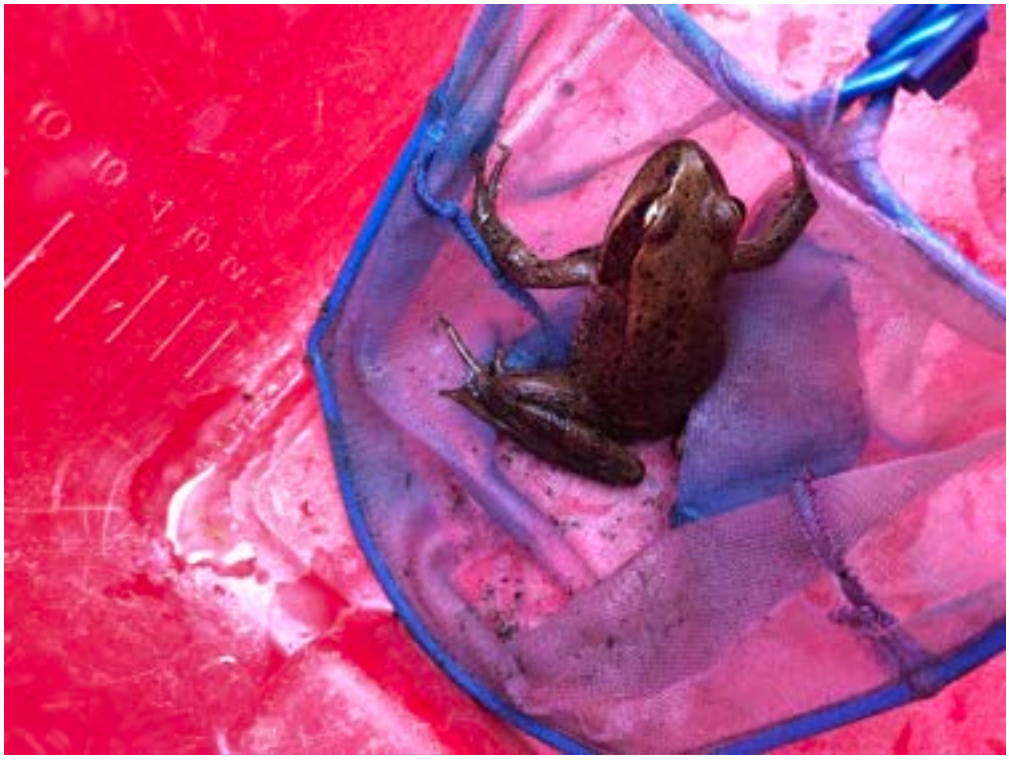

Photo 8: Incidental red-legged frog captured in Reach 4 during construction phase.

Photo 9: Himalayan blackberry removal on the north side of Reach 1C, looking west.

Photo 10: Haybales set up in Reach 1C channel as sedimentation and erosion control.

Photo 11: Constructed dam upstream of the remedial extent in Reach 1B.

Photo 12: Dewatering equipment set up on the north side of Reach 1A.

Photo 13: View of remedial excavation in Reach 1A, looking east. Excavated sediment was placed in dump truck and transported to the stockpile area.

Photo 14: Hydrovac excavation in Reach 1C, Tseycum First Nation archaeological monitor can be seen overseeing the excavation.

Photo 15: SLR collecting confirmatory samples following hydrovac excavation in Reach 3.

Photo 16: View looking south at Contractor using existing stockpiles to create berm for containment cell in the stockpile management area. Berms were covered with polyethylene liner to segregate from other stockpiled material.

Photo 17: View of excavated sediment in containment cells lined and covered with polyethylene liner, looking west.

Photo 18: View of backfill (Type 1 blend) shaping and placement in Reach 1A.

Photo 19: View of backfill (Type 2 blend) shaping and placement in Reach 3.

Photo 20: View of Contractor placing Type 1 backfill material in Reach 1A with an excavator.

Photo 21: Slinger truck placing backfill in Reach 1C where excavator access was limited.

Photo 22: View of KWL personnel inspecting Contractor repairs to riffle 3 within Reach 1B.

Photo 23: Riffle 3 in Reach 1B after riffle repair and backfill complete.

Photo 24: View of remaining wood debris after additional excavation in Reach 4.

Photo 25: View looking west at the stockpile management area after stockpile removal, remaining VAA material is seen on the right.

Photo 26: View looking downstream (east) along lower Reach 1C. Western sword fern plantings with leaf mulch can be seen along the stream edge and bank. VAA installed retaining wall can also be seen on the lower left.

Photo 27: View looking west at the southern side of upper Reach 1C post-hydroseed and silt fence installation.

Photo 28: View looking east at plantings and leaf mulch installed along the north bank of Reach 1A.

Photo 29: View looking west at an access location along the south side of Reach 1B (west of the large oak tree), riparian planting complete.

Photo 30: View looking northeast at riparian planting along upper Reach 1C, where Himalayan blackberry removal occurred.