Annex A. Remediation Action Plan

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July 13, 2021 Project: 626268

Public Services and Procurement Canada – Pacific Region
401 – 1230 Government Street
Victoria, BC V8W 3X4

ATTENTION: Robert Price

REFERENCE: **Remedial Action Plan – CFB Esquimalt Nanoose TX, Nanoose, BC**
Project No. R.116937.001

Introduction

At the request of Public Services and Procurement Canada (PSPC) on behalf of the Department of National Defence (DND), SNC-Lavalin Inc. (SNC-Lavalin) has prepared this remedial action plan for implementation of the planned remediation at the Canadian Forces Base (CFB) Esquimalt Nanoose TX Property (the "Site"), Nanoose, BC.

This document is based on the work plan and cost estimate provided to PSPC in a letter dated June 21, 2021. This work was completed under PSPC Contaminated Sites Remediation Services Contract No. EZ897-192499/003/VAN (CTA) and Task Authorization No. 700592318. The Site Location and Site Plan are included as Drawings 626268-601 and 626268-602, respectively.

Background

The Site is located on top of a hill in a rural area of Nanoose Bay, BC, and consists of approximately 105 hectares. The topography of the Site is fairly flat with some sloping down towards the south and east. The Site was historically used by the DND for radio transmission defence purposes until 1998. The facilities at the Site were reported to be constructed circa 1963 and decommissioned/removed from the Site between 1995 and 2002. Facilities included an underground bunker (Former Transmitter Building), auxiliary buildings and structures, and several radio antennas. The Site is currently vacant of any permanent buildings or structures and is currently used by a model airplane club (PDQ Flyers).

Environmental Site Condition

In 2018, SNC-Lavalin completed a Supplemental Site Investigation (SSI) and Remediation Options Analysis (ROA)[1] with an updated SSI and ROA completed in 2019[2]. The full Site history is presented in the 2018 SSI report. Three Areas of Environmental Concern (AECs) were retained for the Site in the 2018 SSI

[1] SNC-Lavalin Inc., 2018. DRAFT *Supplemental Site Investigation and Remedial Options Analysis, Nanoose Transmitter (TX), Nanoose Bay, BC.* March 9, 2018.
[2] SNC-Lavalin Inc., 2019. FINAL *Supplemental Site Investigation and Remedial Options Analysis, Nanoose Transmitter (TX), Nanoose Bay, BC.* March 31, 2019.

and ROA and included the Former Electrical Substation, the Former Transmitter Building, and Site Wide Groundwater Impacts. The approximate locations of the AECs are presented on Drawing 626268-502.

Based on a comparison to the current land use and federal guidelines and current results, the three identified AECs and associated Contaminants of Concern (COCs) are summarized in the table below.

Table A: Areas of Environmental Concern and Regulated Analytical Parameters

AEC ID	Description	COC Type	Contaminants of Concern	
			Soil	Groundwater
1	Former Electrical Substation	PAH	PAH Parameters (ACE, FLR, and IACR)	-
2	Former Transmitter Building	Petroleum Hydrocarbons / PAH	F2 and F3 PAH Parameters: (NAP, ACE, FLR, PHE, ANT, FLT, B(a)A, B(b)F, B(a)P, B(a)P TPE, IACR)	PAH Parameters: (1-MNAP, 2-MNAP, NAP, ACE, FLR, PHE, ANT, ACR, FLT, PYR, B(a)A, CHR, B(a)A, B(b)F, B(j)F, B(b+j)F, B(a)P, D(ah)A, B(ghi)P, QN)
3	Site Wide	Dissolved Metals	-	Aluminum, Iron, Manganese, Chromium, Copper, Lithium, Selenium, and Zinc

AEC	Area of Environmental Concern	PYR	Pyrene
COC	Contaminant of Concern	B(a)A	Benz(a) anthracene
PAH	Polycyclic Aromatic Hydrocarbon	CHR	Chrysene
1-MNAP	1-Methylnaphthalene	B(b)F	Benzo(b) fluoranthene
2-MNAP	2-Methylnaphthalene	B(j)F	Benzo(j) fluoranthene
NAP	Naphthalene	B(b+j)F	Benzo(b+j) fluoranthene
ACE	Acenaphthene	B(ghi)P	Benzo(g,h,i)perylene
FLR	Fluorene	B(a)P	Benzo(a)pyrene
PHE	Phenanthrene	D(ah)A	Dibenz(a,h) anthracene
ANT	Anthracene	QN	Quinoline
ACR	Acridine	B(a)P TPE	Benzo(a)pyrene total potency equivalents
FLT	Fluoranthene	IACR	Index of Additive Cancer Risk

Soil vapour sampling has not been completed at the Site to date.

Potential Asbestos-Containing Materials

An approximate 1 m thick debris unit consisting of inert material (i.e., brick, concrete, rebar) was identified at approximately 1.8 m to 2.4 m below ground surface (bgs) extending to approximately 3 m bgs within AEC 2. In 2019, SNC-Lavalin completed a Hazardous Building Materials Investigation[3] of the debris unit. Six test pits were excavated into the debris unit with representative samples collected for analysis of asbestos-containing materials (ACM). Based on the analytical results, no asbestos was identified and the demolition debris unit is not considered to be ACM.

[3] SNC-Lavalin Inc., DRAFT *Dry Season Groundwater and Hazardous Building Materials Investigation, Nanoose Transmitter, Nanoose Bay, BC*. February 18, 2020.

Risk Assessment

In 2020, Azimuth Consulting Group Partnership (Azimuth) and SNC-Lavalin completed a Preliminary Human Health and Ecological Risk Assessment[4] (HHERA) to support the divestiture of the Site by evaluating risks from residual contamination present in soil and groundwater at the Site. The results of the HHERA concluded the following:

- Residual contamination at the Site does not pose an unacceptable risk to future commercial or residential receptors with the following recommendations:
  - Groundwater from the Site should not be used as a source of drinking water;
  - Soil vapour monitoring should be conducted at the Site to evaluate naphthalene measured in soil at the Site; and
  - In the event of subsurface work, as per standard practice, provincial/federal worker health and safety regulations should be followed at the Site.
- Risk predictions and their associated uncertainties are considered acceptable for terrestrial ecological receptors at the Site.

It should be noted that the planting of residential gardens may not be appropriate within the Former Electrical Substation (AEC 1).

Purpose

The goal of remediation at the Site is to reduce future liability related to environmental conditions. The remedial excavation of the debris unit is the primary goal with the excavation and disposal of soil with concentrations of the various COCs exceeding the provincial standards to be disposed of off Site.

Regulatory Framework

The concentrations of the COCs in the collected confirmatory soil samples will be compared to both federal guidelines and provincial standards as follows:

- *Canadian Environmental Quality Guidelines* (CEQG), Canadian Council of Ministers of the Environment (CCME), Winnipeg, MB, including updates to 2020.
- *Canada Wide Standards for Petroleum Hydrocarbons in Soil* (CWS), Canadian Council of Ministers of the Environment (CCME), Winnipeg, MB, January 2008.
- *Contaminated Sites Regulation* (CSR), B.C. Reg. 375/96, includes amendments up to B.C. Reg. 161/2020, February 1, 2021.
- *Hazardous Waste Regulation* (HWR), B.C. Reg. 63/88, including amendments up to B.C. Reg. 243/2016, November 1, 2017.

The Site is located on federal property and is operated under federal jurisdiction. The overall land use of the Site is considered to be commercial (CL) with CL guidelines being the primary criteria used to evaluate analytical results for groundwater samples collected at the Site. However, as a portion or all of the potential

[4] Azimuth Consulting Group Partnership, Draft *Preliminary Human Health and Ecological Risk Assessment.* March 6, 2020.

future land use is considered residential land use (RL), the federal RL guidelines have been included for comparison purposes. Analytical results will also be compared to the provincial CSR Residential Low Density (RLLD) and CL standards, for comparison purposes.

The federal guidelines include:

- CEQG CL soil quality guidelines.
- CWS CL soil quality guidelines.

The CCME CEQG guidelines were used to evaluate analytical results for specific parameters analyzed in soil samples collected from the Site. The CCME CWS were used to assess gross petroleum hydrocarbon concentrations in analyzed samples. As a conservative estimate, concentrations of hydrocarbon parameters for surface and subsurface soil have been compared to the most stringent of the coarse-grained and fine-grained CWS standards and CEQG guidelines.

Soil guidelines are protective of potable water, human soil ingestion, ecological soil contact, ecological soil and food ingestion, nutrient and energy cycling, and freshwater aquatic life. Concentrations of PAHs in soil samples were compared to the CCME CEQG industrial land use (IL) guidelines and take into account the protection of both human and environmental health. The carcinogenic effects and the non-carcinogenic effect on human health are calculated based on the CCME Fact Sheet "Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health", 2010 and are included in the summary analytical tables. The soil quality guidelines (SQG) for the protection of environmental health are used for comparison of concentrations of individual PAHs.

Based on local topography, groundwater is anticipated to flow in a southeast direction, towards Nanoose Bay. The nearest downgradient surface water receiving bodies is a small wetland and an unnamed stream located approximately 500 m southwest of the investigation area (located within the Site boundaries). The unnamed stream reportedly drains into Nanoose Creek.

Although groundwater at the Site and in the surrounding area is not confirmed to be used as drinking water, drinking water (DW) standards were used as a conservative measure in the event that groundwater is developed in the future. Therefore, the *Guidelines for Canadian Drinking Water Quality*[5] (GCDWQ) were considered applicable to groundwater at the Site. For the consideration of ecological receptors groundwater was compared to the FIGWQG[6] Tier 2 RL and CL, freshwater aquatic life (AW) guidelines. The FIGWQG Tier 2 Water Use/Exposure Pathways of "Soil Organisms Direct Contact", and "Freshwater Life" were applied.

For comparison purposes, Potential Contaminants of Concern (PCOCs) in groundwater were also compared to the provincial CSR Freshwater AW and DW standards. Provincial drinking water standards were deemed applicable due to the application of Protocol 21[7], "Water Use Determination" and the protection of future drinking water resources.

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5 *Guidelines for Canadian Drinking Water Quality* (GCDWQ), Health Canada, September 2020.

6 *Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites* (FIGWQG), prepared for the Federal Contaminated Sites Action Plan (FSCAP) Secretariat of Environment Canada, Version 4, June 2016.

7 BC Ministry of Environment and Climate Change Strategy, *Protocol 21*: *Water Use Determination,* Version 2.0, October 31, 2017 (effective November 1, 2017).

Site Details

Site Stratigraphy

The general soil stratigraphy consisted of sand and gravel fill material underlain by dense silt and sand. At several locations within AEC 2 (i.e., within the footprint of the Former Transmitter Building), the fill material was underlain by concrete/brick/rebar demolition debris layer starting at between 1.8 m and 2.4 m bgs. In general, the debris unit was observed to be approximately 1 m in thickness in the majority of investigation locations where it was encountered. Beneath the debris and fill, a dense silt and fine-grained sand material was encountered up to a depth of 6.1 m bgs (the maximum depth investigated).

Hydrogeology

The depth to groundwater at the Site varies seasonally as presented in the table below for the proposed excavation area based on the most recent wet and dry season sampling events. During the rainy season, groundwater appears to be perched above the gravel unit.

Table B: Groundwater Depths Within Excavation Areas

Monitoring Well	Depth to Groundwater (m bgs)	
	February 28, 2019	August 28, 2019
MW19-07S	1.9	2.4
MW19-07D	3.9	Dry to 5.5 m bgs
MW19-09S	2.1	Dry to 2.4 m bgs
MW19-09D	Dry to 5.2 m bgs	Dry to 5.2 m bgs

Summary of Contaminated Areas

Based on previous investigations, the estimated areas and volumes of contaminated soils is summarized in the following table with the extents presented on Drawing 626268-606.

Table C: Contaminated Areas Summary

Material Type	Excavation Summary			
	Depth Range (m)	Estimated Area (m^2)	Estimated Volume (m^3)	Estimated Tonnes
> CCME RL/CL	0 – 3.0	1,050	2,000	4,000
> CSR RLLD	0 – 3.0	550	1,000	2,000
> CSR CL	0 – 3.0	750	1,600	3,200
Debris Unit	1.8 – 3.0	1,750	1,600	3,700

It is assumed that the excavations will be sloped at 1:1 outside of the area of the debris unit. The excavation of contaminated soils overburden is required to allow for the removal of the underlying debris unit.

Technical Constraints

Overall, the debris unit is considered to be accessible for removal noting that the debris may be present in large pieces making it difficult for removal. The lateral and vertical extent of the debris unit is based on an estimated extent. The excavation is to proceed until such a point where the removal of debris has met the requirements established by PSPC. In addition, there remains the potential that ACM will be encountered during the excavation even with the previously completed ACM investigation. If suspect ACMs are identified in the debris unit, they should be treated as ACM until they can be proven otherwise by sample analysis. An industrial hygienist will be on Site to confirm that the debris unit does not contain hazardous materials including ACM.

It should be noted that the planned excavation limits are not expected to result in clean confirmatory soil results along the limits of the excavation. The confirmatory soil samples will be collected for the purpose of site characterization and to support the updated HHERA.

The groundwater table is variable across the Site, fluctuates seasonally and seems to be perched above the debris unit during the wet season. Therefore, dewatering during the excavations may be necessary.

Remediation Action Plan

The remediation will involve the excavation of the debris unit and contaminated soil exceeding the CSR standards for transport and disposal at an approved facility. Excavated soil that only exceeds the CCME RL/CL guidelines can be reused as backfill material.

Environmental Effects Determination

As part of PSPC's due diligence during construction phase of the project, an Environmental Effects Determination report has been prepared to meet the requirements of the Canadian Impact Assessment Act (IAA). The report includes the following and be provided to proponents during the tendering process:

- A review of available information including previous investigations and proposed project activities;
- A detailed description of Valued Ecosystem Components (VECs) where there is an interaction with the project and the potential for significant adverse environmental effects;
- A summary of field assessments of terrestrial and aquatic habitats, and potential impacts to those habitats from the remedial excavation program; and
- Identification of mitigation measures to be incorporated into the Project design and implementation to minimize or eliminate these effects on the VECs.

Archaeological Program

The presence of items of archaeological significant artifacts are possible in areas of native soil at the Site. A Preliminary Field Reconnaissance and archaeological awareness training for the contractors and consultants will be required prior to the initiation of remedial Site activities.

Confirmation of Site Requirements

Confirmation of Site requirements applicable to the remedial works will be completed prior to start of work. These requirements include (but are not limited to) the following:

- Timing requirements for work;
- Review of regulatory approvals;
- Geotechnical requirements, including sloping and backfilling;
- Site restoration design; and
- Site protection requirements.

Preparation of Tender Documents

This includes preparation of work scope, specifications, restrictions, and limitations to provide to prospective contractors as needed so they can submit a sound bid. Preparation of tender documents is anticipated to be completed in by the end of July 2021.

Contractor Selection

This will include meeting with prospective contractors at the Site to confirm expectations and constraints, reviewing submitted contractor bids, and negotiating mutually agreeable work budgets, scopes and schedules. Contractor selection is anticipated to be in mid to end of September 2021.

Health and Safety and Site Expectations

This includes identification of Prime Contractor, preparation of health and safety plans, confirmation of communication hierarchies, and a kick-off meeting to confirm scope of work, Site rules and expectations. This task is anticipated to occur at the beginning of October 2021, prior to start of construction works.

Communication Plan

A communication plan will be implemented which will entail SNC-Lavalin notifying the PDQ Flyers of the remediation schedule. During the remedial excavation, the PDQ Flyers will not be able to access the Site.

Site Preparation

It is anticipated that the contractor will mobilize to the Site in late September 2021. Site preparation includes site activities conducted prior to the start of excavation work to ensure the work will proceed smoothly, including (but not limited to) the following:

- Utility locates and any required protection, re-routing or removal of utilities prior to ground disturbance;
- Detailed survey of pre-project area conditions;
- Preparation of spaces for Site support, such as office trailers, portable washrooms, lay-down areas, worker parking, and equipment refueling;

- Set up temporary fencing around work Site;
- Initiation of erosion and sediment control measures;
- Preparation of soil staging area;
- Deployment of water treatment system, if necessary;
- Identification and implementation of on- and off-site traffic control requirements;
- Identification and implementation of Site security requirements; and
- Development of a quality assurance plan for all construction tasks.

Excavation and Restoration

Excavation Approach

The excavation sequence should be designed to allow for multiple tasks to be completed at the same time, where possible, and to limit the exposure of excavation equipment to contaminated media. Sequencing will be at the discretion of the contractor. The excavated material that is considered to be > CCME RL/CL and > CSR RLLD will require stockpiling for further characterization prior to reuse as backfill or transport to an off-Site facility. The excavated material that is considered to be > CSR CL will either be either hot-loaded or stockpiled without further characterization for subsequent transport to the off-site facility. Note, regardless of the results of further characterization, the > CSR RLLD material will not be reused as backfill material.

Environmental Monitoring

An environmental consultant will provide environmental monitoring during all Site activities to ensure compliance with the IAA. An Environmental Protection Plan (EPP) will be developed by the Contractor that addresses potential sources of environmental impacts due to construction work and identifies standard work practices and Site specific mitigation practices to address and minimize these impacts. The EPP should include a detailed plan for spill response and other plans or mitigation measures recommended in the EED report. Environmental monitoring will be conducted to ensure compliance with the contractor's EPP.

The remediation contractor will keep all traffic routes outside the Site clean (e.g., through the use of a street sweeper or other approved means). Debris generated during cleaning activities will be placed into the stockpile area (if present).

Due to its proximity to surface waters, effective erosion and sediment control will be paramount. Runoff water may be collected and stored on Site for testing prior to release or disposal.

Excavation Sampling

An environmental consultant will be on Site for the duration of the remedial excavation to observe and record remedial activities. Final remediation limits at the bottom of each excavation will be confirmed by sampling on a grid of approximately 10 m. Samples along excavation walls will be collected on a horizontal grid of 10 m and 1 m vertically from a depth consistent with the removed zone of contamination. The

environmental consultant will survey sample locations using appropriate survey gear (e.g., total station or Trimble GPS) or hand measurements.

The excavated material that is considered to be > CCME RL/CL and > CSR RLLD is not considered to be sufficiently characterized prior to on-Site reuse or disposal. Therefore, this soil should be stockpiled on Site and tested prior to reuse or disposal. Excavated material to be further characterized should be stockpiled into 250 m^3 stockpiles of material suspected to be of consistent quality. The environmental consultant will investigate the quality of stockpiles material and provide a summary to the remediation contractor in support of reuse or requirements. Stockpiles for disposal will be addressed in a stepwise manner as follows:

- Stockpiles will be managed and samples collected and analyzed in conformance with the BC Ministry of Environment and Climate Change Strategy (ENV) Technical Guidance 1[8] (TG1).
- Suspect > CCME RL/CL - Analytical results will be compared to CCME RL/CL guidelines and CSR RLLD standards for possible reuse on the Site if less than the standards.
- Suspect > CSR RLLD – Analytical results will be compared to CSR RLLD standards to confirm proper soil disposal facility.

Structures and Utilities

It is assumed that sub-grade utilities, if present in excavation areas, will be cut-off, removed, and/or re-routed prior to commencement of ground disturbance activities.

Water Management

Groundwater monitoring wells on Site suggest that water may be present within the excavations, especially if the work is conducted during the wet season. Water in the excavation should be pumped through a treatment system designed for PAH and into aboveground tanks and sampled for COCs and other constituents, as required, prior to discharge or disposal. An in-flow meter or other approved method would be required to track the volume of discharge water.

Backfilling

Following completion of remedial excavation activities, the excavation will be backfilled with a combination of the > CCME RL/CL material (above 1.5 m bgs) and geotechnically suitable material and compacted. An impermeable geotextile liner is to be placed between the backfilled > CCME RL/CL material and the imported backfill material. Imported backfill material must be shown to meet CCME Agricultural Guidelines. Crushed gravel must also be shown to meet acid rock drainage requirements. Prior to import and placement, demonstration of compliance to these guidelines will be required from the Contractor for all material supplied for backfill.

Surface Restoration

Restoration of the Site will be to pre-excavation conditions, or as directed by PSPC in a Restoration Plan.

At the conclusion of the remedial activities, at a minimum the remediation contractor will:

[8] BC Ministry of Environment and Climate Change Strategy, *Technical Guidance Document 1: Site Characterization and Confirmation Testing,* January 2009.

- Restore the Site to meet general pre-excavation conditions.
- Clean all work areas to the satisfaction of PSPC.
- Remove all environmental controls (e.g., erosion and sediment controls).
- Complete an as-built survey following Site restoration including (but not limited to) final Site grade.
- Within 10 working days of the completion of the remedial activities, request a closeout meeting.

Environmental Controls

Environmental controls will be required during all Site activities, including:

- Minimization of air emissions;
- Protection of surface water quality; and
- Minimization of health and safety risks.

The contractor will be required to prepare and submit an EPP that outlines the measures to be taken to prevent impacts to the environment and human health and safety. The EPP will be required to consider the health and safety of the surrounding community during the construction programs. The EPP will incorporate the PSPC Risk Management Form. As a due diligence control, documentation under the IAA will be completed prior to start of remedial construction.

The Site is located in an area mostly surrounded by a perimeter fence and gate at the start of the access road. Site access is limited by the gate with some limited access by the public (i.e., radio flyer club). However, it is assumed that access to the Site during the remedial excavation will be further restricted. It is expected that as part of the EMP and Health and Safety Plan (HASP), security control measures based on the tender specification requirements will be outlined, including fencing and public Site access constraints. Public consultation will be conducted under the direction of PSPC, as required, prior to start of construction work (e.g., archaeological assessment; environmental conditions such as dust and odour).

Emergency Spill Response

The construction contractor will prepare an Emergency Spill Prevention and Response Plan as an adjunct to the EPP. The plan should include the following:

- Identification of potentially hazardous materials in use on the Site;
- Material Safety Data Sheet for hazardous materials;
- Measures to mitigate the release of hazardous materials to the environment;
- Communication hierarchy for reporting of hazardous material releases; and
- Response measures to remove or contain the hazardous materials upon release.

Notice to Reader

This report has been prepared by SNC-Lavalin Inc. (SNC-Lavalin) for Canada, who has been party to the development of the scope of work for this project and understands its limitations[9]. Copyright of this report vests with Her Majesty the Queen in Right of Canada. This report was prepared in accordance with a services contract between SNC-Lavalin and Canada, including General Conditions 2035 of the Standard Acquisition Clauses and Conditions (SACC) Manual.

This report is intended to provide information to Canada to assist it in making business decisions. SNC-Lavalin is not a party to the various considerations underlying the business decisions, and does not make recommendations regarding such business decisions.

The findings, conclusions and recommendations in this report have been developed in a manner consistent with the level of skill normally exercised by environmental professionals currently practising under similar conditions in the area. The findings contained in this report are based, in part, upon information provided by others. If any of the information is inaccurate, modifications to the findings, conclusions and recommendations may be necessary.

The findings, conclusions and recommendations presented by SNC-Lavalin in this report reflect SNC-Lavalin's best judgement based on the site conditions at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. They have been prepared for specific application to this site and are based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific materials as described in this report during a specific time interval. Substances other than those described may exist within the site, reported substance parameters may exist in areas of the site not investigated, and concentrations of substances greater or less than those reported may exist between sample locations.

The findings and conclusions of this report are valid only as of the date of this report. If site conditions change, new information is discovered, or unexpected site conditions are encountered in future work, including excavations, borings, or other studies, the findings, conclusions and/or recommendations of this report should be re-evaluated. It is recommended that users of this report should engage a suitably qualified professional to assist in interpreting the significance, if any, of the findings.

[9] © Her Majesty the Queen in Right of Canada (2021)

Closure

We trust this information is satisfactory for your present needs. Please call the undersigned if you require additional information.

Ian Mace, M.Eng., P.Eng.
Senior Project Manager

Environment
Engineering, Design & Project Management

Doug McMillan, MSc, P.Ag.
Operations Manager / Senior Project Manager

Environment
Engineering, Design & Project Management

IM/gc
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Drawings

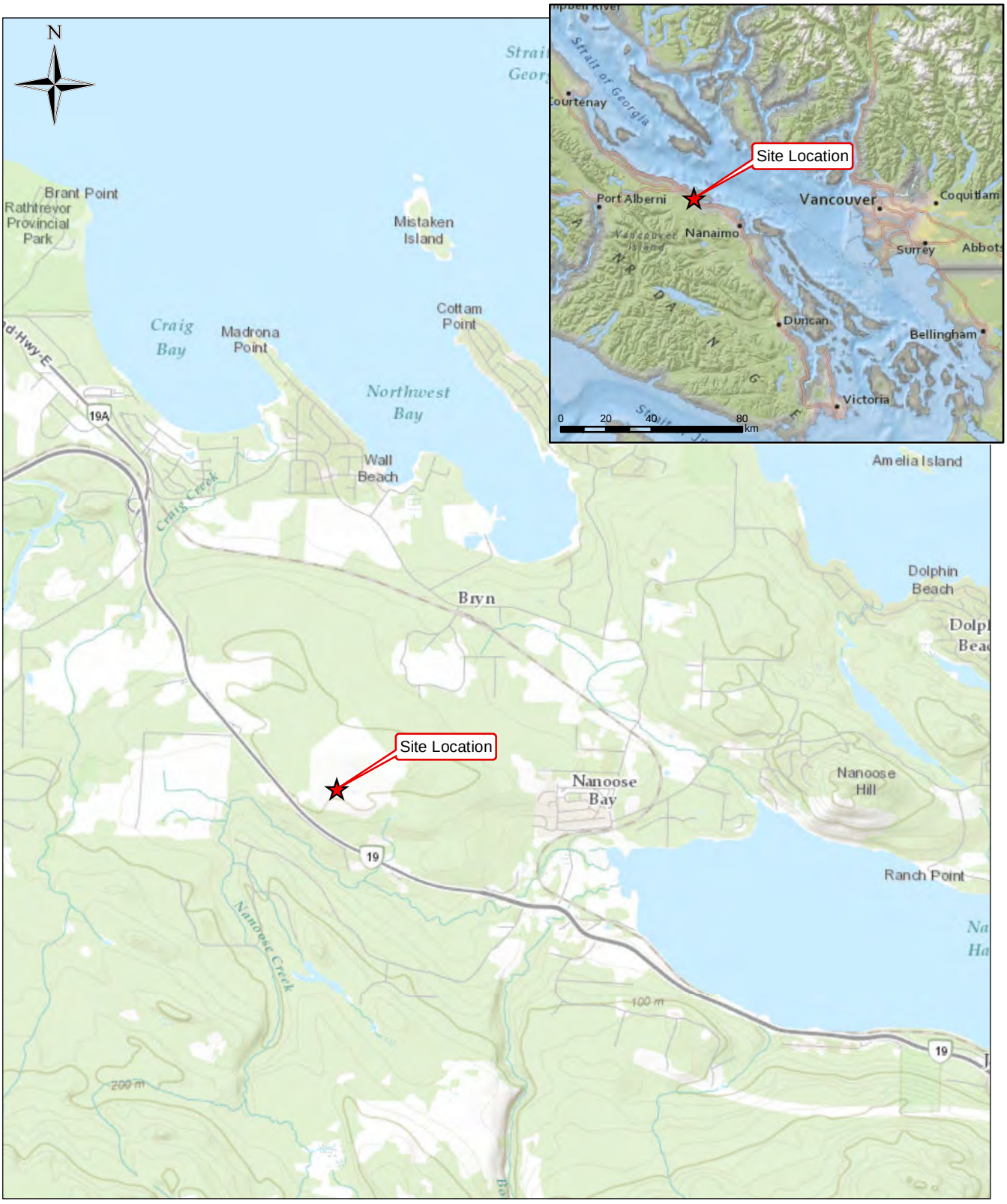
- 626268-601 - Site Location
- 626268-602 - Wide Area Site Plan
- 626268-606 - Proposed Extent of Remedial Excavation
- 626268-607 - Proposed Site Restoration

Attachment

1: Photo Log

Drawings

- 626268-601 - Site Location
- 626268-602 - Wide Area Site Plan
- 626268-606 - Proposed Extent of Remedial Excavation
- 626268-607 - Proposed Site Restoration



LEGEND

★ Site Location

NOTES

1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.

SNC·LAVALIN

CLIENT NAME:	PROJECT LOCATION:
Public Services and Procurement Canada	Nanoose TX Nanoose Bay, BC

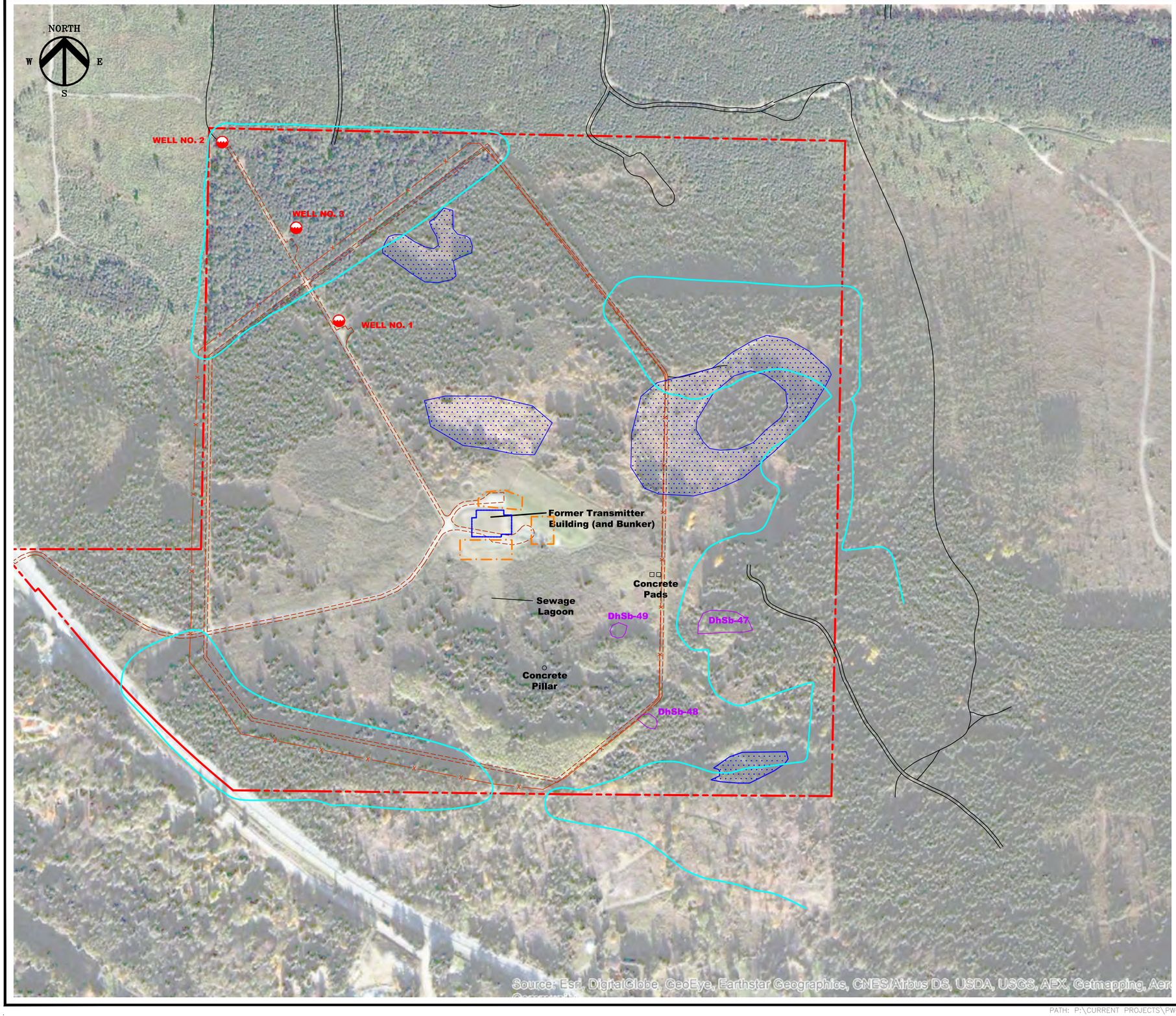
Site Location

0 0.5 1 2 3 4 Kilometers

BY: PB	DATE: 2016/03/28	REF No:	REV: 0
CHK'D: CS	SCALE: 1:55,000	626268-601	

Project Path: "P:\Current Projects\Public Works and Gov't Services Canada\626268-Nanaimo Transmitter"

MXD Path: \\Proj_srv\projects\Current Projects\PWGSC\626268-Nanaimo Transmitter\4.0 Execution\4.5 GIS and Drawings\GIS\MapSeries\100 SERIES\626268-101.mxd



LEGEND

- PROPERTY BOUNDARY
- PAVED ROAD
- GRAVEL ROAD
- FENCE
- FORMER STRUCTURE (LOCATION APPROXIMATE)
- WETLAND
- ARCHAEOLOGICAL SITES
- DRINKING WATER WELL
- APPROXIMATE EXTENTS OF EXCAVATION
- POTENTIAL CONTRACTOR EQUIPMENT LAYDOWN AREA AND STOCKPILE LOCATIONS

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
FIGURE 2	2004-03	KEYSTONE ENVIRONMENTAL
61323-1	2018-02-08	JE ANDERSON & ASSOCIATES

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2021-07-12	ISSUED TO CLIENT	PRT	IM
0	2020-07-20	ISSUED TO CLIENT	AJK	IM

0 100 200 300 METRES

CLIENT NAME:
PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION:
NANOOSE TX,
NANOOSE BAY, BC

SNC·LAVALIN

TITLE:

WIDE AREA SITE PLAN

DRN BY: PES	SCALE: 1:6000	DATE: 2020-03-11	DWG No: 626268-602 REV.: 1
CHK'D: CS	PLOT: 20210712.1416	CADFILE: 626268R13	

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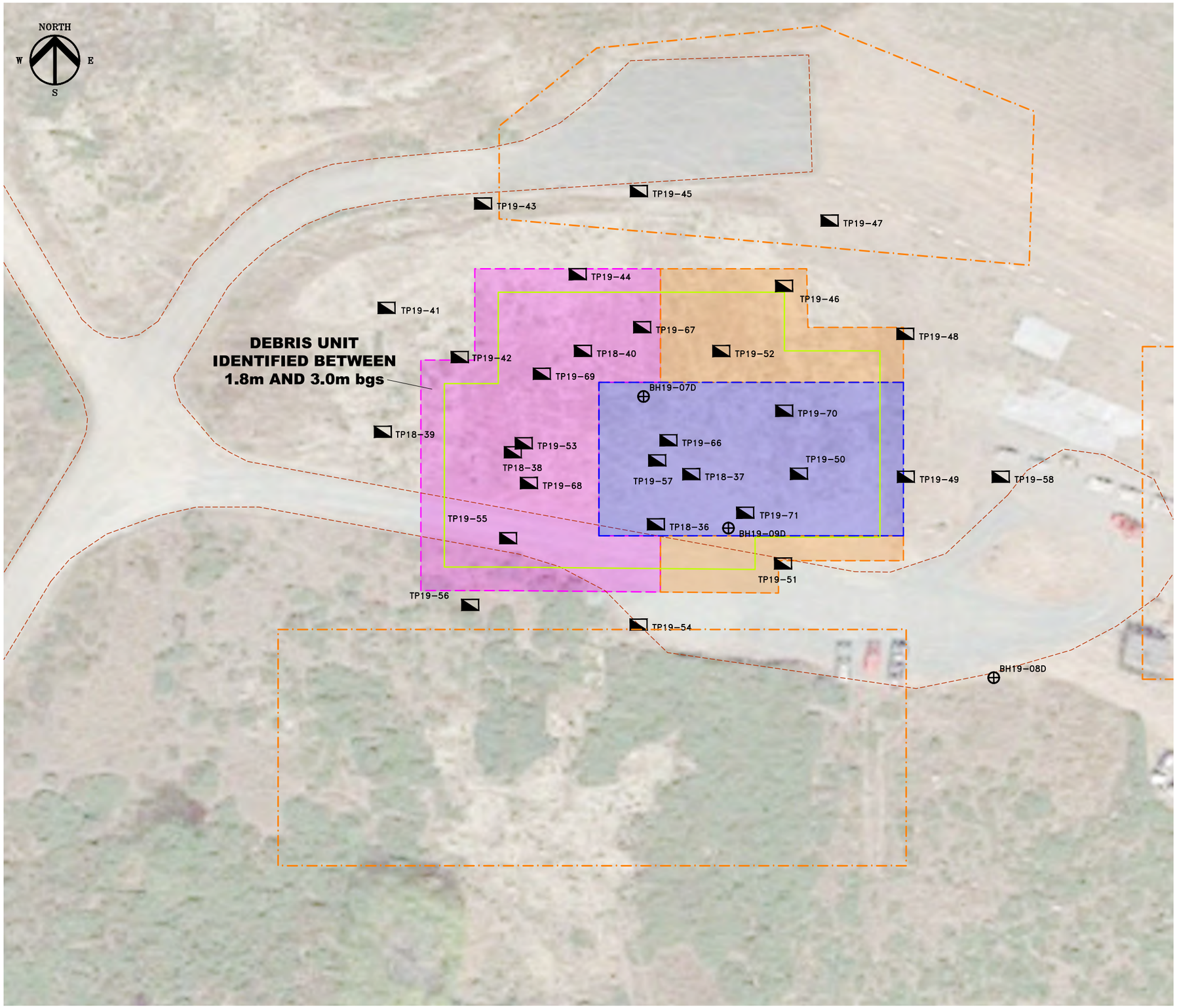


LEGEND

- GRAVEL ROAD
- BOREHOLE
- TEST PIT
- PROPOSED EXCAVATION AREA GREATER THAN THE APPLICABLE CCME GUIDELINES (AREA 3)
- PROPOSED EXCAVATION AREA GREATER THAN THE APPLICABLE CSR RLLD STANDARDS (AREA 2)
- PROPOSED EXCAVATION AREA GREATER THAN THE APPLICABLE CSR CL STANDARDS (AREA 1)
- DEBRIS AREA
- POTENTIAL CONTRACTOR EQUIPMENT LAYDOWN AREA AND STOCKPILE LOCATIONS

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

		GOOGLE AERIAL IMAGERY
61323-1	2018-02-08	JE ANDERSON & ASSOCIATES
DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2021-07-12	ISSUED TO CLIENT	PRT	IM
0	2020-07-20	ISSUED TO CLIENT	AJK	IM

0 10 20 30 METRES

SNC·LAVALIN

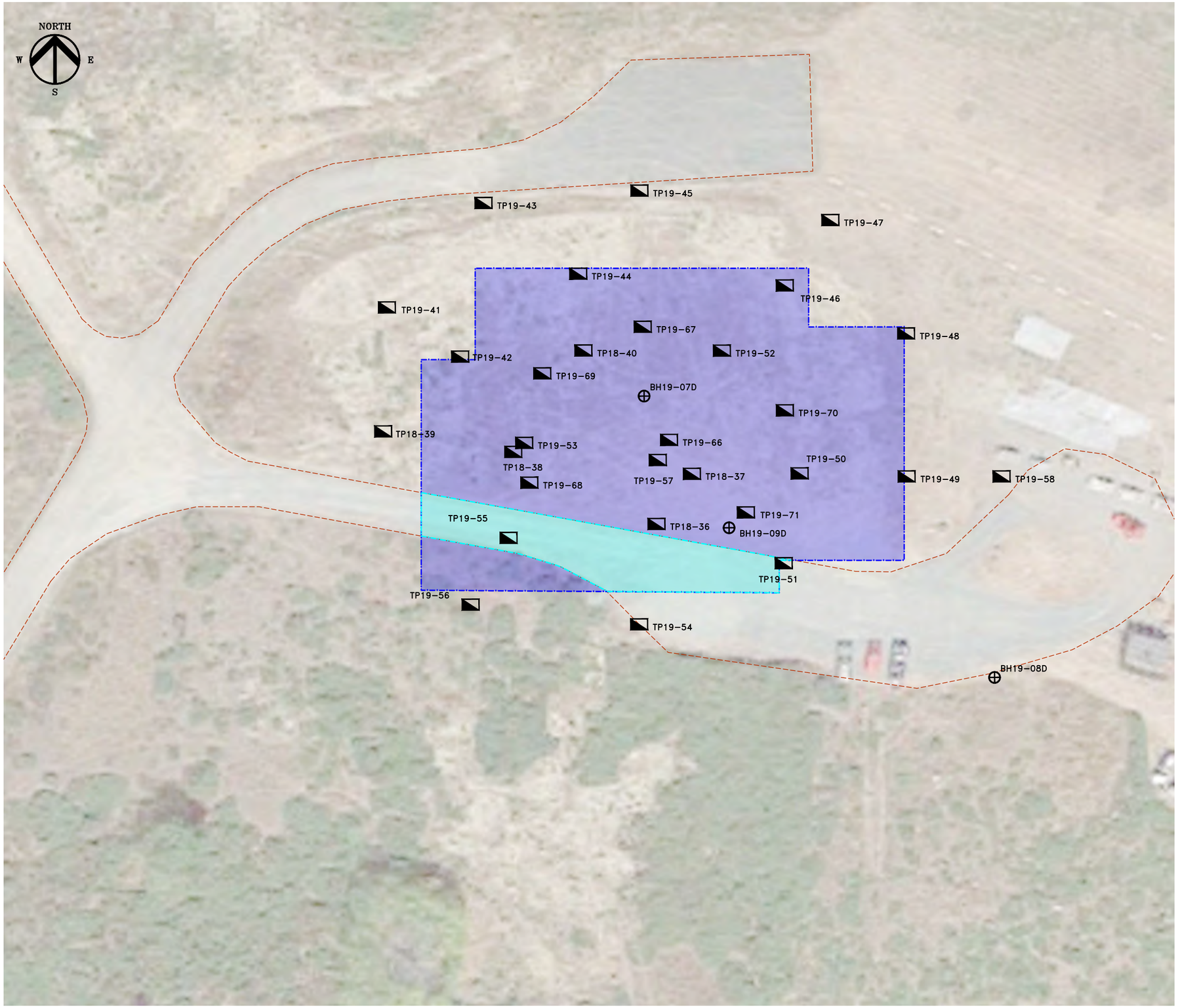
CLIENT NAME:
PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION:
NANOOSE TX
NANOOSE BAY, BC

TITLE:
PROPOSED EXTENT OF REMEDIAL EXCAVATION

DWN BY: PRT	SCALE: 1:600	DATE: 2020-03-12	DWG No: 626268-606 REV.: 1
CHK'D: IM	PLOT: 20210712.1417	CADFILE: 626268R13	

PATH: P:\CURRENT PROJECTS\PWGSC\626268-NANOOSE TRANSMITTER\4.0 EXECUTION\4.5 GIS AND DRAWINGS\CAD\626268R13.DWG



LEGEND

- GRAVEL ROAD
- BOREHOLE
- TEST PIT
- BACKFILL COMPACTION 95% WITH 30cm TOPSOIL WITH NATIVE SEED MIX
- BACKFILL COMPACTION 95% WITH ROAD BASE AGGREGATE AT SURFACE

NOTES

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2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

		GOOGLE AERIAL IMAGERY
61323-1	2018-02-08	JE ANDERSON & ASSOCIATES
DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2021-07-12	ISSUED TO CLIENT	PRT	IM
0	2020-07-20	ISSUED TO CLIENT	AJK	IM

0 10 20 30 METRES

SNC·LAVALIN

CLIENT NAME:
PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION:
NANOOSE TX
NANOOSE BAY, BC

TITLE:

PROPOSED SITE RESTORATION

DWN BY: PRT	SCALE: 1:600	DATE: 2020-03-11	DWG No: 626268-607 REV.: 1
CHK'D: IM	PLOT: 20210712.1417	CADFILE: 626268R13	

PATH: P:\CURRENT PROJECTS\PWGSC\626268-NANOOSE TRANSMITTER\4.0 EXECUTION\4.5 GIS AND DRAWINGS\CAD\626268R13.DWG

Attachment 1

Photo Log

Photograph 1: Rebar present at TP19-50, facing northwest

Photograph 2: View of Work Area facing north.

Photograph 3: View of Work Area facing west.

Photograph 4: Access Road for Work Area.

Photograph 5: View of concrete debris.

Photograph 6: Excavation of TP19-49 facing east towards PDQ hut.

Annex B. Site Photographs

Annex B. Site Photographs

Photograph 1: Rebar present at TP19-50, facing northwest

Photograph 2: View of Work Area facing north.

Photograph 3: View of Work Area facing west.

Photograph 4: Access Road for Work Area.

Photograph 5: View of concrete debris.

Photograph 6: Excavation of TP19-49 facing east towards PDQ hut.

Annex C. Environmental Data

- Soil Analytical Data
- Groundwater Analytical Data
- Hazardous Materials Analysis (Asbestos)

Annex C. Environmental Data

- Soil Analytical Data
- Groundwater Analytical Data
- Hazardous Materials Analysis (Asbestos)

TABLE 1: Surface Soil Sample Log

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Description	Coordinates		Depth (m)	Headspace (ppm)
				North (m)	East (m)		
SS15-1	SS15-1-1	2015 02 04	SAND and GRAVEL, fine to medium grained sand, fine gravel, subangular, trace silt, brown, loose, saturated, rootlets.	5458754.1	410721.1	0.1 - 0.2	0
SS15-2	SS15-2-1	2015 02 04	SAND and GRAVEL, fine to medium grained sand, fine gravel, subangular, trace silt, brown, loose, saturated, rootlets.	5458754.4	410732.7	0.0 - 0.2	0
SS15-3	SS15-3-1	2015 02 04	SAND and GRAVEL, fine to medium grained sand, fine gravel, subangular, trace silt, brown, loose, saturated, rootlets.	5458733.4	410726.6	0.0 - 0.2	0
SS15-4	SS15-4-1	2015 02 04	SILT, sandy, fine grained, black, dense, moist, organics.	5458730.9	410720.4	0.0 - 0.2	0
SS15-5	SS15-5-1	2015 02 05	SILT, sandy, fine grained, black, dense, moist, organics.	5458749.5	410735.6	0.0 - 0.2	0
	SS15-5-2	2015 02 05	SAND, fine grained, silty, trace gravel, fine, subangular, brown, medium dense to dense, wet.	5458749.5	410735.6	0.2 - 0.3	0
SS15-6	SS15-6-1	2015 02 05	SILT, sandy, fine grained, black, dense, moist, organics.	5458760.3	410728.0	0.0 - 0.2	5
	SS15-6-2	2015 02 05	SAND, fine grained, silty, trace gravel, fine, subangular, brown, medium dense to dense, wet.	5458760.3	410728.0	0.2 - 0.3	0
SS15-7	SS15-7-1	2015 02 05	SILT, sandy, fine grained, black, dense, moist, organics.	5458757.0	410713.5	0.0 - 0.2	0
	SS15-7-2	2015 02 05	SAND, fine grained, silty, trace gravel, fine, subangular, brown, medium dense to dense, wet.	5458757.0	410713.5	0.2 - 0.3	0

TABLE 2: Summary of Analytical Results for Soil - Hydrocarbons

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Depth Interval (m)	Field Screen[b] (ppm)	Monocyclic Aromatic Hydrocarbons					Gross Parameters			Petroleum Hydrocarbon Fractions				Methyl tert-butyl ether [MTBE] µg/g
					Benzene µg/g	Ethylbenzene µg/g	Toluene µg/g	Xylenes µg/g	Styrene µg/g	VPHs µg/g	LEPHs[e] µg/g	HEPHs[e] µg/g	F1-BTEX µg/g	F2 (>C10-C16) µg/g	F3 (>C16-C34) µg/g	F4 (>C34-C50) µg/g	
BH15-1D	BH15-1-1	2015 02 03	0.3 - 0.6	5	-	-	-	-	-	-	< 20	30	-	< 20	< 20	< 20	-
	BH15-1-3	2015 02 03	1.7 - 2.0	75	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-1-7	2015 02 03	4.7 - 5.0	100	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-1-17	2015 02 03	15.4 - 15.7	75	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-1-18	Duplicate	15.4 - 15.7	-	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	QA/QC RPD%				*	*	*	*	*	*	*	*	*	*	*	*	*
BH15-2D	BH15-2-2	2015 02 04	1.1 - 1.2	25	< 0.02[a]	< 0.05[a]	< 0.05	< 0.2	< 0.05	-	< 20	< 20	-	< 20	< 20	< 20	< 0.1
	BH15-2-5	2015 02 04	3.0 - 3.4	75	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-2-7	2015 02 04	4.7 - 5.0	25	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
BH15-3	BH15-3-1	2015 02 04	0.2 - 0.5	25	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
	BH15-3-3	2015 02 04	1.7 - 2.0	50	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-3-6	2015 02 04	4.9 - 5.2	75	-	-	-	-	-	-	-	-	-	< 20	< 20	< 20	-
BH15-4	BH15-4-1	2015 02 04	0.2 - 0.5	75	-	-	-	-	-	-	102	204	-	57	223	47	-
	BH15-4-2	2015 02 04	1.2 - 1.5	75	-	-	-	-	-	-	< 20	61	-	< 20	41	< 20	-
	BH15-4-4	2015 02 04	3.5 - 3.8	50	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-4-5	Duplicate	3.5 - 3.8	-	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
	QA/QC RPD%				-	-	-	-	-	-	*	*	-	*	*	*	-
BH15-5	BH15-5-2	2015 02 05	1.2 - 1.5	100	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	27	< 10	< 20	< 20	< 20	< 0.1
	BH15-5-3	2015 02 05	1.8 - 2.1	75	-	-	-	-	-	-	< 20	35	-	< 20	< 20	< 20	-
	BH15-5-6	2015 02 05	3.2 - 3.5	25	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
BH15-6	BH15-6-1	2015 02 05	0.5 - 0.8	25	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
	BH15-6-2	2015 02 05	1.5 - 1.8	25	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-6-4	2015 02 05	3.7 - 4.0	25	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
SS15-2	SS15-2-1	2015 02 04	0.0 - 0.2	0	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
SS15-4	SS15-4-1	2015 02 04	0.0 - 0.2	0	-	-	-	-	-	-	22	129	-	< 20	57	< 20	-
SS15-6	SS15-6-2	2015 02 05	0.2 - 0.3	0	-	-	-	-	-	-	< 20	24	-	< 20	< 20	< 20	-
SS15-7	SS15-7-1	2015 02 05	0.0 - 0.2	0	-	-	-	-	-	-	50	303	-	< 20	96	< 20	-
TP18-38	TP18-38-01	2018 01 23	0.2 - 0.5	0	< 0.005	< 0.01	< 0.05	< 0.05	-	-	-	-	< 10	28	59	77	-
	TP18-38-02	2018 01 23	0.8 - 0.9	0	< 0.005	< 0.01	< 0.05	< 0.05	-	-	-	-	< 10	< 20	30	< 20	-
BH19-09D	BH19-09-04	2019 02 07	2.0 - 2.1	300	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	23	< 10	< 20	26	< 20	< 0.1
TP19-57	TP19-57-04	2019 03 11	1.4 - 1.7	45	< 0.005	0.01	< 0.05	< 0.05	< 0.05	< 10	400	634	< 10	***197***	***808***	205	< 0.1
	TP19-57-05	2019 03 11	2.1 - 2.4	35	-	-	-	-	-	-	-	-	-	42	71	< 20	-
Federal Guideline																	
CCME CEQG Residential Surface (RL Surface)[c]					0.0068[f]	0.018	0.08	2.4	5	n/a	n/a	n/a	170	150	300	2,800	n/a
CCME CEQG Residential Subsoil (RL Subsoil)[c]					0.0068[f]	0.018	0.08	2.4	5	n/a	n/a	n/a	170	230	2,500	10,000	n/a
CCME CEQG Commercial Surface (CL Surface)[c]					0.0068[f]	0.018	0.08	2.4	50	n/a	n/a	n/a	170	230	1,700	3,300	n/a
CCME CEQG Commercial Subsoil (CL Subsoil)[c]					0.0068[f]	0.018	0.08	2.4	50	n/a	n/a	n/a	170	230	3,500	10,000	n/a
BC Standard																	
CSR Low Density Residential Land Use (RLLD)[d]					0.035	15	0.5	6.5	5	200	1,000	1,000	n/a	n/a	n/a	n/a	4,000
CSR Commercial (CL)[d]					0.035	15	0.5	6.5	50	200	2,000	5,000	n/a	n/a	n/a	n/a	20,000
CSR Industrial Land Use (IL)[d]					0.035	15	0.5	6.5	50	200	2,000	5,000	n/a	n/a	n/a	n/a	20,000

Associated AGAT file(s): 15V942889, 15V942897, 18V305465, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Laboratory detection limit exceeds regulatory standard/guideline.
[b] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[c] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[d] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[e] Where no LEPH and HEPH are available, EPH has been compared to LEPH and HEPH standards, which are conservative comparisons.
[f] Guidelines use 10-5 incremental risk.

TABLE 3: Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		BH15-1D					BH15-2D	BH15-3	BH15-4	BH15-5	SS15-2	SS15-6	TP16-1			TP16-2			TP16-3		Federal Guideline		BC Standard		
Sample ID		BH15-1-3	BH15-1-7	BH15-1-17	BH15-1-18	QA/QC	BH15-2-2	BH15-3-3	BH15-4-1	BH15-5-2	SS15-2-1	SS15-6-2	TP16-1-1	TP16-1-2	TP16-1-3	TP16-2-1	TP16-2-2	QA/QC	TP16-3-1	TP16-3-3	CCME CEQG Residential (RL)[b]	CCME CEQG Commercial (CL)[b]	CSR Low Density Residential Land Use (RLLD)[c]	CSR Commercial Land Use (CL)[c]	CSR Industrial Land Use (IL)[c]
Sample Date (yyyy mm dd)		2015 02 03	2015 02 03	2015 02 03	Duplicate	RPD %	2015 02 04	2015 02 04	2015 02 04	2015 02 05	2015 02 04	2015 02 05	2016 01 13	2016 01 13	2016 01 13	2016 01 13	Duplicate	RPD %	2016 01 13	2016 01 13					
Depth Interval (m)		1.7 - 2.0	4.7 - 5.0	15.4 - 15.7	15.4 - 15.7		1.1 - 1.2	1.7 - 2.0	0.2 - 0.5	1.2 - 1.5	0.0 - 0.2	0.2 - 0.3	0.2 - 0.5	0.8 - 1.1	1.4 - 1.5	0.2 - 0.5	0.2 - 0.5		0.2 - 0.5	1.5 - 1.8					
Field Screen (ppm)[a]		75	100	75	-		25	50	75	100	0	0	0	0	0	0	0		0	0					
Parameter	**Units**	**Analytical Results**																							
Polycyclic Aromatic Hydrocarbons																									
Naphthalene	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	***0.81***	< 0.01	< 0.01	< 0.01	0.221	0.486	< 0.005	0.359	0.124	97	0.393	< 0.005	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	-	-	-	-	-	-	-	-	-	-	-	0.246	0.523	< 0.005	0.299	0.122	84	0.386	< 0.005	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	0.7	< 0.01	< 0.01	< 0.01	0.208	0.495	< 0.005	0.308	0.114	92	0.358	< 0.005	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	0.28	< 0.01	< 0.01	< 0.01	0.116	0.246	< 0.005	0.126	0.057	75	0.170	< 0.005	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	***0.49***	< 0.02	< 0.02	< 0.02	0.19	***0.43***	< 0.02	0.21	0.09	*	***0.27***	< 0.02	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1.96	< 0.02	< 0.02	< 0.02	0.8	1.9	< 0.02	1.09	0.41	91	1.24	< 0.02	5[e]	50[e]	5	50	50
Anthracene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.63	< 0.02	< 0.02	< 0.02	0.248	0.542	< 0.004	0.247	0.126	65	0.346	< 0.004	2.5	32	2.5	30	30
Fluoranthene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	0.86	< 0.05	< 0.05	< 0.05	0.40	0.8	< 0.01	0.38	0.19	67	0.52	< 0.01	15.4	180	50	200	200
Pyrene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1.18	< 0.02	< 0.02	< 0.02	0.54	1.0	< 0.01	0.50	0.26	63	0.70	< 0.01	7.7	100	10	100	100
Benz(a)anthracene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.6	< 0.02	< 0.02	< 0.02	0.30	0.51	< 0.03	0.25	0.14	56	0.38	< 0.03	1	10	1	10	10
Chrysene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	0.61	< 0.05	< 0.05	< 0.05	0.30	0.52	< 0.05	0.26	0.14	*	0.40	< 0.05	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.24	< 0.02	< 0.02	< 0.02	0.11	0.18	< 0.05	0.10	0.05	*	0.13	< 0.05	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.17	< 0.02	< 0.02	< 0.02	0.08	0.13	< 0.05	0.06	< 0.05	*	0.10	< 0.05	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	-	-	-	-	-	-	-	-	-	-	-	0.19	0.31	< 0.05	0.16	0.05	*	0.23	< 0.05	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.16	< 0.02	< 0.02	< 0.02	0.07	0.12	< 0.05	0.05	< 0.05	*	0.10	< 0.05	1	10	1	10	10
Benzo(a)pyrene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	0.46	< 0.05	< 0.05	< 0.05	0.22	0.32	< 0.03	0.16	0.10	*	0.27	< 0.03	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.17	< 0.02	< 0.02	< 0.02	0.08	0.10	< 0.02	0.05	0.03	*	0.09	< 0.02	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.07	< 0.02	< 0.02	< 0.02	0.043	0.054	< 0.005	0.026	0.017	*	0.044	< 0.005	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	0.21	< 0.05	< 0.05	< 0.05	0.10	0.12	< 0.05	0.07	< 0.05	*	0.12	< 0.05	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	-	-	-	-	-	-	-	-	-	-	-	0.33	0.48	< 0.05	0.24	0.13	*	0.39	< 0.05	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	-	-	-	-	-	-	-	-	-	-	-	***3.5***	***5.6***	0.5	***2.7***	***1.2***	*	***4.3***	0.5	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		TP16-4	TP16-5	TP16-6	TP16-7	TP16-8	TP16-9	TP16-10	TP16-11			TP16-12	TP16-13	TP16-14		TP16-15	TP16-16	TP16-17	TP16-18	Federal Guideline		BC Standard		
Sample ID		TP16-4-1	TP16-5-1	TP16-6-1	TP16-7-1	TP16-8-1	TP16-9-1	TP16-10-1	TP16-11-01	TP16-11-02	QA/QC	TP16-12-01	TP16-13-01	TP16-14-01	TP16-14-02	TP16-15-01	TP16-16-02	TP16-17-01	TP16-18-01	CCME CEQG Residential (RL)[b]	CCME CEQG Commercial (CL)[b]	CSR Low Density Residential Land Use (RLLD)[c]	CSR Commercial Land Use (CL)[c]	CSR Industrial Land Use (IL)[c]
Sample Date (yyyy mm dd)		2016 01 13	2016 01 13	2016 01 13	2016 01 13	2016 01 13	2016 01 13	2016 01 13	2016 03 07	Duplicate	RPD %	2016 03 07	2016 03 07	2016 03 07	2016 03 07	2016 03 07	2016 03 07	2016 03 07	2016 03 07					
Depth Interval (m)		0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5		0.2 - 0.5	0.2 - 0.5	0.8 - 1.1	1.4 - 1.5	0.2 - 0.5	0.8 - 1.1	0.2 - 0.5	0.2 - 0.5					
Field Screen (ppm)[a]		0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0					
Parameter	**Units**	**Analytical Results**																						
Polycyclic Aromatic Hydrocarbons																								
Naphthalene	µg/g	0.128	0.112	***0.961***	0.043	< 0.005	0.048	< 0.005	0.022	0.036	*	0.005	0.295	0.317	0.480	0.005	< 0.005	< 0.005	0.036	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	0.162	0.140	1.03	0.066	< 0.005	0.066	0.005	0.041	0.048	16	0.010	0.357	0.379	0.518	0.010	< 0.005	< 0.005	0.051	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	0.122	0.118	0.951	0.048	< 0.005	0.048	< 0.005	0.028	0.039	33	0.007	0.310	0.349	0.482	0.017	< 0.005	< 0.005	0.041	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.005	< 0.005	0.012	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	0.006	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	0.084	0.074	***0.454***	0.039	< 0.005	0.039	< 0.005	0.021	0.024	*	0.005	0.179	0.182	0.271	< 0.005	< 0.005	< 0.005	0.025	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	0.13	0.11	***0.91***	0.05	< 0.02	0.06	< 0.02	0.03	0.03	*	< 0.02	***0.28***	***0.30***	***0.49***	< 0.02	< 0.02	< 0.02	0.03	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	0.68	0.58	4.47	0.31	< 0.02	0.32	0.02	0.18	0.20	11	0.05	1.5	1.1	2.3	< 0.02	< 0.02	< 0.02	0.21	5[e]	50[e]	5	50	50
Anthracene	µg/g	0.247	0.163	1.33	0.082	< 0.004	0.093	0.008	0.055	0.055	0	0.013	0.343	0.403	0.69	< 0.004	< 0.004	< 0.004	0.057	2.5	32	2.5	30	30
Fluoranthene	µg/g	0.32	0.26	1.95	0.15	< 0.01	0.15	0.01	0.09	0.10	11	0.02	0.57	0.65	0.9	0.01	< 0.01	< 0.01	0.10	15.4	180	50	200	200
Pyrene	µg/g	0.43	0.34	2.54	0.20	< 0.01	0.20	0.01	0.12	0.12	0	0.03	0.8	0.83	1.2	0.01	< 0.01	< 0.01	0.13	7.7	100	10	100	100
Benz(a)anthracene	µg/g	0.24	0.20	***1.44***	0.12	< 0.03	0.12	< 0.03	0.07	0.07	*	< 0.03	0.40	0.49	0.65	< 0.03	< 0.03	< 0.03	0.07	1	10	1	10	10
Chrysene	µg/g	0.26	0.20	1.48	0.12	< 0.05	0.12	< 0.05	0.07	0.07	*	< 0.05	0.42	0.48	0.6	< 0.05	< 0.05	< 0.05	0.07	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	0.10	0.08	0.47	0.06	< 0.05	0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.15	0.19	0.23	< 0.05	< 0.05	< 0.05	< 0.05	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	0.06	< 0.05	0.28	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.09	0.12	0.15	< 0.05	< 0.05	< 0.05	< 0.05	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	0.16	0.08	0.75	0.06	< 0.05	0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.24	0.31	0.38	< 0.05	< 0.05	< 0.05	< 0.05	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	0.06	0.05	0.28	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.09	0.12	0.16	< 0.05	< 0.05	< 0.05	< 0.05	1	10	1	10	10
Benzo(a)pyrene	µg/g	0.17	0.13	***0.99***	0.08	< 0.03	0.08	< 0.03	0.04	0.05	*	< 0.03	0.26	0.33	0.43	< 0.03	< 0.03	< 0.03	0.04	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	0.06	0.05	0.29	0.03	< 0.02	0.03	< 0.02	0.02	0.02	*	< 0.02	0.10	0.15	0.15	< 0.02	< 0.02	< 0.02	0.02	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	0.028	0.023	0.135	0.015	< 0.005	0.014	< 0.005	0.009	0.010	*	< 0.005	0.052	0.079	0.077	< 0.005	< 0.005	< 0.005	0.011	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	0.07	0.06	0.33	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.11	0.16	0.16	< 0.05	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	0.25	0.19	1.42	0.12	< 0.05	0.12	< 0.05	0.06	0.07	*	< 0.05	0.40	0.52	0.64	< 0.05	< 0.05	< 0.05	0.06	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	***2.8***	***2.1***	***14.9***	***1.4***	0.5	***1.3***	0.5	0.8	0.9	*	0.5	***4.4***	***5.7***	***7.2***	0.5	0.5	0.5	0.8	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
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RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		TP16-19	TP17-19		TP17-20	TP17-21			TP17-21	TP17-22	TP17-23		TP17-24	TP17-25	TP17-26	TP18-27	TP18-28	TP18-29	Federal Guideline		BC Standard		
Sample ID		TP16-19-01	TP17-19-01	TP17-19-02	TP17-20-01	TP17-21-01	TP17-21-02	QA/QC	TP17-21-04	TP17-22-01	TP17-23-01	TP17-23-04	TP17-24-01	TP17-25-01	TP17-26-01	TP18-27-01	TP18-28-01	TP18-29-01	CCME CEQG Residential (RL)[b]	CCME CEQG Commercial (CL)[b]	CSR Low Density Residential Land Use (RLLD)[c]	CSR Commercial Land Use (CL)[c]	CSR Industrial Land Use (IL)[c]
Sample Date (yyyy mm dd)		2016 03 07	2017 10 24	2017 10 24	2017 10 24	2017 10 24	Duplicate	RPD %	2017 10 24	2017 10 24	2017 10 24	2017 10 24	2017 10 24	2017 10 24	2017 10 24	2018 01 23	2018 01 23	2018 01 23					
Depth Interval (m)		0.2 - 0.5	0.8 - 1.1	1.5 - 1.8	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5		1.4 - 1.7	0.2 - 0.5	0.2 - 0.5	1.4 - 1.7	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5					
Field Screen (ppm)[a]		0	0	0	0	0	0		0	0	0	0	0	0	0	-	-	-					
Parameter	**Units**	**Analytical Results**																					
Polycyclic Aromatic Hydrocarbons																							
Naphthalene	µg/g	< 0.005	0.021	0.080	0.029	0.104	0.023	*	0.015	0.055	0.041	0.106	0.241	< 0.005	< 0.005	0.052	0.005	< 0.005	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	< 0.005	0.030	0.095	0.042	0.119	0.033	113	0.024	0.059	0.061	0.119	0.170	< 0.005	< 0.005	0.060	0.010	< 0.005	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	< 0.005	0.022	0.089	0.036	0.103	0.023	*	0.018	0.048	0.045	0.118	0.183	< 0.005	< 0.005	0.048	0.006	< 0.005	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	< 0.005	0.016	0.042	0.023	0.057	0.016	*	0.012	0.030	0.034	0.053	0.074	< 0.005	< 0.005	0.031	0.006	< 0.005	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	< 0.02	0.02	0.07	0.03	0.08	0.02	*	< 0.02	0.05	0.05	0.08	0.12	< 0.02	< 0.02	0.04	< 0.02	< 0.02	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	< 0.02	0.14	0.36	0.18	0.43	0.14	102	0.10	0.25	0.28	0.38	0.58	< 0.02	< 0.02	0.24	0.05	< 0.02	5[e]	50[e]	5	50	50
Anthracene	µg/g	< 0.004	0.041	0.104	0.051	0.129	0.049	90	0.028	0.076	0.082	0.112	0.165	< 0.004	< 0.004	0.074	0.018	< 0.004	2.5	32	2.5	30	30
Fluoranthene	µg/g	< 0.01	0.06	0.14	0.07	0.18	0.07	88	0.04	0.12	0.13	0.15	0.24	< 0.01	< 0.01	0.12	0.03	< 0.01	15.4	180	50	200	200
Pyrene	µg/g	< 0.01	0.08	0.17	0.09	0.24	0.09	91	0.05	0.15	0.17	0.18	0.32	< 0.01	< 0.01	0.16	0.04	< 0.01	7.7	100	10	100	100
Benz(a)anthracene	µg/g	< 0.03	0.05	0.10	0.06	0.14	0.05	*	0.03	0.09	0.11	0.11	0.20	< 0.03	< 0.03	0.09	< 0.03	< 0.03	1	10	1	10	10
Chrysene	µg/g	< 0.05	0.05	0.09	0.05	0.13	0.05	*	< 0.05	0.08	0.10	0.10	0.18	< 0.05	< 0.05	0.08	< 0.05	< 0.05	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	< 0.05	0.04	< 0.02	< 0.02	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	< 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	0.03	< 0.02	< 0.02	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	< 0.05	0.07	< 0.05	< 0.05	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	< 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	0.02	< 0.02	< 0.02	1	10	1	10	10
Benzo(a)pyrene	µg/g	< 0.03	0.03	0.06	0.04	0.10	0.04	*	< 0.03	0.06	0.07	0.07	0.13	< 0.03	< 0.03	0.07	< 0.03	< 0.03	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	< 0.02	< 0.02	0.02	< 0.02	0.04	< 0.02	*	< 0.02	0.02	0.03	0.02	0.05	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	< 0.005	0.007	0.011	0.006	0.021	0.007	*	< 0.005	0.013	0.014	0.010	0.028	< 0.005	< 0.005	0.006	< 0.005	< 0.005	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.05	< 0.05	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	< 0.05	0.05	0.09	0.06	0.15	0.06	*	< 0.05	0.09	0.10	0.10	0.19	< 0.05	< 0.05	0.09	< 0.05	< 0.05	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Risk	µg/g	0.5	0.7	1.0	0.8	***1.5***	0.7	*	0.6	1.0	***1.1***	1.0	***2.0***	< 0.6	< 0.6	***1.1***	< 0.6	< 0.6	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
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RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

cation	TP18-30			TP18-31	TP18-35	TP18-36	TP18-37	TP18-38		TP18-39	TP18-40	TP19-41	TP19-42				TP19-43			Federal Guideline		BC Standard			Sample Location		TP1
ple ID	TP18-30-01	TP18-30-02	QA/QC	TP18-31-01	TP18-35-01	TP18-36-01	TP18-37-01	TP18-38-01	TP18-38-02	TP18-39-01	TP18-40-01	TP19-41-01	TP19-42-01	TP19-42-02	QA/QC	TP19-42-03	TP19-43-01	TP19-43-03	CCME	CCME	CSR Low	CSR	CSR	Sample ID		TP19-44-01
m dd)	2018 01 23	Duplicate	RPD %	2018 01 23	2018 01 23	2018 01 23	2018 01 23	2018 01 23	2018 01 23	2018 01 23	2018 01 23	2019 01 14	2019 01 14	Duplicate	RPD %	2019 01 14	2019 01 14	2019 01 14	CEQG	CEQG	Density	Commercial	Industrial	Sample Date (yyyy mm dd)		2019 01 14
al (m)	0.2 - 0.5	0.2 - 0.5		0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.8 - 0.9	0.2 - 0.5	0.2 - 0.5	0.3 - 0.6	0.3 - 0.6	0.3 - 0.6		0.9 - 1.2	0.3 - 0.6	1.5 - 1.8	Residential	Commercial	Residential	Land Use	Land Use	Depth Interval (m)		0.3 - 0.6
ppm)[a]	-	-		-	-	-	0	0	0	0	0	-	-	-		-	-	-	(RL)[b]	(CL)[b]	Land Use	(CL)[c]	(IL)[c]	Field Screen (ppm)[a]		-
Units	Analytical Results																				(RLLD)[c]			Parameter	Units	
carbons																								Polycyclic Aromatic Hydrocarbons		
µg/g	< 0.005	< 0.005	*	0.032	0.066	0.199	0.255	0.170	0.086	0.006	0.033	< 0.01	< 0.01	< 0.01	*	< 0.01	0.11	< 0.01	0.6[e]	22[e]	0.6	20	20	Naphthalene	µg/g	< 0.01
µg/g	< 0.005	< 0.005	*	0.047	0.072	0.228	0.312	0.242	0.122	0.009	0.054	-	-	-	-	-	-	-	n/a	n/a	250	1,000	1,000	Methylnaphthalene, 1-	µg/g	-
µg/g	< 0.005	< 0.005	*	0.038	0.064	0.211	0.292	0.210	0.113	0.007	0.041	< 0.01	< 0.01	< 0.01	*	< 0.01	0.12	< 0.01	n/a	n/a	60	950	950	Methylnaphthalene, 2-	µg/g	< 0.01
µg/g	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	320	320	n/a	n/a	n/a	Acenaphthylene	µg/g	< 0.01
µg/g	< 0.005	< 0.005	*	0.025	0.035	0.113	0.150	0.143	0.077	< 0.005	0.033	< 0.01	< 0.01	< 0.01	*	< 0.01	0.08	< 0.01	0.28	0.28	950	15,000	15,000	Acenaphthene	µg/g	< 0.01
µg/g	< 0.02	< 0.02	*	0.03	0.06	0.17	0.24	0.22	0.13	< 0.02	0.05	< 0.02	< 0.02	< 0.02	*	< 0.02	0.12	< 0.02	0.25	0.25	600	9,500	9,500	Fluorene	µg/g	< 0.02
µg/g	< 0.02	< 0.02	*	0.19	0.28	0.72	0.93	1.4	0.60	0.04	0.29	< 0.02	< 0.02	< 0.02	*	< 0.02	0.61	< 0.02	5[e]	50[e]	5	50	50	Phenanthrene	µg/g	< 0.02
µg/g	< 0.004	< 0.004	*	0.062	0.092	0.217	0.295	0.314	0.193	0.013	0.082	< 0.02	< 0.02	< 0.02	*	< 0.02	0.14	< 0.02	2.5	32	2.5	30	30	Anthracene	µg/g	< 0.02
µg/g	< 0.01	< 0.01	*	0.08	0.13	0.34	0.43	0.52	0.29	0.01	0.15	< 0.05	< 0.05	< 0.05	*	< 0.05	0.25	< 0.05	15.4	180	50	200	200	Fluoranthene	µg/g	< 0.05
µg/g	< 0.01	< 0.01	*	0.11	0.17	0.43	0.55	0.67	0.38	0.02	0.19	< 0.02	< 0.02	< 0.02	*	< 0.02	0.32	< 0.02	7.7	100	10	100	100	Pyrene	µg/g	< 0.02
µg/g	< 0.03	< 0.03	*	0.05	0.09	0.25	0.30	0.39	0.21	< 0.03	0.11	< 0.02	< 0.02	< 0.02	*	< 0.02	0.18	< 0.02	1	10	1	10	10	Benz(a)anthracene	µg/g	< 0.02
µg/g	< 0.05	< 0.05	*	0.05	0.09	0.23	0.29	0.38	0.20	< 0.05	0.11	< 0.05	< 0.05	< 0.05	*	< 0.05	0.18	< 0.05	6.2	n/a	200	4,500	4,500	Chrysene	µg/g	< 0.05
µg/g	< 0.02	< 0.02	*	0.02	0.03	0.09	0.11	0.20	0.10	< 0.02	0.05	< 0.02	< 0.02	< 0.02	*	< 0.02	0.07	< 0.02	1	10	1	10	10	Benzo(b)fluoranthene	µg/g	< 0.02
µg/g	< 0.02	< 0.02	*	< 0.02	0.02	0.05	0.06	0.12	0.07	< 0.02	0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	0.04	< 0.02	1	10	1	10	10	Benzo(j)fluoranthene	µg/g	< 0.02
µg/g	< 0.05	< 0.05	*	< 0.05	0.05	0.14	0.17	0.32	0.17	< 0.05	0.07	-	-	-	-	-	-	-	1	10	1	10	10	Benzo(b+j)fluoranthene	µg/g	-
µg/g	< 0.02	< 0.02	*	< 0.02	0.02	0.05	0.06	0.11	0.06	< 0.02	0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	0.04	< 0.02	1	10	1	10	10	Benzo(k)fluoranthene	µg/g	< 0.02
µg/g	< 0.03	< 0.03	*	0.04	0.06	0.18	0.21	0.29	0.16	< 0.03	0.08	< 0.05	< 0.05	< 0.05	*	< 0.05	0.14	< 0.05	0.6	72	5	30	50	Benzo(a)pyrene	µg/g	< 0.05
µg/g	< 0.02	< 0.02	*	< 0.02	0.02	0.07	0.09	0.05	0.02	< 0.02	0.03	< 0.02	< 0.02	< 0.02	*	< 0.02	0.05	< 0.02	1	10	1	10	10	Indeno(1,2,3-cd)pyrene	µg/g	< 0.02
µg/g	< 0.005	< 0.005	*	< 0.005	0.013	0.039	0.049	0.028	0.016	< 0.005	0.019	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	1	10	1	10	10	Dibenz(a,h)anthracene	µg/g	< 0.02
µg/g	< 0.05	< 0.05	*	< 0.05	< 0.05	0.08	0.10	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	Benzo(g,h,i)perylene	µg/g	< 0.05
µg/g	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	-	-	-	-	-	n/a	n/a	2.5	10	10	Quinoline	µg/g	-
µg/g	< 0.05	< 0.05	*	0.05	0.09	0.27	0.32	0.40	0.22	< 0.05	0.12	< 0.05	< 0.05	< 0.05	*	< 0.05	0.19	< 0.05	5.3[d]	5.3[d]	n/a	n/a	n/a	B(a)P Equivalency	µg/g	< 0.05
µg/g	< 0.6	< 0.6	*	< 0.6	0.9	***2.7***	***3.3***	***4.9***	***2.6***	< 0.6	***1.2***	< 0.6	< 0.6	< 0.6	*	< 0.6	***2.0***	< 0.6	1	1	n/a	n/a	n/a	Index of Additive Cancer Ris	µg/g	< 0.6

889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V44553

of SNC-Lavalin's report

han indicated detection limit or RPD less than indicated value

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ard/guideline

fference.

ere one or more concentrations are less than five times RDL

limit.

Concentration greater than CCME CEQG Residential (RL) Guideline

Concentration greater than CCME CEQG Commercial (CL) Guideline

Concentration greater than CSR Low Density Residential Land Use (RLLD) standard

Concentration greater than CSR Commercial Land Use (CL) Standard

asured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard

ontact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion

lation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil Genera

or determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water

l plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standard

l risk

y removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respective

Associated AGAT file(s): 15V942889, 15V942897, 16V

All terms defined within the body of SNC-Lavalin's repo

< Denotes concentration less than indicated detectio

- Denotes analysis not conducted.

n/a Denotes no applicable standard/guideline.

RPD Denotes relative percent difference.

* RPDs are not calculated where one or more conce

RDL Denotes reported detection limit.

BOLD	Concentration greater
SHADOW	Concentration greater
SHADED	Concentration greater
OUTLINE	Concentration greater

[a] Field screening results are measured based on a 'dry

[b] Pathways Included: Eco Soil Contact, Management L
Direct Contact (particulate inhalation), Soil Dermal Co

[c] The site-specific factors used for determining the mat
toxicity to soil invertebrates and plants, and groundwa

[d] Guidelines use 10-5 incremental risk.

[e] Freshwater aquatic life pathway removed from naphth

tical Results for Soil - Polycyclic Aromatic Hydrocarbons

9-44	TP19-45	TP19-46			TP19-46	TP19-47		TP19-48		TP19-49			TP19-50					Federal Guideline		BC Standard		
TP19-44-02 2019 01 14 0.9 - 1.2 -	TP19-45-01 2019 01 14 0.3 - 0.6 -	TP19-46-01 2019 01 14 0.3 - 0.6 -	TP19-46-02 Duplicate 0.3 - 0.6 -	QA/QC RPD %	TP19-46-04 2019 01 14 1.5 - 1.8 -	TP19-47-01 2019 01 14 0.3 - 0.6 -	TP19-47-03 2019 01 14 1.5 - 1.8 -	TP19-48-01 2019 01 14 0.3 - 0.6 -	TP19-48-04 2019 01 14 1.5 - 1.8 -	TP19-49-01 2019 01 14 0.3 - 0.6 -	TP19-49-03 2019 01 14 1.5 - 1.8 -	TP19-49-04 2019 01 14 2.1 - 2.4 -	TP19-50-01 2019 01 14 0.3 - 0.6 -	TP19-50-02 Duplicate 0.3 - 0.6 -	QA/QC RPD %	TP19-50-03 2019 01 14 0.9 - 1.2 -	TP19-50-04 2019 01 14 1.5 - 1.8 -	CCME CEQG Residential (RL)[b]	CCME CEQG Commercial (CL)[b]	CSR Low Density Residential Land Use (RLLD)[c]	CSR Commercial Land Use (CL)[c]	CSR Industrial Land Use (IL)[c]
Analytical Results																						
< 0.01	< 0.01	0.02	0.10	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.10	0.03	< 0.01	0.10	0.01	*	0.10	***4***	0.6[e]	22[e]	0.6	20	20
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	250	1,000	1,000
< 0.01	< 0.01	0.02	0.09	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.06	< 0.01	0.12	0.01	*	0.10	3	n/a	n/a	60	950	950
< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	1	320	320	n/a	n/a	n/a
< 0.01	< 0.01	0.02	0.05	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.08	0.04	< 0.01	0.08	0.01	*	0.06	***12***	0.28	0.28	950	15,000	15,000
< 0.02	< 0.02	0.03	0.08	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.12	0.06	< 0.02	0.12	0.02	*	0.09	***30***	0.25	0.25	600	9,500	9,500
< 0.02	< 0.02	0.20	0.39	64	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.67	0.29	< 0.02	0.64	0.13	132	0.46	***140***	5[e]	50[e]	5	50	50
< 0.02	< 0.02	0.06	0.13	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.17	0.08	< 0.02	0.16	0.04	*	0.13	***43***	2.5	32	2.5	30	30
< 0.05	< 0.05	0.11	0.17	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.33	0.12	< 0.05	0.28	0.07	*	0.21	***52***	15.4	180	50	200	200
< 0.02	< 0.02	0.15	0.24	46	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.44	0.16	< 0.02	0.38	0.11	110	0.28	***74***	7.7	100	10	100	100
< 0.02	< 0.02	0.08	0.12	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.25	0.08	< 0.02	0.21	0.05	*	0.15	***36***	1	10	1	10	10
< 0.05	< 0.05	0.08	0.12	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.25	0.09	< 0.05	0.21	0.05	*	0.16	***34***	6.2	n/a	200	4,500	4,500
< 0.02	< 0.02	0.03	0.05	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.10	0.03	< 0.02	0.09	0.03	*	0.06	***11***	1	10	1	10	10
< 0.02	< 0.02	0.02	0.03	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.06	0.02	< 0.02	0.04	< 0.02	*	0.04	***6***	1	10	1	10	10
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	10	1	10	10
< 0.02	< 0.02	0.02	0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.05	0.02	< 0.02	0.04	< 0.02	*	0.03	***7***	1	10	1	10	10
< 0.05	< 0.05	0.08	0.10	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.19	0.07	< 0.05	0.16	0.05	*	0.11	***22***	0.6	72	5	30	50
< 0.02	< 0.02	0.02	0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.08	0.02	< 0.02	0.07	< 0.02	*	0.04	***8***	1	10	1	10	10
< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.04	< 0.02	< 0.02	0.06	< 0.02	*	< 0.02	***4***	1	10	1	10	10
< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.11	< 0.05	< 0.05	0.08	< 0.05	*	0.05	9	n/a	n/a	n/a	n/a	n/a
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	2.5	10	10
< 0.05	< 0.05	0.10	0.13	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.28	0.09	< 0.05	0.26	0.07	*	0.15	***34***	5.3[d]	5.3[d]	n/a	n/a	n/a
< 0.6	< 0.6	0.9	***1.3***	*	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	***2.9***	0.9	< 0.6	***2.5***	0.6	*	***1.7***	***372***	1	1	n/a	n/a	n/a

)59563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V44553

rt

ı limit or RPD less than indicated value

ntrations are less than five times RDL

· than CCME CEQG Residential (RL) Guidelin
· than CCME CEQG Commercial (CL) Guidelin
· than CSR Low Density Residential Land Use (RLLD) standar
· than CSR Commercial Land Use (CL) Standar

headspace' method using a combustible gas meter calibrated to a hexane standar
imit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion
ntact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil Genera
ix standards for this site include: intake of contaminated soil, groundwater used for drinking water
ter flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standar

alene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respective

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		TP19-51			TP19-52		TP19-53	TP19-54					TP19-55			TP19-56		BH19-07D			Federal Guideline		BC Standard		
Sample ID		TP19-51-01	TP19-51-02	TP19-51-03	TP19-52-01	TP19-52-04	TP19-53-03	TP19-54-01	TP19-54-02	TP19-54-03	QA/QC	TP19-54-04	TP19-55-01	TP19-55-02	TP19-55-03	TP19-56-01	TP19-56-03	BH19-07-04	BH19-07-05	QA/QC	CCME	CCME	CSR Low	CSR	CSR
Sample Date (yyyy mm dd)		2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	Duplicate	RPD %	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 02 06	Duplicate	RPD %	CEQG	CEQG	Density	Commercial	Industrial
Depth Interval (m)		0.3 - 0.6	0.9 - 1.2	1.5 - 1.8	0.3 - 0.6	1.5 - 1.8	1.5 - 1.8	0.3 - 0.6	0.9 - 1.2	0.9 - 1.2		1.5 - 1.8	0.3 - 0.6	0.9 - 1.2	1.5 - 1.8	0.3 - 0.6	1.5 - 1.8	2.9 - 3.0	2.9 - 3.0		Residential	Commercial	Residential	Land Use	Land Use
Field Screen (ppm)[a]		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	50	50		(RL)[b]	(CL)[b]	Land Use (RLLD)[c]	(CL)[c]	(IL)[c]
Parameter	**Units**	**Analytical Results**																							
Polycyclic Aromatic Hydrocarbons																									
Naphthalene	µg/g	0.03	0.01	***3.87***	0.07	***0.66***	0.19	< 0.01	0.01	0.08	*	< 0.01	0.02	0.15	0.05	< 0.01	0.13	0.009	0.020	*	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.005	0.015	*	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	0.03	0.01	2.82	0.08	0.61	0.20	< 0.01	0.01	0.10	*	< 0.01	0.01	0.09	0.05	< 0.01	0.09	0.007	0.017	*	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.005	*	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	0.03	0.02	***0.97***	0.06	0.19	0.11	< 0.01	0.01	0.07	*	< 0.01	< 0.01	0.02	0.03	< 0.01	0.04	< 0.005	0.006	*	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	0.04	0.03	***1.80***	0.11	***0.39***	0.21	< 0.02	< 0.02	0.11	*	< 0.02	< 0.02	0.03	0.05	< 0.02	0.06	< 0.02	< 0.02	*	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	0.26	0.16	***6.17***	0.61	1.64	0.87	0.02	0.10	0.64	146	0.03	0.04	0.05	0.28	0.05	0.26	< 0.02	0.04	*	5[e]	50[e]	5	50	50
Anthracene	µg/g	0.08	0.06	2.02	0.16	0.44	0.28	< 0.02	0.03	0.14	*	< 0.02	< 0.02	< 0.02	0.09	< 0.02	0.07	0.009	0.024	*	2.5	32	2.5	30	30
Fluoranthene	µg/g	0.14	0.08	2.47	0.30	0.62	0.35	< 0.05	0.05	0.28	*	< 0.05	< 0.05	< 0.05	0.13	< 0.05	0.11	< 0.01	0.01	*	15.4	180	50	200	200
Pyrene	µg/g	0.23	0.11	3.27	0.41	0.85	0.47	< 0.02	0.07	0.38	*	0.02	0.04	< 0.02	0.17	0.04	0.15	< 0.01	0.01	*	7.7	100	10	100	100
Benz(a)anthracene	µg/g	0.11	0.05	***1.79***	0.23	0.48	0.26	< 0.02	0.03	0.21	*	< 0.02	< 0.02	< 0.02	0.09	0.02	0.07	< 0.03	< 0.03	*	1	10	1	10	10
Chrysene	µg/g	0.09	0.05	1.80	0.22	0.44	0.25	< 0.05	< 0.05	0.20	*	< 0.05	< 0.05	< 0.05	0.09	< 0.05	0.07	< 0.05	< 0.05	*	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	0.05	0.02	0.67	0.10	0.19	0.10	< 0.02	< 0.02	0.08	*	< 0.02	0.02	< 0.02	0.03	0.02	0.02	< 0.02	< 0.02	*	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	0.03	< 0.02	0.46	0.05	0.09	0.05	< 0.02	< 0.02	0.04	*	< 0.02	< 0.02	< 0.02	0.02	< 0.02	0.02	< 0.02	< 0.02	*	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.05	*	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	0.03	< 0.02	0.39	0.05	0.09	0.05	< 0.02	< 0.02	0.04	*	< 0.02	< 0.02	< 0.02	0.02	< 0.02	0.02	< 0.02	< 0.02	*	1	10	1	10	10
Benzo(a)pyrene	µg/g	0.07	< 0.05	***1.33***	0.14	0.33	0.19	< 0.05	< 0.05	0.13	*	< 0.05	< 0.05	< 0.05	0.07	< 0.05	0.06	< 0.03	< 0.03	*	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	0.04	< 0.02	0.48	0.06	0.14	0.08	< 0.02	< 0.02	0.07	*	< 0.02	0.02	< 0.02	0.02	< 0.02	0.02	< 0.02	< 0.02	*	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	0.02	< 0.02	0.23	0.04	0.08	0.04	< 0.02	< 0.02	0.03	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.005	< 0.005	*	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	< 0.05	< 0.05	0.58	0.09	0.18	0.09	< 0.05	< 0.05	0.08	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.05	*	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	0.11	< 0.05	1.96	0.23	0.51	0.28	< 0.05	< 0.05	0.20	*	< 0.05	< 0.05	< 0.05	0.09	< 0.05	0.08	< 0.05	< 0.05	*	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	***1.3***	< 0.6	***20.6***	***2.6***	***5.2***	***2.8***	< 0.6	< 0.6	***2.2***	*	< 0.6	< 0.6	< 0.6	1.0	< 0.6	0.8	< 0.6	< 0.6	*	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		BH19-08D		BH19-09D		TP19-57		TP19-58				TP19-59							Federal Guideline		BC Standard		
Sample ID		BH19-08-01	BH19-08-03	BH19-09-04	BH19-09-06	TP19-57-04	TP19-57-05	TP19-58-01	TP19-58-02	QA/QC	TP19-58-03	TP19-59-01	TP19-59-04	TP19-60-01	TP19-60-02	QA/QC	TP19-60-03	TP19-60-04	CCME CEQG	CCME CEQG	CSR Low Density	CSR Commercial	CSR Industrial
Sample Date (yyyy mm dd)		2019 02 06	2019 02 06	2019 02 07	2019 02 07	2019 03 11	2019 03 11	2019 03 11	Duplicate	RPD %	2019 03 11	2019 03 11	2019 03 11	2019 03 11	Duplicate	RPD %	2019 03 11	2019 03 11	Residential	Commercial	Residential	Land Use	Land Use
Depth Interval (m)		0.3 - 0.5	1.5 - 1.7	2.0 - 2.1	2.9 - 3.0	1.4 - 1.7	2.1 - 2.4	0.3 - 0.6	0.3 - 0.6		0.9 - 1.2	0.3 - 0.6	1.5 - 1.8	0.3 - 0.6	0.3 - 0.6		0.9 - 1.2	1.5 - 1.8	(RL)[b]	(CL)[b]	Land Use (RLLD)[c]	(CL)[c]	(IL)[c]
Field Screen (ppm)[a]		85	85	300	140	45	35	45	45		40	0	0	0	0		0	0					
Parameter	**Units**	**Analytical Results**																					
Polycyclic Aromatic Hydrocarbons																							
Naphthalene	µg/g	0.011	< 0.005	0.306	0.005	***49.3***	***8.94***	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	0.019	< 0.005	0.261	< 0.005	23.8	4.08	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	0.014	< 0.005	0.278	< 0.005	32.8	5.27	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.005	< 0.005	0.018	< 0.005	< 0.5	< 0.05	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	< 0.005	< 0.005	0.109	< 0.005	***8.71***	***0.88***	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	< 0.02	< 0.02	0.18	< 0.02	***15.5***	***1.3***	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	0.05	< 0.02	0.73	< 0.02	***52.7***	4.6	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	5[e]	50[e]	5	50	50
Anthracene	µg/g	0.013	< 0.004	0.270	0.005	***17.8***	1.46	< 0.004	< 0.004	*	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	*	< 0.004	< 0.004	2.5	32	2.5	30	30
Fluoranthene	µg/g	0.01	< 0.01	0.31	< 0.01	***18.6***	1.1	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	15.4	180	50	200	200
Pyrene	µg/g	0.01	< 0.01	0.43	< 0.01	***24.8***	1.4	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	7.7	100	10	100	100
Benz(a)anthracene	µg/g	< 0.03	< 0.03	0.21	< 0.03	***12.6***	0.6	< 0.03	< 0.03	*	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	*	< 0.03	< 0.03	1	10	1	10	10
Chrysene	µg/g	< 0.05	< 0.05	0.19	< 0.05	***13.5***	0.5	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	< 0.02	< 0.02	0.08	< 0.02	***4.65***	0.2	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	< 0.02	< 0.02	0.05	< 0.02	***3.46***	< 0.2	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	< 0.05	< 0.05	0.13	< 0.05	***8.11***	0.20	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	< 0.02	< 0.02	0.06	< 0.02	***3.02***	< 0.2	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1	10	1	10	10
Benzo(a)pyrene	µg/g	< 0.03	< 0.03	0.16	< 0.03	***9.09***	0.4	< 0.03	< 0.03	*	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	*	< 0.03	< 0.03	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	< 0.02	< 0.02	0.04	< 0.02	***3.07***	0.2	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	< 0.005	< 0.005	0.018	< 0.005	0.864	0.15	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	0.011	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	3.02	< 0.5	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	0.24	< 0.5	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	< 0.05	< 0.05	0.22	< 0.05	***12.8***	0.7	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	< 0.6	< 0.6	***2.4***	< 0.6	***144***	***7***	< 0.6	< 0.6	*	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	*	< 0.6	< 0.6	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
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RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent).
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		TP19-61			TP19-62		TP19-63					TP19-64				TP19-65			Federal Guideline		BC Standard		
Sample ID		TP19-61-01	TP19-61-02	TP19-61-04	TP19-62-01	TP19-62-02	TP19-63-02	TP19-63-03	QA/QC	TP19-63-04	TP19-63-05	TP19-64-01	TP19-64-03	TP19-64-04	TP19-64-05	TP19-65-01	TP19-65-03	TP19-65-04	CCME CEQG Residential (RL)[b]	CCME CEQG Commercial (CL)[b]	CSR Low Density Residential Land Use (RLLD)[c]	CSR Commercial Land Use (CL)[c]	CSR Industrial Land Use (IL)[c]
Sample Date (yyyy mm dd)		2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	Duplicate	RPD %	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11					
Depth Interval (m)		0.3 - 0.6	0.9 - 1.2	1.5 - 1.8	0.3 - 0.6	0.9 - 1.2	0.9 - 1.2	0.9 - 1.2		1.5 - 1.8	2.1 - 2.4	0.3 - 0.6	0.9 - 1.2	1.5 - 1.8	2.1 - 2.4	0.3 - 0.6	1.5 - 1.8	2.1 - 2.4					
Field Screen (ppm)[a]		0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0					
Parameter	**Units**	**Analytical Results**																					
Polycyclic Aromatic Hydrocarbons																							
Naphthalene	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.057	0.059	3	0.081	< 0.005	0.005	0.030	0.009	< 0.005	< 0.005	< 0.005	< 0.005	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.089	0.084	6	0.105	0.005	0.008	0.043	0.017	< 0.005	< 0.005	< 0.005	< 0.005	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.062	0.062	0	0.086	< 0.005	< 0.005	0.034	0.011	< 0.005	< 0.005	< 0.005	< 0.005	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.035	0.033	6	0.042	< 0.005	< 0.005	0.022	0.008	< 0.005	< 0.005	< 0.005	< 0.005	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.04	0.04	*	0.05	< 0.02	< 0.02	0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.32	0.28	13	0.36	0.02	0.04	0.20	0.08	< 0.02	0.02	< 0.02	< 0.02	5[e]	50[e]	5	50	50
Anthracene	µg/g	0.008	< 0.004	< 0.004	< 0.004	< 0.004	0.089	0.074	18	0.093	0.009	0.012	0.058	0.021	< 0.004	0.007	< 0.004	< 0.004	2.5	32	2.5	30	30
Fluoranthene	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.15	0.13	14	0.16	0.01	0.02	0.11	0.05	< 0.01	0.01	< 0.01	< 0.01	15.4	180	50	200	200
Pyrene	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.19	0.17	11	0.20	0.01	0.02	0.14	0.06	0.01	0.01	< 0.01	< 0.01	7.7	100	10	100	100
Benz(a)anthracene	µg/g	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.10	0.09	*	0.11	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	1	10	1	10	10
Chrysene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.09	0.08	*	0.10	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.04	0.03	*	0.04	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	0.02	*	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	0.05	*	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.03	0.02	*	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	10	1	10	10
Benzo(a)pyrene	µg/g	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.07	0.05	*	0.07	< 0.03	< 0.03	0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	0.02	*	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	< 0.005	0.005	< 0.005	< 0.005	< 0.005	0.014	0.013	*	0.015	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	0.10	< 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	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	< 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	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.10	0.08	*	0.10	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	***1.1***	0.9	*	***1.1***	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
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BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 4: Summary of Analytical Results for Soil - Total Metals

Sample Location		BH15-1D				BH15-2D		BH15-3	BH15-4	BH15-5	SS15-2	SS15-6	TP18-37			TP18-38	TP18-39	TP18-40	TP19-50	TP19-52	Federal Guideline		BC Standard		
Sample ID		BH15-1-3	BH15-1-17	BH15-1-18	QA/QC	BH15-2-2	BH15-2-7	BH15-3-3	BH15-4-1	BH15-5-2	SS15-2-1	SS15-6-2	TP18-37-01	TP18-37-02	QA/QC	TP18-38-01	TP18-39-01	TP18-40-02	TP19-50-04	TP19-52-04	CCME CEQG Residential (RL)[a]	CCME CEQG Commercial (CL)[a]	CSR Low Density Residential Land Use (RLLD)[b]	CSR Commercial Land Use (CL)[b]	CSR Industrial Land Use (IL)[b]
Sample Date (yyyy mm dd)		2015 02 03	2015 02 03	Duplicate	RPD %	2015 02 04	2015 02 04	2015 02 04	2015 02 04	2015 02 05	2015 02 04	2015 02 05	2018 01 23	Duplicate	RPD %	2018 01 23	2018 01 23	2018 01 23	2019 01 14	2019 01 14					
Depth Interval (m)		1.7 - 2.0	15.4 - 15.7	15.4 - 15.7		1.1 - 1.2	4.7 - 5.0	1.7 - 2.0	0.2 - 0.5	1.2 - 1.5	0.0 - 0.2	0.2 - 0.3	0.2 - 0.5	0.2 - 0.5		0.2 - 0.5	0.2 - 0.5	0.8 - 0.9	1.5 - 1.8	1.5 - 1.8					
Parameter	**Units**	**Analytical Results**																							
Physical Parameters																									
pH	pH	7.3	7.9	7.9	0	7	7.8	6.9	***5.3***	***5.8***	6	***5.9***	6.39	6.67	4	6.22	6.17	6.25	***5.80***	6.14	6.0 - 8.0	6.0 - 8.0	n/a	n/a	n/a
Total Metals																									
Aluminum	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,200	17,700	n/a	n/a	40,000	250,000	250,000
Antimony	µg/g	0.2	0.1	0.1	*	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.2	*	0.2	0.1	0.1	0.3	0.2	20	40	20	40	40
Arsenic	µg/g	3	2.6	2.7	4	2.4	2.3	1.9	2.8	2.9	3.6	3.7	3.0	2.0	40	2.1	1.9	2.2	3.6	3.8	12	12	10	10	10
Barium	µg/g	30.1	45	46.3	3	37.8	36.5	30.6	57.4	84.4	43.6	72.9	44.0	48.4	10	49.9	46.5	44.0	51.3	49.5	500	2,000	350	350	350
Beryllium	µg/g								0.3	0.4	0.4	0.4	0.2			0.2	0.3	0.2	0.2	0.2	4	8	1 (pH <6.5)	1 (pH <6.5)	1 (pH <6.5)
								0.2						0.2	*								4 (pH 6.5-<7.0)	4 (pH 6.5-<7.0)	4 (pH 6.5-<7.0)
		0.2				0.2																	30 (pH 7.0-<7.5)	30 (pH 7.0-<7.5)	30 (pH 7.0-<7.5)
			0.2	0.2	*		0.2																	250 (pH 7.5-<8.0)	250 (pH 7.5-<8.0)
Boron	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	1.5	n/a	n/a	8,500	50,000	1,000,000
Cadmium	µg/g							0.04	0.1	0.22	0.06	0.22	0.25	0.21	17	0.27	0.22	0.18	0.33	0.32	10	22	1 (pH <7.0)	1 (pH <7.0)	1 (pH <7.0)
		0.06				0.05																	3 (pH 7.0-<7.5)	3 (pH 7.0-<7.5)	3 (pH 7.0-<7.5)
			0.04	0.04	*		0.04																	20 (pH 7.5-<8.0)	20 (pH 7.5-<8.0)
Chromium	µg/g	21	17	20	16	27	25	35	32	30	29	33	25	25	0	23	24	22	27	26	64	87	60	60	60
Cobalt	µg/g	8.5	7.1	7.6	7	9.4	10.7	7.8	9.6	12.1	13	13	10.0	10.1	1	9.2	11.3	9.2	10.7	10.7	50	300	25	25	25
Copper	µg/g								41.2	41.7		48.9							47.7		100[c]	100[c]	100 (pH 5.5-<6.0)[c]	100 (pH 5.5-<6.0)[c]	100 (pH 5.5-<6.0)[c]
		29.7	20.9	22.4	7	32.4	43.4	29.9			66.7		39.2	37.1	6	31.9	40.8	27.6		40.3			150 (pH>=6.0)	300 (pH>=6.0)	300 (pH>=6.0)
Iron	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24,400	24,200	n/a	n/a	35,000	150,000	150,000
Lead	µg/g								3.3												140	260	120	120 (pH <5.5)	120 (pH <5.5)
										4.8		2.9						2.4						150 (pH >=5.5)	150 (pH 5.5-<6.0)
											2.4		2.6			4.2	2.5	1.6		2.1					800 (pH 6.0-<6.5)
		1.8	1.7	1.8	*	1.6	1.3	1.6						2.2	17										1,000 (pH>=6.5)
Lithium	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.1	5.8	n/a	n/a	30	450	450
Manganese	µg/g	318	259	270	4	378	397	274	288	717	482	247	292	288	1	297	438	222	362	399	n/a	n/a	2,000	2,000	2,000
Mercury	µg/g	0.04	0.02	0.02	*	0.02	0.02	0.02	0.05	0.06	0.05	0.06	0.03	0.03	*	0.03	0.03	< 0.01	0.03	0.03	6.6	24	10	75	75
Molybdenum	µg/g	0.2	< 0.2	< 0.2	*	0.2	0.2	0.3	0.3	0.6	0.4	0.2	0.2	< 0.2	*	0.2	0.2	< 0.2	0.4	0.2	10	40	15	15	15
Nickel	µg/g	17.5				15.8		13.9	19.1	22.1	23.9	23.6	19.1	19.2	1	18.7	21.1	17.3	23.1	21.6	45	89	70 (pH <7.5)	70 (pH <7.5)	70 (pH <7.5)
			14.8	16.1	*		17.6																	250 (pH>=7.5)	250 (pH>=7.5)
Selenium	µg/g	0.1	< 0.1	< 0.1	*	< 0.1	< 0.1	< 0.1	0.1	0.3	0.3	< 0.1	0.4	0.5	*	0.5	0.4	0.4	0.4	0.3	1	2.9	1	1	1
Silver	µg/g	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	20	40	20	40	40
Strontium	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	21	n/a	n/a	9,500	150,000	150,000
Thallium	µg/g	< 0.1	0.1	< 0.1	*	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	*	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1	1	9	25	25
Tin	µg/g	0.3	0.2	0.3	*	0.4	0.3	0.3	0.4	0.5	0.5	0.5	0.4	0.4	*	0.4	0.4	0.3	1.1	0.5	50	300	50	300	300
Tungsten	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.05	n/a	n/a	15	200	200
Uranium	µg/g	< 0.2	0.3	0.3	*	0.3	0.2	0.2	0.4	0.3	0.3	0.4	0.3	0.2	*	0.3	0.2	< 0.2	0.3	0.2	23	300	30	30	30
Vanadium	µg/g	72	52	56	7	77	90	76	80	97	115	83	79	77	3	69	82	69	80	78	200[c]	200[c]	200[c]	200[c]	200[c]
Zinc	µg/g								31	43		36							32		250	410	150 (pH <6.0)	150 (pH <6.0)	150 (pH <6.0)
											41		31			29	33	28		36			250 (pH 6.0-<6.5)	250 (pH 6.0-<6.5)	250 (pH 6.0-<6.5)
								24						29	7								350 (pH 6.5-<7.0)	350 (pH 6.5-<7.0)	350 (pH 6.5-<7.0)
		27	29	30	3	26	31																450 (pH>=7.0)	450 (pH>=7.0)	450 (pH>=7.0)

Associated AGAT file(s): 15V942889, 15V942897, 18V305465, 19V428489, 19V435966.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[b] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[c] Proposed BC MoE Regional Background Estimate (Protocol 4 for Contaminated Sites: Determining Background Soil Quality).

TABLE 4 (Cont'd): Summary of Analytical Results for Soil - Total Metals

Sample Location		TP19-53	TP19-54			TP19-55	TP19-56	BH19-07D			BH19-09D	Federal Guideline		BC Standard		
Sample ID		TP19-53-03	TP19-54-02	TP19-54-03	QA/QC	TP19-55-03	TP19-56-03	BH19-07-04	BH19-07-05	QA/QC	BH19-09-06	CCME CEQG Residential (RL)[a]	CCME CEQG Commercial (CL)[a]	CSR Low Density Residential Land Use (RLLD)[b]	CSR Commercial Land Use (CL)[b]	CSR Industrial Land Use (IL)[b]
Sample Date (yyyy mm dd)		2019 01 14	2019 01 14	Duplicate	RPD %	2019 01 14	2019 01 14	2019 02 06	Duplicate	RPD %	2019 02 07					
Depth Interval (m)		1.5 - 1.8	0.9 - 1.2	0.9 - 1.2		1.5 - 1.8	1.5 - 1.8	2.9 - 3.0	2.9 - 3.0		2.9 - 3.0					
Parameter	**Units**	**Analytical Results**														
Physical Parameters																
pH	pH	***5.79***	***5.55***	***5.75***	4	***5.64***	6.94	***8.27***	***8.58***	4	***8.18***	6.0 - 8.0	6.0 - 8.0	n/a	n/a	n/a
Total Metals																
Aluminum	µg/g	17,600	16,800	15,700	7	20,000	23,900	18,200	19,900	9	14,500	n/a	n/a	40,000	250,000	250,000
Antimony	µg/g	0.2	0.2	0.2	*	0.3	0.1	0.5	0.8	46	0.2	20	40	20	40	40
Arsenic	µg/g	3.4	3.1	3.7	18	3.7	3.6	3.4	4.0	16	2.5	12	12	10	10	10
Barium	µg/g	49.0	42.3	39.9	6	60.9	48.0	39.0	38.2	2	32.1	500	2,000	350	350	350
Beryllium	µg/g	0.2	0.2	0.2	*	0.2						4	8	1 (pH <6.5)	1 (pH <6.5)	1 (pH <6.5)
							0.3							4 (pH 6.5-<7.0)	4 (pH 6.5-<7.0)	4 (pH 6.5-<7.0)
														30 (pH 7.0-<7.5)	30 (pH 7.0-<7.5)	30 (pH 7.0-<7.5)
														85 (pH >=7.5)	250 (pH 7.5-<8.0)	250 (pH 7.5-<8.0)
								0.2	0.3	*	0.2				350 (pH >=8.0)	350 (pH >=8.0)
Boron	µg/g	1.5	1.6	1.4	*	1.8	2.4	2.5	2.5	0	2.2	n/a	n/a	8,500	50,000	1,000,000
Cadmium	µg/g	0.38	0.37	0.34	8	0.33	0.53					10	22	1 (pH <7.0)	1 (pH <7.0)	1 (pH <7.0)
														3 (pH 7.0-<7.5)	3 (pH 7.0-<7.5)	3 (pH 7.0-<7.5)
														20 (pH >=7.5)	20 (pH 7.5-<8.0)	20 (pH 7.5-<8.0)
								0.26	0.27	4	0.24				50 (pH >=8.0)	50 (pH >=8.0)
Chromium	µg/g	31	25	24	4	35	28	42	52	21	23	64	87	60	60	60
Cobalt	µg/g	11.6	12.1	9.8	21	13.0	15.1	13.2	13.8	4	8.6	50	300	25	25	25
Copper	µg/g	49.0	43.1	34.0	24	47.2						100[c]	100[c]	100 (pH 5.5-<6.0)[c]	100 (pH 5.5-<6.0)[c]	100 (pH 5.5-<6.0)[c]
							55.6	48.6	55.2	13	32.0			150 (pH>=6.0)	300 (pH>=6.0)	300 (pH>=6.0)
Iron	µg/g	25,500	25,000	22,700	10	29,300	33,500	33,300	**35,600**	7	24,900	n/a	n/a	35,000	150,000	150,000
Lead	µg/g											140	260	120	120 (pH <5.5)	120 (pH <5.5)
		2.4	1.7	1.6	6	2.3									150 (pH >=5.5)	150 (pH 5.5-<6.0)
																800 (pH 6.0-<6.5)
							1.8	1.7	1.5	12	3.3					1,000 (pH>=6.5)
Lithium	µg/g	6.0	6.0	5.6	7	7.9	6.7	6.2	7.0	12	3.9	n/a	n/a	30	450	450
Manganese	µg/g	403	371	358	4	383	540	454	425	7	293	n/a	n/a	2,000	2,000	2,000
Mercury	µg/g	0.04	0.03	0.02	*	0.05	0.02	0.02	0.03	*	0.02	6.6	24	10	75	75
Molybdenum	µg/g	< 0.2	< 0.2	< 0.2	*	0.3	0.3	1.8	2.2	20	0.5	10	40	15	15	15
Nickel	µg/g	24.1	23.3	21.0	10	26.3	29.8					45	89	70 (pH <7.5)	70 (pH <7.5)	70 (pH <7.5)
								25.9	28.7	10	16.6				250 (pH>=7.5)	250 (pH>=7.5)
Selenium	µg/g	0.4	0.4	0.4	*	0.4	0.5	0.2	0.4	*	0.1	1	2.9	1	1	1
Silver	µg/g	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	*	< 0.5	20	40	20	40	40
Strontium	µg/g	24	21	20	5	24	20	25	28	11	31	n/a	n/a	9,500	150,000	150,000
Thallium	µg/g	< 0.1	< 0.1	< 0.1	*	< 0.1	< 0.1	< 0.1	< 0.1	*	< 0.1	1	1	9	25	25
Tin	µg/g	0.4	0.3	0.3	*	0.4	0.4	0.6	0.7	*	0.3	50	300	50	300	300
Tungsten	µg/g	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	0.07	0.10	*	0.54	n/a	n/a	15	200	200
Uranium	µg/g	0.3	0.2	< 0.2	*	0.3	0.2	< 0.2	< 0.2	*	< 0.2	23	300	30	30	30
Vanadium	µg/g	83	82	75	9	92	104	89	96	8	72	200[c]	200[c]	200[c]	200[c]	200[c]
Zinc	µg/g	35	33	30	10	38						250	410	150 (pH <6.0)	150 (pH <6.0)	150 (pH <6.0)
														250 (pH 6.0-<6.5)	250 (pH 6.0-<6.5)	250 (pH 6.0-<6.5)
							46							350 (pH 6.5-<7.0)	350 (pH 6.5-<7.0)	350 (pH 6.5-<7.0)
								39	43	10	28			450 (pH>=7.0)	450 (pH>=7.0)	450 (pH>=7.0)

Associated AGAT file(s): 15V942889, 15V942897, 18V305465, 19V428489, 19V435966.
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BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
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[a] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[b] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[c] Proposed BC MoE Regional Background Estimate (Protocol 4 for Contaminated Sites: Determining Background Soil Quality).

TABLE 5: Summary of Analytical Results for Soil - Volatile Organic Compounds

Sample Location		BH15-2D		BH15-5	Federal Guideline		BC Standard	
Sample ID		BH15-2-2	BH15-2-5	BH15-5-2	CCME CEQG Residential (RL)[a]	CCME CEQG Commercial (CL)[a]	CSR Low Density Residential Land Use (RLLD)[b]	CSR Commercial Land Use (CL)[b]
Sample Date (yyyy mm dd)		2015 02 04	2015 02 04	2015 02 05				
Depth Interval (m)		1.1 - 1.2	3.0 - 3.4	1.2 - 1.5				
Parameter	**Units**	**Analytical Results**						
Volatile Organic Compounds								
Acetone	µg/g	< 0.5	< 0.5	< 0.5	n/a	n/a	15,000	200,000
Bromodichloromethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	100	550
Bromoform	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	300	4,000
Bromomethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	20	300
Carbon tetrachloride	µg/g	< 0.02	< 0.02	< 0.02	5	50	5	50
Chlorobenzene	µg/g	< 0.05	< 0.05	< 0.05	1	10	1	10
Chloroethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	n/a
Chloroform	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
Chloromethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	n/a
Dibromochloromethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	85	400
1,2-Dibromoethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	3.5	15
1,2-Dichlorobenzene	µg/g	< 0.05	< 0.05	< 0.05	1	10	1	10
1,3-Dichlorobenzene	µg/g	< 0.05	< 0.05	< 0.05	1	10	1	10
1,4-Dichlorobenzene	µg/g	< 0.05	< 0.05	< 0.05	1	10	1	10
1,1-Dichloroethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
1,2-Dichloroethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
1,1-Dichloroethylene	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
cis-1,2-Dichloroethylene	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
trans-1,2-Dichloroethylene	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
Dichloromethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
1,2-Dichloropropane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
cis-1,3-Dichloropropene	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	5	50
trans-1,3-Dichloropropene	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	5	50
Methyl ethyl ketone	µg/g	< 0.5	< 0.5	< 0.5	n/a	n/a	9,500	150,000
Methyl isobutyl ketone	µg/g	< 0.5	< 0.5	< 0.5	n/a	n/a	n/a	n/a
1,1,1,2-Tetrachloroethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	250	1,500
1,1,2,2-Tetrachloroethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	35	150
Tetrachloroethylene	µg/g	< 0.05	< 0.05	< 0.05	0.2	0.5	2.5	2.5
1,2,4-Trichlorobenzene	µg/g	< 0.05	< 0.05	< 0.05	2	10	2	10
1,1,1-Trichloroethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
1,1,2-Trichloroethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
Trichloroethylene	µg/g	< 0.01	< 0.01	< 0.01	0.01	0.01	0.3	0.3
Trichlorofluoromethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	4,500	70,000
Vinyl chloride	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	0.95	45

Associated AGAT file(s): 15V942889, 15V942897.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[b] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent).

TABLE 6: Summary of Analytical Results for Soil - PCBs

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Depth Interval (m)	PCBs			
				Arochlor 1242 µg/g	Arochlor 1254 µg/g	Arochlor 1260 µg/g	Total PCBs µg/g
BH15-4	BH15-4-1	2015 02 04	0.2 - 0.5	< 0.05	< 0.05	< 0.05	< 0.05
BH15-5	BH15-5-2	2015 02 05	1.2 - 1.5	< 0.05	< 0.05	< 0.05	< 0.05
BH15-6	BH15-6-1	2015 02 05	0.5 - 0.8	< 0.05	< 0.05	< 0.05	< 0.05
Federal Guideline							
CCME CEQG Residential (RL)[a]				n/a	n/a	n/a	1.3[c]
CCME CEQG Commercial (CL)[a]				n/a	n/a	n/a	33
BC Standard							
CSR Low Density Residential Land Use (RLLD)[b]				n/a	n/a	n/a	1.5
CSR Commercial Land Use (CL)[b]				n/a	n/a	n/a	35

Associated AGAT file(s): 15V942889, 15V942897.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[b] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent).
[c] Guideline includes most stringent soil and food ingestion guideline (see factsheet for more details).

TABLE 7: Summary of Analytical Results for Soil - Leachable Polycyclic Aromatic Hydrocarbons

Sample Location		TP19-50	BC Standard
Sample ID		TP19-50-04	HWR Leachate Quality Standards (HWLQ)
Sample Date (yyyy mm dd)		2019 01 14	
Parameter	**Units**	**Analytical Results**	
TCLP Polycyclic Aromatic Hydrocarbons			
Acenaphthene	µg/L	2	n/a
Acenaphthylene	µg/L	< 1	n/a
Anthracene	µg/L	1	n/a
Benzo(a)anthracene	µg/L	< 1	n/a
Benzo(a)pyrene	µg/L	< 1	1
Benzo(b)fluoranthene	µg/L	< 1	n/a
Benzo(g,h,i)perylene	µg/L	< 1	n/a
Benzo(k)fluoranthene	µg/L	< 1	n/a
Chrysene	µg/L	< 1	n/a
Dibenz(a,h)anthracene	µg/L	< 1	n/a
Fluoranthene	µg/L	< 1	n/a
Fluorene	µg/L	5	n/a
Indeno(1,2,3-cd)pyrene	µg/L	< 1	n/a
Naphthalene	µg/L	3	n/a
Phenanthrene	µg/L	7	n/a
Pyrene	µg/L	< 1	n/a
2-Methylnaphthalene	µg/L	2	n/a

Associated AGAT file(s): 19V428489.

All terms defined within the body of SNC-Lavalin's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.

- Denotes analysis not conducted.

n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD Concentration greater than HWR Leachate Quality Standards (HWLQ) Standard

TABLE 8: Summary of Analytical Results for Groundwater - Hydrocarbons

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Monocyclic Aromatic Hydrocarbons					Gross Parameters					Petroleum Hydrocarbon Fractions				Methyl tert-butyl ether [MTBE] µg/L
			Benzene µg/L	Ethylbenzene µg/L	Toluene µg/L	Xylenes µg/L	Styrene µg/L	VHw6-10 µg/L	VPHw µg/L	EPHw10-19 µg/L	LEPHw µg/L	EPH (C19-C32) µg/L	F1- µg/L	F2 (>C10-C16) µg/L	F3 (>C16-C34) µg/L	F4 (>C34-C50) µg/L	
MW15-1S	MW15-1S-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	100	< 100	< 1
	MW15-A-150210	Duplicate	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
	QA/QC RPD%		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MW15-1D	MW15-1D-150211	2015 02 11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	-	-	-	< 100	-	-	-	< 1
MW15-2S	MW15-2S-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-2D	MW15-2D-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-3	MW15-3-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-4	MW15-4-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-5	MW15-5-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW19-07S	MW19-07S-190228/0301	2019 02 28/03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	250	220	-	< 100	< 200	-	-	< 1
MW19-07D	MW19-07D-190301	2019 03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 200	< 200	-	< 100	< 200	-	-	< 1
MW19-08D	MW19-08D-190301	2019 03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 200	< 200	-	< 100	< 200	-	-	< 1
MW19-09S	MW19-09S-190228/0301	2019 02 28/03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 200	< 200	-	< 100	< 200	-	-	< 1
Federal Guideline																	
Canadian Drinking Water Quality Guidelines (CDWQG)[a]			5	1.6	24	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	15
FIGWQG Tier 2 Residential Land Use (RL)[b]			140	16,000	83	3,900	72	n/a	n/a	n/a	n/a	n/a	810	1,300	n/a	n/a	340
FIGWQG Tier 2 Commercial Land Use (CL)[b]			690	41,000	83	18,000	72	n/a	n/a	n/a	n/a	n/a	9,100	1,300	n/a	n/a	4,300
BC Standard																	
CSR Drinking Water (DW)			5	140	60	90	800	15,000[d]	n/a	5,000[d]	n/a	n/a	n/a	n/a	n/a	n/a	95
CSR Aquatic Life (AW)[c]			400	2,000	5	300	720	15,000[d]	1,500	5,000[d]	500	n/a	n/a	n/a	n/a	n/a	34,000

Associated AGAT file(s): 15V943947, 15V944419, 19V442894.

All terms defined within the body of SNC-Lavalin's report.

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- Denotes analysis not conducted.

n/a Denotes no applicable standard/guideline.

RPD Denotes relative percent difference.

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.

[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.

[c] Standard to protect freshwater aquatic life.

[d] Applicable at all sites irrespective of water use.

TABLE 9: Summary of Analytical Results for Groundwater - Polycyclic Aromatic Hydrocarbons

Sample Location		MW15-1S	MW15-1S	MW15-2S	MW15-2D	MW15-2D	MW15-3	MW15-4	MW15-5	MW19-07S	MW19-07D	MW19-07D		Federal Guideline			BC Standard	
Sample ID		MW15-1S-150211	MW15-A-150211	MW15-2S-150211	MW15-2D-150211	MW15-2D-190829	MW15-3-150211	MW15-4-150211	MW15-5-150211	MW19-07S-190301	MW19-07D-190301	MW19-A-190301	QA/QC	Canadian Drinking Water Quality Guidelines (CDWQG)[b]	FIGWQG Tier 2 Residential Land Use (RL)[c]	FIGWQG Tier 2 Commercial Land Use (CL)[c]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[d]
Sample Date (yyyy mm dd)		2015 02 11	2015 02 11	2015 02 11	2015 02 11	2019 08 29	2015 02 11	2015 02 11	2015 02 11	2019 03 01	2019 03 01	Duplicate	RPD %					
Parameter	**Units**	**Analytical Results**				**Analytical Results**												
Polycyclic Aromatic Hydrocarbons																		
Naphthalene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	0.09	*	n/a	1.1	1.1	80	10
Methylnaphthalene, 1-	µg/L	-	-	-	-	< 0.05	-	-	-	36.3	0.06	0.06	*	n/a	180	180	5.5	n/a
Methylnaphthalene, 2-	µg/L	-	-	-	-	< 0.05	-	-	-	32.1	0.05	0.05	*	n/a	180	180	15	n/a
Acenaphthylene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.02	*	n/a	46	46	n/a	n/a
Acenaphthene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	*8.64*	0.03	0.03	*	n/a	5.8	5.8	250	60
Fluorene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	*9.68*	0.04	0.03	*	n/a	3	3	150	120
Phenanthrene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.04	< 0.05	< 0.05	< 0.05	*11.1*	0.06	0.08	*	n/a	0.4	0.4	n/a	3
Anthracene	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*1.87*	*0.02*	*0.03*	*	n/a	0.012	0.012	1,000	1
Acridine	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*1.85*	< 0.05	< 0.05	*	n/a	0.05	0.05	n/a	0.5
Fluoranthene	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*2.72*	0.03	0.04	*	n/a	0.04	0.04	150	2
Pyrene	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02	*3.57*	*0.04*	*0.05*	*	n/a	0.025	0.025	100	0.2
Benz(a)anthracene	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*1.21*	0.01	*0.02*	*	n/a	0.018	0.018	0.07	1
Chrysene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	1.09	0.01	0.03	*	n/a	1.4	1.4	7	1
Benzo(b)fluoranthene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	0.41	< 0.01	0.01	*	n/a	n/a	n/a	0.07	n/a
Benzo(j)fluoranthene	µg/L	-	-	-	-	< 0.01	-	-	-	0.24	< 0.01	0.02	*	n/a	0.48	0.48	0.07	n/a
Benzo(b+j)fluoranthene	µg/L	-	-	-	-	< 0.01	-	-	-	*0.65*	< 0.01	0.03	*	n/a	0.48	0.48	0.07	n/a
Benzo(k)fluoranthene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	0.30	< 0.01	0.01	*	n/a	0.48	0.48	n/a	n/a
Benzo(a)pyrene	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	***0.74***	< 0.01	*0.02*	*	0.04	0.015	0.015	0.01	0.1
Indeno(1,2,3-cd)pyrene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	0.19	< 0.01	0.01	*	n/a	0.21	0.21	n/a	n/a
Dibenz(a,h)anthracene	µg/L	< 0.05[a]	< 0.05[a]	< 0.05[a]	< 0.05[a]	< 0.01	< 0.05[a]	< 0.05[a]	< 0.05[a]	0.09	< 0.01	< 0.01	*	n/a	0.26	0.26	0.01	n/a
Benzo(g,h,i)perylene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	*0.24*	< 0.01	0.01	*	n/a	0.17	0.17	n/a	n/a
Quinoline	µg/L	< 0.1[a]	< 0.1[a]	< 0.1[a]	< 0.1[a]	< 0.05	< 0.1[a]	< 0.1[a]	< 0.1[a]	2.89	< 0.05	< 0.05	*	n/a	3.4	3.4	0.05	34

Associated AGAT file(s): 15V944419, 19V442894, 19V512465.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Laboratory detection limit exceeds regulatory standard/guideline.
[b] Pathways Included: Aesthetic Objectives, Maximum Acceptable Concentrations.
[c] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[d] Standard to protect freshwater aquatic life.

TABLE 9 (Cont'd): Summary of Analytical Results for Groundwater - Polycyclic Aromatic Hydrocarbons

Sample Location		MW19-08D	MW19-09S	Federal Guideline			BC Standard	
Sample ID		MW19-08D-190301	MW19-09S-190301	Canadian Drinking Water Quality Guidelines (CDWQG)[b]	FIGWQG Tier 2 Residential Land Use (RL)[c]	FIGWQG Tier 2 Commercial Land Use (CL)[c]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[d]
Sample Date (yyyy mm dd)		2019 03 01	2019 03 01					
Parameter	**Units**	**Analytical Results**						
Polycyclic Aromatic Hydrocarbons								
Naphthalene	µg/L	< 0.05	*2.11*	n/a	1.1	1.1	80	10
Methylnaphthalene, 1-	µg/L	< 0.05	0.63	n/a	180	180	5.5	n/a
Methylnaphthalene, 2-	µg/L	< 0.05	0.70	n/a	180	180	15	n/a
Acenaphthylene	µg/L	< 0.02	< 0.02	n/a	46	46	n/a	n/a
Acenaphthene	µg/L	< 0.02	0.16	n/a	5.8	5.8	250	60
Fluorene	µg/L	< 0.02	0.27	n/a	3	3	150	120
Phenanthrene	µg/L	0.05	*0.78*	n/a	0.4	0.4	n/a	3
Anthracene	µg/L	0.01	*0.22*	n/a	0.012	0.012	1,000	1
Acridine	µg/L	< 0.05	< 0.05	n/a	0.05	0.05	n/a	0.5
Fluoranthene	µg/L	< 0.02	*0.34*	n/a	0.04	0.04	150	2
Pyrene	µg/L	< 0.02	*0.47*	n/a	0.025	0.025	100	0.2
Benz(a)anthracene	µg/L	< 0.01	*0.19*	n/a	0.018	0.018	0.07	1
Chrysene	µg/L	< 0.01	0.16	n/a	1.4	1.4	7	1
Benzo(b)fluoranthene	µg/L	< 0.01	0.06	n/a	n/a	n/a	0.07	n/a
Benzo(j)fluoranthene	µg/L	< 0.01	0.04	n/a	0.48	0.48	0.07	n/a
Benzo(b+j)fluoranthene	µg/L	< 0.01	0.10	n/a	0.48	0.48	0.07	n/a
Benzo(k)fluoranthene	µg/L	< 0.01	0.05	n/a	0.48	0.48	n/a	n/a
Benzo(a)pyrene	µg/L	< 0.01	***0.12***	0.04	0.015	0.015	0.01	0.1
Indeno(1,2,3-cd)pyrene	µg/L	< 0.01	0.03	n/a	0.21	0.21	n/a	n/a
Dibenz(a,h)anthracene	µg/L	< 0.01	0.01	n/a	0.26	0.26	0.01	n/a
Benzo(g,h,i)perylene	µg/L	< 0.01	0.04	n/a	0.17	0.17	n/a	n/a
Quinoline	µg/L	< 0.05	< 0.05	n/a	3.4	3.4	0.05	34

Associated AGAT file(s): 15V944419, 19V442894, 19V512465.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Laboratory detection limit exceeds regulatory standard/guideline.
[b] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[c] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[d] Standard to protect freshwater aquatic life.

TABLE 10: Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-1S									MW15-1D				Federal Guideline			BC Standard	
Sample ID		MW15-1S-150210	MW15-A-150210	QA/QC	MW15-1S-160112	MW16-A-160112	QA/QC	MW15-1S-180208	MW15-1S-190222	MW15-1S-190301	MW15-1D-150211	MW15-1D-190222	MW15-1D-190301	MW15-1D-190829	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2015 02 10	Duplicate	RPD %	2016 01 12	Duplicate	RPD %	2018 02 08	2019 02 22	2019 03 01	2015 02 11	2019 02 22	2019 03 01	2019 08 29					
Parameter	Units	Analytical Results																	
Physical Parameters																			
pH (field)	pH	7.3	7.3	*	7.3	7.3	*	7.2	***6.3***	***6.4***	7.3	7.7	7.7	7.33	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	84.5	84.7	0	136	135	1	70.4	59.6	66.3	213	116	123	117	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																			
Aluminum	µg/L								***188***	***101***					100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		74	86	15	23	30	26	***1,290***			10	4	3	3		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	24.9	25	0	37.3	36.9	1	18.8	16.4	18.6	58.7	31	32.8	30.2	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	33	43	*	13	16	*	***2,330***	***654***	***677***	< 10	< 10	22	21	300	300	300	n/a	n/a
Magnesium	mg/L	5.41	5.42	0	10.4	10.3	1	5.7	4.52	4.82	16.2	9.44	10.1	10.2	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	**1,070**	**1,080**	1	**417**	**413**	1	**1,720**	**1,020**	**1,510**	**261**	**47**	18	< 1	20	n/a	n/a	n/a	n/a
Potassium	mg/L	-	-	-	0.972	0.968	0	0.869	0.663	0.66	-	1.8	1.71	1.55	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	15.7	16	2	8.32	8.26	1	11.5	16.7	20.9	15.3	13.1	13.6	11.8	200	n/a	n/a	200	n/a
Dissolved Metals																			
Antimony	µg/L	< 0.2	< 0.2	*	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	0.5	< 0.2	< 0.2	< 0.2	6	2,000	2,000	6	90
Arsenic	µg/L	0.2	0.4	*	0.3	0.3	*	1.1	0.6	0.6	1	1.0	1.4	1.3	10	5	5	10	50
Barium	µg/L	20.5	22	7	18.9	18.9	0	36.2	23.2	28.8	20.1	8.7	12.0	8.8	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	0.03	0.02	*	< 0.01	< 0.01	*	0.09	0.02	0.01	< 0.01	< 0.01	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	13	14	7	11	10	10	5	5	6	19	21	17	16	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L														5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
		0.09	0.09	*				0.08	0.08	0.07									1.5 (H >30-<90)
					0.09	0.09	*					0.05	0.10	0.01					2.5 (H >90-<150)
																			3.5 (H >150-<210)
											0.01								4 (H >=210)
Chromium	µg/L	0.6	0.8	*	< 0.5	< 0.5	*	1.5	0.9	< 0.5	< 0.5	1.3	1.5	2.4	50	8.9	8.9	50	10
Cobalt	µg/L	2.78	2.72	2	0.41	0.40	2	7.35	3.63	3.72	0.43	0.07	< 0.05	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L														1,000	2 - 4	2 - 4	1,500	20 (H <50)
								6.9	*4.6*	*3.3*									30 (H >50-<75)
		2.7	*10.9*	*															40 (H >75-<100)
												1.3	2.0	0.7					50 (H >100-<125)
					1.7	1.6	*												60 (H >125-<150)
																			70 (H >150-<175)
																			80 (H >175-<200)
											1.5								90 (H >=200)
Lead	µg/L														5	1 - 7	1 - 7	10	40 (H<50)
		< 0.05	0.08	*				0.93	0.05	< 0.05									50 (H 50-<100)
					< 0.05	< 0.05	*					< 0.05	< 0.05	< 0.05					60 (H 100-<200)
											< 0.05								110 (H 200-<300)
Lithium	µg/L	0.7	0.7	*	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	0.8	0.7	< 0.5	0.6	n/a	n/a	n/a	8	n/a
Mercury	µg/L	< 0.01	< 0.01	*	< 0.01	< 0.01	*	0.02	-	-	< 0.01	-	-	-	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.23	0.27	*	0.09	0.06	*	0.12	0.11	0.05	17.3	3.07	2.38	1.97	n/a	73	73	250	10,000
Nickel	µg/L								3.4						n/a	25 - 150	25 - 150	80	250 (H 0-<60)
		5.7	6.1	*				5.5		3.9		0.6		< 0.2					650 (H 60-<120)
					3.4	3.4	*						0.4						1,100 (H 120-<180)
											1.7								1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	*	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	1	1	10	20
Silver	µg/L	0.03	0.04	*				< 0.02	< 0.02	0.03					n/a	0.25	0.25	20	0.5 (H <=100)
					< 0.02	< 0.02	*				< 0.02	< 0.02	< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	-	-	-	-	-	-	105	103	103	-	200	185	200	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.01	0.03	*	0.01	0.02	*	< 0.01	0.03	0.03	< 0.01	0.02	0.01	< 0.01	n/a	0.8	0.8	n/a	3
Tin	µg/L	-	-	-	-	-	-	< 0.05	< 0.05	< 0.05	-	0.28	0.58	0.55	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	3	2.8	7	1.7	1.9	*	25.1	5.9	4.1	0.9	2.2	1.7	1.5	n/a	100	100	n/a	1,000
Tungsten	µg/L	-	-	-	-	-	-	0.38	< 0.01	< 0.01	-	0.69	0.56	-	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.07	0.07	0	0.02	0.02	*	0.15	0.04	0.03	0.95	1.13	1.03	0.97	20	15	15	20	85
Vanadium	µg/L	1	1.2	*	0.6	0.7	*	5.4	2.4	0.9	2.5	3.1	2.5	2.4	n/a	n/a	n/a	20	n/a
Zinc	µg/L	2	3	*				5	2	2					5,000	30	30	3,000	75 (H 0-<90)
																			150 (H 90-<100)
					< 2	< 2	*					3	4	< 2					900 (H 100-<200)
											< 2								1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894, 19V512465.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 10 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-2S								MW15-2D				Federal Guideline			BC Standard	
Sample ID		MW15-2S-150210	MW15-2S-160113	MW15-2S-171030	MW15-2S-180208	MW18-A-180208	QA/QC	MW15-2S-190222	MW15-2S-190228	MW15-2D-150210	MW15-2D-160113	MW15-2D-171030	MW15-2D-180208	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2015 02 10	2016 01 13	2017 10 30	2018 02 08	Duplicate	RPD %	2019 02 22	2019 02 28	2015 02 10	2016 01 13	2017 10 30	2018 02 08					
Parameter	Units	Analytical Results																
Physical Parameters																		
pH (field)	pH	8.1	7.1	-	7.7	7.7	0	7.1	7.7	8.8	8.3	-	**6.9**	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	146	88.1	51.1	96.1	68	34	45.8	43.3	146	132	124	130	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																		
Aluminum	µg/L			***352***								< 2		100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		12	2		8	3	*	2	3	6	< 2		6		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	42.1	25.7	14.1	29.1	18	47	11.4	10.8	33.9	29.3	27.6	29.6	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	< 10	< 10	***24,100***	***28,300***	***28,600***	1	< 10	21	< 10	< 10	< 10	14	300	300	300	n/a	n/a
Magnesium	mg/L	10	5.81	3.87	5.7	5.59	2	4.2	3.97	14.9	14.3	13.3	13.6	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	**592**	**30**	**1,670**	**1,780**	**1,800**	1	9	2	**323**	< 1	< 1	< 1	20	n/a	n/a	n/a	n/a
Potassium	mg/L	-	0.794	13.1	0.515	0.471	9	0.285	0.189	-	0.823	0.628	0.621	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	15.5	13.3	60.3	6.56	6.39	3	5.96	6.5	31.1	8.91	8.02	8.98	200	n/a	n/a	200	n/a
Dissolved Metals																		
Antimony	µg/L	< 0.2	< 0.2	0.5	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	6	2,000	2,000	6	90
Arsenic	µg/L	0.2	0.2	***19.2***	*8.7*	*8.3*	5	< 0.1	0.1	0.9	1.1	1.2	1.2	10	5	5	10	50
Barium	µg/L	30.7	14.6	105	34.1	34.0	0	13.7	13.3	7.8	5.1	5.3	4.4	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	0.33	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	20	9	35	5	4	*	5	5	21	10	9	7	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L													5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
			0.02	< 0.01		< 0.01	*	0.03	0.03									1.5 (H >30-<90)
		0.1			< 0.01					0.02	< 0.01	0.03	< 0.01					2.5 (H >90-<150)
																		3.5 (H >150-<210)
																		4 (H >=210)
Chromium	µg/L	< 0.5	< 0.5	3.0	< 0.5	< 0.5	*	< 0.5	< 0.5	2.4	1.1	1.2	1.0	50	8.9	8.9	50	10
Cobalt	µg/L	3	0.06	13.0	10.1	9.95	1	< 0.05	< 0.05	0.64	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L							0.6	0.4					1,000	2 - 4	2 - 4	1,500	20 (H <50)
				< 0.2		< 0.2	*											30 (H >50-<75)
			0.6		0.7													40 (H >75-<100)
												< 0.2						50 (H >100-<125)
		1.1								1.1	0.5		0.5					60 (H >125-<150)
																		70 (H >150-<175)
																		80 (H >175-<200)
																		90 (H >=200)
Lead	µg/L							< 0.05	< 0.05					5	1 - 7	1 - 7	10	40 (H<50)
			< 0.05	0.12	< 0.05	< 0.05	*											50 (H 50-<100)
		< 0.05								< 0.05	< 0.05	< 0.05	< 0.05					60 (H 100-<200)
																		110 (H 200-<300)
Lithium	µg/L	2.4	1.1	9.2	0.8	0.8	*	0.6	0.5	1.5	0.8	0.7	0.7	n/a	n/a	n/a	8	n/a
Mercury	µg/L	< 0.01	< 0.01	-	< 0.01	< 0.01	*	-	-	< 0.01	< 0.01	< 0.01	< 0.01	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.89	0.25	0.10	0.58	0.66	13	0.14	0.16	5.14	0.61	0.48	0.18	n/a	73	73	250	10,000
Nickel	µg/L			*29.3*				2.5	2.1					n/a	25 - 150	25 - 150	80	250 (H 0-<60)
			1.4		8.9	9.0	*											650 (H 60-<120)
		10.7								2.5	0.2	0.2	0.2					1,100 (H 120-<180)
																		1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	1	1	10	20
Silver	µg/L		< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02					n/a	0.25	0.25	20	0.5 (H <=100)
		0.02								0.02	< 0.02	< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	-	-	-	69.5	65.2	6	30.1	24.8	-	-	-	53.9	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.02	0.02	0.03	< 0.01	< 0.01	*	0.03	0.02	< 0.01	< 0.01	< 0.01	< 0.01	n/a	0.8	0.8	n/a	3
Tin	µg/L	-	-	-	< 0.05	< 0.05	*	< 0.05	< 0.05	-	-	-	< 0.05	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	2.1	1.4	9.3	3.8	4.2	10	1.7	1.5	2.6	2.0	2.7	4.8	n/a	100	100	n/a	1,000
Tungsten	µg/L	-	-	-	0.29	0.11	90	< 0.01	0.04	-	-	-	0.35	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.18	0.06	0.31	0.14	0.13	7	0.02	0.02	0.26	0.11	0.06	0.07	20	15	15	20	85
Vanadium	µg/L	< 0.5	0.6	5.1	1.1	1.2	*	< 0.5	< 0.5	4.1	10.0	11.7	11.7	n/a	n/a	n/a	20	n/a
Zinc	µg/L		< 2	12		< 2	*	3	2					5,000	30	30	3,000	75 (H 0-<90)
					3													150 (H 90-<100)
		2								< 2	< 2	< 1	< 2					900 (H 100-<200)
																		1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894, 19V512465.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Pathways Included: Aesthetic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 10 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-2D (Cont'd)					MW15-3						MW15-4		Federal Guideline			BC Standard	
Sample ID		MW15-2D-190222	MW19-A-190222	QA/QC	MW15-2D-190228	MW15-2D-190828/29	MW15-3-150210	MW15-3-160112	MW15-3-171026	MW15-3-180208	MW15-3-190222	MW15-3-190228	MW15-4-150210	MW15-4-160113	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2019 02 22	Duplicate	RPD %	2019 02 28	2019 08 28	2015 02 10	2016 01 12	2017 10 26	2018 02 08	2019 02 22	2019 02 28	2015 02 10	2016 01 13					
Parameter	**Units**	**Analytical Results**																	
Physical Parameters																			
pH (field)	pH	7.1	7.1	0	7.7	7.45	7.6	8	8.1	7.1	7.2	7.6	7.5	7.5	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	115	115	0	122	111	58.6	46.9	17.2	20.1	52.9	52.7	125	161	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																			
Aluminum	µg/L														100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		2	< 2	*	< 2	27	23	10	21	8	15	17	10	< 2		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	25.8	25.7	0	27.4	24.8	17.8	14.2	5.05	5.87	15.8	15.8	35.3	46.6	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	< 10	< 10	*	25	31	261	***321***	***329***	***2,980***	17	21	< 10	10	300	300	300	n/a	n/a
Magnesium	mg/L	12.3	12.3	0	13	11.9	3.44	2.79	1.11	1.31	3.27	3.21	8.89	10.8	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	< 1	< 1	*	< 1	19	**596**	**155**	**128**	**233**	**294**	5	**204**	3	20	n/a	n/a	n/a	n/a
Potassium	mg/L	0.523	0.551	5	0.462	0.541	-	0.293	0.591	0.414	0.355	0.223	-	1.12	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	8.56	8.55	0	8.68	7.75	9.96	5.95	35.4	10.9	8.63	6.76	36.1	30.9	200	n/a	n/a	200	n/a
Dissolved Metals																			
Antimony	µg/L	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	< 0.2	0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	6	2,000	2,000	6	90
Arsenic	µg/L	1.1	0.9	20	1.1	1.1	0.4	0.3	1.4	1.2	0.1	0.1	0.2	0.3	10	5	5	10	50
Barium	µg/L	4.0	4.1	2	4.3	4.6	7.8	12.5	12.6	5.0	7.6	8.6	28	24.5	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	*	< 0.01	< 0.01	0.02	0.01	0.07	0.01	0.01	0.02	0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	8	8	*	7	7	5	2	4	< 2	3	2	70	76	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L								***0.04***	< 0.01					5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
			< 0.01	*			0.02	0.04			***0.11***	0.02							1.5 (H >30-<90)
		< 0.01			0.02	< 0.01							0.08						2.5 (H >90-<150)
														0.02					3.5 (H >150-<210)
																			4 (H >=210)
Chromium	µg/L	1.0	0.9	*	0.9	1.0	0.7	< 0.5	1.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	8.9	8.9	50	10
Cobalt	µg/L	< 0.05	< 0.05	*	< 0.05	0.10	3.67	1.04	1.82	1.95	0.68	< 0.05	1.41	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L							0.7	0.8	1.2					1,000	2 - 4	2 - 4	1,500	20 (H <50)
							0.4				0.7	0.7							30 (H >50-<75)
																			40 (H >75-<100)
		0.7	***16.2***	*	0.3	0.8							1.1						50 (H >100-<125)
																			60 (H >125-<150)
														0.9					70 (H >150-<175)
																			80 (H >175-<200)
																			90 (H >=200)
Lead	µg/L							< 0.05	0.07	0.06					5	1 - 7	1 - 7	10	40 (H<50)
							< 0.05				< 0.05	< 0.05							50 (H 50-<100)
		< 0.05	< 0.05	*	< 0.05	< 0.05							< 0.05	< 0.05					60 (H 100-<200)
																			110 (H 200-<300)
Lithium	µg/L	0.8	0.8	*	0.5	0.8	0.7	< 0.5	1.7	< 0.5	< 0.5	< 0.5	2.2	1.8	n/a	n/a	n/a	8	n/a
Mercury	µg/L	-	-	-	-	-	< 0.01	< 0.01	< 0.01	< 0.01	-	-	0.01	< 0.01	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.43	0.49	13	0.67	0.21	0.51	0.19	0.20	0.12	0.16	0.12	0.26	0.15	n/a	73	73	250	10,000
Nickel	µg/L						4.6	1.3	2.4	1.1	0.9	0.5			n/a	25 - 150	25 - 150	80	250 (H 0-<60)
		0.3	0.3	*		0.4													650 (H 60-<120)
					< 0.2								5.4	1.3					1,100 (H 120-<180)
																			1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	*	< 0.5	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	1	1	10	20
Silver	µg/L						< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02			n/a	0.25	0.25	20	0.5 (H <=100)
		< 0.02	< 0.02	*	< 0.02	< 0.02							< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	57.7	56.9	1	54.8	53.8	-	-	-	28.7	58.1	51.2	-	-	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.03	0.03	*	0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	0.03	0.02	< 0.01	0.02	n/a	0.8	0.8	n/a	3
Tin	µg/L	0.05	< 0.05	*	< 0.05	< 0.05	-	-	-	< 0.05	< 0.05	< 0.05	-	-	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	3.4	3.1	9	2.9	3.1	1.3	0.9	1.3	2.6	1.3	1.1	2	1.5	n/a	100	100	n/a	1,000
Tungsten	µg/L	< 0.01	< 0.01	*	0.30	-	-	-	-	0.17	< 0.01	0.03	-	-	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.07	0.07	0	0.06	0.05	0.05	0.02	0.21	0.05	0.04	0.03	0.21	0.22	20	15	15	20	85
Vanadium	µg/L	13.2	12.2	8	11.7	15.6	0.9	1.5	1.1	1.1	0.7	< 0.5	0.6	< 0.5	n/a	n/a	n/a	20	n/a
Zinc	µg/L						< 2	< 2	2	< 2	6	< 2			5,000	30	30	3,000	75 (H 0-<90)
																			150 (H 90-<100)
		4	3	*	4	< 2							3	< 2					900 (H 100-<200)
																			1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894, 19V512465.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 10 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-4 (Cont'd)			MW15-5					MW18-06S			MW18-06D		Federal Guideline			BC Standard	
Sample ID		MW15-4-180208	MW15-4-190222	MW15-4-190228	MW15-5-150210	MW15-5-160113	MW15-5-180208	MW15-5-190222	MW15-5-190301	MW18-6S-180208	MW18-06S-190222	MW18-06S-190228	MW18-6D-180208	MW18-06D-190222	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2018 02 08	2019 02 22	2019 02 28	2015 02 10	2016 01 13	2018 02 08	2019 02 22	2019 03 01	2018 02 08	2019 02 22	2019 02 28	2018 02 08	2019 02 22					
Parameter	Units	Analytical Results																	
Physical Parameters																			
pH (field)	pH	**6.7**	7.1	7.6	7.8	-	**6.9**	-	7.9	7.1	8.2	7.4	7.5	8.2	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	118	117	121	65.2	201	83.3	93.1	80.8	103	136	128	168	131	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																			
Aluminum	µg/L					*24*		*19*							100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		2	4	< 2	71		55		28	7	4	2	5	6		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	31.1	31.4	32.6	19.5	52.1	26.3	24.8	22.7	30.9	37.9	35.9	48	35.6	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	< 10	< 10	< 10	37	10	165	73	76	< 10	< 10	< 10	< 10	< 10	300	300	300	n/a	n/a
Magnesium	mg/L	9.69	9.26	9.67	4.02	17.2	4.29	7.57	5.86	6.26	10	9.34	11.6	10.2	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	< 1	< 1	< 1	**281**	**5,250**	**1,680**	**305**	**1,170**	**62**	**80**	**71**	**192**	< 1	20	n/a	n/a	n/a	n/a
Potassium	mg/L	0.775	0.653	0.566	-	5.82	2.07	3.39	2.26	2.51	1.86	1.63	1.79	1.44	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	33	31.8	33.4	4.25	5.76	2.55	3.32	2.54	44.2	19.1	17.2	16.1	13	200	n/a	n/a	200	n/a
Dissolved Metals																			
Antimony	µg/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	1.0	0.3	0.3	0.5	0.2	6	2,000	2,000	6	90
Arsenic	µg/L	0.3	0.3	0.2	< 0.1	0.3	0.2	0.2	0.1	1.2	0.8	0.8	0.6	1.0	10	5	5	10	50
Barium	µg/L	19.0	16.8	18.9	10.9	64.1	29.8	32.2	24.4	18.2	29.7	29.3	13.3	15.3	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	78	77	81	7	13	5	8	8	55	19	17	44	11	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L														5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
					0.07		0.05		0.06										1.5 (H >30-<90)
		< 0.01	0.11	0.02				0.06		< 0.01	< 0.01	0.01		0.02					2.5 (H >90-<150)
						0.16							< 0.01						3.5 (H >150-<210)
																			4 (H >=210)
Chromium	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	0.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5	50	8.9	8.9	50	10
Cobalt	µg/L	< 0.05	< 0.05	< 0.05	1.56	0.79	0.87	0.14	0.32	0.17	0.09	0.07	0.32	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L														1,000	2 - 4	2 - 4	1,500	20 (H <50)
					1.5														30 (H >50-<75)
							2.0	*3.1*	1.7										40 (H >75-<100)
		0.6	0.5	0.4						1.1									50 (H >100-<125)
											0.7	0.5		0.8					60 (H >125-<150)
													2.2						70 (H >150-<175)
																			80 (H >175-<200)
						6.0													90 (H >=200)
Lead	µg/L														5	1 - 7	1 - 7	10	40 (H<50)
					< 0.05		< 0.05	< 0.05	< 0.05										50 (H 50-<100)
		< 0.05	< 0.05	< 0.05						< 0.05	< 0.05	< 0.05	< 0.05	< 0.05					60 (H 100-<200)
						0.05													110 (H 200-<300)
Lithium	µg/L	1.2	1.3	1.6	1.6	0.8	< 0.5	< 0.5	< 0.5	9.2	3.0	2.5	0.9	1.2	n/a	n/a	n/a	8	n/a
Mercury	µg/L	< 0.01	-	-	< 0.01	< 0.01	< 0.01	-	-	< 0.01	-	-	< 0.01	-	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.09	0.13	0.14	0.06	0.14	< 0.05	0.13	0.07	13.7	11.2	10.0	6.48	3.88	n/a	73	73	250	10,000
Nickel	µg/L														n/a	25 - 150	25 - 150	80	250 (H 0-<60)
		0.7	0.8		3		1.4	1.1	0.7	1.0									650 (H 60-<120)
				0.6							0.4	< 0.2	1.0	0.2					1,100 (H 120-<180)
						4.8													1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*1.3*	0.7	0.8	*1.6*	0.7	50	1	1	10	20
Silver	µg/L				0.02		< 0.02	< 0.02	< 0.02						n/a	0.25	0.25	20	0.5 (H <=100)
		< 0.02	< 0.02	< 0.02		< 0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	130	145	132	-	-	142	197	180	102	127	104	148	105	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	< 0.01	0.03	0.01	< 0.01	0.04	< 0.01	0.03	0.01	< 0.01	0.04	0.02	< 0.01	0.05	n/a	0.8	0.8	n/a	3
Tin	µg/L	< 0.05	< 0.05	< 0.05	-	-	< 0.05	0.73	< 0.05	< 0.05	0.11	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	3.7	2.1	1.9	3.3	1.7	3.5	2.0	1.9	3.3	2.4	1.8	3.1	2.6	n/a	100	100	n/a	1,000
Tungsten	µg/L	0.14	< 0.01	0.01	-	-	0.11	< 0.01	0.02	0.17	0.22	0.65	0.13	< 0.01	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.05	0.06	0.05	0.05	0.17	0.02	0.02	0.02	4.54	2.91	2.11	1.49	1.39	20	15	15	20	85
Vanadium	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.5	< 0.5	< 0.5	0.8	0.8	< 0.5	0.9	0.8	n/a	n/a	n/a	20	n/a
Zinc	µg/L				9		7		5						5,000	30	30	3,000	75 (H 0-<90)
								7											150 (H 90-<100)
		< 2	2	< 2						< 2	< 2	< 2	< 2	< 2					900 (H 100-<200)
						4													1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894, 19V512465.
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RDL Denotes reported detection limit.

[a] Pathways Included: Aesthetic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 10 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW18-06D (Cont'd)	MW19-07S	MW19-07D			MW19-08D	MW19-09S	Federal Guideline			BC Standard	
Sample ID		MW18-06D-190228	MW19-07S-190228	MW19-07D-190301	MW19-A-190301	QA/QC	MW19-08D-190301	MW19-09S-190228	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2019 02 28	2019 02 28	2019 03 01	Duplicate	RPD %	2019 03 01	2019 02 28					
Parameter	**Units**	**Analytical Results**											
Physical Parameters													
pH (field)	pH	7.4	8.2	7.7	7.7	*	**6.9**	7.6	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	125	211	180	183	2	192	99.3	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics													
Aluminum	µg/L			6	6	*			100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		10	***876***				9	73		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	34.9	84.4	53.8	54.3	1	56.2	35	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	14	17	49	20	*	16	17	300	300	300	n/a	n/a
Magnesium	mg/L	9.31	0.083	11.2	11.4	2	12.6	2.89	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	< 1	< 1	**1,400**	**1,420**	1	**1,310**	**125**	20	n/a	n/a	n/a	n/a
Potassium	mg/L	1.34	4.87	1.73	1.8	4	2.71	2.32	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	12.8	51.8	40.5	41.6	3	23.6	18	200	n/a	n/a	200	n/a
Dissolved Metals													
Antimony	µg/L	0.2	2.0	0.9	0.9	*	0.2	0.5	6	2,000	2,000	6	90
Arsenic	µg/L	0.9	3.2	2.2	2.1	5	1.1	0.8	10	5	5	10	50
Barium	µg/L	13.9	13.5	14.7	14.6	1	24.7	16.7	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	11	14	36	35	3	16	10	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L								5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
													1.5 (H >30-<90)
		< 0.01						0.03					2.5 (H >90-<150)
				0.03	0.04	*	0.05						3.5 (H >150-<210)
			0.02										4 (H >=210)
Chromium	µg/L	1.1	***14.0***	< 0.5	< 0.5	*	< 0.5	0.7	50	8.9	8.9	50	10
Cobalt	µg/L	< 0.05	0.38	2.27	2.36	4	2.45	1.11	n/a	n/a	n/a	20[d]	40
Copper	µg/L								1,000	2 - 4	2 - 4	1,500	20 (H <50)
													30 (H >50-<75)
								1.9					40 (H >75-<100)
													50 (H >100-<125)
		0.7											60 (H >125-<150)
							1.3						70 (H >150-<175)
				2.9	2.6	11							80 (H >175-<200)
			9.3										90 (H >=200)
Lead	µg/L								5	1 - 7	1 - 7	10	40 (H<50)
								< 0.05					50 (H 50-<100)
		< 0.05		< 0.05	< 0.05	*	< 0.05						60 (H 100-<200)
			< 0.05										110 (H 200-<300)
Lithium	µg/L	1.2	0.5	2.0	1.5	*	1.8	9.4	n/a	n/a	n/a	8	n/a
Mercury	µg/L	-	-	-	-	-	-	-	1	0.026	0.026	1	0.25
Molybdenum	µg/L	3.92	4.80	15.8	15.7	1	10.5	1.72	n/a	73	73	250	10,000
Nickel	µg/L								n/a	25 - 150	25 - 150	80	250 (H 0-<60)
								3.5					650 (H 60-<120)
		< 0.2											1,100 (H 120-<180)
			2.9	5.4	5.4	0	4.9						1,500 (H >=180)
Selenium	µg/L	< 0.5	***1.1***	0.6	0.6	*	0.5	< 0.5	50	1	1	10	20
Silver	µg/L							< 0.02	n/a	0.25	0.25	20	0.5 (H <=100)
		< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02						15 (H >100)
Strontium	µg/L	90.9	228	161	163	1	230	199	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.01	0.02	0.02	0.02	*	0.02	0.02	n/a	0.8	0.8	n/a	3
Tin	µg/L	0.13	1.75	0.36	0.38	5	0.79	0.31	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	2.3	1.4	1.9	2.1	*	2.9	1.6	n/a	100	100	n/a	1,000
Tungsten	µg/L	0.10	0.44	< 0.01	0.12	*	0.14	0.08	n/a	n/a	n/a	3	n/a
Uranium	µg/L	1.09	0.03	2.14	2.17	1	1.19	0.58	20	15	15	20	85
Vanadium	µg/L	0.7	13.2	2.1	1.5	*	0.6	1.3	n/a	n/a	n/a	20	n/a
Zinc	µg/L								5,000	30	30	3,000	75 (H 0-<90)
								114					150 (H 90-<100)
		3		4	4	*	5						900 (H 100-<200)
			3										1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894, 19V512465.
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RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Pathways Included: Aesthetic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 11: Summary of Analytical Results for Asbestos Samples

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Depth Interval (m)	Type of Sample	Bulk Asbestos %
TP19-66	TP19-66-01a	2019 12 12	1.5 - 1.7	white tile, grey grout, grey concrete	not detected
	TP19-66-01b	2019 12 12	1.5 - 1.7	white tile, grey grout, grey concrete	not detected
	TP19-66-01c	2019 12 12	1.5 - 1.7	white tile, grey grout, grey concrete	not detected
	TP19-66-02a	2019 12 12	1.7 - 1.8	grey porous concrete	not detected
	TP19-66-02b	2019 12 12	1.7 - 1.8	grey porous concrete	not detected
	TP19-66-02c	2019 12 12	1.7 - 1.8	grey porous concrete	not detected
	TP19-66-03	2019 12 12	1.8 - 2.0	tan tile, brown grout	not detected
TP19-68	TP19-68-01a	2019 12 12	1.4 - 1.5	grey mortar	not detected
	TP19-68-01b	2019 12 12	1.4 - 1.5	grey mortar	not detected
	TP19-68-01c	2019 12 12	1.4 - 1.5	grey mortar	not detected
	TP19-68-02a	2019 12 12	1.5 - 1.7	light orange brick	not detected
	TP19-68-02b	2019 12 12	1.5 - 1.7	light orange brick	not detected
	TP19-68-02c	2019 12 12	1.5 - 1.7	light orange brick	not detected
TP19-69	TP19-69-01a	2019 12 12	1.5 - 1.7	black brittle papery layers	not detected
	TP19-69-01b	2019 12 12	1.5 - 1.7	black brittle papery layers	not detected
	TP19-69-01c	2019 12 12	1.5 - 1.7	black brittle papery layers	not detected
TP19-71	TP19-71-01	2019 12 12	1.7 - 1.8	grey concrete	not detected

Associated AGAT file(s): 19V557561.
All terms defined within the body of SNC-Lavalin's report.

Annex D. Physical Data

- Borehole and Test Pit Soil Logs
- Groundwater Monitoring Data

Annex D. Physical Data

- Borehole and Test Pit Soil Logs
- Groundwater Monitoring Data

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Borehole No. : BH19-07D

PAGE 1 OF 1

Drilling Contractor	Drillwell Enterprises Ltd.	Date Monitored	n/a	Project Number:	626268
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	110.179	Borehole Logged By:	TP
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	110.092	Date Drilled:	2019 02 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5458694.485	Easting: 410759.422	Log Typed By:	NDS

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: MW19-07D

Depth (m)	Soil Description	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND (FILL), fine to coarse grained, some silt, some gravel, fine, subrounded, dark brown, medium dense, moist, trace rootlets.	07-01		69	50
	Below 0.6 m - fine and coarse gravel, angular, oxidized orange, no rootlets.	07-02			60
1		07-03		80	35
	Below 1.5 m - no oxidation.				
	CONCRETE DEBRIS (FILL).				
2					
3	SAND and GRAVEL (FILL), fine to coarse grained sand, fine and coarse gravel, subangular to subrounded, brown, loose, damp, some concrete debris.	**07-04** ***07-05**		133	50
	SAND, fine to coarse grained, some silt, some gravel, fine and coarse, grey/brown, very dense, dry.	07-06			180
		07-07			260
4				148	
	Below 4.6 m - dense, damp.	07-08			260
5					
		07-09		238	45
6		07-10		167	130
	Bottom of hole at 6.1 m.				
7					
8					
9					
10					

ROAD BOX
CONCRETE
SAND
BENTONITE
MW19-07D
SAND

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 21 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Borehole No. : BH19-07S

PAGE 1 OF 1

Drilling Contractor	Drillwell Enterprises Ltd.	Date Monitored	n/a	Project Number:	626268
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	110.164	Borehole Logged By:	TP
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	110.095	Date Drilled:	2019 02 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5458694.597	Easting: 410758.605	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

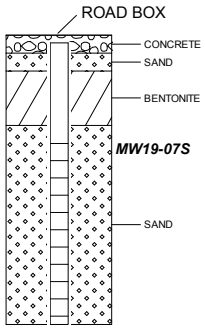
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: MW19-07S

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND (FILL), fine to coarse grained, some silt, some gravel, fine, subrounded, dark brown, medium dense, moist, trace rootlets.						
1	Below 0.6 m - fine and coarse gravel, angular, oxidized orange, no rootlets.						
	Below 1.5 m - no oxidation.						
2	CONCRETE DEBRIS (FILL).						
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							



NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

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Client
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Location
Nanaimo Transmitter, Nanoose Bay, BC

Borehole No. : BH19-09D

PAGE 1 OF 1

Drilling Contractor	Drillwell Enterprises Ltd.	Date Monitored	n/a	Project Number:	626268
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	110.341	Borehole Logged By:	TP
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	110.272	Date Drilled:	2019 02 07
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5458677.814	Easting: 410770.248	Log Typed By:	NDS

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

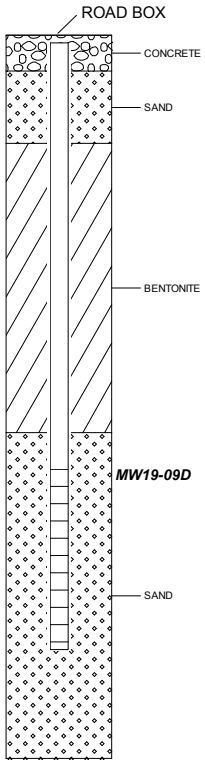
Reading within indicated scale; Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC; Slotted PVC

Well Name 1: MW19-09D

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND (FILL), fine to coarse grained, some silt, trace gravel, fine, subrounded to rounded, brown/black, medium dense, moist, organics/rootlets.			09-01		67	140
1	Below 0.6 m - some gravel, fine and coarse, subrounded to subangular, trace clay, concrete debris.			09-02			130
2	Between 1.5 m and 1.7 m - SAND and ORGANICS seam, fine to coarse grained, trace silt, black, medium dense, moist, rootlets.			09-03		106	170
				09-04			300
	No recovery.			***09-05**		25	
3	SAND, fine to coarse grained, some silt, trace gravel, fine and coarse, subrounded to rounded, grey/brown, very dense, crumbly, dry.			**09-06**		95	140
				09-07			130
4	Below 4.0 m - some gravel, fine and coarse, trace silt, damp.			09-08		120	140
5				09-09		203	130
6				09-10		150	130
	Bottom of hole at 6.1 m.						
7							
8							
9							
10							



NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Borehole No. : BH19-09S

PAGE 1 OF 1

Drilling Contractor	Drillwell Enterprises Ltd.	Date Monitored	n/a	Project Number:	626268
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	110.354	Borehole Logged By:	TP
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	110.269	Date Drilled:	2019 02 07
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5458677.042	Easting: 410769.694	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

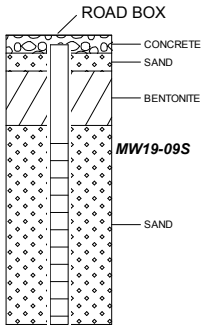
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: MW19-09S

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND (FILL), fine to coarse grained, some silt, trace gravel, fine, subrounded to rounded, brown/black, medium dense, moist, organics/rootlets.						
1	Below 0.6 m - some gravel, fine and coarse, subrounded to subangular, trace clay, concrete debris.						
	Between 1.5 m and 1.7 m - SAND and ORGANICS seam, fine to coarse grained, trace silt, black, medium dense, moist, rootlets.						
2	No recovery.						
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							



NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 21 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-41

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.464	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458703.923	Easting: 410729.355	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND (FILL), fine grained, some gravel, fine, subrounded, trace coarse gravel, subangular, brown, medium dense, damp.			**41-01**		
1	At 0.9 m - grounding cable.					
	SAND and GRAVEL (FILL), fine to coarse grained sand, fine and coarse gravel, subrounded, brown, medium dense, damp.			41-02		
	SAND, some silt, trace gravel, fine, subrounded to subangular, grey, medium dense, damp.			41-03		
2	Below 1.8 m - increased gravel, decreased silt, dark brown.			41-04		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-43

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.116	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458714.538	Easting: 410738.312	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine to medium grained sand, fine gravel, trace silt, brown, dense, damp, silt pockets, black, trace rootlets.			**43-01**		
1	Below 0.9 m - fine to coarse grained sand, fine and coarse gravel, occasional cobbles, mottled orange, no silt pockets.			43-02		
	SAND, fine grained, some gravel, fine and coarse, subrounded, trace silt, brown, loose, wet.			**43-03**		
2	Below 2.1 m - increased gravel, occasional cobbles.			43-04		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-44

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.734	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458707.423	Easting: 410749.413	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND (FILL), fine to medium grained, some silt, trace gravel, fine, subrounded, light brown, dense, moist, trace organics/rootlets.			**44-01**		
1	Below 0.9 m - fine and coarse gravel, damp, no rootlets.			**44-02** ***44-03**		
	SAND, fine grained, gravelly, fine and coarse, subrounded, trace silt, occasional cobbles, subrounded, brown, dense, damp, trace rootlets.			44-04		
2	Below 1.8 m - moist.			44-05		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-45

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.177	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458715.835	Easting: 410757.627	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND and GRAVEL (FILL), fine grained sand, fine and coarse gravel, subrounded, trace silt, light brown, medium dense, damp, black pockets (suspect topsoil), trace organics/rootlets.			**45-01**		
1	Below 0.9 m - moist, no black pockets.			45-02		
	SAND, fine to medium grained, some silt, trace gravel, fine, subrounded, grey, mottled orange, very dense, damp to moist.			45-03		
2	Below 2.1 m - occasional cobbles, grey/brown, dense, damp.			45-04		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-46

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.691	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458705.017	Easting: 410765.872	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND (FILL), fine to medium grained, some gravel, fine, subrounded, trace silt, light brown, medium dense, damp, trace black pockets, trace roots.			**46-01** ***46-02**		
1	Below 0.9 m - orange/brown, moist, no roots.			46-03		
	SAND, fine grained, some silt, trace gravel, fine and coarse, subrounded, grey/brown, dense, damp, trace wood debris.			**46-04**		
2	Below 1.8 m - no wood debris.			46-05		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-47

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.372	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458709.282	Easting: 410775.221	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND (FILL), fine grained, some gravel, trace silt, light brown, medium dense, damp, trace roots.			**47-01**		
1	Below 0.9 m - fine to coarse grained sand, no silt, orange/brown, moist.			47-02		
	SAND, fine to medium grained, some silt, trace gravel, fine and coarse, subrounded, occasional cobbles, grey/brown, very dense, damp.			**47-03**		
2	Below 2.1 m - fine gravel, dense, moist.			47-04		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-48

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.883	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458693.880	Easting: 410779.980	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine grained sand, fine and coarse gravel, subrounded, trace silt, light brown, medium dense, damp, trace roots. Below 0.6 m - some silt, occasional cobbles, subrounded, moist.			**48-01** ***48-02**		
1				48-03		
	SAND (FILL), medium to coarse grained, trace gravel, fine, subrounded, red/brown, medium dense, moist.			**48-04**		
2	SAND, fine grained, some silt, trace gravel, fine and coarse, subrounded, grey/brown, dense, damp.			48-05		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-49

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.248	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458679.521	Easting: 410778.962	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	GRASS.						○ Reading within indicated scale ● Reading outside indicated scale 10^1 10^2 10^3 10^4
	SAND and GRAVEL (FILL), fine grained sand, fine and coarse gravel, trace silt, brown, medium dense, damp, trace roots.			**49-01**			
1	Below 0.9 m - occasional cobbles, subrounded, no roots.			49-02			
	Below 1.5 m - moist.			**49-03**			
2	SAND (FILL), medium to coarse grained, trace gravel, fine, subrounded, red/brown, medium dense, moist.			**49-04**			
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-50

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.255	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458680.605	Easting: 410768.322	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine grained sand, fine and coarse gravel, subrounded, brown, medium dense, damp, silt pockets, grey.			50-01 *50-02		
1	At 1.2 m - rebar.			50-03		
	SAND (FILL), medium to coarse grained, some gravel, fine, subrounded, red/brown, medium dense, moist, trace concrete debris.			50-04		
2	At 1.8 m - refusal on concrete debris and rebar.					
	Bottom of hole at 1.8 m.					
3						
4						
5						
6						
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9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-51

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.301	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458674.149	Easting: 410764.094	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine grained sand, fine and coarse gravel, subrounded, brown, medium dense, damp, silt pockets, grey.			51-01		
1	At 1.2 m - trace concrete debris, rebar.			51-02		
	SAND (FILL), fine grained, some silt, trace gravel, fine, subrounded, grey, loose, wet.			51-03		
2	Bottom of hole at 1.8 m.					
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NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-52

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.137	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458693.864	Easting: 410761.494	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine to coarse grained sand, fine and coarse gravel, subrounded, trace silt, occasional cobbles, brown, medium dense, wet, trace roots.			**52-01** ***52-02**		
1	Below 0.6 m - moist, no roots.			52-03		
	Below 1.5 m - trace concrete debris, rebar.			**52-04**		
2	Below 1.8 m - no soil recovery, concrete debris, metal debris, rebar.					
	Bottom of hole at 2.4 m.					
3						
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NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-53

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.072	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458686.497	Easting: 410746.027	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine to medium grained sand, fine and coarse gravel, subrounded, some silt, occasional cobbles, brown, medium dense, moist, trace roots.			53-01		
1	Below 0.6 m - no roots.			53-02		
	Below 0.9 m - grey/brown, trace concrete debris, trace brick debris.			**53-03**		
2	At 2.4 m - no soil recovery, wet, concrete debris, metal debris, brick debris.					
	Bottom of hole at 2.4 m.					
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NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-54

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.430	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458664.996	Easting: 410751.638	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine to coarse grained sand, fine and coarse gravel, subrounded, some silt, occasional cobbles, brown, medium dense, damp.			**54-01**		
1	Below 0.9 m - black pockets with silt, styrofoam debris, trace brick debris.			**54-02** ***54-03**		
	Below 1.5 m - moist.			**54-04**		
2	Below 2.1 m - no brick/styrofoam pockets.			54-05		
	Bottom of hole at 2.4 m.					
3						
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NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-55

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.134	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458672.462	Easting: 410733.196	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine to medium grained sand, fine and coarse gravel, subrounded, some silt, occasional cobbles, brown, medium dense, damp, trace roots.			55-01		
1	Below 0.9 m - silt pockets, black, no roots, trace brick debris.			55-02		
	Below 1.5 m - moist, trace concrete debris, metal debris.			55-03		
2	Below 1.8 m - no soil recovery, brick debris, concrete debris.					
	Bottom of hole at 2.4 m.					
3						
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NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-56

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.153	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458665.998	Easting: 410725.696	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine to medium grained sand, fine and coarse gravel, subrounded, some silt, occasional cobbles, subrounded, brown, medium dense, damp, trace roots.			**56-01**		
1	Below 0.9 m - trace brick debris.			56-02		
				56-03		
2	At 1.8 m - rebar. Below 1.8 m - moist.			56-04		
	Bottom of hole at 2.4 m.					
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NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-57

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 03 11
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458686.475	Easting: 410761.136	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	GRASS.						
	SAND and GRAVEL (FILL), fine to medium grained sand, fine and coarse gravel, subrounded, some silt, occasional cobbles, brown, medium dense, damp, trace roots.			57-01			25
	Below 0.6 m - grey/brown, no roots.			57-02 *57-03			30
1	Below 1.2 m - concrete debris, some rebar, some brick debris.			**57-04**			45
2	Below 2.1 m - grey, loose, wet.			**57-05**			35
	Bottom of hole at 2.4 m.						
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NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA DMG 2019 03 15 Print Date:2019-07-23

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Client
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Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-66

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: n/a	Easting: n/a	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND, silty, gravelly, fine to coarse, subrounded, brown, medium dense, moist, rootlets.						
1	SILT and SAND, some clay, grey-brown, medium dense, moist. Below 1.2 m - rebar, concrete, metal, concrete with ceramic tile, wires.			66-01 66-02 66-03			
2	Bottom of hole at 2.1 m.						
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NOTES

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-67

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: n/a	Easting: n/a	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND, silty, gravelly. At 0.3 m - black shiny, hard layer. Between 0.6 m and 0.9 m - grey-brown, metal debris.					
1	SAND and GRAVEL, subrounded, some silt, brown.					
2	Bottom of hole at 1.8 m.					
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NOTES

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-68

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: n/a	Easting: n/a	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND, silty, gravelly, fine to coarse, subrounded, brown, medium dense, moist.					
1	Below 1.2 m - debris, metal pipe scrap, metal, rebar.			68-01 68-02		
2	Bottom of hole at 1.8 m.					
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NOTES

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-69

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: n/a	Easting: n/a	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND, silty, gravelly, fine to coarse, subrounded, brown, medium dense, moist.					
1	Below 1.2 m - debris, concrete, rebar, metal, black papery debris.			69-01		
2	Bottom of hole at 1.8 m.					
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NOTES

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-70

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: n/a	Easting: n/a	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND, silty, gravelly, fine to coarse, subrounded, brown, medium dense.					
1	SAND, coarse grained, silty, gravelly, orange-brown, loose, moist.					
2	Bottom of hole at 2.1 m.					
3						
4						
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6						
7						
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9						
10						

NOTES

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-71

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: n/a	Easting: n/a	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND, silty, gravelly, fine to coarse, subrounded, brown, medium dense, moist, rootlets.					
	Below 0.5 m - no rootlets.					
1	SILT and SAND, some clay, some gravel, fine to coarse, grey-brown, medium dense, moist. Below 1.2 m - rebar, concrete rubble.			71-01		
2	Bottom of hole at 1.9 m.					
3						
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NOTES

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP18-36

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	BH
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2018 01 23
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458678.297	Easting: 410760.973	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND (FILL), fine grained, some gravel, fine, subangular, some silt, trace coarse gravel, subangular, occasional cobbles, subrounded, brown, loose, organics pockets, black, clay pockets.			**36-01**			○ Reading within indicated scale ● Reading outside indicated scale 10^1 10^2 10^3 10^4
1	Below 0.8 m - grey.			36-02			
	Bottom of hole at 1.1 m.						
2							
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NOTES
Bolded sample denotes sample analyzed. * denotes blind field duplicate.

QA CLS 2018 03 08 Print Date:2018-03-08

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Client
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Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP18-37

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	BH
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2018 01 23
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458684.705	Easting: 410765.500	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND and GRAVEL (FILL), some silt, occasional cobbles, brown, medium dense, damp, organics pockets, black, clay pockets.			**37-01** ***37-02**			0
1	Below 0.8 m - grey.			37-03			0
	Bottom of hole at 0.9 m.						
2							
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NOTES
Bolded sample denotes sample analyzed. * denotes blind field duplicate.

QA CLS 2018 03 08 Print Date:2018-03-08

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP18-38

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	BH
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2018 01 23
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458687.514	Easting: 410742.672	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND and GRAVEL (FILL), some silt, occasional cobbles, brown, medium dense, damp, organics pockets, black, clay pockets.			38-01			0
	Below 0.8 m - grey.			38-02			0
1	Bottom of hole at 0.9 m.						
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NOTES
Bolded sample denotes sample analyzed. * denotes blind field duplicate.

QA CLS 2018 03 08 Print Date:2018-03-08

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Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP18-39

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	BH
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2018 01 23
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458690.128	Easting: 410726.048	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND and GRAVEL (FILL), some silt, occasional cobbles, brown, medium dense, damp, organics pockets, black, clay pockets.			**39-01**			0
1	Below 0.8 m - grey.			39-02			0
	Bottom of hole at 0.9 m.						
2							
3							
4							
5							
6							
7							
8							
9							
10							

NOTES
Bolded sample denotes sample analyzed. * denotes blind field duplicate.

QA CLS 2018 03 08 Print Date:2018-03-08

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP18-40

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	BH
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2018 01 23
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458700.475	Easting: 410751.633	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND and GRAVEL (FILL), some silt, occasional cobbles, brown, medium dense, damp, organics pockets, black, clay pockets.			40-01			0
1	Below 0.8 m - grey.			40-02			0
	Bottom of hole at 0.9 m.						
2							
3							
4							
5							
6							
7							
8							
9							
10							

NOTES
Bolded sample denotes sample analyzed. * denotes blind field duplicate.

QA CLS 2018 03 08 Print Date:2018-03-08

Annex E. Hazardous Buildings Materials Investigation

Annex E. Hazardous Buildings Materials Investigation

SNC-Lavalin Inc.
#202 - 890 Crace Street
Nanaimo, British Columbia, Canada V9R 2T3
250.716.9000 604.515.5150

March 31, 2020 Project: 626268

Public Services and Procurement Canada
401-1230 Government Street
Victoria, BC V8W 3X4

ATTENTION: Mr. Robert Price

REFERENCE: **Dry Season Groundwater and Hazardous Building Materials Investigation Nanoose Transmitter, Nanoose Bay, BC**

1 Introduction

At the request of Public Services and Procurement Canada (PSPC), SNC-Lavalin Inc. (SNC-Lavalin) was retained to complete a dry season groundwater and hazardous building materials investigation at the Former Nanoose Transmitter, located in Nanoose Bay, British Columbia (the "Site"). This work as completed under Contract EZ897-191436/004/VAN and Task Authorization No. 700468779.The location of the Site is illustrated on Drawing 626268-301. The Wide Area Site Plan is presented on Drawing 626268-402.

2 Background

The Site is located on top of a hill in a rural area of Nanoose Bay, BC, and consists of approximately 105 hectares. The topography of the Site is fairly flat with some sloping towards the south and east. The Site was historically used by the Department of National Defense (DND) for radio transmission defence purposes until 1998. The facilities at the Site were reported to be constructed circa 1963 and decommissioned/removed from the Site between 1995 and 2002. Facilities included an underground bunker (Former Transmitter Building), auxiliary buildings and structures, and several radio antennas. The Site is currently vacant of any permanent buildings or structures and is currently used by a model airplane club (PDQ Flyers).

2.1 Environmental Site Condition

In 2018, SNC-Lavalin completed a Supplemental Site Investigation (SSI) and Remediation Options Analysis (ROA)[1] with an additional SSI and ROA completed in 2019[2]. Additional groundwater sampling (dry and wet season) was recommended in order to confirm seasonality of the groundwater concentrations at the Site. The full Site history is presented in the 2018 report. Three Areas of Environmental Concern (AECs) were retained for the Site in the 2018 SSI and ROA. The three AECs and associated contaminants of concern (COCs), as well as the regulated analytical parameters of concern, identified in the 2019 SSI, are summarized in the table below based on the referenced federal Commercial Land use guidelines.

Table A: Areas of Environmental Concern and Regulated Analytical Parameters

AEC ID	Description	COCs	Regulated Analytical Parameters	
			Soil	Groundwater
1	Former Electrical Substation	PAH	PAH Parameters (ACE, FLR, and IACR)	-
2	Former Transmitter Building	Petroleum Hydrocarbons / PAH	F2 and F3 PAH Parameters: (NAP, ACE, FLR, PHE, ANT, FLT, B(a)A, B(b)F, B(a)P, B(a)P TPE, IACR)	PAH Parameters: (1-MNAP, 2-MNAP, NAP, ACE, FLR, PHE, ANT, ACR, FLT, PYR, B(a)A, CHR, B(a)A, B(b)F, B(j)F, B(b+j)F, B(a)P, D(ah)A, B(ghi)P, QN)
3	Site Wide	Dissolved Metals	-	Aluminum, Iron, Manganese, Chromium, Copper, Lithium, Selenium, and Zinc

AEC	Area of Environmental Concern	B(a)A	Benz(a) anthracene
COC	Contaminant of Concern	CHR	Chrysene
1-MNAP	1-Methylnaphthalene	B(b)F	Benzo(b) fluoranthene
2-MNAP	2-Methylnaphthalene	B(j)F	Benzo(j) fluoranthene
NAP	Naphthalene	B(b+j)F	Benzo(b+j) fluoranthene
ACE	Acenaphthene	B(ghi)P	Benzo(g,h,i)perylene
FLR	Fluorene	B(a)P	Benzo(a)pyrene
PHE	Phenanthrene	D(ah)A	Dibenz(a,h) anthracene
ANT	Anthracene	QN	Quinoline
ACR	Acridine	B(a)P TPE	Benzo(a)pyrene total potency equivalents
FLT	Fluoranthene	IACR	Index of Additive Cancer Risk
PYR	Pyrene		

[1] SNC-Lavalin Inc., 2018. DRAFT *Supplemental Site Investigation and Remedial Options Analysis, Nanoose Transmitter (TX), Nanoose Bay, BC.* March 9, 2018.
[2] SNC-Lavalin Inc., 2019. FINAL Supplemental Site Investigation and Remedial Options Analysis, Nanoose Transmitter (TX), Nanoose Bay, BC, March 31, 2019.

2.2 Potential Asbestos-Containing Materials

In the 2004 Phase I ESA[3] prepared by Keystone Environmental Ltd., it was reported that Jacques Whitford Environment Limited (JWEL) had identified the presence of asbestos-containing materials (ACM) within the bunker (i.e., the Former Transmitter Building) prior to its demolition in their Environmental Assessment Registration Form (EARF). A copy of this document has not been reviewed. JWEL was reported to have identified ACM consisting of pipe insulation, mechanical insulation, wall paneling and vinyl flooring within the bunker. All ACM's were to be removed prior to deconstruction; however, no records of this work have been received. Therefore, the potential for ACM within any rubble from the deconstructed bunker exists. The JWEL EARF was reported to indicate that the facility was to be decommissioned in four phases as follows:

1. Identification and removal of hazardous materials;
2. Deconstruction and disposal of the structure;
3. Demolition of the bunker foundation including full disposal at designated landfill and/or recycling site(s); and,
4. Restoration of the Site.

During the completion of the 2019 SSI and ROA, a debris unit was identified within the area of the former transmitter building (AEC 2) measuring approximately 1 m thick at a starting depth of between 1.8 m and 2.4 m below ground surface (bgs). The debris consisted of a mixture of concrete, brick and rebar.

Confirmation of the removal of ACM prior to the bunker demolition has not been located by the Department of National Defence (DND). As a result, the potential presence of ACM within the identified debris was determined to exist.

3 Scope of Work

The scope of the groundwater sampling and hazardous building materials investigation included:

- Development of health and safety plan (HASP) and subcontractor documents;
- Collection of groundwater samples during summer from all installed monitoring wells (August 28 and 29, 2019);
- Identify utilities using BC One-Call services and a 3rd party locating contractor (Kelly's 1st Call Locating) at each proposed test-pit location to ensure that underground utilities were not damaged (or encountered);
- Completion of a test-pitting program during a site visit on December 12, 2019, which included the advancement of six test-pits using a backhoe operated and provided by Knappett Industries (2006) Ltd., and sampling of any suspect ACM debris that was encountered;
- Submission of groundwater samples to a Canadian Association for Laboratory Accreditation Inc. (CALA) certified laboratory (AGAT Laboratories) for selective analysis of contaminants of

[3] Keystone Environmental Ltd., *Phase I Environmental Site Assessment, Nanoose TX, CFB Esquimalt, Nanoose, BC.* March 2004.

concern (COC) including polycyclic aromatic hydrocarbons (PAH) and metals. Samples were shipped along with chain-of-custody documentation;
- Suspect ACM samples were also submitted to AGAT Laboratories for analysis of asbestos; and
- Preparation of this report.

4 Regulatory Framework

The Site is located on federal property and is operated under federal jurisdiction. The overall land use of the Site is considered to be commercial (CL) with CL guidelines being the primary criteria used to evaluate analytical results for groundwater samples collected at the Site. However, as a portion or all of the potential future land use is considered residential land use (RL), the federal RL guidelines have been included for comparison purposes.

4.1 Groundwater Quality Standards and Guidelines

Based on local topography, groundwater is anticipated to flow in a southeast direction, towards Nanoose Bay. The nearest down-gradient surface water receiving bodies is a small wetland and an unnamed stream located approximately 500 m southwest of the investigation area (located within the Site boundaries). The unnamed stream reportedly drains into Nanoose Creek.

Although groundwater at the Site and in the surrounding area is not confirmed to be used as drinking water, drinking water (DW) standards were used as a conservative measure in the event that groundwater is developed in the future. Therefore, the Canadian Drinking Water Quality Guidelines (CDWQG) were considered applicable to groundwater at the Site. For the consideration of ecological receptors groundwater was compared to the Federal Interim Groundwater Quality Guideline (FIGQG) Tier 2 RL and CL, freshwater aquatic life (AW) guidelines. The FIGQG Tier 2 Water Use/Exposure Pathways of “Soil Organisms Direct Contact”, and “Freshwater Life” were applied.

For comparison purposes, COCs in groundwater were also compared to the provincial Contaminated Sites Regulation[4] (CSR) Freshwater AW and drinking water (DW) standards. Provincial drinking water standards were deemed applicable due to the application of Protocol 21[5], “Water Use Determination” and the protection of future drinking water resources.

4.2 Asbestos Standards and Guidelines

Federal and provincial regulations require that regulated building materials be properly identified and managed to prevent potential exposure to workers. These materials must be properly controlled,

[4] *Contaminated Sites Regulation* (CSR), B.C. Reg. 375/96, including amendments up to B.C. Reg. 13/2019, January 24, 2019
[5] *Protocol 21*: *Water Use Determination,* Version 2.0, October 31, 2017 (effective November 1, 2017).

removed, and/or disposed of at a suitably permitted facility in accordance with the applicable federal and provincial regulations. The following federal and provincial regulations relate to these materials:

4.2.1 Federal

Various regulations made under the *Canadian Environmental Protection Act* (CEPA), S.C. 1999, c. 33, last amended on June 17, 2019, including specialized handling and/or disposal requirements for materials including lead, PCBs, mercury, halocarbons (ODS and Non-ODS), radiological sources and/or substances and solid/hazardous wastes. Regulations include the following:

- Federal Halocarbon Regulations, 2003 (SOR/2003-289) and Regulations Amending the Federal Halocarbon Regulations, 2003 (SOR/2009-221) defines the use and handling of halocarbons (including ODS) in refrigeration, air-conditioning, fire-extinguishing, and solvent systems that are located on federal lands, or are owned by federal departments, boards, and agencies, Crown corporations, or federal works and undertakings;
- Ozone-Depleting Substances and Halocarbon Alternatives Regulations (SOR/2016-137) defines the import, export, manufacture, use, sale and offer for sale of ODS; and
- PCB Regulations (SOR/2008-273) defines PCBs containing materials and how they must be managed and disposed of.

Regulations made under the *Canadian Consumer Product Safety Act* (CCPS)*, 2010, S.C. 2010, c. 21*, last amended on December 12, 2016, including specialized handling and/or disposal requirements for materials including lead, and/or substances and solid/hazardous wastes. Regulations include the following:

- *Surface Coating Materials Regulations,* SOR/2016-193[6], requires the concentration of total lead present in a surface coating material to be not more than 90 mg/kg.

Other federal regulations regarding specialized handling and/or disposal requirements for materials including lead, PCBs, mercury, halocarbons (ODS and Non-ODS), radiological sources and/or substances and solid/hazardous wastes. Regulations include the following:

- *Transportation of Dangerous Goods Act* (TDGA), S.C. 1992, c. 34, last amended on January 1, 2017, *Transportation of Dangerous Goods Regulations (TDGR) (Canada), SOR/2001-286, June 20, 2019*, as amended, requires that radioactive materials must be transported in accordance with the provisions of the Act;
- The Nuclear Safety and Control Act (1997, c.9), Nuclear Substances and Radiation Devices Regulations (SOR/2000-207) applies to nuclear substances and sealed sources, including devices such as smoke detectors;
- *Hazardous Products Act* (HPA), (R.S. 1985, c. H-3), last amended on May 23, 2018, prohibits the sale or importation of urea formaldehyde foam insulation (UFFI) into Canada;
- Human Resources Social Development Canada (HRSDC), Canada Labour Code (R.S.C., 1985, c. L-2, as amended up to December 13, 2018), Part II – Canada Occupational Health and Safety, Section 125.1 states it is the duty of employers that all hazardous substances in the workplace, including asbestos, be identified, controlled, and stored to minimize potential exposure to workers. Under the Canada Labour Code Part II definitions, a “hazardous

[6] Available at http://laws-lois.justice.gc.ca/PDF/SOR-2016-193.pdf

substance" includes a controlled product and a chemical, biological, or physical agent that, by reason of a property that the agent possess, is hazardous to the safety or health of a person exposed to it; and
- Canada Occupational Health and Safety Regulations (SOR/86-304), Part X – Hazardous Substances, as amended up to November 23, 2018.

Provincial

Provincial regulations include:

- *Workers Compensation Act, Occupational Health and Safety Regulation* (OHSR), B.C. Reg. 296/97, includes amendments up to B.C. Reg. 14/2019, June 3, 2019, requires that materials including any asbestos, lead, or other heavy metal or toxic substance, biological agents (i.e., rodent droppings), and flammable or explosive materials that may be handled, disturbed or removed during demolition must be identified and removed or safely contained prior to demolition. In addition, a copy of the observation report identifying these materials must be available at the work site;
- *Environmental Management Act* (EMA), B.C. Reg. 13/2019 / effective January 24, 2019, Ozone Depleting Substances (ODS) and Other Halocarbons Regulation, BC Reg. 387/99, including amendments up to BC Reg. 317/2012, requires ODSs be recovered from equipment prior to disposal; and
- *Hazardous Waste Regulation* (HWR), B.C. Reg. 63/88, including amendments up to B.C. Reg. 243/2016, November 1, 2017, requires all Hazardous Wastes (HW) must be properly managed and disposed of.

Asbestos

We note that at the time of this report, the provincial OHSR defines an ACM as any manufactured article or other material which contains 0.5% or more asbestos by weight and vermiculite insulation containing any amount of asbestos.

5 Methodology

The dry season groundwater sampling and hazardous building materials investigation activities were undertaken at the Site between August and December 2019. Photographs taken during the field activities are provided in Attachment 1.

5.1 Groundwater Monitoring, Well Purging and Sampling

Groundwater monitoring for all 15 wells was completed on August 28, 2019. Due to the summer period and recent lack of precipitation, seven wells were completely dry and another six wells had 20 cm of water or less in the standpipe. As a result, groundwater samples could only be collected from two monitoring wells. Details of groundwater monitoring are presented on monitoring reports contained in Attachment 2.

Wells were purged and sampled on August 28 and 29, 2019, using Waterra® tubing, bailers and supplies. Purging was carried out with Waterra® tubing until a minimum of three well volumes of water was removed (one well volume is equal to the volume of water in the PVC pipe). After purging, each groundwater sample was collected directly into appropriate laboratory-prepared containers and corresponding preservatives were added. Groundwater samples were stored in ice-chilled coolers and submitted for analysis to AGAT for select analysis of PAH and dissolved metals. PAH samples were collected the day after purging using a bailer to obtain samples with minimal turbidity, and dissolved metals samples were field filtered prior to sample collection.

5.2 Test-Pitting and Asbestos Sampling

An authorized dig permit issued from DND personnel was obtained and all underground utilities were located at the Site using a private utility locator contractor (Kelly's 1st Call Locating) on December 12, 2019). The previous Phase 1 ESA (SNC-Lavalin, 2012) identified three registered archaeological Sites within the Site boundaries. The identified archaeological sites were determined to be outside of work areas and as such, archaeological monitoring was not required during the hazardous building materials investigation.

On December 12, 2019, SNC-Lavalin directed the advancement of six test-pits (TP19-66 through TP19-71) by Knappett Industries (2006) Ltd., of Nanaimo, BC using a track mounted excavator. Test pits were advanced to depths between 1.8 – 2.1 m bgs depending on refusal due to concrete, rebar and other debris. Suspect ACM (i.e., floor tile grout – Photo 2 and black papery material – Photo 3) debris samples were collected directly from the excavator bucket. The SNC-Lavalin field personnel supervising this investigation has extensive training and experience in hazardous building materials assessments including AHERA asbestos inspection training.

Soil conditions in each test-pit were logged in detail with respect to soil type, colour, density, moisture content, and apparent contamination (i.e., odour, staining). Detailed test-pit information such as soil stratigraphy, sample locations and debris sample descriptions are presented on the appended Test-Pit Logs, Attachment 3.

17 suspect ACM debris samples were placed directly in sealable polyethylene bags, labelled and transported under chain of custody control to AGAT Laboratories in Burnaby BC, and analyzed for asbestos. Analysis of bulk samples for determination of asbestos content was performed using polarized light microscopy (PLM) procedures in accordance with the applicable regulations using the US Environmental Protection Agency (US EPA) Test Method EPA/600 R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, June 1993. Positive stop testing methodology was employed for all asbestos samples submitted in which samples representing similar material are analyzed one at a time. If a sample exhibits a positive result for asbestos, the remaining samples are not analyzed and all similar samples are assumed to be asbestos-containing, including any previous non-asbestos similar samples that were analyzed prior to identifying the asbestos-containing sample.

5.3 Quality Assurance / Quality Control

QA/QC measures were undertaken to ensure unbiased and representative sample collection and assess the repeatability and accuracy of laboratory analyses. SNC-Lavalin's QA/QC measures included:

- Completion of field sampling tasks in accordance with in-house written preferred operating procedures (POPs);
- Variances between field procedures and POPs are noted;
- Receipt of analytical data from the laboratory in digital format for direct input into a database;
- Tabulation of the results directly from the database and checking with the printed final laboratory reports; and
- Laboratory analytical precision of the groundwater and/or soil vapours samples was measured internally using replicate samples, and surrogate samples were analyzed to measures percent recovery as part of AGAT's internal QA/QC program.

6 Summary of Results

The following presents the results of the dry season groundwater sampling and hazardous building materials investigation activities. Note that the attached tables show the analytical results for all site investigations completed by SNC-Lavalin to date.

6.1 Hydrogeology

The measured depths to water, excluding MW15-1D, ranged from 2.4 m (MW19-07S) to 5.5 m bgs (MW15-2D). This is significantly (> 1 m) lower than in previous monitoring events due to this event being in the peak of summer, and the Site seeing little precipitation in the several months prior. The depth to water in MW15-1D was 16.2 m bgs which is consistent with previous monitoring events, and only this well and MW15-2D had a significant water column greater than 1 m.

Non-aqueous phase liquids were not observed in any monitoring wells. Based on the potentiometric groundwater elevations in the monitoring wells, the inferred groundwater flow direction in this area of the Site is towards the southeast.

The monitoring report is provided in Attachment 2.

6.2 Groundwater Analytical Results

The two wells with sufficient water and recharge (MW15-1D and MW15-2D) were sampled on August 28 and 29, 2019. The remaining 13 wells were unable to be purged and sampled due to being dry or having little water and insufficient recharge.

Groundwater samples were selectively analyzed for PAH and dissolved metals. The concentrations of dissolved metals in MW15-1D and MW15-2D were less than all applied standards and were consistent with past sampling events in each respective location. Additionally, for MW15-2D, all concentrations of PAH were less than laboratory detection limits which is also consistent with past sampling events.

The analytical results, including all historical groundwater results, are presented in Tables 1 to 4, and on Drawings 626268-403 and 626268-404. The laboratory analytical reports are provided in Attachment 4.

6.3 Soil Stratigraphy

The general soil stratigraphy consisted of sand and gravel fill material underlain by dense silt and sand. At several locations the fill material was underlain by concrete, rebar and ceramic demolition debris below 1.2 m bgs. In general, the debris unit was observed to be approximately 1 m in thickness in the investigation locations where it was encountered, up to a depth of 2.1 m bgs (the maximum depth investigated).

No visual or olfactory evidence of contamination was encountered at any of the test-pit locations. Detailed soil descriptions from the test-pitting programs are provided on the appended logs in Attachment 3.

6.4 Asbestos

The asbestos content in all 17 analysed samples was non-detectable. This confirms a content of less than 0.5% asbestos, and as such no samples are considered to be an ACM as per the provincial OHSR. The laboratory analytical results for asbestos are presented in the attached Table 5 including a detailed description of the sample type. The test-pit locations with debris analyzed for asbestos are presented on Drawing 626268-405. The laboratory analytical reports are provided in Attachment 4.

7 Conclusion and Recommendations

Based on the information presented in this report, the following key conclusions can be derived with respect to the investigation completed at the Site:

- The groundwater table is lower at the Site during the dry season, inhibiting sampling and determination of seasonal groundwater quality variations.
- The demolition debris unit is not considered to be ACM.

If the debris unit is to be excavated, ongoing supervision of the excavation by appropriately trained personnel is recommended in order to identify any other potential ACM within the unit that was not previously sampled. Following debris unit removal, further assessment of the groundwater quality and delineation is recommended.

8 Notice to Reader

This report has been prepared by SNC-Lavalin Inc. (SNC-Lavalin) for Canada, who has been party to the development of the scope of work for this project and understands its limitations. Copyright of this report vests with Her Majesty the Queen in Right of Canada. This report was prepared in accordance with a services contract between SNC-Lavalin and Canada, including General Conditions 2035 of the Standard Acquisition Clauses and Conditions (SACC) Manual.

This report is intended to provide information to Canada to assist it in making business decisions. SNC-Lavalin are not a party to the various considerations underlying the business decisions and does not make recommendations regarding such business decisions.

The findings, conclusions and recommendations in this report have been developed in a manner consistent with the level of skill normally exercised by environmental professionals currently practising under similar conditions in the area. The findings contained in this report are based, in part, upon information provided by others. If any of the information is inaccurate, modifications to the findings, conclusions and recommendations may be necessary.

The findings, conclusions and recommendations presented by SNC-Lavalin in this report reflect and SNC-Lavalin's best judgement based on the site conditions at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. They have been prepared for specific application to this site and are based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific materials as described in this report during a specific time interval. Substances other than those described may exist within the site, reported substance parameters may exist in areas of the site not investigated, and concentrations of substances greater or less than those reported may exist between sample locations.

The findings and conclusions of this report are valid only as of the date of this report. If site conditions change, new information is discovered, or unexpected site conditions are encountered in future work, including excavations, borings, or other studies, the findings, conclusions and/or recommendations of this report should be re-evaluated. It is recommended that users of this report should engage a suitably qualified professional to assist in interpreting the significance, if any, of the findings.

9 Closure

SNC-Lavalin appreciates the opportunity to provide this letter. If you have any questions or comments, or require further information, please do not hesitate to contact the undersigned at (250) 716-9000.

Prepared by:

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March 31/2020

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Tables

1: Summary of Analytical Results for Groundwater – Hydrocarbons
2: Summary of Analytical Results for Groundwater – Polycyclic Aromatic Hydrocarbons
3: Summary of Analytical Results for Groundwater – Dissolved Metals
4: Summary of Analytical Results for Groundwater – Volatile Organic Compounds
5: Summary of Analytical Results for Asbestos Samples

Drawings

- 626268-401 – Location Plan
- 626268-402 – Wide Area Site Plan
- 626268-403 – Analytical Results for Groundwater – Federal Standards
- 626268-404 – Analytical Results for Groundwater – Provincial Standards
- 626268-405 – Debris Unit – Results for Asbestos Containing Material

Attachment

1: Photographs
2: Monitoring Report
3: Test Pit Logs
4: Laboratory Analytical Reports

Tables

TABLE 1: Summary of Analytical Results for Groundwater - Hydrocarbons

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Monocyclic Aromatic Hydrocarbons					Gross Parameters					Petroleum Hydrocarbon Fractions				Methyl tert-butyl ether [MTBE] µg/L
			Benzene µg/L	Ethylbenzene µg/L	Toluene µg/L	Xylenes µg/L	Styrene µg/L	VHw6-10 µg/L	VPHw µg/L	EPHw10-19 µg/L	LEPHw µg/L	EPH (C19-C32) µg/L	F1- µg/L	F2 (>C10-C16) µg/L	F3 (>C16-C34) µg/L	F4 (>C34-C50) µg/L	
MW15-1S	MW15-1S-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	100	< 100	< 1
	MW15-A-150210	Duplicate	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
	QA/QC RPD%		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MW15-1D	MW15-1D-150211	2015 02 11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	-	-	-	< 100	-	-	-	< 1
MW15-2S	MW15-2S-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-2D	MW15-2D-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-3	MW15-3-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-4	MW15-4-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-5	MW15-5-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW19-07S	MW19-07S-190228/0301	2019 02 28/03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	250	220	-	< 100	< 200	-	-	< 1
MW19-07D	MW19-07D-190301	2019 03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 200	< 200	-	< 100	< 200	-	-	< 1
MW19-08D	MW19-08D-190301	2019 03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 200	< 200	-	< 100	< 200	-	-	< 1
MW19-09S	MW19-09S-190228/0301	2019 02 28/03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 200	< 200	-	< 100	< 200	-	-	< 1
Federal Guideline																	
Canadian Drinking Water Quality Guidelines (CDWQG)[a]			5	1.6	24	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	15
FIGWQG Tier 2 Residential Land Use (RL)[b]			140	16,000	83	3,900	72	n/a	n/a	n/a	n/a	n/a	810	1,300	n/a	n/a	340
FIGWQG Tier 2 Commercial Land Use (CL)[b]			690	41,000	83	18,000	72	n/a	n/a	n/a	n/a	n/a	9,100	1,300	n/a	n/a	4,300
BC Standard																	
CSR Drinking Water (DW)			5	140	60	90	800	15,000[d]	n/a	5,000[d]	n/a	n/a	n/a	n/a	n/a	n/a	95
CSR Aquatic Life (AW)[c]			400	2,000	5	300	720	15,000[d]	1,500	5,000[d]	500	n/a	n/a	n/a	n/a	n/a	34,000

Associated AGAT file(s): 15V943947, 15V944419, 19V442894.

All terms defined within the body of SNC-Lavalin's report.

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- Denotes analysis not conducted.

n/a Denotes no applicable standard/guideline.

RPD Denotes relative percent difference.

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.

[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.

[c] Standard to protect freshwater aquatic life.

[d] Applicable at all sites irrespective of water use.

TABLE 2: Summary of Analytical Results for Groundwater - Polycyclic Aromatic Hydrocarbons

Sample Location		MW15-1S		MW15-2S	MW15-2D	MW15-2D	MW15-3	MW15-4	MW15-5	MW19-07S	MW19-07D			Federal Guideline			BC Standard	
Sample ID		MW15-1S-150211	MW15-A-150211	MW15-2S-150211	MW15-2D-150211	MW15-2D-190829	MW15-3-150211	MW15-4-150211	MW15-5-150211	MW19-07S-190301	MW19-07D-190301	MW19-A-190301	QA/QC	Canadian Drinking Water Quality Guidelines (CDWQG)[b]	FIGWQG Tier 2 Residential Land Use (RL)[c]	FIGWQG Tier 2 Commercial Land Use (CL)[c]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[d]
Sample Date (yyyy mm dd)		2015 02 11	2015 02 11	2015 02 11	2015 02 11	2019 08 29	2015 02 11	2015 02 11	2015 02 11	2019 03 01	2019 03 01	Duplicate	RPD %					
Parameter	**Units**	**Analytical Results**				**Analytical Results**												
Polycyclic Aromatic Hydrocarbons																		
Naphthalene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	0.09	*	n/a	1.1	1.1	80	10
Methylnaphthalene, 1-	µg/L	-	-	-	-	< 0.05	-	-	-	36.3	0.06	0.06	*	n/a	180	180	5.5	n/a
Methylnaphthalene, 2-	µg/L	-	-	-	-	< 0.05	-	-	-	32.1	0.05	0.05	*	n/a	180	180	15	n/a
Acenaphthylene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.02	*	n/a	46	46	n/a	n/a
Acenaphthene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	*8.64*	0.03	0.03	*	n/a	5.8	5.8	250	60
Fluorene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	*9.68*	0.04	0.03	*	n/a	3	3	150	120
Phenanthrene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.04	< 0.05	< 0.05	< 0.05	*11.1*	0.06	0.08	*	n/a	0.4	0.4	n/a	3
Anthracene	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*1.87*	*0.02*	*0.03*	*	n/a	0.012	0.012	1,000	1
Acridine	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*1.85*	< 0.05	< 0.05	*	n/a	0.05	0.05	n/a	0.5
Fluoranthene	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*2.72*	0.03	0.04	*	n/a	0.04	0.04	150	2
Pyrene	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02	*3.57*	*0.04*	*0.05*	*	n/a	0.025	0.025	100	0.2
Benz(a)anthracene	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*1.21*	0.01	*0.02*	*	n/a	0.018	0.018	0.07	1
Chrysene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	1.09	0.01	0.03	*	n/a	1.4	1.4	7	1
Benzo(b)fluoranthene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	0.41	< 0.01	0.01	*	n/a	n/a	n/a	0.07	n/a
Benzo(j)fluoranthene	µg/L	-	-	-	-	< 0.01	-	-	-	0.24	< 0.01	0.02	*	n/a	0.48	0.48	0.07	n/a
Benzo(b+j)fluoranthene	µg/L	-	-	-	-	< 0.01	-	-	-	*0.65*	< 0.01	0.03	*	n/a	0.48	0.48	0.07	n/a
Benzo(k)fluoranthene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	0.30	< 0.01	0.01	*	n/a	0.48	0.48	n/a	n/a
Benzo(a)pyrene	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	***0.74***	< 0.01	*0.02*	*	0.04	0.015	0.015	0.01	0.1
Indeno(1,2,3-cd)pyrene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	0.19	< 0.01	0.01	*	n/a	0.21	0.21	n/a	n/a
Dibenz(a,h)anthracene	µg/L	< 0.05[a]	< 0.05[a]	< 0.05[a]	< 0.05[a]	< 0.01	< 0.05[a]	< 0.05[a]	< 0.05[a]	0.09	< 0.01	< 0.01	*	n/a	0.26	0.26	0.01	n/a
Benzo(g,h,i)perylene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	*0.24*	< 0.01	0.01	*	n/a	0.17	0.17	n/a	n/a
Quinoline	µg/L	< 0.1[a]	< 0.1[a]	< 0.1[a]	< 0.1[a]	< 0.05	< 0.1[a]	< 0.1[a]	< 0.1[a]	2.89	< 0.05	< 0.05	*	n/a	3.4	3.4	0.05	34

Associated AGAT file(s): 15V944419, 19V442894, 19V512465.
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n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Laboratory detection limit exceeds regulatory standard/guideline.
[b] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[c] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[d] Standard to protect freshwater aquatic life.

TABLE 2 (Cont'd): Summary of Analytical Results for Groundwater - Polycyclic Aromatic Hydrocarbons

Sample Location		MW19-08D	MW19-09S	Federal Guideline			BC Standard	
Sample ID		MW19-08D-190301	MW19-09S-190301	Canadian Drinking Water Quality Guidelines (CDWQG)[b]	FIGWQG Tier 2 Residential Land Use (RL)[c]	FIGWQG Tier 2 Commercial Land Use (CL)[c]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[d]
Sample Date (yyyy mm dd)		2019 03 01	2019 03 01					
Parameter	Units	Analytical Results						
Polycyclic Aromatic Hydrocarbons								
Naphthalene	µg/L	< 0.05	*2.11*	n/a	1.1	1.1	80	10
Methylnaphthalene, 1-	µg/L	< 0.05	0.63	n/a	180	180	5.5	n/a
Methylnaphthalene, 2-	µg/L	< 0.05	0.70	n/a	180	180	15	n/a
Acenaphthylene	µg/L	< 0.02	< 0.02	n/a	46	46	n/a	n/a
Acenaphthene	µg/L	< 0.02	0.16	n/a	5.8	5.8	250	60
Fluorene	µg/L	< 0.02	0.27	n/a	3	3	150	120
Phenanthrene	µg/L	0.05	*0.78*	n/a	0.4	0.4	n/a	3
Anthracene	µg/L	0.01	*0.22*	n/a	0.012	0.012	1,000	1
Acridine	µg/L	< 0.05	< 0.05	n/a	0.05	0.05	n/a	0.5
Fluoranthene	µg/L	< 0.02	*0.34*	n/a	0.04	0.04	150	2
Pyrene	µg/L	< 0.02	*0.47*	n/a	0.025	0.025	100	0.2
Benz(a)anthracene	µg/L	< 0.01	*0.19*	n/a	0.018	0.018	0.07	1
Chrysene	µg/L	< 0.01	0.16	n/a	1.4	1.4	7	1
Benzo(b)fluoranthene	µg/L	< 0.01	0.06	n/a	n/a	n/a	0.07	n/a
Benzo(j)fluoranthene	µg/L	< 0.01	0.04	n/a	0.48	0.48	0.07	n/a
Benzo(b+j)fluoranthene	µg/L	< 0.01	0.10	n/a	0.48	0.48	0.07	n/a
Benzo(k)fluoranthene	µg/L	< 0.01	0.05	n/a	0.48	0.48	n/a	n/a
Benzo(a)pyrene	µg/L	< 0.01	***0.12***	0.04	0.015	0.015	0.01	0.1
Indeno(1,2,3-cd)pyrene	µg/L	< 0.01	0.03	n/a	0.21	0.21	n/a	n/a
Dibenz(a,h)anthracene	µg/L	< 0.01	0.01	n/a	0.26	0.26	0.01	n/a
Benzo(g,h,i)perylene	µg/L	< 0.01	0.04	n/a	0.17	0.17	n/a	n/a
Quinoline	µg/L	< 0.05	< 0.05	n/a	3.4	3.4	0.05	34

Associated AGAT file(s): 15V944419, 19V442894, 19V512465.
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OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Laboratory detection limit exceeds regulatory standard/guideline.
[b] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[c] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[d] Standard to protect freshwater aquatic life.

TABLE 3: Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-1S									MW15-1D				Federal Guideline			BC Standard	
Sample ID		MW15-1S-150210	MW15-A-150210	QA/QC	MW15-1S-160112	MW16-A-160112	QA/QC	MW15-1S-180208	MW15-1S-190222	MW15-1S-190301	MW15-1D-150211	MW15-1D-190222	MW15-1D-190301	MW15-1D-190829	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2015 02 10	Duplicate	RPD %	2016 01 12	Duplicate	RPD %	2018 02 08	2019 02 22	2019 03 01	2015 02 11	2019 02 22	2019 03 01	2019 08 29					
Parameter	Units	Analytical Results																	
Physical Parameters																			
pH (field)	pH	7.3	7.3	*	7.3	7.3	*	7.2	***6.3***	***6.4***	7.3	7.7	7.7	7.33	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	84.5	84.7	0	136	135	1	70.4	59.6	66.3	213	116	123	117	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																			
Aluminum	µg/L								***188***	***101***					100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		74	86	15	23	30	26	***1,290***			10	4	3	3		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	24.9	25	0	37.3	36.9	1	18.8	16.4	18.6	58.7	31	32.8	30.2	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	33	43	*	13	16	*	***2,330***	***654***	***677***	< 10	< 10	22	21	300	300	300	n/a	n/a
Magnesium	mg/L	5.41	5.42	0	10.4	10.3	1	5.7	4.52	4.82	16.2	9.44	10.1	10.2	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	**1,070**	**1,080**	1	**417**	**413**	1	**1,720**	**1,020**	**1,510**	**261**	**47**	18	< 1	20	n/a	n/a	n/a	n/a
Potassium	mg/L	-	-	-	0.972	0.968	0	0.869	0.663	0.66	-	1.8	1.71	1.55	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	15.7	16	2	8.32	8.26	1	11.5	16.7	20.9	15.3	13.1	13.6	11.8	200	n/a	n/a	200	n/a
Dissolved Metals																			
Antimony	µg/L	< 0.2	< 0.2	*	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	0.5	< 0.2	< 0.2	< 0.2	6	2,000	2,000	6	90
Arsenic	µg/L	0.2	0.4	*	0.3	0.3	*	1.1	0.6	0.6	1	1.0	1.4	1.3	10	5	5	10	50
Barium	µg/L	20.5	22	7	18.9	18.9	0	36.2	23.2	28.8	20.1	8.7	12.0	8.8	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	0.03	0.02	*	< 0.01	< 0.01	*	0.09	0.02	0.01	< 0.01	< 0.01	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	13	14	7	11	10	10	5	5	6	19	21	17	16	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L														5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
		0.09	0.09	*				0.08	0.08	0.07									1.5 (H >30-<90)
					0.09	0.09	*					0.05	0.10	0.01					2.5 (H >90-<150)
																			3.5 (H >150-<210)
											0.01								4 (H >=210)
Chromium	µg/L	0.6	0.8	*	< 0.5	< 0.5	*	1.5	0.9	< 0.5	< 0.5	1.3	1.5	2.4	50	8.9	8.9	50	10
Cobalt	µg/L	2.78	2.72	2	0.41	0.40	2	7.35	3.63	3.72	0.43	0.07	< 0.05	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L														1,000	2 - 4	2 - 4	1,500	20 (H <50)
								6.9	***4.6***	***3.3***									30 (H >50-<75)
		2.7	***10.9***	*															40 (H >75-<100)
												1.3	2.0	0.7					50 (H >100-<125)
					1.7	1.6	*												60 (H >125-<150)
																			70 (H >150-<175)
																			80 (H >175-<200)
											1.5								90 (H >=200)
Lead	µg/L														5	1 - 7	1 - 7	10	40 (H<50)
		< 0.05	0.08	*				0.93	0.05	< 0.05									50 (H 50-<100)
					< 0.05	< 0.05	*					< 0.05	< 0.05	< 0.05					60 (H 100-<200)
											< 0.05								110 (H 200-<300)
Lithium	µg/L	0.7	0.7	*	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	0.8	0.7	< 0.5	0.6	n/a	n/a	n/a	8	n/a
Mercury	µg/L	< 0.01	< 0.01	*	< 0.01	< 0.01	*	0.02	-	-	< 0.01	-	-	-	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.23	0.27	*	0.09	0.06	*	0.12	0.11	0.05	17.3	3.07	2.38	1.97	n/a	73	73	250	10,000
Nickel	µg/L								3.4						n/a	25 - 150	25 - 150	80	250 (H 0-<60)
		5.7	6.1	*				5.5		3.9		0.6		< 0.2					650 (H 60-<120)
					3.4	3.4	*						0.4						1,100 (H 120-<180)
											1.7								1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	*	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	1	1	10	20
Silver	µg/L	0.03	0.04	*				< 0.02	< 0.02	0.03					n/a	0.25	0.25	20	0.5 (H <=100)
					< 0.02	< 0.02	*				< 0.02	< 0.02	< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	-	-	-	-	-	-	105	103	103	-	200	185	200	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.01	0.03	*	0.01	0.02	*	< 0.01	0.03	0.03	< 0.01	0.02	0.01	< 0.01	n/a	0.8	0.8	n/a	3
Tin	µg/L	-	-	-	-	-	-	< 0.05	< 0.05	< 0.05	-	0.28	0.58	0.55	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	3	2.8	7	1.7	1.9	*	25.1	5.9	4.1	0.9	2.2	1.7	1.5	n/a	100	100	n/a	1,000
Tungsten	µg/L	-	-	-	-	-	-	0.38	< 0.01	< 0.01	-	0.69	0.56	-	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.07	0.07	0	0.02	0.02	*	0.15	0.04	0.03	0.95	1.13	1.03	0.97	20	15	15	20	85
Vanadium	µg/L	1	1.2	*	0.6	0.7	*	5.4	2.4	0.9	2.5	3.1	2.5	2.4	n/a	n/a	n/a	20	n/a
Zinc	µg/L	2	3	*				5	2	2					5,000	30	30	3,000	75 (H 0-<90)
																			150 (H 90-<100)
					< 2	< 2	*					3	4	< 2					900 (H 100-<200)
											< 2								1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894, 19V512465.
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[a] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
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SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 3 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-2S								MW15-2D				Federal Guideline			BC Standard	
Sample ID		MW15-2S-150210	MW15-2S-160113	MW15-2S-171030	MW15-2S-180208	MW18-A-180208	QA/QC	MW15-2S-190222	MW15-2S-190228	MW15-2D-150210	MW15-2D-160113	MW15-2D-171030	MW15-2D-180208	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2015 02 10	2016 01 13	2017 10 30	2018 02 08	Duplicate	RPD %	2019 02 22	2019 02 28	2015 02 10	2016 01 13	2017 10 30	2018 02 08					
Parameter	Units	Analytical Results																
Physical Parameters																		
pH (field)	pH	8.1	7.1	-	7.7	7.7	0	7.1	7.7	8.8	8.3	-	**6.9**	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	146	88.1	51.1	96.1	68	34	45.8	43.3	146	132	124	130	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																		
Aluminum	µg/L			***352***								< 2		100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		12	2		8	3	*	2	3	6	< 2		6		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	42.1	25.7	14.1	29.1	18	47	11.4	10.8	33.9	29.3	27.6	29.6	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	< 10	< 10	***24,100***	***28,300***	***28,600***	1	< 10	21	< 10	< 10	< 10	14	300	300	300	n/a	n/a
Magnesium	mg/L	10	5.81	3.87	5.7	5.59	2	4.2	3.97	14.9	14.3	13.3	13.6	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	**592**	**30**	**1,670**	**1,780**	**1,800**	1	9	2	**323**	< 1	< 1	< 1	20	n/a	n/a	n/a	n/a
Potassium	mg/L	-	0.794	13.1	0.515	0.471	9	0.285	0.189	-	0.823	0.628	0.621	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	15.5	13.3	60.3	6.56	6.39	3	5.96	6.5	31.1	8.91	8.02	8.98	200	n/a	n/a	200	n/a
Dissolved Metals																		
Antimony	µg/L	< 0.2	< 0.2	0.5	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	6	2,000	2,000	6	90
Arsenic	µg/L	0.2	0.2	***19.2***	*8.7*	*8.3*	5	< 0.1	0.1	0.9	1.1	1.2	1.2	10	5	5	10	50
Barium	µg/L	30.7	14.6	105	34.1	34.0	0	13.7	13.3	7.8	5.1	5.3	4.4	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	0.33	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	20	9	35	5	4	*	5	5	21	10	9	7	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L													5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
			0.02	< 0.01		< 0.01	*	0.03	0.03									1.5 (H >30-<90)
		0.1			< 0.01					0.02	< 0.01	0.03	< 0.01					2.5 (H >90-<150)
																		3.5 (H >150-<210)
																		4 (H >=210)
Chromium	µg/L	< 0.5	< 0.5	3.0	< 0.5	< 0.5	*	< 0.5	< 0.5	2.4	1.1	1.2	1.0	50	8.9	8.9	50	10
Cobalt	µg/L	3	0.06	13.0	10.1	9.95	1	< 0.05	< 0.05	0.64	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L							0.6	0.4					1,000	2 - 4	2 - 4	1,500	20 (H <50)
				< 0.2		< 0.2	*											30 (H >50-<75)
			0.6		0.7													40 (H >75-<100)
												< 0.2						50 (H >100-<125)
		1.1								1.1	0.5		0.5					60 (H >125-<150)
																		70 (H >150-<175)
																		80 (H >175-<200)
																		90 (H >=200)
Lead	µg/L							< 0.05	< 0.05					5	1 - 7	1 - 7	10	40 (H<50)
			< 0.05	0.12	< 0.05	< 0.05	*											50 (H 50-<100)
		< 0.05								< 0.05	< 0.05	< 0.05	< 0.05					60 (H 100-<200)
																		110 (H 200-<300)
Lithium	µg/L	2.4	1.1	9.2	0.8	0.8	*	0.6	0.5	1.5	0.8	0.7	0.7	n/a	n/a	n/a	8	n/a
Mercury	µg/L	< 0.01	< 0.01	-	< 0.01	< 0.01	*	-	-	< 0.01	< 0.01	< 0.01	< 0.01	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.89	0.25	0.10	0.58	0.66	13	0.14	0.16	5.14	0.61	0.48	0.18	n/a	73	73	250	10,000
Nickel	µg/L			*29.3*				2.5	2.1					n/a	25 - 150	25 - 150	80	250 (H 0-<60)
			1.4		8.9	9.0	*											650 (H 60-<120)
		10.7								2.5	0.2	0.2	0.2					1,100 (H 120-<180)
																		1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	1	1	10	20
Silver	µg/L		< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02					n/a	0.25	0.25	20	0.5 (H <=100)
		0.02								0.02	< 0.02	< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	-	-	-	69.5	65.2	6	30.1	24.8	-	-	-	53.9	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.02	0.02	0.03	< 0.01	< 0.01	*	0.03	0.02	< 0.01	< 0.01	< 0.01	< 0.01	n/a	0.8	0.8	n/a	3
Tin	µg/L	-	-	-	< 0.05	< 0.05	*	< 0.05	< 0.05	-	-	-	< 0.05	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	2.1	1.4	9.3	3.8	4.2	10	1.7	1.5	2.6	2.0	2.7	4.8	n/a	100	100	n/a	1,000
Tungsten	µg/L	-	-	-	0.29	0.11	90	< 0.01	0.04	-	-	-	0.35	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.18	0.06	0.31	0.14	0.13	7	0.02	0.02	0.26	0.11	0.06	0.07	20	15	15	20	85
Vanadium	µg/L	< 0.5	0.6	5.1	1.1	1.2	*	< 0.5	< 0.5	4.1	10.0	11.7	11.7	n/a	n/a	n/a	20	n/a
Zinc	µg/L		< 2	12		< 2	*	3	2					5,000	30	30	3,000	75 (H 0-<90)
					3													150 (H 90-<100)
		2								< 2	< 2	< 1	< 2					900 (H 100-<200)
																		1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894, 19V512465.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Pathways Included: Aesthetic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 3 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-2D (Cont'd)					MW15-3						MW15-4		Federal Guideline			BC Standard	
Sample ID		MW15-2D-190222	MW19-A-190222	QA/QC	MW15-2D-190228	MW15-2D-190828/29	MW15-3-150210	MW15-3-160112	MW15-3-171026	MW15-3-180208	MW15-3-190222	MW15-3-190228	MW15-4-150210	MW15-4-160113	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2019 02 22	Duplicate	RPD %	2019 02 28	2019 08 28	2015 02 10	2016 01 12	2017 10 26	2018 02 08	2019 02 22	2019 02 28	2015 02 10	2016 01 13					
Parameter	Units	Analytical Results																	
Physical Parameters																			
pH (field)	pH	7.1	7.1	0	7.7	7.45	7.6	8	8.1	7.1	7.2	7.6	7.5	7.5	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	115	115	0	122	111	58.6	46.9	17.2	20.1	52.9	52.7	125	161	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																			
Aluminum	µg/L														100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		2	< 2	*	< 2	27	23	10	21	8	15	17	10	< 2		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	25.8	25.7	0	27.4	24.8	17.8	14.2	5.05	5.87	15.8	15.8	35.3	46.6	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	< 10	< 10	*	25	31	261	***321***	***329***	***2,980***	17	21	< 10	10	300	300	300	n/a	n/a
Magnesium	mg/L	12.3	12.3	0	13	11.9	3.44	2.79	1.11	1.31	3.27	3.21	8.89	10.8	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	< 1	< 1	*	< 1	19	**596**	**155**	**128**	**233**	**294**	5	**204**	3	20	n/a	n/a	n/a	n/a
Potassium	mg/L	0.523	0.551	5	0.462	0.541	-	0.293	0.591	0.414	0.355	0.223	-	1.12	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	8.56	8.55	0	8.68	7.75	9.96	5.95	35.4	10.9	8.63	6.76	36.1	30.9	200	n/a	n/a	200	n/a
Dissolved Metals																			
Antimony	µg/L	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	< 0.2	0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	6	2,000	2,000	6	90
Arsenic	µg/L	1.1	0.9	20	1.1	1.1	0.4	0.3	1.4	1.2	0.1	0.1	0.2	0.3	10	5	5	10	50
Barium	µg/L	4.0	4.1	2	4.3	4.6	7.8	12.5	12.6	5.0	7.6	8.6	28	24.5	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	*	< 0.01	< 0.01	0.02	0.01	0.07	0.01	0.01	0.02	0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	8	8	*	7	7	5	2	4	< 2	3	2	70	76	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L								***0.04***	< 0.01					5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
			< 0.01	*			0.02	0.04			***0.11***	0.02							1.5 (H >30-<90)
		< 0.01			0.02	< 0.01							0.08						2.5 (H >90-<150)
														0.02					3.5 (H >150-<210)
																			4 (H >=210)
Chromium	µg/L	1.0	0.9	*	0.9	1.0	0.7	< 0.5	1.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	8.9	8.9	50	10
Cobalt	µg/L	< 0.05	< 0.05	*	< 0.05	0.10	3.67	1.04	1.82	1.95	0.68	< 0.05	1.41	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L							0.7	0.8	1.2					1,000	2 - 4	2 - 4	1,500	20 (H <50)
							0.4				0.7	0.7							30 (H >50-<75)
																			40 (H >75-<100)
		0.7	***16.2***	*	0.3	0.8							1.1						50 (H >100-<125)
																			60 (H >125-<150)
														0.9					70 (H >150-<175)
																			80 (H >175-<200)
																			90 (H >=200)
Lead	µg/L							< 0.05	0.07	0.06					5	1 - 7	1 - 7	10	40 (H<50)
							< 0.05				< 0.05	< 0.05							50 (H 50-<100)
		< 0.05	< 0.05	*	< 0.05	< 0.05							< 0.05	< 0.05					60 (H 100-<200)
																			110 (H 200-<300)
Lithium	µg/L	0.8	0.8	*	0.5	0.8	0.7	< 0.5	1.7	< 0.5	< 0.5	< 0.5	2.2	1.8	n/a	n/a	n/a	8	n/a
Mercury	µg/L	-	-	-	-	-	< 0.01	< 0.01	< 0.01	< 0.01	-	-	0.01	< 0.01	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.43	0.49	13	0.67	0.21	0.51	0.19	0.20	0.12	0.16	0.12	0.26	0.15	n/a	73	73	250	10,000
Nickel	µg/L						4.6	1.3	2.4	1.1	0.9	0.5			n/a	25 - 150	25 - 150	80	250 (H 0-<60)
		0.3	0.3	*		0.4													650 (H 60-<120)
					< 0.2								5.4	1.3					1,100 (H 120-<180)
																			1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	*	< 0.5	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	1	1	10	20
Silver	µg/L						< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02			n/a	0.25	0.25	20	0.5 (H <=100)
		< 0.02	< 0.02	*	< 0.02	< 0.02							< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	57.7	56.9	1	54.8	53.8	-	-	-	28.7	58.1	51.2	-	-	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.03	0.03	*	0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	0.03	0.02	< 0.01	0.02	n/a	0.8	0.8	n/a	3
Tin	µg/L	0.05	< 0.05	*	< 0.05	< 0.05	-	-	-	< 0.05	< 0.05	< 0.05	-	-	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	3.4	3.1	9	2.9	3.1	1.3	0.9	1.3	2.6	1.3	1.1	2	1.5	n/a	100	100	n/a	1,000
Tungsten	µg/L	< 0.01	< 0.01	*	0.30	-	-	-	-	0.17	< 0.01	0.03	-	-	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.07	0.07	0	0.06	0.05	0.05	0.02	0.21	0.05	0.04	0.03	0.21	0.22	20	15	15	20	85
Vanadium	µg/L	13.2	12.2	8	11.7	15.6	0.9	1.5	1.1	1.1	0.7	< 0.5	0.6	< 0.5	n/a	n/a	n/a	20	n/a
Zinc	µg/L						< 2	< 2	2	< 2	6	< 2			5,000	30	30	3,000	75 (H 0-<90)
																			150 (H 90-<100)
		4	3	*	4	< 2							3	< 2					900 (H 100-<200)
																			1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894, 19V512465.
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n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 3 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-4 (Cont'd)			MW15-5					MW18-06S			MW18-06D		Federal Guideline			BC Standard	
Sample ID		MW15-4-180208	MW15-4-190222	MW15-4-190228	MW15-5-150210	MW15-5-160113	MW15-5-180208	MW15-5-190222	MW15-5-190301	MW18-6S-180208	MW18-06S-190222	MW18-06S-190228	MW18-6D-180208	MW18-06D-190222	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2018 02 08	2019 02 22	2019 02 28	2015 02 10	2016 01 13	2018 02 08	2019 02 22	2019 03 01	2018 02 08	2019 02 22	2019 02 28	2018 02 08	2019 02 22					
Parameter	Units	Analytical Results																	
Physical Parameters																			
pH (field)	pH	**6.7**	7.1	7.6	7.8	-	**6.9**	-	7.9	7.1	8.2	7.4	7.5	8.2	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	118	117	121	65.2	201	83.3	93.1	80.8	103	136	128	168	131	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																			
Aluminum	µg/L					*24*		*19*							100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		2	4	< 2	71		55		28	7	4	2	5	6		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	31.1	31.4	32.6	19.5	52.1	26.3	24.8	22.7	30.9	37.9	35.9	48	35.6	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	< 10	< 10	< 10	37	10	165	73	76	< 10	< 10	< 10	< 10	< 10	300	300	300	n/a	n/a
Magnesium	mg/L	9.69	9.26	9.67	4.02	17.2	4.29	7.57	5.86	6.26	10	9.34	11.6	10.2	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	< 1	< 1	< 1	**281**	**5,250**	**1,680**	**305**	**1,170**	**62**	**80**	**71**	**192**	< 1	20	n/a	n/a	n/a	n/a
Potassium	mg/L	0.775	0.653	0.566	-	5.82	2.07	3.39	2.26	2.51	1.86	1.63	1.79	1.44	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	33	31.8	33.4	4.25	5.76	2.55	3.32	2.54	44.2	19.1	17.2	16.1	13	200	n/a	n/a	200	n/a
Dissolved Metals																			
Antimony	µg/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	1.0	0.3	0.3	0.5	0.2	6	2,000	2,000	6	90
Arsenic	µg/L	0.3	0.3	0.2	< 0.1	0.3	0.2	0.2	0.1	1.2	0.8	0.8	0.6	1.0	10	5	5	10	50
Barium	µg/L	19.0	16.8	18.9	10.9	64.1	29.8	32.2	24.4	18.2	29.7	29.3	13.3	15.3	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	78	77	81	7	13	5	8	8	55	19	17	44	11	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L														5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
					0.07		0.05		0.06										1.5 (H >30-<90)
		< 0.01	0.11	0.02				0.06		< 0.01	< 0.01	0.01		0.02					2.5 (H >90-<150)
						0.16							< 0.01						3.5 (H >150-<210)
																			4 (H >=210)
Chromium	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	0.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5	50	8.9	8.9	50	10
Cobalt	µg/L	< 0.05	< 0.05	< 0.05	1.56	0.79	0.87	0.14	0.32	0.17	0.09	0.07	0.32	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L														1,000	2 - 4	2 - 4	1,500	20 (H <50)
					1.5														30 (H >50-<75)
							2.0	*3.1*	1.7										40 (H >75-<100)
		0.6	0.5	0.4						1.1									50 (H >100-<125)
											0.7	0.5		0.8					60 (H >125-<150)
													2.2						70 (H >150-<175)
																			80 (H >175-<200)
						6.0													90 (H >=200)
Lead	µg/L														5	1 - 7	1 - 7	10	40 (H<50)
					< 0.05		< 0.05	< 0.05	< 0.05										50 (H 50-<100)
		< 0.05	< 0.05	< 0.05						< 0.05	< 0.05	< 0.05	< 0.05	< 0.05					60 (H 100-<200)
						0.05													110 (H 200-<300)
Lithium	µg/L	1.2	1.3	1.6	1.6	0.8	< 0.5	< 0.5	< 0.5	9.2	3.0	2.5	0.9	1.2	n/a	n/a	n/a	8	n/a
Mercury	µg/L	< 0.01	-	-	< 0.01	< 0.01	< 0.01	-	-	< 0.01	-	-	< 0.01	-	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.09	0.13	0.14	0.06	0.14	< 0.05	0.13	0.07	13.7	11.2	10.0	6.48	3.88	n/a	73	73	250	10,000
Nickel	µg/L														n/a	25 - 150	25 - 150	80	250 (H 0-<60)
		0.7	0.8		3		1.4	1.1	0.7	1.0									650 (H 60-<120)
				0.6							0.4	< 0.2	1.0	0.2					1,100 (H 120-<180)
						4.8													1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*1.3*	0.7	0.8	*1.6*	0.7	50	1	1	10	20
Silver	µg/L				0.02		< 0.02	< 0.02	< 0.02						n/a	0.25	0.25	20	0.5 (H <=100)
		< 0.02	< 0.02	< 0.02		< 0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	130	145	132	-	-	142	197	180	102	127	104	148	105	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	< 0.01	0.03	0.01	< 0.01	0.04	< 0.01	0.03	0.01	< 0.01	0.04	0.02	< 0.01	0.05	n/a	0.8	0.8	n/a	3
Tin	µg/L	< 0.05	< 0.05	< 0.05	-	-	< 0.05	0.73	< 0.05	< 0.05	0.11	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	3.7	2.1	1.9	3.3	1.7	3.5	2.0	1.9	3.3	2.4	1.8	3.1	2.6	n/a	100	100	n/a	1,000
Tungsten	µg/L	0.14	< 0.01	0.01	-	-	0.11	< 0.01	0.02	0.17	0.22	0.65	0.13	< 0.01	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.05	0.06	0.05	0.05	0.17	0.02	0.02	0.02	4.54	2.91	2.11	1.49	1.39	20	15	15	20	85
Vanadium	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.5	< 0.5	< 0.5	0.8	0.8	< 0.5	0.9	0.8	n/a	n/a	n/a	20	n/a
Zinc	µg/L				9		7		5						5,000	30	30	3,000	75 (H 0-<90)
								7											150 (H 90-<100)
		< 2	2	< 2						< 2	< 2	< 2	< 2	< 2					900 (H 100-<200)
						4													1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894, 19V512465.
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< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Pathways Included: Aesthetic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 3 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW18-06D (Cont'd)	MW19-07S	MW19-07D			MW19-08D	MW19-09S	Federal Guideline			BC Standard	
Sample ID		MW18-06D-190228	MW19-07S-190228	MW19-07D-190301	MW19-A-190301	QA/QC	MW19-08D-190301	MW19-09S-190228	Canadian Drinking Water Quality	FIGWQG Tier 2 Residential Land	FIGWQG Tier 2 Commercial Land	CSR Drinking	CSR Aquatic Life
Sample Date (yyyy mm dd)		2019 02 28	2019 02 28	2019 03 01	Duplicate	RPD %	2019 03 01	2019 02 28	Guidelines (CDWQG)[a]	Use (RL)[b]	Use (CL)[b]	Water (DW)	(AW)[c]
Parameter	**Units**	**Analytical Results**											
Physical Parameters													
pH (field)	pH	7.4	8.2	7.7	7.7	*	**6.9**	7.6	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	125	211	180	183	2	192	99.3	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics													
Aluminum	µg/L			6	6	*			100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		10	***876***				9	73		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	34.9	84.4	53.8	54.3	1	56.2	35	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	14	17	49	20	*	16	17	300	300	300	n/a	n/a
Magnesium	mg/L	9.31	0.083	11.2	11.4	2	12.6	2.89	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	< 1	< 1	**1,400**	**1,420**	1	**1,310**	**125**	20	n/a	n/a	n/a	n/a
Potassium	mg/L	1.34	4.87	1.73	1.8	4	2.71	2.32	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	12.8	51.8	40.5	41.6	3	23.6	18	200	n/a	n/a	200	n/a
Dissolved Metals													
Antimony	µg/L	0.2	2.0	0.9	0.9	*	0.2	0.5	6	2,000	2,000	6	90
Arsenic	µg/L	0.9	3.2	2.2	2.1	5	1.1	0.8	10	5	5	10	50
Barium	µg/L	13.9	13.5	14.7	14.6	1	24.7	16.7	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	11	14	36	35	3	16	10	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L								5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
													1.5 (H >30-<90)
		< 0.01						0.03					2.5 (H >90-<150)
				0.03	0.04	*	0.05						3.5 (H >150-<210)
			0.02										4 (H >=210)
Chromium	µg/L	1.1	***14.0***	< 0.5	< 0.5	*	< 0.5	0.7	50	8.9	8.9	50	10
Cobalt	µg/L	< 0.05	0.38	2.27	2.36	4	2.45	1.11	n/a	n/a	n/a	20[d]	40
Copper	µg/L								1,000	2 - 4	2 - 4	1,500	20 (H <50)
													30 (H >50-<75)
								1.9					40 (H >75-<100)
													50 (H >100-<125)
		0.7											60 (H >125-<150)
							1.3						70 (H >150-<175)
				2.9	2.6	11							80 (H >175-<200)
			9.3										90 (H >=200)
Lead	µg/L								5	1 - 7	1 - 7	10	40 (H<50)
								< 0.05					50 (H 50-<100)
		< 0.05		< 0.05	< 0.05	*	< 0.05						60 (H 100-<200)
			< 0.05										110 (H 200-<300)
Lithium	µg/L	1.2	0.5	2.0	1.5	*	1.8	9.4	n/a	n/a	n/a	8	n/a
Mercury	µg/L	-	-	-	-	-	-	-	1	0.026	0.026	1	0.25
Molybdenum	µg/L	3.92	4.80	15.8	15.7	1	10.5	1.72	n/a	73	73	250	10,000
Nickel	µg/L								n/a	25 - 150	25 - 150	80	250 (H 0-<60)
								3.5					650 (H 60-<120)
		< 0.2											1,100 (H 120-<180)
			2.9	5.4	5.4	0	4.9						1,500 (H >=180)
Selenium	µg/L	< 0.5	***1.1***	0.6	0.6	*	0.5	< 0.5	50	1	1	10	20
Silver	µg/L							< 0.02	n/a	0.25	0.25	20	0.5 (H <=100)
		< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02						15 (H >100)
Strontium	µg/L	90.9	228	161	163	1	230	199	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.01	0.02	0.02	0.02	*	0.02	0.02	n/a	0.8	0.8	n/a	3
Tin	µg/L	0.13	1.75	0.36	0.38	5	0.79	0.31	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	2.3	1.4	1.9	2.1	*	2.9	1.6	n/a	100	100	n/a	1,000
Tungsten	µg/L	0.10	0.44	< 0.01	0.12	*	0.14	0.08	n/a	n/a	n/a	3	n/a
Uranium	µg/L	1.09	0.03	2.14	2.17	1	1.19	0.58	20	15	15	20	85
Vanadium	µg/L	0.7	13.2	2.1	1.5	*	0.6	1.3	n/a	n/a	n/a	20	n/a
Zinc	µg/L								5,000	30	30	3,000	75 (H 0-<90)
								114					150 (H 90-<100)
		3		4	4	*	5						900 (H 100-<200)
			3										1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894, 19V512465.
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n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Pathways Included: Aesthetic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

TABLE 4: Summary of Analytical Results for Groundwater - Volatile Organic Compounds

Sample Location		MW15-2S	MW15-2D	MW15-5	Federal Guideline			BC Standard	
Sample ID		MW15-2S-150210	MW15-2D-150210	MW15-5-150210	Canadian Drinking Water Quality Guidelines (CDWQG)[b]	FIGWQG Tier 2 Residential Land Use (RL)[c]	FIGWQG Tier 2 Commercial Land Use (CL)[c]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[d]
Sample Date (yyyy mm dd)		2015 02 10	2015 02 10	2015 02 10					
Parameter	Units	Analytical Results							
Volatile Organic Compounds									
Bromodichloromethane	µg/L	< 1	< 1	< 1	n/a	8,500	8,500	100	n/a
Bromoform	µg/L	< 1	< 1	< 1	n/a	380	3,700	100	n/a
Bromomethane	µg/L	< 1	< 1	< 1	n/a	5.6	33	5.5	n/a
Carbon tetrachloride	µg/L	< 0.5	< 0.5	< 0.5	2	0.56	6.8	2	130
Chlorobenzene	µg/L	< 1	< 1	< 1	30	1.3	1.3	80	13
Chloroethane	µg/L	< 1	< 1	< 1	n/a	n/a	n/a	n/a	n/a
Chloroform	µg/L	< 1	< 1	< 1	n/a	1.8	1.8	100	20
Chloromethane	µg/L	< 1	< 1	< 1	n/a	n/a	n/a	n/a	n/a
Dibromochloromethane	µg/L	< 1	< 1	< 1	n/a	1,100	10,000	100	n/a
1,2-Dibromoethane	µg/L	< 0.3[a]	< 0.3[a]	< 0.3[a]	n/a	0.25	5.1	0.5	n/a
1,2-Dichlorobenzene	µg/L	< 0.5	< 0.5	< 0.5	3	0.7	0.7	200	7
1,3-Dichlorobenzene	µg/L	< 0.5	< 0.5	< 0.5	n/a	150	150	n/a	1,500
1,4-Dichlorobenzene	µg/L	< 0.5	< 0.5	< 0.5	1	26	26	5	260
1,1-Dichloroethane	µg/L	< 1	< 1	< 1	n/a	320	6,600	30	n/a
1,2-Dichloroethane	µg/L	< 1	< 1	< 1	5	10	100	5	1,000
1,1-Dichloroethylene	µg/L	< 1	< 1	< 1	14	39	490	14	n/a
cis-1,2-Dichloroethylene	µg/L	< 1	< 1	< 1	n/a	1.6	30	8	n/a
trans-1,2-Dichloroethylene	µg/L	< 1	< 1	< 1	n/a	1.6	30	80	n/a
Dichloromethane	µg/L	< 1	< 1	< 1	50	98	98	50	980
1,2-Dichloropropane	µg/L	< 1	< 1	< 1	n/a	16	330	4.5	n/a
cis-1,3-Dichloropropene	µg/L	< 1	< 1	< 1	n/a	n/a	n/a	1.5	n/a
trans-1,3-Dichloropropene	µg/L	< 1	< 1	< 1	n/a	n/a	n/a	1.5	n/a
Methyl ethyl ketone	µg/L	< 10	< 10	< 10	n/a	150,000	150,000	2,500	n/a
Methyl isobutyl ketone	µg/L	< 10	< 10	< 10	n/a	58,000	58,000	n/a	n/a
1,1,1,2-Tetrachloroethane	µg/L	< 1	< 1	< 1	n/a	3.4	66	6	n/a
1,1,2,2-Tetrachloroethane	µg/L	< 1[a]	< 1[a]	< 1[a]	n/a	3.2	63	0.8	n/a
Tetrachloroethylene	µg/L	< 1	< 1	< 1	10	110	110	30	1,100
Total Trihalomethanes	µg/L	< 2	< 2	< 2	100	n/a	n/a	100	n/a
1,2,4-Trichlorobenzene	µg/L	< 1	< 1	< 1	n/a	24	24	5.5	240
1,1,1-Trichloroethane	µg/L	< 1	< 1	< 1	n/a	640	1,100	8,000	n/a
1,1,2-Trichloroethane	µg/L	< 1	< 1	< 1	n/a	4.7	91	3	n/a
Trichloroethylene	µg/L	< 1	< 1	< 1	5	20	29	5	200
Trichlorofluoromethane	µg/L	< 1	< 1	< 1	n/a	n/a	n/a	1,000	n/a
Vinyl chloride	µg/L	< 1	< 1	< 1	2	1.1	13	2	n/a

Associated AGAT file(s): 15V943947.
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RPD Denotes relative percent difference.
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RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Laboratory detection limit exceeds regulatory standard/guideline.
[b] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[c] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[d] Standard to protect freshwater aquatic life.

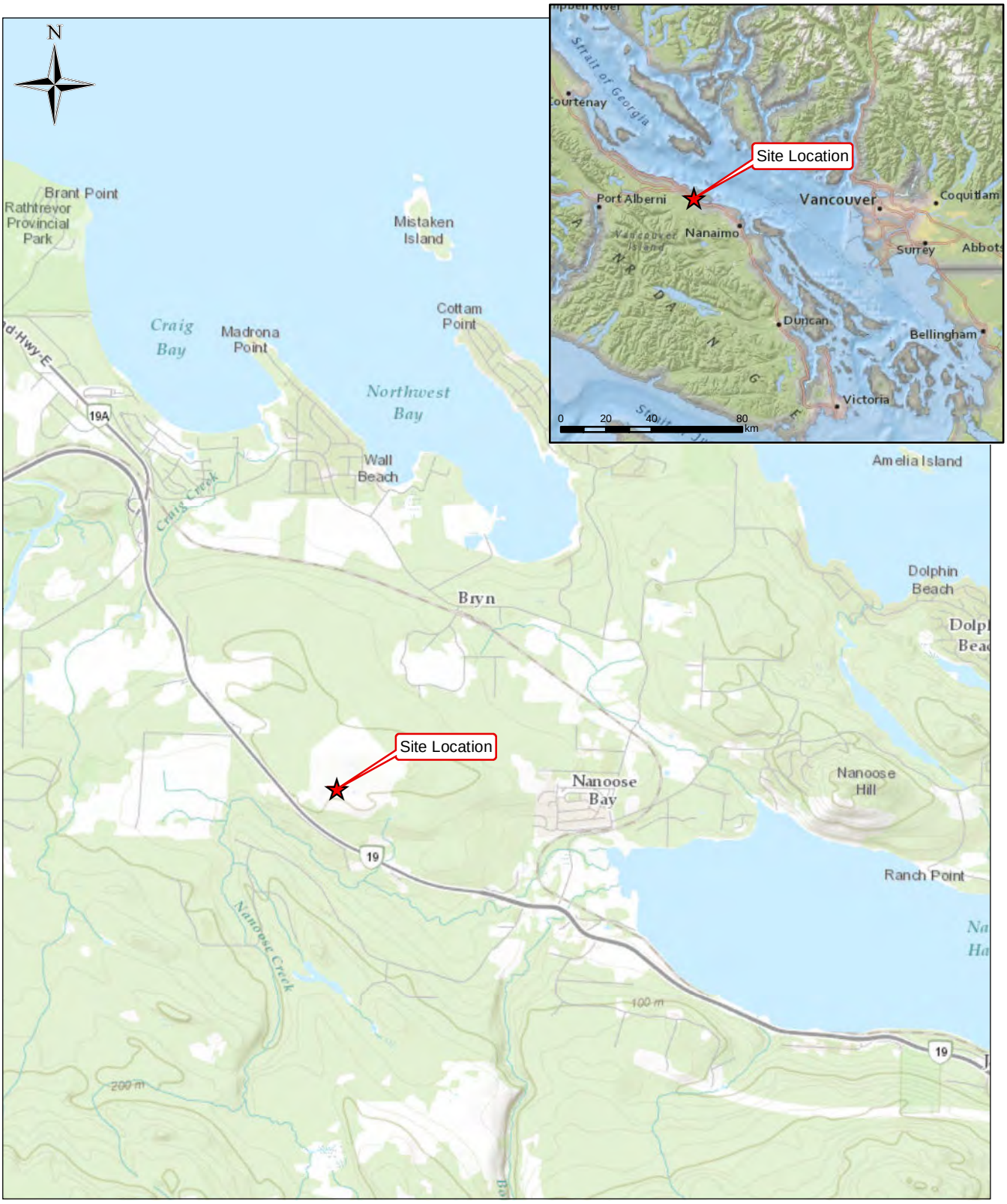
TABLE 5: Summary of Analytical Results for Asbestos Samples

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Depth Interval (m)	Type of Sample	Bulk Asbestos %
TP19-66	TP19-66-01a	2019 12 12	1.5 - 1.7	white tile, grey grout, grey concrete	not detected
	TP19-66-01b	2019 12 12	1.5 - 1.7	white tile, grey grout, grey concrete	not detected
	TP19-66-01c	2019 12 12	1.5 - 1.7	white tile, grey grout, grey concrete	not detected
	TP19-66-02a	2019 12 12	1.7 - 1.8	grey porous concrete	not detected
	TP19-66-02b	2019 12 12	1.7 - 1.8	grey porous concrete	not detected
	TP19-66-02c	2019 12 12	1.7 - 1.8	grey porous concrete	not detected
	TP19-66-03	2019 12 12	1.8 - 2.0	tan tile, brown grout	not detected
TP19-68	TP19-68-01a	2019 12 12	1.4 - 1.5	grey mortar	not detected
	TP19-68-01b	2019 12 12	1.4 - 1.5	grey mortar	not detected
	TP19-68-01c	2019 12 12	1.4 - 1.5	grey mortar	not detected
	TP19-68-02a	2019 12 12	1.5 - 1.7	light orange brick	not detected
	TP19-68-02b	2019 12 12	1.5 - 1.7	light orange brick	not detected
	TP19-68-02c	2019 12 12	1.5 - 1.7	light orange brick	not detected
TP19-69	TP19-69-01a	2019 12 12	1.5 - 1.7	black brittle papery layers	not detected
	TP19-69-01b	2019 12 12	1.5 - 1.7	black brittle papery layers	not detected
	TP19-69-01c	2019 12 12	1.5 - 1.7	black brittle papery layers	not detected
TP19-71	TP19-71-01	2019 12 12	1.7 - 1.8	grey concrete	not detected

Associated AGAT file(s): 19V557561.
All terms defined within the body of SNC-Lavalin's report.

Drawings

- 626268-401 – Location Plan
- 626268-402 – Wide Area Site Plan
- 626268-403 – Analytical Results for Groundwater – Federal Standards
- 626268-404 – Analytical Results for Groundwater – Provincial Standards
- 626268-405 – Debris Unit – Results for Asbestos Containing Material



LEGEND

★ Site Location

NOTES

1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.

SNC·LAVALIN

CLIENT NAME:	PROJECT LOCATION:
Public Works and Government Services Canada	Nanoose TX Nanoose Bay, BC

Site Location

0 0.5 1 2 3 4 Kilometers

BY: PB	DATE: 2015-03-31	REF No:	REV: 0
CHK'D: CS	SCALE: 1:55,000	626268-001	

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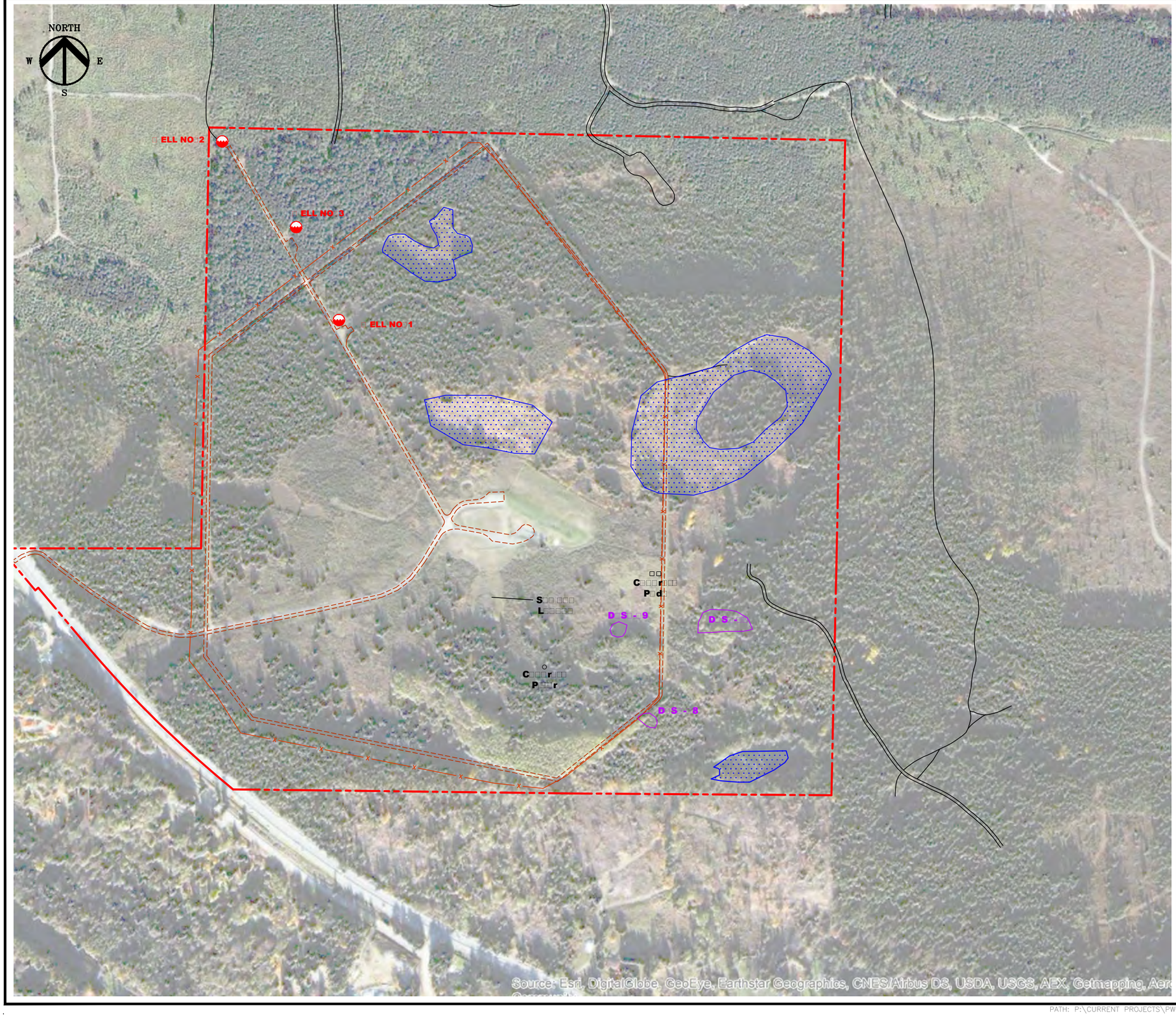
MXD Path: \\Proj_srv\projects\Current Projects\Public Works and Gov't Services Canada\626268-Nanaimo Transmitter\4.0 Execution\4.5 GIS and Drawings\GIS\MapSeries\626268-001.mxd



LEGEND

- PROPERTY BOUNDARY
- PAVED ROAD
- GRAVEL ROAD
- FENCE
- FORMER STRUCTURE (LOCATION APPROXIMATE)
- WETLAND
- ARCHAEOLOGICAL SITES
- DRINKING WATER WELL

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

FIGURE 2	2004-03	KEYSTONE ENVIRONMENTAL
61323-1	2018-02-08	JE ANDERSON & ASSOCIATES
DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2020-06-10	ISSUED TO CLIENT	AJK	IM

0 100 200 300 METRES

CLIENT NAME:
PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION:
NANOOSE TX,
NANOOSE BAY, BC

SNC·LAVALIN

TITLE:

□ IDE AREA SITE PLAN

DRN BY: PES	SCALE: 1:6000	DATE: 2018-02-15	DWG No: REV.: 0
CHK'D: CS	PLOT: 20200610.1251	CADFILE: 626268R12	626268-□02

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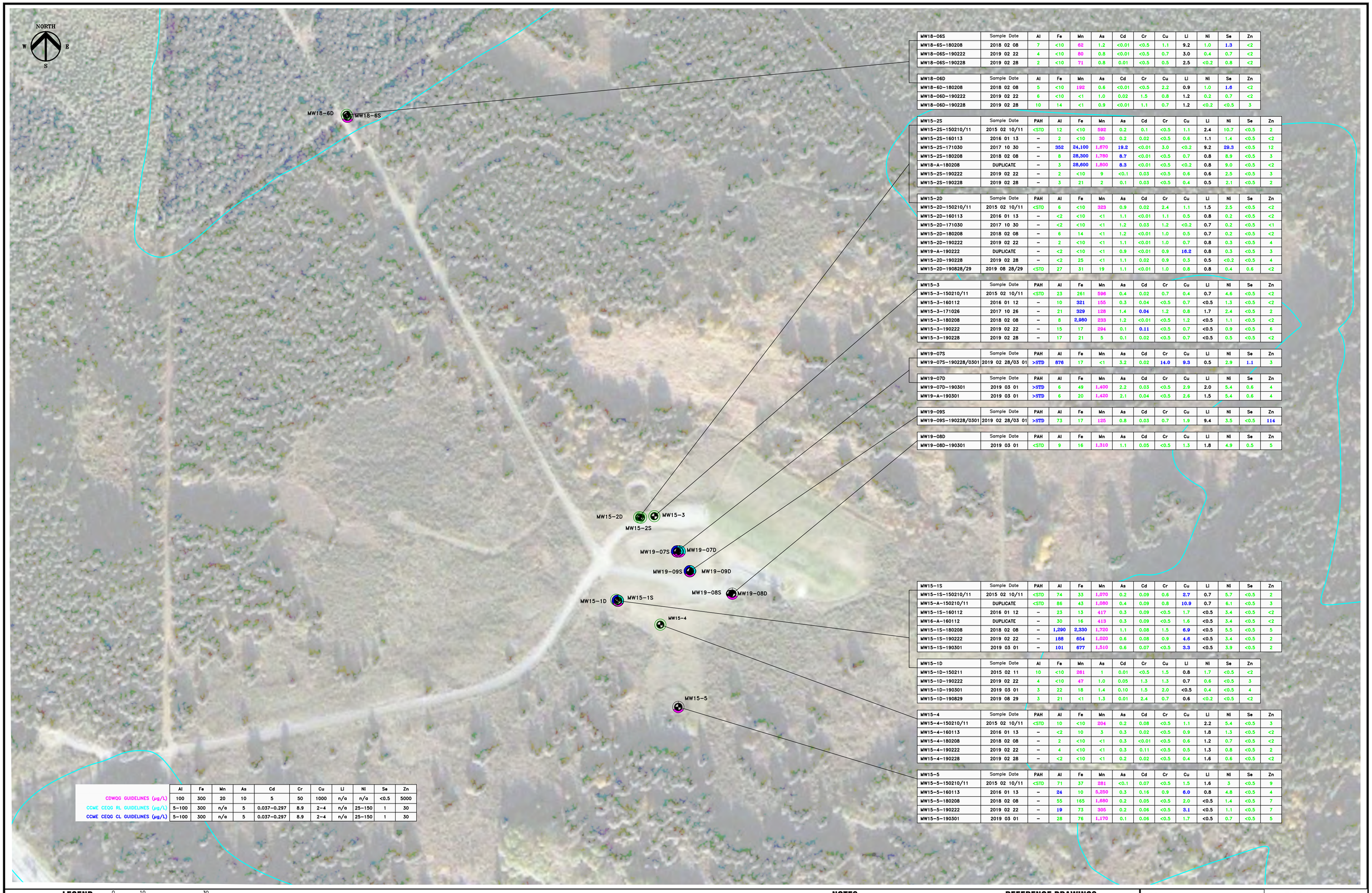

MW18-06S	Sample Date	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW18-6S-180208	2018 02 08	7	<10	62	1.2	<0.01	<0.5	1.1	9.2	1.0	1.3	<2
MW18-06S-190222	2019 02 22	4	<10	80	0.8	<0.01	<0.5	0.7	3.0	0.4	0.7	<2
MW18-06S-190228	2019 02 28	2	<10	71	0.8	0.01	<0.5	0.5	2.5	<0.2	0.8	<2

MW18-06D	Sample Date	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW18-6D-180208	2018 02 08	5	<10	192	0.6	<0.01	<0.5	2.2	0.9	1.0	1.6	<2
MW18-06D-190222	2019 02 22	6	<10	<1	1.0	0.02	1.5	0.8	1.2	0.2	0.7	<2
MW18-06D-190228	2019 02 28	10	14	<1	0.9	<0.01	1.1	0.7	1.2	<0.2	<0.5	3

MW15-2S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-2S-150210/11	2015 02 10/11	<STD	12	<10	592	0.2	0.1	<0.5	1.1	2.4	10.7	<0.5	2
MW15-2S-160113	2016 01 13	–	2	<10	30	0.2	0.02	<0.5	0.6	1.1	1.4	<0.5	<2
MW15-2S-171030	2017 10 30	–	352	24,100	1,670	19.2	<0.01	3.0	<0.2	9.2	29.3	<0.5	12
MW15-2S-180208	2018 02 08	–	8	28,300	1,780	8.7	<0.01	<0.5	0.7	0.8	8.9	<0.5	3
MW18-A-180208	DUPLICATE	–	3	28,600	1,800	8.3	<0.01	<0.5	<0.2	0.8	9.0	<0.5	<2
MW15-2S-190222	2019 02 22	–	2	<10	9	<0.1	0.03	<0.5	0.6	0.6	2.5	<0.5	3
MW15-2S-190228	2019 02 28	–	3	21	2	0.1	0.03	<0.5	0.4	0.5	2.1	<0.5	2

MW15-2D	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-2D-150210/11	2015 02 10/11	<STD	6	<10	323	0.9	0.02	2.4	1.1	1.5	2.5	<0.5	<2
MW15-2D-160113	2016 01 13	–	<2	<10	<1	1.1	<0.01	1.1	0.5	0.8	0.2	<0.5	<2
MW15-2D-171030	2017 10 30	–	<2	<10	<1	1.2	0.03	1.2	<0.2	0.7	0.2	<0.5	<1
MW15-2D-180208	2018 02 08	–	6	14	<1	1.2	<0.01	1.0	0.5	0.7	0.2	<0.5	<2
MW15-2D-190222	2019 02 22	–	2	<10	<1	1.1	<0.01	1.0	0.7	0.8	0.3	<0.5	4
MW19-A-190222	DUPLICATE	–	<2	<10	<1	0.9	<0.01	0.9	16.2	0.8	0.3	<0.5	3
MW15-2D-190228	2019 02 28	–	<2	25	<1	1.1	0.02	0.9	0.3	0.5	<0.2	<0.5	4
MW15-2D-190828/29	2019 08 28/29	<STD	27	31	19	1.1	<0.01	1.0	0.8	0.8	0.4	0.6	<2

MW15-3	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-3-150210/11	2015 02 10/11	<STD	23	261	596	0.4	0.02	0.7	0.4	0.7	4.6	<0.5	<2
MW15-3-160112	2016 01 12	–	10	321	155	0.3	0.04	<0.5	0.7	<0.5	1.3	<0.5	<2
MW15-3-171026	2017 10 26	–	21	329	128	1.4	0.04	1.2	0.8	1.7	2.4	<0.5	2
MW15-3-180208	2018 02 08	–	8	2,980	233	1.2	<0.01	<0.5	1.2	<0.5	1.1	<0.5	<2
MW15-3-190222	2019 02 22	–	15	17	294	0.1	0.11	<0.5	0.7	<0.5	0.9	<0.5	6
MW15-3-190228	2019 02 28	–	17	21	5	0.1	0.02	<0.5	0.7	<0.5	0.5	<0.5	<2

MW19-07S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-07S-190228/0301	2019 02 28/03 01	>STD	876	17	<1	3.2	0.02	14.0	9.3	0.5	2.9	1.1	3

MW19-07D	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-07D-190301	2019 03 01	>STD	6	49	1,400	2.2	0.03	<0.5	2.9	2.0	5.4	0.6	4
MW19-A-190301	2019 03 01	>STD	6	20	1,420	2.1	0.04	<0.5	2.6	1.5	5.4	0.6	4

MW19-09S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-09S-190228/0301	2019 02 28/03 01	>STD	73	17	125	0.8	0.03	0.7	1.9	9.4	3.5	<0.5	114

MW19-08D	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-08D-190301	2019 03 01	<STD	9	16	1,310	1.1	0.05	<0.5	1.3	1.8	4.9	0.5	5

MW15-1S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-1S-150210/11	2015 02 10/11	<STD	74	33	1,070	0.2	0.09	0.6	2.7	0.7	5.7	<0.5	2
MW15-A-150210/11	DUPLICATE	<STD	86	43	1,080	0.4	0.09	0.8	10.9	0.7	6.1	<0.5	3
MW15-1S-160112	2016 01 12	–	23	13	417	0.3	0.09	<0.5	1.7	<0.5	3.4	<0.5	<2
MW16-A-160112	DUPLICATE	–	30	16	413	0.3	0.09	<0.5	1.6	<0.5	3.4	<0.5	<2
MW15-1S-180208	2018 02 08	–	1,290	2,330	1,720	1.1	0.08	1.5	6.9	<0.5	5.5	<0.5	5
MW15-1S-190222	2019 02 22	–	188	654	1,020	0.6	0.08	0.9	4.6	<0.5	3.4	<0.5	2
MW15-1S-190301	2019 03 01	–	101	677	1,510	0.6	0.07	<0.5	3.3	<0.5	3.9	<0.5	2

MW15-1D	Sample Date	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-1D-150211	2015 02 11	10	<10	261	1	0.01	<0.5	1.5	0.8	1.7	<0.5	<2
MW15-1D-190222	2019 02 22	4	<10	47	1.0	0.05	1.3	1.3	0.7	0.6	<0.5	3
MW15-1D-190301	2019 03 01	3	22	18	1.4	0.10	1.5	2.0	<0.5	0.4	<0.5	4
MW15-1D-190829	2019 08 29	3	21	<1	1.3	0.01	2.4	0.7	0.6	<0.2	<0.5	<2

MW15-4	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-4-150210/11	2015 02 10/11	<STD	10	<10	204	0.2	0.08	<0.5	1.1	2.2	5.4	<0.5	3
MW15-4-160113	2016 01 13	–	<2	10	3	0.3	0.02	<0.5	0.9	1.8	1.3	<0.5	<2
MW15-4-180208	2018 02 08	–	2	<10	<1	0.3	<0.01	<0.5	0.6	1.2	0.7	<0.5	<2
MW15-4-190222	2019 02 22	–	4	<10	<1	0.3	0.11	<0.5	0.5	1.3	0.8	<0.5	2
MW15-4-190228	2019 02 28	–	<2	<10	<1	0.2	0.02	<0.5	0.4	1.6	0.6	<0.5	<2

MW15-5	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-5-150210/11	2015 02 10/11	<STD	71	37	281	<0.1	0.07	<0.5	1.5	1.6	3	<0.5	9
MW15-5-160113	2016 01 13	–	24	10	5,250	0.3	0.16	0.9	6.0	0.8	4.8	<0.5	4
MW15-5-180208	2018 02 08	–	55	165	1,880	0.2	0.05	<0.5	2.0	<0.5	1.4	<0.5	7
MW15-5-190222	2019 02 22	–	19	73	305	0.2	0.06	<0.5	3.1	<0.5	1.1	<0.5	7
MW15-5-190301	2019 03 01	–	28	76	1,170	0.1	0.06	<0.5	1.7	<0.5	0.7	<0.5	5

	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
CDWQG GUIDELINES (µg/L)	100	300	20	10	5	50	1000	n/a	n/a	<0.5	5000
CCME CEQG RL GUIDELINES (µg/L)	5–100	300	n/a	5	0.037–0.297	8.9	2–4	n/a	25–150	1	30
CCME CEQG CL GUIDELINES (µg/L)	5–100	300	n/a	5	0.037–0.297	8.9	2–4	n/a	25–150	1	30

LEGEND

0 10 30 METRES

- SUBJECT PROPERTY LIMITS
- LOT BOUNDARY
- MONITORING WELL
- CONCENTRATIONS ARE LESS OR EQUAL TO THE APPLICABLE GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CDWQG GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CCME CEQG RL GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CCME CEQG CL GUIDELINES

LOCATION

ANALYTICAL GROUNDWATER RESULTS

MW19-09S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-09S-190228/0301	2019 02 28/03 01	>STD	73	17	125	0.8	0.03	0.7	1.9	9.4	3.5	<0.5	114

SAMPLE ID

DEPTH OF SAMPLE (m)

BLUE – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CCME CEQG CL GUIDELINES

MAGENTA – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CDWQG GUIDELINES

GREEN – CONCENTRATIONS ARE LESS THAN THE APPLICABLE STANDARDS

Al	ALUMINIUM
Fe	IRON
Mn	MANGANESE
As	ARSENIC
Cd	CADMIUM
Cr	CHROMIUM
Cu	COPPER
Li	LITHIUM
Ni	NICKEL
Se	SELENIUM
Zn	ZINC

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

–	–	–
DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2020–06–10	ISSUED TO CLIENT	AJK	IM

CLIENT NAME:
PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION:
NANOOSE TX,
NANOOSE BAY, BC

SNC·LAVALIN

TITLE:
ANAL□TICAL RES□LTS FOR □RO□ND□ATER - FEDERAL STANDARDS

DWN BY: DRMM	SCALE: 1:750	DATE: 2019–09–16	DWG No:	REV.: 0
CHK'D: DG	PLOT: 20200610.1252	CADFILE: 626268R12	626268- 03	

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LEGEND

0 10 30 METRES

- SUBJECT PROPERTY LIMITS
- LOT BOUNDARY
- MONITORING WELL
- CONCENTRATIONS ARE LESS THAN THE APPLICABLE GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR DW GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR AW GUIDELINES

LOCATION

ANALYTICAL GROUNDWATER RESULTS

MW19-09S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-09S-190228/0301	2019 02 28/03 01	>STD	73	17	125	0.8	0.03	0.7	1.9	9.4	3.5	<0.5	114

SAMPLE ID

DEPTH OF SAMPLE (m)

CYAN – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR AW GUIDELINES

GREEN – CONCENTRATIONS ARE LESS THAN THE APPLICABLE GUIDELINES

RED – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR DW GUIDELINES

Al	ALUMINIUM
Fe	IRON
Mn	MANGANESE
As	ARSENIC
Cd	CADMIUM
Cr	CHROMIUM
Cu	COPPER
Li	LITHIUM
Ni	NICKEL
Se	SELENIUM
Zn	ZINC

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

–	–	–
DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2020-06-10	ISSUED TO CLIENT	AJK	IM

CLIENT NAME:
PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION:
NANOOSE TX,
NANOOSE BAY, BC

SNC·LAVALIN

TITLE:
ANAL TICAL RES LTS FOR RO ND ATER - PROVINCIAL STANDARDS

DWN BY: DRMM	SCALE: 1:750	DATE: 2019-09-16	DWG No: REV.: 0
CHK'D: DG	PLOT: 20200610.1300	CADFILE: 626268R12	626268- 0

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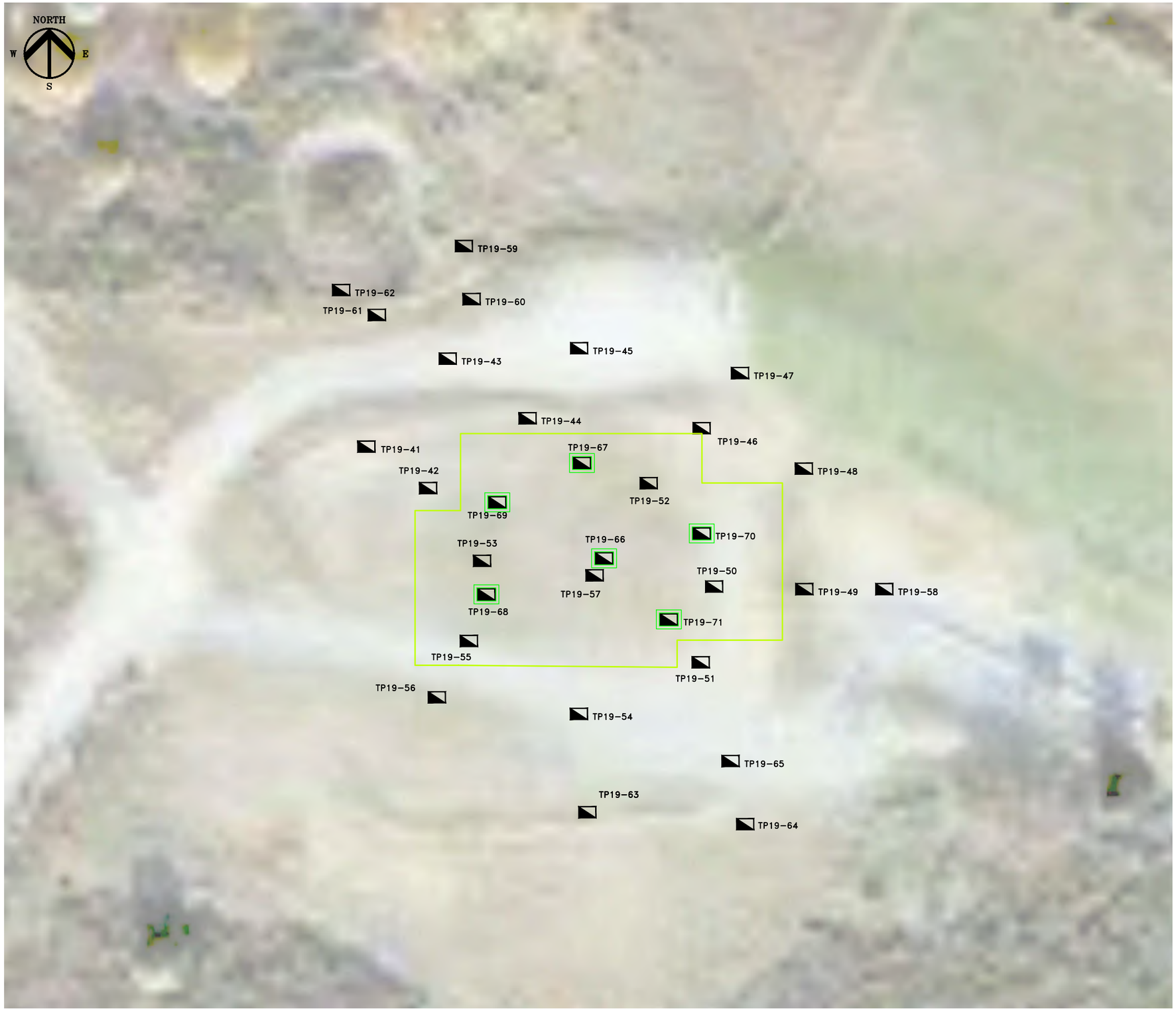


LEGEND

- SUBJECT PROPERTY LIMITS
- LOT BOUNDARY
- DEBRIS AREA
- TEST PIT
- ASBESTOS CONTENT LESS THAN 0.5%

SAMPLES NOT ANALYZED FOR ASBESTOS CONTENT IN OTHER TEST PITS

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

FIGURE 2	2004-03	KEYSTONE ENVIRONMENTAL
61323-1	2018-02-08	JE ANDERSON & ASSOCIATES
DWG. NO.	DATE	DESCRIPTION

REVISIONS

0	2020-06-10	ISSUED TO CLIENT	AJK	IM
REV.	DATE	DESCRIPTION	BY	CHK

0 10 20 30 METRES

CLIENT NAME:
PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION:
NANOOSE TX,
NANOOSE BAY, BC

SNC·LAVALIN

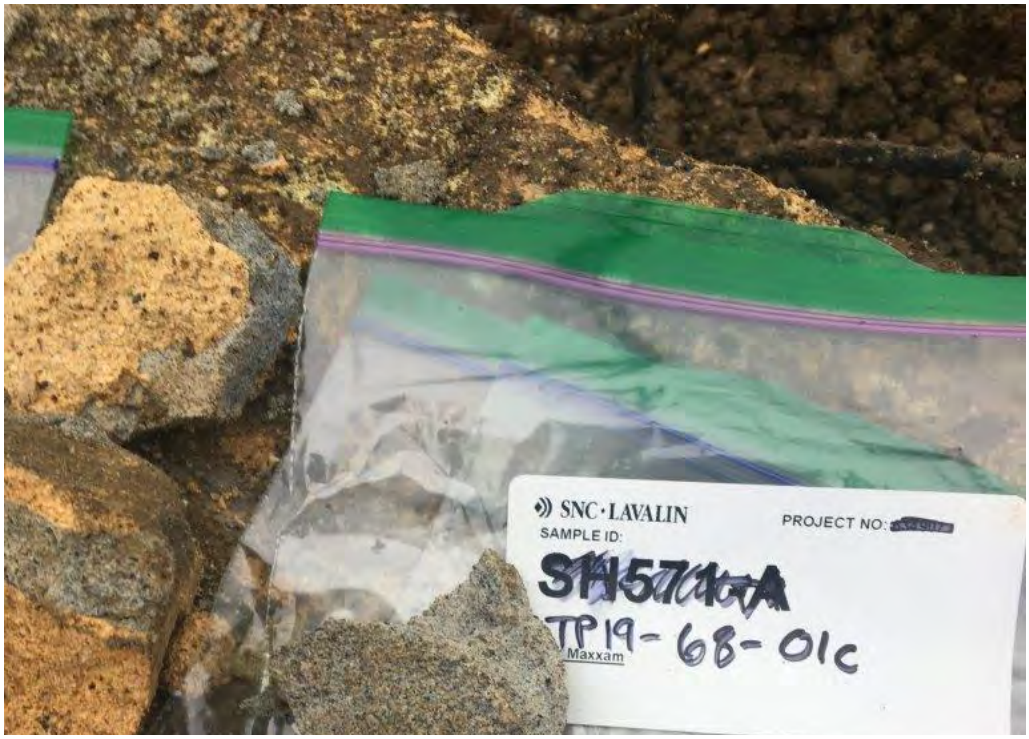
TITLE: **DE□ RIS □ NIT - RES□ LTS FOR AS□ ESTOS CONTAININ□ MATERIAL**

DRN BY: PES	SCALE: 1:6000	DATE: 2018-02-15	DWG No: REV.: 0
CHK'D: CS	PLOT: 20200611.1258	CADFILE:626268R12	626268-□0□

PATH: \\PROJ_SRV\PROJECTS\CURRENT PROJECTS\PWGSC\626268-NANOOSE TRANSMITTER\4.0 EXECUTION\4.5 GIS AND DRAWINGS\CAD\626268R12.DWG

Attachment 1

Photographs



Photograph 1: View of brick debris at TP19-68.

Photograph 2: Ceramic floor tile.

Photograph 3: Black papery material identified at TP19-69.

Photograph 4: View of concrete brick debris.

Photograph 5: View of mixed debris present in TP19-69.

Attachment 2

Monitoring Report

SNC·LAVALIN

MONITORING REPORT

Project No.: 626268
Date: 2019-08-28
Observer: CWM
Weather: 28°C Sunny
Time: 00:00:00
Approved by: TP

Public Services and Procurement Canada
Nanaimo Transmitter
Nanoose Bay, BC

Monitoring Well No.	Reference Elevation[1] (m)	Depth to NAPL[2] (m)	Apparent NAPL Thickness[3] (mm)	Depth to Water (m)	Potentiometric Elevation[3] (m)	Depth to Bottom (m)	Calculated Vapour Conc.[4] (ppm)	Time	Comments
MW15-1S	110.625	-	0	3.730	106.90	3.82	-	15:40	*
MW15-1D	110.582	-	0	16.204	94.38	17.43	-	15:50	
MW15-2S	109.940	-	0	3.302	106.64	3.41	-	11:50	*
MW15-2D	109.860	-	0	5.524	104.34	6.68	-	11:30	*
MW15-3	109.903	-	0	3.492	106.41	3.60	-	14:00	*
MW15-4	109.102	-	0	4.968	104.13	5.17	-	14:55	*
MW15-5	107.022	-	0	3.405	103.62	3.50	-	14:25	*
MW18-06S	107.126	-	-	-	-	2.66	-	11:00	*Dry
MW18-06D	107.177	-	-	-	-	5.95	-	11:10	*Dry
MW19-07S	110.095	-	0	2.395	107.70	2.42	-	13:35	*
MW19-07D	110.092	-	-	-	-	5.48	-	13:30	*Dry
MW19-08S	110.167	-	-	-	-	2.24	-	12:55	*Dry
MW19-08D	110.125	-	-	-	-	6.05	-	12:40	*Dry
MW19-09S	110.269	-	-	-	-	2.23	-	13:15	*Dry
MW19-09D	110.272	-	-	-	-	5.08	-	13:20	*Dry

NOTES: *Waterra in well during measurements.

[1] Reference Elevation is a mark on the rim of the monitoring well standpipe surveyed with respect to Geodetic Datum.

[2] Non-Aqueous Phase Liquid

[3] NAPL specific gravity assumed to be 0.8

[4] 1% LEL is approximately equivalent to 110 ppm.

Attachment 3

Test Pit Logs

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-66

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458689.047	Easting: 410762.576	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND, silty, gravelly, fine to coarse, subrounded, brown, medium dense, moist, rootlets.					
1	SILT and SAND, some clay, grey-brown, medium dense, moist. Below 1.2 m - rebar, concrete, metal, concrete with ceramic tile, wires.			66-01 66-02 66-03		
2	Bottom of hole at 2.1 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA CWM 2020 01 07 Print Date:2020-06-12

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-67

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458703.497	Easting: 410759.217	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND, silty, gravelly. At 0.3 m - black shiny, hard layer. Between 0.6 m and 0.9 m - grey-brown, metal debris.					
1	SAND and GRAVEL, subrounded, some silt, brown.					
2	Bottom of hole at 1.8 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA CWM 2020 01 07 Print Date:2020-06-12

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-68

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458683.579	Easting: 410744.729	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND, silty, gravelly, fine to coarse, subrounded, brown, medium dense, moist.						
1	Below 1.2 m - debris, metal pipe scrap, metal, rebar.			68-01 68-02			
2	Bottom of hole at 1.8 m.						
3							
4							
5							
6							
7							
8							
9							
10							

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA CWM 2020 01 07 Print Date:2020-06-12

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-69

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458697.545	Easting: 410746.381	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND, silty, gravelly, fine to coarse, subrounded, brown, medium dense, moist.					
1	Below 1.2 m - debris, concrete, rebar, metal, black papery debris.			69-01		
2	Bottom of hole at 1.8 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA CWM 2020 01 07 Print Date:2020-06-12

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-70

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458692.823	Easting: 410777.380	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND, silty, gravelly, fine to coarse, subrounded, brown, medium dense.					
1	SAND, coarse grained, silty, gravelly, orange-brown, loose, moist.					
2	Bottom of hole at 2.1 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA CWM 2020 01 07 Print Date:2020-06-12

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-71

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	CP
Borehole Dia. (m)	n/a	Top of Casing Elev. (m)	n/a	Date Drilled:	2019 12 12
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458679.782	Easting: 410772.392	Log Typed By:	SW

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND, silty, gravelly, fine to coarse, subrounded, brown, medium dense, moist, rootlets.					
	Below 0.5 m - no rootlets.					
1	SILT and SAND, some clay, some gravel, fine to coarse, grey-brown, medium dense, moist. Below 1.2 m - rebar, concrete rubble.			71-01		
2	Bottom of hole at 1.9 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA CWM 2020 01 07 Print Date:2020-06-12

Attachment 4

Laboratory Analytical Reports

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC)
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Ian Mace

PROJECT: 626268/667966

AGAT WORK ORDER: 19V512465

TRACE ORGANICS REVIEWED BY: Dana Solari, Lab Reporter

WATER ANALYSIS REVIEWED BY: Dana Solari, Lab Reporter

DATE REPORTED: Sep 09, 2019

PAGES (INCLUDING COVER): 12

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES
VERSION 1: Sample receipt temperature: 3°C

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 19V512465

PROJECT: 626268/667966

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC)

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Public Works PAH in Water Low Level

DATE RECEIVED: 2019-08-30

DATE REPORTED: 2019-09-09

SAMPLE DESCRIPTION:				MW15-2D-190829
SAMPLE TYPE:				Water
DATE SAMPLED:				2019-08-29
Parameter	Unit	G / S	RDL	487098
Naphthalene	µg/L		0.05	<0.05
Quinoline	µg/L		0.05	<0.05
Acenaphthylene	µg/L		0.02	<0.02
Acenaphthene	µg/L		0.02	<0.02
Fluorene	µg/L		0.02	<0.02
Phenanthrene	µg/L		0.04	<0.04
Anthracene	µg/L		0.01	<0.01
Acridine	µg/L		0.05	<0.05
Fluoranthene	µg/L		0.02	<0.02
Pyrene	µg/L		0.02	<0.02
Benzo(a)anthracene	µg/L		0.01	<0.01
Chrysene	µg/L		0.01	<0.01
Benzo(b)fluoranthene	µg/L		0.01	<0.01
Benzo(j)fluoranthene	µg/L		0.01	<0.01
Benzo(k)fluoranthene	µg/L		0.01	<0.01
Benzo(a)pyrene	µg/L		0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L		0.01	<0.01
Dibenzo(a,h)anthracene	µg/L		0.01	<0.01
Benzo(g,h,i)perylene	µg/L		0.01	<0.01
1-Methylnaphthalene	µg/L		0.05	<0.05
2-Methylnaphthalene	µg/L		0.05	<0.05
Benzo(b+j)fluoranthene	µg/L		0.01	<0.01
Surrogate	Unit	Acceptable Limits		
Naphthalene - d8	%	50-130		106
2-Fluorobiphenyl	%	50-130		90
P-Terphenyl - d14	%	60-130		80

Certified By: D. Solanki

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Certificate of Analysis

AGAT WORK ORDER: 19V512465

PROJECT: 626268/667966

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC)

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Public Works PAH in Water Low Level

DATE RECEIVED: 2019-08-30

DATE REPORTED: 2019-09-09

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

487098 LEPH & HEPH results have been corrected for PAH contributions.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solanki

AGAT Laboratories
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Certificate of Analysis

AGAT WORK ORDER: 19V512465

PROJECT: 626268/667966

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC)

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2019-08-30

DATE REPORTED: 2019-09-09

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: MW15-1D-190829	SAMPLE DESCRIPTION: MW15-2D-190828
				SAMPLE TYPE: Water	SAMPLE TYPE: Water
				DATE SAMPLED: 2019-08-29	DATE SAMPLED: 2019-08-28
				487096	487097
Aluminum Dissolved	µg/L		2	3	27
Antimony Dissolved	µg/L		0.2	<0.2	<0.2
Arsenic Dissolved	µg/L		0.1	1.3	1.1
Barium Dissolved	µg/L		0.2	8.8	4.6
Beryllium Dissolved	µg/L		0.01	<0.01	<0.01
Bismuth Dissolved	µg/L		0.05	<0.05	<0.05
Boron Dissolved	µg/L		2	16	7
Cadmium Dissolved	µg/L		0.01	0.01	<0.01
Calcium Dissolved	µg/L		50	30200	24800
Chromium Dissolved	µg/L		0.5	2.4	1.0
Cobalt Dissolved	µg/L		0.05	<0.05	0.10
Copper Dissolved	µg/L		0.2	0.7	0.8
Iron Dissolved	µg/L		10	21	31
Lead Dissolved	µg/L		0.05	<0.05	<0.05
Lithium Dissolved	µg/L		0.5	0.6	0.8
Magnesium Dissolved	µg/L		50	10200	11900
Manganese Dissolved	µg/L		1	<1	19
Molybdenum Dissolved	µg/L		0.05	1.97	0.21
Nickel Dissolved	µg/L		0.2	<0.2	0.4
Potassium Dissolved	µg/L		50	1550	541
Selenium Dissolved	µg/L		0.5	<0.5	0.6
Silicon Dissolved	µg/L		50	5390	10900
Silver Dissolved	µg/L		0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	11800	7750
Strontium Dissolved	µg/L		0.1	200	53.8
Sulphur Dissolved	µg/L		500	2160	1440
Thallium Dissolved	µg/L		0.01	<0.01	<0.01
Tin Dissolved	µg/L		0.05	0.55	<0.05
Titanium Dissolved	µg/L		0.5	1.5	3.1

Certified By: D. Solanki

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V512465

PROJECT: 626268/667966

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC)

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Public Works Dissolved Metals

DATE RECEIVED: 2019-08-30

DATE REPORTED: 2019-09-09

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: MW15-1D-190829	SAMPLE DESCRIPTION: MW15-2D-190828
				SAMPLE TYPE: Water	SAMPLE TYPE: Water
				DATE SAMPLED: 2019-08-29	DATE SAMPLED: 2019-08-28
				487096	487097
Uranium Dissolved	µg/L		0.01	0.97	0.05
Vanadium Dissolved	µg/L		0.5	2.4	15.6
Zinc Dissolved	µg/L		2	<2	<2
Zirconium Dissolved	µg/L		0.1	<0.1	<0.1
Hardness (calc)	ug CaCO3/L		100	117000	111000

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

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solarin

AGAT Laboratories

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Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC)

AGAT WORK ORDER: 19V512465

PROJECT: 626268/667966

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Sep 09, 2019			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works PAH in Water Low Level															
Naphthalene	71706	W-MS1	1.10	1.02	7.5%	< 0.05	97%	80%	120%				90%	50%	130%
Quinoline	71706	W-MS1	1.35	1.40	3.6%	< 0.05	99%	80%	120%				108%	50%	130%
Acenaphthylene	71706	W-MS1	1.05	1.00	4.9%	< 0.02	100%	80%	120%				84%	50%	130%
Acenaphthene	71706	W-MS1	1.10	1.06	3.7%	< 0.02	101%	80%	120%				88%	50%	130%
Fluorene	71706	W-MS1	0.97	0.93	4.2%	< 0.02	101%	80%	120%				78%	50%	130%
Phenanthrene	71706	W-MS1	1.04	0.99	4.9%	< 0.04	100%	80%	120%				84%	60%	130%
Anthracene	71706	W-MS1	1.14	1.08	5.4%	< 0.01	99%	80%	120%				91%	60%	130%
Acridine	71706	W-MS1	1.24	1.29	4.0%	< 0.05	100%	80%	120%				100%	50%	130%
Fluoranthene	71706	W-MS1	1.14	1.09	4.5%	< 0.02	98%	80%	120%				93%	60%	130%
Pyrene	71706	W-MS1	1.17	1.11	5.3%	< 0.02	97%	80%	120%				94%	60%	130%
Benzo(a)anthracene	71706	W-MS1	1.07	1.02	4.8%	< 0.01	100%	80%	120%				86%	60%	130%
Chrysene	71706	W-MS1	1.11	1.07	3.7%	< 0.01	99%	80%	120%				89%	60%	130%
Benzo(b)fluoranthene	71706	W-MS1	1.00	0.97	3.0%	< 0.01	102%	80%	120%				81%	60%	130%
Benzo(j)fluoranthene	71706	W-MS1	1.18	1.12	5.2%	< 0.01	97%	80%	120%				95%	60%	130%
Benzo(k)fluoranthene	71706	W-MS1	1.09	1.00	8.6%	< 0.01	99%	80%	120%				88%	60%	130%
Benzo(a)pyrene	71706	W-MS1	1.03	0.96	7.0%	< 0.01	101%	80%	120%				83%	60%	130%
Indeno(1,2,3-c,d)pyrene	71706	W-MS1	0.98	0.97	1.0%	< 0.01	99%	80%	120%				79%	60%	130%
Dibenzo(a,h)anthracene	71706	W-MS1	0.97	0.96	1.0%	< 0.01	100%	80%	120%				78%	60%	130%
Benzo(g,h,i)perylene	71706	W-MS1	1.02	1.01	1.0%	< 0.01	99%	80%	120%				83%	60%	130%
1-Methylnaphthalene	71706	W-MS1	1.14	1.04	9.2%	< 0.05	99%	80%	120%				91%	50%	130%
2-Methylnaphthalene	71706	W-MS1	0.97	0.91	6.4%	< 0.05	100%	80%	120%				78%	50%	130%
Naphthalene - d8	71706	W-MS1	97	90	7.5%		102%	80%	120%				98%	50%	130%
2-Fluorobiphenyl	71706	W-MS1	102	90	12.5%		98%	80%	120%				102%	50%	130%
P-Terphenyl - d14	71706	W-MS1	88	85	3.5%		94%	80%	120%				88%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By: D. Solomi

AGAT Laboratories

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http://www.agatlabs.com

Quality Assurance

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC)

AGAT WORK ORDER: 19V512465

PROJECT: 626268/667966

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Sep 09, 2019

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Public Works Dissolved Metals															
Aluminum Dissolved	485385		6	7	NA	< 2	109%	90%	110%	104%	90%	110%			
Antimony Dissolved	485385		<0.2	<0.2	NA	< 0.2	106%	90%	110%	104%	90%	110%			
Arsenic Dissolved	485385		0.3	<0.1	NA	< 0.1	98%	90%	110%	90%	90%	110%			
Barium Dissolved	485385		21.9	22.7	3.2%	< 0.2	94%	90%	110%	99%	90%	110%			
Beryllium Dissolved	485385		0.04	0.04	NA	< 0.01	95%	90%	110%	103%	90%	110%			
Bismuth Dissolved	485385		<0.05	<0.05	NA	< 0.05				97%	90%	110%			
Boron Dissolved	485385		30	31	1.0%	< 2	97%	90%	110%	99%	90%	110%			
Cadmium Dissolved	485385		0.14	0.12	8.8%	< 0.01	103%	90%	110%	99%	90%	110%			
Calcium Dissolved	485385		6280	6300	0.4%	< 50	100%	90%	110%	100%	90%	110%			
Chromium Dissolved	485385		<0.5	<0.5	NA	< 0.5	103%	90%	110%	99%	90%	110%			
Cobalt Dissolved	485385		24.1	24.0	0.4%	< 0.05	110%	90%	110%	105%	90%	110%			
Copper Dissolved	485385		1.6	1.6	6.2%	< 0.2	108%	90%	110%	102%	90%	110%			
Iron Dissolved	485385		30	27	NA	< 10	110%	90%	110%	101%	90%	110%			
Lead Dissolved	485385		0.06	0.06	NA	< 0.05	104%	90%	110%	103%	90%	110%			
Lithium Dissolved	485385		6.7	6.6	1.4%	< 0.5				101%	90%	110%			
Magnesium Dissolved	485385		2630	2630	0.2%	< 50	101%	90%	110%	99%	90%	110%			
Manganese Dissolved	485385		478	480	0.3%	< 1	105%	90%	110%	100%	90%	110%			
Molybdenum Dissolved	485385		<0.05	<0.05	NA	< 0.05	99%	90%	110%	95%	90%	110%			
Nickel Dissolved	485385		27.1	26.2	3.5%	< 0.2	108%	90%	110%	104%	90%	110%			
Potassium Dissolved	485385		423	420	0.6%	< 50	92%	90%	110%	93%	90%	110%			
Selenium Dissolved	485385		<0.5	<0.5	NA	< 0.5	98%	90%	110%	95%	90%	110%			
Silicon Dissolved	485385		399	396	0.7%	< 50				99%	90%	110%			
Silver Dissolved	485385		<0.02	<0.02	NA	< 0.02				98%	90%	110%			
Sodium Dissolved	485385		300	292	2.4%	< 50	96%	90%	110%	96%	90%	110%			
Strontium Dissolved	485385		65.5	66.7	1.8%	< 0.1	102%	90%	110%	96%	90%	110%			
Sulphur Dissolved	485385		8220	8300	1.0%	< 500				110%	90%	110%			
Thallium Dissolved	485385		0.02	0.01	NA	< 0.01	96%	90%	110%	96%	90%	110%			
Tin Dissolved	485385		0.09	0.10	NA	< 0.05				101%	90%	110%			
Titanium Dissolved	485385		<0.5	<0.5	NA	< 0.5				100%	90%	110%			
Uranium Dissolved	485385		<0.01	<0.01	NA	< 0.01	98%	90%	110%	96%	90%	110%			
Vanadium Dissolved	485385		<0.5	<0.5	NA	< 0.5	98%	90%	110%	98%	90%	110%			
Zinc Dissolved	485385		18	16	9.4%	< 2	105%	90%	110%	104%	90%	110%			
Zirconium Dissolved	485385		<0.1	<0.1	NA	< 0.1				98%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC) AGAT WORK ORDER: 19V512465

PROJECT: 626268/667966 ATTENTION TO: Ian Mace

SAMPLING SITE: SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acridine	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Naphthalene - d8			GC/MS
2-Fluorobiphenyl	ORG-180-5133	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC) AGAT WORK ORDER: 19V512465

PROJECT: 626268/667966 ATTENTION TO: Ian Mace

SAMPLING SITE: SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Bismuth Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silicon Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Strontium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sulphur Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
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TEL (778)452-4000
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Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC)

AGAT WORK ORDER: 19V512465

PROJECT: 626268/667966

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Tin Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zirconium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

AGAT Laboratories
120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 • F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 3°C
AGAT Job Number: 19V512465
Notes: AUG 30 AM 8:49

Report Information
Company: SNC-Lavalin Inc
Contact: Ian Mace
Address: 890 Crace St, #202
Nanaimo, BC, V9R 2T3
Phone: 250-716-9000 Fax:
AGAT Quote #:
Client Project #: 626268/667966

Report Information
1. Name: Ian Mace
Email: ian.mace@snclavalin.com
2. Name: Didi Grimes
Email: didi.grimes@snclavalin.com

Report Format
☐ Single Sample per page
☒ Multiple Samples per page
☐ Excel Format Included

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 working days
Rush TAT ☐ Same Business Day - 200%
☐ 1 Business Day - 100%
☐ 2 Business Days - 50%
☐ 3 Business Days - 25%
Date Required:
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To Same as above Yes ☐ / No ☒
Company: Public Services & Procurement Canada
Contact: Robert Price
Address: 401-1230 Government St,
Victoria, BC, V8W 3X4
Phone: 250-363-8410 Fax:
PO/AFE#: TBD

Requirements *(Please Check)*
☐ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☐ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☒ BC CSR - Water
☒ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 *(Please Specify)*
CCME *(Please Specify)*
Other *(Please Specify)* FGQG RL

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	DISSOLVED METALS	PAH	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
487096	MW15-1D-190829	Water	190829; 09:50	Field filtered	X		1	Y		
97	MW15-2D-190828	↓	190828; 12:15	↓ ↓	X		1	Y		
98	MW15-2D-190829	↓	190829; 09:30			X	2	Y		

Samples Relinquished By (Print Name and Sign)	Date/Time	Samples Received By (Print Name and Sign)	Date/Time
Chris MacLean	190829; 10:30		

Page 1 of 1
N°: 037382

Document #: DIV-186 1500.005
Date Revised: January 17, 2019

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 19V513465

RECEIVING BASICS:

Received From: PUROLATOR Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 1 Containers: 3

TIME SENSITIVE ISSUES:

Earliest Date Sampled: Aug 29/19 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) ***use jars when available**

(1) 3 + 2 + 4 = 3 °C (2) ___ + ___ + ___ = ___ °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

CUSTODY SEAL INTACT

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC)
219-800 BURRARD ST
VANCOUVER, BC V6Z 0B9
604-671-1831

ATTENTION TO: Ian Mace

PROJECT: 667966/626268

AGAT WORK ORDER: 19V557561

ASBESTOS REVIEWED BY: Ian Seddon, Analyst

DATE REPORTED: Dec 23, 2019

PAGES (INCLUDING COVER): 6

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 19V557561

PROJECT: 667966/626268

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC)

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Bulk Asbestos

DATE RECEIVED: 2019-12-18 **DATE REPORTED: 2019-12-23**

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: TP19-65-01 / SAMPLE TYPE: Other / DATE SAMPLED: 2019-12-12 / 813761	TP19-66-01a / Other / 2019-12-12 / 813855	TP19-66-01b / Other / 2019-12-12 / 813856	TP19-66-01c / Other / 2019-12-12 / 813857	TP19-66-02a / Other / 2019-12-12 / 813858	TP19-66-02b / Other / 2019-12-12 / 813859	TP19-66-02c / Other / 2019-12-12 / 813860	TP19-66-03 / Other / 2019-12-12 / 813861
Asbestos (Bulk)	%		0.5	ND	ND	ND	ND	ND	ND	ND	ND

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: TP19-68-01a / SAMPLE TYPE: Other / DATE SAMPLED: 2019-12-12 / 813862	TP19-68-01b / Other / 2019-12-12 / 813864	TP19-68-01c / Other / 2019-12-12 / 813865	TP19-68-02a / Other / 2019-12-12 / 813866	TP19-68-02b / Other / 2019-12-12 / 813867	TP19-68-02c / Other / 2019-12-12 / 813868	TP19-69-01a / Other / 2019-12-12 / 813869	TP19-69-01b / Other / 2019-12-12 / 813870
Asbestos (Bulk)	%		0.5	ND	ND	ND	ND	ND	ND	ND	ND

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: TP19-69-01c / SAMPLE TYPE: Other / DATE SAMPLED: 2019-12-12 / 813871
Asbestos (Bulk)	%		0.5	ND

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

813761-813871 Condition of sample was satisfactory at time of arrival in laboratory. Analysis done at AGAT 5623 McAdam Road Mississauga location.

"ND" - Not Detected

As per Reg 278/05 and AGAT SOP, all non-detect results have been analyzed and confirmed three times.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC) **AGAT WORK ORDER: 19V557561**

PROJECT: 667966/626268 **ATTENTION TO: Ian Mace**

SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Asbestos (Bulk)	INORG 93-6010	EPA 600/R-93/116 & NIOSH 9002	PLM

W0191557541

DEC 18 AM 11:15

14°C

Mississauga Lab
6740 Campobello Rd,
Mississauga, ON L5N 2L8
Phone: 905-817-5700
Toll Free: 800-563-6266

Burnaby Lab
4606 Canada Way
Burnaby, BC V5G 1K5
Phone: 604-734-7276
Toll Free: 800-665-8566

Atlanta Lab
3380 Chastain Meadows Pky, Ste 300
Kennesaw, GA 30144
Phone: 770-499-7500
Toll Free: 800-806-5887

ASBESTOS & FIBRE CHAIN OF CUSTODY RECORD

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)	
Company Name:	SNC-Lavalin	Company Name:	SNC-Lavalin	Quotation #:	
Contact Name:	Robert Price	Contact Name:	Ian Mace	P.O. #/ AFE#:	TBD
Address:	401-1230 Government Street	Address:	202-890 Crace Street	Project #:	667966/626268
	Victoria, BC		Nanaimo BC, V9R 2T3	Site Location:	Nanoose TX
Phone:	250-363-8410 Fax:	Phone:	250-716-9000 Fax:	Sampled By:	CP
Email:		Email:	Ian.Mace@snclavalin.com, Didi.Grimes@snclavalin.com, Celeste.Pakstas@snclavalin.com		

Turnaround Time (TAT) Required

Regular TAT (Most analyses)

☐ 5-DAYS ☐ 10-DAYS

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)

☐ 4-HR ☐ SAME DAY ☐ 1-DAY ☐ 2-DAYS ☐ 3-DAYS

Date Required:

Rush Confirmation #:

SPECIAL INSTRUCTIONS

If one sample in a triplet has >0.5% asbestos, do not analyze the remaining samples. Please analyze all observed layers separately.

ASBESTOS ANALYSIS

PROVINCIAL REGULATORY GUIDELINE

☐ Alberta ☐ Nfld & Labrador ☐ Nunavut ☐ Quebec
☐ BC ☐ NWT ☐ Ontario ☐ Saskatchewan
☐ Manitoba ☐ Nova Scotia ☐ PEI ☐ Yukon
☐ New Brunswick

Analysis Requested

SAMPLE NUMBER - DESCRIPTION	Alt Sample ID	DATE SAMPLED (YYYY/MM/DD)	SAMPLE TYPE	AIR VOLUME (L) (If applicable)	PLM ANALYSIS - BULK: EPA 600/R-93/116	NIOSH 9002	EPA GRAVIMETRIC	200- POINT COUNT	400-POINT COUNT	1000-POINT COUNT	NYELAP 198 6 (NOB)	CINCINNATI PLM EPA 600/R-04/004	PCM - AIR: NIOSH 7400 A RULES	NIOSH 7400 B RULES	TEM: VERMICULITE CINCINNATI EPA 600/R-04/004	AIR NIOSH 7402	SEMI QUANTITATION (DL 1%)	FULL QUANTITATION (DL 0.1%)	NYELAP 198 4 (NOB)	POSITIVE STOP	HOLD - DO NOT ANALYZE	COMMENTS
TP19-65-01	81 3761	2019-12-12	Concrete		X																	concrete, grey
TP19-66-01a	55	2019-12-12	tile layers		X																	white tile, grey grout, grey concrete
TP19-66-01b	56	2019-12-12	tile layers		X																	white tile, grey grout, grey concrete
TP19-66-01c	57	2019-12-12	tile layers		X																	white tile, grey grout, grey concrete
TP19-66-02a	58	2019-12-12	concrete		X																	grey porous concrete
TP19-66-02b	59	2019-12-12	Concrete		X																	grey porous concrete
TP19-66-02c	60	2019-12-12	Concrete		X																	grey porous concrete
TP19-66-03	61	2019-12-12	tile layers		X																	tan tile, brown grout
TP19-68-01a	62	2019-12-12	mortar		X																	grey mortar
TP19-68-01b	64	2019-12-12	mortar		X																	grey mortar
TP19-68-01c	65	2019-12-12	mortar		X																	grey mortar

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	BV JOB #
C Pakstas	2019/12/17	1330				V123005

Mississauga Lab
6740 Campobello Rd,
Mississauga, ON L5N 2L8
Phone: 905-817-5700
Toll Free: 800-563-6266

Burnaby Lab
4606 Canada Way
Burnaby, BC V5G 1K5
Phone: 604-734-7276
Toll Free: 800-665-8566

Atlanta Lab
3380 Chastain Meadows Pky, Ste 300
Kennesaw, GA 30144
Phone: 770-499-7500
Toll Free: 800-806-5887

DEC 18 AM 11:15

14°C

ASBESTOS & FIBRE CHAIN OF CUSTODY RECORD

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	SNC-Lavalin	Company Name:	SNC-Lavalin	Quotation #:		Regular TAT (Most analyses)
Contact Name:	Robert Price	Contact Name:	Ian Mace	P.O. #/ AFE#:	TBD	☐ 5-DAYS ☐ 10-DAYS
Address:	401-1230 Government Street	Address:	202-890 Crace Street	Project #:	667966/626268	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
	Victoria, BC		Nanaimo BC, V9R 2T3	Site Location:	Nanoose TX	Rush TAT (Surcharges will be applied)
Phone:	250-363-8410 Fax:	Phone:	250-716-9000 Fax:	Sampled By:	CP	☐ 4-HR ☐ SAME DAY ☐ 1-DAY ☐ 2-DAYS ☐ 3-DAYS
Email:		Email:	Ian.Mace@snclavalin.com, Didi.Grimes@snclavalin.com, Celeste.Pakstas@snclavalin.com			Date Required:
						Rush Confirmation #:

ASBESTOS ANALYSIS

PROVINCIAL REGULATORY GUIDELINE

☐ Alberta ☐ Nfld & Labrador ☐ Nunavut ☐ Quebec
☐ BC ☐ NWT ☐ Ontario ☐ Saskatchewan
☐ Manitoba ☐ Nova Scotia ☐ PEI ☐ Yukon
☐ New Brunswick

Analysis Requested

SAMPLE NUMBER - DESCRIPTION	DATE SAMPLED (YYYY/MM/DD)	SAMPLE TYPE	AIR VOLUME (L) (If applicable)	PLM ANALYSIS - BULK: EPA 600/R-93/116	NIOSH 9002	EPA GRAVIMETRIC	200- POINT COUNT	400-POINT COUNT	1000-POINT COUNT	NYELAP 198 6 (NOB)	CINCINNATI PLM EPA 600/R-04/004	PCM - AIR: NIOSH 7400 A RULES	NIOSH 7400 B RULES	TEM: VERMICULITE CINCINNATI EPA 600/R-04/004	AIR NIOSH 7402	SEMI QUANTITATION (DL 1%)	FULL QUANTITATION (DL 0.1%)	NYELAP 198 4 (NOB)	POSITIVE STOP	HOLD - DO NOT ANALYZE	COMMENTS
TP19-68-02a	2019-12-12	brick		X																	light orange brick
TP19-68-02b	2019-12-12	brick		X																	light orange brick
TP19-68-02c	2019-12-12	brick		X															▼		light orange brick
TP19-69-01a	2019-12-12	paper		X																	black brittle papery layers
TP19-69-01b	2019-12-12	paper		X																	black brittle papery layers
TP19-69-01c	2019-12-12	paper		X															▼		black brittle papery layers

SPECIAL INSTRUCTIONS

If one sample in a triplet has >0.5% asbestos, do not analyze the remaining samples. Please analyze all observed layers separately.

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	BV JOB #
C Pakstas	2019/12/17	1330				

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 19V557561

RECEIVING BASICS:

Received From: K&H   Waybill #: ____

SAMPLE QUANTITIES:

Coolers: 1   Containers: 17

TIME SENSITIVE ISSUES:

Earliest Date Sampled: 12-11-2019   ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) ___+___+___= 14 °C (2) ___+___+___=___°C (3) ___+___+___=___°C (4) ___+___+___=___°C

Was ice or ice pack present: Yes (No)

Integrity Issues:

Account Project Manager: ____ have they been notified of the above issues: Yes No

Whom spoken to: ____ Date and Time: ____

ADDITIONAL NOTES:

Annex F. Environmental Effects Determination

Annex F. Environmental Effects Determination

OPI Project File Number: .106044.001
EIA Number: 2021-21-102838

Department of National Defence (DND)

Due Diligence Environmental Effects Determination (DDEED) Report

Project: Nanoose Transmitter (TX) Remedial Excavation, Nanoose Bay, BC

Prepared by: Vitaly Ostroumov

Date: 2021/09/28

Version: V3

Executive Summary

A review of the potential significant adverse environmental effects was conducted for the former Nanoose Transmitter (TX) Remedial Excavation project located at the Department of National Defence's Nanoose Bay property. The site location is depicted in Figure 1.

The Project consists of the following components:

1. Site preparation;
2. Excavation; and
3. Remediation activities.

Potential significant adverse effects of the Physical Activity were assessed and mitigation measures have been identified to minimize or eliminate these effects on the Valued Environmental Components (VECs). Mitigation measures for the protection of the following VECs are provided in this report: Atmosphere, Surface Water and Groundwater, Soils and Geology, Ambient Noise, Terrestrial Animals and Habitat, Aquatic Animals and Habitat, Vegetation, Species at Risk and Migratory Birds, Cultural Resources, Health and Safety.

Mitigation measures identified in the interaction tables will be incorporated into the Project design and implementation. Potential environmental effects associated with the Project are expected to be minimal and short-term in duration. With appropriate mitigation, adequate Project planning, and compliance with applicable legislative and regulatory requirements, there is little likelihood that significant adverse environmental impacts will result from proposed Project activities.

On the basis of this Due Diligence Environmental Effects Determination report, it has been determined that the Physical Activity is not likely to cause significant adverse environmental effects. Therefore, the Physical Activity can proceed with application of the mitigation measures specified in the interaction tables in this report.

Part 1. Project Information

1.1 Title of Proposed Project

Former Nanoose Transmitter (TX) Remedial Excavation

1.2 Originating Directorate, Base, or Unit

The originating Establishment is: CFB Esquimalt

1.3 Location of Proposed Project

Latitude: 49°16'28.30"N, Longitude: -123° 13' 37.96"W

The Project is located at the former Nanoose Transmitter (TX) property, located on the east side of Highway 19, approximately 2.3 km west of the community of Nanoose Bay, BC (See Drawing No. 626268-701). The proposed excavation and remediation work area, as well as potential laydown areas adjacent (north, south, and east) to the excavation (i.e., the Site) will be located at the historical footprint of the now-removed Nanoose Bay Transmitter underground bunker facility, as depicted by Drawing No. 626268-702. The area surrounding the Site is isolated and surrounded by undeveloped lands. A local community group, the PFQ Flyers, a model aircraft club, currently utilize the field to the northeast of the Site for flying model aircraft.

1.4 Project Summary

The Site is located on top of a hill in a rural area of Nanoose Bay, BC, and consists of the former bunker footprint, approximately 1,750 m^2, as well as the laydown areas. The Site totals approximately 7,000 m^2 and is located on a clearing on DND property. The topography of the Site is fairly flat with some sloping towards the south and east. The Site was historically used by the Department of National Defence (DND) for radio transmission defence purposes until 1998. The facilities at the Site were reported to be constructed circa 1963 and decommissioned/removed from the Site between 1995 and 2002. Facilities included an underground bunker (Former Transmitter Building), auxiliary buildings and structures, and several radio antennas. The Site is currently vacant of any permanent buildings or structures and is currently used by a model airplane club (PDQ Flyers). Training operations do not currently take place at the Site.

In 2018, SNC-Lavalin completed a Supplemental Site Investigation (SSI) and Remediation Options Analysis (ROA) with an additional SSI and ROA completed in 2019. The full Site history is presented in the 2018 SSI report (Annex 4). Soil sampling at the planned Site, the location of the now-removed radio transmission bunker, identified metals, petroleum hydrocarbons (PHC), and polycyclic aromatic hydrocarbons (PAH) concentrations greater than Canadian Council of Ministers of the Environment (CCME) Residential Land (RL) and Commercial Land (CL) Use Guidelines, as well *as BC Contaminated Sites Regulation (CSR)* Commercial Land (CL) and Residential Land Low Density (RLLD) standards. Impacted soils are predicted to extend from surface to 3 m below ground surface (bgs). In addition, a debris unit, consisting primarily of concrete, brick, and rebar from the former bunker, was also identified between 1.8 m and 3 m bgs.

Remedial excavation work is intended to reach 3 m bgs with the goal to be the removal of the debris unit. It is anticipated that soil will be stockpiled in a dedicated stockpiling area, which is currently proposed to be immediately north, south, and/or east of the excavation area (Drawing No. 626268-702). Concrete debris will be stockpiled separately from soil and fill material and will be disposed of by Contractor for recycling or disposal. The excavated material that is considered to be > CCME RL/CL and > CSR RLLD will require stockpiling for further characterization prior to reuse as backfill or transport to an off-Site facility. The excavated material that is considered to be > CSR CL will be either hot-loaded or stockpiled without further characterization for subsequent transport to the off-Site facility. Note, regardless of the results of further characterization, the > CSR RLLD material will not be reused as backfill material. All material disposed of off-Site will be transported to a facility authorized to accept contaminated soil or hazardous waste under

the *BC Environmental Management Act*. Any imported fill material will be required to meet the CCME Agricultural Land Use Guidelines. The reuse of material exceeding the CCME RL/CL guidelines and less than the CSR RLLD/CL standards as backfill material is not considered to represent a risk at the Site. The > CCME RL/CL material will be used as backfill above 1.5 m bgs with an impermeable geotextile liner to be placed between it and the imported backfill material.

In the event additional soils suspected of containing contaminants of concern (COCs) in concentrations greater than BC CSR CL and RLLD standards are encountered, those soils will be placed on-Site in up to 150 m^3 stockpiles for soil suspected to be > CSR CL and 250 m^3 for soil suspected to be > CSR RLLD, characterized for environmental parameters, and then transported off-Site following receipt of analytical results and approval by the PSPC representative. Soils suspected of containing hazardous waste will be placed on-Site in up to 50 m^3 stockpiles, characterized for environmental parameters, and transported off-Site following receipt of analytical results and approval by the PSPC representative.

1.5 Applicability of DND EIA Directive

This activity does not meet the definition of a project under sections 81-91 of the Canadian *Impact Assessment Act* (IAA) as it does not involve a physical work. It is also not a designated project under paragraph 109(b) of the IAA or by order made by the Minister under subsection 9(1).

In accordance with the ADM(IE) Environmental Impact Assessment Directive and MARPAC SEMS DE1, a Due Diligence Environmental Effects Determination (DDEED) is recommended for the proposed work as the activities have the potential for adverse environmental effects and have not previously been assessed.

1.6 DDEED Start Date

Start date of the DDEED process: 2020-02-13

1.7 EIA Number

EIA Number: 2021-21-102838

1.8 Provincial and Municipal Government Involvement

None identified.

1.9 Other Federal Departments or Third-Party Groups

None identified.

1.10 Contacts

1.10.1 DDEED Point of Contact

a) Name: Becky MacInnis, MARPAC Environmental Staff Specialist (ESS)

b) E-mail Address: Becky.MacInnis@forces.gc.ca

1.10.2 Project OPI

a) Name: Name: Rachel Speller, MES, Environment Officer, Formation Safety and Environment (FSE), Canadian Forces Base Esquimalt

b) E-mail Address: Rachel.Speller@forces.gc.ca

1.11 Other Reference Numbers (If Applicable)

Project No. R.116937.001

Part 2. Environmental Effects Discussion

2.1 Description of Project Components, Project Schedule, and Project Site

The scope of work is to remove ~9,200 tonnes/4,600 m^3 of PHC, PAH, and metals contaminated soil from the Site, as well as ~3,700 tonnes/1,600 m^3 of concrete debris, to an assumed maximum depth of 3 m bgs. The excavation will occur in an area which previously housed an underground concrete bunker that protected a radio facility, which was removed from the Site between 1995 and 2002. It is anticipated the soil will be stockpiled in dedicated lay-down areas adjacent to the excavation (Drawing No. 626268-702) before being loaded onto trucks for shipment off-Site to approved facilities. Excavated soil determined to be less than the applicable CSR RLLD/CL standards may be used as backfill material.

The Site is a level, pre-disturbed area and includes the former bunker footprint, which is approximately 1,750 m^3 in size. Ground cover currently consists of gravel, with a few individual invasive species shrubs, e.g., gorse and scotch broom, sporadically distributed. The Project area is known to contain occurrences of highly invasive or noxious plants. The area surrounding the former bunker facility has been completely cleared of native vegetation. In areas where vegetation has reestablished, vegetation consists primarily of invasive gorse or scotch broom and grasses. Vegetation in these areas is not anticipated to be removed as part of Project activities.

Upon completion of remedial excavation, the Site will be backfilled with imported clean materials and excavated material less than applicable CSR RLLD/CL standards and compacted to 95% proctor. The Site will then be divested to a local First Nations group.

For the purposes of this Environmental Effects Determination, the Project will be comprised of the following three main task components:

1. Site preparation;
2. Remedial excavation and backfilling; and
3. Site Restoration.

The proposed Site layout is illustrated on Drawing No. 626268-702.

Site Preparation

Site preparation includes activities carried out prior to the start of excavation work to ensure work will proceed smoothly. These activities include, but are not limited to, the following:

- Utility location and establishment of any required protection, re-routing, or removal of utilities prior to ground disturbance, if required;
- Identification and implementation of on- and off-Site traffic control requirements;
- Detailed survey of Project area to document pre-remediation conditions, including photographs;
- Set-up of temporary fencing around work site;
- Preparation of spaces for Site support, such as office trailers, portable washrooms, lay-down areas, worker parking, and equipment refueling, where necessary; and
- Installation of erosion and sediment control measures.

Remedial Excavation and Backfilling

It is anticipated that a total of ~9,200 tonnes/4,600 m^3 of soil exceeding BC CSR RLLD regulations and CCME RL/CL guidelines for metals/PHCs/PAHs will be excavated to depths of 3 m at the Site. Additionally, 3,700 tonnes/1,600 m^3 of concrete debris located 1.8 m to 3 m bgs will be removed within the same footprint. Excavation methods will consist of conventional (i.e., machine digging) methods. It is anticipated the soil and concrete debris will be stockpiled in potential stockpiling areas just north, east, and south of the Site

before being loaded onto trucks and transported off-Site. Soil from the Site will be transported to a facility authorized to accept contaminated soil or hazardous waste under the BC *Environmental Management Act*. This material may be stockpiled on-Site prior to transport and disposal as part of this Project. The excavated debris will be disposed at an approved recycling facility. Soil exceeding BC CSR RLLD and CL regulations will be transported to a licensed and approved facility for disposal. Soil exceeding CCME RL/CL guidelines but not in excess of BC CSR standards will be reused as backfill material.

Following completion of remedial excavation activities, the excavation areas will be backfilled with clean imported material and excavated material and compacted.

Backfill will consist of a 75 mm minus angular crushed gravel placed to the level of the surrounding Site grade in a maximum of 20 cm lifts, each lift being compacted to 95% of the material's modified proctor maximum dry density (MPMDD). Compaction must be demonstrated to the PSPC representative by a geotechnical engineer and approved before placing additional lifts. Any reused excavated material will be backfilled within the top 1.5 m of the excavation and separated from the imported backfill material with a geotextile liner.

Backfilling will be conducted as soon as practicable following excavation and receipt of confirmatory sample results to minimize the length of time the excavation is open.

Site Restoration

Restoration of the Site will be to pre-excavation conditions. Affected road areas will be restored at surface with road base and the remainder of the excavation areas being finished with 0.3 m of topsoil and grass seed.

Post-remediation groundwater quality, including vertical and lateral delineation of the previously identified PAH contamination in groundwater, will be assessed with the installation of up to six monitoring wells. An addendum to the Preliminary Human Health and Ecological Risk Assessment (HHERA) will be made with the results of post-remediation testing, along with a site closure document, before the monitoring wells (existing and post-remediation) are decommissioned. The decommissioning of the monitoring wells will likely be completed in the fiscal year following the completion of the remedial excavation, pending analytical results.

Scheduling

It is anticipated that the remedial excavation program will take approximately 20 business days (12 hours per day) to complete from mobilization to demobilization, including a four-day confirmatory sample turnaround time (includes courier and data interpretation).

2.2 Identification of Valued Ecosystem Components (VECs)

The Environmental Effects Matrix is used to identify potential interactions between project components and identified VECs.

Table 1. Environmental Effects Matrix

PROJECT COMPONENTS Enter each component e.g. phases of construction, aspects of operation.	**VALUED ECOSYSTEM COMPONENTS (VEC)** *[modify as necessary]*																	
	PHYSICAL							BIOLOGICAL					SOCIAL AND CULTURAL					
	Atmosphere	Surface Water	Groundwater	Soils and Geology	Ambient Noise	...	...	Terrestrial Animals and Habitat	Aquatic Animals and Habitat	Vegetation	Species at Risk and Migratory Birds	...	Land Use	Parks and Recreational Areas	Population	Cultural Resources	Aboriginal / Traditional Activities	Health and Safety
Site Preparation	x	x	x	x	x			x	x	x	x					x		x
Excavation	x	x	x	x	x			x	x	x	x					x		x
Remediation	x	x	x	x	x			x	x	x	x							x

Legend: [*Blank*] = No Effect **|** [X] = Potential Significant Adverse Effect

2.3 Description of Valued Ecosystem Components

General Description

A Site visit was completed by SNC-Lavalin Inc. (SNC-Lavalin) on March 12, 2020. Selected Site photographs are included in Annex B. Relevant search results are included in Annex C.

The Site consists of a vacant, grass covered gravel-surfaced area of approximately 7,000 m^2, surrounded by invasive vegetation (gorse and scotch broom) to the north, south, east, and west. Wetland features are located approximately 100 m north and at gradient of the Site. According to the DND Sensitive Area Map Series (SAMS), the Site is located in close proximity to wetland habitat, located just north of the Site and proposed lay-down area (Drawing 626268-702). At the time of the Site visit, the area immediately north of the work area consisted primarily of invasive species (i.e., gorse) and grasses with no surface water present (with the exception of a small volume of water in adjacent ditches). A small amount of ponded water was observed in the wooded area approximately 100 m north of the Site, and wetland habitat may be present beyond this area; however, given its distance from the Site, this area was not assessed further. However, surface water has been retained as a VEC due to the potential for off-Site migration of contaminants/soil from the excavation/stockpile areas.

2.3.1 Physical Components

i) Atmosphere

The Project area is located in the Coastal Douglas-fir Moist Maritime Biogeoclimatic subzone (CDFmm). The CDFmm represents the mildest climate in Canada with warm, dry summers and mild, moist winters (Green and Klinka, 1994). The closest climate station to the Site with comprehensive data is “Nanaimo A”, located approximately 19 km southeast of the Site. The average daily temperatures at this station, from 1981 to 2010, ranged from 3.0 degrees Celsius (°C) in December to 18.1°C in July. The mean annual precipitation for the period of 1981 to 2010 ranges from 25.4 millimeters (mm) to 197.2 mm, which includes snowfall (Environment and Climate Change Canada, 2020).

The subject Site is currently utilized by members and guests of the PDQ Flyers model airplane club. Vehicle emissions from those utilizing the Site are current contributors to pre-existing sources of air contaminants in the local area. Receptors of Project effects on local air quality would be DND staff, visitors, and local wildlife.

ii) Surface Water

Some standing water was observed during the field visit in short segments of drainage ditches along the access road leading to the Site (see Site photos in Annex B). These ditches were not observed to be connected to any watercourse. A small amount of ponded water was observed in the wooded area approximately 100 m north of the Site, and wetland habitat may be present beyond this area; however, given its distance from the Site, this area was not assessed. DND Sensitive Area geodatabase mapping identifies wetland features in close proximity of the Site, just north of the proposed lay-down area; however, wetland features were not identified in the area immediately north of the Site during field observations (see Site photos in Annex B). In general, given the Site topography, surface water is expected to flow from the northwest to the southeast. The nearest down-gradient surface water receiving bodies are a small wetland and an unnamed stream located approximately 500 m south/southeast of the Site. The unnamed stream reportedly drains into Nanoose Creek. No direct pathways, such as streams or ditches, exist on the Site to provide flow of surface water towards the observed wetlands approximately 100 m north of the Site or the stream and wetland 500 m southeast of the Site. Surface water is anticipated to infiltrate to ground before potentially reaching any streams or wetland areas.

iii) Groundwater

Six groundwater monitoring wells were installed within and inferred downgradient of the footprint of the proposed excavation area on February 6 and 7, 2019 (MW19-07S, MW19-07D, MW19-08S, MW19-08D, MW19-09S, and MW19-09D). Seven other wells were present from earlier studies in the vicinity of the excavation area. Wells MW15-2D, MW15-2S, and MW15-3 are located just west of the proposed lay-down area, wells MW15-1D, MW15-1S, MW15-4, and MW15-5 are located south of the Site, downgradient of the Project Site. Two background wells (MW18-6D and MW18-6S) are located approximately 450 m northwest of the proposed work site to measure background concentrations.

Groundwater wells were monitored on December 7, 2018, February 22 and 28 and March 1, 2019. Measured depths to water in the background wells were generally 0.15 m bgs (MW18-6S) and 3 m bgs (MW18-6D). Depth to water ranged from 1.3 m to 4 m bgs in monitoring wells. The depth to water in MW15-1D was 16.2 m bgs. Non-aqueous phase liquids were not observed in any monitoring wells. Based on the potentiometric groundwater elevations in the monitoring wells, the inferred groundwater flow direction in this area of the Site is towards the southeast. Monitoring events took place in February, December, and March, which is typically a wet season in the Site's region.

A sheen and hydrocarbon-like odour were observed during the groundwater development and sampling program at monitoring well locations MW19-07S and MW19-07D (February 28 and March 1, 2019). Groundwater samples were selectively analyzed for benzene, toluene, ethylbenzene, xylenes (BETX), volatile petroleum hydrocarbons in water including BETX (VHw6-10), volatile petroleum hydrocarbons in water excluding BETX (VPHw), light extractable petroleum hydrocarbons in water (LEPHw), PHC of F1 and F2 fractions, PAH, and dissolved metals. Wells within the vicinity of the proposed excavation and work site (MW19 wells) had groundwater that tested in excess of CCME guidelines and BC CSR standards in various contaminants (metals, PAHs). Wells south of the proposed work site (MW15-1S, MW15-3, and MW15-5) did not exceed BC CSR standards, but exceeded CCME guidelines for metals, especially manganese. The elevated concentrations of dissolved metals across the Site are generally considered to be as a result of poor recovery within the monitoring wells and/or background groundwater conditions. Detailed results of the analytical testing can be found in SNC Lavalin's SSI and ROA for the Site (March 2019) found in Annex D.

iv) Soils and Geology

The general soil stratigraphy consisted of sand and gravel fill material underlain by dense silt and sand. At several locations within the footprint of the Former Transmitter Building, the fill material was underlain by concrete/brick/rebar demolition debris layer starting at between 1.8 and 2.4 m bgs. In general, the debris unit was observed to be approximately 1 m in thickness in the majority of investigation locations where it was encountered. Beneath the debris and fill, a dense silt and fine-grained sand material was encountered up to a depth of 6.1 m bgs (the maximum depth investigated). No visual or olfactory evidence of contamination was encountered at any of the borehole or test pit locations. In 2019, SNC-Lavalin completed a Hazardous Building Materials Investigation of the debris unit and, based on the analytical results, the concrete debris is not considered to contain asbestos-containing materials (ACM).

Selected soil samples collected during the drilling and test pitting were analyzed for various Potential Contaminants of Concern (PCOC) parameters, including BETX, PHC F1 to F4, VPH, LEPHs, heavy extractable petroleum hydrocarbons (HEPHs), PAH, and metals. Select samples were also analyzed for leachable PAH. In general, the contaminants of concern (COC) in soil within and in proximity to the former bunker footprint included PHC F2 and F3 and various PAH. Detailed results of the analytical testing can be found in SNC-Lavalin's SSI and ROA for the Site (March 2019) as well as Annex D.

Surficial geology consists of undivided sedimentary rocks, boulder, cobble, and pebble conglomerate, coarse to fine sandstone, siltstone, shale, and coal (Santonian to Maastrichtian) (iMapBC, 2020).

v) Ambient Noise

The Site is currently vacant and is used by a model remote control (RC) airplane club (PDQ Flyers) to conduct remote airplane flight activities. The noise generated by RC planes is not considered to be of high levels and occurs intermittently. The PDQ Flyers club employs noise regulations to limit sound emission to 92 decibels (db) measured at 6 m. A maximum of five model planes are allowed to fly at one time (PDQ Flyers Noise Regulations). It is understood that flight activities would cease during any remedial excavation activities.

2.3.2 Biological Components

i) Terrestrial Animals and Habitat

Terrestrial habitat at the Site is minimal and consists of short (i.e., cultivated) grasses surrounded by invasive evergreen shrubs (i.e., gorse and scotch broom). Despite their status of invasive species of concern in BC, these shrubs provide suitable habitat and cover for area wildlife. A number of American robins (*Turdus migratorius*) and songbirds (species unidentified) were observed in this area at the time of the Site visit.

A grassy field (cultivated) is located to the northeast of the Site. The Site is surrounded by low-lying shrubs (i.e., gorse and Scotch broom) to the north, west, and south of the Site. A grassy field (cultivated) is located to the northeast. During the Site visit, game trails and deer (*Odocoileus hemionus columbianus*) droppings were observed, but no deer were visually observed. Deer are considered common to the area, and generally not easily disturbed by foot or vehicle traffic. Nearby areas include mature forests comprised of a variety of species including Douglas-fir (*Pseudotsuga menziesii*), arbutus (*Arbutus menziesii*), western red cedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), shore pine (*Pinus contorta*), red alder (*Alnus rubra*), swordfern (*Polystichum munitum*), salal (*Gaultheria shallon*), gorse, and Scotch broom (Jaques Witford Environmental Ltd., 2002; SNC-Lavalin, 2020) which provide cover and varied habitat for a wide variety of terrestrial wildlife.

A search of the BC Conservation Data Centre (CDC) databases indicates that there are numerous species of concern with potential to occur in the area, which is further discussed in 2.3.2.iv, Species at Risk and Migratory Birds.

Given the quality of the habitat on-Site (cleared, historically developed), species at risk occurrence is considered low.

ii) Aquatic Animals and Habitat

No aquatic habitat is present on-Site; however, surrounding roadside ditches and the small wetland to the north of the Site may provide suitable habitat for wetland species, including Northern red-legged frog (*Rana aurora*), Western Toad (*Anaxyrus boreas*), and Wandering Salamander (*Aneides vagrans*). Refer to Section 2.3.2.iv Species at Risk and Migratory Birds for further details on this species. No fish bearing streams or water bodies have been identified within a 300 m radius of the Site (iMapBC, 2020, DCC 2015 and Site visit).

iii) Vegetation

Vegetation in the area of the Site is limited and consists of short, cultivated grasses surrounded by invasive species (i.e., gorse and Scotch broom). Gorse is considered noxious under the BC Weed Control Act. Scotch broom is unregulated, but is also considered an invasive species of concern. Vegetation beyond the Site boundary includes areas of documented ecological communities at risk. These areas are not anticipated to be impacted by the Project (Section 2.3.2 iv).

The Project area is known to contain occurrences of highly invasive or noxious plants.

iv) Species at Risk and Migratory Birds

Species at Risk

A search of the CDC's BC Species and Ecosystem Explorer database was also completed to determine the potential presence at or near the Site of provincially Red-listed and Blue-listed species and ecological communities, as well as federally listed species occurring on Schedule 1 of the *Species at Risk Act* (SARA). The search results identified 109 plants and animals using the following search parameters: Nanaimo Regional District, South Island Forest District, Coastal Douglas-fir Biogeoclimatic Zone, Moist maritime subzone. Under the same search parameters, 43 provincially Red-listed and Blue-listed ecological communities were found. A copy of the search results is included in Annex C.

Given the quality and type of habitat at the Site (cleared, human activity, historically disturbed), it is not likely that the majority of these species would be present on the Site.

A Rare Species Occurrence map produced by Natural Resources Canada for the Site on June 30, 2020 indicates that Band-tailed Pigeon (*Patagioenas fasciata*), BC Blue-listed and listed as Special Concern within Schedule 1 of SARA, as well as the Common Wood-nymph, *incana* subspecies (*Cercyonis pegala incana*), BC Red-listed, occurs on the Site. During the field investigation occurring on March 12, 2020, neither of these species were observed. Additionally, no species at risk critical habitat is recorded at the Site for these or any other species. However, it is considered that these species may occur incidentally during construction. Common Wood-nymph utilizes grassy clearings near forested areas throughout its life cycle (Emmel, 1969) and Band-tailed Pigeon likewise nest in trees located near clearings and moderately developed areas (COSEWIC, 2008).

The nature of the proposed activities is not anticipated to impact Band-tailed Pigeon potentially occurring at the Site as the Project is not expected to result in increased habitat fragmentation, high intensity noise, or disturbance of trees. Common Wood-nymph may occur within the grasses surrounding the Site. During the hottest period of the year, Common Wood-nymph may lie dormant in the grass (MFG, 2021) and may be affected by excessive traffic over the grass coverage surrounding the work area during this stage and during early life cycle stages. It is expected that mitigations implemented throughout the Project will prevent impacts to Common Wood-nymph and Band-tailed Pigeon species.

Ecological Communities

A BC Red-listed community of dull Oregon-grape and Douglas fir *(Berberis nervosa/Pseudotsuga menziesii*) is mapped to occur to the north (450 m), south (350 m), and east (350 m) of the Site as per CDC data (iMap BC, 2020). This community is classified as having well-developed vertical structure consisting of tall shrubs and trees of different age and height classes and typically containing many of the trees and shrubs observed in the general vicinity of the Site (red alder, bigleaf maple, and salal).

Amphibians

No aquatic habitat is present on-Site; however, surrounding roadside ditches and the wetland area to the north of the Site may provide suitable habitat for northern red-legged frog (Rana aurora), Western Toad (*Axanyrus boreas*), and Wandering Salamander (*Aneides vagrans*). All three are listed as Special Concern on SARA Schedule 1 and the latter two are provincially Blue-listed species. Habitat preferences for these species includes moist forest and wetlands with trees. Western toads and Red-legged frogs breed in well shaded shallow ponds or slow moving streams, temporary pools, or wetlands regardless of size, but in close proximity to forests. They seek shelter under logs or other debris when away from streams. Wandering salamander may find their way into hollow decayed trees.

Invertebrates

DND's Sensitive Area geodatabase mapping shows that the Site is encompassed by common Wood-nymph *incana* subspecies (*Cercyonis pegala incana*), which is BC Red-listed. Common Wood-nymph utilize grassy forest openings, clearcuts, and meadows during their life cycles and lay eggs on blades of grass (Emmel, 1969). Pacific sideband mollusc (*Monadenia fidelis*) was also identified by the DND to occur in the area, although it is not presently considered to be at risk.

Migratory Birds

Section 34 (a) of the provincial BC *Wildlife Act* protects all birds and their eggs. Section 34 (c) protects their nests while they are occupied by a bird or egg. Section 34(b) of the provincial Wildlife Act protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons, and burrowing owls year-round. Most native bird species in Canada are protected under the Migratory Birds Convention Act, 1994 (MBCA), and are collectively referred to as "migratory birds". General prohibitions under the Act and its regulations protect migratory birds, their nests, and eggs anywhere they are found in Canada.

Numerous migratory bird species may occur in the region. A CDC search of birds in the region protected under the *Migratory Birds Convention Act* (MBCA) identified 12 migratory birds under the following search criteria: Nanaimo Regional District, South Island Forest District, Coastal Douglas-fir Biogeoclimatic Zone, Moist maritime subzone.

Migratory birds may be present in adjacent habitat or nesting on DND infrastructure near the Site, such as Common Nighthawk (*Chordeiles minor*) and Barn Swallow (*Hirundo rustica*). Purple Martin (*Uria aalge*) is a migratory bird that may utilize the habitat found on and in immediate proximity of the Site, including cultivated grassy fields, shrubs, bare sites/clearings, and grassy uplands. The Site is located in proximity (140 m northeast and 230 m northwest of the Site) to Band-tailed Pigeon habitat (*Patagioenas fasciata*), which is a migratory bird listed as Special Concern on Schedule 1 of the SARA and Blue-listed in BC.

For species at risk and migratory birds, none of these potential occurrences are anticipated to be affected by activities at the Site if all mitigation measures in this report are adhered to.

2.3.3 Social and Cultural Components

i) Cultural Resources

The *Heritage Conservation Act* (HCA) provides for the protection of British Columbia's archaeological resources (RSBC 1996 Chapter 187). The HCA applies to archaeological sites predating 1846, whether they are located on public or private land. The HCA states that sites may not be destroyed, excavated, or altered without a permit issued by the Minister or designate.

The January 2020 SAMS for the Site area shows the distribution of recorded sensitive areas (including archaeological sites and cultural features) surrounding the Site (Annex A). Based on this map, a heritage site is located approximately 190 m southeast of the Site. It consists of a visible building foundation and small-medium water-rolled cobbles and subangular rocks. This site could be related to historic homesteads in the area. Additionally, historic First Nations burial sites are located in clusters approximately 250 m, 400 m, and 410 m southeast of the excavation area. These sites are not anticipated to be disturbed by Project activity.

ii) Social

The community of Nanoose Bay is located approximately 2 km east of the Site and hosts various services, including Nanoose Bay Elementary School, the Nanoose Bay Volunteer Fire Department, Nanoose Library, and Nanoose Place Community Center. The nearest public waste disposal facility is located 10 km northwest of the Site at Church Road Transfer Station in the community of Errington. Englishman River Regional Park is also located near Errington, approximately 4.5 km northwest of the Site. The Nanoose Indian Reserve, under the Naut'Sa Mawt Tribal Council, is located approximately 7.6 km southeast of the Site, near the community of Lantzville. These social resources are not expected to be impacted by the proposed remediation works. The PDQ Flyers occasionally utilize the Site to conduct remote airplane flight activities.

iii) Health and Safety

The Site is currently vacant. The model airplane club will suspend activities when work is scheduled. Site access will be arranged through PSPC representative and DND Range Control.

Public transportation routes will also be utilized in association with the off-Site movement of materials. As the Site is rarely visited by anyone aside from members of the model airplane club, who will not be conducting activities during scheduled works, potential for accident and injury at the Site is limited to construction worker safety and visitor safety during Project activities.

2.4 Project Effects and Associated Mitigation Measures

The following table describes the potential effects of proposed activities on the VECs identified on the Site, as well as mitigation measures to minimize and eliminate residual significant adverse effects resulting from the proposed works. The likelihood of adverse effects, if all the outlined mitigation measures are implemented, is determined.

Table 2. Project Interaction with Atmosphere

Project Component(s)	Description of Effects on *Atmosphere*	Mitigation Measures	Are residual significant adverse effects likely?
All Project Components	Land alteration activities, such as clearing vegetation, moving soil, excavating, or placing fill, have the potential to generate dust and temporarily degrade local atmospheric conditions.	Employ good housekeeping and dust suppression techniques to reduce airborne dust and prevent off-Site migration: - Monitor and manage track-out of vehicles and equipment from the Site in order to reduce the potential for the dispersion of material and debris as fugitive dust. - Remove excess soil from equipment, machinery, and vehicles regularly and before movement of vehicles out of the Site. - Sweep paved access roads and clean construction site daily. - Cover stockpiled materials at all times access is not needed. - Enforce speed control on-Site. - Employ proper truck loading. - Cover all materials transported to and from the Site as appropriate. Cover dust-producing materials with 6 mm polyethylene sheeting (at a minimum). - Application of water spray as a dust suppressant is acceptable, provided runoff is appropriately managed. - Application of oil as a dust suppressant is prohibited. - Application of other dust suppressants is not permitted without prior authorization from DND OPI. Develop and implement a plan which details dust emission and control measures to be employed. Ensure the plan assigns implementation and monitoring roles. Ensure on-Site personnel have reviewed the plan, understand their roles and responsibilities, and are properly trained and equipped to implement the plan. Schedule work to avoid periods of extremely dry or windy conditions. Monitor airborne dust conditions daily and employ additional housekeeping and dust suppression techniques as required.	No

Table 2. Project Interaction with Atmosphere

Project Component(s)	Description of Effects on *Atmosphere*	Mitigation Measures	Are residual significant adverse effects likely?
		DND OPI is responsible for coordinating notification of the affected community, including the PDQ Flyers, of the nature and likely duration of forthcoming Project activities that may temporarily degrade local atmospheric conditions. Coordinate notification to individuals and/or organizations/municipalities outside the Department through Base Public Affairs.	
All Project Components	Emissions from construction equipment, machinery, generators, and vehicles used during land alteration activities will generate Green House Gases (GHG) and temporarily reduce local air quality.	Ensure equipment, machinery, and vehicles used on-Site are in good working order and comply with applicable air quality standards. Operate equipment and machinery at optimum rated loads. Turn off equipment and machinery when not in use to minimize exhaust. Repair or replace equipment and machinery producing excessive exhaust. Minimize vehicle idling time. Use stationary emission sources (e.g., portable diesel generators, compressors, etc.) only as necessary and turn off when not in use.	No
All Project Components	Emissions from generators, if utilized, will generate Green House Gases (GHG) and temporarily reduce local air quality.	Install the generator in a location that will minimize disturbance from emissions and noise to adjacent communities.	No

Table 3. Project Interaction with Surface Water and Groundwater

Project Component(s)	Description of Effects on *Surface Water and Groundwater*	Mitigation Measures	Are residual significant adverse effects likely?
All Project Components	Land alteration and equipment traffic on roadways will increase the potential for transport of silt-laden water to the aquatic environment (directly or via storm water drainage system). This could result in runoff with high levels of suspended solids entering surface water features. Increases in suspended solids will degrade surface water quality. An elevated load of suspended solids in surface water can coat fish gills and reduce oxygen concentrations in the water causing asphyxiation. There is potential for storm water from the Site to contain contaminants in concentrations exceeding applicable discharge guidelines, due to historical soil or groundwater contamination. Elevated levels of contaminants in surface water can potentially cause a variety of adverse effects on aquatic wildlife including tumours, organ damage, physical deformities, reproductive disorders, and population decline.	Isolate the work area and prevent the release of any potential sediment-laden or polluted runoff from entering a surface water feature or encroaching onto adjacent properties or roadways. Implement erosion and sediment control measures along the north boundary of the laydown area to protect potential runoff towards potential wetland features observed north of the Site. Do not conduct work or move machinery within 30 m of drainage ditches or ditch segments in proximity to works. Employ erosion and sediment control measures if this is unavoidable. Develop and implement a plan which details erosion and sediment control measures and storm water pollution prevention measures. Ensure plan assigns implementation and monitoring roles. Ensure on-Site personnel have reviewed the plan, understand their roles and responsibilities, and are properly trained and equipped to implement the plan. Ensure plan addresses unforeseen storm events with associated potential overland erosion from rainfall impact and storm water runoff. Implement, at a minimum, the following erosion and sediment control measures: - Install effective erosion and sediment control measures prior to land disturbance in areas where there is potential surface runoff to sensitive receptors, such as drainage ditches, catch basins, or water features. - Inspect and maintain erosion and sediment and control measures on a regular basis while in use. - Repair erosion and sediment control measures if damage occurs. - Ensure on-Site personnel are prepared to quickly erect additional erosion and sediment control measures to minimize sediment entering receiving waters if necessary. - Minimize the area of soil exposed at any one time by: phasing activities (Site preparation, excavation, and Site remediation); retaining vegetation as much as possible; and, once construction works are completed, stabilizing any exposed soils as soon as possible using temporary measures such as mulch, erosion sediment control blankets, hydro-seeding, and/or plastic sheeting or replanting exposed soils with an approved seed mix or long-term vegetation.	No

Table 3. Project Interaction with Surface Water and Groundwater

Project Component(s)	Description of Effects on *Surface Water and Groundwater*	Mitigation Measures	Are residual significant adverse effects likely?
		- Remove non-biodegradable erosion and sediment control measures once the area is stabilized (not before). - Implement measures to manage water flowing into the Site as well as water being pumped/diverted from the Site such that sediment is filtered out prior to the water entering a water body. - Schedule work to avoid periods of heavy precipitation and extreme dry conditions. - Discontinue work during periods of heavy rain that may lead to excessive erosion of soils and cause increased sedimentation into watercourses that are off-Site. - Limit the movement of vehicles/machinery to defined work areas. - Avoid off-road access of vehicles/machinery. If off-road access is unavoidable, minimize disturbance to soils/vegetation by using the same access route and avoiding wet areas. Implement measures outlined in Vegetation and Terrestrial Wildlife Habitat below. - Restore areas impacted by off-road access to original condition. - Limit laydown and material storage areas to previously paved/developed areas (impermeable surfaces). - Refer to additional mitigation measures for Species at Risk provided in Tables 7, 8, and 9, below. Implement, at a minimum, the following storm water pollution prevention measures: - Do not permit water containing deleterious substances to be pumped into surface water features, sewer, or drainage systems. - Implement Site isolation measures to minimize water flowing onto the Site and into excavation areas. - Characterize all water, through sampling and analysis, prior to pumping/discharging off-Site. This includes water that is captured within an excavation zone (from precipitation and groundwater/marine infiltration). - Do not pump/discharge water off-Site until sampling and analysis have confirmed that water meets the discharge criteria applicable to the point of discharge. Water discharged to the sanitary sewer must meet the applicable municipal sewer use bylaw requirements. Water discharged to the aquatic environment must meet the CCME Water Quality Guidelines for the Protection of Aquatic Life, the BC Approved Water Quality Guidelines (Aquatic Life), and BC Working Water Quality Guidelines (Aquatic Life) – the most stringent standard from these	

Table 3. Project Interaction with Surface Water and Groundwater

Project Component(s)	Description of Effects on *Surface Water and Groundwater*	Mitigation Measures	Are residual significant adverse effects likely?
		guidelines is to be applied. Water discharged to ground must meet CCME's Canadian Environmental Quality Guidelines and Federal Groundwater Quality Guidelines. - Engage a Qualified Environmental Professional (QEP) to complete the required sampling. - Ensure samples are tested for all known or potential contaminants of concern. - Ensure analysis is completed by an independent testing agency accredited according to the Standards Council of Canada, the Canadian Association of Laboratory Accreditation Inc. (ISO/IEC 17025), and British Columbia Ministry of Environment. - Use flocculation tanks, settling basins, or other treatment facilities to ensure water meets discharge criteria applicable to the point of discharge. - No vehicle washing is permitted on-Site. If a wheel wash is installed, all wash water must be contained and disposed of at an appropriately licensed facility. - No construction wastes, including hazardous products or wastes, will be discharged to surface water features, drainage features, or sanitary sewer.	
All Project Components	Accidental fuel spills from equipment, machinery, and vehicles used during land alteration activities have the potential to pollute soils, nearby surface water features, and enter the underlying aquifer. Releases of petroleum-based products can induce toxic effects in aquatic organisms including mortality and sub-lethal effects such as impaired growth or reproductive capacity.	Develop and implement a plan which details spill prevention and response measures to be employed. Ensure plan includes a list of spill response equipment that will be present on-Site. Ensure plan assigns implementation and monitoring roles. Ensure on-Site personnel have reviewed the plan, understand their roles and responsibilities, and are properly trained and equipped to conduct spill response activities. Identify high-risk locations where spills are probable and maintain spill kits and vessels capable of containing 110% of the largest potential spill through the duration of the Project at these locations. Consider the location of the generator, if present, and the associated fuel tank to be a high-risk location. Include an inventory of required contents at the top of the kit. Locate Personal Protective Equipment (PPE) at the top of the spill kit to ensure easy access for the spill responder. Keep spill kits closed with a safety seal affixed to indicate if the kit has been used or tampered with.	No

Table 3. Project Interaction with Surface Water and Groundwater

Project Component(s)	Description of Effects on *Surface Water and Groundwater*	Mitigation Measures	Are residual significant adverse effects likely?
		Respond immediately to all spills in accordance with the spill plan. Contact the following if a spill cannot be contained and cleaned up and second level response is required: - 911 for land-borne spills. Inform the 911 operator that the spill has occurred on CFB Esquimalt property. Verbally report all spills to DND OPI immediately. If DND OPI is not available, contact the Joint Operations Centre (JOC) (363-2425, 363-5848). Submit the following information to DND OPI within one day of a spill incident: - Date and time of spill (indicate occurrence, discovery, and cleanup commencement. - Type of material spilled and Transport of Dangerous Goods classification. - Spill surface (gravel, water, pavement, shop floor). - Quantity of material spilled and quantity recovered (kg/L). - Source/origin of spill. - Cause of spill (description of incident). - Corrective action taken and action plan to prevent a subsequent spill. - Human impacts. - Environmental impacts (ground, water, vegetation, wildlife). - Weather conditions at the time of the incident. - Agencies or authorities notified or involved. - Media interest. - Additional comments. DND OPI is responsible for ensuring that all spills are reported to MARPAC FSE in accordance with MARPAC SEMS DSE1: Safety and Environmental Emergency Incident Reporting. If MARPAC FSE personnel are not immediately available, contact the Joint Operations Centre (JOC) (363-2425, 363-5848). If required, MARPAC FSE or the JOC will contact Emergency Management BC directly to ensure that Environment and Climate Change Canada's (ECCC) notification requirement is met.	

Table 3. Project Interaction with Surface Water and Groundwater

Project Component(s)	Description of Effects on *Surface Water and Groundwater*	Mitigation Measures	Are residual significant adverse effects likely?
		Ensure all equipment, machinery. and vehicles brought on-Site are clean and free of leaks, excess oil, and grease. Check all equipment, machinery, and vehicles every morning for leaks and ensure they are maintained in good working order. Ensure hydraulic machinery operating in proximity to drainage or fish-bearing bodies of water uses environmentally-sensitive hydraulic fluids that are non-toxic to aquatic life and are readily or inherently biodegradable. Limit refueling, fuel stockpiling, and maintenance of equipment to designated areas on level, impermeable surface areas at least 30 m away from any drainage or surface water features. Ensure all refueling occurs with funnels, pads, and drip pans in place. Store fuels, lubricants, and chemicals appropriately on-Site, with proper controls to prevent the release of deleterious substances, in a designated area at least 30 m away from surface water features or surface water drainage. Place properly sized oil drip pans under all equipment and vehicles left on-Site.	
All Project Components	Accidental fuel spills or leaks from fuel storage tanks associated with temporary power generators have the potential to contaminate soil, surface water, and groundwater.	Install, operate, maintain, and test temporary power generator and associated fuel tank in accordance with the following, as applicable: - CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products. - National Fire Code of Canada. - CSA Standard B139, Installation Code for Oil-Burning Equipment. - CSA B138: Standard for Generators and Portable Powered Equipment. Ensure the generator fuel tank is completely empty of product when transiting to/from the Site. Inspect the generator and fuel tank for potential damage accrued during transit prior to the first transfer of any petroleum products or allied petroleum products into the storage tank system.	No

Table 3. Project Interaction with Surface Water and Groundwater

Project Component(s)	Description of Effects on *Surface Water and Groundwater*	Mitigation Measures	Are residual significant adverse effects likely?
		Ensure safe fueling procedures are developed and adhered to. Install the generator and fuel tank in a location that is protected from potential vehicle/machinery impacts, is on an impermeable surface, and is at least 30 m away from sensitive receptors such as surface water or drainage features. Use secondary spill containment if generator and fuel tank cannot be located at least 30 m away from sensitive receptors. Keep a spill kit capable of containing 110% of the fuel tank volume accessible and nearby at all times. Block off or plug storm drains in the vicinity of the generator and fuel tank to prevent migration of product in the event of a spill from the belly tank. Use sand bags, portable berms, or specially designed mats.	
All Project Components	Inappropriate storage of waste materials could result in soil and/or surface water pollution.	Store waste materials in a protected, secure location at least 30 m from sensitive receptors, such as surface water or drainage features. Refer to additional mitigation measures outlined above.	No

Table 4. Project Interaction with Soil and Geology

Project Component(s)	Description of Effects on *Soil and Geology*	Mitigation Measures	Are residual significant adverse effects likely?
All Project Components	Land alteration activities have the potential to uncover metals, hydrocarbons, PAHs, and other Contaminants of Concern associated with historical activities. Relocation and export of these soils from the Site has the potential to contaminate adjacent soils in the export area. Residual soil on equipment and vehicles has the potential to migrate to and contaminate off-Site soils and surface waters during track out of equipment and vehicles from the Site. The import of fill material from off-Site sources that do not meet Site soil criteria has the potential to be a continued source of contamination if imported to the Site.	**GENERAL** On-Site personnel will stop work if suspected contamination (e.g., hydrocarbon staining or odour, wood waste, old concrete/metal debris) is encountered during Project implementation where it is not expected. On-Site personnel will immediately notify the DND OPI. The DND OPI is responsible for informing MARPAC FSE. Do not disturb contaminated soils until a QEP has assessed the situation and developed a management plan that has been approved by DND OPI and MARPAC FSE. Develop and implement a Soil Management Plan to address how soils will be handled, stockpiled, and disposed of. Ensure this plan assigns implementation and monitoring roles. Ensure on-Site personnel have reviewed the plan, understand their roles and responsibilities, and are properly trained and equipped to carry out the plan. Ensure the plan includes the following information: - work title - work number - Contract Authority contact information (if applicable) - on-Site Supervisor contact information - location of the excavation and soil storage area - list of known or potential contaminants of concern - approximate volume of soil - plan for soil storage, reuse, relocation, or disposal - management plan for stockpiled soils - signature of individual responsible for plan Stockpile and cover all excavated materials in an appropriate temporary soil storage area, with continuous impermeable surface and appropriate grading and berming. Temporary soil storage area must be approved by the DND OPI prior to its use. DND OPI is responsible for engaging and gaining approval from all appropriate stakeholders (including MARPAC FSE) prior to approving a temporary soil storage area. Ensure the temporary soil storage area is in a protected location, at least 30 m away from any sensitive receptors. Place all stockpiled materials on a minimum 6 mm PVC or plastic liner to prevent contamination of underlying surface materials. Cover all stockpiled materials with a minimum 6 mm PVC or plastic liner to minimize interaction with wind and precipitation.	No

Table 4. Project Interaction with Soil and Geology

Project Component(s)	Description of Effects on *Soil and Geology*	Mitigation Measures	Are residual significant adverse effects likely?
		Monitor and manage track-out of vehicles and equipment from the Site in order to reduce the potential for the dispersion of material and debris as fugitive dust. Remove excess soil from equipment, machinery, vehicles, and roadways regularly. No vehicle washing is permitted on-Site. If a wheel wash is installed, contain all wash water and dispose of at a facility in accordance with Federal, Provincial, and Municipal criteria applicable to the method of disposal. **RELOCATION OF SOIL** Include the following in the Soil Management Plan if excess soil/fill will be relocated to another area within the DND, to another DND property, or relocated off of federal land: - Sampling plan - Analytical results - Plan for the reuse of excess soils on DND property - If relocated to provincial land, name and address of authorized facility and copy of BC MOE permits - Manifests/weight tickets/disposal certificates Do not relocate soils to another area within the DND property or to another DND property without prior authorization from DND OPI. DND OPI is responsible for engaging and gaining approval from all appropriate stakeholders (including MARPAC FSE) prior to relocating soils on DND properties. Conduct environmental characterization of stockpiled soils in accordance with the British Columbia Ministry of Environment Technical Guidance on Contaminated Sites – Site Characterization and Confirmation Testing (2009). Conduct sampling using a QEP. Complete sample analysis using a laboratory that has been accredited by an internationally recognized body (e.g., Standards Council of Canada [SCC] or Canadian Association for Laboratory Accreditation [CALA]) and in accordance with the International Standard ISO/IEC 17025.	

Table 4. Project Interaction with Soil and Geology

Project Component(s)	Description of Effects on *Soil and Geology*	Mitigation Measures	Are residual significant adverse effects likely?
		Manage soils in accordance with the BC Hazardous Waste Regulations or complete a Contaminated Soils Relocation Agreement (CSRA) as required under the BC CSR if excess soil/fill be relocated from federal to provincial land. Dispose of soil/fill at a facility authorized to accept contaminated soil or hazardous waste under the BC Environmental Management Act when not relocating soil/fill through a CSRA. Ensure all applicable documentation (manifests/CSRA/disposal certificates) for the relocation of soil to provincial land are included with the Soil Management Plan. Expedite characterization and relocation of soil to minimize risk of contaminant migration from stockpiles. **IMPORT OF SOIL** DND OPI shall ensure adherence with the Directorate of Contaminated Sites (DCS) Contaminated Sites Instruction (CSI.004.001): Imported Fill (15 June 2020). Specifically: Imported fill shall be virgin material and shall not contain any recycled material. If this is not possible, Base Safety and Environment (BSE) and DCS shall be engaged during the selection process for imported fill. At a minimum, prior to importing materials to DND property, imported fill shall be tested for: metals, VOCs, PAHs, hydrocarbons, and PFAS.	

Table 4. Project Interaction with Soil and Geology

<table>
<tr><th>Project Component(s)</th><th>Description of Effects on Soil and Geology</th><th>Mitigation Measures</th><th>Are residual significant adverse effects likely?</th></tr>
<tr><td></td><td></td><td>Sampling for PFAS shall include the following compounds:

<table>
<tr><th>PFAS Name</th><th>PFAS Acronym</th><th>Criteria (mg/kg)</th></tr>
<tr><td>Perfluorooctane sulfonate</td><td>PFOS</td><td>0.01</td></tr>
<tr><td>Perfluorooctanoic acid</td><td>PFOA</td><td>0.01</td></tr>
<tr><td>Perfluorobutanoate</td><td>PFBA</td><td>0.01</td></tr>
<tr><td>Perfluorobutane sulfonate</td><td>PFBS</td><td>0.01</td></tr>
<tr><td>Perfluoropentanoate</td><td>PFPeA</td><td>0.01</td></tr>
<tr><td>Perfluorohexane sulfonate</td><td>PFHxS</td><td>0.01</td></tr>
<tr><td>Perfluorohexanoate</td><td>PFHxA</td><td>0.01</td></tr>
<tr><td>Perfluoroheptanoate</td><td>PFHpA</td><td>0.01</td></tr>
<tr><td>Perfluorononanoate</td><td>PFNA</td><td>0.01</td></tr>
</table>

Complete sample analysis using a laboratory that has been accredited by an internationally recognized body (e.g., Standards Council of Canada [SCC] or Canadian Association for Laboratory Accreditation [CALA]) and in accordance with the International Standard ISO/IEC 17025.

Conduct environmental characterization of imported soil/fill in accordance with the British Columbia Ministry of Environment Technical Guidance on Contaminated Sites – Site Characterization and Confirmation Testing (2009).

All tested samples of imported fill must meet the CCME criteria for an Agricultural Land Use (or background concentrations). If this is not possible, BSE and/or DCS must be engaged during the selection process for imported fill.

A record of all testing must be kept for verification, along with details of the source site (the location where the imported fill is coming from) and the receiving site (where the imported soil is being reused).</td><td></td></tr>
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Table 4. Project Interaction with Soil and Geology

Project Component(s)	Description of Effects on *Soil and Geology*	Mitigation Measures	Are residual significant adverse effects likely?
		Pits and quarries cannot be pre-qualified. Sampling results shall be no more than three months old. Refer to additional mitigation measures outlined under Table 3, Project Interaction with Surface and Groundwater.	
All Project Components	Land alteration activities have the potential to impact underground utilities which could result in worker injury, release of deleterious substances, and disruptions to operations.	Initiate a BC One Call and obtain an approved RP Ops U (P) Excavation Clearance Form prior to project commencement.	No
All Project Components	Accidental fuel spills or leaks from fuel storage tanks associated with temporary power generators have the potential to contaminate soil, surface water, and groundwater.	Refer to additional mitigation measures outlined under Table 3, Project Interaction with Surface and Groundwater.	No
All Project Components	Accidental fuel spills from equipment, machinery, and vehicles used during Project activities have the potential to pollute soils, nearby surface water features, and enter the underlying aquifer.	Refer to additional mitigation measures outlined under Table 3, Project Interaction with Surface and Groundwater.	No
All Project Components	Inappropriate storage of waste materials could result in soil and/or surface water pollution.	Develop and implement a work plan to appropriately manage and dispose of Project waste materials. Ensure this plan assigns implementation and monitoring roles. Ensure all waste materials are segregated, salvaged, and recycled where practical. Store waste materials in a protected, secure location at least 30 m from sensitive receptors, such as surface water or drainage features. Visually inspect waste material storage area regularly to identify potential problems or leaks. Provide on-Site containers for collection, handling, and storage of anticipated quantities of waste materials. Do not use the local waste collection system. Ensure on-Site containers are enclosed to limit contact with rain and runoff and prevent light materials from blowing out.	No

Table 4. Project Interaction with Soil and Geology

Project Component(s)	Description of Effects on *Soil and Geology*	Mitigation Measures	Are residual significant adverse effects likely?
		Do not allow on-Site containers to overflow. Do not allow waste materials to accumulate on the ground. Do not bury waste materials on-Site.	
Site Preparation	The potential for soil erosion increases if the soil has no or very little vegetative cover of plants. Plant cover protects the soil from raindrop impact and splash, tends to slow down the movement of runoff water, and allows excess surface water to infiltrate.	Remove vegetation using mechanical or hand clearing methods. Minimize the removal of vegetation wherever possible. Restrict movement of vehicles, machinery, and foot traffic along dedicated pathways that minimize landscape and vegetation disturbance. Erect visible temporary fencing to protect existing vegetation and trees from accidental damage by heavy machinery. Ensure protection includes tree roots within the dripline. Do not permit equipment, machinery, and vehicles in these areas. Ensure on-Site personnel are aware of these areas and associated restrictions.	No
All Project Components	Off-road operation or storage of equipment, machinery, and vehicles may crush vegetation and damage tree root systems. Heavy construction equipment can compact soil and dramatically reduce pore space. Compaction inhibits root growth, limits water penetration, and decreases oxygen needed for root survival.	Off-road activities will be limited to routes authorized by MARPAC FSE that avoid impacts to SAR and minimize impacts to vegetation. Restrict the storage of machinery and equipment to pre-disturbed areas (e.g., parking lots, roads) whenever possible. Refer to Tables 7, 8, and 9, Species at Risk and Migratory Birds, Aquatic Animals and Habitat & Project Interaction with Vegetation for further mitigations for species at risk in the Project area. Conduct off-road operation of equipment, machinery, and vehicles when ground is dry. Avoid unnecessary machinery and vehicle operation during wet periods. Restrict movement of vehicles, machinery, and foot traffic along dedicated pathways that minimize landscape disturbance. Erect visible temporary fencing to protect existing vegetation and trees from accidental damage by heavy machinery. Ensure protection includes tree roots within the dripline. Do not permit equipment, machinery, and vehicles in these areas. Ensure on-Site personnel are aware of these areas and associated restrictions.	No

Table 5. Project Interaction with Ambient Noise

Project Component(s)	Description of Effects on *Ambient Noise*	Mitigation Measures	Are residual significant adverse effects likely?
All Project Components	Noise levels will increase above ambient conditions during Project activities. Increased levels of noise may be disruptive to residents/personnel adjacent to the Site. High levels of noise from equipment and remediation activities at the Pproject Site have the potential to harm hearing of on-Site workers. Increased levels of noise in the natural environment may be disruptive to terrestrial animals, including raptors and migratory/SAR birds, in the immediate area, potentially resulting in their relocation from the area.	Comply with Canada Occupational Health and Safety Regulations (DND/CAF personnel) and the BC Occupational Health and Safety Regulations (Contractor personnel) regarding noise regulations and PPE requirements. Properly maintain equipment and machinery to minimize unnecessary noise pollution. Fit all machinery and equipment with functioning exhaust and muffler systems. Ensure machinery covers and equipment panels are well fitted and remain in place to muffle noise. Ensure bolts and fasteners are tight to avoid rattling. Place power-generating equipment to reduce exposure and minimize disruption to adjacent occupants. Shield loud power equipment and turn off equipment when not in use. Prevent occurrence of multiple noise activities during a single event (cumulative effects) or for prolonged periods. DND OPI is responsible for completing a noise generation evaluation if noise complaints are reported. Project activities that have the potential to increase ambient noise levels will comply with time periods identified in applicable municipal noise bylaws. If work is required outside these hours, the DND OPI is responsible for gaining approval as required. DND OPI is responsible for coordinating notification of the affected community of the nature and likely duration of any particularly noisy operations that may be forthcoming as a part of Project activities. Coordinate notification to individuals and/or organizations/municipalities outside the Department through Base Public Affairs. Schedule noise generating activities to avoid sensitive bird periods such as breeding, nesting, roosting, rearing young, and staging (migration). The general nesting period for southern BC is February to September. A QEP will conduct a bird nest survey within seven days prior to commencement of noise generating activities if activities will be conducted during the nesting period and/or if there is the potential that nests of species at risk, migratory birds, eagles, peregrine falcons, gyrfalcons, ospreys, herons, and/or burrowing owls may be present. If nests are present, a QEP will develop a management plan identifying protective measures specific to the species present.	No

Table 5. Project Interaction with Ambient Noise

Project Component(s)	Description of Effects on *Ambient Noise*	Mitigation Measures	Are residual significant adverse effects likely?
		Management plan should be developed in accordance with the most recent version of the following documents, as applicable: - Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia, BC Ministry of Environment. - Guide for developing Beneficial Management Practices for Migratory Bird Conservation, Environment and Climate Change Canada. Project implementation will not commence until the management plan is approved by DND OPI and MARPAC FSE. DND OPI is responsible for developing contingency plans to modify Project activities in accordance with the management plan. A QEP, who is provided with authority to modify or halt Project activities if it is deemed necessary to do so for the protection of bird species or habitat, will monitor the plan through implementation.	
All Project Components	Generator use will temporarily increase local ambient noise levels.	DND OPI is responsible for coordinating notification of the affected community prior to generator use.	No

Table 6. Project Interaction with Terrestrial Animals and Habitat

Project Component(s)	Description of Effects on Terrestrial Animals and Habitat	Mitigation Measures	Are residual significant adverse effects likely?
All Project Components	Machinery and equipment used in land alteration activities have the potential to harm terrestrial wildlife, including SAR and migratory birds that enter the Project Site and damage previously unknown wildlife habitat features that are encountered during Project implementation. Wildlife may become trapped in open excavation areas.	Develop and implement a plan which details wildlife protection measures to be employed. Ensure plan assigns implementation and monitoring roles. Ensure on-Site personnel have reviewed the plan, understand their roles and responsibilities, and are properly trained and equipped to implement the plan. Implement, at a minimum, the following wildlife protection measures: - Employ temporary fencing and barricades when possible to prevent wildlife from entering the Site. - Ensure all food wastes are secured in wildlife-proof containers and are removed promptly from the Site. - Ensure all potential sources of water are minimized by limiting standing pools of water on the Site. - Limit potential sources of shelter by covering or containing piles of soil, fill, brush, rocks, and other loose materials, capping ends of pipes; and ensuring that trailers, bins, boxes, and vacant buildings are secured at the end of each work day. - Check the Site for wildlife prior to beginning work each day. - Regularly inspect protective fencing, barricades, or other installed measures to ensure their integrity and continued function. On-Site personnel will stop work if wildlife enter the Site. Work will not commence until wildlife have vacated the vicinity of the Site. Wildlife will be allowed to exit the Site on their own, via safe routes. On-Site personnel are prohibited from capturing, handling, or harassing wildlife. In the event that wildlife on-Site appear to be injured, abandoned, or in distress, on-Site personnel will immediately notify the DND OPI. The DND OPI is responsible for engaging MARPAC FSE who will advise on the appropriate management strategy. On-Site personnel will stop work if wildlife habitat features (nest, den, burrow, hibernaculum, etc.) are discovered during Project implementation. On-Site personnel will immediately notify the DND OPI. The DND OPI is responsible for informing MARPAC FSE. Do not disturb wildlife habitat features within the Site until a QEP has assessed the situation and developed a management plan that has been approved by DND OPI and MARPAC FSE.	No

Table 6. Project Interaction with Terrestrial Animals and Habitat

Project Component(s)	Description of Effects on Terrestrial Animals and Habitat	Mitigation Measures	Are residual significant adverse effects likely?
		Restrict movement of vehicles, machinery, and foot traffic to a small number of defined dedicated pathways to minimize habitat and landscape disturbance. Wetted areas and ditches, if present in proximity to the Site, that can be utilized by amphibian species with potential to occur (e.g., northern red-legged frog, Western Toad, and Wandering Salamander) must not be disturbed. Do not conduct unnecessary removal or disturbance of logs, stumps, or decaying large woody debris. Avoid unnecessary transit over open grassy areas which could be utilized by common Wood-nymph butterflies (mapped to occur on-Site in DND's SAMS) and their larvae. Restrict movement of vehicles, machinery, and foot traffic along dedicated pathways that minimize grass disturbance. If SAR are encountered on-Site, the QEP responsible for environmental monitoring must be notified immediately.	
All Project Components	Food wastes and other garbage may attract wildlife to the Site. Off-Site disposal of waste materials in landfills results in displacement of terrestrial animals and destruction of habitat.	Develop and implement a work plan to appropriately manage and dispose of Project waste materials. Ensure this plan assigns implementation and monitoring roles. Ensure all waste materials are segregated, salvaged, and recycled where practical. Visually inspect waste material storage area regularly to identify potential problems or leaks. Provide on-Site containers for collection, handling, and storage of anticipated quantities of waste materials. Do not use the local waste collection system. Ensure on-Site containers are enclosed to limit contact with rain and runoff and prevent light materials from blowing out. Ensure on-Site containers are not easily accessible by wildlife (e.g., gulls, bears, racoons). Do not allow on-Site containers to overflow. Do not allow waste materials to accumulate on the ground.	No

Table 6. Project Interaction with Terrestrial Animals and Habitat

Project Component(s)	Description of Effects on Terrestrial Animals and Habitat	Mitigation Measures	Are residual significant adverse effects likely?
		Do not bury waste materials on-Site. Do not dispose of waste materials in surface water or drainage features. Segregate potentially hazardous waste from nonhazardous Site debris. Remove waste material and debris from Site and deposit in waste containers at end of each working day.	
Site Preparation	Removal/disturbance of vegetation may result in the loss of nesting habitat, loss of nests (direct mortality), and the disruption to bird breeding and nesting activities.	Schedule vegetation disturbance/clearing activities to avoid sensitive bird periods such as breeding, nesting, rearing young, and staging (migration). The general nesting period for southern BC is February to September. Trees or other structures containing the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons, and burrowing owls will not be felled or disturbed, even outside of the breeding season. Nests of eagle, peregrine falcon, gyrfalcon, osprey, heron, or burrowing owl are protected all year, whether occupied or not. It is prohibited to damage, destroy, or remove a non-active nest without a permit or an authorization. Stop work if nests containing eggs or young are encountered at any time and inform the DND OPI. Do not commence work in the vicinity of the nest until a QEP has been to the Site, assessed the feature, and developed a management plan which has been approved by MARPAC FSE. A QEP will conduct a bird nest survey within seven days prior to commencement of vegetation removal activities and report on results prior to Project implementation if activities will be conducted during the nesting period and/or if there is the suitable nest habitat for eagles, peregrine falcons, gyrfalcons, ospreys, herons, and burrowing owls. For any nests identified as active (and for inactive nests of raptors, herons, SAR bird species, or migratory birds), a QEP will develop a management plan identifying protective measures specific to the species present.	No

Table 6. Project Interaction with Terrestrial Animals and Habitat

Project Component(s)	Description of Effects on Terrestrial Animals and Habitat	Mitigation Measures	Are residual significant adverse effects likely?
		The management plan should be developed in accordance with the most recent version of the following documents, as applicable: - Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia, BC Ministry of Environment. - Guide for Developing Beneficial Management Practices for Migratory Bird Conservation, Environment and Climate Change Canada. Project implementation will not commence until the management plan is approved by DND OPI and MARPAC FSE. DND OPI is responsible for developing contingency plans to modify Project activities in accordance with the management plan. A QEP will monitor the plan through implementation. The QEP has with the authority to modify or halt Project activities if it is deemed necessary to do so for the protection of bird species or habitat A monitoring report will be produced by the QEP after each day of monitoring on-Site.	
All Project Components	Increased levels of noise in the natural environment may be disruptive to terrestrial animals, including raptors and migratory/SAR birds, in the immediate area, potentially resulting in their relocation from the area.	Refer to mitigation measures outlined in Table 5, Project Interaction with Ambient Noise.	No

Table 7. Project Interaction with Aquatic Animals and Habitat

Project Component(s)	Description of Effects on *Aquatic Animals and Habitat*	Mitigation Measures	Are residual significant adverse effects likely?
All Project Components	Sensitive aquatic habitat may be damaged or destroyed by machinery, equipment, vehicles, and on-Site activities when works are occurring in the vicinity. The nearest aquatic habitat to the subject Site is located approximately 500 m southeast of the Site. No effects on aquatic habitat from the proposed works are anticipated. Wetland habitat occurs in the same vicinity, as well as 100 m north of the Site. No impacts to these wetlands are anticipated as a result of Project activity. Accidental fuel spills from equipment, machinery, and vehicles used during vegetation removal activities have the potential to pollute soils, nearby surface water features, and enter the underlying aquifer. Accidental fuel spills or leaks from fuel storage tanks associated with temporary power generators have the potential to contaminate soil, surface water, and groundwater. Accidental fuel spills from machinery, equipment, and vehicles have the potential to pollute the nearby aquatic environment. Releases of petroleum-based products can induce toxic effects in aquatic organisms including mortality and sub-lethal effects such as impaired growth or reproductive capacity.	QEP to conduct the following when works are occurring near sensitive features: - Flag off/barricade any sensitive areas including wetted areas and ditches that may provide amphibian habitat that are near Project footprint. - Monitor on-Site activities to verify compliance with the DDEED and to ensure that mitigation measures are sufficient for avoiding adverse environmental effects. - Alter work methodology and/or issue stop work orders, in order to prevent environmental impacts and/or adverse environmental effects, whether probable, imminent, or occurring. Once corrective actions have been implemented and deemed appropriate by the QEP, the suspended Project activities will resume under the guidance of the QEP. - Report all environmental non-compliances and incidents to DND OPI immediately. DND OPI to inform MARPAC FSE of all environmental non-compliances and incidents. - Complete and submit an environmental monitoring report that includes the following: - Names of on-Site personnel. - Dates and brief description of the activities that were monitored. - Description of sensitive features and corresponding mitigation measures implemented to protect these features. - Description of environmental non-conformances and incidents and actions taken to mitigate impacts. Do not conduct unnecessary removal or disturbance of logs, stumps, or decaying large woody debris. Do not drive vehicles or machinery alongside or through any ditches or wetted areas encountered on the Site. Refer to mitigation measures outlined under Table 3, Project Interaction with Surface and Groundwater and Table 6, Project Interaction with Terrestrial Animals and Habitat.	No

Table 8. Project Interaction with Species at Risk and Migratory Birds

Project Component(s)	Description of Effects on *Species at Risk and Migratory Birds*	Mitigation Measures	Are residual significant adverse effects likely?
All Project Components		Stop work if SAR and/or SAR habitat features are encountered at any time and inform the DND OPI. DND OPI is responsible for contacting MARPAC FSE for advice.	No
All Project Components	Project activities have the potential to impact Northern red-legged frog, Western Toad, and Wandering Salamander habitat through the introduction of deleterious substances into roadside ditches and the wetland area to the south of the Site.	Do not disturb any existing wetted areas in proximity of the Site that can be utilized by amphibian species with potential to occur (e.g., Northern red-legged frog, Western Toad, and Wandering Salamander). Do not conduct unnecessary removal or disturbance of logs, stumps, or decaying large woody debris. Implement erosion and sediment control measures along the north boundary of the laydown area to protect potential runoff towards potential wetland features observed north of the Site. Do not conduct work or move machinery within 30 m of drainage ditches or ditch segments in proximity to works. Employ erosion and sediment control measures if this is unavoidable. Refer to mitigation measures outlined under Table 3, Project Interaction with Surface and Groundwater.	No
All Project Components	Project activities have the potential to impact Common Wood-nymph through excessive disturbance of and traffic over grass coverage surrounding the Site.	Conduct daily sweeps for Common Wood-nymphs prior to starting work. If Common Wood-nymph are observed in locations requiring disturbance (e.g., within laydown areas, remediation footprint, or egress routes), the QEP responsible for environmental monitoring must be notified immediately. Avoid unnecessary transit over open grassy areas which could be utilized by Common Wood-nymph butterflies and their larvae. Restrict movement of vehicles, machinery, and foot traffic along dedicated pathways that minimize grass disturbance. If feasible, schedule work to occur outside of the hottest months of the year to avoid disturbing wood nymphs that may be dormant within the grass surrounding the Site.	No

Table 8. Project Interaction with Species at Risk and Migratory Birds

Project Component(s)	Description of Effects on *Species at Risk and Migratory Birds*	Mitigation Measures	Are residual significant adverse effects likely?
All Project Components	Machinery and equipment used in land alteration activities have the potential to harm terrestrial wildlife, including SAR and migratory birds that enter the Project Site and damage previously unknown wildlife habitat features that are encountered during Project implementation. Wildlife may become trapped in open excavation areas, areas of standing water (e.g., stormwater ponds, sumps), and open pipes on the Site.	Refer to mitigation measures outlined in Table 6, Project Interaction with Terrestrial Animals and Habitat.	No
All Project Components	Increased levels of noise in the natural environment may be disruptive to terrestrial animals, including raptors and migratory/SAR birds, in the immediate area, potentially resulting in their relocation from the area.	Refer to mitigation measures outlined in Table 6, Project Interaction with Terrestrial.	No
Site Preparation	Removal/disturbance of vegetation may result in the loss of nesting habitat, loss of nests (direct mortality), and the disruption to bird breeding and nesting activities.	Barn swallows (Hirundo rustica) are present on numerous CFB Esquimalt properties and are protected under the *Species at Risk Act* (Threatened). Under the Act, the nest, occupied or not, is considered a residence and is protected from any activity that damages or destroys the function of the nest from 1 May or the date when adults are first seen building or occupying the nest (whichever is earlier) to 31 August or when the bird is last seen at the nest (whichever is later). Activities include, but are not limited to, moving, damaging, or destroying the nest; blocking access to the nest; and/or disturbing the nest (including auditory disturbance), or any other activity that would damage or destroy the functions of the nest. Refer to mitigation measures outlined in Table 6, Project Interaction with Terrestrial Animals and Habitat.	No
All Project Components	Heavy machinery and equipment used in land alteration activities may increase the risk of transporting noxious weeds and invasive species to the Site.	Ensure machinery and materials arrive on-Site in a clean condition and are maintained free of invasive species and noxious weeds. Restore disturbed areas to function as they did in their pre-disturbance condition. Avoid transferring soil or plant material to other work sites; bag or securely contain invasive plants for transport and dispose off-Site in accordance with local municipal procedures; inspect all equipment, machinery, and vehicles for soil or plant materials and if necessary wash down before leaving the Site, minimize unnecessary soil disturbance; and re-vegetate disturbed areas as soon as possible with a native seed mix.	No

Table 8. Project Interaction with Species at Risk and Migratory Birds

Project Component(s)	Description of Effects on *Species at Risk and Migratory Birds*	Mitigation Measures	Are residual significant adverse effects likely?
		Replant exposed soils with an approved seed mix during Site restoration activities to prevent the establishment of invasive species. Refer to mitigation measures outlined in Table 6, Project Interaction with Terrestrial Animals and Habitat.	
All Project Components	Project activities will involve the removal/disturbance of vegetation within the Project footprint. This includes the disturbance of cultivated grasslands associated with land alteration activities occurring outside of pre-developed areas (e.g., gravel, asphalt, concrete).	Refer to mitigation measures outlined in Table 6, Project Interaction with Terrestrial Animals and Habitat.	

Table 9. Project Interaction with Vegetation

Project Component(s)	Description of Effects on *Vegetation*	Mitigation Measures	Are residual significant adverse effects likely?
Site Preparation/Remedial Excavation and Backfilling	Project activities will involve the removal/disturbance of vegetation (including invasive species) within the Project footprint. This includes the disturbance of cultivated grasslands associated with land alteration activities occurring outside of pre-developed areas (e.g., gravel, asphalt, concrete). The potential for soil erosion increases if the soil has no or very little vegetative cover of plants. Plant cover protects the soil from raindrop impact and splash, tends to slow down the movement of runoff water, and allows excess surface water to infiltrate.	Remove vegetation using mechanical or hand clearing methods. Do not use biocides. Invasive plant species excavated during the vegetation removal activities shall be properly controlled following excavation and during off-Site transportation (i.e., placed on impermeable surfaces and covered securely with impermeable polyethylene sheeting) to reduce the potential for spreading and/or seed dispersal. Avoid transferring soil or plant material to other work sites; bag or securely contain invasive plants for transport and dispose off-Site in accordance with local municipal procedures; inspect all equipment, machinery, and vehicles for soil or plant materials and if necessary wash down before leaving the Site, minimize unnecessary soil disturbance; and re-vegetate disturbed areas as soon as possible with a native seed mix.	No

Table 9. Project Interaction with Vegetation

Project Component(s)	Description of Effects on *Vegetation*	Mitigation Measures	Are residual significant adverse effects likely?
		If Project activities have the potential to impact native plants and/or trees, DND OPI will consult with MARPAC FSE during Project design phase to determine salvage/replacement/restoration requirements. DND OPI is responsible for implementing salvage/replacement/ restoration requirements, including aftercare to ensure survival. Schedule Site restoration activities to occur as soon as work is complete to prevent erosion. If there is insufficient time remaining in the growing season for the seeds to germinate, stabilize the Site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and implement Site restoration activities as soon as the growing season permits. Project activities are not anticipated to impact nearby trees. Equipment on-Site will park in pre-disturbed, designated areas only to avoid direct and/or indirect impacts (i.e., impacts to tree roots, etc.). Restrict movement of vehicles, machinery, and foot traffic to a small number of defined dedicated pathways to minimize vegetation, grass, and landscape disturbance. Refer to mitigation measures outlined in Table 6, Project Interaction with Terrestrial Animals and Habitat.	
All Project Components	Heavy machinery and equipment used in land alteration activities may increase the risk of transporting noxious weeds and invasive species to the Site. Noxious weeds and invasive species may negatively impact biodiversity by out-competing and replacing native plants and plant SAR in the area, potentially causing species extirpation and even extinction.	Ensure machinery and materials arrive and depart the Site in a clean condition and are maintained free of invasive species and noxious weeds. Avoid transferring soil or plant material to other work sites; bag or securely contain invasive plants for transport and dispose off-Site in accordance with local municipal procedures; inspect all equipment, machinery, and vehicles for soil or plant materials and if necessary wash down before leaving the Site, minimize unnecessary soil disturbance; and re-vegetate disturbed areas as soon as possible with a native seed mix. Restore disturbed areas to function as they did in their pre-disturbance condition. Replant exposed soils with an approved seed mix during Site restoration activities to prevent the establishment of invasive species.	No

Table 9. Project Interaction with Vegetation

Project Component(s)	Description of Effects on *Vegetation*	Mitigation Measures	Are residual significant adverse effects likely?
All Project Components	Off-road operation or storage of equipment, machinery, and vehicles may crush vegetation and damage tree root systems. Heavy construction equipment can compact soil and dramatically reduce pore space. Compaction inhibits root growth, limits water penetration, and decreases oxygen needed for root survival.	Off-road operation of equipment is prohibited. All equipment will be operated and stored on pre-disturbed, non-vegetated areas such as the proposed laydown areas (Drawing 626268-702), within the Site itself and on area roads.	No

Table 10. Project Interaction with Cultural Resources

Project Component(s)	Description of Effects on *Cultural Resources*	Mitigation Measures	Are residual significant adverse effects likely?
Site Preparation/Remedial Excavation and Backfilling	Land alteration activities have the potential to uncover and disturb previously unidentified cultural features. Archaeological sites are protected by the HCA. They are non-renewable, very susceptible to disturbance, and are finite in number. Archaeological sites are an important resource that is protected for their historical, cultural, scientific, and educational value to the general public, local communities, and First Nations. Impacts to archaeological sites must be avoided or managed.	Prior to excavation activities, Site supervisors and excavation operators will attend an on-Site archaeological briefing. Develop and implement a chance finds procedure that will address the possibility of encountering archaeological materials during land alteration activities and to provide protocols to follow in the event of a chance archaeological find to ensure that archaeological sites are documented and protected, and that appropriate reporting and notification requirements are being followed, as required. Chance finds procedure to include the following: - Stop work immediately if potential archaeological materials are discovered during Project activities and immediately notify the DND OPI. The DND OPI is responsible for immediately reporting archaeological chance finds to MARPAC FSE. MARPAC FSE will advise if any internal and/or external notifications are required and if there are any specific restrictions/considerations required prior to moving forward with further archaeological assessment/investigation. - Do not disturb potential archaeological materials until a professional archaeological has been to the Site, assessed/investigated the materials, and developed a management plan that has been approved by DND OPI and MARPAC FSE. DND OPI is responsible for providing MARPAC FSE with a final copy of any archaeological reports and all associated GIS datasets. GIS datasets to be provided as ArcGIS file geodatabases and/or shapefiles.	No

Table 11. Project Interaction with Health and Safety

Project Component(s)	Description of Effects on *Health and Safety*	Mitigation Measures	Are residual significant adverse effects likely?
All Project Components	Potential hazards associated with Project activities may impact the health and safety of workers, visitors, and residents/personnel adjacent to the Site.	Develop and implement a Health and Safety Plan to minimize the potential for accidental injury or property damage during all stages of the Project. Ensure the plan outlines measures for protecting Site workers, visitors, and DND/CAF personnel working adjacent to the Site. Ensure the plan is monitored through Project implementation. Ensure all Project activities comply with the direction detailed in the Canada Occupational Health and Safety Regulations (DND/CAF personnel) and the BC Occupational Health and Safety Regulations (Contractor personnel) regarding Occupational Health and Safety (OHS). Immediately take measures to rectify unforeseen or peculiar safety related hazards that become evident during Project implementation. Verbally advise the DND OPI immediately and provide a written report of the hazard or condition as soon as practical. Conduct regular safety briefings and meetings with on-Site workers to encourage safe working procedures are followed. Investigate and report all incidents and accidents as required by: - DND General Safety Program (DND/CAF personnel). - Occupational Health and Safety Regulation, B.C. Reg. 195/2015, Workers Compensation Act (Contractor personnel). DND OPI is responsible for ensuring compliance with BSO 2-539: Occupational Health and Safety Liaison with Private Contractors. This includes: - ensuring that all hazards associated with the Project are identified and assessed and mitigation strategies are developed prior to work commencing. - ensuring that a communication plan is developed with the appropriate DND/CAF supervisors for hazards that have the potential to impact adjacent DND/CAF personnel. Refer to additional mitigation measures Table 3, Project interaction with Surface Water and Groundwater.	No

Table 11. Project Interaction with Health and Safety

Project Component(s)	Description of Effects on *Health and Safety*	Mitigation Measures	Are residual significant adverse effects likely?
Site Preparation/Remedial Excavation and Backfilling	Land alteration activities have the potential to impact overhead and underground utilities which could result in worker injury, release of deleterious substances, and disruptions to operations. Land alteration activities have the potential to uncover metals, hydrocarbons, PAHs, and other Contaminants of Concern. Exposure to these contaminants during sub-surface work may impact worker health. Use of heavy machinery and equipment and increased vehicle traffic associated with land alteration activities carries the potential for accident and injury to workers, visitors, and local residents.	Initiate a BC One Call and obtain an approved RP Ops U (P) Excavation Clearance Form prior to project commencement. Ensure all overhead lines to be removed from the Site are de-energized prior to removal. A Project specific Health and Safety Plan shall be developed and implemented to minimize the potential for accidental injury during remediation activities in accordance with existing and legislated safety requirements. The Health and Safety plan will be prepared and submitted for approval by DND. Implement mitigation measures identified in Table 3, Project Interaction with Surface Water and Groundwater.	No
All Project Components	Dust generated may present a risk to workers or other people in the area if contaminated soil is encountered. Inhaled dust particles could cause irritation of respiratory tracts or create an exposure pathway for potentially adsorbed contaminants.	Refer to mitigation measures outlined in Table 1, Project Interaction with Atmosphere.	No
All Project Components	High levels of noise from equipment and demolition activities at the Project Site have the potential to harm hearing of on-Site workers.	Refer to mitigation measures outlined in Table 5, Project Interaction with Ambient Noise.	No

2.5 Indigenous Community Engagement

The Nanoose TX site is under the custodianship of the Department of National Defence but located on traditional territory of the Snaw-naw-as (Nanoose). An assessment conducted by DND following *Aboriginal Consultation and Accommodation – Updated Guidelines for Federal Officials to Fulfill the Legal Duty to Consult* (March 2011; Annex E), indicated that the proposed Project will not have adverse impacts on potential or established Aboriginal or treaty rights within the Project area. As such, consultation with the Snaw-naw-as (Nanoose) is not required.

2.6 Public Participation

The Project involves repairs and maintenance to existing physical structures and will be conducted within DND-administered lands at the Nanoose TX Site. Public consultation and/or participation is not planned as:

- the footprint of the Project is limited to DND-administered properties;
- there is no indication of an existing or likely public interest in the Project;
- the Project does not have the potential to generate a conflict between environmental, social, or economic values of public concern;
- the Project is not likely to be perceived as having the potential for significant adverse environmental effects;
- there is no likely potential to learn from the community as it pertains to Project implementation; and
- there is no uncertainty about potential adverse environmental effects.

2.7 References and Expertise from Other Federal Government Bodies or Third-Party Groups

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iMapBC, 2020. BC Ministry of Forests, Lands and Natural Resource Operations (MFLNRO). iMapBC Public Mapping Application (iMap BC, 2020). Available: http://ilmbwww.gov.bc.ca/content/e-services/geobc/imapbc [Accessed March 2020].

Jaques Whitford Environment Ltd (Field Observations). Environmental Assessment Registration Form: TX Site Deconstruction Project, Nanoose Bay, BC, 2002

Montana Field Guide (MFG). Common Wood-nymph – *Cercyonis pegala*. Montana Natural Heritage Program. Available: fieldguide.mt.gov/speciesDetail.aspx?elcode=IILEPN7010.

PDQ Flyers. Noise Regulations. Available: http://www.pdqflyers.com/noise-regulations.php [Accessed March 2020].

SNC-Lavalin, 2019. Supplemental Site Investigation and Remedial Option Analysis - Nanoose Transmitter (TX), Nanoose Bay, BC. Prepared for Public Services and Procurement Canada.

Part 3. Environmental Effects Determination

On the basis of this DND DDEED Report, it has been determined that the impact of this Project on the environment is as follows:

☒ Project is not likely to cause significant adverse environmental effects. The Project **can** proceed with application of the mitigation measures specified in the interaction tables in this report.

☐ The Project is likely to cause significant adverse environmental effects that cannot be mitigated. The Project must not proceed and must be referred to Governor in Council through the appropriate chain of command before it can potentially proceed in its current state. Otherwise, changes to the Project scope (parameters and/or Site location) are recommended. This would require a new EDD be submitted through the Portal.

DND DDEED Report Prepared by:

28-Sep-2021
Vitaly Ostroumov, BSc, RPBio — Date (dd-mm-yyyy)
Environmental Assessment Professional, SNC-Lavalin Inc.

DND DDEED Report Reviewed by:

Name: Becky MacInnis, P.Chem., P.Ag.
Title: MARPAC ESS

MACINNIS, REBECCA 276
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Date: 2021.10.04 14:32:48 -07'00'

Signature — Date (dd-mm-yyyy)

DND DDEED Report Accepted and Approved by:

The undersigned accepts the determination and recommendations of this environmental effects determination report. The undersigned also accepts the responsibility to incorporate the recommendations of the report into the Project design and implementation.

Name: Rachel Speller, MES **Title:** Environment Officer – Base Safety and Environment

SPELLER, RACHEL 973
Digitally signed by SPELLER, RACHEL 973
Date: 2021.09.29 11:22:51 -07'00'

Signature — Date (dd-mm-yyyy)

Figures

LEGEND

★ Site Location

NOTES

1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.

SNC·LAVALIN

CLIENT NAME:	PROJECT LOCATION:
Public Works and Government Services Canada	Nanoose TX Nanoose Bay, BC

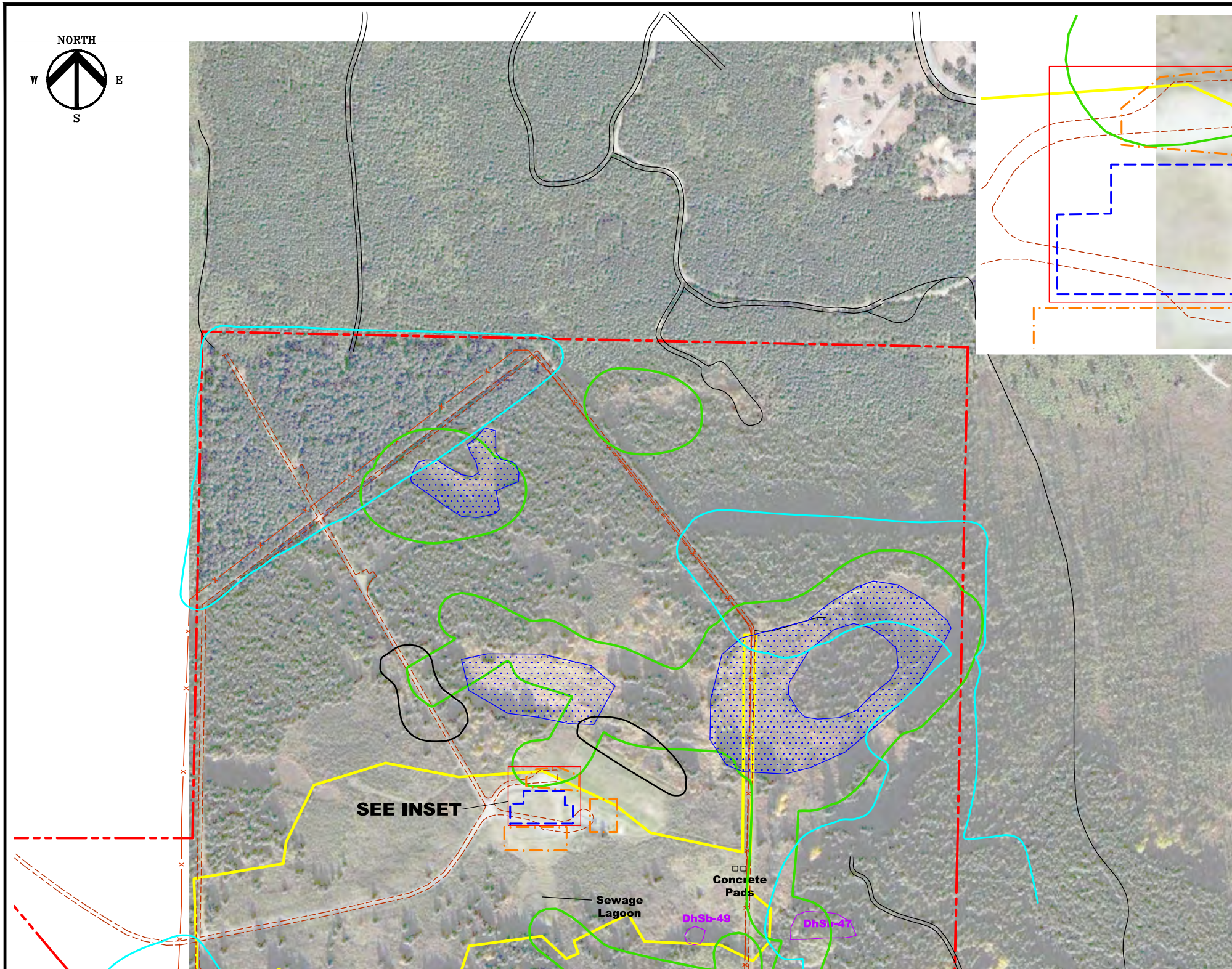
Site Location

0 0.5 1 2 3 4 Kilometers

BY: CW	DATE: 2020-03-26	REF No:	REV: 0
CHK'D: VO	SCALE: 1:60,000	626268-701	

Project Path: "P:\Current Projects\Public Works and Gov't Services Canada\626268-Nanaimo Transmitter"

MXD Path: P:\Current Projects\PWGSC\626268-Nanoose Transmitter\4.0 Execution\4.5 GIS and Drawings\GIS\MapSeries\626268-701.mxd


NORTH
W
E
S
SEE INSET
Concrete Pads
Sewage Lagoon
DhSb-49
DhSb-47

Annex A. DND Sensitive Areas Map

Canada

5459000 000000

Annex B. Site Photographs

Photograph 1: Access road to Site.

Photograph 2: Proposed excavation area, facing northwest.

Photograph 3: Proposed excavation area, facing north.

Photograph 4: Proposed excavation area, facing west.

Photograph 5: Proposed excavation area, facing northeast.

Photograph 6: PDQ Flyers building and recreation area.

Photograph 7: Adjacent lands to the northwest.

Photograph 8: Adjacent lands to the north.

Photograph 9: Adjacent lands to the south.

Photograph 10: Cleared field to the east.

Photograph 11: Adjacent lands to the west.

Photograph 12: Drainage ditch along access road.

Annex C. Search Results

BC Species and Ecosystem Explorer Search Results (Plants)

Scientific Name	English Name	BC List	SARA
Allium amplectens	slimleaf onion	Blue	N/A
Bartramia aprica	rigid apple moss	Red	1-E
Bidens amplissima	Vancouver Island beggarticks	Blue	1-SC
Carex tumulicola	foothill sedge	Yellow	1-E
Crumia latifolia	N/A	Blue	N/A
Dryopteris arguta	coastal wood fern	Blue	1-SC
Entosthodon fascicularis	banded cord-moss	Blue	1-SC
Epilobium densiflorum	dense spike-primrose	Red	1-E
Fissidens ventricosus	N/A	Blue	N/A
Funaria muhlenbergii	N/A	Blue	N/A
Githopsis specularioides	common bluecup	Blue	N/A
Hosackia pinnata	bog bird's-foot lotus	Red	1-E
Limnanthes macounii	Macoun's meadow-foam	Red	1-T
Meconella oregana	white meconella	Red	1-E
Microseris bigelovii	coast microseris	Red	1-E
Platyhypnidium riparioides	N/A	Blue	N/A
Racomitrium pacificum	N/A	Blue	N/A
Ranunculus alismifolius var. *alismifolius*	water-plantain buttercup	Red	1-E
Sericocarpus rigidus	white-top aster	Blue	1-SC
Sidalcea hendersonii	Henderson's checker-mallow	Blue	N/A
Syntrichia laevipila	twisted oak moss	Blue	1-SC
Trifolium dichotomum	Macrae's clover	Blue	N/A
Uropappus lindleyi	Lindley's microseris	Red	1-E
Utricularia ochroleuca	ochroleucous bladderwort	Blue	N/A
Viola howellii	Howell's violet	Red	N/A
Viola praemorsa var. *praemorsa*	yellow montane violet	Red	1-E
Zeltnera muehlenbergii	Muhlenberg's centaury	Red	1-E

Search Criteria
Plants
AND BC Conservation Status:Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern)
AND Forest Districts:South Island Forest District (DSI) (Restricted to Red, Blue, and Legally designated species)
AND MOE Regions:1- Vancouver Island (Restricted to Red, Blue, and Legally designated species)
AND Regional Districts: Nanaimo (RDN)
AND BGC Zone:
Sort Order:Scientific Name Ascending

BC Species and Ecosystem Explorer Search Results (Animal Species)

Scientific Name	English Name	BC List	SARA
Anaxyrus boreas	Western Toad	Yellow	1-SC
Aneides vagrans	Wandering Salamander	Blue	1-SC
Rana aurora	Northern Red-legged Frog	Blue	1-SC
Accipiter gentilis laingi	Northern Goshawk, *laingi* subspecies	Red	1-T
Ardea herodias fannini	Great Blue Heron, *fannini* subspecies	Blue	1-SC
Asio flammeus	Short-eared Owl	Blue	1-SC
Botaurus lentiginosus	American Bittern	Blue	N/A
Brachyramphus marmoratus	Marbled Murrelet	Blue	1-T
Chordeiles minor	Common Nighthawk	Yellow	1-T
Coccothraustes vespertinus	Evening Grosbeak	Yellow	1-SC
Branta bernicla	Brant	Blue	N/A
Butorides virescens	Green Heron	Blue	N/A
Contopus cooperi	Olive-sided Flycatcher	Blue	1-T
Cypseloides niger	Black Swift	Blue	1-E
Falco peregrinus	Peregrine Falcon	No Status	1-SC
Falco peregrinus pealei	Peregrine Falcon, *pealei* subspecies	Blue	1-SC
Glaucidium gnoma swarthi	Northern Pygmy-owl, *swarthi* subspecies	Blue	N/A
Hirundo rustica	Barn Swallow	Blue	1-T
Megascops kennicottii kennicottii	Western Screech-Owl, *kennicottii* subspecies	Blue	1-T
Patagioenas fasciata	Band-tailed Pigeon	Blue	1-SC
Phalacrocorax auritus	Double-crested Cormorant	Blue	N/A
Pooecetes gramineus affinis	Vesper Sparrow, *affinis* subspecies	Red	1-E
Progne subis	Purple Martin	Blue	N/A
Tyto alba	Barn Owl	Red	1-T
Uria aalge	Common Murre	Red	N/A
Allogona townsendiana	Oregon Forestsnail	Red	1-E
Carychium occidentale	Western Thorn	Blue	N/A
Galba bulimoides	Prairie Fossaria	Blue	N/A
Galba vancouverensis	Vancouver Fossaria	Red	N/A
Haliotis kamtschatkana	Northern Abalone	Red	1-E
Hemphillia dromedarius	Dromedary Jumping-slug	Red	1-T
Hemphillia glandulosa	Warty Jumping-slug	Red	1-SC
Nearctula sp. 1	Threaded Vertigo	Blue	1-SC
Physella virginea	Sunset Physa	Blue	N/A
Planorbula campestris	Meadow Rams-horn	Blue	N/A
Pristiloma johnsoni	Broadwhorl Tightcoil	Blue	N/A
Promenetus umbilicatellus	Umbilicate Sprite	Blue	N/A
Callophrys eryphon sheltonensis	Western Pine Elfin, *sheltonensis* subspecies	Blue	N/A

Callophrys mossii mossii	Moss' Elfin, *mossii* subspecies	Blue	N/A
Cercyonis pegala incana	Common Wood-nymph, *incana* subspecies	Red	N/A
Coenonympha tullia insulana	Common Ringlet, *insulana* subspecies	Red	N/A
Danaus plexippus	Monarch	Blue	1-SC
Erynnis propertius	Propertius Duskywing	Red	N/A
Erythemis collocata	Western Pondhawk	Blue	N/A
Euchloe ausonides insulanus	Large Marble, *insulanus* subspecies	Red	1-XX
Euphyes vestris	Dun Skipper	Red	1-T
Hesperia colorado oregonia	Western Branded Skipper, *oregonia* subspecies	Red	N/A
Ophiogomphus occidentis	Sinuous Snaketail	Blue	N/A
Parnassius clodius claudianus	Clodius Parnassian, *claudianus* subspecies	Blue	N/A
Plebejus icarioides blackmorei	Boisduval's Blue, *blackmorei* subspecies	Blue	N/A
Plebejus saepiolus insulanus	Greenish Blue, *insulanus* subspecies	Red	1-E
Speyeria zerene bremnerii	Zerene Fritillary, *bremnerii* subspecies	Red	N/A
Sympetrum vicinum	Autumn Meadowhawk	Blue	N/A
Corynorhinus townsendii	Townsend's Big-eared Bat	Blue	N/A
Eumetopias jubatus	Steller Sea Lion	Blue	1-SC
Myotis lucifugus	Little Brown Myotis	Yellow	1-E
Mustela erminea anguinae	Ermine, *anguinae* subspecies	Blue	N/A
Sorex navigator brooksi	Western Water Shrew, brooksi subspecies	Blue	N/A
Gasterosteus sp. 2	Enos Lake Limnetic Stickleback	Red	1-E
Gasterosteus sp. 3	Enos Lake Benthic Stickleback	Red	1-E
Oncorhynchus clarkii clarkii	Cutthroat Trout, *clarkii* subspecies	Blue	N/A
Chrysemys picta	Painted Turtle	No Status	1-E/SC
Chrysemys picta pop. 1	Painted Turtle - Pacific Coast Population	Red	1-E

Search Criteria
Animals
AND BC Conservation Status: Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern)
AND Forest Districts: South Island Forest District (DSI) (Restricted to Red, Blue, and Legally designated species)
AND MOE Regions:1- Vancouver Island (Restricted to Red, Blue, and Legally designated species)
AND Regional Districts: Nanaimo (RDN)
AND BGC Zone:
Sort Order: Scientific Name Ascending

BC Species and Ecosystems Explorer Search Results (Ecological Communities)

Scientific Name	English Name	BC List
Abies grandis / Berberis nervosa	grand fir / dull Oregon-grape	Red
Abies grandis / Tiarella trifoliata	grand fir / three-leaved foamflower	Red
Alnus rubra / *Carex obnupta* [*Populus trichocarpa*]	red alder / slough sedge [black cottonwood]	Red
Alnus rubra / Lysichiton americanus	red alder / skunk cabbage	Red
Alnus rubra / Rubus spectabilis / Equisetum arvense	red alder / salmonberry / common horsetail	Blue
Arbutus menziesii / Arctostaphylos columbiana	arbutus / hairy manzanita	Red
Artemisia campestris - Festuca rubra / Racomitrium canescens	northern wormwood - red fescue / grey rock-moss	Red
Bolboschoenus maritimus var. *paludosus* Alkali Marsh	seacoast bulrush Alkali Marsh	Red
Carex lasiocarpa - Rhynchospora alba	slender sedge - white beak-rush	Red
Carex lyngbyei Herbaceous Vegetation	Lyngbye's sedge herbaceous vegetation	Red
Carex macrocephala Herbaceous Vegetation	large-headed sedge Herbaceous Vegetation	Red
Deschampsia cespitosa ssp. beringensis - Symphyotrichum subspicatum	tufted hairgrass - Douglas' aster	Red
Distichlis spicata - Sarcocornia pacifica	seashore saltgrass - Pacific swampfire	Red
Dulichium arundinaceum Herbaceous Vegetation	three-way sedge	Red
Eleocharis palustris Herbaceous Vegetation	common spike-rush Herbaceous Vegetation	Blue
Festuca roemeri - Koeleria macrantha	Roemer's fescue - junegrass	Red
Juncus arcticus - Plantago macrocarpa	arctic rush - Alaska plantain	Red
Leymus mollis ssp. *mollis - Lathyrus japonicus*	dune wildrye - beach pea	Red
Menyanthes trifoliata - Carex lasiocarpa	buckbean - slender sedge	Blue
Myosurus minimus - Montia spp. - *Limnanthes macounii*	tiny mousetail - montias - Macoun's meadow-foam	Red
Myrica gale / Carex sitchensis	sweet gale / Sitka sedge	Red
Pinus contorta / Sphagnum spp. CDFmm	lodgepole pine / peat-mosses CDFmm	Red
Populus tremuloides / Malus fusca / Carex obnupta	trembling aspen / Pacific crab apple / slough sedge	Red
Populus trichocarpa - Alnus rubra / Rubus spectabilis	black cottonwood - red alder / salmonberry	Blue
Pseudotsuga menziesii - Arbutus menziesii	Douglas-fir - arbutus	Red
Pseudotsuga menziesii / Berberis nervosa	Douglas-fir / dull Oregon-grape	Red
Pseudotsuga menziesii / Melica subulata	Douglas-fir / Alaska oniongrass	Red
Quercus garryana - Arbutus menziesii	Garry oak - arbutus	Red
Quercus garryana / Bromus carinatus	Garry oak / California brome	Red

Quercus garryana / Holodiscus discolor	Garry oak / oceanspray	Red
Rhododendron groenlandicum / Kalmia microphylla / Sphagnum spp.	Labrador-tea / western bog-laurel / peat-mosses	Blue
Ruppia maritima Herbaceous Vegetation	beaked ditch-grass Herbaceous Vegetation	Red
Salix sitchensis - Salix lasiandra var. *lasiandra / Lysichiton americanus*	Sitka willow - Pacific willow / skunk cabbage	Red
Sarcocornia pacifica - Lysimachia maritima	American glasswort - sea-milkwort	Red
Schoenoplectus acutus Deep Marsh	hard-stemmed bulrush Deep Marsh	Blue
Selaginella wallacei / Cladina spp.	Wallace's selaginella / reindeer lichens	Blue
Thuja plicata / Achlys triphylla	western redcedar / vanilla-leaf	Red
Thuja plicata / Oemleria cerasiformis	western redcedar / Indian-plum	Red
Thuja plicata - Picea sitchensis / Lysichiton americanus	western redcedar - Sitka spruce / skunk cabbage	Blue
Thuja plicata / Polystichum munitum - Lysichiton americanus	western redcedar / sword fern - skunk cabbage	Blue
Thuja plicata - Pseudotsuga menziesii / Eurhynchium oreganum	western redcedar - Douglas-fir / Oregon beaked-moss	Red
Thuja plicata / Symphoricarpos albus	western redcedar / common snowberry	Red
Typha latifolia Marsh	common cattail Marsh	Blue

Search Criteria
Ecosystem Realm-Groups: Flood Group (F) OR Forest OR Grassland Group (G) OR Hydrogenic Group (H) OR Rock Group (R) OR Subalpine Shrub Group (S) OR Mineral Wetland Group OR Peatland Group OR Estuarine Realm OR Alpine Group (A) OR Beach Group (B)
AND BC Conservation Status: Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern)
AND Forest Districts: South Island Forest District (DSI) (Restricted to Red, Blue, and Legally designated species)
AND MOE Regions:1- Vancouver Island (Restricted to Red, Blue, and Legally designated species)
AND Regional Districts: Nanaimo (RDN)
AND BGC Zone:
Sort Order:Scientific Name Ascending

BC Species and Ecosystem Explorer Search Results (Federal Migratory Bird Convention Act)

Scientific Name	English Name	BC List	MBCA	SARA	Breeding Bird
Coccothraustes vespertinus	Evening Grosbeak	Yellow	Y	1-SC	Y
Chordeiles minor	Common Nighthawk	Yellow	Y	1-T	Y
Hirundo rustica	Barn Swallow	Blue	Y	1-T	Y
Contopus cooperi	Olive-sided Flycatcher	Blue	Y	1-T	Y
Butorides virescens	Green Heron	Blue	Y	N/A	Y
Patagioenas fasciata	Band-tailed Pigeon	Blue	Y	1-SC	Y
Branta bernicla	Brant	Blue	Y	N/A	N
Brachyramphus marmoratus	Marbled Murrelet	Blue	Y	1-T	Y
Botaurus lentiginosus	American Bittern	Blue	Y	N/A	Y
Progne subis	Purple Martin	Blue	Y	N/A	Y
Cypseloides niger	Black Swift	Blue	Y	1-E	Y
Uria aalge	Common Murre	Red	Y	N/A	Y

Search Criteria
Animals
AND Migratory Bird Conventions Act: True
AND Forest Districts: South Island Forest District (DSI) (Restricted to Red, Blue, and Legally designated species)
AND MOE Regions:1- Vancouver Island (Restricted to Red, Blue, and Legally designated species)
AND Regional Districts: Nanaimo (RDN)
AND BGC Zone:
Sort Order:Provincial Status Descending

Annex D. SSI and ROA Report

Supplemental Site Investigation and Remedial Options Analysis

Nanoose Transmitter (TX), Nanoose Bay, BC

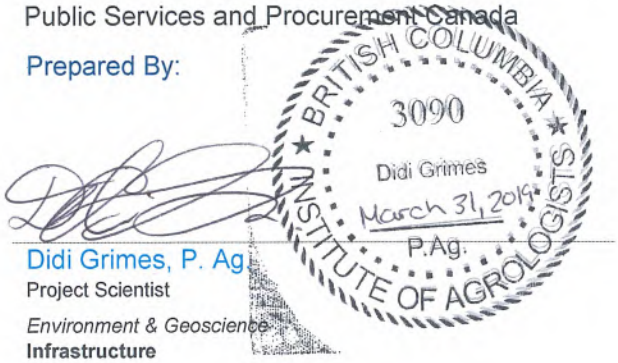
March 31, 2019

Internal Ref: 626268

Prepared for:

Public Services and Procurement Canada

Prepared By:



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SNC·LAVALIN

Executive Summary

At the request of Public Services and Procurement Canada (PSPC), SNC-Lavalin Inc. (SNC-Lavalin) has completed a Supplemental Site Investigation (SSI) and Remedial Options Analysis (ROA) of the Former Nanoose Transmitter, located in Nanoose Bay, British Columbia (the "Site"). This work as completed under Contract EZ897-170760/002/PWY and Task Authorization No. 700426061.

The purpose of the SSI was to delineate the previously identified polycyclic aromatic hydrocarbons (PAH) soil impacts to support the completion of an updated ROA. In addition, further investigation regarding the previously identified dissolved metals impacts to groundwater was completed.

During the delineation work, a debris unit within the footprint of the Former Transmitter Building (AEC 2) was encountered. Additional work was completed to delineate the debris and new PAH impacts identified in soil. The SSI consisted of the drilling of boreholes, installation of monitoring wells, the excavation of 25 test-pits, the collection of soil samples and the completion of groundwater monitoring and sampling. The collected soil and groundwater samples were submitted for select laboratory analysis of metals, polycyclic aromatic hydrocarbons (PAH), petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene and xylenes (BETX).

The Site is on federal land, under the custodianship of the Department of National Defence (DND), and thus soil and groundwater analytical data were compared to were compared to the applicable guidelines in the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG), Canada Wide Standards (CWS) for Petroleum Hydrocarbons in Soil, and Federal Groundwater Quality Guidelines (FGQG). Land use at the Site is commercial (CL) and is considered to be the primary criteria used to evaluate analytical results for soil and groundwater samples collected at the Site. However, as a portion or all of the potential future land use is considered residential land use (RL), the federal RL guidelines have been included for comparison purposes. In addition, the analytical results were compared to the applicable provincial standards as divestment of the property to a non-Federal jurisdiction may occur.

Based on the information presented in this report, the following key conclusions can be derived with respect to the investigation completed at the Site:

- Soil contamination (PAH) in AEC 1 has been vertically and laterally delineated.
- Soil (PHC F2 and F3, PAH) and groundwater (PAH) contamination was identified in the area of the Former Transmitter Building (AEC 2). Impacts are broadly vertically and laterally delineated in soil. Vertical delineation of groundwater impacts is required.
- A demolition debris unit consisting of concrete/brick/rebar was encountered in AEC 2 between 1.8 and 2.4 m below ground surface (bgs). The area of the identified debris unit is estimated to be 1,750 m^2.
- Dissolved metals impacts have been confirmed in groundwater and are potentially a result of a combination of poorly developed monitoring wells (due to low yield) and background concentrations.

Soil impacted with PHCs and/or PAH was identified in two areas of the Site. The total area of impacted soil is estimated to be 700 m^2 (AEC 1) and 4,700 m^2 (AEC 2). To remediate these impacts, three options have been presented:

- Option A: Remedial excavation of all impacted soil to federal CL guidelines (estimated cost of **$1,900,000**);
- Option B: Remedial excavation of soil to provincial standards (estimated cost of **$1,450,000**); and,
- Option C: Risk Assessment (estimated cost of **$109,000**).

The excavation of all impacted soil (Option A) would effectively reduce liability and meet regulatory compliance and would minimize impacts to surrounding ecological habitat. Option B (excavation to provincial standards) has high costs and could require additional measures and long term continuance of liability. Option C (risk assessment) has the lowest cost and has the highest potential to require additional measures and long term continuance of liability.

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1 Introduction

At the request of Public Services and Procurement Canada (PSPC), SNC-Lavalin Inc. (SNC-Lavalin) has completed a Supplemental Site Investigation (SSI) and Remedial Options Analysis (ROA) of the Former Nanoose Transmitter, located in Nanoose Bay, British Columbia (the "Site"). This work as completed under Contract EZ897-170760/002/PWY and Task Authorization No. 700426061. The location and layout of the Site is shown on Drawings 626268-301 and 626268-302, respectively.

1.1 Purpose

The purpose of the SSI was to delineate the previously identified polycyclic aromatic hydrocarbons (PAH) soil impacts to support the completion of an updated ROA. During the delineation work, concrete/brick/rebar demolition debris was identified. A drilling program to assess the soil and groundwater quality within, beneath and downgradient of the buried demolition debris was then completed followed by further test-pitting to delineate PAH impacts in soil. In addition, further investigation regarding the previously identified dissolved metals impacts in groundwater was completed.

1.2 Scope of Work

The SSI scope of work consisted of the following general tasks:

- Development of health and safety plan (HASP) and subcontractor documents;
- Identify utilities using BC One-Call services and a 3rd party locating contractor (Kelly's 1st Call Locating and Geoscan Subsurface Surveys Inc. [GeoScan]) at each proposed test-pit and drilling location to ensure that underground utilities were not damaged (or encountered);
- Completion of a test-pitting program during two site visits (January and March 2019) which included the advancement of 25 test-pits using a backhoe operated and provided by Knappett Industries (2006) Ltd.;
- The advancement of six boreholes and the installation of six groundwater monitoring wells to assess groundwater quality. The drilling activities were completed by Drillwell Enterprises Ltd. on February 6, 2019;
- Redevelopment of all monitoring wells at the Site in order to reduce the potential for fines present within the well sand pack;
- Monitoring well development of newly installed groundwater wells;
- Collection of groundwater samples during two rounds of sampling from all installed monitoring wells (February and March 2019);
- Submission of soil and groundwater samples to a Canadian Association for Laboratory Accreditation Inc. (CALA) certified laboratory (AGAT Laboratories) for selective analysis of potential contaminants of concern (PCOCs) and contaminants of concern (COC) including petroleum hydrocarbons (PHCs) F1 to F4, benzene, ethylbenzene, toluene, xylenes (BETX), volatile petroleum hydrocarbons (VPH), light extractable petroleum hydrocarbons (LEPH), heavy extractable petroleum hydrocarbons (HEPH), polycyclic aromatic hydrocarbons (PAH) and metals. Samples were shipped along with chain-of-custody documentation;

- Completion of a survey of the test-pit locations and the newly installed monitoring wells by J.E. Anderson and Associates;
- Evaluation of remedial options and indicative costs; and,
- Preparation of this factual report.

Each of the three phases of the investigation with the rational for the SSI and ROA were provided to PSPC in a detailed scope of work dated November 28, 2018[1], January 21, 2019[2], and February 13, 2019[3].

[1] SNC-Lavalin Inc. 2018 (SNC-Lavalin, 2018). *Proposed Delineation Work Plan and Remedial Options Analysis Update Nanoose Transmitter (TX), Nanoose Bay, BC, Project No: R.101515.001*. November 28, 2018.
[2] SNC-Lavalin Inc. 2019a (SNC-Lavalin, 2019a). *Proposed Debris Area Investigation Work Plan Nanoose Transmitter (TX), Nanoose Bay, BC, Project No: R.101515.001*. January 21, 2019.
[3] SNC-Lavalin Inc. 2019b (SNC-Lavalin, 2019b). *Proposed 2019 Delineation Work Plan – Revised Nanoose Transmitter (TX), Nanoose Bay, BC, Project No: R.101515.001*. February 13, 2019.

2 Background

2.1 Environmental Site Condition

The Site is located on top of a hill in a rural area of Nanoose Bay, BC, and consists of approximately 105 hectares. The topography of the Site is fairly flat with some sloping towards the south and east. The Site was historically used by the Department of National Defense (DND) for radio transmission defence purposes until 1998. The facilities at the Site were reported to be constructed circa 1963 and decommissioned/removed from the Site between 1995 and 2002. Facilities included an underground bunker (Former Transmitter Building), auxiliary buildings and structures, and several radio antennas. The Site is currently vacant of any permanent buildings or structures and is currently used by a model airplane club (PDQ Flyers).

In 2018, SNC-Lavalin completed a SSI and Remediation Options Analysis (ROA)[4]. The full Site history is presented in this report. Three Areas of Environmental Concern (AECs) were retained for the Site in the 2018 SSI and ROA. The three AECs and associated contaminants of concern (COCs), as well as the regulated analytical parameters of concern, identified in the 2018 SSI, are summarized in the table below.

Table A: Areas of Environmental Concern and Regulated Analytical Parameters

AEC ID	Description	COCs	Regulated Analytical Parameters	
			Soil	Groundwater
1	Former Electrical Substation	PAH	Naphthalene, Acenaphthene, Fluorene, Benzo(a)anthracene, Benzo(a)pyrene and IACR	-
2	Former Transmitter Building	PAH	IACR	-
3	Site Wide	Dissolved Metals	-	Aluminum, Iron, Manganese, Copper, Arsenic, Lithium and Nickel

AEC – area of environmental concern
IACR - Index of Additive Cancer Risk
COC – contaminant of concern

2.2 Potential Asbestos-Containing Materials

In the 2004 Phase I ESA[5] prepared by Keystone Environmental Ltd., it was reported that Jacques Whitford Environment Limited (JWEL) had identified the presence of asbestos-containing materials (ACM) within the bunker (i.e., the Former Transmitter Building) prior to its demolition in their Environmental Assessment Registration Form (EARF). A copy of this document has not been reviewed. JWEL was reported to have identified ACM consisting of pipe insulation, mechanical insulation, wall paneling and vinyl flooring within

[4] SNC-Lavalin Inc., 2018. DRAFT *Supplemental Site Investigation and Remedial Options Analysis, Nanoose Transmitter (TX), Nanoose Bay, BC.* March 9, 2018.
[5] Keystone Environmental Ltd., *Phase I Environmental Site Assessment, Nanoose TX, CFB Esquimalt, Nanoose, BC.* March 2004.

the bunker. All ACM's were to be removed prior to deconstruction; however, no records of this work have been received. Therefore, the potential for ACM within any rubble from the deconstructed bunker exists. The JWEL EARF was reported to indicate that the facility was to be decommissioned in four phases as follows:

1: Identification and removal of hazardous materials;
2: Deconstruction and disposal of the structure;
3: Demolition of the bunker foundation including full disposal at designated landfill and/or recycling site(s); and,
4: Restoration of the Site.

Confirmation of the removal of ACM prior to the bunker demolition has not been reviewed by SNC-Lavalin.

3 Regulatory Framework

Analytical results for soil and groundwater samples collected during the SSI were compared to applicable guidelines/standards provided in the following federal documents:

- *Canadian Environmental Quality Guidelines* (CEQG), Canadian Council of Ministers of the Environment (CCME), Winnipeg, MB, including updates to 2017.
- *Canada Wide Standards for Petroleum Hydrocarbons in Soil* (CWS), Canadian Council of Ministers of the Environment (CCME), Winnipeg, MB, January 2008.

Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites (FIGQG), Version 4, Ministry of Environment, Ottawa, ON, June 2016. For comparison purposes, the soil and groundwater analytical results were compared to the applicable standards provided in the following provincial documents as divestment of the property to a non-Federal jurisdiction may occur. As such, the data was also compared against standards within the following provincial regulations:

- *Contaminated Sites Regulation* (CSR), B.C. Reg. 375/96, including amendments up to B.C. Reg. 13/2019, January 24, 2019; and,
- *Hazardous Waste Regulation* (HWR), B.C. Reg. 63/88, including amendments up to B.C. Reg. 243/2016, November 1, 2017.

3.1 Soil Quality Standards and Guidelines

The Site is located on federal property and is operated under federal jurisdiction. The overall land use of the Site is considered to be commercial (CL) with CL guidelines being the primary criteria used to evaluate analytical results for soil and groundwater samples collected at the Site. However, as a portion or all of the potential future land use is considered residential land use (RL), the federal RL guidelines have been included for comparison purposes. Analytical results were also compared to the provincial CSR low density residential land use (RLLD) and CL standards, for comparison purposes. The federal guidelines include:

- CEQG RL and CL soil quality guidelines.
- 1997 Provisional Canadian Environmental Soil Quality guidelines (SQGE) for naphthalene.
- 1991 Interim Soil Quality Criteria for phenanthrene.
- CWS RL and CL soil quality guidelines.

The CCME CEQG guidelines were used to evaluate analytical results for specific parameters analyzed in soil samples collected from the Site. The CCME CWS were used to assess gross petroleum hydrocarbon concentrations in analyzed samples. As a conservative estimate, concentrations of hydrocarbon parameters for surface and subsurface soil have been compared to the most stringent of the coarse-grained and fine-grained CWS standards and CEQG guidelines.

Soil guidelines are protective of potable water, human soil ingestion, ecological soil contact, ecological soil and food ingestion, nutrient and energy cycling, and freshwater aquatic life. Groundwater was previously used as a drinking water source at the Site; however, there is no potable water service. There are 13 groundwater wells within 1 km of the Site, five of which are located within the Site boundaries. In addition, two small wetland areas are located within the Site boundaries. A small unnamed creek appears to flow

from the southernmost wetland to Nanoose Creek, located south of the Site[6] (SNC-Lavalin, 2012). As such, the Site specific exposure pathways for the protection of potable water and freshwater aquatic life were initially considered to be applicable to the Site.

Concentrations of PAH in soil samples were compared to the CEQG RL and CL guidelines and take into account the protection of both human and environmental health. The guidelines protective of carcinogenic effects and the non-carcinogenic effects on human health are calculated based on the CCME Fact Sheet "Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health", 2010 and are included in the summary analytical tables. The SQG for the protection of environmental health are used for comparison of concentrations of individual PAH.

Table 1 of the CCME PAH Fact Sheet "Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health", 2010 stipulates that the application of more conservative standards for naphthalene and phenanthrene on a site specific basis where potential impacts to surface waters are a concern. If impact to surface water is not a concern, it is recommended in the factsheet to revert to the 1997 provisional soil quality guidelines (SQGE) for naphthalene and the 1991 Interim Soil Quality Criteria for phenanthrene. These standards have been applied for comparison purposes for PAH in soil.

3.2 Groundwater Quality Standards and Guidelines

Based on local topography, groundwater is anticipated to flow in a southeast direction, towards Nanoose Bay. The nearest down-gradient surface water receiving bodies is a small wetland and an unnamed stream located approximately 500 m southwest of the investigation area (located within the Site boundaries). The unnamed stream reportedly drains into Nanoose Creek.

Although groundwater at the Site and in the surrounding area is not confirmed to be used as drinking water, drinking water (DW) standards were used as a conservative measure in the event that groundwater is developed in the future. Therefore, the Canadian Drinking Water Quality Guidelines (CDWQG) were considered applicable to groundwater at the Site. For the consideration of ecological receptors groundwater was compared to the FIGQG Tier 2 RL and CL, freshwater aquatic life (AW) guidelines. The FIGQG Tier 2 Water Use/Exposure Pathways of "Soil Organisms Direct Contact", and "Freshwater Life" were applied.

For comparison purposes, PCOCs in groundwater were also compared to the provincial CSR Freshwater AW and drinking water (DW) standards. Provincial drinking water standards were deemed applicable due to the application of Protocol 21[7], "Water Use Determination" and the protection of future drinking water resources.

[6] SNC-Lavalin Inc., *Phase I Environmental Site Assessment , Nanaimo Transmitter, Regional District of Nanaimo, BC*. 2012.
[7] BC Ministry of Environment and Climate Change Strategy, *Protocol 21*: *Water Use Determination,* Version 2.0, October 31, 2017 (effective November 1, 2017).

4 Investigation Methodology

The SSI activities were undertaken at the Site between December 2018 and March 2019. Photographs taken during the field activities are provided in Appendix I. Detailed descriptions of SNC-Lavalin's field methodologies are provided in Appendix II.

4.1 Test-Pitting and Soil Sampling

An authorized dig permit issued from DND personnel was obtained and all underground utilities were located at the Site using a private utility locator contractor (Kelly's 1st Call Locating on January 14 and GeoScan on March 11, 2019). The previous Phase 1 ESA (SNC-Lavalin, 2012) identified three registered archaeological Sites within the Site boundaries. The identified archaeological sites were determined to be outside of work area and as such, archaeological monitoring was not required during the SSI.

On January 14 and March 11, 2019, SNC-Lavalin directed the advancement of twenty-five test-pits (TP19-41 through TP19-56 in January 2019 and TP19-57 through TP19-66 in March 2019) by Knappett Industries (2006) Ltd., of Nanaimo, BC using a track mounted excavator. Test-pits were advanced to a depth of 2.4 m below ground surface (bgs) with the exception of TP19-50 and TP19-51 which were advanced to 1.8 m bgs due to refusal on concrete debris and rebar. Soil samples from the test-pits were collected directly from the excavator bucket.

Soil conditions in each test-pit were logged in detail with respect to soil type, colour, density, moisture content, and apparent contamination (i.e., odour, staining). Soil sample collection details are included in Appendix II. Detailed test-pit information such as soil stratigraphy, sample locations, field screening results are presented on the Test-Pit Logs, Appendix III.

Soil samples were placed directly into laboratory supplied duplicate sample jars with Teflon® lined lids following collection. Where volatiles were a PCOC, a second portion of each sample collected was placed in a sealable polyethylene bag and allowed to equilibrate with the headspace in the bag. The vapour contained in the headspace was measured for hydrocarbon vapour concentration using an RKI™ Eagle 2 Gas Sample Drawing Monitor. For samples that were to be analyzed for volatile hydrocarbons, approximately 5 g of soil was collected using a Terra Core™ and was placed into a laboratory supplied vial with 10 mL of methanol.

The field screening results were used, along with visual observations, to identify samples for potential laboratory analysis. The jarred soil samples were stored in an ice-chilled cooler and were shipped to AGAT Laboratories (AGAT) with completed chain-of-custody documentation. Soil samples were selectively analyzed for BETX, PHC F1 to F4, VPHs, LEPHs, HEPHs, PAH, and metals.

4.2 Drilling and Monitoring Well Installation

Prior to drilling, all underground utilities were located at the Site using a private utility locator contractor (Kelly's 1st Call Locating) on February 5, 2019. On February 6 and 7, 2019 six boreholes were advanced and completed as groundwater monitoring wells (MW19-07S, MW19-07D. MW19-08S, MW19-08D, MW19-09S, and MW19-09D). The boreholes were advanced using a vibratory sonic drill rig operated by Drillwell Enterprises Ltd of Duncan, BC. Soil conditions in each borehole were logged in detail with respect

to soil type, colour, density, moisture content, and apparent contamination (i.e., odour, staining). Soil sample collection details are included in Appendix II.

Monitoring wells were installed to allow measurement of headspace organic vapours, liquid phase hydrocarbon thickness (if present), depth to water, and to facilitate groundwater sample collection. Monitoring wells consisted of 5 cm diameter polyvinyl chloride (PVC) pipes, with slotted screens. The annulus of each borehole was filled with clean silica sand above the well screen and sealed from the surface with hydrated bentonite to prevent vertical migration of surface water from entering the well. Flush-mount steel covers were cemented over the wells to allow access for sample collection and monitoring. Detailed borehole information such as soil stratigraphy, sample locations, field screening results, and monitoring well completion details are presented on the Borehole Logs provided in Appendix III.

4.3 Groundwater Monitoring

Groundwater monitoring was completed on December 7, 2018, February 22 and 28 and March 1, 2019. For newly installed wells, subsurface conditions were allowed to stabilize at each well prior to monitoring and development. Depths to liquid levels were measured relative to ground surface. Details of groundwater monitoring are presented on monitoring reports contained in Appendix IV.

4.4 Well Development and Sampling

Newly installed wells were purged and developed using Waterra® tubing and supplies. Purging and development was carried out with Waterra® tubing until a minimum of three well volumes of water was removed (one well volume is equal to the volume of water in the PVC pipe plus the volume in the silica sand pack pore space) or the well went dry. If the well went dry, the water levels were allowed to recover to a minimum of 50 % of the initial level prior to being purged dry a minimum of three times. Redevelopment of all monitoring wells installed prior to 2019 was completed between December 2018 and February 2019 in order to reduce the potential for fines present within the well sand pack.

Dissolved metals samples were field filtered prior to sample collection. Each groundwater sample was collected directly into appropriate laboratory-prepared containers. Groundwater samples were stored in ice-chilled coolers and submitted for analysis to AGAT for select analysis of BETX, VHw_{6-10}, VPHw, LEPHw, PHC F1 and F2, PAH, and dissolved metals.

4.5 Surveying

Monitoring well and test-pit locations were surveyed by J.E. Anderson and Associates on February 8, 2019 to provide the position relative to a geodetic datum and Universal Transverse Mercator (UTM) co-ordinates. Survey of the location of the March 2019 test-pits was completed using hand held GPS. The survey results were incorporated onto test-pit and borehole logs presented in Appendix III.

4.6 Quality Assurance / Quality Control

QA/QC measures were undertaken to ensure unbiased and representative sample collection and assess the repeatability and accuracy of laboratory analyses. SNC-Lavalin's QA/QC measures included:

- Completion of field sampling tasks in accordance with in-house written preferred operating procedures (POPs);
- Variances between field procedures and POPs are noted;
- Collection and analyses of duplicate soil and groundwater samples at a rate of 10%;
- Receipt of analytical data from the laboratory in digital format for direct input into a database;
- Tabulation of the results directly from the database and checking with the printed final laboratory reports; and
- Laboratory analytical precision of the groundwater and/or soil vapours samples was measured internally using replicate samples, and surrogate samples were analyzed to measures percent recovery as part of AGAT's internal QA/QC program.

5 Results

The following presents the results of the SSI activities. Note that the attached tables show the analytical results for all site investigations completed by SNC-Lavalin to date.

5.1 Soil Stratigraphy

The general soil stratigraphy consisted of sand and gravel fill material underlain by dense silt and sand. At several locations within AEC 2 (i.e., within the footprint of the Former Transmitter Building), the fill material was underlain by concrete/brick/rebar demolition debris layer starting at between 1.8 and 2.4 m bgs. In general, the debris unit was observed to be approximately 1 m in thickness in the majority of investigation locations where it was encountered. Beneath the debris and fill, a dense silt and fine-grained sand material was encountered up to a depth of 6.1 m bgs (the maximum depth investigated).

No visual or olfactory evidence of contamination was encountered at any of the borehole or test-pit locations. Detailed soil descriptions from the drilling and test-pitting programs are provided on the logs in Appendix III.

5.2 Hydrogeology

Groundwater wells were monitored on December 7, 2018, February 22 and 28 and March 1, 2019. Location MW18-06D was dry during the December 2018 monitoring event. In February 2019, MW19-08S and MW19-09D did not recover following well development and therefore no samples were collected from these locations.

Over the course of the SSI, the measured depths to water in the background wells were generally 0.15 m bgs (MW18-6S) and 3.0 m bgs (MW18-6D). For the investigation locations, excluding MW15-1D, the depth to water ranged from 1.3 m to 4.0 m bgs. The depth to water in MW15-1D was 16.2 m bgs.

Non-aqueous phase liquids were not observed in any monitoring wells. Based on the potentiometric groundwater elevations in the monitoring wells, the inferred groundwater flow direction in this area of the Site is towards the southeast.

The monitoring report is provided in Appendix IV, and groundwater elevations from February 28 and March 1, 2019 are shown on Drawing 626268-307.

5.3 Soil Analytical Results

Selected soil samples during the drilling and test-pitting were analyzed for various PCOC parameters including BETX, PHC F1 to F4, VPH, LEPHs, HEPHs, PAH, and metals. Select samples were also analyzed for leachable PAH.

The soil analytical results are presented on Tables 2 through 7 and on Drawings 626268-303 and 626268-304. A copy of the analytical reports is provided in Appendix V.

The following table (Table B) summarizes the soil samples at each AEC with concentrations that exceed the CCME CL guidelines and/or CSR CL standards. Exceedances of the RL guidelines and standards are presented on the tables and drawings.

Table B: Summary of Identified Soil Contamination

Borehole/ Sample ID	Sample Depth (m)	Soil PCOCs > CCME CL	Soil PCOCs > CSR CL	Comments
TP19-43-01	0.3 - 0.6	IACR	-	Vertical delineation in same TP at 1.5 – 1.8 m
TP19-46-02	0.3 – 0.6	IACR	-	Vertical delineation in same TP at 1.5 – 1.8 m
TP19-49-01	0.3 – 0.6	IACR	-	Vertical delineation in same TP at 1.5 – 1.8 m
TP19-50-01	0.3 – 0.6	IACR	-	Vertical delineation in BH19-09 at 2.9 – 3.0 m
TP19-50-03	0.9 – 1.2	IACR	-	
TP19-50-04	1.5 – 1.8	ACE, FLR, PHE, ANT, B(a)A, B(b)F, B(a)P TPE, IACR	PHE, ANT, B(a)A, B(b)F	
TP19-51-01	0.3 – 0.6	IACR	-	Vertical delineation in BH19-09 at 2.9 – 3.0 m and TP19-65 at 2.1 – 2.4 m.
TP19-51-03	1.5 – 1.8	ACE, FLR, IACR	-	
TP19-52-01	0.3 – 0.6	IACR	-	Vertical delineation at BH19-07 at 2.9 – 3.0 m
TP19-52-04	1.5 – 1.8	FLR, IACR	-	
TP19-53-03	1.5 – 1.8	IACR	-	Lateral delineation at TP19-55 at 1.5 – 1.8 m
TP19-54-03	0.9 – 1.2	IACR	-	Vertical delineation in same TP at 0.3 – 0.6 m and 1.5 – 1.8 m
TP19-57-04	1.4 – 1.7	NAP, ACE, FLR, PHE, B(a)A, B(a)P TPE, IACR	NAP, PHE, B(a)A,	PAH exceedances vertically delineated in nearby BH19-07 at 2.9 – 3.0 m and BH19-09 at 2.9 – 3.0 m
TP19-57-05	2.1 – 2.4	ACE, FLR, IACR	-	Vertical delineation at BH19-07 at 2.9 – 3.0 m and BH19-09 at 2.9 – 3.0 m.
TP19-63-02	0.9 – 1.2	IACR	-	Vertical delineation in same TP at 2.1 – 2.4 m.
TP19-63-04	1.5 – 1.8	IACR	-	Vertical delineation in same TP at 2.1 – 2.4 m.
BH19-07-05 (duplicate	2.9 – 3.0	-	Iron	Vertical delineation at BH19-09 at 2.9 – 3.0 m.

Table B: Summary of Identified Soil Contamination

Borehole/ Sample ID	Sample Depth (m)	Soil PCOCs > CCME CL	Soil PCOCs > CSR CL	Comments
sample only)				
BH19-09-04	2.0 – 2.1	IACR	-	Vertical delineation at same BH at 2.9 – 3.0 m.

NAP	Naphthalene	B(b)F	Benzo(b) fluoranthene
B(a)A	Benz(a) anthracene	B(a)P TPE equivalents	Benzo(a)pyrene total potency
ACE	Acenaphthene	IACR	Index of Additive Cancer Risk
FLR	Fluorene		
PHE	Phenanthrene		
ANT	Anthracene		

5.4 Groundwater Analytical Results

Two groundwater monitoring and sampling events were completed as part of the SSI. The initial event was completed on February 22, 2019 with nine groundwater samples (MW15-1S, MW15-1D, MW15-2S, MW15-02D, MW15-3, MW15-4, MW15-5 MW18-6S and MW18-6D) and one blind field duplicate being collected. The second sampling event was completed on February 28 and March 1, 2019 with a total of 14 samples, plus one blind field duplicate, being collected from all monitoring well locations. A sheen and hydrocarbon-like odour were observed during the groundwater development and sampling program at monitoring well locations MW19-07S and MW19-07D. Two monitoring well locations (MW19-08S and MW19-09D) were noted to be dry and therefore could not be sampled.

Groundwater samples were selectively analyzed for BETX, VHw_{6-10}, VPHw, LEPHw, PHC F1 and F2, PAH, and dissolved metals. The analytical results are presented in Tables 8 through 12 and on Drawings 626268-305 and 626268-306. Analytical reports are provided in Appendix V.

The following table (Table C) summarizes the groundwater samples collected in 2019 with concentrations that exceed the CCME guidelines and/or CSR standards.

Table C: Summary of Groundwater Analytical Results

ID	Sample Date	PCOC > Federal Guidelines	PCOC > Provincial Standards
MW15-1S	February 22, 2018	Al, Fe, Mn, Cu	-
	March 1, 2019		
MW15-3	February 22, 2019	Mn, Cd	-
	February 28, 2019	-	-
MW15-5	February 22, 2018	Al, Mn, Cu	-
	March 1, 2019	Mn	-
MW18-6S*	February 22, 2019	Mn	-
	February 28, 2019	Mn	-
MW19-07S	February 28/ March 1, 2019	Al, Cr, Cu, Se, PAH Parameters (ACE, FLR, PHE, ANT, ACR, FLT, PYR, B(a)A, B(b+j)F, B(a)P, B(ghi)P)	Cr, PAH Parameters (1-MNAP, 2-MNAP, PHE, ANT, ACR, FLT, PYR, B(a)A, CHR, B(b)F, B(j)F, B(b+j)F, B(a)P, D(ah)A, QN)
MW19-07D	March 1, 2019	Mn, PAH Parameters (ANT, PYR, B(a)A, B(a)P)	B(a)P (in duplicate sample only)
MW19-08D	March 1, 2019	Mn	-
MW19-09S	February 28/ March 1, 2019	Mn, Zn, PAH Parameters (NAP, PHE, ANT, FLR, PYR, B(a)A,	Li, PAH Parameters (PYR, B(a)A, B(b+j)F, B(a)P)

* Background MW Location

Al	Dissolved aluminum
Fe	Dissolved iron
Mn	Dissolved manganese
Cu	Dissolved copper
Cd	Dissolved Cadmium
Cr	Dissolved chromium
Li	Dissolved lithium
Se	Dissolved selenium
Zn	Dissolved Zinc
PHC	Petroleum Hydrocarbon Fractions
1-MNAP	1-Methylnaphthalene
2-MNAP	2-Methylnaphthalene
NAP	Naphthalene
ACE	Acenaphthene
ACR	Acridine
FLT	Fluoranthene
PYR	Pyrene
B(a)A	Benz(a) anthracene
CHR	Chrysene
B(b)F	Benzo(b) fluoranthene
B(j)F	Benzo(j) fluoranthene
B(b+j)F	Benzo(b+j) fluoranthene
B(ghi)P	Benzo(g,h,i)perylene
B(a)P	Benzo(a)pyrene
D(ah)A	Dibenz(a,h) anthracene
QN	Quinoline
FLR	Fluorene
PHE	Phenanthrene
ANT	Anthracene

5.5 Quality Control / Quality Assurance

To assess the QA/QC for the blind filed duplicate sets, SNC-Lavalin calculated the practical quantitative limits (PQL: defined as 5 times the method detection limit) and, if appropriate, the relative percent difference (RPD: defined as the absolute value of difference between a sample set divided by the average of the two results). If sample concentrations are less than the PQL, RPDs are not considered meaningful and are not calculated. SNC-Lavalin's RPD targets are 60% for all soil parameters and 40% for all groundwater parameters analyzed. Calculated RPD values for the blind field duplicate samples are presented in the data tables.

5.5.1 Soil

For the samples submitted for analysis of PAH, eight blind field duplicates were analyzed resulting in a duplicate frequency of 12.7%, which exceeds SNC-Lavalin's target of 10%. For the eight samples submitted for analysis of metals, two blind field duplicate were submitted for analysis results in a duplicate frequency of 20%, exceeding SNC-Lavalin's target of 10%.

RPD values were calculated for those parameters that had measured concentrations greater than five times the method detection limit (MDL). Three soil duplicate pairs were identified with RPD values exceeding SNC-Lavalin's acceptable range of 60% and are summarized below:

- Duplicate pair TP19-46-01 and TP19-46-02 had a calculated RPD value for phenanthrene of 64% and marginally exceeded the target value.
- Duplicate pair TP19-50-01 and TP19-50-02 had a calculated RPD value for phenanthrene of 132% and for pyrene of 110%.
- Duplicate pair TP19-54-02 and TP19-54-03 had a calculated RPD value for phenanthrene of 146%.

SNC-Lavalin contacted AGAT on January 25, 2019 to review the PAH data for the three duplicate pairs and provide comment. A response from AGAT was received via e-mail on January 30, 2019 indicating that AGAT had reviewed the data and their internal QAQC results and that no data errors were identified. It was noted that based on visual inspection, the calculated RPD value is likely a result of sample heterogeneity. Based on review of the analytical data, which indicated the concentrations of PCOCs in the above samples were less than the applicable standards, the identified RPD issues do not affect the interpretation of the analytical results and as such, SNC-Lavalin considers the data to be representative.

For the remaining duplicate pairs the RPD values were less than SNC-Lavalin's target of 60%.

5.5.2 Groundwater

For the 23 groundwater samples submitted for dissolved metals analysis, two blind field duplicates were analysed resulting in a duplicate frequency of 8.6%, which is below SNC-Lavalin's target of 10%. For the four samples submitted for analysis of PAH, one blind field duplicate was submitted for analysis resulting in a duplicate frequency of 25%, exceeding SNC-Lavalin's target of 10%. All calculated RPD values for were less than 40%. As such, SNC-Lavalin considers the data to be representative.

6 Discussion

The following sections summarize the results of the SSI investigations, and present an overview of the current soil and groundwater conditions at the Site.

6.1 Soil Quality

6.1.1 PAH Delineation

The previous SSI completed by SNC-Lavalin in 2018 identified calculated IACR values greater than the CCME RL and CCME CL guidelines to a depth of 0.9 m bgs within the footprint of the Former Transmitter Building (AEC 2). The 2019 investigation completed in AEC 2 consisted of 25 test-pits advanced at varying step-out distances from the previously identified IACR impacts and the investigation of potential impacts at a greater depth. During the delineation investigation, a debris unit was encountered consisting of rebar, brick, concrete, and metal across much of the area of the former bunker (as shown on the Drawing 626268-309).

The debris unit was generally identified starting at a depth of 1.8 to 2.4 m bgs and was thick enough in some areas to inhibit further excavation (i.e., maximum identified thickness of 1.2 m). Delineation of the identified debris unit and the identified PHC and PAH impacts was generally achieved through the drilling and subsequent test-pitting programs in February and March 2019. Based on results to date, lateral delineation of the impacted zone between 0.3 m and 2.4 m bgs has been achieved in all directions. Vertical delineation was generally achieved during the drilling investigation at boreholes BH19-07D and BH19-09D at a depth of 2.9 – 3.0 m bgs.

The calculated values of IACR were greater than the applicable federal guidelines at one test-pit (TP19-63) which was completed to delineate IACR impacts to the south of AEC 2 (TP19-54). Given the slope of the Site towards the south and the inferred groundwater flow direction to the south, the building debris within the footprint of the Former Transmitter Building (AEC 2) is likely the primary source of contamination for the Site.

Based on the results of the investigations completed to date, the lateral extents of soil contamination (exceeding CCME CL guidelines) and the debris unit are as follows:

- AEC 1 – 700 m^2;
- AEC 2 – 4,700 m^2; and,
- Debris unit – 1,750 m^2.

Note, the debris unit overlaps with the area of AEC 2.

6.1.2 Metals

The concentration of iron marginally exceeded the CSR RLLD standard in a duplicate sample collected from borehole location BH19-07 within AEC 2. The Ministry of Environment & Climate Change Strategy (ENV) allows for the application of regional background concentrations below 1 m on Sites that do not have deep rooting plants or borrowing animals. Given the wild undeveloped status of much of the Site, these conditions cannot confidently be met. The measured concentration is much less than the background

concentration for iron (70,000 µg/g) for the region. It is likely that the concentration of iron is due to an anomaly or nugget effect and is not representative of widespread iron contamination in soil. As such, iron has not been retained as a COC for the Site.

6.2 Groundwater Quality

6.2.1 PAH Parameters

Groundwater samples were collected from the newly installed monitoring wells to assess hydrocarbon and PAH PCOCs within the identified debris unit in AEC 2. Concentrations of several PAH parameters were found to exceed both the federal guidelines and provincial standards in the shallow monitoring wells at two locations (MW19-07S and MW19-09S). Vertical delineation of the impacts was not achieved; however, the measured PAH concentrations in MW19-07D were considerably less than those measured in the shallow well in the same location. Lateral delineation was achieved to the southeast (i.e., downgradient direction) at monitoring well MW19-08D. The identified PAH impacts in groundwater were added to the COCs for AEC 2. Additional groundwater sampling is recommended to confirm results. The installation of additional monitoring wells would be required in an upgradient/cross gradient direction would be required if the remedial excavation of the contaminated soil is not completed.

6.2.2 Dissolved Metals

Previous investigation results at the Site identified unstable concentrations of dissolved metals in groundwater that were potentially attributed to silt influence and not necessarily an anthropogenic source. The wells installed at the Site are low yield (i.e., slow water level recovery) and generally go dry before the calculated purge volumes are able to be removed (i.e., three well volumes of water). As part of the 2018 and 2019 SSI, re-development of the existing wells was completed prior to two rounds of sampling for dissolved metals parameters.

In general, the measured concentrations of dissolved metals were lower following the re-development of all existing monitoring well locations. The most recent results from three of the previously impacted monitoring wells (MW15-2S, MW15-3 and MW15-4) had concentrations of dissolved metals less than the applicable federal guidelines and provincial standards.

The measured concentrations of dissolved metals in the background wells (MW18-06S and MW18-06D) identified concentrations of manganese (shallow well only) greater than the CCME RL guidelines. Given the concentrations of manganese across the Site in multiple locations, the presence of manganese is likely representative of enriched background concentrations. Newly installed monitoring wells (MW19-07S, MW19-07D, MW19-08D and MW19-09S) had concentrations of aluminium, manganese, chromium, copper, lithium selenium, and/or zinc greater than the applicable federal guidelines or provincial standards. Additional groundwater data is required to confirm seasonality and dissolved metals concentrations at the Site; however, based on review of the data collected to-date, it is considered likely that these impacts are not related to an anthropogenic source. The dissolved metals impacts remain a site-wide AEC based on the data to date.

6.3 Summary of Areas of Environmental Concern

Based on the findings of the 2019 SSI, three AECs have been retained for the Site. The AECs and their regulated analytical parameters of concern based on federal CL guidelines are summarized in the below table and are shown on Drawing 626268-308.

Table D: Areas of Environmental Concern and Regulated Analytical Parameters

AEC ID	Description	COCs	Regulated Analytical Parameters	
			Soil	Groundwater
1	Former Electrical Substation	PAH	PAH Parameters (ACE, FLR, and IACR)	-
2	Former Transmitter Building	PAH	PAH Parameters: (NAP, ACE, FLR, PHE, ANT, FLT, B(a)A, B(b)F, B(a)P, B(a)P TPE, IACR)	PAH Parameters: (1-MNAP, 2-MNAP, NAP, ACE, FLR, PHE, ANT, ACR, FLT, PYR, B(a)A, CHR, B(a)A, B(b)F, B(j)F, B(b+j)F, B(a)P, D(ah)A, B(ghi)P, QN)
3	Site Wide	Dissolved Metals	-	Aluminum, Iron, Manganese, Chromium, Copper, Lithium, Selenium, and Zinc

AEC	Area of Environmental Concern	B(a)A	Benz(a) anthracene
COC	Contaminant of Concern	CHR	Chrysene
		B(b)F	Benzo(b) fluoranthene
1-MNAP	1-Methylnaphthalene	B(j)F	Benzo(j) fluoranthene
2-MNAP	2-Methylnaphthalene		
NAP	Naphthalene	B(b+j)F	Benzo(b+j) fluoranthene
		B(ghi)P	Benzo(g,h,i)perylene
ACE	Acenaphthene	B(a)P	Benzo(a)pyrene
FLR	Fluorene		
PHE	Phenanthrene	D(ah)A	Dibenz(a,h) anthracene
ANT	Anthracene		
ACR	Acridine	QN	Quinoline
FLT	Fluoranthene	B(a)P TPE	Benzo(a)pyrene total potency equivalents
PYR	Pyrene	IACR	Index of Additive Cancer Risk

7 Remedial Options Analysis

The objective of remediation is the protection of human health and environment, and the reduction of environmental liability. To reduce the liability associated with the Site and to prepare for future divesture, remediation is considered to include the following:

- Excavation or risk assessment to address the identifies soil contamination;
- Potential removal of the debris unit; and,
- Additional groundwater sampling to confirm the background groundwater conditions.

The removal of the remaining site infrastructure and the decommissioning of the on-Site groundwater wells is no longer considered to be a requirement for property divestiture. Below provides a recommended scope of work and indicative cost estimates.

In order to estimate the total impacted volume of contaminated soil and debris, SNC-Lavalin had to make assumptions for impacted areas based on the analytical results, site observations and topography. A cost estimate was obtained from Knappett based on the below assumptions. The extent of assumed PAH and hydrocarbon contamination and debris is as follows and presented on Drawing 626268-308:

Table E: Estimate of Contaminated Soil and Debris

Area	Material Type	Area (m^2)	Estimated Depth (m)	Estimated Volume (m^3)
AEC 1	Soil > CCME RL/CL	600	0 - 1.5	900
	Soil > CSR RLLD	100	0 - 1.5	150
AEC 2	Soil > CCME RL/CL	2,800	0 - 2.0	5,600
	Soil > CSR RLLD	600	0 - 2.0	1,200
	Soil > CSR CL	1,300	0 - 2.0	2,600
-	Concrete Debris	1,750	2.0 – 3.0	1,750

AEC – area of environmental concern
> CCME RL/CL – measured concentrations are greater than the federal Canadian Council of Ministers of the Environment Residential and Commercial Land Use guidelines
> CSR RLLD - measured concentrations are greater than the provincial Contaminated Sites Regulation Residential Land Low Density standards
> CSR CL - measured concentrations are greater than the provincial Contaminated Sites Regulation Commercial Land Use standards

To remediate or risk manage the contaminants of concern, three remedial options have been selected to address the impacts to soil at the Site:

- Option A: Remedial Excavation of all impacted soil to numerical guidelines;
- Option B: Remedial Excavation of soil to Provincial Standards; and
- Option C: Risk Assessment.

7.1 Option A: Remedial Excavation of All Impacted Soil

Remedial excavation is a common approach and could be used to remove as much soil as practicable containing elevated concentrations of PAH for off-site disposal. Remediation of impacted soil would require the excavation, transport and disposal at a licensed and approved landfill facility (contaminated soil only). The proposed excavation would include Areas 1 through 6, as shown on Drawing 626268-309.

In addition to the contaminated soil, a debris unit consisting of concrete, rebar, brick, Styrofoam and/or metal is to be potentially removed from the Site during the remedial excavation program. The site photographs and borehole logs show an example of the concrete and mixed debris unit requiring removal and disposal that has been observed.

The remedial excavation option includes all activities required to prepare the Site for divesture including the groundwater well decommissioning as well as the implementation of the remedial excavation which includes the removal of concrete and mixed debris. The general assumptions for determining the liability costs for a remedial excavation approach at the Site are:

- Preparation of an Environmental Effects Determination report;
- Preparation of tender documents and submission review;
- For the purposes of provincial disposal:
  - Approximately 6,500 m^3 of soil is assumed to have concentrations of PAH greater than the CCME CEQG RL and CL guidelines but less than the CSR RLLD standards (“CSR RLLD – soil”);
  - Approximately 1,350 m^3 of soil is assumed to have concentrations of PAH greater than both the CCME CEQG RL guidelines and the CSR RLLD standards (“CSR RLLD + soil”); and
  - Approximately 2,600 m^3 of soil is assumed to have concentrations of PAH and hydrocarbons greater than the CCME CEQG RL guidelines, and the CSR RLLD and CL standards (“CSR CL+ soil”).
- The “CSR RLLD + soil” and “CSR CL + soil” will be transported to a licensed and approved facility for disposal. The “CSR RLLD – soil” would be transported to a fill site located on non-agricultural land.
- Approximately 1,750 m^3 of concrete debris will be transported to a licensed and approved facility for disposal. It is assumed that the debris unit is not considered include ACM.
- The cost for the removal and debris unit is approximately $100,000 and is included in the cost for the Remedial Excavation Oversight.
- If the debris was determined to be ACM, the additional cost for disposal would be in the order of $1,200,000.
- Contaminated soil is assumed to be located to a maximum depth of 3.0 m bgs throughout the Site.
- An estimated costs of $200,000 has been allocated for the treatment of water (surface and/or groundwater) within the excavations assuming discharge to ground following treatment.
- There is no cost difference for remediation to CCME RL or CL guidelines as the guideline for IACR is the same for both land uses.
- Total environmental oversight estimated at 30 days, 12 hours per day. Field work assumed to be completed by an Intermediate Environmental Technician (during all activities, including acting as Environmental Monitor for PSPC). This assumes that the pit location used by the remediation contractor is 30 minutes from the Site.

- Excavation will be backfilled with imported clean material. Compaction with the excavator tracks has been assumed sufficient.
- Affected road areas will be restored at surface with road base and the remainder of the excavation areas being finished with 0.1 m of topsoil and grass seed.
- Assessment of the post remediation groundwater quality will be required to confirm remediation of the elevated concentrations of PAH in groundwater.
- Decommissioning of the existing monitoring wells and the wells installed following the completion of the remedial excavation.

Costs to complete a remedial excavation approach at the Site based on the above assumptions have been estimated and are presented below.

Table F: Estimated Costs – Option A

Tasks	Environmental Oversight and Expenses	Analytical and Third Party Contractors	Subtotal
Project Management, Reporting and Meetings	$30,000	-	$30,000
Project Set Up, Design Review and Health and Safety	$10,000	-	$10,000
Tender Specifications and Support	$10,000	-	$10,000
Remedial Excavation Oversight	$100,000	$1,685,000	$1,785,000
Post Remediation Groundwater Assessment	$15,000	$25,000	$40,000
Monitoring Well Decommissioning and Site Closure	$10,000	$15,000	$25,000
TOTAL	**$175,000**	**$1,725,000**	**$1,900,000**

7.2 Option B: Remedial Excavation to Provincial Standards

Remedial excavation to provincial standards could be used to remove as much soil as practicable containing elevated concentrations of PAH for off-site disposal. The remedial excavation to provincial standards option includes all activities required to prepare the Site for divesture including the remedial excavation of contaminated soil exceeding provincial standards and the debris unit. Under this scenario, IACR would not be considered a contaminant of concern for the Site. The proposed areas of excavation would be Areas 1, 5 and 6 as shown on Drawing 626268-309.

The general assumptions for determining the liability costs for a remedial excavation approach at the Site are:

- Preparation of an Environmental Effects Determination report;
- Preparation of tender documents and submission review;

- For the purposes of provincial disposal:
  - Approximately 1,350 m^3 of soil is assumed to have concentrations of PAH greater than both the CCME CEQG RL guidelines and the CSR RLLD standards ("CSR RLLD + soil"); and
  - Approximately 2,600 m^3 of soil is assumed to have concentrations of PAH greater than the CCME CEQG RL guidelines, and the CSR RLLD and CL standards ("CSR CL+ soil").
- The "CSR RLLD + soil" and "CSR CL + soil" will be transported to a licensed and approved facility for disposal.
- Approximately 1,750 m^3 of concrete debris will be transported to a licensed and approved facility for disposal. It is assumed that the debris unit is not considered to include ACM.
- The cost for the removal and debris unit is approximately $100,000 and is included in the cost for the Remedial Excavation Oversight.
- If the debris was determined to be ACM, the additional cost for disposal would be in the order of $1,200,000.
- Contaminated soil is assumed to be located to a maximum depth of 3.0 m bgs throughout the Site.
- An estimated costs of $200,000 has been allocated for the treatment of water (surface and/or groundwater) within the excavations assuming discharge to ground following treatment.
- Total environmental oversight estimated at 15 days, 12 hours per day. Field work assumed to be completed by an Intermediate Environmental Technician (during all activities, including acting as Environmental Monitor for PSPC). This assumes that the pit location used by the remediation contractor is 30 minutes from the Site.
- Excavation will be backfilled with imported clean material. Compaction with the excavator tracks has been assumed sufficient.
- Affected road areas will be restored at surface with road base and the remainder of the excavation areas being finished with 0.1 m of topsoil and grass seed.
- Assessment of the post remediation groundwater quality will be required to confirm remediation of the elevated concentrations of PAH in groundwater and assessment of the soil vapour quality.
- Decommissioning of the existing monitoring wells and the wells installed following the completion of the remedial excavation.

Costs to complete a remedial excavation approach at the Site based on the above assumptions have been estimated and are presented below. Note that the costs for the removal of site infrastructure are included in the Remedial Excavation Oversight costs.

Table G: Estimated Costs – Option B

Tasks	Environmental Oversight and Expenses	Analytical and Third Party Contractors	Subtotal
Project Management, Reporting and Meetings	$30,000	-	$30,000
Project Set Up, Design Review and Health and Safety	$10,000	-	$10,000
Tender Specifications and Support	$10,000	-	$10,000
Remedial Excavation Oversight	$60,000	$1,260,000	$1,320,000
Post Remediation Groundwater and Vapour Assessment	$25,000	$30,000	$55,000
Monitoring Well Decommissioning and Site Closure	$10,000	$15,000	$25,000
TOTAL	**$145,000**	**$1,305,000**	**$1,450,000**

It should be noted that additional costs will be incurred if a submission to the ENV for a certificate of compliance for the Site is determined to be a requirement for Site divestiture.

7.3 Option C: Risk Assessment

A human health and ecological risk assessment (HHERA) could be completed to identify any potential risks to human and ecological receptors at the Site. Due to uncertainties with ultimate Site divestiture, the HHERA would be a combined report, conducted in accordance with both federal and provincial guidance for risk assessment. For the federal HHERA, the most current guidance provided by Health Canada (human health) as well as the CCME and Environment and Climate Change Canada (ECCC) Federal Contaminated Sites Action Plan (FCSAP) (ecological health) will be applied. To support the provincial HHERA, the BC CSR risk assessment guidance (which also relies on Health Canada guidance) will be applied.

Through the completion of an HHERA for the Site, the need for removal of impacted soil is not anticipated; however, there is potential that the risk assessment could require removal of soil hot spots, dependent on the acceptability of recommended risk management controls and/or the identification of the presence or potential future presence of sensitive receptors at the Site.

The objective of the HHERA would be to identify any potential risks to human and ecological receptors under current Site conditions. The HHERA would consist of four main sections:

- Problem Formulation;
- Exposure Assessment;
- Toxicity Assessment; and
- Risk Characterization.

In the Problem Formulation phase, a detailed evaluation of contaminants of potential concern (COPCs), human and ecological receptors of concern (ROCs), and potentially operable exposure pathways would be

identified and summarized in a Conceptual Site Model (CSM). The Exposure Assessment would quantify the frequency, magnitude and duration of exposure of ROCs to the identified COPCs. The Toxicity Assessment will evaluate the potential adverse effects that exposures to site COPCs could cause to the identified receptors. Through the Risk Characterization phase, the results of the Exposure and Toxicity Assessments are integrated and interpreted to produce risk estimates and place these in context with inherent uncertainties. The outcomes of the HHERA would enable the identification for potential risk controls that should be implemented at the Site to limit potential exposure to COPCs (if required).

A comprehensive HHERA report would be prepared documenting the input data, methods, results, and conclusions.

Prior to completion of the HHERA, further delineation (lateral and vertical) of the PAH contaminated groundwater within AEC 2 would be required.

Costs to complete a risk assessment approach at the Site based on the above assumptions have been estimated and are presented below.

Table H: Estimated Costs – Option C

Tasks	Environmental Oversight and Expenses	Analytical and Third Party Contractors	Subtotal
Project Management, Reporting and Meetings	$10,000	-	$10,000
Project Set Up, Design Review and Health and Safety	$4,000	-	$4,000
Groundwater Delineation Program	$20,000	$15,000	$35,000
Risk Assessment	$35,000	-	$35,000
Monitoring Well Decommissioning and Site Closure	$10,000	$15,000	$25,000
TOTAL	**$79,000**	**$30,000**	**$109,000**

7.4 Remedial Options Screening

Table I provides an estimated cost and ROA for each of the proposed remedial techniques. The table evaluates various parameters to assist in decision making, including:

- Technical Feasibility – the technical feasibility evaluates whether the type and distribution of contaminants and subsurface conditions are amenable to the method proposed.
- Timing – timing for the project is evaluated based on the likelihood of obtaining the remediation objectives within a 1 year (good), 2 – 3 years (satisfactory) or longer (poor) timeframe.
- Operations and Maintenance – the requirement for procuring and operating equipment to support the remedial approach (considers cost and timing implications).
- Likelihood of Success – an overall qualitative assessment of meeting the remediation objectives for the proposed method within a reasonable timeframe.

- Estimated Cost – consider both short-term and long-term relative costs for remediation and post-remediation work, and range from < $200,000 (low), $200,000 to $400,000 (moderate), and >$500,000 (high).
- Liability – consider future liability, including removal of liability (good), long-term liability with low impact (e.g. no anticipated future changes in land use or Site conditions) on human health or ecology (satisfactory), or long term liability with high impact (e.g. future land use change or change in conditions) to human health or ecology (poor).

Table I: Remedial Alternatives and Cost Analysis

Remedial Options	Option A: Excavation of All Impacted Soil	Option B: Excavation to Provincial Standards	Option C: Risk Assessment
Technical Feasibility	○	○	○
Timing	○	○	○
Operations and Maintenance	○	○	○
Likelihood of Success	○	◉[1]	◉[1]
Estimated Cost	H	H	L
Liability	○	◉[1]	◉[1]

1 If unacceptable risk levels are predicted, risk-management or long-term monitoring may be a requirement of site closure

Remedial Option Assessment		Costs	
○	Good	L	Low
◉	Satisfactory	M	Moderate
●	Poor	H	High

The excavation of all impacted soil (Option A) would effectively reduce liability and meet regulatory compliance and would minimize impacts to surrounding ecological habitat. Option B (excavation to provincial standards) has high costs and could require additional measures and long term continuance of liability. Option C (risk assessment) has the lowest cost and has the highest potential to require additional measures and long term continuance of liability.

8 Conclusions and Recommendations

Based on the information presented in this report, the following key conclusions can be derived with respect to the investigation completed at the Site:

- Soil contamination (PAH) in AEC 1 has been vertically and laterally delineated.
- Soil (PAH) and groundwater (PAH) contamination was identified in the area of the Former Transmitter Building (AEC 2). Impacts are broadly vertically and laterally delineated in soil. Vertical delineation of groundwater impacts is required.
- A demolition debris unit consisting of concrete/brick/rebar was encountered in AEC 2 at a depth of between 1.8 and 2.4 m bgs measuring approximately 1 m in thickness. The area of the identified debris unit is estimated to be 1,750 m^2.
- Dissolved metals impacts have been confirmed in groundwater and are potentially a result of a combination of poorly developed monitoring wells (due to low yield) and background concentrations.

Soil impacted with PAH was identified in two areas of the Site. The total area of impacted soil is estimated to be 700 m^2 (AEC 1) and 4,700 m^2 (AEC 2). To remediate these impacts, three options have been presented:

- Option A: Remedial excavation of all impacted soil to federal CL guidelines (estimated cost of **$1,900,000**);
- Option B: Remedial excavation of soil to provincial standards (estimated cost of **$1,450,000**); and
- Option C: Risk Assessment (estimated cost of **$104,000**).

The excavation of all impacted soil (Option A) would effectively reduce liability and meet regulatory compliance and would minimize impacts to surrounding ecological habitat. Option B (excavation to provincial standards) has high costs and could require additional measures and long term continuance of liability. Option C (risk assessment) has the lowest cost and has the highest potential to require additional measures and long term continuance of liability.

9 Bibliography

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10 Notice to Reader

This report has been prepared by SNC-Lavalin Inc. (SNC-Lavalin) for Canada, who has been party to the development of the scope of work for this project and understands its limitations. Copyright of this report vests with Her Majesty the Queen in Right of Canada. This report was prepared in accordance with a services contract between SNC-Lavalin and Canada, including General Conditions 2035 of the Standard Acquisition Clauses and Conditions (SACC) Manual.

This report is intended to provide information to Canada to assist it in making business decisions. SNC-Lavalin are not a party to the various considerations underlying the business decisions, and does not make recommendations regarding such business decisions.

The findings, conclusions and recommendations in this report have been developed in a manner consistent with the level of skill normally exercised by environmental professionals currently practising under similar conditions in the area. The findings contained in this report are based, in part, upon information provided by others. If any of the information is inaccurate, modifications to the findings, conclusions and recommendations may be necessary.

The findings, conclusions and recommendations presented by SNC-Lavalin in this report reflect and SNC-Lavalin's best judgement based on the site conditions at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. They have been prepared for specific application to this site and are based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific materials as described in this report during a specific time interval. Substances other than those described may exist within the site, reported substance parameters may exist in areas of the site not investigated, and concentrations of substances greater or less than those reported may exist between sample locations.

The findings and conclusions of this report are valid only as of the date of this report. If site conditions change, new information is discovered, or unexpected site conditions are encountered in future work, including excavations, borings, or other studies, the findings, conclusions and/or recommendations of this report should be re-evaluated. It is recommended that users of this report should engage a suitably qualified professional to assist in interpreting the significance, if any, of the findings.

Tables

TABLE 1: Surface Soil Sample Log

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Description	Coordinates		Depth (m)	Headspace (ppm)
				North (m)	East (m)		
SS15-1	SS15-1-1	2015 02 04	SAND and GRAVEL, fine to medium grained sand, fine gravel, subangular, trace silt, brown, loose, saturated, rootlets.	5458754.1	410721.1	0.1 - 0.2	0
SS15-2	SS15-2-1	2015 02 04	SAND and GRAVEL, fine to medium grained sand, fine gravel, subangular, trace silt, brown, loose, saturated, rootlets.	5458754.4	410732.7	0.0 - 0.2	0
SS15-3	SS15-3-1	2015 02 04	SAND and GRAVEL, fine to medium grained sand, fine gravel, subangular, trace silt, brown, loose, saturated, rootlets.	5458733.4	410726.6	0.0 - 0.2	0
SS15-4	SS15-4-1	2015 02 04	SILT, sandy, fine grained, black, dense, moist, organics.	5458730.9	410720.4	0.0 - 0.2	0
SS15-5	SS15-5-1	2015 02 05	SILT, sandy, fine grained, black, dense, moist, organics.	5458749.5	410735.6	0.0 - 0.2	0
	SS15-5-2	2015 02 05	SAND, fine grained, silty, trace gravel, fine, subangular, brown, medium dense to dense, wet.	5458749.5	410735.6	0.2 - 0.3	0
SS15-6	SS15-6-1	2015 02 05	SILT, sandy, fine grained, black, dense, moist, organics.	5458760.3	410728.0	0.0 - 0.2	5
	SS15-6-2	2015 02 05	SAND, fine grained, silty, trace gravel, fine, subangular, brown, medium dense to dense, wet.	5458760.3	410728.0	0.2 - 0.3	0
SS15-7	SS15-7-1	2015 02 05	SILT, sandy, fine grained, black, dense, moist, organics.	5458757.0	410713.5	0.0 - 0.2	0
	SS15-7-2	2015 02 05	SAND, fine grained, silty, trace gravel, fine, subangular, brown, medium dense to dense, wet.	5458757.0	410713.5	0.2 - 0.3	0

TABLE 2: Summary of Analytical Results for Soil - Hydrocarbons

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Depth Interval (m)	Field Screen[b] (ppm)	Monocyclic Aromatic Hydrocarbons					Gross Parameters			Petroleum Hydrocarbon Fractions				Methyl tert-butyl ether [MTBE]
					Benzene µg/g	Ethylbenzene µg/g	Toluene µg/g	Xylenes µg/g	Styrene µg/g	VPHs µg/g	LEPHs[e] µg/g	HEPHs[e] µg/g	F1-BTEX µg/g	F2 (>C10-C16) µg/g	F3 (>C16-C34) µg/g	F4 (>C34-C50) µg/g	µg/g
BH15-1D	BH15-1-1	2015 02 03	0.3 - 0.6	5	-	-	-	-	-	-	< 20	30	-	< 20	< 20	< 20	-
	BH15-1-17	2015 02 03	15.4 - 15.7	75	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-1-18	Duplicate	15.4 - 15.7	-	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	QA/QC RPD%				*	*	*	*	*	*	*	*	*	*	*	*	*
	BH15-1-3	2015 02 03	1.7 - 2.0	75	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-1-7	2015 02 03	4.7 - 5.0	100	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
BH15-2D	BH15-2-2	2015 02 04	1.1 - 1.2	25	< 0.02[a]	< 0.05[a]	< 0.05	< 0.2	< 0.05	-	< 20	< 20	-	< 20	< 20	< 20	< 0.1
	BH15-2-5	2015 02 04	3.0 - 3.4	75	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-2-7	2015 02 04	4.7 - 5.0	25	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
BH15-3	BH15-3-1	2015 02 04	0.2 - 0.5	25	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
	BH15-3-3	2015 02 04	1.7 - 2.0	50	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-3-6	2015 02 04	4.9 - 5.2	75	-	-	-	-	-	-	-	-	-	< 20	< 20	< 20	-
BH15-4	BH15-4-1	2015 02 04	0.2 - 0.5	75	-	-	-	-	-	-	102	204	-	57	223	47	-
	BH15-4-2	2015 02 04	1.2 - 1.5	75	-	-	-	-	-	-	< 20	61	-	< 20	41	< 20	-
	BH15-4-4	2015 02 04	3.5 - 3.8	50	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-4-5	Duplicate	3.5 - 3.8	-	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
	QA/QC RPD%				-	-	-	-	-	-	*	*	-	*	*	*	-
BH15-5	BH15-5-2	2015 02 05	1.2 - 1.5	100	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	27	< 10	< 20	< 20	< 20	< 0.1
	BH15-5-3	2015 02 05	1.8 - 2.1	75	-	-	-	-	-	-	< 20	35	-	< 20	< 20	< 20	-
	BH15-5-6	2015 02 05	3.2 - 3.5	25	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
BH15-6	BH15-6-1	2015 02 05	0.5 - 0.8	25	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
	BH15-6-2	2015 02 05	1.5 - 1.8	25	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
	BH15-6-4	2015 02 05	3.7 - 4.0	25	-	-	-	-	-	-	< 20	< 20	-	< 20	< 20	< 20	-
SS15-2	SS15-2-1	2015 02 04	0.0 - 0.2	0	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	< 20	< 10	< 20	< 20	< 20	< 0.1
SS15-4	SS15-4-1	2015 02 04	0.0 - 0.2	0	-	-	-	-	-	-	22	129	-	< 20	57	< 20	-
SS15-6	SS15-6-2	2015 02 05	0.2 - 0.3	0	-	-	-	-	-	-	< 20	24	-	< 20	< 20	< 20	-
SS15-7	SS15-7-1	2015 02 05	0.0 - 0.2	0	-	-	-	-	-	-	50	303	-	< 20	96	< 20	-
TP18-38	TP18-38-01	2018 01 23	0.2 - 0.5	0	< 0.005	< 0.01	< 0.05	< 0.05	-	-	-	-	< 10	28	59	77	-
	TP18-38-02	2018 01 23	0.8 - 0.9	0	< 0.005	< 0.01	< 0.05	< 0.05	-	-	-	-	< 10	< 20	30	< 20	-
BH19-09D	BH19-09-04	2019 02 07	2.0 - 2.1	300	< 0.005	< 0.01	< 0.05	< 0.05	< 0.05	< 10	< 20	23	< 10	< 20	26	< 20	< 0.1
TP19-57	TP19-57-04	2019 03 11	1.4 - 1.7	45	< 0.005	0.01	< 0.05	< 0.05	< 0.05	< 10	400	634	< 10	***197***	***808***	205	< 0.1
	TP19-57-05	2019 03 11	2.1 - 2.4	35	-	-	-	-	-	-	-	-	-	42	71	< 20	-
Federal Guideline																	
CCME CEQG Residential Surface (RL Surface)[c]					0.0068[f]	0.018	0.08	2.4	5	n/a	n/a	n/a	170	150	300	2,800	n/a
CCME CEQG Residential Subsoil (RL Subsoil)[c]					0.0068[f]	0.018	0.08	2.4	5	n/a	n/a	n/a	170	230	2,500	10,000	n/a
CCME CEQG Commercial Surface (CL Surface)[c]					0.0068[f]	0.018	0.08	2.4	50	n/a	n/a	n/a	170	230	1,700	3,300	n/a
CCME CEQG Commercial Subsoil (CL Subsoil)[c]					0.0068[f]	0.018	0.08	2.4	50	n/a	n/a	n/a	170	230	3,500	10,000	n/a
BC Standard																	
CSR Low Density Residential Land Use (RLLD)[d]					0.035	15	0.5	6.5	5	200	1,000	1,000	n/a	n/a	n/a	n/a	4,000
CSR Commercial (CL)[d]					0.035	15	0.5	6.5	50	200	2,000	5,000	n/a	n/a	n/a	n/a	20,000
CSR Industrial Land Use (IL)[d]					0.035	15	0.5	6.5	50	200	2,000	5,000	n/a	n/a	n/a	n/a	20,000

Associated AGAT file(s): 15V942889, 15V942897, 18V305465, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Laboratory detection limit exceeds regulatory standard/guideline.
[b] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[c] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[d] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[e] Where no LEPH and HEPH are available, EPH has been compared to LEPH and HEPH standards, which are conservative comparisons.
[f] Guidelines use 10-5 incremental risk.

TABLE 3: Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		BH15-1D					BH15-2D	BH15-3	BH15-4	BH15-5	SS15-2	SS15-6	TP16-1			TP16-2			TP16-3		Federal Guideline		BC Standard		
Sample ID		BH15-1-3	BH15-1-7	BH15-1-17	BH15-1-18	QA/QC	BH15-2-2	BH15-3-3	BH15-4-1	BH15-5-2	SS15-2-1	SS15-6-2	TP16-1-1	TP16-1-2	TP16-1-3	TP16-2-1	TP16-2-2	QA/QC	TP16-3-1	TP16-3-3	CCME CEQG Residential (RL)[b]	CCME CEQG Commercial (CL)[b]	CSR Low Density Residential Land Use (RLLD)[c]	CSR Commercial Land Use (CL)[c]	CSR Industrial Land Use (IL)[c]
Sample Date (yyyy mm dd)		2015 02 03	2015 02 03	2015 02 03	Duplicate	RPD %	2015 02 04	2015 02 04	2015 02 04	2015 02 05	2015 02 04	2015 02 05	2016 01 13	2016 01 13	2016 01 13	2016 01 13	Duplicate	RPD %	2016 01 13	2016 01 13					
Depth Interval (m)		1.7 - 2.0	4.7 - 5.0	15.4 - 15.7	15.4 - 15.7		1.1 - 1.2	1.7 - 2.0	0.2 - 0.5	1.2 - 1.5	0.0 - 0.2	0.2 - 0.3	0.2 - 0.5	0.8 - 1.1	1.4 - 1.5	0.2 - 0.5	0.2 - 0.5		0.2 - 0.5	1.5 - 1.8					
Field Screen (ppm)[a]		75	100	75	-		25	50	75	100	0	0	0	0	0	0	0		0	0					
Parameter	**Units**	**Analytical Results**																							
Polycyclic Aromatic Hydrocarbons																									
Naphthalene	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	***0.81***	< 0.01	< 0.01	< 0.01	0.221	0.486	< 0.005	0.359	0.124	97	0.393	< 0.005	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	-	-	-	-	-	-	-	-	-	-	-	0.246	0.523	< 0.005	0.299	0.122	84	0.386	< 0.005	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	0.7	< 0.01	< 0.01	< 0.01	0.208	0.495	< 0.005	0.308	0.114	92	0.358	< 0.005	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	0.28	< 0.01	< 0.01	< 0.01	0.116	0.246	< 0.005	0.126	0.057	75	0.170	< 0.005	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	***0.49***	< 0.02	< 0.02	< 0.02	0.19	***0.43***	< 0.02	0.21	0.09	*	***0.27***	< 0.02	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1.96	< 0.02	< 0.02	< 0.02	0.8	1.9	< 0.02	1.09	0.41	91	1.24	< 0.02	5[e]	50[e]	5	50	50
Anthracene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.63	< 0.02	< 0.02	< 0.02	0.248	0.542	< 0.004	0.247	0.126	65	0.346	< 0.004	2.5	32	2.5	30	30
Fluoranthene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	0.86	< 0.05	< 0.05	< 0.05	0.40	0.8	< 0.01	0.38	0.19	67	0.52	< 0.01	15.4	180	50	200	200
Pyrene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1.18	< 0.02	< 0.02	< 0.02	0.54	1.0	< 0.01	0.50	0.26	63	0.70	< 0.01	7.7	100	10	100	100
Benz(a)anthracene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.6	< 0.02	< 0.02	< 0.02	0.30	0.51	< 0.03	0.25	0.14	56	0.38	< 0.03	1	10	1	10	10
Chrysene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	0.61	< 0.05	< 0.05	< 0.05	0.30	0.52	< 0.05	0.26	0.14	*	0.40	< 0.05	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.24	< 0.02	< 0.02	< 0.02	0.11	0.18	< 0.05	0.10	0.05	*	0.13	< 0.05	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.17	< 0.02	< 0.02	< 0.02	0.08	0.13	< 0.05	0.06	< 0.05	*	0.10	< 0.05	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	-	-	-	-	-	-	-	-	-	-	-	0.19	0.31	< 0.05	0.16	0.05	*	0.23	< 0.05	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.16	< 0.02	< 0.02	< 0.02	0.07	0.12	< 0.05	0.05	< 0.05	*	0.10	< 0.05	1	10	1	10	10
Benzo(a)pyrene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	0.46	< 0.05	< 0.05	< 0.05	0.22	0.32	< 0.03	0.16	0.10	*	0.27	< 0.03	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.17	< 0.02	< 0.02	< 0.02	0.08	0.10	< 0.02	0.05	0.03	*	0.09	< 0.02	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.07	< 0.02	< 0.02	< 0.02	0.043	0.054	< 0.005	0.026	0.017	*	0.044	< 0.005	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	0.21	< 0.05	< 0.05	< 0.05	0.10	0.12	< 0.05	0.07	< 0.05	*	0.12	< 0.05	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	-	-	-	-	-	-	-	-	-	-	-	0.33	0.48	< 0.05	0.24	0.13	*	0.39	< 0.05	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	-	-	-	-	-	-	-	-	-	-	-	***3.5***	***5.6***	0.5	***2.7***	***1.2***	*	***4.3***	0.5	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		TP16-4	TP16-5	TP16-6	TP16-7	TP16-8	TP16-9	TP16-10	TP16-11			TP16-12	TP16-13	TP16-14		TP16-15	TP16-16	TP16-17	TP16-18	Federal Guideline		BC Standard		
Sample ID		TP16-4-1	TP16-5-1	TP16-6-1	TP16-7-1	TP16-8-1	TP16-9-1	TP16-10-1	TP16-11-01	TP16-11-02	QA/QC	TP16-12-01	TP16-13-01	TP16-14-01	TP16-14-02	TP16-15-01	TP16-16-02	TP16-17-01	TP16-18-01	CCME CEQG Residential (RL)[b]	CCME CEQG Commercial (CL)[b]	CSR Low Density Residential Land Use (RLLD)[c]	CSR Commercial Land Use (CL)[c]	CSR Industrial Land Use (IL)[c]
Sample Date (yyyy mm dd)		2016 01 13	2016 01 13	2016 01 13	2016 01 13	2016 01 13	2016 01 13	2016 01 13	2016 03 07	Duplicate	RPD %	2016 03 07	2016 03 07	2016 03 07	2016 03 07	2016 03 07	2016 03 07	2016 03 07	2016 03 07					
Depth Interval (m)		0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5		0.2 - 0.5	0.2 - 0.5	0.8 - 1.1	1.4 - 1.5	0.2 - 0.5	0.8 - 1.1	0.2 - 0.5	0.2 - 0.5					
Field Screen (ppm)[a]		0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0					
Parameter	**Units**	**Analytical Results**																						
Polycyclic Aromatic Hydrocarbons																								
Naphthalene	µg/g	0.128	0.112	***0.961***	0.043	< 0.005	0.048	< 0.005	0.022	0.036	*	0.005	0.295	0.317	0.480	0.005	< 0.005	< 0.005	0.036	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	0.162	0.140	1.03	0.066	< 0.005	0.066	0.005	0.041	0.048	16	0.010	0.357	0.379	0.518	0.010	< 0.005	< 0.005	0.051	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	0.122	0.118	0.951	0.048	< 0.005	0.048	< 0.005	0.028	0.039	33	0.007	0.310	0.349	0.482	0.017	< 0.005	< 0.005	0.041	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.005	< 0.005	0.012	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	0.006	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	0.084	0.074	***0.454***	0.039	< 0.005	0.039	< 0.005	0.021	0.024	*	0.005	0.179	0.182	0.271	< 0.005	< 0.005	< 0.005	0.025	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	0.13	0.11	***0.91***	0.05	< 0.02	0.06	< 0.02	0.03	0.03	*	< 0.02	***0.28***	***0.30***	***0.49***	< 0.02	< 0.02	< 0.02	0.03	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	0.68	0.58	4.47	0.31	< 0.02	0.32	0.02	0.18	0.20	11	0.05	1.5	1.1	2.3	< 0.02	< 0.02	< 0.02	0.21	5[e]	50[e]	5	50	50
Anthracene	µg/g	0.247	0.163	1.33	0.082	< 0.004	0.093	0.008	0.055	0.055	0	0.013	0.343	0.403	0.69	< 0.004	< 0.004	< 0.004	0.057	2.5	32	2.5	30	30
Fluoranthene	µg/g	0.32	0.26	1.95	0.15	< 0.01	0.15	0.01	0.09	0.10	11	0.02	0.57	0.65	0.9	0.01	< 0.01	< 0.01	0.10	15.4	180	50	200	200
Pyrene	µg/g	0.43	0.34	2.54	0.20	< 0.01	0.20	0.01	0.12	0.12	0	0.03	0.8	0.83	1.2	0.01	< 0.01	< 0.01	0.13	7.7	100	10	100	100
Benz(a)anthracene	µg/g	0.24	0.20	***1.44***	0.12	< 0.03	0.12	< 0.03	0.07	0.07	*	< 0.03	0.40	0.49	0.65	< 0.03	< 0.03	< 0.03	0.07	1	10	1	10	10
Chrysene	µg/g	0.26	0.20	1.48	0.12	< 0.05	0.12	< 0.05	0.07	0.07	*	< 0.05	0.42	0.48	0.6	< 0.05	< 0.05	< 0.05	0.07	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	0.10	0.08	0.47	0.06	< 0.05	0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.15	0.19	0.23	< 0.05	< 0.05	< 0.05	< 0.05	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	0.06	< 0.05	0.28	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.09	0.12	0.15	< 0.05	< 0.05	< 0.05	< 0.05	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	0.16	0.08	0.75	0.06	< 0.05	0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.24	0.31	0.38	< 0.05	< 0.05	< 0.05	< 0.05	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	0.06	0.05	0.28	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.09	0.12	0.16	< 0.05	< 0.05	< 0.05	< 0.05	1	10	1	10	10
Benzo(a)pyrene	µg/g	0.17	0.13	***0.99***	0.08	< 0.03	0.08	< 0.03	0.04	0.05	*	< 0.03	0.26	0.33	0.43	< 0.03	< 0.03	< 0.03	0.04	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	0.06	0.05	0.29	0.03	< 0.02	0.03	< 0.02	0.02	0.02	*	< 0.02	0.10	0.15	0.15	< 0.02	< 0.02	< 0.02	0.02	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	0.028	0.023	0.135	0.015	< 0.005	0.014	< 0.005	0.009	0.010	*	< 0.005	0.052	0.079	0.077	< 0.005	< 0.005	< 0.005	0.011	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	0.07	0.06	0.33	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.11	0.16	0.16	< 0.05	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	0.25	0.19	1.42	0.12	< 0.05	0.12	< 0.05	0.06	0.07	*	< 0.05	0.40	0.52	0.64	< 0.05	< 0.05	< 0.05	0.06	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	***2.8***	***2.1***	***14.9***	***1.4***	0.5	***1.3***	0.5	0.8	0.9	*	0.5	***4.4***	***5.7***	***7.2***	0.5	0.5	0.5	0.8	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		TP16-19	TP17-19		TP17-20	TP17-21			TP17-22	TP17-23		TP17-24	TP17-25	TP17-26	TP18-27	TP18-28	TP18-29	Federal Guideline		BC Standard		
Sample ID		TP16-19-01	TP17-19-01	TP17-19-02	TP17-20-01	TP17-21-01	TP17-21-02	QA/QC	TP17-21-04	TP17-22-01	TP17-23-01	TP17-23-04	TP17-24-01	TP17-25-01	TP17-26-01	TP18-27-01	TP18-28-01	TP18-29-01	CCME CEQG Residential (RL)[b]	CCME CEQG Commercial (CL)[b]	CSR Low Density Residential Land Use (RLLD)[c]	CSR Commercial Land Use (CL)[c]	CSR Industrial Land Use (IL)[c]
Sample Date (yyyy mm dd)		2016 03 07	2017 10 24	2017 10 24	2017 10 24	2017 10 24	Duplicate	RPD %	2017 10 24	2017 10 24	2017 10 24	2017 10 24	2017 10 24	2017 10 24	2017 10 24	2018 01 23	2018 01 23	2018 01 23					
Depth Interval (m)		0.2 - 0.5	0.8 - 1.1	1.5 - 1.8	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5		1.4 - 1.7	0.2 - 0.5	0.2 - 0.5	1.4 - 1.7	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5					
Field Screen (ppm)[a]		0	0	0	0	0	0		0	0	0	0	0	0	0	-	-	-					
Parameter	**Units**	**Analytical Results**																					
Polycyclic Aromatic Hydrocarbons																							
Naphthalene	µg/g	< 0.005	0.021	0.080	0.029	0.104	0.023	*	0.015	0.055	0.041	0.106	0.241	< 0.005	< 0.005	0.052	0.005	< 0.005	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	< 0.005	0.030	0.095	0.042	0.119	0.033	113	0.024	0.059	0.061	0.119	0.170	< 0.005	< 0.005	0.060	0.010	< 0.005	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	< 0.005	0.022	0.089	0.036	0.103	0.023	*	0.018	0.048	0.045	0.118	0.183	< 0.005	< 0.005	0.048	0.006	< 0.005	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	< 0.005	0.016	0.042	0.023	0.057	0.016	*	0.012	0.030	0.034	0.053	0.074	< 0.005	< 0.005	0.031	0.006	< 0.005	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	< 0.02	0.02	0.07	0.03	0.08	0.02	*	< 0.02	0.05	0.05	0.08	0.12	< 0.02	< 0.02	0.04	< 0.02	< 0.02	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	< 0.02	0.14	0.36	0.18	0.43	0.14	102	0.10	0.25	0.28	0.38	0.58	< 0.02	< 0.02	0.24	0.05	< 0.02	5[e]	50[e]	5	50	50
Anthracene	µg/g	< 0.004	0.041	0.104	0.051	0.129	0.049	90	0.028	0.076	0.082	0.112	0.165	< 0.004	< 0.004	0.074	0.018	< 0.004	2.5	32	2.5	30	30
Fluoranthene	µg/g	< 0.01	0.06	0.14	0.07	0.18	0.07	88	0.04	0.12	0.13	0.15	0.24	< 0.01	< 0.01	0.12	0.03	< 0.01	15.4	180	50	200	200
Pyrene	µg/g	< 0.01	0.08	0.17	0.09	0.24	0.09	91	0.05	0.15	0.17	0.18	0.32	< 0.01	< 0.01	0.16	0.04	< 0.01	7.7	100	10	100	100
Benz(a)anthracene	µg/g	< 0.03	0.05	0.10	0.06	0.14	0.05	*	0.03	0.09	0.11	0.11	0.20	< 0.03	< 0.03	0.09	< 0.03	< 0.03	1	10	1	10	10
Chrysene	µg/g	< 0.05	0.05	0.09	0.05	0.13	0.05	*	< 0.05	0.08	0.10	0.10	0.18	< 0.05	< 0.05	0.08	< 0.05	< 0.05	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	< 0.05	0.04	< 0.02	< 0.02	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	< 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	0.03	< 0.02	< 0.02	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	< 0.05	0.07	< 0.05	< 0.05	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	< 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	0.02	< 0.02	< 0.02	1	10	1	10	10
Benzo(a)pyrene	µg/g	< 0.03	0.03	0.06	0.04	0.10	0.04	*	< 0.03	0.06	0.07	0.07	0.13	< 0.03	< 0.03	0.07	< 0.03	< 0.03	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	< 0.02	< 0.02	0.02	< 0.02	0.04	< 0.02	*	< 0.02	0.02	0.03	0.02	0.05	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	< 0.005	0.007	0.011	0.006	0.021	0.007	*	< 0.005	0.013	0.014	0.010	0.028	< 0.005	< 0.005	0.006	< 0.005	< 0.005	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.05	< 0.05	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	< 0.05	0.05	0.09	0.06	0.15	0.06	*	< 0.05	0.09	0.10	0.10	0.19	< 0.05	< 0.05	0.09	< 0.05	< 0.05	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	0.5	0.7	1.0	0.8	***1.5***	0.7	*	0.6	1.0	***1.1***	1.0	***2.0***	< 0.6	< 0.6	***1.1***	< 0.6	< 0.6	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		TP18-30			TP18-31	TP18-35	TP18-36	TP18-37	TP18-38		TP18-39	TP18-40	TP19-41	TP19-42				TP19-43		Federal Guideline		BC Standard		
Sample ID		TP18-30-01	TP18-30-02	QA/QC	TP18-31-01	TP18-35-01	TP18-36-01	TP18-37-01	TP18-38-01	TP18-38-02	TP18-39-01	TP18-40-01	TP19-41-01	TP19-42-01	TP19-42-02	QA/QC	TP19-42-03	TP19-43-01	TP19-43-03	CCME CEQG Residential (RL)[b]	CCME CEQG Commercial (CL)[b]	CSR Low Density Residential Land Use (RLLD)[c]	CSR Commercial Land Use (CL)[c]	CSR Industrial Land Use (IL)[c]
Sample Date (yyyy mm dd)		2018 01 23	Duplicate	RPD %	2018 01 23	2018 01 23	2018 01 23	2018 01 23	2018 01 23	2018 01 23	2018 01 23	2018 01 23	2019 01 14	2019 01 14	Duplicate	RPD %	2019 01 14	2019 01 14	2019 01 14					
Depth Interval (m)		0.2 - 0.5	0.2 - 0.5		0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.2 - 0.5	0.8 - 0.9	0.2 - 0.5	0.2 - 0.5	0.3 - 0.6	0.3 - 0.6	0.3 - 0.6		0.9 - 1.2	0.3 - 0.6	1.5 - 1.8					
Field Screen (ppm)[a]		-	-		-	-	-	0	0	0	0	0	-	-	-		-	-	-					
Parameter	**Units**	**Analytical Results**																						
Polycyclic Aromatic Hydrocarbons																								
Naphthalene	µg/g	< 0.005	< 0.005	*	0.032	0.066	0.199	0.255	0.170	0.086	0.006	0.033	< 0.01	< 0.01	< 0.01	*	< 0.01	0.11	< 0.01	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	< 0.005	< 0.005	*	0.047	0.072	0.228	0.312	0.242	0.122	0.009	0.054	-	-	-	-	-	-	-	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	< 0.005	< 0.005	*	0.038	0.064	0.211	0.292	0.210	0.113	0.007	0.041	< 0.01	< 0.01	< 0.01	*	< 0.01	0.12	< 0.01	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	< 0.005	< 0.005	*	0.025	0.035	0.113	0.150	0.143	0.077	< 0.005	0.033	< 0.01	< 0.01	< 0.01	*	< 0.01	0.08	< 0.01	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	< 0.02	< 0.02	*	0.03	0.06	0.17	0.24	0.22	0.13	< 0.02	0.05	< 0.02	< 0.02	< 0.02	*	< 0.02	0.12	< 0.02	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	< 0.02	< 0.02	*	0.19	0.28	0.72	0.93	1.4	0.60	0.04	0.29	< 0.02	< 0.02	< 0.02	*	< 0.02	0.61	< 0.02	5[e]	50[e]	5	50	50
Anthracene	µg/g	< 0.004	< 0.004	*	0.062	0.092	0.217	0.295	0.314	0.193	0.013	0.082	< 0.02	< 0.02	< 0.02	*	< 0.02	0.14	< 0.02	2.5	32	2.5	30	30
Fluoranthene	µg/g	< 0.01	< 0.01	*	0.08	0.13	0.34	0.43	0.52	0.29	0.01	0.15	< 0.05	< 0.05	< 0.05	*	< 0.05	0.25	< 0.05	15.4	180	50	200	200
Pyrene	µg/g	< 0.01	< 0.01	*	0.11	0.17	0.43	0.55	0.67	0.38	0.02	0.19	< 0.02	< 0.02	< 0.02	*	< 0.02	0.32	< 0.02	7.7	100	10	100	100
Benz(a)anthracene	µg/g	< 0.03	< 0.03	*	0.05	0.09	0.25	0.30	0.39	0.21	< 0.03	0.11	< 0.02	< 0.02	< 0.02	*	< 0.02	0.18	< 0.02	1	10	1	10	10
Chrysene	µg/g	< 0.05	< 0.05	*	0.05	0.09	0.23	0.29	0.38	0.20	< 0.05	0.11	< 0.05	< 0.05	< 0.05	*	< 0.05	0.18	< 0.05	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	< 0.02	< 0.02	*	0.02	0.03	0.09	0.11	0.20	0.10	< 0.02	0.05	< 0.02	< 0.02	< 0.02	*	< 0.02	0.07	< 0.02	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	< 0.02	< 0.02	*	< 0.02	0.02	0.05	0.06	0.12	0.07	< 0.02	0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	0.04	< 0.02	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	< 0.05	< 0.05	*	< 0.05	0.05	0.14	0.17	0.32	0.17	< 0.05	0.07	-	-	-	-	-	-	-	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	< 0.02	< 0.02	*	< 0.02	0.02	0.05	0.06	0.11	0.06	< 0.02	0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	0.04	< 0.02	1	10	1	10	10
Benzo(a)pyrene	µg/g	< 0.03	< 0.03	*	0.04	0.06	0.18	0.21	0.29	0.16	< 0.03	0.08	< 0.05	< 0.05	< 0.05	*	< 0.05	0.14	< 0.05	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	< 0.02	< 0.02	*	< 0.02	0.02	0.07	0.09	0.05	0.02	< 0.02	0.03	< 0.02	< 0.02	< 0.02	*	< 0.02	0.05	< 0.02	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	< 0.005	< 0.005	*	< 0.005	0.013	0.039	0.049	0.028	0.016	< 0.005	0.019	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	< 0.05	< 0.05	*	< 0.05	< 0.05	0.08	0.10	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	0.05	< 0.05	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	-	-	-	-	-	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	< 0.05	< 0.05	*	0.05	0.09	0.27	0.32	0.40	0.22	< 0.05	0.12	< 0.05	< 0.05	< 0.05	*	< 0.05	0.19	< 0.05	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	< 0.6	< 0.6	*	< 0.6	0.9	***2.7***	***3.3***	***4.9***	***2.6***	< 0.6	***1.2***	< 0.6	< 0.6	< 0.6	*	< 0.6	***2.0***	< 0.6	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
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n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		TP19-44		TP19-45	TP19-46			TP19-46	TP19-47		TP19-48		TP19-49			TP19-50					Federal Guideline		BC Standard		
Sample ID		TP19-44-01	TP19-44-02	TP19-45-01	TP19-46-01	TP19-46-02	QA/QC	TP19-46-04	TP19-47-01	TP19-47-03	TP19-48-01	TP19-48-04	TP19-49-01	TP19-49-03	TP19-49-04	TP19-50-01	TP19-50-02	QA/QC	TP19-50-03	TP19-50-04	CCME CEQG Residential (RL)[b]	CCME CEQG Commercial (CL)[b]	CSR Low Density Residential Land Use (RLLD)[c]	CSR Commercial Land Use (CL)[c]	CSR Industrial Land Use (IL)[c]
Sample Date (yyyy mm dd)		2019 01 14	2019 01 14	2019 01 14	2019 01 14	Duplicate	RPD %	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	Duplicate	RPD %	2019 01 14	2019 01 14					
Depth Interval (m)		0.3 - 0.6	0.9 - 1.2	0.3 - 0.6	0.3 - 0.6	0.3 - 0.6		1.5 - 1.8	0.3 - 0.6	1.5 - 1.8	0.3 - 0.6	1.5 - 1.8	0.3 - 0.6	1.5 - 1.8	2.1 - 2.4	0.3 - 0.6	0.3 - 0.6		0.9 - 1.2	1.5 - 1.8					
Field Screen (ppm)[a]		-	-	-	-	-		-	-	-	-	-	-	-	-	-	-		-	-					
Parameter	**Units**	**Analytical Results**																							
Polycyclic Aromatic Hydrocarbons																									
Naphthalene	µg/g	< 0.01	< 0.01	< 0.01	0.02	0.10	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.10	0.03	< 0.01	0.10	0.01	*	0.10	***4***	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	< 0.01	< 0.01	< 0.01	0.02	0.09	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.06	< 0.01	0.12	0.01	*	0.10	3	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	1	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	< 0.01	< 0.01	< 0.01	0.02	0.05	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.08	0.04	< 0.01	0.08	0.01	*	0.06	***12***	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	< 0.02	< 0.02	< 0.02	0.03	0.08	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.12	0.06	< 0.02	0.12	0.02	*	0.09	***30***	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	< 0.02	< 0.02	< 0.02	0.20	0.39	64	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.67	0.29	< 0.02	0.64	0.13	132	0.46	***140***	5[e]	50[e]	5	50	50
Anthracene	µg/g	< 0.02	< 0.02	< 0.02	0.06	0.13	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.17	0.08	< 0.02	0.16	0.04	*	0.13	***43***	2.5	32	2.5	30	30
Fluoranthene	µg/g	< 0.05	< 0.05	< 0.05	0.11	0.17	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.33	0.12	< 0.05	0.28	0.07	*	0.21	***52***	15.4	180	50	200	200
Pyrene	µg/g	< 0.02	< 0.02	< 0.02	0.15	0.24	46	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.44	0.16	< 0.02	0.38	0.11	110	0.28	***74***	7.7	100	10	100	100
Benz(a)anthracene	µg/g	< 0.02	< 0.02	< 0.02	0.08	0.12	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.25	0.08	< 0.02	0.21	0.05	*	0.15	***36***	1	10	1	10	10
Chrysene	µg/g	< 0.05	< 0.05	< 0.05	0.08	0.12	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.25	0.09	< 0.05	0.21	0.05	*	0.16	***34***	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	0.03	0.05	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.10	0.03	< 0.02	0.09	0.03	*	0.06	***11***	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	0.02	0.03	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.06	0.02	< 0.02	0.04	< 0.02	*	0.04	***6***	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	0.02	0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.05	0.02	< 0.02	0.04	< 0.02	*	0.03	***7***	1	10	1	10	10
Benzo(a)pyrene	µg/g	< 0.05	< 0.05	< 0.05	0.08	0.10	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.19	0.07	< 0.05	0.16	0.05	*	0.11	***22***	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	< 0.02	< 0.02	< 0.02	0.02	0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.08	0.02	< 0.02	0.07	< 0.02	*	0.04	***8***	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.04	< 0.02	< 0.02	0.06	< 0.02	*	< 0.02	***4***	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.11	< 0.05	< 0.05	0.08	< 0.05	*	0.05	9	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	< 0.05	< 0.05	< 0.05	0.10	0.13	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.28	0.09	< 0.05	0.26	0.07	*	0.15	***34***	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	< 0.6	< 0.6	< 0.6	0.9	***1.3***	*	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	***2.9***	0.9	< 0.6	***2.5***	0.6	*	***1.7***	***372***	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
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RPD Denotes relative percent difference.
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BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		TP19-51			TP19-52		TP19-53	TP19-54					TP19-55				TP19-56		BH19-07D			Federal Guideline		BC Standard		
Sample ID		TP19-51-01	TP19-51-02	TP19-51-03	TP19-52-01	TP19-52-04	TP19-53-03	TP19-54-01	TP19-54-02	TP19-54-03	QA/QC	TP19-54-04	TP19-55-01	TP19-55-02	TP19-55-03	TP19-56-01	TP19-56-03	BH19-07-04	BH19-07-05	QA/QC	CCME	CCME	CSR Low	CSR	CSR
Sample Date (yyyy mm dd)		2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	Duplicate	RPD %	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 01 14	2019 02 06	Duplicate	RPD %	CEQG	CEQG	Density	Commercial	Industrial
Depth Interval (m)		0.3 - 0.6	0.9 - 1.2	1.5 - 1.8	0.3 - 0.6	1.5 - 1.8	1.5 - 1.8	0.3 - 0.6	0.9 - 1.2	0.9 - 1.2		1.5 - 1.8	0.3 - 0.6	0.9 - 1.2	1.5 - 1.8	0.3 - 0.6	1.5 - 1.8	2.9 - 3.0	2.9 - 3.0		Residential	Commercial	Residential	Land Use	Land Use
Field Screen (ppm)[a]		-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	50	50		(RL)[b]	(CL)[b]	Land Use (RLLD)[c]	(CL)[c]	(IL)[c]
Parameter	Units	Analytical Results																								
Polycyclic Aromatic Hydrocarbons																										
Naphthalene	µg/g	0.03	0.01	***3.87***	0.07	***0.66***	0.19	< 0.01	0.01	0.08	*	< 0.01	0.02	0.15	0.05	< 0.01	0.13	0.009	0.020	*	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.005	0.015	*	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	0.03	0.01	2.82	0.08	0.61	0.20	< 0.01	0.01	0.10	*	< 0.01	0.01	0.09	0.05	< 0.01	0.09	0.007	0.017	*	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.005	*	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	0.03	0.02	***0.97***	0.06	0.19	0.11	< 0.01	0.01	0.07	*	< 0.01	< 0.01	0.02	0.03	< 0.01	0.04	< 0.005	0.006	*	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	0.04	0.03	***1.80***	0.11	***0.39***	0.21	< 0.02	< 0.02	0.11	*	< 0.02	< 0.02	0.03	0.05	< 0.02	0.06	< 0.02	< 0.02	*	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	0.26	0.16	***6.17***	0.61	1.64	0.87	0.02	0.10	0.64	146	0.03	0.04	0.05	0.28	0.05	0.26	< 0.02	0.04	*	5[e]	50[e]	5	50	50
Anthracene	µg/g	0.08	0.06	2.02	0.16	0.44	0.28	< 0.02	0.03	0.14	*	< 0.02	< 0.02	< 0.02	0.09	< 0.02	0.07	0.009	0.024	*	2.5	32	2.5	30	30
Fluoranthene	µg/g	0.14	0.08	2.47	0.30	0.62	0.35	< 0.05	0.05	0.28	*	< 0.05	< 0.05	< 0.05	0.13	< 0.05	0.11	< 0.01	0.01	*	15.4	180	50	200	200
Pyrene	µg/g	0.23	0.11	3.27	0.41	0.85	0.47	< 0.02	0.07	0.38	*	0.02	0.04	< 0.02	0.17	0.04	0.15	< 0.01	0.01	*	7.7	100	10	100	100
Benz(a)anthracene	µg/g	0.11	0.05	***1.79***	0.23	0.48	0.26	< 0.02	0.03	0.21	*	< 0.02	< 0.02	< 0.02	0.09	0.02	0.07	< 0.03	< 0.03	*	1	10	1	10	10
Chrysene	µg/g	0.09	0.05	1.80	0.22	0.44	0.25	< 0.05	< 0.05	0.20	*	< 0.05	< 0.05	< 0.05	0.09	< 0.05	0.07	< 0.05	< 0.05	*	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	0.05	0.02	0.67	0.10	0.19	0.10	< 0.02	< 0.02	0.08	*	< 0.02	0.02	< 0.02	0.03	0.02	0.02	< 0.02	< 0.02	*	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	0.03	< 0.02	0.46	0.05	0.09	0.05	< 0.02	< 0.02	0.04	*	< 0.02	< 0.02	< 0.02	0.02	< 0.02	0.02	< 0.02	< 0.02	*	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.05	*	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	0.03	< 0.02	0.39	0.05	0.09	0.05	< 0.02	< 0.02	0.04	*	< 0.02	< 0.02	< 0.02	0.02	< 0.02	0.02	< 0.02	< 0.02	*	1	10	1	10	10
Benzo(a)pyrene	µg/g	0.07	< 0.05	***1.33***	0.14	0.33	0.19	< 0.05	< 0.05	0.13	*	< 0.05	< 0.05	< 0.05	0.07	< 0.05	0.06	< 0.03	< 0.03	*	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	0.04	< 0.02	0.48	0.06	0.14	0.08	< 0.02	< 0.02	0.07	*	< 0.02	0.02	< 0.02	0.02	< 0.02	0.02	< 0.02	< 0.02	*	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	0.02	< 0.02	0.23	0.04	0.08	0.04	< 0.02	< 0.02	0.03	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.005	< 0.005	*	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	< 0.05	< 0.05	0.58	0.09	0.18	0.09	< 0.05	< 0.05	0.08	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.05	*	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	0.11	< 0.05	1.96	0.23	0.51	0.28	< 0.05	< 0.05	0.20	*	< 0.05	< 0.05	< 0.05	0.09	< 0.05	0.08	< 0.05	< 0.05	*	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	***1.3***	< 0.6	***20.6***	***2.6***	***5.2***	***2.8***	< 0.6	< 0.6	***2.2***	*	< 0.6	< 0.6	< 0.6	1.0	< 0.6	0.8	< 0.6	< 0.6	*	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		BH19-08D		BH19-09D		TP19-57		TP19-58				TP19-59					TP19-60			Federal Guideline		BC Standard		
Sample ID		BH19-08-01	BH19-08-03	BH19-09-04	BH19-09-06	TP19-57-04	TP19-57-05	TP19-58-01	TP19-58-02	QA/QC	TP19-58-03	TP19-59-01	TP19-59-04	TP19-60-01	TP19-60-02	QA/QC	TP19-60-03	TP19-60-04	CCME CEQG	CCME CEQG	CSR Low Density	CSR Commercial	CSR Industrial
Sample Date (yyyy mm dd)		2019 02 06	2019 02 06	2019 02 07	2019 02 07	2019 03 11	2019 03 11	2019 03 11	Duplicate	RPD %	2019 03 11	2019 03 11	2019 03 11	2019 03 11	Duplicate	RPD %	2019 03 11	2019 03 11	Residential	Commercial	Residential	Land Use	Land Use
Depth Interval (m)		0.3 - 0.5	1.5 - 1.7	2.0 - 2.1	2.9 - 3.0	1.4 - 1.7	2.1 - 2.4	0.3 - 0.6	0.3 - 0.6		0.9 - 1.2	0.3 - 0.6	1.5 - 1.8	0.3 - 0.6	0.3 - 0.6		0.9 - 1.2	1.5 - 1.8					
Field Screen (ppm)[a]		85	85	300	140	45	35	45	45		40	0	0	0	0		0	0					
Parameter	Units	Analytical Results																	(RL)[b]	(CL)[b]	(RLLD)[c]	(CL)[c]	(IL)[c]
Polycyclic Aromatic Hydrocarbons																							
Naphthalene	µg/g	0.011	< 0.005	0.306	0.005	***49.3***	***8.94***	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	0.019	< 0.005	0.261	< 0.005	23.8	4.08	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	0.014	< 0.005	0.278	< 0.005	32.8	5.27	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.005	< 0.005	0.018	< 0.005	< 0.5	< 0.05	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	< 0.005	< 0.005	0.109	< 0.005	***8.71***	***0.88***	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	< 0.02	< 0.02	0.18	< 0.02	***15.5***	***1.3***	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	0.05	< 0.02	0.73	< 0.02	***52.7***	4.6	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	5[e]	50[e]	5	50	50
Anthracene	µg/g	0.013	< 0.004	0.270	0.005	***17.8***	1.46	< 0.004	< 0.004	*	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	*	< 0.004	< 0.004	2.5	32	2.5	30	30
Fluoranthene	µg/g	0.01	< 0.01	0.31	< 0.01	***18.6***	1.1	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	15.4	180	50	200	200
Pyrene	µg/g	0.01	< 0.01	0.43	< 0.01	***24.8***	1.4	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	7.7	100	10	100	100
Benz(a)anthracene	µg/g	< 0.03	< 0.03	0.21	< 0.03	***12.6***	0.6	< 0.03	< 0.03	*	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	*	< 0.03	< 0.03	1	10	1	10	10
Chrysene	µg/g	< 0.05	< 0.05	0.19	< 0.05	***13.5***	0.5	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	< 0.02	< 0.02	0.08	< 0.02	***4.65***	0.2	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	< 0.02	< 0.02	0.05	< 0.02	***3.46***	< 0.2	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	< 0.05	< 0.05	0.13	< 0.05	***8.11***	0.20	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	< 0.02	< 0.02	0.06	< 0.02	***3.02***	< 0.2	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1	10	1	10	10
Benzo(a)pyrene	µg/g	< 0.03	< 0.03	0.16	< 0.03	***9.09***	0.4	< 0.03	< 0.03	*	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	*	< 0.03	< 0.03	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	< 0.02	< 0.02	0.04	< 0.02	***3.07***	0.2	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	< 0.005	< 0.005	0.018	< 0.005	0.864	0.15	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	0.011	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	3.02	< 0.5	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	0.24	< 0.5	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	< 0.05	< 0.05	0.22	< 0.05	***12.8***	0.7	< 0.05	< 0.05	*	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	< 0.6	< 0.6	***2.4***	< 0.6	***144***	***7***	< 0.6	< 0.6	*	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	*	< 0.6	< 0.6	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent).
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 3 (Cont'd): Summary of Analytical Results for Soil - Polycyclic Aromatic Hydrocarbons

Sample Location		TP19-61			TP19-62		TP19-63					TP19-64					TP19-65			Federal Guideline		BC Standard		
Sample ID		TP19-61-01	TP19-61-02	TP19-61-04	TP19-62-01	TP19-62-02	TP19-63-02	TP19-63-03	QA/QC	TP19-63-04	TP19-63-05	TP19-64-01	TP19-64-03	TP19-64-04	TP19-64-05	TP19-65-01	TP19-65-03	TP19-65-04	CCME CEQG Residential (RL)[b]	CCME CEQG Commercial (CL)[b]	CSR Low Density Residential Land Use (RLLD)[c]	CSR Commercial Land Use (CL)[c]	CSR Industrial Land Use (IL)[c]
Sample Date (yyyy mm dd)		2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	Duplicate	RPD %	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11	2019 03 11					
Depth Interval (m)		0.3 - 0.6	0.9 - 1.2	1.5 - 1.8	0.3 - 0.6	0.9 - 1.2	0.9 - 1.2	0.9 - 1.2		1.5 - 1.8	2.1 - 2.4	0.3 - 0.6	0.9 - 1.2	1.5 - 1.8	2.1 - 2.4	0.3 - 0.6	1.5 - 1.8	2.1 - 2.4					
Field Screen (ppm)[a]		0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0					
Parameter	**Units**	**Analytical Results**																					
Polycyclic Aromatic Hydrocarbons																							
Naphthalene	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.057	0.059	3	0.081	< 0.005	0.005	0.030	0.009	< 0.005	< 0.005	< 0.005	< 0.005	0.6[e]	22[e]	0.6	20	20
Methylnaphthalene, 1-	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.089	0.084	6	0.105	0.005	0.008	0.043	0.017	< 0.005	< 0.005	< 0.005	< 0.005	n/a	n/a	250	1,000	1,000
Methylnaphthalene, 2-	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.062	0.062	0	0.086	< 0.005	< 0.005	0.034	0.011	< 0.005	< 0.005	< 0.005	< 0.005	n/a	n/a	60	950	950
Acenaphthylene	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	*	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	320	320	n/a	n/a	n/a
Acenaphthene	µg/g	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.035	0.033	6	0.042	< 0.005	< 0.005	0.022	0.008	< 0.005	< 0.005	< 0.005	< 0.005	0.28	0.28	950	15,000	15,000
Fluorene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.04	0.04	*	0.05	< 0.02	< 0.02	0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.25	0.25	600	9,500	9,500
Phenanthrene	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.32	0.28	13	0.36	0.02	0.04	0.20	0.08	< 0.02	0.02	< 0.02	< 0.02	5[e]	50[e]	5	50	50
Anthracene	µg/g	0.008	< 0.004	< 0.004	< 0.004	< 0.004	0.089	0.074	18	0.093	0.009	0.012	0.058	0.021	< 0.004	0.007	< 0.004	< 0.004	2.5	32	2.5	30	30
Fluoranthene	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.15	0.13	14	0.16	0.01	0.02	0.11	0.05	< 0.01	0.01	< 0.01	< 0.01	15.4	180	50	200	200
Pyrene	µg/g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.19	0.17	11	0.20	0.01	0.02	0.14	0.06	0.01	0.01	< 0.01	< 0.01	7.7	100	10	100	100
Benz(a)anthracene	µg/g	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.10	0.09	*	0.11	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	1	10	1	10	10
Chrysene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.09	0.08	*	0.10	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	6.2	n/a	200	4,500	4,500
Benzo(b)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.04	0.03	*	0.04	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	10	1	10	10
Benzo(j)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	0.02	*	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	10	1	10	10
Benzo(b+j)fluoranthene	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	0.05	*	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1	10	1	10	10
Benzo(k)fluoranthene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.03	0.02	*	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	10	1	10	10
Benzo(a)pyrene	µg/g	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.07	0.05	*	0.07	< 0.03	< 0.03	0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.6	72	5	30	50
Indeno(1,2,3-cd)pyrene	µg/g	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	0.02	*	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	10	1	10	10
Dibenz(a,h)anthracene	µg/g	< 0.005	0.005	< 0.005	< 0.005	< 0.005	0.014	0.013	*	0.015	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1	10	1	10	10
Benzo(g,h,i)perylene	µg/g	0.10	< 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	n/a	n/a	n/a	n/a	n/a
Quinoline	µg/g	< 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	n/a	n/a	2.5	10	10
B(a)P Equivalency	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.10	0.08	*	0.10	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	5.3[d]	5.3[d]	n/a	n/a	n/a
Index of Additive Cancer Ris	µg/g	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	***1.1***	0.9	*	***1.1***	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	1	1	n/a	n/a	n/a

Associated AGAT file(s): 15V942889, 15V942897, 16V059563, 16V074750, 17V278021, 18V305465, 19V428489, 19V435966, 19V445538.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[b] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[d] Guidelines use 10-5 incremental risk.
[e] Freshwater aquatic life pathway removed from naphthalene and phenanthrene guidelines, reverting to CCME 1997 and CCME 1991 guidelines, respectively.

TABLE 4: Summary of Analytical Results for Soil - Total Metals

Sample Location		BH15-1D				BH15-2D		BH15-3	BH15-4	BH15-5	SS15-2	SS15-6	TP18-37			TP18-38	TP18-39	TP18-40	TP19-50	TP19-52	Federal Guideline		BC Standard		
Sample ID		BH15-1-3	BH15-1-17	BH15-1-18	QA/QC	BH15-2-2	BH15-2-7	BH15-3-3	BH15-4-1	BH15-5-2	SS15-2-1	SS15-6-2	TP18-37-01	TP18-37-02	QA/QC	TP18-38-01	TP18-39-01	TP18-40-02	TP19-50-04	TP19-52-04	CCME CEQG Residential (RL)[a]	CCME CEQG Commercial (CL)[a]	CSR Low Density Residential Land Use (RLLD)[b]	CSR Commercial Land Use (CL)[b]	CSR Industrial Land Use (IL)[b]
Sample Date (yyyy mm dd)		2015 02 03	2015 02 03	Duplicate	RPD %	2015 02 04	2015 02 04	2015 02 04	2015 02 04	2015 02 05	2015 02 04	2015 02 05	2018 01 23	Duplicate	RPD %	2018 01 23	2018 01 23	2018 01 23	2019 01 14	2019 01 14					
Depth Interval (m)		1.7 - 2.0	15.4 - 15.7	15.4 - 15.7		1.1 - 1.2	4.7 - 5.0	1.7 - 2.0	0.2 - 0.5	1.2 - 1.5	0.0 - 0.2	0.2 - 0.3	0.2 - 0.5	0.2 - 0.5		0.2 - 0.5	0.2 - 0.5	0.8 - 0.9	1.5 - 1.8	1.5 - 1.8					
Parameter	**Units**	**Analytical Results**																							
Physical Parameters																									
pH	pH	7.3	7.9	7.9	0	7	7.8	6.9	***5.3***	***5.8***	6	***5.9***	6.39	6.67	4	6.22	6.17	6.25	***5.80***	6.14	6.0 - 8.0	6.0 - 8.0	n/a	n/a	n/a
Total Metals																									
Aluminum	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,200	17,700	n/a	n/a	40,000	250,000	250,000
Antimony	µg/g	0.2	0.1	0.1	*	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.2	*	0.2	0.1	0.1	0.3	0.2	20	40	20	40	40
Arsenic	µg/g	3	2.6	2.7	4	2.4	2.3	1.9	2.8	2.9	3.6	3.7	3.0	2.0	40	2.1	1.9	2.2	3.6	3.8	12	12	10	10	10
Barium	µg/g	30.1	45	46.3	3	37.8	36.5	30.6	57.4	84.4	43.6	72.9	44.0	48.4	10	49.9	46.5	44.0	51.3	49.5	500	2,000	350	350	350
Beryllium	µg/g								0.3	0.4	0.4	0.4	0.2			0.2	0.3	0.2	0.2	0.2	4	8	1 (pH <6.5)	1 (pH <6.5)	1 (pH <6.5)
								0.2						0.2	*								4 (pH 6.5-<7.0)	4 (pH 6.5-<7.0)	4 (pH 6.5-<7.0)
		0.2				0.2																	30 (pH 7.0-<7.5)	30 (pH 7.0-<7.5)	30 (pH 7.0-<7.5)
			0.2	0.2	*		0.2																	250 (pH 7.5-<8.0)	250 (pH 7.5-<8.0)
Boron	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	1.5	n/a	n/a	8,500	50,000	1,000,000
Cadmium	µg/g							0.04	0.1	0.22	0.06	0.22	0.25	0.21	17	0.27	0.22	0.18	0.33	0.32	10	22	1 (pH <7.0)	1 (pH <7.0)	1 (pH <7.0)
		0.06				0.05																	3 (pH 7.0-<7.5)	3 (pH 7.0-<7.5)	3 (pH 7.0-<7.5)
			0.04	0.04	*		0.04																	20 (pH 7.5-<8.0)	20 (pH 7.5-<8.0)
Chromium	µg/g	21	17	20	16	27	25	35	32	30	29	33	25	25	0	23	24	22	27	26	64	87	60	60	60
Cobalt	µg/g	8.5	7.1	7.6	7	9.4	10.7	7.8	9.6	12.1	13	13	10.0	10.1	1	9.2	11.3	9.2	10.7	10.7	50	300	25	25	25
Copper	µg/g								41.2	41.7		48.9							47.7		100[c]	100[c]	100 (pH 5.5-<6.0)[e]	100 (pH 5.5-<6.0)[e]	100 (pH 5.5-<6.0)[e]
		29.7	20.9	22.4	7	32.4	43.4	29.9			66.7		39.2	37.1	6	31.9	40.8	27.6		40.3			150 (pH>=6.0)	300 (pH>=6.0)	300 (pH>=6.0)
Iron	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24,400	24,200	n/a	n/a	35,000	150,000	150,000
Lead	µg/g								3.3												140	260	120	120 (pH <5.5)	120 (pH <5.5)
										4.8		2.9						2.4						150 (pH >=5.5)	150 (pH 5.5-<6.0)
											2.4		2.6			4.2	2.5	1.6		2.1					800 (pH 6.0-<6.5)
		1.8	1.7	1.8	*	1.6	1.3	1.6						2.2	17										1,000 (pH>=6.5)
Lithium	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.1	5.8	n/a	n/a	30	450	450
Manganese	µg/g	318	259	270	4	378	397	274	288	717	482	247	292	288	1	297	438	222	362	399	n/a	n/a	2,000	2,000	2,000
Mercury	µg/g	0.04	0.02	0.02	*	0.02	0.02	0.02	0.05	0.06	0.05	0.06	0.03	0.03	*	0.03	0.03	< 0.01	0.03	0.03	6.6	24	10	75	75
Molybdenum	µg/g	0.2	< 0.2	< 0.2	*	0.2	0.2	0.3	0.3	0.6	0.4	0.2	0.2	< 0.2	*	0.2	0.2	< 0.2	0.4	0.2	10	40	15	15	15
Nickel	µg/g	17.5				15.8		13.9	19.1	22.1	23.9	23.6	19.1	19.2	1	18.7	21.1	17.3	23.1	21.6	45	89	70 (pH <7.5)	70 (pH <7.5)	70 (pH <7.5)
			14.8	16.1	*		17.6																	250 (pH>=7.5)	250 (pH>=7.5)
Selenium	µg/g	0.1	< 0.1	< 0.1	*	< 0.1	< 0.1	< 0.1	0.1	0.3	0.3	< 0.1	0.4	0.5	*	0.5	0.4	0.4	0.4	0.3	1	2.9	1	1	1
Silver	µg/g	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	20	40	20	40	40
Strontium	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	21	n/a	n/a	9,500	150,000	150,000
Thallium	µg/g	< 0.1	0.1	< 0.1	*	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	*	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1	1	9	25	25
Tin	µg/g	0.3	0.2	0.3	*	0.4	0.3	0.3	0.4	0.5	0.5	0.5	0.4	0.4	*	0.4	0.4	0.3	1.1	0.5	50	300	50	300	300
Tungsten	µg/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	< 0.05	n/a	n/a	15	200	200
Uranium	µg/g	< 0.2	0.3	0.3	*	0.3	0.2	0.2	0.4	0.3	0.3	0.4	0.3	0.2	*	0.3	0.2	< 0.2	0.3	0.2	23	300	30	30	30
Vanadium	µg/g	72	52	56	7	77	90	76	80	97	115	83	79	77	3	69	82	69	80	78	200[c]	200[c]	200[c]	200[c]	200[c]
Zinc	µg/g								31	43		36							32		250	410	150 (pH <6.0)	150 (pH <6.0)	150 (pH <6.0)
											41		31			29	33	28		36			250 (pH 6.0-<6.5)	250 (pH 6.0-<6.5)	250 (pH 6.0-<6.5)
								24						29	7								350 (pH 6.5-<7.0)	350 (pH 6.5-<7.0)	350 (pH 6.5-<7.0)
		27	29	30	3	26	31																450 (pH>=7.0)	450 (pH>=7.0)	450 (pH>=7.0)

Associated AGAT file(s): 15V942889, 15V942897, 18V305465, 19V428489, 19V435966.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
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n/a Denotes no applicable standard/guideline.
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BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[b] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[c] Proposed BC MoE Regional Background Estimate (Protocol 4 for Contaminated Sites: Determining Background Soil Quality).

TABLE 4 (Cont'd): Summary of Analytical Results for Soil - Total Metals

Sample Location		TP19-53	TP19-54			TP19-55	TP19-56	BH19-07D			BH19-09D	Federal Guideline		BC Standard		
Sample ID		TP19-53-03	TP19-54-02	TP19-54-03	QA/QC	TP19-55-03	TP19-56-03	BH19-07-04	BH19-07-05	QA/QC	BH19-09-06	CCME CEQG Residential (RL)[a]	CCME CEQG Commercial (CL)[a]	CSR Low Density Residential Land Use (RLLD)[b]	CSR Commercial Land Use (CL)[b]	CSR Industrial Land Use (IL)[b]
Sample Date (yyyy mm dd)		2019 01 14	2019 01 14	Duplicate	RPD %	2019 01 14	2019 01 14	2019 02 06	Duplicate	RPD %	2019 02 07					
Depth Interval (m)		1.5 - 1.8	0.9 - 1.2	0.9 - 1.2		1.5 - 1.8	1.5 - 1.8	2.9 - 3.0	2.9 - 3.0		2.9 - 3.0					
Parameter	**Units**	**Analytical Results**														
Physical Parameters																
pH	pH	***5.79***	***5.55***	***5.75***	4	***5.64***	6.94	***8.27***	***8.58***	4	***8.18***	6.0 - 8.0	6.0 - 8.0	n/a	n/a	n/a
Total Metals																
Aluminum	µg/g	17,600	16,800	15,700	7	20,000	23,900	18,200	19,900	9	14,500	n/a	n/a	40,000	250,000	250,000
Antimony	µg/g	0.2	0.2	0.2	*	0.3	0.1	0.5	0.8	46	0.2	20	40	20	40	40
Arsenic	µg/g	3.4	3.1	3.7	18	3.7	3.6	3.4	4.0	16	2.5	12	12	10	10	10
Barium	µg/g	49.0	42.3	39.9	6	60.9	48.0	39.0	38.2	2	32.1	500	2,000	350	350	350
Beryllium	µg/g	0.2	0.2	0.2	*	0.2						4	8	1 (pH <6.5)	1 (pH <6.5)	1 (pH <6.5)
							0.3							4 (pH 6.5-<7.0)	4 (pH 6.5-<7.0)	4 (pH 6.5-<7.0)
														30 (pH 7.0-<7.5)	30 (pH 7.0-<7.5)	30 (pH 7.0-<7.5)
														85 (pH >=7.5)	250 (pH 7.5-<8.0)	250 (pH 7.5-<8.0)
								0.2	0.3	*	0.2				350 (pH >=8.0)	350 (pH >=8.0)
Boron	µg/g	1.5	1.6	1.4	*	1.8	2.4	2.5	2.5	0	2.2	n/a	n/a	8,500	50,000	1,000,000
Cadmium	µg/g	0.38	0.37	0.34	8	0.33	0.53					10	22	1 (pH <7.0)	1 (pH <7.0)	1 (pH <7.0)
														3 (pH 7.0-<7.5)	3 (pH 7.0-<7.5)	3 (pH 7.0-<7.5)
														20 (pH >=7.5)	20 (pH 7.5-<8.0)	20 (pH 7.5-<8.0)
								0.26	0.27	4	0.24				50 (pH >=8.0)	50 (pH >=8.0)
Chromium	µg/g	31	25	24	4	35	28	42	52	21	23	64	87	60	60	60
Cobalt	µg/g	11.6	12.1	9.8	21	13.0	15.1	13.2	13.8	4	8.6	50	300	25	25	25
Copper	µg/g	49.0	43.1	34.0	24	47.2						100[c]	100[c]	100 (pH 5.5-<6.0)[e]	100 (pH 5.5-<6.0)[e]	100 (pH 5.5-<6.0)[e]
							55.6	48.6	55.2	13	32.0			150 (pH>=6.0)	300 (pH>=6.0)	300 (pH>=6.0)
Iron	µg/g	25,500	25,000	22,700	10	29,300	33,500	33,300	**35,600**	7	24,900	n/a	n/a	35,000	150,000	150,000
Lead	µg/g											140	260	120	120 (pH <5.5)	120 (pH <5.5)
		2.4	1.7	1.6	6	2.3									150 (pH >=5.5)	150 (pH 5.5-<6.0)
																800 (pH 6.0-<6.5)
							1.8	1.7	1.5	12	3.3					1,000 (pH>=6.5)
Lithium	µg/g	6.0	6.0	5.6	7	7.9	6.7	6.2	7.0	12	3.9	n/a	n/a	30	450	450
Manganese	µg/g	403	371	358	4	383	540	454	425	7	293	n/a	n/a	2,000	2,000	2,000
Mercury	µg/g	0.04	0.03	0.02	*	0.05	0.02	0.02	0.03	*	0.02	6.6	24	10	75	75
Molybdenum	µg/g	< 0.2	< 0.2	< 0.2	*	0.3	0.3	1.8	2.2	20	0.5	10	40	15	15	15
Nickel	µg/g	24.1	23.3	21.0	10	26.3	29.8					45	89	70 (pH <7.5)	70 (pH <7.5)	70 (pH <7.5)
								25.9	28.7	10	16.6				250 (pH>=7.5)	250 (pH>=7.5)
Selenium	µg/g	0.4	0.4	0.4	*	0.4	0.5	0.2	0.4	*	0.1	1	2.9	1	1	1
Silver	µg/g	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	*	< 0.5	20	40	20	40	40
Strontium	µg/g	24	21	20	5	24	20	25	28	11	31	n/a	n/a	9,500	150,000	150,000
Thallium	µg/g	< 0.1	< 0.1	< 0.1	*	< 0.1	< 0.1	< 0.1	< 0.1	*	< 0.1	1	1	9	25	25
Tin	µg/g	0.4	0.3	0.3	*	0.4	0.4	0.6	0.7	*	0.3	50	300	50	300	300
Tungsten	µg/g	< 0.05	< 0.05	< 0.05	*	< 0.05	< 0.05	0.07	0.10	*	0.54	n/a	n/a	15	200	200
Uranium	µg/g	0.3	0.2	< 0.2	*	0.3	0.2	< 0.2	< 0.2	*	< 0.2	23	300	30	30	30
Vanadium	µg/g	83	82	75	9	92	104	89	96	8	72	200[c]	200[c]	200[c]	200[c]	200[c]
Zinc	µg/g	35	33	30	10	38						250	410	150 (pH <6.0)	150 (pH <6.0)	150 (pH <6.0)
														250 (pH 6.0-<6.5)	250 (pH 6.0-<6.5)	250 (pH 6.0-<6.5)
							46							350 (pH 6.5-<7.0)	350 (pH 6.5-<7.0)	350 (pH 6.5-<7.0)
								39	43	10	28			450 (pH>=7.0)	450 (pH>=7.0)	450 (pH>=7.0)

Associated AGAT file(s): 15V942889, 15V942897, 18V305465, 19V428489, 19V435966.
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n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[b] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent). Samples with depths below 3.0 m are compared to Industrial Land Use (IL) standards
[c] Proposed BC MoE Regional Background Estimate (Protocol 4 for Contaminated Sites: Determining Background Soil Quality).

TABLE 5: Summary of Analytical Results for Soil - Volatile Organic Compounds

Sample Location		BH15-2D		BH15-5	Federal Guideline		BC Standard	
Sample ID		BH15-2-2	BH15-2-5	BH15-5-2	CCME CEQG Residential (RL)[a]	CCME CEQG Commercial (CL)[a]	CSR Low Density Residential Land Use (RLLD)[b]	CSR Commercial Land Use (CL)[b]
Sample Date (yyyy mm dd)		2015 02 04	2015 02 04	2015 02 05				
Depth Interval (m)		1.1 - 1.2	3.0 - 3.4	1.2 - 1.5				
Parameter	**Units**	**Analytical Results**						
Volatile Organic Compounds								
Acetone	µg/g	< 0.5	< 0.5	< 0.5	n/a	n/a	15,000	200,000
Bromodichloromethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	100	550
Bromoform	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	300	4,000
Bromomethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	20	300
Carbon tetrachloride	µg/g	< 0.02	< 0.02	< 0.02	5	50	5	50
Chlorobenzene	µg/g	< 0.05	< 0.05	< 0.05	1	10	1	10
Chloroethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	n/a
Chloroform	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
Chloromethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	n/a
Dibromochloromethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	85	400
1,2-Dibromoethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	3.5	15
1,2-Dichlorobenzene	µg/g	< 0.05	< 0.05	< 0.05	1	10	1	10
1,3-Dichlorobenzene	µg/g	< 0.05	< 0.05	< 0.05	1	10	1	10
1,4-Dichlorobenzene	µg/g	< 0.05	< 0.05	< 0.05	1	10	1	10
1,1-Dichloroethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
1,2-Dichloroethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
1,1-Dichloroethylene	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
cis-1,2-Dichloroethylene	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
trans-1,2-Dichloroethylene	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
Dichloromethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
1,2-Dichloropropane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
cis-1,3-Dichloropropene	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	5	50
trans-1,3-Dichloropropene	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	5	50
Methyl ethyl ketone	µg/g	< 0.5	< 0.5	< 0.5	n/a	n/a	9,500	150,000
Methyl isobutyl ketone	µg/g	< 0.5	< 0.5	< 0.5	n/a	n/a	n/a	n/a
1,1,1,2-Tetrachloroethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	250	1,500
1,1,2,2-Tetrachloroethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	35	150
Tetrachloroethylene	µg/g	< 0.05	< 0.05	< 0.05	0.2	0.5	2.5	2.5
1,2,4-Trichlorobenzene	µg/g	< 0.05	< 0.05	< 0.05	2	10	2	10
1,1,1-Trichloroethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
1,1,2-Trichloroethane	µg/g	< 0.05	< 0.05	< 0.05	5	50	5	50
Trichloroethylene	µg/g	< 0.01	< 0.01	< 0.01	0.01	0.01	0.3	0.3
Trichlorofluoromethane	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	4,500	70,000
Vinyl chloride	µg/g	< 0.05	< 0.05	< 0.05	n/a	n/a	0.95	45

Associated AGAT file(s): 15V942889, 15V942897.
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n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[b] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent).

TABLE 6: Summary of Analytical Results for Soil - PCBs

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Depth Interval (m)	PCBs			
				Arochlor 1242 µg/g	Arochlor 1254 µg/g	Arochlor 1260 µg/g	Total PCBs µg/g
BH15-4	BH15-4-1	2015 02 04	0.2 - 0.5	< 0.05	< 0.05	< 0.05	< 0.05
BH15-5	BH15-5-2	2015 02 05	1.2 - 1.5	< 0.05	< 0.05	< 0.05	< 0.05
BH15-6	BH15-6-1	2015 02 05	0.5 - 0.8	< 0.05	< 0.05	< 0.05	< 0.05
Federal Guideline							
CCME CEQG Residential (RL)[a]				n/a	n/a	n/a	1.3[c]
CCME CEQG Commercial (CL)[a]				n/a	n/a	n/a	33
BC Standard							
CSR Low Density Residential Land Use (RLLD)[b]				n/a	n/a	n/a	1.5
CSR Commercial Land Use (CL)[b]				n/a	n/a	n/a	35

Associated AGAT file(s): 15V942889, 15V942897.
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- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CCME CEQG Residential (RL) Guideline
SHADOW	Concentration greater than CCME CEQG Commercial (CL) Guideline
SHADED	Concentration greater than CSR Low Density Residential Land Use (RLLD) standard
OUTLINE	Concentration greater than CSR Commercial Land Use (CL) Standard

[a] Pathways Included: Eco Soil Contact, Management Limit, Offsite Migration, Protection of Groundwater for Freshwater Aquatic Life, Soil and Food Ingestion, Direct Contact (particulate inhalation), Soil Dermal Contact, Soil Ingestion, Protection of Potable Groundwater, Historical Guideline, Soil General.
[b] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent).
[c] Guideline includes most stringent soil and food ingestion guideline (see factsheet for more details).

TABLE 7: Summary of Analytical Results for Soil - Leachable Polycyclic Aromatic Hydrocarbons

Sample Location		TP19-50	BC Standard
Sample ID		TP19-50-04	HWR Leachate Quality Standards (HWLQ)
Sample Date (yyyy mm dd)		2019 01 14	
Parameter	**Units**	**Analytical Results**	
TCLP Polycyclic Aromatic Hydrocarbons			
Acenaphthene	µg/L	2	n/a
Acenaphthylene	µg/L	< 1	n/a
Anthracene	µg/L	1	n/a
Benzo(a)anthracene	µg/L	< 1	n/a
Benzo(a)pyrene	µg/L	< 1	1
Benzo(b)fluoranthene	µg/L	< 1	n/a
Benzo(g,h,i)perylene	µg/L	< 1	n/a
Benzo(k)fluoranthene	µg/L	< 1	n/a
Chrysene	µg/L	< 1	n/a
Dibenz(a,h)anthracene	µg/L	< 1	n/a
Fluoranthene	µg/L	< 1	n/a
Fluorene	µg/L	5	n/a
Indeno(1,2,3-cd)pyrene	µg/L	< 1	n/a
Naphthalene	µg/L	3	n/a
Phenanthrene	µg/L	7	n/a
Pyrene	µg/L	< 1	n/a
2-Methylnaphthalene	µg/L	2	n/a

Associated AGAT file(s): 19V428489.

All terms defined within the body of SNC-Lavalin's report.

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- Denotes analysis not conducted.

n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD Concentration greater than HWR Leachate Quality Standards (HWLQ) Standard

TABLE 8: Summary of Analytical Results for Groundwater - Hydrocarbons

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Monocyclic Aromatic Hydrocarbons					Gross Parameters					Petroleum Hydrocarbon Fractions				Methyl tert-butyl ether [MTBE] µg/L
			Benzene µg/L	Ethylbenzene µg/L	Toluene µg/L	Xylenes µg/L	Styrene µg/L	VHw6-10 µg/L	VPHw µg/L	EPHw10-19 µg/L	LEPHw µg/L	EPH (C19-C32) µg/L	F1- µg/L	F2 (>C10-C16) µg/L	F3 (>C16-C34) µg/L	F4 (>C34-C50) µg/L	
MW15-1S	MW15-1S-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	100	< 100	< 1
	MW15-A-150210	Duplicate	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
	QA/QC RPD%		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MW15-1D	MW15-1D-150211	2015 02 11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	-	-	-	< 100	-	-	-	< 1
MW15-2S	MW15-2S-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-2D	MW15-2D-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-3	MW15-3-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-4	MW15-4-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW15-5	MW15-5-150210	2015 02 10/11	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 1
MW19-07S	MW19-07S-190228/0301	2019 02 28/03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	250	220	-	< 100	< 200	-	-	< 1
MW19-07D	MW19-07D-190301	2019 03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 200	< 200	-	< 100	< 200	-	-	< 1
MW19-08D	MW19-08D-190301	2019 03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 200	< 200	-	< 100	< 200	-	-	< 1
MW19-09S	MW19-09S-190228/0301	2019 02 28/03 01	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 100	< 100	< 200	< 200	-	< 100	< 200	-	-	< 1
Federal Guideline																	
Canadian Drinking Water Quality Guidelines (CDWQG)[a]			5	1.6	24	20	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	15
FIGWQG Tier 2 Residential Land Use (RL)[b]			140	16,000	83	3,900	72	n/a	n/a	n/a	n/a	n/a	810	1,300	n/a	n/a	340
FIGWQG Tier 2 Commercial Land Use (CL)[b]			690	41,000	83	18,000	72	n/a	n/a	n/a	n/a	n/a	9,100	1,300	n/a	n/a	4,300
BC Standard																	
CSR Drinking Water (DW)			5	140	60	90	800	15,000[d]	n/a	5,000[d]	n/a	n/a	n/a	n/a	n/a	n/a	95
CSR Aquatic Life (AW)[c]			400	2,000	5	300	720	15,000[d]	1,500	5,000[d]	500	n/a	n/a	n/a	n/a	n/a	34,000

Associated AGAT file(s): 15V943947, 15V944419, 19V442894.

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- Denotes analysis not conducted.

n/a Denotes no applicable standard/guideline.

RPD Denotes relative percent difference.

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.

[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.

[c] Standard to protect freshwater aquatic life.

[d] Applicable at all sites irrespective of water use.

TABLE 9: Summary of Analytical Results for Groundwater - Polycyclic Aromatic Hydrocarbons

Sample Location		MW15-1S		MW15-2S	MW15-2D	MW15-3	MW15-4	MW15-5	MW19-07S	MW19-07D			Federal Guideline			BC Standard	
Sample ID		MW15-1S-150211	MW15-A-150211	MW15-2S-150211	MW15-2D-150211	MW15-3-150211	MW15-4-150211	MW15-5-150211	MW19-07S-190301	MW19-07D-190301	MW19-A-190301	QA/QC	Canadian Drinking	FIGWQG Tier 2	FIGWQG Tier 2	CSR Drinking	CSR Aquatic
Sample Date (yyyy mm dd)		2015 02 11	2015 02 11	2015 02 11	2015 02 11	2015 02 11	2015 02 11	2015 02 11	2019 03 01	2019 03 01	Duplicate	RPD %	Water Quality	Residential Land Use	Commercial Land	Water (DW)	Life (AW)[d]
Parameter	**Units**	**Analytical Results**											**Guidelines (CDWQG)[b]**	**(RL)[c]**	**Use (CL)[c]**		
Polycyclic Aromatic Hydrocarbons																	
Naphthalene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	0.09	*	n/a	1.1	1.1	80	10
Methylnaphthalene, 1-	µg/L	-	-	-	-	-	-	-	36.3	0.06	0.06	*	n/a	180	180	5.5	n/a
Methylnaphthalene, 2-	µg/L	-	-	-	-	-	-	-	32.1	0.05	0.05	*	n/a	180	180	15	n/a
Acenaphthylene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.02	*	n/a	46	46	n/a	n/a
Acenaphthene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*8.64*	0.03	0.03	*	n/a	5.8	5.8	250	60
Fluorene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*9.68*	0.04	0.03	*	n/a	3	3	150	120
Phenanthrene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*11.1*	0.06	0.08	*	n/a	0.4	0.4	n/a	3
Anthracene	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*1.87*	*0.02*	*0.03*	*	n/a	0.012	0.012	1,000	1
Acridine	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*1.85*	< 0.05	< 0.05	*	n/a	0.05	0.05	n/a	0.5
Fluoranthene	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*2.72*	0.03	0.04	*	n/a	0.04	0.04	150	2
Pyrene	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02	*3.57*	*0.04*	*0.05*	*	n/a	0.025	0.025	100	0.2
Benz(a)anthracene	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	*1.21*	0.01	*0.02*	*	n/a	0.018	0.018	0.07	1
Chrysene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1.09	0.01	0.03	*	n/a	1.4	1.4	7	1
Benzo(b)fluoranthene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.41	< 0.01	0.01	*	n/a	n/a	n/a	0.07	n/a
Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	0.24	< 0.01	0.02	*	n/a	0.48	0.48	0.07	n/a
Benzo(b+j)fluoranthene	µg/L	-	-	-	-	-	-	-	*0.65*	< 0.01	0.03	*	n/a	0.48	0.48	0.07	n/a
Benzo(k)fluoranthene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.30	< 0.01	0.01	*	n/a	0.48	0.48	n/a	n/a
Benzo(a)pyrene	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	***0.74***	< 0.01	*0.02*	*	0.04	0.015	0.015	0.01	0.1
Indeno(1,2,3-cd)pyrene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.19	< 0.01	0.01	*	n/a	0.21	0.21	n/a	n/a
Dibenz(a,h)anthracene	µg/L	< 0.05[a]	< 0.05[a]	< 0.05[a]	< 0.05[a]	< 0.05[a]	< 0.05[a]	< 0.05[a]	0.09	< 0.01	< 0.01	*	n/a	0.26	0.26	0.01	n/a
Benzo(g,h,i)perylene	µg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*0.24*	< 0.01	0.01	*	n/a	0.17	0.17	n/a	n/a
Quinoline	µg/L	< 0.1[a]	< 0.1[a]	< 0.1[a]	< 0.1[a]	< 0.1[a]	< 0.1[a]	< 0.1[a]	2.89	< 0.05	< 0.05	*	n/a	3.4	3.4	0.05	34

Associated AGAT file(s): 15V944419, 19V442894.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Laboratory detection limit exceeds regulatory standard/guideline.
[b] Pathways Included: Aesthetic Objectives, Maximum Acceptable Concentrations.
[c] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[d] Standard to protect freshwater aquatic life.

TABLE 9 (Cont'd): Summary of Analytical Results for Groundwater - Polycyclic Aromatic Hydrocarbons

Sample Location		MW19-08D	MW19-09S	Federal Guideline			BC Standard	
Sample ID		MW19-08D-190301	MW19-09S-190301	Canadian Drinking Water Quality Guidelines (CDWQG)[b]	FIGWQG Tier 2 Residential Land Use (RL)[c]	FIGWQG Tier 2 Commercial Land Use (CL)[c]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[d]
Sample Date (yyyy mm dd)		2019 03 01	2019 03 01					
Parameter	Units	Analytical Results						
Polycyclic Aromatic Hydrocarbons								
Naphthalene	µg/L	< 0.05	*2.11*	n/a	1.1	1.1	80	10
Methylnaphthalene, 1-	µg/L	< 0.05	0.63	n/a	180	180	5.5	n/a
Methylnaphthalene, 2-	µg/L	< 0.05	0.70	n/a	180	180	15	n/a
Acenaphthylene	µg/L	< 0.02	< 0.02	n/a	46	46	n/a	n/a
Acenaphthene	µg/L	< 0.02	0.16	n/a	5.8	5.8	250	60
Fluorene	µg/L	< 0.02	0.27	n/a	3	3	150	120
Phenanthrene	µg/L	0.05	*0.78*	n/a	0.4	0.4	n/a	3
Anthracene	µg/L	0.01	*0.22*	n/a	0.012	0.012	1,000	1
Acridine	µg/L	< 0.05	< 0.05	n/a	0.05	0.05	n/a	0.5
Fluoranthene	µg/L	< 0.02	*0.34*	n/a	0.04	0.04	150	2
Pyrene	µg/L	< 0.02	*0.47*	n/a	0.025	0.025	100	0.2
Benz(a)anthracene	µg/L	< 0.01	*0.19*	n/a	0.018	0.018	0.07	1
Chrysene	µg/L	< 0.01	0.16	n/a	1.4	1.4	7	1
Benzo(b)fluoranthene	µg/L	< 0.01	0.06	n/a	n/a	n/a	0.07	n/a
Benzo(j)fluoranthene	µg/L	< 0.01	0.04	n/a	0.48	0.48	0.07	n/a
Benzo(b+j)fluoranthene	µg/L	< 0.01	0.10	n/a	0.48	0.48	0.07	n/a
Benzo(k)fluoranthene	µg/L	< 0.01	0.05	n/a	0.48	0.48	n/a	n/a
Benzo(a)pyrene	µg/L	< 0.01	***0.12***	0.04	0.015	0.015	0.01	0.1
Indeno(1,2,3-cd)pyrene	µg/L	< 0.01	0.03	n/a	0.21	0.21	n/a	n/a
Dibenz(a,h)anthracene	µg/L	< 0.01	0.01	n/a	0.26	0.26	0.01	n/a
Benzo(g,h,i)perylene	µg/L	< 0.01	0.04	n/a	0.17	0.17	n/a	n/a
Quinoline	µg/L	< 0.05	< 0.05	n/a	3.4	3.4	0.05	34

Associated AGAT file(s): 15V944419, 19V442894.
All terms defined within the body of SNC-Lavalin's report.
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- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Laboratory detection limit exceeds regulatory standard/guideline.
[b] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[c] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[d] Standard to protect freshwater aquatic life.

TABLE 10: Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-1S									MW15-1D			Federal Guideline			BC Standard	
Sample ID		MW15-1S-150210	MW15-A-150210	QA/QC	MW15-1S-160112	MW16-A-160112	QA/QC	MW15-1S-180208	MW15-1S-190222	MW15-1S-190301	MW15-1D-150211	MW15-1D-190222	MW15-1D-190301	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2015 02 10	Duplicate	RPD %	2016 01 12	Duplicate	RPD %	2018 02 08	2019 02 22	2019 03 01	2015 02 11	2019 02 22	2019 03 01					
Parameter	Units	Analytical Results																
Physical Parameters																		
pH (field)	pH	7.3	7.3	*	7.3	7.3	*	7.2	***6.3***	***6.4***	7.3	7.7	7.7	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	84.5	84.7	0	136	135	1	70.4	59.6	66.3	213	116	123	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																		
Aluminum	µg/L								***188***	***101***				100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		74	86	15	23	30	26	***1,290***			10	4	3		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	24.9	25	0	37.3	36.9	1	18.8	16.4	18.6	58.7	31	32.8	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	33	43	*	13	16	*	***2,330***	***654***	***677***	< 10	< 10	22	300	300	300	n/a	n/a
Magnesium	mg/L	5.41	5.42	0	10.4	10.3	1	5.7	4.52	4.82	16.2	9.44	10.1	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	**1,070**	**1,080**	1	**417**	**413**	1	**1,720**	**1,020**	**1,510**	**261**	47	18	50	n/a	n/a	n/a	n/a
Potassium	mg/L	-	-	-	0.972	0.968	0	0.869	0.663	0.66	-	1.8	1.71	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	15.7	16	2	8.32	8.26	1	11.5	16.7	20.9	15.3	13.1	13.6	200	n/a	n/a	200	n/a
Dissolved Metals																		
Antimony	µg/L	< 0.2	< 0.2	*	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	0.5	< 0.2	< 0.2	6	2,000	2,000	6	90
Arsenic	µg/L	0.2	0.4	*	0.3	0.3	*	1.1	0.6	0.6	1	1.0	1.4	10	5	5	10	50
Barium	µg/L	20.5	22	7	18.9	18.9	0	36.2	23.2	28.8	20.1	8.7	12.0	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	0.03	0.02	*	< 0.01	< 0.01	*	0.09	0.02	0.01	< 0.01	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	13	14	7	11	10	10	5	5	6	19	21	17	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L													5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
		0.09	0.09	*				0.08	0.08	0.07								1.5 (H >30-<90)
					0.09	0.09	*					0.05	0.10					2.5 (H >90-<150)
																		3.5 (H >150-<210)
											0.01							4 (H >=210)
Chromium	µg/L	0.6	0.8	*	< 0.5	< 0.5	*	1.5	0.9	< 0.5	< 0.5	1.3	1.5	50	8.9	8.9	50	10
Cobalt	µg/L	2.78	2.72	2	0.41	0.40	2	7.35	3.63	3.72	0.43	0.07	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L													1,000	2 - 4	2 - 4	1,500	20 (H <50)
								6.9	***4.6***	***3.3***								30 (H >50-<75)
		2.7	***10.9***	*														40 (H >75-<100)
												1.3	2.0					50 (H >100-<125)
					1.7	1.6	*											60 (H >125-<150)
																		70 (H >150-<175)
																		80 (H >175-<200)
											1.5							90 (H >=200)
Lead	µg/L													10	1 - 7	1 - 7	10	40 (H<50)
		< 0.05	0.08	*				0.93	0.05	< 0.05								50 (H 50-<100)
					< 0.05	< 0.05	*					< 0.05	< 0.05					60 (H 100-<200)
											< 0.05							110 (H 200-<300)
Lithium	µg/L	0.7	0.7	*	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	0.8	0.7	< 0.5	n/a	n/a	n/a	8	n/a
Mercury	µg/L	< 0.01	< 0.01	*	< 0.01	< 0.01	*	0.02	-	-	< 0.01	-	-	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.23	0.27	*	0.09	0.06	*	0.12	0.11	0.05	17.3	3.07	2.38	n/a	73	73	250	10,000
Nickel	µg/L								3.4					n/a	25 - 150	25 - 150	80	250 (H 0-<60)
		5.7	6.1	*				5.5		3.9		0.6						650 (H 60-<120)
					3.4	3.4	*						0.4					1,100 (H 120-<180)
											1.7							1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	*	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	1	1	10	20
Silver	µg/L	0.03	0.04	*				< 0.02	< 0.02	0.03				n/a	0.25	0.25	20	0.5 (H <=100)
					< 0.02	< 0.02	*				< 0.02	< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	-	-	-	-	-	-	105	103	103	-	200	185	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.01	0.03	*	0.01	0.02	*	< 0.01	0.03	0.03	< 0.01	0.02	0.01	n/a	0.8	0.8	n/a	3
Tin	µg/L	-	-	-	-	-	-	< 0.05	< 0.05	< 0.05	-	0.28	0.58	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	3	2.8	7	1.7	1.9	*	25.1	5.9	4.1	0.9	2.2	1.7	n/a	100	100	n/a	1,000
Tungsten	µg/L	-	-	-	-	-	-	0.38	< 0.01	< 0.01	-	0.69	0.56	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.07	0.07	0	0.02	0.02	*	0.15	0.04	0.03	0.95	1.13	1.03	20	15	15	20	85
Vanadium	µg/L	1	1.2	*	0.6	0.7	*	5.4	2.4	0.9	2.5	3.1	2.5	n/a	n/a	n/a	20	n/a
Zinc	µg/L	2	3	*				5	2	2				5,000	30	30	3,000	75 (H 0-<90)
																		150 (H 90-<100)
					< 2	< 2	*					3	4					900 (H 100-<200)
											< 2							1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894.
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RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 10 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-2S								MW15-2D				Federal Guideline			BC Standard	
Sample ID		MW15-2S-150210	MW15-2S-160113	MW15-2S-171030	MW15-2S-180208	MW18-A-180208	QA/QC	MW15-2S-190222	MW15-2S-190228	MW15-2D-150210	MW15-2D-160113	MW15-2D-171030	MW15-2D-180208	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2015 02 10	2016 01 13	2017 10 30	2018 02 08	Duplicate	RPD %	2019 02 22	2019 02 28	2015 02 10	2016 01 13	2017 10 30	2018 02 08					
Parameter	Units	Analytical Results																
Physical Parameters																		
pH (field)	pH	8.1	7.1	-	7.7	7.7	0	7.1	7.7	8.8	8.3	-	**6.9**	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	146	88.1	51.1	96.1	68	34	45.8	43.3	146	132	124	130	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																		
Aluminum	µg/L			***352***								< 2		100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		12	2		8	3	*	2	3	6	< 2		6		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	42.1	25.7	14.1	29.1	18	47	11.4	10.8	33.9	29.3	27.6	29.6	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	< 10	< 10	***24,100***	***28,300***	***28,600***	1	< 10	21	< 10	< 10	< 10	14	300	300	300	n/a	n/a
Magnesium	mg/L	10	5.81	3.87	5.7	5.59	2	4.2	3.97	14.9	14.3	13.3	13.6	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	**592**	30	**1,670**	**1,780**	**1,800**	1	9	2	**323**	< 1	< 1	< 1	50	n/a	n/a	n/a	n/a
Potassium	mg/L	-	0.794	13.1	0.515	0.471	9	0.285	0.189	-	0.823	0.628	0.621	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	15.5	13.3	60.3	6.56	6.39	3	5.96	6.5	31.1	8.91	8.02	8.98	200	n/a	n/a	200	n/a
Dissolved Metals																		
Antimony	µg/L	< 0.2	< 0.2	0.5	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	6	2,000	2,000	6	90
Arsenic	µg/L	0.2	0.2	***19.2***	*8.7*	*8.3*	5	< 0.1	0.1	0.9	1.1	1.2	1.2	10	5	5	10	50
Barium	µg/L	30.7	14.6	105	34.1	34.0	0	13.7	13.3	7.8	5.1	5.3	4.4	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	0.33	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	20	9	35	5	4	*	5	5	21	10	9	7	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L													5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
			0.02	< 0.01		< 0.01	*	0.03	0.03									1.5 (H >30-<90)
		0.1			< 0.01					0.02	< 0.01	0.03	< 0.01					2.5 (H >90-<150)
																		3.5 (H >150-<210)
																		4 (H >=210)
Chromium	µg/L	< 0.5	< 0.5	3.0	< 0.5	< 0.5	*	< 0.5	< 0.5	2.4	1.1	1.2	1.0	50	8.9	8.9	50	10
Cobalt	µg/L	3	0.06	13.0	10.1	9.95	1	< 0.05	< 0.05	0.64	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L							0.6	0.4					1,000	2 - 4	2 - 4	1,500	20 (H <50)
				< 0.2		< 0.2	*											30 (H >50-<75)
			0.6		0.7													40 (H >75-<100)
												< 0.2						50 (H >100-<125)
		1.1								1.1	0.5		0.5					60 (H >125-<150)
																		70 (H >150-<175)
																		80 (H >175-<200)
																		90 (H >=200)
Lead	µg/L							< 0.05	< 0.05					10	1 - 7	1 - 7	10	40 (H<50)
			< 0.05	0.12	< 0.05	< 0.05	*											50 (H 50-<100)
		< 0.05								< 0.05	< 0.05	< 0.05	< 0.05					60 (H 100-<200)
																		110 (H 200-<300)
Lithium	µg/L	2.4	1.1	9.2	0.8	0.8	*	0.6	0.5	1.5	0.8	0.7	0.7	n/a	n/a	n/a	8	n/a
Mercury	µg/L	< 0.01	< 0.01	-	< 0.01	< 0.01	*	-	-	< 0.01	< 0.01	< 0.01	< 0.01	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.89	0.25	0.10	0.58	0.66	13	0.14	0.16	5.14	0.61	0.48	0.18	n/a	73	73	250	10,000
Nickel	µg/L			*29.3*				2.5	2.1					n/a	25 - 150	25 - 150	80	250 (H 0-<60)
			1.4		8.9	9.0	*											650 (H 60-<120)
		10.7								2.5	0.2	0.2	0.2					1,100 (H 120-<180)
																		1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	1	1	10	20
Silver	µg/L		< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02					n/a	0.25	0.25	20	0.5 (H <=100)
		0.02								0.02	< 0.02	< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	-	-	-	69.5	65.2	6	30.1	24.8	-	-	-	53.9	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.02	0.02	0.03	< 0.01	< 0.01	*	0.03	0.02	< 0.01	< 0.01	< 0.01	< 0.01	n/a	0.8	0.8	n/a	3
Strontium	µg/L	-	-	-	< 0.05	< 0.05	*	< 0.05	< 0.05	-	-	-	< 0.05	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	2.1	1.4	9.3	3.8	4.2	10	1.7	1.5	2.6	2.0	2.7	4.8	n/a	100	100	n/a	1,000
Strontium	µg/L	-	-	-	0.29	0.11	90	< 0.01	0.04	-	-	-	0.35	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.18	0.06	0.31	0.14	0.13	7	0.02	0.02	0.26	0.11	0.06	0.07	20	15	15	20	85
Vanadium	µg/L	< 0.5	0.6	5.1	1.1	1.2	*	< 0.5	< 0.5	4.1	10.0	11.7	11.7	n/a	n/a	n/a	20	n/a
Zinc	µg/L		< 2	12		< 2	*	3	2					5,000	30	30	3,000	75 (H 0-<90)
					3													150 (H 90-<100)
		2								< 2	< 2	< 1	< 2					900 (H 100-<200)
																		1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

ITALIC	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
SHADOW	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 10 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-2D (Cont'd)				MW15-3						MW15-4			Federal Guideline			BC Standard	
Sample ID		MW15-2D-190222	MW19-A-190222	QA/QC	MW15-2D-190228	MW15-3-150210	MW15-3-160112	MW15-3-171026	MW15-3-180208	MW15-3-190222	MW15-3-190228	MW15-4-150210	MW15-4-160113	MW15-4-180208	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2019 02 22	Duplicate	RPD %	2019 02 28	2015 02 10	2016 01 12	2017 10 26	2018 02 08	2019 02 22	2019 02 28	2015 02 10	2016 01 13	2018 02 08					
Parameter	**Units**	**Analytical Results**																	
Physical Parameters																			
pH (field)	pH	7.1	7.1	0	7.7	7.6	8	8.1	7.1	7.2	7.6	7.5	7.5	**6.7**	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	115	115	0	122	58.6	46.9	17.2	20.1	52.9	52.7	125	161	118	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																			
Aluminum	µg/L														100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		2	< 2	*	< 2	23	10	21	8	15	17	10	< 2	2		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	25.8	25.7	0	27.4	17.8	14.2	5.05	5.87	15.8	15.8	35.3	46.6	31.1	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	< 10	< 10	*	25	261	***321***	***329***	***2,980***	17	21	< 10	10	< 10	300	300	300	n/a	n/a
Magnesium	mg/L	12.3	12.3	0	13	3.44	2.79	1.11	1.31	3.27	3.21	8.89	10.8	9.69	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	< 1	< 1	*	< 1	**596**	**155**	**128**	**233**	**294**	5	**204**	3	< 1	50	n/a	n/a	n/a	n/a
Potassium	mg/L	0.523	0.551	5	0.462	-	0.293	0.591	0.414	0.355	0.223	-	1.12	0.775	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	8.56	8.55	0	8.68	9.96	5.95	35.4	10.9	8.63	6.76	36.1	30.9	33	200	n/a	n/a	200	n/a
Dissolved Metals																			
Antimony	µg/L	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	6	2,000	2,000	6	90
Arsenic	µg/L	1.1	0.9	20	1.1	0.4	0.3	1.4	1.2	0.1	0.1	0.2	0.3	0.3	10	5	5	10	50
Barium	µg/L	4.0	4.1	2	4.3	7.8	12.5	12.6	5.0	7.6	8.6	28	24.5	19.0	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	*	< 0.01	0.02	0.01	0.07	0.01	0.01	0.02	0.01	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	8	8	*	7	5	2	4	< 2	3	2	70	76	78	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L							***0.04***	< 0.01						5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
			< 0.01	*		0.02	0.04			***0.11***	0.02								1.5 (H >30-<90)
		< 0.01			0.02							0.08		< 0.01					2.5 (H >90-<150)
													0.02						3.5 (H >150-<210)
																			4 (H >=210)
Chromium	µg/L	1.0	0.9	*	0.9	0.7	< 0.5	1.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	8.9	8.9	50	10
Cobalt	µg/L	< 0.05	< 0.05	*	< 0.05	3.67	1.04	1.82	1.95	0.68	< 0.05	1.41	< 0.05	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L						0.7	0.8	1.2						1,000	2 - 4	2 - 4	1,500	20 (H <50)
						0.4				0.7	0.7								30 (H >50-<75)
																			40 (H >75-<100)
		0.7	***16.2***	*	0.3							1.1		0.6					50 (H >100-<125)
																			60 (H >125-<150)
													0.9						70 (H >150-<175)
																			80 (H >175-<200)
																			90 (H >=200)
Lead	µg/L						< 0.05	0.07	0.06						10	1 - 7	1 - 7	10	40 (H<50)
						< 0.05				< 0.05	< 0.05								50 (H 50-<100)
		< 0.05	< 0.05	*	< 0.05							< 0.05	< 0.05	< 0.05					60 (H 100-<200)
																			110 (H 200-<300)
Lithium	µg/L	0.8	0.8	*	0.5	0.7	< 0.5	1.7	< 0.5	< 0.5	< 0.5	2.2	1.8	1.2	n/a	n/a	n/a	8	n/a
Mercury	µg/L	-	-	-	-	< 0.01	< 0.01	< 0.01	< 0.01	-	-	0.01	< 0.01	< 0.01	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.43	0.49	13	0.67	0.51	0.19	0.20	0.12	0.16	0.12	0.26	0.15	0.09	n/a	73	73	250	10,000
Nickel	µg/L					4.6	1.3	2.4	1.1	0.9	0.5				n/a	25 - 150	25 - 150	80	250 (H 0-<60)
		0.3	0.3	*										0.7					650 (H 60-<120)
					< 0.2							5.4	1.3						1,100 (H 120-<180)
																			1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	50	1	1	10	20
Silver	µg/L					< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02				n/a	0.25	0.25	20	0.5 (H <=100)
		< 0.02	< 0.02	*	< 0.02							< 0.02	< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	57.7	56.9	1	54.8	-	-	-	28.7	58.1	51.2	-	-	130	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.03	0.03	*	0.01	< 0.01	0.02	0.02	< 0.01	0.03	0.02	< 0.01	0.02	< 0.01	n/a	0.8	0.8	n/a	3
Strontium	µg/L	0.05	< 0.05	*	< 0.05	-	-	-	< 0.05	< 0.05	< 0.05	-	-	< 0.05	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	3.4	3.1	9	2.9	1.3	0.9	1.3	2.6	1.3	1.1	2	1.5	3.7	n/a	100	100	n/a	1,000
Strontium	µg/L	< 0.01	< 0.01	*	0.30	-	-	-	0.17	< 0.01	0.03	-	-	0.14	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.07	0.07	0	0.06	0.05	0.02	0.21	0.05	0.04	0.03	0.21	0.22	0.05	20	15	15	20	85
Vanadium	µg/L	13.2	12.2	8	11.7	0.9	1.5	1.1	1.1	0.7	< 0.5	0.6	< 0.5	< 0.5	n/a	n/a	n/a	20	n/a
Zinc	µg/L					< 2	< 2	2	< 2	6	< 2				5,000	30	30	3,000	75 (H 0-<90)
																			150 (H 90-<100)
		4	3	*	4							3	< 2	< 2					900 (H 100-<200)
																			1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894.
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[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
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ITALIC	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
SHADOW	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 10 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW15-4 (Cont'd)		MW15-5					MW18-06S			MW18-06D		Federal Guideline			BC Standard	
Sample ID		MW15-4-190222	MW15-4-190228	MW15-5-150210	MW15-5-160113	MW15-5-180208	MW15-5-190222	MW15-5-190301	MW18-6S-180208	MW18-06S-190222	MW18-06S-190228	MW18-6D-180208	MW18-06D-190222	Canadian Drinking Water Quality Guidelines (CDWQG)[a]	FIGWQG Tier 2 Residential Land Use (RL)[b]	FIGWQG Tier 2 Commercial Land Use (CL)[b]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[c]
Sample Date (yyyy mm dd)		2019 02 22	2019 02 28	2015 02 10	2016 01 13	2018 02 08	2019 02 22	2019 03 01	2018 02 08	2019 02 22	2019 02 28	2018 02 08	2019 02 22					
Parameter	Units	Analytical Results																
Physical Parameters																		
pH (field)	pH	7.1	7.6	7.8	-	**6.9**	-	7.9	7.1	8.2	7.4	7.5	8.2	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	117	121	65.2	201	83.3	93.1	80.8	103	136	128	168	131	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics																		
Aluminum	µg/L				*24*		*19*							100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		4	< 2	71		55		28	7	4	2	5	6		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	31.4	32.6	19.5	52.1	26.3	24.8	22.7	30.9	37.9	35.9	48	35.6	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	< 10	< 10	37	10	165	73	76	< 10	< 10	< 10	< 10	< 10	300	300	300	n/a	n/a
Magnesium	mg/L	9.26	9.67	4.02	17.2	4.29	7.57	5.86	6.26	10	9.34	11.6	10.2	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	< 1	< 1	**281**	**5,250**	**1,680**	**305**	**1,170**	**62**	**80**	**71**	**192**	< 1	50	n/a	n/a	n/a	n/a
Potassium	mg/L	0.653	0.566	-	5.82	2.07	3.39	2.26	2.51	1.86	1.63	1.79	1.44	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	31.8	33.4	4.25	5.76	2.55	3.32	2.54	44.2	19.1	17.2	16.1	13	200	n/a	n/a	200	n/a
Dissolved Metals																		
Antimony	µg/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	1.0	0.3	0.3	0.5	0.2	6	2,000	2,000	6	90
Arsenic	µg/L	0.3	0.2	< 0.1	0.3	0.2	0.2	0.1	1.2	0.8	0.8	0.6	1.0	10	5	5	10	50
Barium	µg/L	16.8	18.9	10.9	64.1	29.8	32.2	24.4	18.2	29.7	29.3	13.3	15.3	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	77	81	7	13	5	8	8	55	19	17	44	11	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L													5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
				0.07		0.05		0.06										1.5 (H >30-<90)
		0.11	0.02				0.06		< 0.01	< 0.01	0.01		0.02					2.5 (H >90-<150)
					0.16							< 0.01						3.5 (H >150-<210)
																		4 (H >=210)
Chromium	µg/L	< 0.5	< 0.5	< 0.5	0.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5	50	8.9	8.9	50	10
Cobalt	µg/L	< 0.05	< 0.05	1.56	0.79	0.87	0.14	0.32	0.17	0.09	0.07	0.32	< 0.05	n/a	n/a	n/a	20[d]	40
Copper	µg/L													1,000	2 - 4	2 - 4	1,500	20 (H <50)
				1.5														30 (H >50-<75)
						2.0	*3.1*	1.7										40 (H >75-<100)
		0.5	0.4						1.1									50 (H >100-<125)
										0.7	0.5		0.8					60 (H >125-<150)
												2.2						70 (H >150-<175)
																		80 (H >175-<200)
					6.0													90 (H >=200)
Lead	µg/L													10	1 - 7	1 - 7	10	40 (H<50)
				< 0.05		< 0.05	< 0.05	< 0.05										50 (H 50-<100)
		< 0.05	< 0.05						< 0.05	< 0.05	< 0.05	< 0.05	< 0.05					60 (H 100-<200)
					0.05													110 (H 200-<300)
Lithium	µg/L	1.3	1.6	1.6	0.8	< 0.5	< 0.5	< 0.5	9.2	3.0	2.5	0.9	1.2	n/a	n/a	n/a	8	n/a
Mercury	µg/L	-	-	< 0.01	< 0.01	< 0.01	-	-	< 0.01	-	-	< 0.01	-	1	0.026	0.026	1	0.25
Molybdenum	µg/L	0.13	0.14	0.06	0.14	< 0.05	0.13	0.07	13.7	11.2	10.0	6.48	3.88	n/a	73	73	250	10,000
Nickel	µg/L													n/a	25 - 150	25 - 150	80	250 (H 0-<60)
		0.8		3		1.4	1.1	0.7	1.0									650 (H 60-<120)
			0.6							0.4	< 0.2	1.0	0.2					1,100 (H 120-<180)
					4.8													1,500 (H >=180)
Selenium	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*1.3*	0.7	0.8	*1.6*	0.7	50	1	1	10	20
Silver	µg/L			0.02		< 0.02	< 0.02	< 0.02						n/a	0.25	0.25	20	0.5 (H <=100)
		< 0.02	< 0.02		< 0.02				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02					15 (H >100)
Strontium	µg/L	145	132	-	-	142	197	180	102	127	104	148	105	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.03	0.01	< 0.01	0.04	< 0.01	0.03	0.01	< 0.01	0.04	0.02	< 0.01	0.05	n/a	0.8	0.8	n/a	3
Strontium	µg/L	< 0.05	< 0.05	-	-	< 0.05	0.73	< 0.05	< 0.05	0.11	< 0.05	< 0.05	< 0.05	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	2.1	1.9	3.3	1.7	3.5	2.0	1.9	3.3	2.4	1.8	3.1	2.6	n/a	100	100	n/a	1,000
Strontium	µg/L	< 0.01	0.01	-	-	0.11	< 0.01	0.02	0.17	0.22	0.65	0.13	< 0.01	n/a	n/a	n/a	3	n/a
Uranium	µg/L	0.06	0.05	0.05	0.17	0.02	0.02	0.02	4.54	2.91	2.11	1.49	1.39	20	15	15	20	85
Vanadium	µg/L	< 0.5	< 0.5	< 0.5	0.5	< 0.5	< 0.5	< 0.5	0.8	0.8	< 0.5	0.9	0.8	n/a	n/a	n/a	20	n/a
Zinc	µg/L			9		7		5						5,000	30	30	3,000	75 (H 0-<90)
							7											150 (H 90-<100)
		2	< 2						< 2	< 2	< 2	< 2	< 2					900 (H 100-<200)
					4													1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894.
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TABLE 10 (Cont'd): Summary of Analytical Results for Groundwater - Dissolved Metals

Sample Location		MW18-06D (Cont'd)	MW19-07S	MW19-07D			MW19-07D	MW19-08D	MW19-09S	Federal Guideline			BC Standard	
Sample ID		MW18-06D-190228	MW19-07S-190228	MW19-07D-190301	MW19-A-190301	QA/QC	MW19-A-190301	MW19-08D-190301	MW19-09S-190228	Canadian Drinking Water Quality	FIGWQG Tier 2 Residential Land	FIGWQG Tier 2 Commercial Land	CSR Drinking	CSR Aquatic Life
Sample Date (yyyy mm dd)		2019 02 28	2019 02 28	2019 03 01	Duplicate	RPD %	2019 03 01	2019 03 01	2019 02 28					
Parameter	**Units**	**Analytical Results**								**Guidelines (CDWQG)[a]**	**Use (RL)[b]**	**Use (CL)[b]**	**Water (DW)**	**(AW)[c]**
Physical Parameters														
pH (field)	pH	7.4	8.2	7.7	7.7	*	7.7	**6.9**	7.6	7.0 - 10.5	6.5 - 9.0	6.5 - 9.0	n/a	n/a
Hardness	mg/L	125	211	180	183	2	183	192	99.3	n/a	n/a	n/a	n/a	n/a
Dissolved Inorganics														
Aluminum	µg/L			6	6	*				100	5 (pH<6.5)	5 (pH<6.5)	9,500	n/a
		10	***876***				6	9	73		100 (pH>=6.5)	100 (pH>=6.5)		
Calcium	mg/L	34.9	84.4	53.8	54.3	1	54.3	56.2	35	n/a	n/a	n/a	n/a	n/a
Iron	µg/L	14	17	49	20	*	20	16	17	300	300	300	n/a	n/a
Magnesium	mg/L	9.31	0.083	11.2	11.4	2	11.4	12.6	2.89	n/a	n/a	n/a	n/a	n/a
Manganese	µg/L	< 1	< 1	**1,400**	**1,420**	1	**1,420**	**1,310**	**125**	50	n/a	n/a	n/a	n/a
Potassium	mg/L	1.34	4.87	1.73	1.8	4	1.8	2.71	2.32	n/a	n/a	n/a	n/a	n/a
Sodium	mg/L	12.8	51.8	40.5	41.6	3	41.6	23.6	18	200	n/a	n/a	200	n/a
Dissolved Metals														
Antimony	µg/L	0.2	2.0	0.9	0.9	*	0.9	0.2	0.5	6	2,000	2,000	6	90
Arsenic	µg/L	0.9	3.2	2.2	2.1	5	2.1	1.1	0.8	10	5	5	10	50
Barium	µg/L	13.9	13.5	14.7	14.6	1	14.6	24.7	16.7	1,000	2,900	2,900	1,000	10,000
Beryllium	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	*	< 0.01	< 0.01	< 0.01	n/a	5.3	5.3	8	1.5
Boron	µg/L	11	14	36	35	3	35	16	10	5,000	1,500	1,500	5,000	12,000
Cadmium	µg/L									5	0.037 - 0.297	0.037 - 0.297	5	0.5 (H 0-<30)
							0.04							1.5 (H >30-<90)
		< 0.01							0.03					2.5 (H >90-<150)
				0.03	0.04	*		0.05						3.5 (H >150-<210)
			0.02											4 (H >=210)
Chromium	µg/L	1.1	***14.0***	< 0.5	< 0.5	*	< 0.5	< 0.5	0.7	50	8.9	8.9	50	10
Cobalt	µg/L	< 0.05	0.38	2.27	2.36	4	2.36	2.45	1.11	n/a	n/a	n/a	20[d]	40
Copper	µg/L						2.6			1,000	2 - 4	2 - 4	1,500	20 (H <50)
														30 (H >50-<75)
									1.9					40 (H >75-<100)
														50 (H >100-<125)
		0.7												60 (H >125-<150)
								1.3						70 (H >150-<175)
				2.9	2.6	11								80 (H >175-<200)
			9.3											90 (H >=200)
Lead	µg/L						< 0.05			10	1 - 7	1 - 7	10	40 (H<50)
									< 0.05					50 (H 50-<100)
		< 0.05		< 0.05	< 0.05	*		< 0.05						60 (H 100-<200)
			< 0.05											110 (H 200-<300)
Lithium	µg/L	1.2	0.5	2.0	1.5	*	1.5	1.8	9.4	n/a	n/a	n/a	8	n/a
Mercury	µg/L	-	-	-	-	-	-	-	-	1	0.026	0.026	1	0.25
Molybdenum	µg/L	3.92	4.80	15.8	15.7	1	15.7	10.5	1.72	n/a	73	73	250	10,000
Nickel	µg/L						5.4			n/a	25 - 150	25 - 150	80	250 (H 0-<60)
									3.5					650 (H 60-<120)
		< 0.2												1,100 (H 120-<180)
			2.9	5.4	5.4	0		4.9						1,500 (H >=180)
Selenium	µg/L	< 0.5	***1.1***	0.6	0.6	*	0.6	0.5	< 0.5	50	1	1	10	20
Silver	µg/L						< 0.02		< 0.02	n/a	0.25	0.25	20	0.5 (H <=100)
		< 0.02	< 0.02	< 0.02	< 0.02	*		< 0.02						15 (H >100)
Strontium	µg/L	90.9	228	161	163	1	163	230	199	n/a	n/a	n/a	2,500	n/a
Thallium	µg/L	0.01	0.02	0.02	0.02	*	0.02	0.02	0.02	n/a	0.8	0.8	n/a	3
Strontium	µg/L	0.13	1.75	0.36	0.38	5	0.38	0.79	0.31	n/a	n/a	n/a	2,500	n/a
Titanium	µg/L	2.3	1.4	1.9	2.1	*	2.1	2.9	1.6	n/a	100	100	n/a	1,000
Strontium	µg/L	0.10	0.44	< 0.01	0.12	*	0.12	0.14	0.08	n/a	n/a	n/a	3	n/a
Uranium	µg/L	1.09	0.03	2.14	2.17	1	2.17	1.19	0.58	20	15	15	20	85
Vanadium	µg/L	0.7	13.2	2.1	1.5	*	1.5	0.6	1.3	n/a	n/a	n/a	20	n/a
Zinc	µg/L						4			5,000	30	30	3,000	75 (H 0-<90)
									114					150 (H 90-<100)
		3		4	4	*		5						900 (H 100-<200)
			3											1,650 (H 200-<300)

Associated AGAT file(s): 15V943947, 15V944419, 16V059563, 17V278033, 17V278344, 18V310102, 19V440800, 19V442894.
All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Pathways Included: Aesthetic Objectives, Maximum Acceptable Concentrations.
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[c] Standard to protect freshwater aquatic life.
[d] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

ITALIC	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
SHADOW	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

TABLE 11: Summary of Analytical Results for Groundwater - Volatile Organic Compounds

Sample Location		MW15-2S	MW15-2D	MW15-5	Federal Guideline			BC Standard	
Sample ID		MW15-2S-150210	MW15-2D-150210	MW15-5-150210	Canadian Drinking Water Quality Guidelines (CDWQG)[b]	FIGWQG Tier 2 Residential Land Use (RL)[c]	FIGWQG Tier 2 Commercial Land Use (CL)[c]	CSR Drinking Water (DW)	CSR Aquatic Life (AW)[d]
Sample Date (yyyy mm dd)		2015 02 10	2015 02 10	2015 02 10					
Parameter	Units	Analytical Results							
Volatile Organic Compounds									
Bromodichloromethane	µg/L	< 1	< 1	< 1	n/a	8,500	8,500	100	n/a
Bromoform	µg/L	< 1	< 1	< 1	n/a	380	3,700	100	n/a
Bromomethane	µg/L	< 1	< 1	< 1	n/a	5.6	33	5.5	n/a
Carbon tetrachloride	µg/L	< 0.5	< 0.5	< 0.5	2	0.56	6.8	2	130
Chlorobenzene	µg/L	< 1	< 1	< 1	30	1.3	1.3	80	13
Chloroethane	µg/L	< 1	< 1	< 1	n/a	n/a	n/a	n/a	n/a
Chloroform	µg/L	< 1	< 1	< 1	n/a	1.8	1.8	100	20
Chloromethane	µg/L	< 1	< 1	< 1	n/a	n/a	n/a	n/a	n/a
Dibromochloromethane	µg/L	< 1	< 1	< 1	n/a	1,100	10,000	100	n/a
1,2-Dibromoethane	µg/L	< 0.3[a]	< 0.3[a]	< 0.3[a]	n/a	0.25	5.1	0.5	n/a
1,2-Dichlorobenzene	µg/L	< 0.5	< 0.5	< 0.5	3	0.7	0.7	200	7
1,3-Dichlorobenzene	µg/L	< 0.5	< 0.5	< 0.5	n/a	150	150	n/a	1,500
1,4-Dichlorobenzene	µg/L	< 0.5	< 0.5	< 0.5	1	26	26	5	260
1,1-Dichloroethane	µg/L	< 1	< 1	< 1	n/a	320	6,600	30	n/a
1,2-Dichloroethane	µg/L	< 1	< 1	< 1	5	10	100	5	1,000
1,1-Dichloroethylene	µg/L	< 1	< 1	< 1	14	39	490	14	n/a
cis-1,2-Dichloroethylene	µg/L	< 1	< 1	< 1	n/a	1.6	30	8	n/a
trans-1,2-Dichloroethylene	µg/L	< 1	< 1	< 1	n/a	1.6	30	80	n/a
Dichloromethane	µg/L	< 1	< 1	< 1	50	98	98	50	980
1,2-Dichloropropane	µg/L	< 1	< 1	< 1	n/a	16	330	4.5	n/a
cis-1,3-Dichloropropene	µg/L	< 1	< 1	< 1	n/a	n/a	n/a	1.5	n/a
trans-1,3-Dichloropropene	µg/L	< 1	< 1	< 1	n/a	n/a	n/a	1.5	n/a
Methyl ethyl ketone	µg/L	< 10	< 10	< 10	n/a	150,000	150,000	2,500	n/a
Methyl isobutyl ketone	µg/L	< 10	< 10	< 10	n/a	58,000	58,000	n/a	n/a
1,1,1,2-Tetrachloroethane	µg/L	< 1	< 1	< 1	n/a	3.4	66	6	n/a
1,1,2,2-Tetrachloroethane	µg/L	< 1[a]	< 1[a]	< 1[a]	n/a	3.2	63	0.8	n/a
Tetrachloroethylene	µg/L	< 1	< 1	< 1	10	110	110	30	1,100
Total Trihalomethanes	µg/L	< 2	< 2	< 2	100	n/a	n/a	100	n/a
1,2,4-Trichlorobenzene	µg/L	< 1	< 1	< 1	n/a	24	24	5.5	240
1,1,1-Trichloroethane	µg/L	< 1	< 1	< 1	n/a	640	1,100	8,000	n/a
1,1,2-Trichloroethane	µg/L	< 1	< 1	< 1	n/a	4.7	91	3	n/a
Trichloroethylene	µg/L	< 1	< 1	< 1	5	20	29	5	200
Trichlorofluoromethane	µg/L	< 1	< 1	< 1	n/a	n/a	n/a	1,000	n/a
Vinyl chloride	µg/L	< 1	< 1	< 1	2	1.1	13	2	n/a

Associated AGAT file(s): 15V943947.
All terms defined within the body of SNC-Lavalin's report.
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- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
RPD Denotes relative percent difference.
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Laboratory detection limit exceeds regulatory standard/guideline.
[b] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.
[c] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.
[d] Standard to protect freshwater aquatic life.

TABLE 12: Summary of Analytical Results for Groundwater - PCBs

Sample Location	Sample ID	Sample Date (yyyy mm dd)	PCBs			
			Arochlor 1242 µg/L	Arochlor 1254 µg/L	Arochlor 1260 µg/L	Total PCBs µg/L
MW15-4	MW15-4-150211	2015 02 11	< 0.009	< 0.009	< 0.009	< 0.009
MW15-5	MW15-5-150211	2015 02 11	< 0.009	< 0.009	< 0.009	< 0.009
Federal Guideline						
Canadian Drinking Water Quality Guidelines (CDWQG) [a]			n/a	n/a	n/a	n/a
FIGWQG Tier 2 Residential Land Use (RL) [b]			n/a	n/a	n/a	n/a
FIGWQG Tier 2 Commercial Land Use (CL) [b]			n/a	n/a	n/a	n/a
BC Standard						
CSR Drinking Water (DW)			n/a	n/a	n/a	n/a
CSR Aquatic Life (AW) [c]			n/a	n/a	n/a	n/a

Associated AGAT file(s): 15V944419.

All terms defined within the body of SNC-Lavalin's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.

- Denotes analysis not conducted.

n/a Denotes no applicable standard/guideline.

RPD Denotes relative percent difference.

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD	Concentration greater than Canadian Drinking Water Quality Guidelines (CDWQG) Guideline
ITALIC	Concentration greater than FIGWQG Tier 2 Residential Land Use (RL) Guideline
UNDERLINE	Concentration greater than FIGWQG Tier 2 Commercial Land Use (CL) Guideline
SHADED	Concentration greater than CSR Drinking Water (DW) standard
OUTLINE	Concentration greater than CSR Aquatic Life (AW) standard

[a] Pathways Included: Aesthethic Objectives, Maximum Acceptable Concentrations.

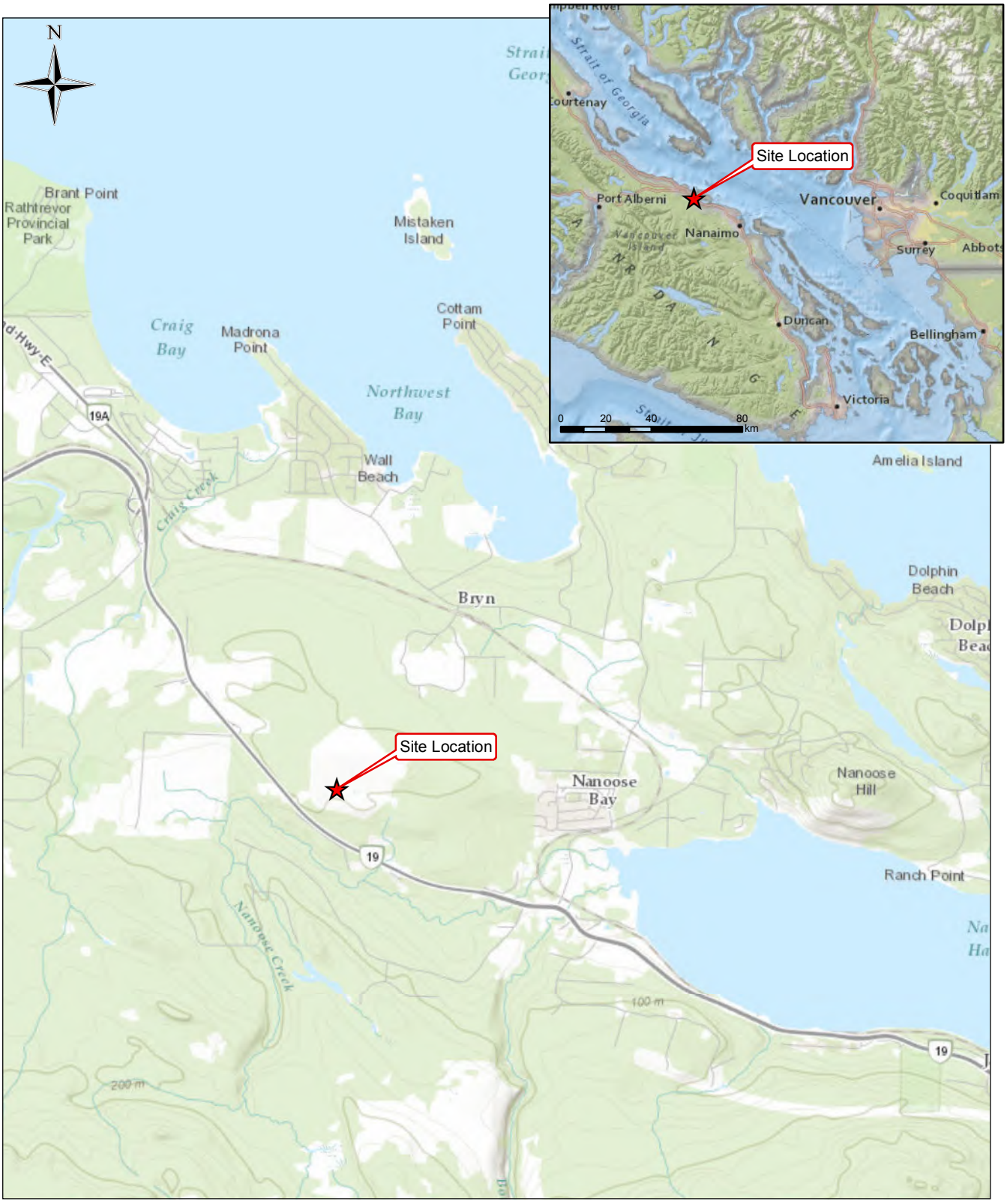
[b] Pathways Included: Freshwater Aquatic Life - Coarse, Inhalation - Coarse, Soil Organisms Direct Contact - Coarse.

[c] Standard to protect freshwater aquatic life.

[d] Applicable at all sites irrespective of water use.

Drawings

- 626268-301 Site Location
- 626268-302 Wide Area Site Plan
- 626268-303 Detailed Soil Analytical Results – Federal Standards
- 626268-304 Detailed Soil Analytical Results – Provincial Standards
- 626268-305 Detailed Groundwater Analytical Results – Federal Standards
- 626268-306 Detailed Groundwater Analytical Results – Provincial Standards
- 626268-307 Potentiometric Elevations and Inferred Contours (2019)
- 626268-308 Areas of Environmental Concern
- 626268-309 Proposed Extent of Remedial Excavations



LEGEND

★ Site Location

NOTES

1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.

SNC·LAVALIN

CLIENT NAME:	PROJECT LOCATION:
Public Works and Government Services Canada	Nanoose TX Nanoose Bay, BC

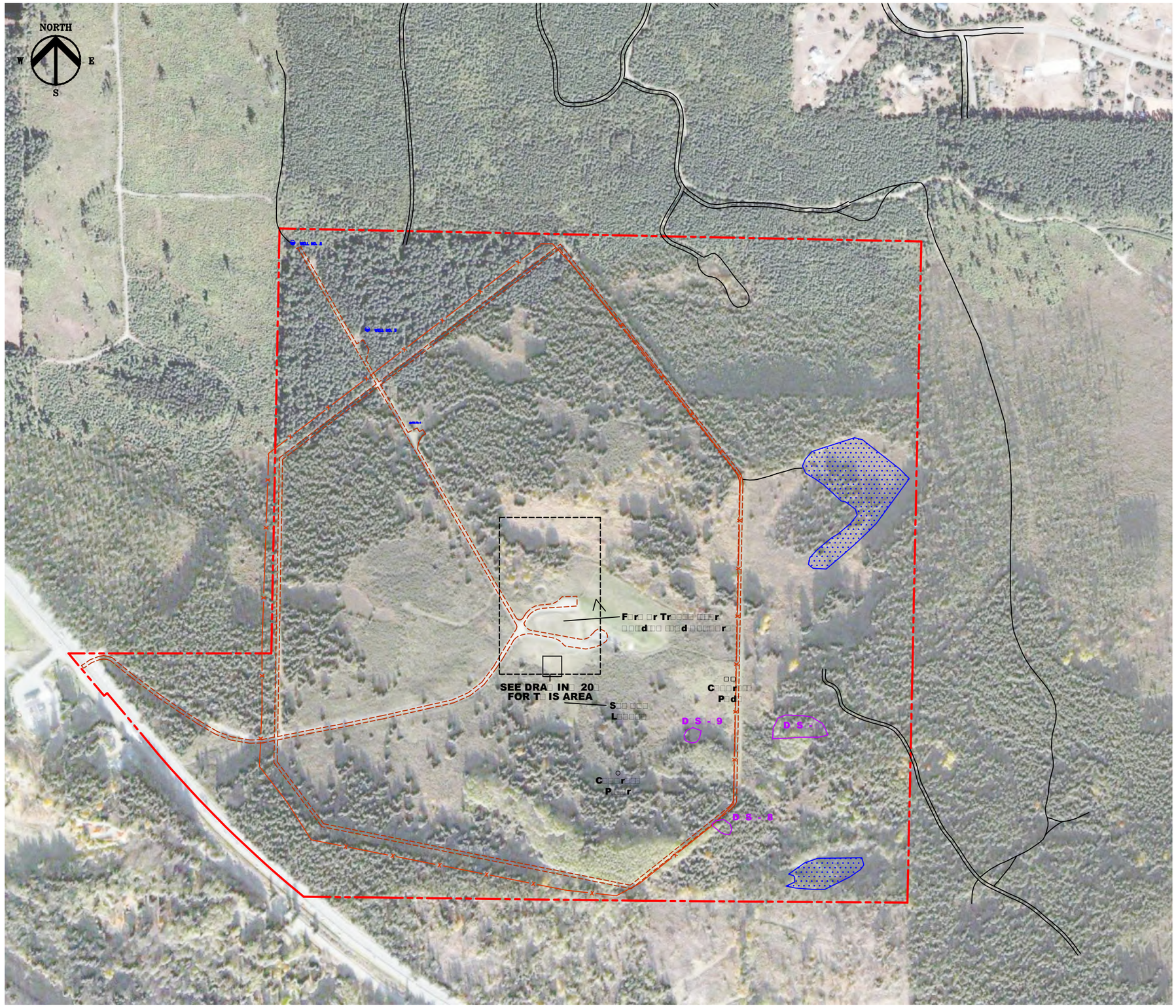
Site Location

0 0.5 1 2 3 4 Kilometers

BY: PB	DATE: 2016/03/28	REF No:	REV: 0
CHK'D: CS	SCALE: 1:55,000	626268-301	

Project Path: "P:\Current Projects\Public Works and Gov't Services Canada\626268-Nanaimo Transmitter"

MXD Path: \\Proj_srv\projects\Current Projects\PWGSC\626268-Nanaimo Transmitter\4.0 Execution\4.5 GIS and Drawings\GIS\MapSeries\100 SERIES\626268-101.mxd



LEGEND

- PROPERTY BOUNDARY
- PAVED ROAD
- GRAVEL ROAD
- FENCE
- FORMER STRUCTURE (LOCATION APPROXIMATE)
- WETLAND
- ARCHAEOLOGICAL SITES
- DRINKING WATER WELL
- BOREHOLE
- MONITORING WELL
- SOIL SAMPLE

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
FIGURE 2	2004–03	KEYSTONE ENVIRONMENTAL
61323–1	2018–02–08	JE ANDERSON & ASSOCIATES

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2019–07–23	ISSUED AS FINAL	DRMM	IM
0	2019–03–25	ISSUED AS DRAFT	DRMM	DG

0 100 200 300 METRES

SNC·LAVALIN

CLIENT NAME:
PUBLIC SERVICES AND PROCUREMENT CANADA

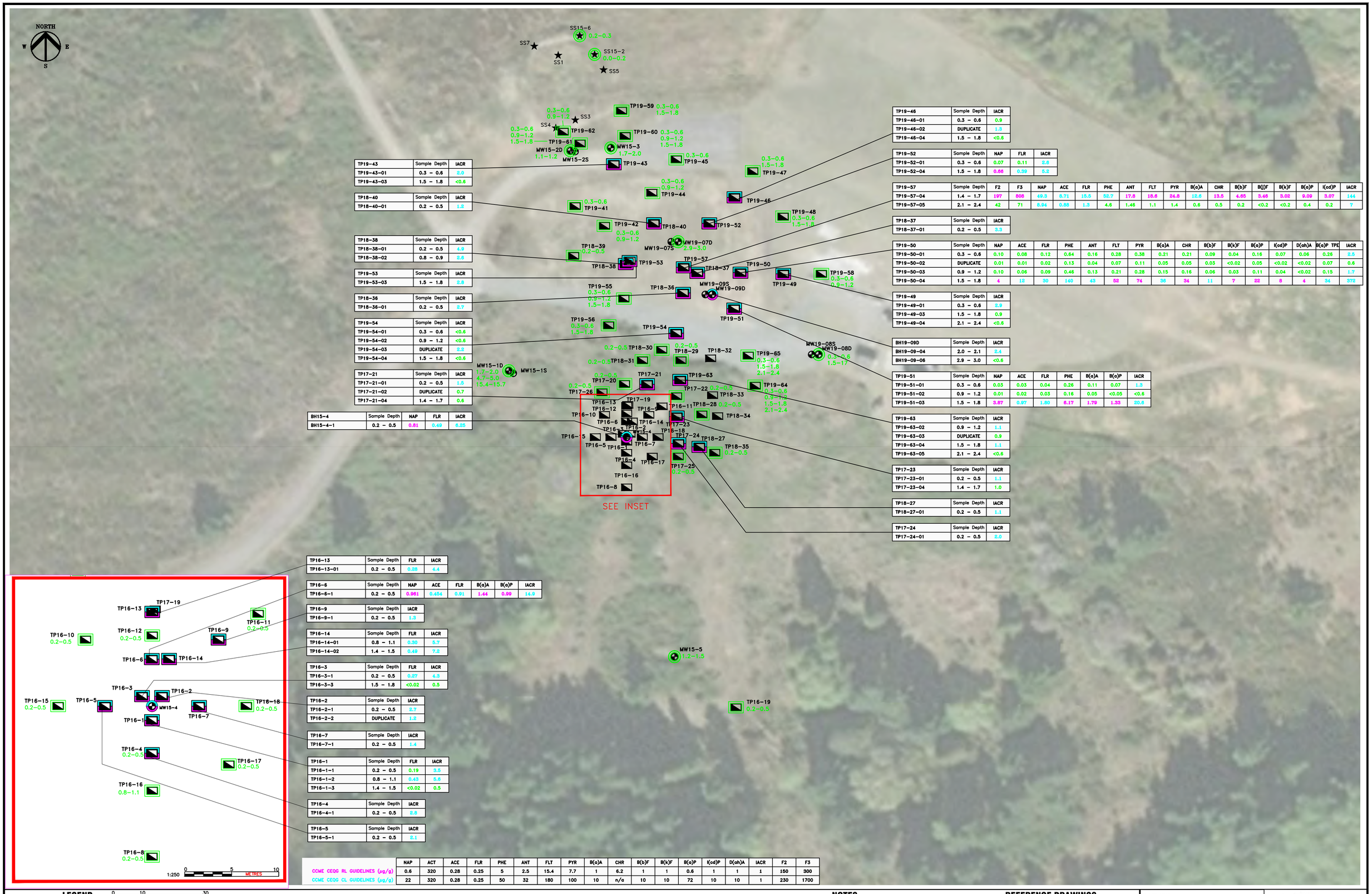
PROJECT LOCATION:
NANOOSE TX
NANOOSE BAY, BC

TITLE:

IDE AREA SITE PLAN

DWN BY: PES	SCALE: 1:6,000	DATE: 2018–02–15	DWG No: 626268-302 REV.: 0
CHK'D: CS	PLOT: 20190724.1314	CADFILE: 626268R7	

PATH: D:\PWGSC–626268–NANOOSE\CAD\626268R7.DWG



TP19-43	Sample Depth	IACR
TP19-43-01	0.3 – 0.6	2.0
TP19-43-03	1.5 – 1.8	<0.6

TP18-40	Sample Depth	IACR
TP18-40-01	0.2 – 0.5	1.3

TP18-38	Sample Depth	IACR
TP18-38-01	0.2 – 0.5	4.9
TP18-38-02	0.8 – 0.9	2.6

TP19-53	Sample Depth	IACR
TP19-53-03	1.5 – 1.8	2.8

TP18-36	Sample Depth	IACR
TP18-36-01	0.2 – 0.5	2.7

TP19-54	Sample Depth	IACR
TP19-54-01	0.3 – 0.6	<0.6
TP19-54-02	0.9 – 1.2	<0.6
TP19-54-03	DUPLICATE	2.2
TP19-54-04	1.5 – 1.8	<0.6

TP17-21	Sample Depth	IACR
TP17-21-01	0.2 – 0.5	1.5
TP17-21-02	DUPLICATE	0.7
TP17-21-04	1.4 – 1.7	0.6

BH15-4	Sample Depth	NAP	FLR	IACR
BH15-4-1	0.2 – 0.5	0.81	0.49	6.25

TP19-46	Sample Depth	IACR
TP19-46-01	0.3 – 0.6	0.9
TP19-46-02	DUPLICATE	1.3
TP19-46-04	1.5 – 1.8	<0.6

TP19-52	Sample Depth	NAP	FLR	IACR
TP19-52-01	0.3 – 0.6	0.07	0.11	2.6
TP19-52-04	1.5 – 1.8	0.66	0.39	5.2

TP19-57	Sample Depth	F2	F3	NAP	ACE	FLR	PHE	ANT	FLT	PYR	B(a)A	CHR	B(b)F	B(k)F	B(a)P	I(cd)P	IACR
TP19-57-04	1.4 – 1.7	197	806	49.3	8.71	15.5	82.7	17.8	18.6	24.8	12.6	13.5	4.65	3.46	3.02	9.09	3.07	144
TP19-57-05	2.1 – 2.4	42	71	8.04	0.88	1.3	4.6	1.46	1.1	1.4	0.6	0.5	0.2	<0.2	<0.2	0.4	0.2	7

TP18-37	Sample Depth	IACR
TP18-37-01	0.2 – 0.5	3.3

TP19-50	Sample Depth	NAP	ACE	FLR	PHE	ANT	FLT	PYR	B(a)A	CHR	B(b)F	B(k)F	B(a)P	I(cd)P	D(ah)A	B(a)P TPE	IACR
TP19-50-01	0.3 – 0.6	0.10	0.08	0.12	0.64	0.16	0.28	0.38	0.21	0.21	0.09	0.04	0.16	0.07	0.06	0.26	2.5
TP19-50-02	DUPLICATE	0.01	0.01	0.02	0.13	0.04	0.07	0.11	0.05	0.05	0.03	<0.02	0.05	<0.02	<0.02	0.07	0.6
TP19-50-03	0.9 – 1.2	0.10	0.06	0.09	0.46	0.13	0.21	0.28	0.15	0.16	0.06	0.03	0.11	0.04	<0.02	0.15	1.7
TP19-50-04	1.5 – 1.8	4	12	30	140	43	52	74	36	34	11	7	22	8	4	34	372

TP19-49	Sample Depth	IACR
TP19-49-01	0.3 – 0.6	2.9
TP19-49-03	1.5 – 1.8	0.9
TP19-49-04	2.1 – 2.4	<0.6

BH19-09D	Sample Depth	IACR
BH19-09-04	2.0 – 2.1	2.4
BH19-09-06	2.9 – 3.0	<0.6

TP19-51	Sample Depth	NAP	ACE	FLR	PHE	B(a)A	B(a)P	IACR
TP19-51-01	0.3 – 0.6	0.03	0.03	0.04	0.26	0.11	0.07	1.3
TP19-51-02	0.9 – 1.2	0.01	0.02	0.03	0.16	0.05	<0.05	<0.6
TP19-51-03	1.5 – 1.8	3.87	0.97	1.80	6.17	1.79	1.33	20.6

TP19-63	Sample Depth	IACR
TP19-63-02	0.9 – 1.2	1.1
TP19-63-03	DUPLICATE	0.9
TP19-63-04	1.5 – 1.8	1.1
TP19-63-05	2.1 – 2.4	<0.6

TP17-23	Sample Depth	IACR
TP17-23-01	0.2 – 0.5	1.1
TP17-23-04	1.4 – 1.7	1.0

TP18-27	Sample Depth	IACR
TP18-27-01	0.2 – 0.5	1.1

TP17-24	Sample Depth	IACR
TP17-24-01	0.2 – 0.5	2.0

TP16-13	Sample Depth	FLR	IACR
TP16-13-01	0.2 – 0.5	0.28	4.4

TP16-6	Sample Depth	NAP	ACE	FLR	B(a)A	B(a)P	IACR
TP16-6-1	0.2 – 0.5	0.961	0.454	0.91	1.44	0.99	14.9

TP16-9	Sample Depth	IACR
TP16-9-1	0.2 – 0.5	1.3

TP16-14	Sample Depth	FLR	IACR
TP16-14-01	0.8 – 1.1	0.30	5.7
TP16-14-02	1.4 – 1.5	0.49	7.2

TP16-3	Sample Depth	FLR	IACR
TP16-3-1	0.2 – 0.5	0.27	4.3
TP16-3-3	1.5 – 1.8	<0.02	0.5

TP16-2	Sample Depth	IACR
TP16-2-1	0.2 – 0.5	2.7
TP16-2-2	DUPLICATE	1.2

TP16-7	Sample Depth	IACR
TP16-7-1	0.2 – 0.5	1.4

TP16-1	Sample Depth	FLR	IACR
TP16-1-1	0.2 – 0.5	0.19	3.5
TP16-1-2	0.8 – 1.1	0.43	5.6
TP16-1-3	1.4 – 1.5	<0.02	0.5

TP16-4	Sample Depth	IACR
TP16-4-1	0.2 – 0.5	2.8

TP16-5	Sample Depth	IACR
TP16-5-1	0.2 – 0.5	2.1

MW15-5
1.2-1.5

TP16-19
0.2-0.5

	NAP	ACT	ACE	FLR	PHE	ANT	FLT	PYR	B(a)A	CHR	B(b)F	B(k)F	B(a)P	I(cd)P	D(ah)A	IACR	F2	F3
CCME CEQG RL GUIDELINES (µg/g)	0.6	320	0.28	0.25	5	2.5	15.4	7.7	1	6.2	1	1	0.6	1	1	1	150	300
CCME CEQG CL GUIDELINES (µg/g)	22	320	0.28	0.25	50	32	180	100	10	n/a	10	10	72	10	10	1	230	1700

LEGEND

0 10 30 METRES

- SUBJECT PROPERTY LIMITS
- LOT BOUNDARY
- BOREHOLE
- TEST PIT
- CONCENTRATIONS ARE LESS OR EQUAL TO THE APPLICABLE GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CCME CEQG CL GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CCME CEQG RL GUIDELINES

0.2-0.5 SAMPLE DEPTHS

LOCATION

ANALYTICAL SOIL RESULTS				
BH15-4	Sample Depth	NAP	FLR	IACR
BH15-4-1	0.2 – 0.5	0.81	0.49	6.25

SAMPLE ID

DEPTH OF SAMPLE (m)

MAGENTA – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CCME CEQG RL GUIDELINES

CYAN – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CCME CEQG CL GUIDELINES

NAP	NAPHTHALENE
ACT	ACENAPHTHYLENE
ACE	ACENAPHTHENE
FLR	FLUORENE
PHE	PHENANTHRENE
ANT	ANTHRACENE
FLT	FLUORANTHENE
PYR	PYRENE
B(A)A	BENZ(A) ANTHRACENE
CHR	CHRYSENE
B(b)F	BENZO(B) FLUORANTHENE
B(j)F	BENZO(J) FLUORANTHENE
B(k)F	BENZO(K) FLUORANTHENE
B(b+j)F	BENZO(B+J) FLUORANTHENE
B(ghi)P	BENZO(G,H,I)PERYLENE
B(a)P	BENZO(A)PYRENE
I(cd)P	INDENO(1,2,3-CD) PYRENE
D(ah)A	DIBENZ(A,H) ANTHRACENE
IACR	INDEX OF ADDITIVE CANCER RISK

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2019-07-23	ISSUED AS FINAL	DRMM	IM
0	2019-03-25	ISSUED AS DRAFT	DRMM	DG

CLIENT NAME:
PUBLIC SERVICES AND PROCUREMENT CANADA

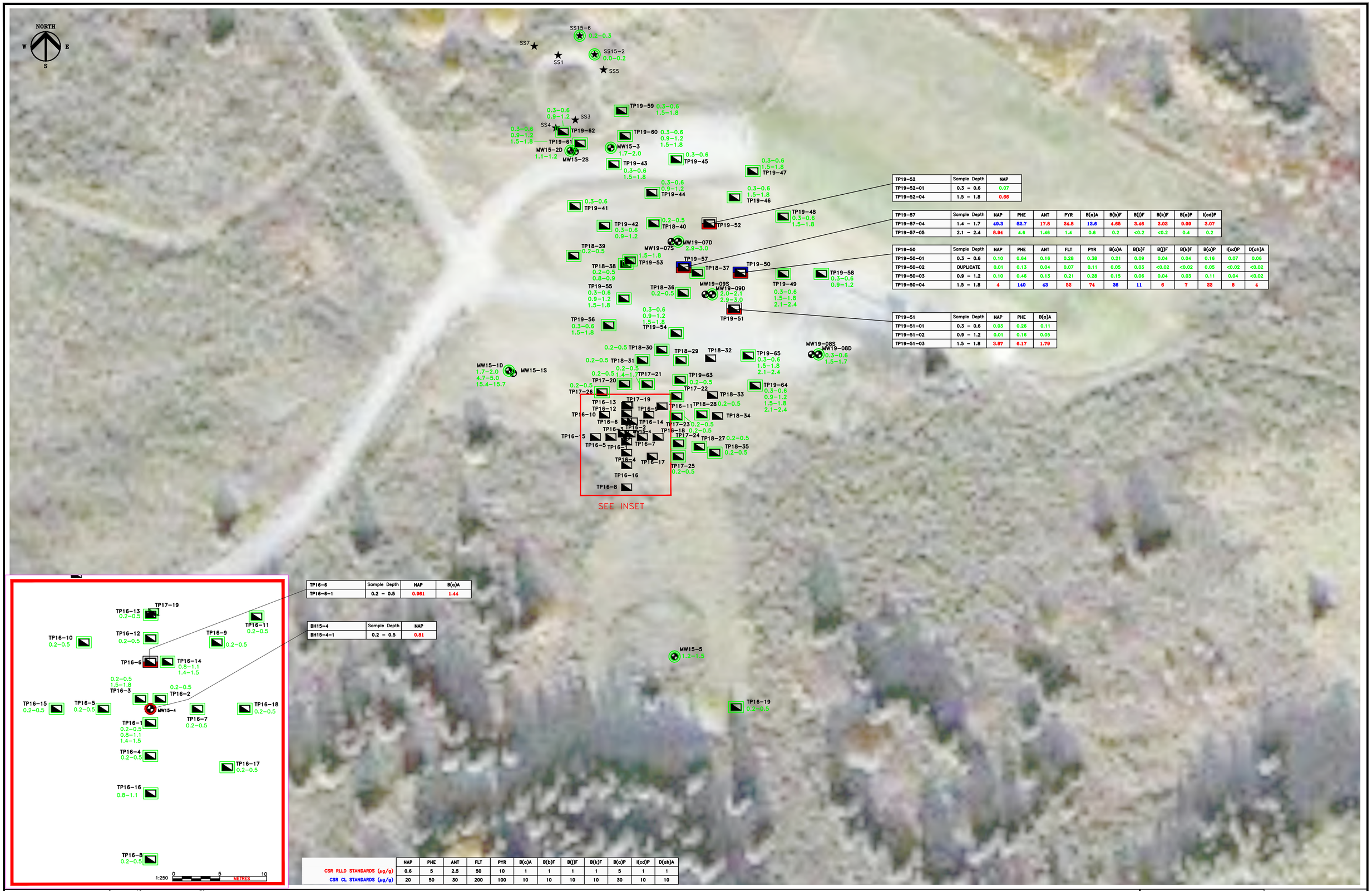
PROJECT LOCATION:
NANOOSE TX,
NANOOSE BAY, BC

SNC·LAVALIN

TITLE:
ANALYTICAL RESULTS FOR SOIL - FEDERAL STANDARDS

DWN BY: DRMM | SCALE: 1:750 | DATE: 2019-03-05 | DWG No: 626268-303 | REV.: 1
CHK'D: DG | PLOT: 20190724.1315 | CADFILE: 626268R7

PATH: D:\PWGSC-626268-NANOOSE\CAD\626268R7.DWG



TP19-52	Sample Depth	NAP
TP19-52-01	0.3 – 0.6	0.07
TP19-52-04	1.5 – 1.8	0.66

TP19-57	Sample Depth	NAP	PHE	ANT	PYR	B(a)A	B(b)F	B(j)F	B(k)F	B(a)P	I(cd)P
TP19-57-04	1.4 – 1.7	49.3	52.7	17.8	24.8	12.6	4.65	3.46	3.02	9.09	3.07
TP19-57-05	2.1 – 2.4	8.94	4.6	1.46	1.4	0.6	0.2	<0.2	<0.2	0.4	0.2

TP19-50	Sample Depth	NAP	PHE	ANT	FLT	PYR	B(a)A	B(b)F	B(j)F	B(k)F	B(a)P	I(cd)P	D(ah)A
TP19-50-01	0.3 – 0.6	0.10	0.64	0.16	0.28	0.38	0.21	0.09	0.04	0.04	0.16	0.07	0.06
TP19-50-02	DUPLICATE	0.01	0.13	0.04	0.07	0.11	0.05	0.03	<0.02	<0.02	0.05	<0.02	<0.02
TP19-50-03	0.9 – 1.2	0.10	0.46	0.13	0.21	0.28	0.15	0.06	0.04	0.03	0.11	0.04	<0.02
TP19-50-04	1.5 – 1.8	4	140	43	52	74	36	11	6	7	22	8	4

TP19-51	Sample Depth	NAP	PHE	B(a)A
TP19-51-01	0.3 – 0.6	0.03	0.26	0.11
TP19-51-02	0.9 – 1.2	0.01	0.16	0.05
TP19-51-03	1.5 – 1.8	3.87	6.17	1.79

TP16-6	Sample Depth	NAP	B(a)A
TP16-6-1	0.2 – 0.5	0.061	1.44

BH15-4	Sample Depth	NAP
BH15-4-1	0.2 – 0.5	0.81

	NAP	PHE	ANT	FLT	PYR	B(a)A	B(b)F	B(j)F	B(k)F	B(a)P	I(cd)P	D(ah)A
CSR RLLD STANDARDS (µg/g)	0.6	5	2.5	50	10	1	1	1	1	5	1	1
CSR CL STANDARDS (µg/g)	20	50	30	200	100	10	10	10	10	30	10	10

LEGEND

0 10 30 METRES

- SUBJECT PROPERTY LIMITS
- LOT BOUNDARY
- BOREHOLE
- TEST PIT
- CONCENTRATIONS ARE LESS OR EQUAL TO THE APPLICABLE GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR CL STANDARDS
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR RLLD STANDARDS

0.2-0.5 SAMPLE DEPTHS

LOCATION

TP19-XX	Sample Depth	NAP	PHE	B(a)A
TP19-XX-01	1.5 – 1.8	0.2	6.17	15

ANALYTICAL SOIL RESULTS

SAMPLE ID

DEPTH OF SAMPLE (m)

GREEN – CONCENTRATIONS ARE LESS OR EQUAL TO THE APPLICABLE STANDARDS

RED – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR RLLD STANDARDS

BLUE – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR CL STANDARDS

NAP	NAPHTHALENE
ACT	ACENAPHTHYLENE
ACE	ACENAPHTHENE
FLR	FLUORENE
PHE	PHENANTHRENE
ANT	ANTHRACENE
FLT	FLUORANTHENE
PYR	PYRENE
B(A)A	BENZ(A) ANTHRACENE
CHR	CHRYSENE
B(b)F	BENZO(B) FLUORANTHENE
B(j)F	BENZO(J) FLUORANTHENE
B(k)F	BENZO(K) FLUORANTHENE
B(b+j)F	BENZO(B+J) FLUORANTHENE
B(ghi)P	BENZO(G,H,I)PERYLENE
B(a)P	BENZO(A)PYRENE
I(cd)P	INDENO(1,2,3-CD) PYRENE
D(ah)A	DIBENZ(A,H) ANTHRACENE
IACR	INDEX OF ADDITIVE CANCER RISK

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

–	–	–
DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2019-07-23	ISSUED AS FINAL	DRMM	IM
0	2019-03-25	ISSUED AS DRAFT	DRMM	DG

CLIENT NAME: PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION: NANOOSE TX, NANOOSE BAY, BC

SNC·LAVALIN

TITLE: **ANALYTICAL RESULTS FOR SOIL - PROVINCIAL STANDARDS**

DWN BY: DRMM | SCALE: 1:750 | DATE: 2019-03-05 | DWG No: | REV.: 1

CHK'D: DG | PLOT: 20190724.1316 | CADFILE: 626268R7 | 626268-30

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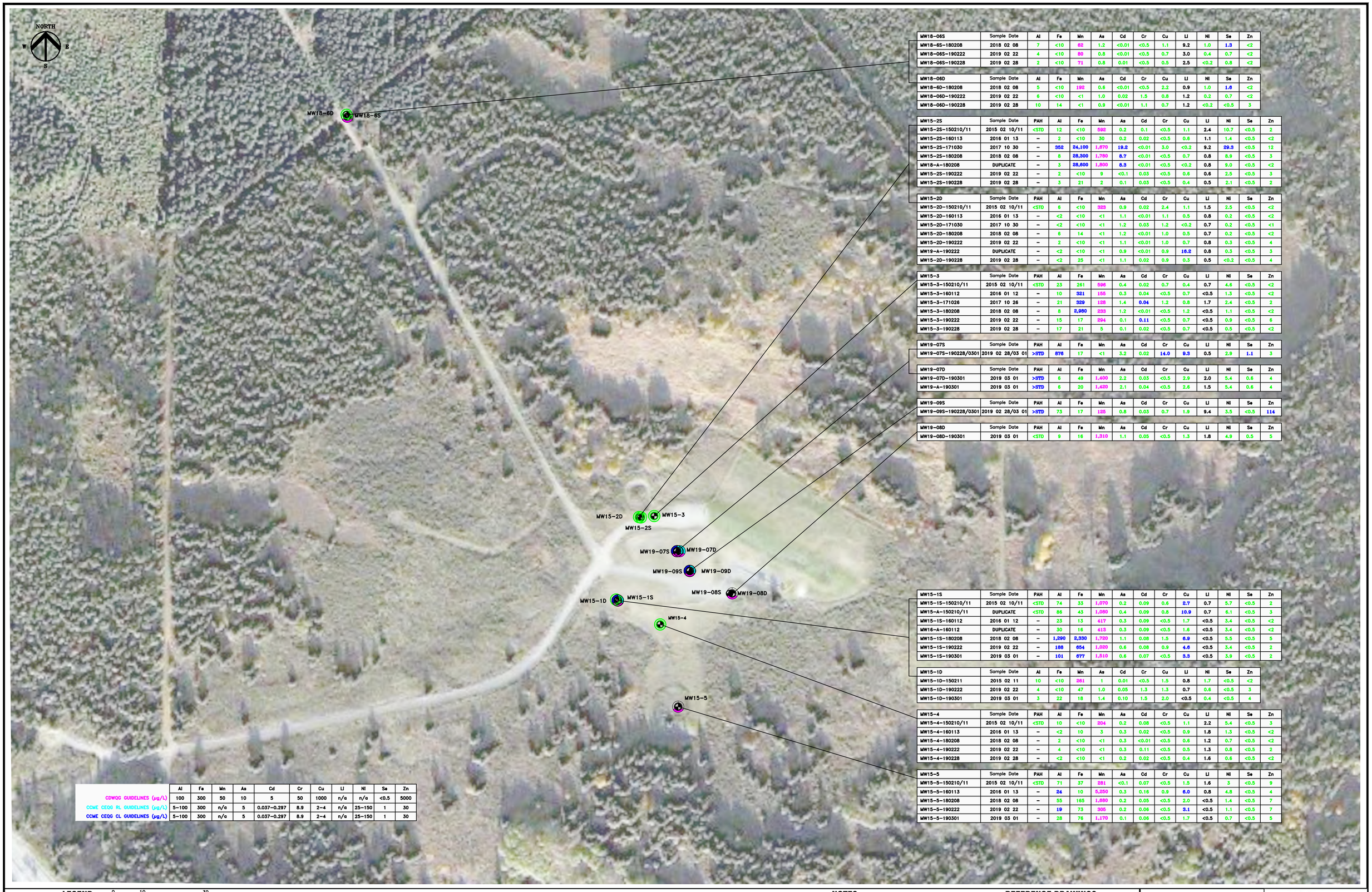

MW18-06S	Sample Date	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW18-6S-180208	2018 02 08	7	<10	62	1.2	<0.01	<0.5	1.1	9.2	1.0	1.3	<2
MW18-06S-190222	2019 02 22	4	<10	80	0.8	<0.01	<0.5	0.7	3.0	0.4	0.7	<2
MW18-06S-190228	2019 02 28	2	<10	71	0.8	0.01	<0.5	0.5	2.5	<0.2	0.8	<2

MW18-06D	Sample Date	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW18-6D-180208	2018 02 08	5	<10	192	0.6	<0.01	<0.5	2.2	0.9	1.0	1.6	<2
MW18-06D-190222	2019 02 22	6	<10	<1	1.0	0.02	1.5	0.8	1.2	0.2	0.7	<2
MW18-06D-190228	2019 02 28	10	14	<1	0.9	<0.01	1.1	0.7	1.2	<0.2	<0.5	3

MW15-2S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-2S-150210/11	2015 02 10/11	<STD	12	<10	592	0.2	0.1	<0.5	1.1	2.4	10.7	<0.5	2
MW15-2S-160113	2016 01 13	–	2	<10	30	0.2	0.02	<0.5	0.6	1.1	1.4	<0.5	<2
MW15-2S-171030	2017 10 30	–	352	24,100	1,870	19.2	<0.01	3.0	<0.2	9.2	29.3	<0.5	12
MW15-2S-180208	2018 02 08	–	8	28,300	1,780	8.7	<0.01	<0.5	0.7	0.8	8.9	<0.5	3
MW18-A-180208	DUPLICATE	–	3	28,600	1,800	8.3	<0.01	<0.5	<0.2	0.8	9.0	<0.5	<2
MW15-2S-190222	2019 02 22	–	2	<10	9	<0.1	0.03	<0.5	0.6	0.6	2.5	<0.5	3
MW15-2S-190228	2019 02 28	–	3	21	2	0.1	0.03	<0.5	0.4	0.5	2.1	<0.5	2

MW15-2D	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-2D-150210/11	2015 02 10/11	<STD	6	<10	323	0.9	0.02	2.4	1.1	1.5	2.5	<0.5	<2
MW15-2D-160113	2016 01 13	–	<2	<10	<1	1.1	<0.01	1.1	0.5	0.8	0.2	<0.5	<2
MW15-2D-171030	2017 10 30	–	<2	<10	<1	1.2	0.03	1.2	<0.2	0.7	0.2	<0.5	<1
MW15-2D-180208	2018 02 08	–	6	14	<1	1.2	<0.01	1.0	0.5	0.7	0.2	<0.5	<2
MW15-2D-190222	2019 02 22	–	2	<10	<1	1.1	<0.01	1.0	0.7	0.8	0.3	<0.5	4
MW19-A-190222	DUPLICATE	–	<2	<10	<1	0.9	<0.01	0.9	16.2	0.8	0.3	<0.5	3
MW15-2D-190228	2019 02 28	–	<2	25	<1	1.1	0.02	0.9	0.3	0.5	<0.2	<0.5	4

MW15-3	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-3-150210/11	2015 02 10/11	<STD	23	261	596	0.4	0.02	0.7	0.4	0.7	4.6	<0.5	<2
MW15-3-160112	2016 01 12	–	10	321	155	0.3	0.04	<0.5	0.7	<0.5	1.3	<0.5	<2
MW15-3-171026	2017 10 26	–	21	329	128	1.4	0.04	1.2	0.8	1.7	2.4	<0.5	2
MW15-3-180208	2018 02 08	–	8	2,980	233	1.2	<0.01	<0.5	1.2	<0.5	1.1	<0.5	<2
MW15-3-190222	2019 02 22	–	15	17	294	0.1	0.11	<0.5	0.7	<0.5	0.9	<0.5	6
MW15-3-190228	2019 02 28	–	17	21	5	0.1	0.02	<0.5	0.7	<0.5	0.5	<0.5	<2

MW19-07S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-07S-190228/0301	2019 02 28/03 01	>STD	876	17	<1	3.2	0.02	14.0	9.3	0.5	2.9	1.1	3

MW19-07D	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-07D-190301	2019 03 01	>STD	6	49	1,400	2.2	0.03	<0.5	2.9	2.0	5.4	0.6	4
MW19-A-190301	2019 03 01	>STD	6	20	1,420	2.1	0.04	<0.5	2.6	1.5	5.4	0.6	4

MW19-09S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-09S-190228/0301	2019 02 28/03 01	>STD	73	17	125	0.8	0.03	0.7	1.9	9.4	3.5	<0.5	114

MW19-08D	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-08D-190301	2019 03 01	<STD	9	16	1,310	1.1	0.05	<0.5	1.3	1.8	4.9	0.5	5

MW15-1S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-1S-150210/11	2015 02 10/11	<STD	74	33	1,070	0.2	0.09	0.6	2.7	0.7	5.7	<0.5	2
MW15-A-150210/11	DUPLICATE	<STD	86	43	1,080	0.4	0.09	0.8	10.9	0.7	6.1	<0.5	3
MW15-1S-160112	2016 01 12	–	23	13	417	0.3	0.09	<0.5	1.7	<0.5	3.4	<0.5	<2
MW16-A-160112	DUPLICATE	–	30	16	413	0.3	0.09	<0.5	1.6	<0.5	3.4	<0.5	<2
MW15-1S-180208	2018 02 08	–	1,290	2,330	1,720	1.1	0.08	1.5	6.9	<0.5	5.5	<0.5	5
MW15-1S-190222	2019 02 22	–	188	654	1,020	0.6	0.08	0.9	4.6	<0.5	3.4	<0.5	2
MW15-1S-190301	2019 03 01	–	101	677	1,510	0.6	0.07	<0.5	3.3	<0.5	3.9	<0.5	2

MW15-1D	Sample Date	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-1D-150211	2015 02 11	10	<10	261	1	0.01	<0.5	1.5	0.8	1.7	<0.5	<2
MW15-1D-190222	2019 02 22	4	<10	47	1.0	0.05	1.3	1.3	0.7	0.6	<0.5	3
MW15-1D-190301	2019 03 01	3	22	18	1.4	0.10	1.5	2.0	<0.5	0.4	<0.5	4

MW15-4	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-4-150210/11	2015 02 10/11	<STD	10	<10	204	0.2	0.08	<0.5	1.1	2.2	5.4	<0.5	3
MW15-4-160113	2016 01 13	–	<2	10	3	0.3	0.02	<0.5	0.9	1.8	1.3	<0.5	<2
MW15-4-180208	2018 02 08	–	2	<10	<1	0.3	<0.01	<0.5	0.6	1.2	0.7	<0.5	<2
MW15-4-190222	2019 02 22	–	4	<10	<1	0.3	0.11	<0.5	0.5	1.3	0.8	<0.5	2
MW15-4-190228	2019 02 28	–	<2	<10	<1	0.2	0.02	<0.5	0.4	1.6	0.6	<0.5	<2

MW15-5	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-5-150210/11	2015 02 10/11	<STD	71	37	281	<0.1	0.07	<0.5	1.5	1.6	3	<0.5	9
MW15-5-160113	2016 01 13	–	24	10	5,250	0.3	0.16	0.9	6.0	0.8	4.8	<0.5	4
MW15-5-180208	2018 02 08	–	55	165	1,580	0.2	0.05	<0.5	2.0	<0.5	1.4	<0.5	7
MW15-5-190222	2019 02 22	–	19	73	305	0.2	0.06	<0.5	3.1	<0.5	1.1	<0.5	7
MW15-5-190301	2019 03 01	–	28	76	1,170	0.1	0.06	<0.5	1.7	<0.5	0.7	<0.5	5

	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
CDWQG GUIDELINES (µg/L)	100	300	50	10	5	50	1000	n/a	n/a	<0.5	5000
CCME CEQG RL GUIDELINES (µg/L)	5–100	300	n/a	5	0.037–0.297	8.9	2–4	n/a	25–150	1	30
CCME CEQG CL GUIDELINES (µg/L)	5–100	300	n/a	5	0.037–0.297	8.9	2–4	n/a	25–150	1	30

LEGEND

0 10 30 METRES

- SUBJECT PROPERTY LIMITS
- LOT BOUNDARY
- MONITORING WELL
- CONCENTRATIONS ARE LESS OR EQUAL TO THE APPLICABLE GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CEWQG GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CCME CEQG RL GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CCME CEQG CL GUIDELINES

LOCATION

ANALYTICAL GROUNDWATER RESULTS

MW19-09S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-09S-190228/0301	2019 02 28/03 01	>STD	73	17	125	0.8	0.03	0.7	1.9	9.4	3.5	<0.5	114

SAMPLE ID

DEPTH OF SAMPLE (m)

BLUE – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CCME CEQG CL GUIDELINES

MAGENTA – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CDWQG GUIDELINES

GREEN – CONCENTRATIONS ARE LESS THAN THE APPLICABLE STANDARDS

Al	ALUMINIUM
Fe	IRON
Mn	MANGANESE
As	ARSENIC
Cd	CADMIUM
Cr	CHROMIUM
Cu	COPPER
Li	LITHIUM
Ni	NICKEL
Se	SELENIUM
Zn	ZINC

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2019-03-27	ISSUED AS FINAL	DRMM	IM
0	2019-03-25	ISSUED AS DRAFT	DRMM	DG

CLIENT NAME: PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION: NANOOSE TX, NANOOSE BAY, BC

SNC·LAVALIN

TITLE: ANAL□TICAL RES□LTS FOR □RO□ND□ATER - FEDERAL STANDARDS

DWN BY: DRMM | SCALE: 1:750 | DATE: 2019-03-05 | DWG No: 626268-30 | REV.: 1

CHK'D: DG | PLOT: 20190724.1342 | CADFILE: 626268R7

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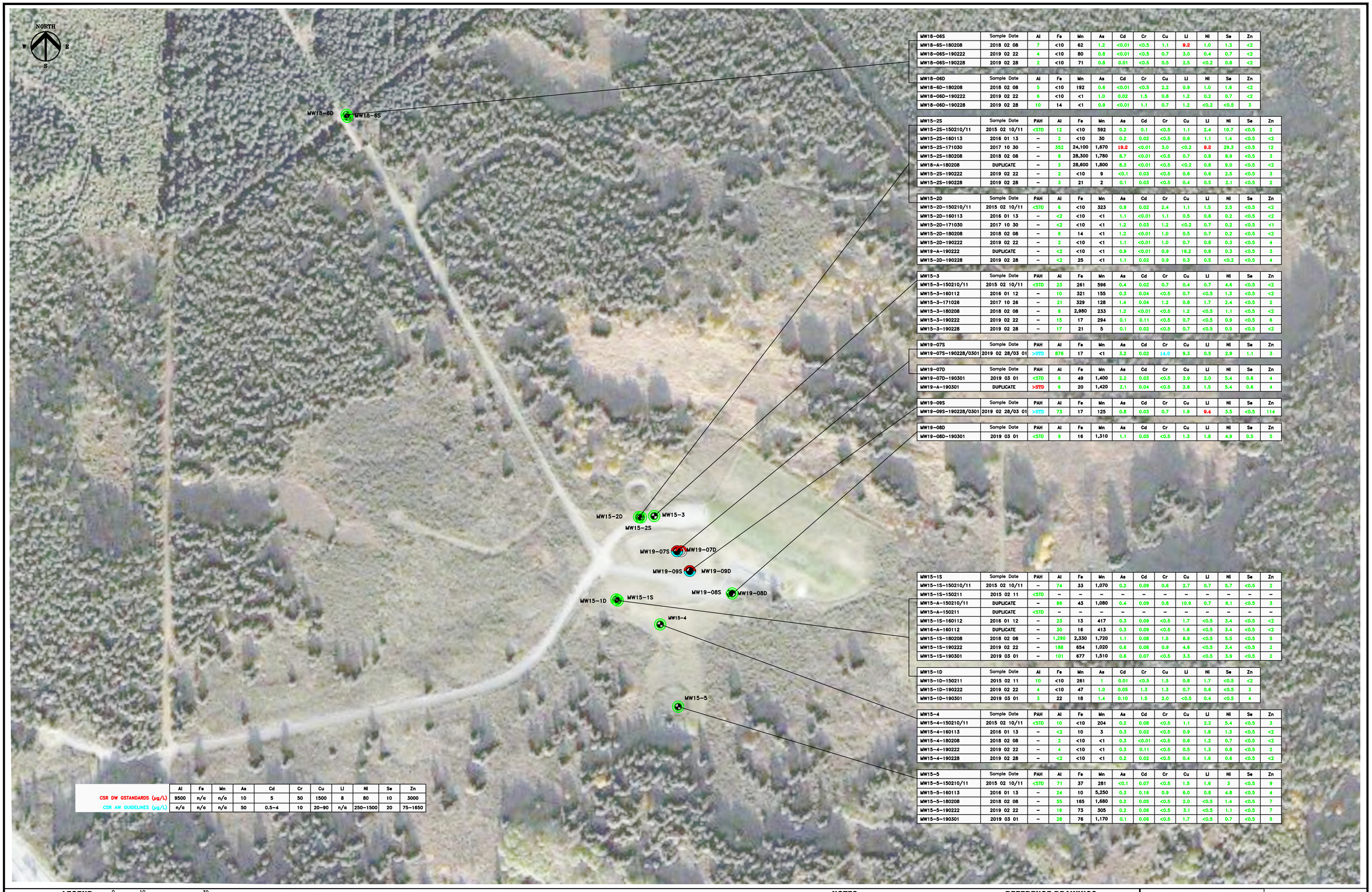

MW18-06S	Sample Date	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW18-6S-180208	2018 02 08	7	<10	62	1.2	<0.01	<0.5	1.1	9.2	1.0	1.3	<2
MW18-06S-190222	2019 02 22	4	<10	80	0.8	<0.01	<0.5	0.7	3.0	0.4	0.7	<2
MW18-06S-190228	2019 02 28	2	<10	71	0.8	0.01	<0.5	0.5	2.5	<0.2	0.8	<2

MW18-06D	Sample Date	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW18-6D-180208	2018 02 08	5	<10	192	0.6	<0.01	<0.5	2.2	0.9	1.0	1.6	<2
MW18-06D-190222	2019 02 22	6	<10	<1	1.0	0.02	1.5	0.8	1.2	0.2	0.7	<2
MW18-06D-190228	2019 02 28	10	14	<1	0.9	<0.01	1.1	0.7	1.2	<0.2	<0.5	3

MW15-2S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-2S-150210/11	2015 02 10/11	<STD	12	<10	592	0.2	0.1	<0.5	1.1	2.4	10.7	<0.5	2
MW15-2S-160113	2016 01 13	–	2	<10	30	0.2	0.02	<0.5	0.6	1.1	1.4	<0.5	<2
MW15-2S-171030	2017 10 30	–	352	24,100	1,670	19.2	<0.01	3.0	<0.2	9.2	29.3	<0.5	12
MW15-2S-180208	2018 02 08	–	8	28,300	1,780	8.7	<0.01	<0.5	0.7	0.8	8.9	<0.5	3
MW18-A-180208	DUPLICATE	–	3	28,600	1,800	8.3	<0.01	<0.5	<0.2	0.8	9.0	<0.5	<2
MW15-2S-190222	2019 02 22	–	2	<10	9	<0.1	0.03	<0.5	0.6	0.8	2.5	<0.5	3
MW15-2S-190228	2019 02 28	–	3	21	2	0.1	0.03	<0.5	0.4	0.5	2.1	<0.5	2

MW15-2D	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-2D-150210/11	2015 02 10/11	<STD	6	<10	323	0.9	0.02	2.4	1.1	1.5	2.5	<0.5	<2
MW15-2D-160113	2016 01 13	–	<2	<10	<1	1.1	<0.01	1.1	0.5	0.8	0.2	<0.5	<2
MW15-2D-171030	2017 10 30	–	<2	<10	<1	1.2	0.03	1.2	<0.2	0.7	0.2	<0.5	<1
MW15-2D-180208	2018 02 08	–	6	14	<1	1.2	<0.01	1.0	0.5	0.7	0.2	<0.5	<2
MW15-2D-190222	2019 02 22	–	2	<10	<1	1.1	<0.01	1.0	0.7	0.8	0.3	<0.5	4
MW19-A-190222	DUPLICATE	–	<2	<10	<1	0.9	<0.01	0.9	16.2	0.8	0.3	<0.5	3
MW15-2D-190228	2019 02 28	–	<2	25	<1	1.1	0.02	0.9	0.3	0.5	<0.2	<0.5	4

MW15-3	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-3-150210/11	2015 02 10/11	<STD	23	261	596	0.4	0.02	0.7	0.4	0.7	4.6	<0.5	<2
MW15-3-160112	2016 01 12	–	10	321	155	0.3	0.04	<0.5	0.7	<0.5	1.3	<0.5	<2
MW15-3-171026	2017 10 26	–	21	329	128	1.4	0.04	1.2	0.8	1.7	2.4	<0.5	2
MW15-3-180208	2018 02 08	–	8	2,980	233	1.2	<0.01	<0.5	1.2	<0.5	1.1	<0.5	<2
MW15-3-190222	2019 02 22	–	15	17	294	0.1	0.11	<0.5	0.7	<0.5	0.9	<0.5	6
MW15-3-190228	2019 02 28	–	17	21	5	0.1	0.02	<0.5	0.7	<0.5	0.5	<0.5	<2

MW19-07S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-07S-190228/0301	2019 02 28/03 01	>STD	876	17	<1	3.2	0.02	14.0	9.3	0.5	2.9	1.1	3

MW19-07D	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-07D-190301	2019 03 01	<STD	6	49	1,400	2.2	0.03	<0.5	2.9	2.0	5.4	0.6	4
MW19-A-190301	DUPLICATE	>STD	6	20	1,420	2.1	0.04	<0.5	2.6	1.5	5.4	0.6	4

MW19-09S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-09S-190228/0301	2019 02 28/03 01	>STD	73	17	125	0.8	0.03	0.7	1.9	9.4	3.5	<0.5	114

MW19-08D	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-08D-190301	2019 03 01	<STD	9	16	1,310	1.1	0.05	<0.5	1.3	1.8	4.9	0.5	5

MW15-1S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-1S-150210/11	2015 02 10/11	–	74	33	1,070	0.2	0.09	0.6	2.7	0.7	5.7	<0.5	2
MW15-1S-150211	2015 02 11	<STD	–	–	–	–	–	–	–	–	–	–	–
MW15-A-150210/11	DUPLICATE	–	86	43	1,080	0.4	0.09	0.8	10.9	0.7	6.1	<0.5	3
MW15-A-150211	DUPLICATE	<STD	–	–	–	–	–	–	–	–	–	–	–
MW15-1S-160112	2016 01 12	–	23	13	417	0.3	0.09	<0.5	1.7	<0.5	3.4	<0.5	<2
MW16-A-160112	DUPLICATE	–	30	16	413	0.3	0.09	<0.5	1.6	<0.5	3.4	<0.5	<2
MW15-1S-180208	2018 02 08	–	1,290	2,330	1,720	1.1	0.08	1.5	6.9	<0.5	5.5	<0.5	5
MW15-1S-190222	2019 02 22	–	188	654	1,020	0.6	0.08	0.9	4.6	<0.5	3.4	<0.5	2
MW15-1S-190301	2019 03 01	–	101	677	1,510	0.6	0.07	<0.5	3.3	<0.5	3.9	<0.5	2

MW15-1D	Sample Date	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-1D-150211	2015 02 11	10	<10	261	1	0.01	<0.5	1.5	0.8	1.7	<0.5	<2
MW15-1D-190222	2019 02 22	4	<10	47	1.0	0.05	1.3	1.3	0.7	0.6	<0.5	3
MW15-1D-190301	2019 03 01	3	22	18	1.4	0.10	1.5	2.0	<0.5	0.4	<0.5	4

MW15-4	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-4-150210/11	2015 02 10/11	<STD	10	<10	204	0.2	0.08	<0.5	1.1	2.2	5.4	<0.5	3
MW15-4-160113	2016 01 13	–	<2	10	3	0.3	0.02	<0.5	0.9	1.8	1.3	<0.5	<2
MW15-4-180208	2018 02 08	–	2	<10	<1	0.3	<0.01	<0.5	0.6	1.2	0.7	<0.5	<2
MW15-4-190222	2019 02 22	–	4	<10	<1	0.3	0.11	<0.5	0.5	1.3	0.8	<0.5	2
MW15-4-190228	2019 02 28	–	<2	<10	<1	0.2	0.02	<0.5	0.4	1.6	0.6	<0.5	<2

MW15-5	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW15-5-150210/11	2015 02 10/11	<STD	71	37	281	<0.1	0.07	<0.5	1.5	1.6	3	<0.5	9
MW15-5-160113	2016 01 13	–	24	10	5,250	0.3	0.16	0.9	6.0	0.8	4.8	<0.5	4
MW15-5-180208	2018 02 08	–	55	165	1,680	0.2	0.05	<0.5	2.0	<0.5	1.4	<0.5	7
MW15-5-190222	2019 02 22	–	19	73	305	0.2	0.06	<0.5	3.1	<0.5	1.1	<0.5	7
MW15-5-190301	2019 03 01	–	28	76	1,170	0.1	0.06	<0.5	1.7	<0.5	0.7	<0.5	5

	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
CSR DW GSTANDARDS (µg/L)	9500	n/a	n/a	10	5	50	1500	8	80	10	3000
CSR AW GUIDELINES (µg/L)	n/a	n/a	n/a	50	0.5–4	10	20–90	n/a	250–1500	20	75–1650

LEGEND

0 10 30 METRES

- SUBJECT PROPERTY LIMITS
- LOT BOUNDARY
- MONITORING WELL
- CONCENTRATIONS ARE LESS THAN THE APPLICABLE GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR DW GUIDELINES
- CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR AW GUIDELINES

LOCATION — ANALYTICAL GROUNDWATER RESULTS

MW19-09S	Sample Date	PAH	Al	Fe	Mn	As	Cd	Cr	Cu	Li	Ni	Se	Zn
MW19-09S-190228/0301	2019 02 28/03 01	>STD	73	17	125	0.8	0.03	0.7	1.9	9.4	3.5	<0.5	114

SAMPLE ID

DEPTH OF SAMPLE (m)

CYAN – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR AW GUIDELINES

GREEN – CONCENTRATIONS ARE LESS THAN THE APPLICABLE GUIDELINES

RED – CONCENTRATIONS ARE GREATER THAN THE APPLICABLE CSR DW GUIDELINES

Al	ALUMINIUM
Fe	IRON
Mn	MANGANESE
As	ARSENIC
Cd	CADMIUM
Cr	CHROMIUM
Cu	COPPER
Li	LITHIUM
Ni	NICKEL
Se	SELENIUM
Zn	ZINC

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2109-07-23	ISSUED AS FINAL	DRMM	IM
0	2019-03-25	ISSUED AS DRAFT	DRMM	DG

CLIENT NAME: PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION: NANOOSE TX, NANOOSE BAY, BC

SNC·LAVALIN

TITLE: ANAL□TICAL RES□LTS FOR □RO□ND□ATER - PROVINCIAL STANDARDS

DWN BY: DRMM	SCALE: 1:750	DATE: 2019-03-05	DWG No: REV.: 1
CHK'D: DG	PLOT: 20190724.1325	CADFILE: 626268R7	626268-306

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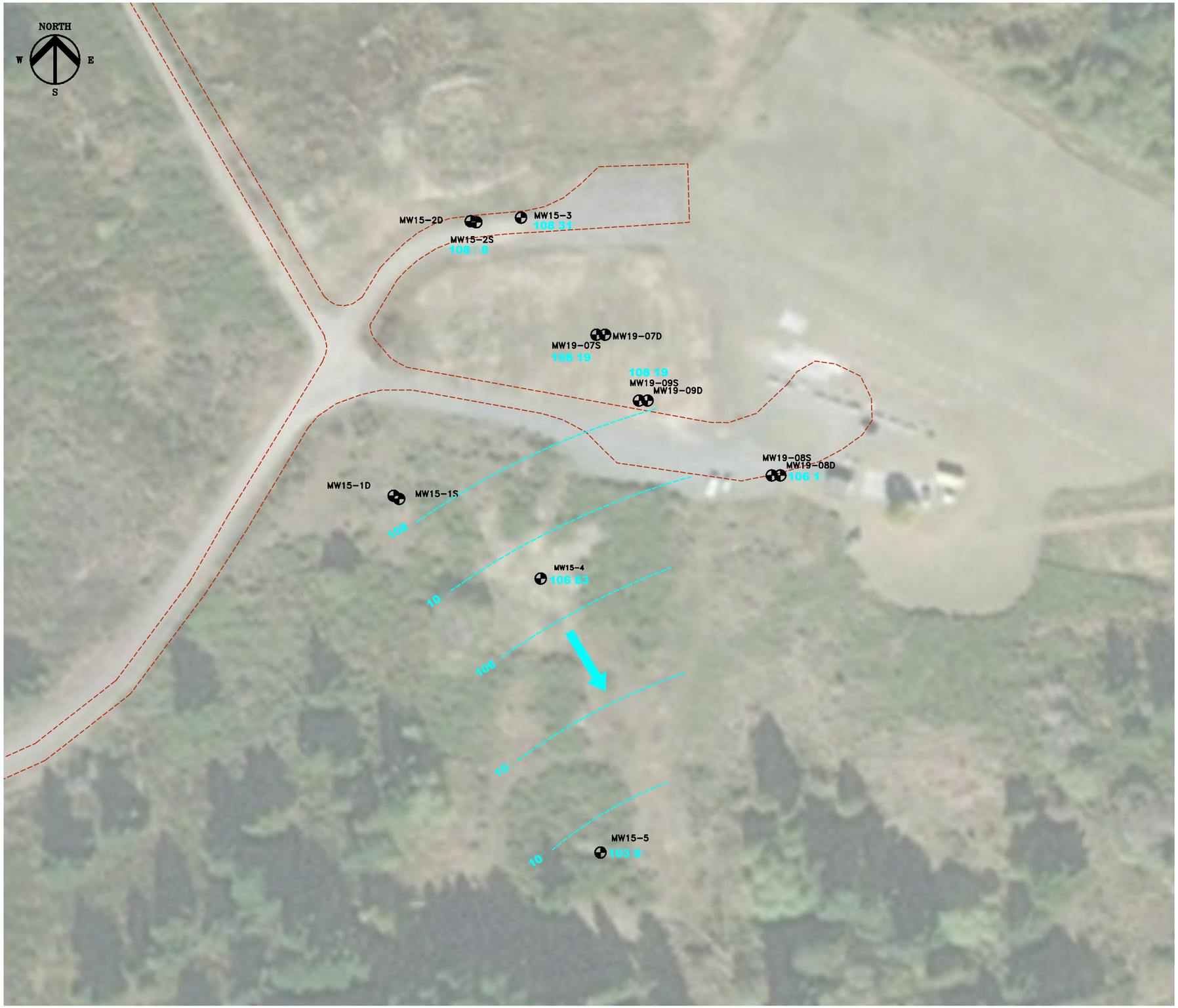

LEGEND

- GRAVEL ROAD
- MONITORING WELL
- INFERRED POTENTIOMETRIC CONTOUR (m) (2019-02-28 and 2019-03-01)
- 108□9 POTENTIOMETRIC ELEVATION (m) (2019-02-28 and 2019-03-01)
- ESTIMATED GROUNDWATER FLOW DIRECTION

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

		GOOGLE AERIAL IMAGERY
61323-1	2018-02-08	JE ANDERSON & ASSOCIATES
DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2019-07-23	ISSUED AS FINAL	DRMM	IM
0	2019-03-25	ISSUED AS DRAFT	DRMM	DG

0 10 20 30 METRES

SNC·LAVALIN

CLIENT NAME: PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION: NANOOSE TX NANOOSE BAY, BC

TITLE: **POTENTIOMETRIC ELEVATIONS AND INFERRED CONTO□ RS**

DWN BY: DRMM	SCALE: 1:2,500	DATE: 2018-03-08	DWG No: 626268-30□ REV.: 1
CHK'D: DG	PLOT: 20190724.1327	CADFILE: 626268R7	

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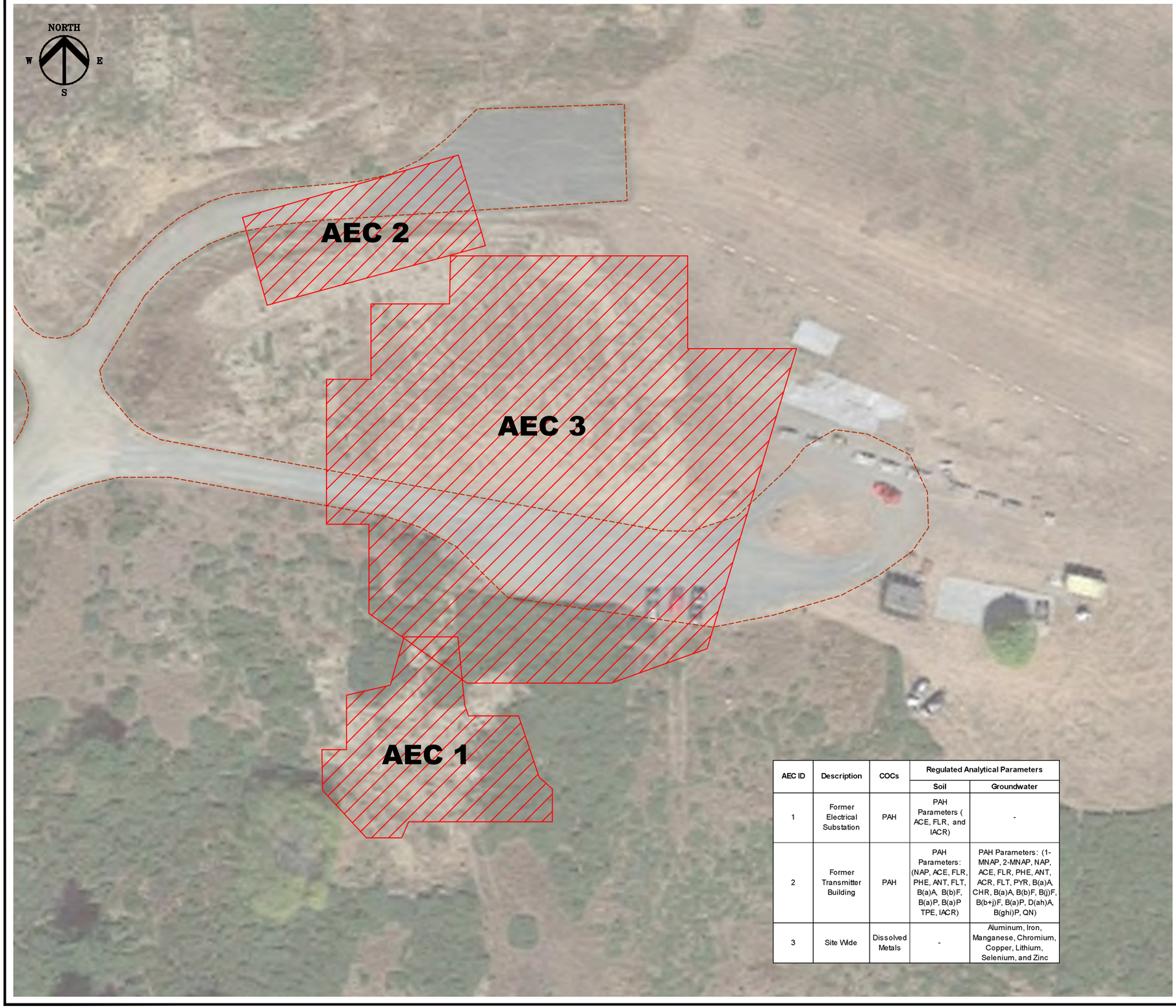

AEC ID	Description	COCs	Regulated Analytical Parameters	
			Soil	Groundwater
1	Former Electrical Substation	PAH	PAH Parameters (ACE, FLR, and IACR)	-
2	Former Transmitter Building	PAH	PAH Parameters: (NAP, ACE, FLR, PHE, ANT, FLT, B(a)A, B(b)F, B(a)P, B(a)P TPE, IACR)	PAH Parameters: (1-MNAP, 2-MNAP, NAP, ACE, FLR, PHE, ANT, ACR, FLT, PYR, B(a)A, CHR, B(a)A, B(b)F, B(j)F, B(b+j)F, B(a)P, D(ah)A, B(ghi)P, QN)
3	Site Wide	Dissolved Metals	-	Aluminum, Iron, Manganese, Chromium, Copper, Lithium, Selenium, and Zinc

LEGEND

GRAVEL ROAD

AREA OF ENVIRONMENTAL CONCERN

AEC	AREA OF ENVIRONMENTAL CONCERN
COC	CONTAMINANT OF CONCERN
1-MNAP	1-METHYLNAPHTHALENE
2-MNAP	2-METHYLNAPHTHALENE
NAP	NAPHTHALENE
ACE	ACENAPHTHENE
FLR	FLUORENE
PHE	PHENANTHRENE
ANT	ANTHRACENE
ACR	ACRIDINE
FLT	FLUORANTHENE
PYR	PYRENE
B(a)A	Benz(a) ANTHRACENE
CHR	CHRYSENE
B(b)F	Benzo(b)FLUORANTHENE
B(j)F	Benzo(j) FLUORANTHENE
B(b+j)F	Benzo(b+j) fluoranthene
B(ghi)P	Benzo(g,h,i)perylene
B(a)P	Benzo(a)pyrene
D(ah)A	Dibenz(a,h) anthracene
D(ah)A	Dibenz(a,h)anthracene
QN	Quinoline
B(a)P	TPEBenzo(a)PYRENE TOTAL POTENCY EQUIVALENTS
IACR	INDEX OF ADDITIVE CANCER RISK

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

		GOOGLE AERIAL IMAGERY
61323-1	2018-02-08	JE ANDERSON & ASSOCIATES
DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2019-07-23	ISSUED AS FINAL	DRMM	IM
0	2019-03-25	ISSUED AS DRAFT	DRMM	DG

0 10 20 30 METRES

SNC·LAVALIN

CLIENT NAME: PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION: NANOOSE TX NANOOSE BAY, BC

TITLE:

AREAS OF ENVIRONMENTAL CONCERN

DWN BY: PES	SCALE: 1:600	DATE: 2018-03-08	DWG No: REV.: 1
CHK'D: CS	PLOT: 20190724.1328	CADFILE: 626268R7	626268-308

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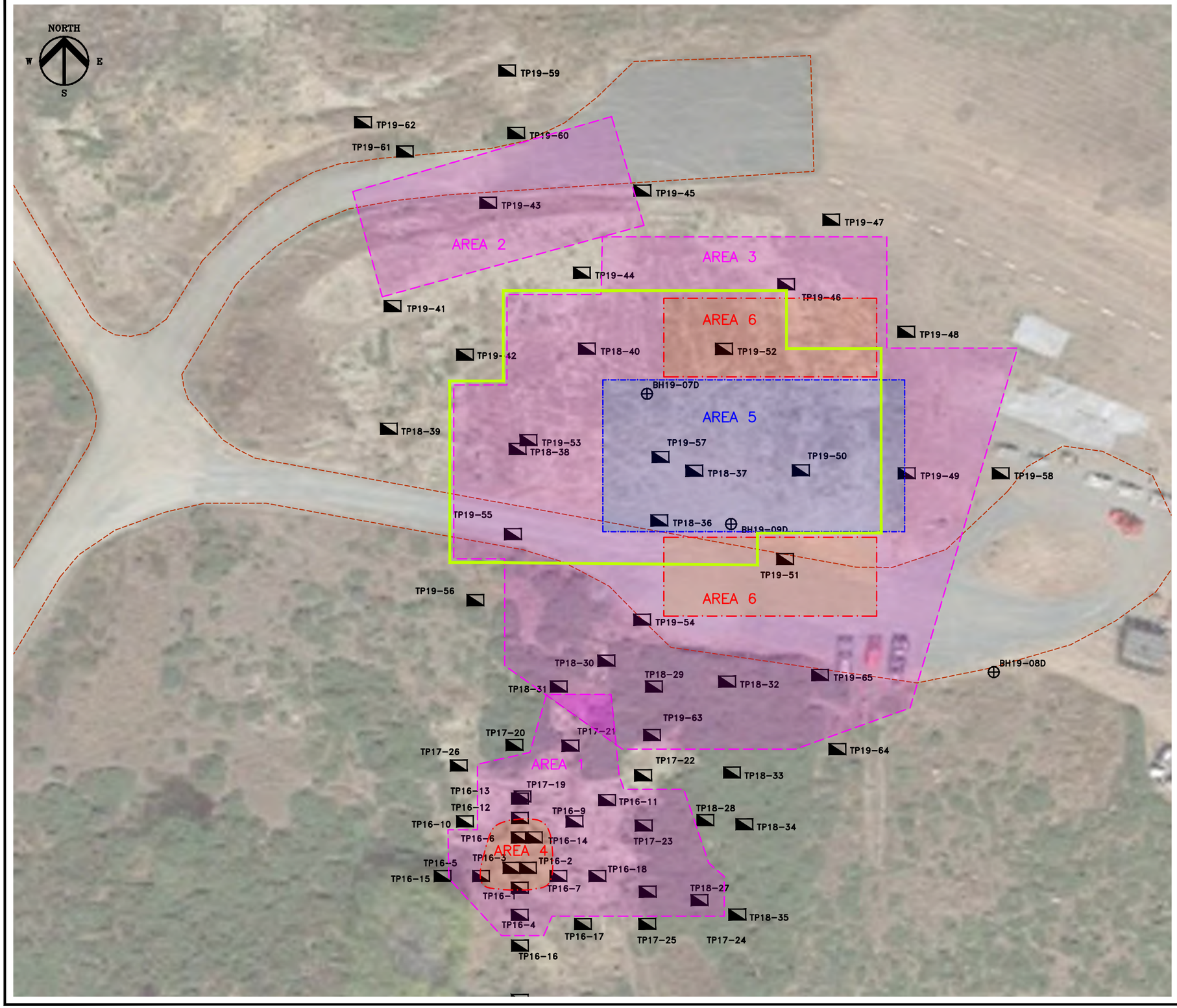

LEGEND

- GRAVEL ROAD
- BOREHOLE
- TEST PIT
- PROPOSED EXCAVATION AREA GREATER THAN THE APPLICABLE CCME GUIDELINES
- PROPOSED EXCAVATION AREA GREATER THAN THE APPLICABLE CSR RLLD STANDARDS
- PROPOSED EXCAVATION AREA GREATER THAN THE APPLICABLE CSR CL STANDARDS
- DEBRIS AREA

NOTES

1. ORIGINAL DRAWING IN COLOUR.
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REFERENCE DRAWINGS

		GOOGLE AERIAL IMAGERY
61323-1	2018-02-08	JE ANDERSON & ASSOCIATES
DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2019-07-23	ISSUED AS FINAL	DRMM	IM
0	2019-03-25	ISSUED AS DRAFT	DRMM	DG

0 10 20 30 METRES

SNC·LAVALIN

CLIENT NAME: PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT LOCATION: NANOOSE TX NANOOSE BAY, BC

TITLE:

PROPOSED EXTENT OF REMEDIAL EXCAVATIONS

DWN BY: PES	SCALE: 1:600	DATE: 2018-03-08	DWG No: 626268-309 REV.: 1
CHK'D: CS	PLOT: 20190724.1328	CADFILE: 626268R7	

PATH: D:\PWGSC-626268-NANOOSE\CAD\626268R7.DWG

Appendix I

Site Photographs

Photograph 1: Looking northwest at TP19-50.
Rebar encountered in the debris unit is visible in the test hole.

Photograph 2: Example of brick, metal and concrete encountered during test pitting in the debris unit

Photograph 3: Looking east at TP19-49.
The PDQ hut and playing field are visible further east.

Photograph 4: Looking north during drilling at BH19-07D.

Photograph 5: Looking west during drilling of BH19-08D.
The gravel parking lot is visible on the right.

Photograph 6: Looking east at TP19-60. MW15-3 is visible.

Appendix II

Field Methodology

Field Methodology

All field investigations were conducted in accordance with Environment Canada guidance and BC Ministry of Environment & Climate Change Strategy (ENV) regulatory requirements and technical guidance/protocols, industry best practices and SNC-Lavalin's with SNC-Lavalin Preferred Operating Procedures (POPs). In addition, quality assurance/quality control (QA/QC) measures were implemented for all sampling and analyses to ensure that all data is representative.

Soil Sample Collection Procedure

During the drilling and test-pitting investigations, soil samples were collected for logging of soil type, colour, apparent density, moisture content, and field screen results for VOC and/or hydrocarbon vapours concentrations. Representative soil samples were collected from each borehole and test-pit at regular intervals and from distinct soil layers. A duplicate portion of each sample was screened in the field for VOC and/or hydrocarbon vapour concentrations. All logging, sampling and field screening was conducted in accordance with our preferred operating procedures.

All soil samples were collected and placed directly into laboratory supplied duplicate sample jars with Teflon® lined lids. A portion of each collected sample was placed in a sealable polyethylene bag and allowed to equilibrate with the headspace in the bag. Selected soil samples were submitted to AGAT Laboratory (AGAT) of Burnaby, BC for analysis of PCOCs and COCs, including BETX, PHC F1 to F4, VPHs, LEPHs, HEPHs, PAH, and metals to assess the soil quality at the Site. The field screening results are shown on the corresponding borehole and test-pit log. Sample selection was based upon indications of contamination (i.e., visual observations), field screen hydrocarbon vapour concentrations, proximity to the water table, COC and PCOCs identified during previous investigations.

Soil samples were submitted for analyses based on required delineation at a given depth based on previous results, or visual observations and field screening results. In addition, selection of soil samples for analyses was made based on stratigraphic units and proximity to the groundwater table. These procedures are equivalent to Technical Guidance Document 1[8] (TG1) for in situ soil sampling. Based on SNC-Lavalin's experience, this approach is a suitable method for selecting soil samples for analysis.

Chain-of-Custody Procedure

In order to ensure the integrity of the samples, all environmental samples collected by SNC-Lavalin (i.e., soil, water, and soil vapour) were subject to chain-of-custody procedures. These procedures included the following:

- A chain-of-custody was initiated immediately following sample collection by completing a chain-of-custody form provided by the laboratory;
- The chain-of-custody form was maintained with the samples at all times following collection;
- When stored away from the custodian (e.g., overnight), samples were stored where inaccessible to unauthorized third parties;

[8] Technical Guidance Document 1: *Site Characterization and Confirmation Testing*, BC ENV, January 2009.

- Chain-of-custody documents were signed and dated by the custodian upon relinquishment of custody;
- All containers sent out by a third party courier were pre-packed, fastened, and affixed with a custody seal prior to pick-up; and
- The chain-of-custody forms were signed and dated by laboratory personnel upon arrival, and inspected for custody seal and sample integrity.

Transportation of Samples

All environmental samples were transported to the designated laboratory (AGAT) by courier and arrived at the laboratory one day following pick-up by the courier. With few exceptions (e.g., pH in water), samples were transported so that hold times were not surpassed. Where samples were not analyzed within the hold times, it was noted on the laboratory report.

Duplicate Sample Collection

Duplicate samples were collected for each media at a minimum rate of 10% (i.e., one duplicate for every 10 samples collected). An attempt was made to ensure that the duplicate samples were representative of the same material. Soil was collected for duplicate samples from the same layer(s) and material within the sampling location. Given the small-scale heterogeneity in some materials some degree of heterogeneity between duplicates was anticipated to be reflected in the relative percent difference for some parameters.

Test Pit Assessment

After accurately locating the test-pit on the site plan, test-pits were excavated to depths ranging from 1.8 to 2.4 m bgs. Grab soil samples were collected from the bucket of the track mounted excavator. Sample depths were determined by advancing a tape into the test-pit. Soil conditions were logged in detail for soil type, colour, texture, moisture and apparent indications of impacts (i.e., odour or staining). Each soil sample collected was placed into 125 mL laboratory-prepared glass jars with Teflon® lined lids. The jars were stored in ice-chilled coolers and submitted, along with the appropriate SNC-Lavalin chain-of-custody information, for analysis to AGAT.

Drilling Assessment Methodology

Boreholes were advanced using a vibratory sonic drill rig and the monitoring wells installed within the open borehole. As the boreholes were advanced, soil conditions were logged in detail for soil type, colour, texture, moisture content and any apparent contamination. Representative soil samples were collected from each borehole at specific intervals and from distinct soil layers. Soil samples, where collected, were taken by collecting samples from the sonic bag. Each soil sample was placed into duplicate sample jars with Teflon® lids immediately upon collection. A duplicate portion of each sample was screened in the field for combustible organic vapour concentrations. Where VOC analysis was required, approximately 5 g of soil was collected using a plastic syringe and placed into laboratory supplied vials with methanol. All samples were stored in ice-chilled coolers for transport to AGAT for laboratory analysis.

Monitoring Well Installation

Each monitoring well installed in the boreholes consisted of 50 mm diameter PVC screens with 0.010 inch slots installed across an estimated water-bearing zone, and completed with blank 50 mm PVC risers flush with the ground surface. Screen lengths were determined prior to drilling, and well depths were adjusted during drilling based on conditions encountered. Clean silica sand was placed around the borehole annulus over the screen length to minimize the percentage of fine-grained material entering the well (sand filter). A bentonite seal was placed within the annulus above the sand, to near surface. Monitoring well and January 2019 test-pit locations were surveyed by J.E. Anderson and Associates to provide the position relative to a geodetic datum and Universal Transverse Mercator (UTM) co-ordinates.

Well Monitoring

The headspace vapour concentrations in each well were measured with a RKI Eagle® combustible gas meter, calibrated to a hexane standard and operated in the methane elimination mode. Depths to liquid levels (liquid phase hydrocarbons, if any, and groundwater) were measured relative to a geodetic datum.

Well Development and Water Sampling

The monitoring wells were developed using dedicated inertia lift tubing and foot valves. The purpose of the well development was to remove fine-grained material from around the well and sand filter and to enable collection of a water sample representative of the groundwater in surrounding unit. The monitoring wells were purged and allowed to recharge prior to the collection of groundwater samples. Development was carried out until a minimum of three borehole volumes of water was removed or conditions (e.g., turbidity, pH, conductivity) stabilized. Detailed development and purge records are kept on file.

Groundwater samples were collected using one of the following methods, based on water yield and sampling parameters:

- Dedicated Waterra® inertia lift pump – This sampling method includes a down-well inertial lift foot pump, which pumps the water up through dedicated tubing for sample collection.
- Dedicated disposable bailer – This sampling method includes lowering a disposable bailer down the well into the water to collect the sample. Typically, multiple descent of the bailer into the water is required for extraction of the sample.

Upon collection, each sample was immediately transferred to suitable laboratory-prepared bottles with preservatives appropriate for the intended analyses and stored in ice-chilled coolers with chain-of-custody documentation for transport to AGAT.

Appendix III

Test-Pit and Borehole Logs

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Borehole No. : BH19-07D

PAGE 1 OF 1

Drilling Contractor	Drillwell Enterprises Ltd.	Date Monitored	n/a
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	110.179
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	110.092
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5458694.485	Easting: 410759.422

Project Number:	626268
Borehole Logged By:	TP
Date Drilled:	2019 02 06
Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

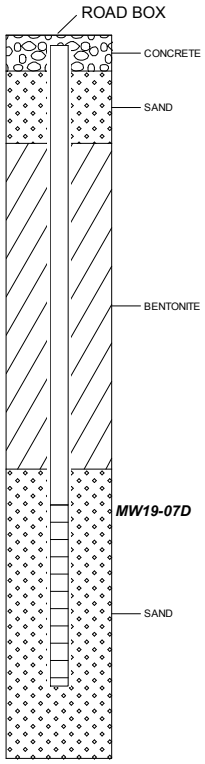
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: MW19-07D

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND (FILL), fine to coarse grained, some silt, some gravel, fine, subrounded, dark brown, medium dense, moist, trace rootlets.			07-01		69	50
	Below 0.6 m - fine and coarse gravel, angular, oxidized orange, no rootlets.			07-02			60
1				07-03		80	35
	Below 1.5 m - no oxidation.						
2	CONCRETE DEBRIS (FILL).						
				07-04		133	50
3	SAND and GRAVEL (FILL), fine to coarse grained sand, fine and coarse gravel, subangular to subrounded, brown, loose, damp, some concrete debris.			*07-05			180
	SAND, fine to coarse grained, some silt, some gravel, fine and coarse, grey/brown, very dense, dry.			07-06			
				07-07			260
4						148	
	Below 4.6 m - dense, damp.			07-08			260
5				07-09		238	45
6	Bottom of hole at 6.1 m.			07-10		167	130
7							
8							
9							
10							



NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 21 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Borehole No. : BH19-07S

PAGE 1 OF 1

Drilling Contractor	Drillwell Enterprises Ltd.	Date Monitored	n/a	Project Number:	626268
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	110.164	Borehole Logged By:	TP
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	110.095	Date Drilled:	2019 02 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5458694.597	Easting: 410758.605	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

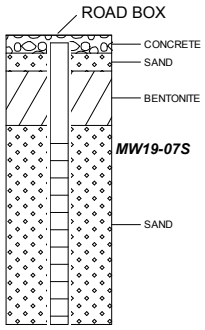
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: MW19-07S

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND (FILL), fine to coarse grained, some silt, some gravel, fine, subrounded, dark brown, medium dense, moist, trace rootlets.						
1	Below 0.6 m - fine and coarse gravel, angular, oxidized orange, no rootlets.						
	Below 1.5 m - no oxidation.						
2	CONCRETE DEBRIS (FILL).						
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							



NOTES
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QA TP 2019 02 21 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Borehole No. : BH19-08D

PAGE 1 OF 1

Drilling Contractor	Drillwell Enterprises Ltd.	Date Monitored	n/a	Project Number:	626268
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	110.211	Borehole Logged By:	TP
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	110.125	Date Drilled:	2019 02 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5458656.558	Easting: 410782.257	Log Typed By:	NDS

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

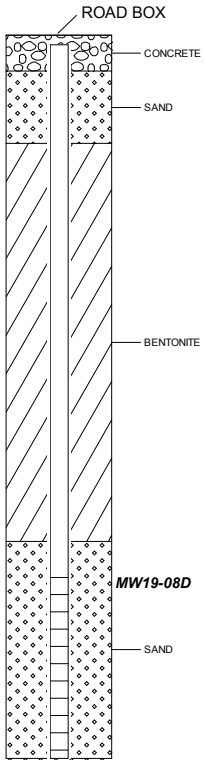
Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: MW19-08D

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SILT (FILL), some clay, trace sand, fine grained, trace gravel, fine, rounded to subrounded, grey/black, firm, low plasticity, damp, trace organics.			**08-01**		50	85
1	Below 0.9 m - some sand, fine to coarse grained, some gravel, trace clay, brown.			08-02			90
	SAND, fine grained, silty, trace gravel, fine, rounded to subrounded, light brown, dense, dry to damp.			**08-03**		87	85
2				08-04 *08-05			85
3	Below 3.1 m - very dense, dry.			08-06		167	220
4	Below 4.3 m - some silt, fine and coarse gravel, damp.			08-07		150	170
5	Below 4.9 m - dry.			08-08		217	280
6	Bottom of hole at 6.1 m.			08-09		175	95
7							
8							
9							
10							

Soil Vapour (ppm) scale: 10^1 10^2 10^3 10^4



NOTES
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QA TP 2019 02 21 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Borehole No. : BH19-08S

PAGE 1 OF 1

Drilling Contractor	Drillwell Enterprises Ltd.	Date Monitored	n/a	Project Number:	626268
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	110.244	Borehole Logged By:	TP
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	110.167	Date Drilled:	2019 02 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5458656.945	Easting: 410781.271	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

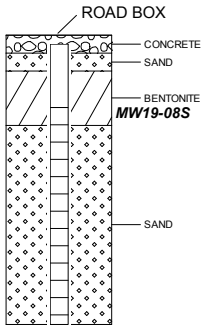
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: MW19-08S

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SILT (FILL), some clay, trace sand, fine grained, trace gravel, fine, rounded to subrounded, grey/black, firm, low plasticity, damp, trace organics.						
1	Below 0.9 m - some sand, fine to coarse grained, some gravel, trace clay, brown.						
	SAND, fine grained, silty, trace gravel, fine, rounded to subrounded, light brown, dense, dry to damp.						
2	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							



NOTES
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QA TP 2019 02 21 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Borehole No. : BH19-09D

PAGE 1 OF 1

Drilling Contractor	Drillwell Enterprises Ltd.	Date Monitored	n/a	Project Number:	626268
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	110.341	Borehole Logged By:	TP
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	110.272	Date Drilled:	2019 02 07
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5458677.814	Easting: 410770.248	Log Typed By:	NDS

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

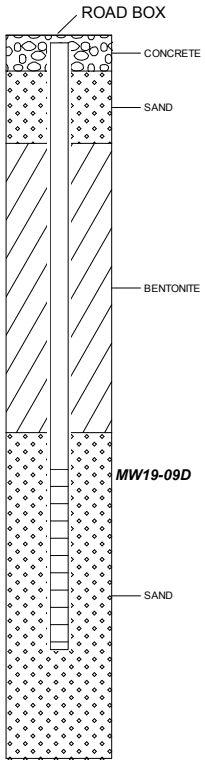
Reading within indicated scale; Reading outside indicated scale

Soil Vapour (ppm)

Solid PVC; Slotted PVC

Well Name 1: MW19-09D

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND (FILL), fine to coarse grained, some silt, trace gravel, fine, subrounded to rounded, brown/black, medium dense, moist, organics/rootlets.			09-01		67	140
1	Below 0.6 m - some gravel, fine and coarse, subrounded to subangular, trace clay, concrete debris.			09-02			130
2	Between 1.5 m and 1.7 m - SAND and ORGANICS seam, fine to coarse grained, trace silt, black, medium dense, moist, rootlets.			09-03		106	170
				09-04			300
	No recovery.			***09-05**		25	
3	SAND, fine to coarse grained, some silt, trace gravel, fine and coarse, subrounded to rounded, grey/brown, very dense, crumbly, dry.			**09-06**		95	140
				09-07			130
4	Below 4.0 m - some gravel, fine and coarse, trace silt, damp.			09-08		120	140
5				09-09		203	130
6				09-10		150	130
	Bottom of hole at 6.1 m.						
7							
8							
9							
10							



NOTES
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QA TP 2019 02 21 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Borehole No. : BH19-09S

PAGE 1 OF 1

Drilling Contractor	Drillwell Enterprises Ltd.	Date Monitored	n/a	Project Number:	626268
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	110.354	Borehole Logged By:	TP
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	110.269	Date Drilled:	2019 02 07
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5458677.042	Easting: 410769.694	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

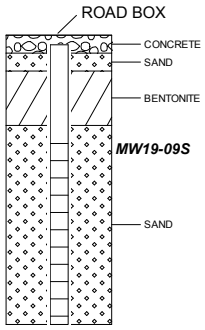
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: MW19-09S

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND (FILL), fine to coarse grained, some silt, trace gravel, fine, subrounded to rounded, brown/black, medium dense, moist, organics/rootlets.						
1	Below 0.6 m - some gravel, fine and coarse, subrounded to subangular, trace clay, concrete debris.						
	Between 1.5 m and 1.7 m - SAND and ORGANICS seam, fine to coarse grained, trace silt, black, medium dense, moist, rootlets.						
2	No recovery.						
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							



NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 21 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-41

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.464	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458703.923	Easting: 410729.355	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	GRASS.						
	SAND (FILL), fine grained, some gravel, fine, subrounded, trace coarse gravel, subangular, brown, medium dense, damp.			**41-01**			
1	At 0.9 m - grounding cable.			41-02			
	SAND and GRAVEL (FILL), fine to coarse grained sand, fine and coarse gravel, subrounded, brown, medium dense, damp.						
	SAND, some silt, trace gravel, fine, subrounded to subangular, grey, medium dense, damp.			41-03			
2	Below 1.8 m - increased gravel, decreased silt, dark brown.			41-04			
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							

NOTES
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QA TP 2019 02 04 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-42

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.768	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458699.601	Easting: 410736.878	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine to coarse grained sand, fine gravel, subrounded to subangular, trace silt, brown, medium dense, damp, trace rootlets.			**42-01** ***42-02**		
1	Below 0.9 m - angular gravel, occasional cobbles, subrounded, moist.			**42-03**		
	SAND, fine grained, some silt, trace gravel, fine, subrounded, occasional cobbles, grey, dense, moist.			42-04		
2	Below 1.8 m - fine to coarse grained sand, brown, wet.			42-05		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-43

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.116	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458714.538	Easting: 410738.312	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	GRASS.						
	SAND and GRAVEL (FILL), fine to medium grained sand, fine gravel, trace silt, brown, dense, damp, silt pockets, black, trace rootlets.			**43-01**			
1	Below 0.9 m - fine to coarse grained sand, fine and coarse gravel, occasional cobbles, mottled orange, no silt pockets.			43-02			
	SAND, fine grained, some gravel, fine and coarse, subrounded, trace silt, brown, loose, wet.			**43-03**			
2	Below 2.1 m - increased gravel, occasional cobbles.			43-04			
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-44

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.734	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458707.423	Easting: 410749.413	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND (FILL), fine to medium grained, some silt, trace gravel, fine, subrounded, light brown, dense, moist, trace organics/rootlets.			**44-01**		
1	Below 0.9 m - fine and coarse gravel, damp, no rootlets.			**44-02** ***44-03**		
	SAND, fine grained, gravelly, fine and coarse, subrounded, trace silt, occasional cobbles, subrounded, brown, dense, damp, trace rootlets.			44-04		
2	Below 1.8 m - moist.			44-05		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
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QA TP 2019 02 04 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-45

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.177	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458715.835	Easting: 410757.627	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND and GRAVEL (FILL), fine grained sand, fine and coarse gravel, subrounded, trace silt, light brown, medium dense, damp, black pockets (suspect topsoil), trace organics/rootlets.			**45-01**		
1	Below 0.9 m - moist, no black pockets.			45-02		
	SAND, fine to medium grained, some silt, trace gravel, fine, subrounded, grey, mottled orange, very dense, damp to moist.			45-03		
2	Below 2.1 m - occasional cobbles, grey/brown, dense, damp.			45-04		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
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QA TP 2019 02 04 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-46

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.691	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458705.017	Easting: 410765.872	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND (FILL), fine to medium grained, some gravel, fine, subrounded, trace silt, light brown, medium dense, damp, trace black pockets, trace roots.			**46-01** ***46-02**		
1	Below 0.9 m - orange/brown, moist, no roots.			46-03		
	SAND, fine grained, some silt, trace gravel, fine and coarse, subrounded, grey/brown, dense, damp, trace wood debris.			**46-04**		
2	Below 1.8 m - no wood debris.			46-05		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-47

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.372	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458709.282	Easting: 410775.221	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND (FILL), fine grained, some gravel, trace silt, light brown, medium dense, damp, trace roots.			**47-01**		
1	Below 0.9 m - fine to coarse grained sand, no silt, orange/brown, moist.			47-02		
	SAND, fine to medium grained, some silt, trace gravel, fine and coarse, subrounded, occasional cobbles, grey/brown, very dense, damp.			**47-03**		
2	Below 2.1 m - fine gravel, dense, moist.			47-04		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-48

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	109.883	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458693.880	Easting: 410779.980	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine grained sand, fine and coarse gravel, subrounded, trace silt, light brown, medium dense, damp, trace roots. Below 0.6 m - some silt, occasional cobbles, subrounded, moist.			**48-01** ***48-02**		
1				48-03		
	SAND (FILL), medium to coarse grained, trace gravel, fine, subrounded, red/brown, medium dense, moist.			**48-04**		
2	SAND, fine grained, some silt, trace gravel, fine and coarse, subrounded, grey/brown, dense, damp.			48-05		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-49

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.248	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458679.521	Easting: 410778.962	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine grained sand, fine and coarse gravel, trace silt, brown, medium dense, damp, trace roots.			**49-01**		
1	Below 0.9 m - occasional cobbles, subrounded, no roots.			49-02		
	Below 1.5 m - moist.			**49-03**		
2	SAND (FILL), medium to coarse grained, trace gravel, fine, subrounded, red/brown, medium dense, moist.			**49-04**		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-50

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.255	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458680.605	Easting: 410768.322	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine grained sand, fine and coarse gravel, subrounded, brown, medium dense, damp, silt pockets, grey.			50-01 *50-02		
1	At 1.2 m - rebar.			50-03		
	SAND (FILL), medium to coarse grained, some gravel, fine, subrounded, red/brown, medium dense, moist, trace concrete debris.			50-04		
2	At 1.8 m - refusal on concrete debris and rebar.					
	Bottom of hole at 1.8 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
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Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-51

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.301	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458674.149	Easting: 410764.094	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine grained sand, fine and coarse gravel, subrounded, brown, medium dense, damp, silt pockets, grey.			51-01		
1	At 1.2 m - trace concrete debris, rebar.			51-02		
	SAND (FILL), fine grained, some silt, trace gravel, fine, subrounded, grey, loose, wet.			51-03		
2	Bottom of hole at 1.8 m.					
3						
4						
5						
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7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-52

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.137	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458693.864	Easting: 410761.494	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	GRASS.						
	SAND and GRAVEL (FILL), fine to coarse grained sand, fine and coarse gravel, subrounded, trace silt, occasional cobbles, brown, medium dense, wet, trace roots.			**52-01** ***52-02**			
1	Below 0.6 m - moist, no roots.			52-03			
	Below 1.5 m - trace concrete debris, rebar.			**52-04**			
2	Below 1.8 m - no soil recovery, concrete debris, metal debris, rebar.						
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-53

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.072	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458686.497	Easting: 410746.027	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine to medium grained sand, fine and coarse gravel, subrounded, some silt, occasional cobbles, brown, medium dense, moist, trace roots.			53-01		
1	Below 0.6 m - no roots.			53-02		
	Below 0.9 m - grey/brown, trace concrete debris, trace brick debris.			**53-03**		
2	At 2.4 m - no soil recovery, wet, concrete debris, metal debris, brick debris.					
	Bottom of hole at 2.4 m.					
3						
4						
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8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

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Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-54

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.430	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458664.996	Easting: 410751.638	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine to coarse grained sand, fine and coarse gravel, subrounded, some silt, occasional cobbles, brown, medium dense, damp.			**54-01**		
1	Below 0.9 m - black pockets with silt, styrofoam debris, trace brick debris.			**54-02** ***54-03**		
	Below 1.5 m - moist.			**54-04**		
2	Below 2.1 m - no brick/styrofoam pockets.			54-05		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-55

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.134	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458672.462	Easting: 410733.196	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine to medium grained sand, fine and coarse gravel, subrounded, some silt, occasional cobbles, brown, medium dense, damp, trace roots.			55-01		
1	Below 0.9 m - silt pockets, black, no roots, trace brick debris.			55-02		
	Below 1.5 m - moist, trace concrete debris, metal debris.			55-03		
2	Below 1.8 m - no soil recovery, brick debris, concrete debris.					
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
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Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-56

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	110.153	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 01 14
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458665.998	Easting: 410725.696	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	GRASS.					
	SAND and GRAVEL (FILL), fine to medium grained sand, fine and coarse gravel, subrounded, some silt, occasional cobbles, subrounded, brown, medium dense, damp, trace roots.			**56-01**		
1	Below 0.9 m - trace brick debris.			56-02		
				56-03		
2	At 1.8 m - rebar. Below 1.8 m - moist.			56-04		
	Bottom of hole at 2.4 m.					
3						
4						
5						
6						
7						
8						
9						
10						

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA TP 2019 02 04 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-57

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 03 11
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458686.475	Easting: 410761.136	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	GRASS.						
	SAND and GRAVEL (FILL), fine to medium grained sand, fine and coarse gravel, subrounded, some silt, occasional cobbles, brown, medium dense, damp, trace roots.			57-01			25
	Below 0.6 m - grey/brown, no roots.			57-02 *57-03			30
1	Below 1.2 m - concrete debris, some rebar, some brick debris.			**57-04**			45
2	Below 2.1 m - grey, loose, wet.			**57-05**			35
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA DMG 2019 03 15 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-58

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 03 11
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458684.375	Easting: 410805.068	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	GRASS.						
	SAND (FILL), fine grained, some gravel, fine, subrounded, light brown, medium dense, damp, grey silt pockets, roots, trace wood debris.			**58-01** ***58-02**			45
1	SAND and GRAVEL (FILL), fine to medium grained sand, fine and coarse gravel, subrounded, trace silt, brown, loose, moist.			**58-03**			40
	SILT, trace sand, fine grained, trace gravel, fine, grey, stiff.			58-04			25
2	SAND, fine grained, some gravel, fine, subrounded to subangular, some silt, light brown, very dense, damp.			58-05			35
	Bottom of hole at 2.4 m.						
3							
4							
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6							
7							
8							
9							
10							

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA DMG 2019 03 15 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-59

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 03 11
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458736.392	Easting: 410741.317	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	GRASS.						
	SILT and SAND, fine grained, trace gravel, fine, subrounded to rounded, light brown, oxidized orange, medium dense, dry.			**59-01**			0
	Below 0.6 m - red/brown, damp.						
1	Below 0.9 m - some gravel, fine and coarse, soft, wet.			59-02 *59-03			0
	SILT, trace sand, fine grained, trace gravel, fine, angular, light brown, hard, dry.			**59-04**			0
	At 1.8 m - refusal.						
2	Bottom of hole at 1.8 m.						
3							
4							
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NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA DMG 2019 03 15 Print Date:2019-07-23

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Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-60

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 03 11
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458728.346	Easting: 410742.480	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	GRASS.						
	SILT and SAND, fine grained, trace gravel, fine, subrounded, brown, medium dense, dry, trace roots.			60-01 *60-02			0
	Between 0.6 m and 0.8 m - SILT layer, black, soft, moist.						
1	Below 1.1 m - increased gravel, oxidized orange, soft, wet.			60-03			0
	SILT, trace sand, fine grained, trace gravel, fine, subrounded, light brown, hard, dry.			60-04			0
	At 1.8 m - refusal.						
2	Bottom of hole at 1.8 m.						
3							
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NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA DMG 2019 03 15 Print Date:2019-07-23

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Client
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Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-61

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 03 11
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458725.947	Easting: 410728.112	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	GRASS.						
	SAND and GRAVEL (FILL), fine to medium grained sand, fine gravel, subrounded, light brown, medium dense, damp, trace roots.			61-01			0
1	SILT and SAND, fine grained, trace gravel, fine, light brown, oxidized orange, dense, moist. Below 1.1 m - wet.			61-02 *61-03			0
	SILT, trace sand, fine grained, trace gravel, fine, subrounded to subangular, light brown, hard, dry. At 1.8 m - refusal.			61-04			0
2	Bottom of hole at 1.8 m.						
3							
4							
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10							

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA DMG 2019 03 15 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-62

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Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 03 11
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458729.708	Easting: 410722.705	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND and GRAVEL (FILL), medium to coarse grained sand, fine gravel, brown, dense, damp.						0
	SILT and SAND, fine grained, trace gravel, fine, light brown, oxidized orange, dense, moist.			62-01			
1	Below 1.1 m - wet.			62-02			0
	SILT, trace sand, fine grained, trace gravel, fine, subrounded to subangular, light brown, hard, dry.			62-03			0
2	At 1.8 m - refusal. Bottom of hole at 1.8 m.						
3							
4							
5							
6							
7							
8							
9							
10							

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA DMG 2019 03 15 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-63

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 03 11
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458650.560	Easting: 410760.038	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	GRASS.						
	SAND (FILL), fine grained, some gravel, fine and coarse, trace silt, brown, medium dense, moist, trace roots.			63-01			0
1	Below 0.9 m - no roots.			**63-02** ***63-03**			0
	SILT (TOPSOIL), black, moist.						
	SAND and GRAVEL, medium to coarse grained sand, fine gravel, trace coarse gravel, brown, medium dense, moist to wet.			**63-04**			0
2				**63-05**			0
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA DMG 2019 03 15 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-64

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 03 11
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458648.748	Easting: 410783.980	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND (FILL), fine grained, some silt, trace gravel, fine and coarse, brown, medium dense, damp.			**64-01** ***64-02**			0
1				**64-03**			0
	SILT (TOPSOIL), black, moist, trace roots.						
	SAND and GRAVEL (FILL), medium to coarse grained sand, fine gravel, subrounded to rounded, trace coarse gravel, red/brown, medium dense, moist.			**64-04**			0
2				**64-05**			0
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA DMG 2019 03 15 Print Date:2019-07-23

SNC·LAVALIN

Client
Public Services and Procurement Canada

Location
Nanaimo Transmitter, Nanoose Bay, BC

Test Pit No. : TP19-65

PAGE 1 OF 1

Drilling Contractor	Knappett Industries	Date Monitored	n/a	Project Number:	626268
Drilling Method	Excavator	Ground Surface Elev. (m)	n/a	Borehole Logged By:	DMG
Borehole Dia. (m)		Top of Casing Elev. (m)	n/a	Date Drilled:	2019 03 11
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5458658.322	Easting: 410781.749	Log Typed By:	NDS

Drilling Legend
Sample Interval

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND (FILL), fine grained, some silt, trace gravel, fine and coarse, subrounded, brown, medium dense, moist, trace roots.			**65-01**			0
1	Below 0.6 m - no roots. Between 0.8 m and 0.9 m - SILT (TOPSOIL), black.			65-02			0
2	SAND and GRAVEL (FILL), medium to coarse grained sand, fine gravel, red/brown, oxidized orange, medium dense, moist, trace grey clay pockets.			**65-03**			0
	Below 2.1 m - no oxidation, no clay pockets.			**65-04**			0
	Bottom of hole at 2.4 m.						
3							
4							
5							
6							
7							
8							
9							
10							

NOTES
Bolded sample denotes sample analyzed. *denotes blind field duplicate.

QA DMG 2019 03 15 Print Date:2019-07-23

Appendix IV

Monitoring Report

MONITORING REPORT

SNC·LAVALIN

Project No.: 626268
Date: 2018-12-07
Observer: DMG
Weather: -1°C Clear
Time: 09:20:00
Approved by: DMG

Public Services and Procurement Canada
Nanaimo Transmitter
Nanoose Bay, BC

Monitoring Well No.	Reference Elevation[1] (m)	Depth to NAPL[2] (m)	Apparent NAPL Thickness[3] (mm)	Depth to Water (m)	Potentiometric Elevation[3] (m)	Depth to Bottom (m)	Calculated Vapour Conc.[4] (ppm)	Time	Comments
MW15-1D	110.582	-	0	16.594	93.99	17.43	-	11:58	*
MW15-1S	110.625	-	0	2.391	108.23	3.85	-	11:35	*
MW15-2S	109.940	-	0	1.565	108.38	3.30	-	10:00	*
MW15-2D	109.860	-	0	3.983	105.88	6.70	-	9:43	*
MW15-3	109.903	-	0	1.609	108.29	3.60	-	12:30	*
MW15-4	109.102	-	0	2.693	106.41	5.11	-	11:05	*
MW15-5	107.022	-	0	3.028	103.99	3.47	-	11:24	*
MW18-06S	107.126	-	0	1.054	106.07	2.68	-	10:45	*
MW18-06D	107.177	-	-	-	-	5.58	-	10:40	* Dry.

NOTES: * Waterra in well during measurements.

[1] Reference Elevation is a mark on the rim of the monitoring well standpipe surveyed with respect to Geodetic Datum.

[2] Non-Aqueous Phase Liquid

[3] NAPL specific gravity assumed to be 0.8

[4] 1% LEL is approximately equivalent to 110 ppm.

MONITORING REPORT

SNC·LAVALIN

Project No.: 626268
Date: 2019-02-22
Observer: TP/CWM
Weather: 1°C Snow
Time: 08:00:00
Approved by: DMG

Public Services and Procurement Canada
Nanaimo Transmitter
Nanoose Bay, BC

Monitoring Well No.	Reference Elevation[1] (m)	Depth to NAPL[2] (m)	Apparent NAPL Thickness[3] (mm)	Depth to Water (m)	Potentiometric Elevation[3] (m)	Depth to Bottom (m)	Calculated Vapour Conc.[4] (ppm)	Time	Comments
MW15-1S	110.625	-	0	2.080	108.55	3.82	-	-	
MW15-1D	110.582	-	0	16.884	93.70	17.34	0	-	
MW15-2S	109.940	-	0	1.320	108.62	2.89	0	10:52	
MW15-2D	109.860	-	0	2.976	106.88	6.67	0	10:32	
MW15-3	109.903	-	0	1.455	108.45	3.60	-	-	
MW15-4	109.102	-	0	2.570	106.53	5.18	75	13:00	
MW15-5	107.022	-	0	3.334	103.69	3.50	0	13:25	
MW18-06S	107.126	-	0	0.150	106.98	2.66	80	13:53	
MW18-06D	107.177	-	0	3.160	104.02	5.95	85	14:03	

[1] Reference Elevation is a mark on the rim of the monitoring well standpipe surveyed with respect to Geodetic Datum.

[2] Non-Aqueous Phase Liquid

[3] NAPL specific gravity assumed to be 0.8

[4] 1% LEL is approximately equivalent to 110 ppm.

MONITORING REPORT

SNC·LAVALIN

Project No.: 626268
Date: 2019-02-28
Observer: TP/CWM
Weather: -1°C Snow
Time: 08:00:00
Approved by: DMG

Public Services and Procurement Canada
Nanaimo Transmitter
Nanoose Bay, BC

Monitoring Well No.	Reference Elevation[1] (m)	Depth to NAPL[2] (m)	Apparent NAPL Thickness[3] (mm)	Depth to Water (m)	Potentiometric Elevation[3] (m)	Depth to Bottom (m)	Calculated Vapour Conc.[4] (ppm)	Time	Comments
MW15-2S	109.940	-	0	1.465	108.48	3.36	0	11:45	
MW15-2D	109.860	-	0	3.003	106.86	6.68	90	11:40	
MW15-3	109.903	-	0	1.595	108.31	3.65	0	-	
MW15-4	109.102	-	0	2.477	106.63	5.18	0	13:15	
MW15-5	107.022	-	0	3.056	103.97	3.50	0	13:05	
MW18-06S	107.126	-	0	0.150	106.98	2.66	0	11:00	
MW18-06D	107.177	-	0	2.232	104.95	5.95	0	11:15	
MW19-07S	110.095	-	0	1.903	108.19	2.47	50	9:30	
MW19-07D	110.092	-	0	3.870	106.22	5.53	100	9:35	
MW19-08D	110.125	-	0	3.975	106.15	6.05	55	8:48	
MW19-09S	110.269	-	0	2.080	108.19	2.23	55	9:15	
MW19-09D	110.272	-	-	-	-	5.08	-	9:20	Dry.

[1] Reference Elevation is a mark on the rim of the monitoring well standpipe surveyed with respect to Geodetic Datum.

[2] Non-Aqueous Phase Liquid

[3] NAPL specific gravity assumed to be 0.8

[4] 1% LEL is approximately equivalent to 110 ppm.

MONITORING REPORT

SNC·LAVALIN

Project No.: 626268
Date: 2019-03-01
Observer: TP/CWM
Weather: -2°C Clear
Time: 07:50:00
Approved by: DMG

Public Services and Procurement Canada
Nanaimo Transmitter
Nanoose Bay, BC

Monitoring Well No.	Reference Elevation[1] (m)	Depth to NAPL[2] (m)	Apparent NAPL Thickness[3] (mm)	Depth to Water (m)	Potentiometric Elevation[3] (m)	Depth to Bottom (m)	Calculated Vapour Conc.[4] (ppm)	Time	Comments
MW15-1S	110.625	-	0	2.131	108.49	3.82	70	9:15	
MW15-1D	110.582	-	0	16.192	94.39	17.43	45	9:00	

[1] Reference Elevation is a mark on the rim of the monitoring well standpipe surveyed with respect to Geodetic Datum.

[2] Non-Aqueous Phase Liquid

[3] NAPL specific gravity assumed to be 0.8

[4] 1% LEL is approximately equivalent to 110 ppm.

Appendix V

Analytical Laboratory Reports

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: SNC - LAVALIN INC.
#202-890 CRACE STREET
NANAIMO, BC V9R2T3
(250) 756-3527

ATTENTION TO: Ian Mace

PROJECT: 626268

AGAT WORK ORDER: 19V428489

SOIL ANALYSIS REVIEWED BY: Dana Solari, Lab Reporter

TRACE ORGANICS REVIEWED BY: Dana Solari, Lab Reporter

DATE REPORTED: Jan 31, 2019

PAGES (INCLUDING COVER): 27

VERSION*: 3

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 3: Sample receipt temperature 0°C.

Version 3 of this report was issued to include additional PAH and TCLP PAH analysis. Version 3 is an amendment to all other Versions.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 19V428489

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Metals in Soil

DATE RECEIVED: 2019-01-16

DATE REPORTED: 2019-01-31

		SAMPLE DESCRIPTION:		TP19-50-04	TP19-52-04	TP19-53-03	TP19-54-02	TP19-54-03	TP19-55-03	TP19-56-03
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14
Parameter	Unit	G / S	RDL	9837394	9837401	9837404	9837406	9837407	9837412	9837415
Aluminum	µg/g		10	18200	17700	17600	16800	15700	20000	23900
Antimony	µg/g		0.1	0.3	0.2	0.2	0.2	0.2	0.3	0.1
Arsenic	µg/g		0.1	3.6	3.8	3.4	3.1	3.7	3.7	3.6
Barium	µg/g		0.5	51.3	49.5	49.0	42.3	39.9	60.9	48.0
Beryllium	µg/g		0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3
Bismuth	µg/g		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	µg/g		0.5	1.5	1.5	1.5	1.6	1.4	1.8	2.4
Cadmium	µg/g		0.01	0.33	0.32	0.38	0.37	0.34	0.33	0.53
Chromium	µg/g		1	27	26	31	25	24	35	28
Cobalt	µg/g		0.1	10.7	10.7	11.6	12.1	9.8	13.0	15.1
Copper	µg/g		0.2	47.7	40.3	49.0	43.1	34.0	47.2	55.6
Iron	µg/g		10	24400	24200	25500	25000	22700	29300	33500
Lead	µg/g		0.1	2.4	2.1	2.4	1.7	1.6	2.3	1.8
Lithium	µg/g		0.5	6.1	5.8	6.0	6.0	5.6	7.9	6.7
Manganese	µg/g		1	362	399	403	371	358	383	540
Mercury	µg/g		0.01	0.03	0.03	0.04	0.03	0.02	0.05	0.02
Molybdenum	µg/g		0.2	0.4	0.2	<0.2	<0.2	<0.2	0.3	0.3
Nickel	µg/g		0.5	23.1	21.6	24.1	23.3	21.0	26.3	29.8
Selenium	µg/g		0.1	0.4	0.3	0.4	0.4	0.4	0.4	0.5
Silver	µg/g		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Strontium	µg/g		1	25	21	24	21	20	24	20
Thallium	µg/g		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/g		0.2	1.1	0.5	0.4	0.3	0.3	0.4	0.4
Tungsten	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Uranium	µg/g		0.2	0.3	0.2	0.3	0.2	<0.2	0.3	0.2
Vanadium	µg/g		1	80	78	83	82	75	92	104
Zinc	µg/g		1	32	36	35	33	30	38	46
Zirconium	µg/g		0.1	8.6	9.8	8.5	10.4	9.4	9.1	16.2
pH 1:2	pH units		0.05	5.80	6.14	5.79	5.55	5.75	5.64	6.94

Certified By: D. Solarin

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 19V428489

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Metals in Soil

DATE RECEIVED: 2019-01-16

DATE REPORTED: 2019-01-31

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

9837394-9837415 Results are based on the dry weight of the sample

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solomi

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 19V428489

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbons Analysis - Leachate

DATE RECEIVED: 2019-01-16

DATE REPORTED: 2019-01-31

		SAMPLE DESCRIPTION:		TP19-50-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2019-01-14
Parameter	Unit	G / S	RDL	9837394
Naphthalene - Leachable	mg/L		0.001	0.003
2-Methylnaphthalene - Leachable	mg/L		0.001	0.002
1-Methylnaphthalene - Leachable	mg/L		0.001	0.004
Acenaphthylene - Leachable	mg/L		0.001	<0.001
Acenaphthene - Leachable	mg/L		0.001	0.002
Fluorene - Leachable	mg/L		0.001	0.005
Phenanthrene - Leachable	mg/L		0.001	0.007
Anthracene - Leachable	mg/L		0.001	0.001
Fluoranthene - Leachable	mg/L		0.001	<0.001
Pyrene - Leachable	mg/L		0.001	<0.001
Benzo(a)anthracene - Leachable	mg/L		0.001	<0.001
Chrysene - Leachable	mg/L		0.001	<0.001
Benzo(b)fluoranthene - Leachable	mg/L		0.001	<0.001
Benzo(k)fluoranthene - Leachable	mg/L		0.001	<0.001
Benzo(a)pyrene - Leachable	mg/L		0.001	<0.001
Indeno(1,2,3-c,d)pyrene - Leachable	mg/L		0.001	<0.001
Dibenzo(a,h)anthracene - Leachable	mg/L		0.001	<0.001
Benzo(g,h,i)perylene - Leachable	mg/L		0.001	<0.001
Surrogate	Unit	Acceptable Limits		
Naphthalene - d8	%	50-130		86
2-Fluorobiphenyl	%	50-130		86
P-Terphenyl - d14	%	60-130		81

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

9837394 Analysis based on "as received"

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solarin

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 19V428489

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

SNC - PAH Analysis in Soil

DATE RECEIVED: 2019-01-16

DATE REPORTED: 2019-01-31

		SAMPLE DESCRIPTION:		TP19-41-01	TP19-42-01	TP19-42-02	TP19-42-03	TP19-43-01	TP19-43-03	TP19-44-01	TP19-44-02
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14
Parameter	Unit	G / S	RDL	9837351	9837355	9837356	9837357	9837360	9837362	9837364	9837365
2-Methylnaphthalene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	0.12	<0.01	<0.01	<0.01
Acenaphthene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	0.08	<0.01	<0.01	<0.01
Acenaphthylene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	0.14	<0.02	<0.02	<0.02
Benzo(a)anthracene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	0.18	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	0.14	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	0.07	<0.02	<0.02	<0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02
Chrysene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	0.18	<0.05	<0.05	<0.05
Dibenzo(a,h)anthracene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Fluoranthene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	0.25	<0.05	<0.05	<0.05
Fluorene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	0.12	<0.02	<0.02	<0.02
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02
Naphthalene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	0.11	<0.01	<0.01	<0.01
Phenanthrene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	0.61	<0.02	<0.02	<0.02
Pyrene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	0.32	<0.02	<0.02	<0.02
Total PAH	µg/g		0.2	<0.2	<0.2	<0.2	<0.2	2.5	<0.5	<0.2	<0.2
Moisture Content	%		0.5	8.9	11.9	13.6	11.8	21.8	14.6	11.8	11.4
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	0.19	<0.05	<0.05	<0.05
IACR CCME (Soil)			0.6	<0.6	<0.6	<0.6	<0.6	2.0	<0.6	<0.6	<0.6
High Molecular Weight PAHs	µg/g		0.4	<0.4	<0.4	<0.4	<0.4	2.1	<0.4	<0.4	<0.4
Low Molecular Weight PAHs	µg/g		0.06	<0.06	<0.06	<0.06	<0.06	0.55	<0.06	<0.06	<0.06
Surrogate	Unit	Acceptable Limits									
Naphthalene - d8	%	50-130		99	100	101	102	97	109	94	95
2-Fluorobiphenyl	%	50-130		99	99	81	101	99	107	77	95
P-Terphenyl - d14	%	50-130		102	104	106	106	105	107	103	103

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AGAT WORK ORDER: 19V428489

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

SNC - PAH Analysis in Soil

DATE RECEIVED: 2019-01-16

DATE REPORTED: 2019-01-31

SAMPLE DESCRIPTION:				TP19-45-01	TP19-46-01	TP19-46-02	TP19-46-04	TP19-47-01	TP19-47-03	TP19-48-01	TP19-48-04
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14
Parameter	Unit	G / S	RDL	9837369	9837373	9837374	9837376	9837378	9837380	9837382	9837385
2-Methylnaphthalene	µg/g		0.01	<0.01	0.02	0.09	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthene	µg/g		0.01	<0.01	0.02	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	µg/g		0.02	<0.02	0.06	0.13	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)anthracene	µg/g		0.02	<0.02	0.08	0.12	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.05	<0.05	0.08	0.10	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	<0.02	0.03	0.05	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/g		0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chrysene	µg/g		0.05	<0.05	0.08	0.12	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenzo(a,h)anthracene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Fluoranthene	µg/g		0.05	<0.05	0.11	0.17	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	µg/g		0.02	<0.02	0.03	0.08	<0.02	<0.02	<0.02	<0.02	<0.02
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Naphthalene	µg/g		0.01	<0.01	0.02	0.10	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	µg/g		0.02	<0.02	0.20	0.39	<0.02	<0.02	<0.02	<0.02	<0.02
Pyrene	µg/g		0.02	<0.02	0.15	0.24	<0.02	<0.02	<0.02	<0.02	<0.02
Total PAH	µg/g		0.2	<0.2	0.9	1.7	<0.5	<0.2	<0.5	<0.2	<0.5
Moisture Content	%		0.5	41.5	11.6	19.4	15.7	10.7	12.2	13.1	10.4
B[a]P TPE (Soil)	µg/g		0.05	<0.05	0.10	0.13	<0.05	<0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)			0.6	<0.6	0.9	1.3	<0.6	<0.6	<0.6	<0.6	<0.6
High Molecular Weight PAHs	µg/g		0.4	<0.4	0.9	1.4	<0.4	<0.4	<0.4	<0.4	<0.4
Low Molecular Weight PAHs	µg/g		0.06	<0.06	0.11	0.41	<0.06	<0.06	<0.06	<0.06	<0.06
Surrogate	Unit	Acceptable Limits									
Naphthalene - d8	%	50-130		94	96	87	108	95	107	93	111
2-Fluorobiphenyl	%	50-130		98	97	88	107	77	105	93	109
P-Terphenyl - d14	%	50-130		106	101	102	106	98	105	101	108

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AGAT WORK ORDER: 19V428489

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

SNC - PAH Analysis in Soil

DATE RECEIVED: 2019-01-16

DATE REPORTED: 2019-01-31

SAMPLE DESCRIPTION:				TP19-49-01	TP19-49-03	TP19-49-04	TP19-50-01	TP19-50-02	TP19-50-03		TP19-50-04
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil		Soil
DATE SAMPLED:				2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14		2019-01-14
Parameter	Unit	G / S	RDL	9837387	9837389	9837390	9837391	9837392	9837393	RDL	9837394
2-Methylnaphthalene	µg/g		0.01	0.12	0.06	<0.01	0.12	0.01	0.10	1	3
Acenaphthene	µg/g		0.01	0.08	0.04	<0.01	0.08	0.01	0.06	1	12
Acenaphthylene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1	1
Anthracene	µg/g		0.02	0.17	0.08	<0.02	0.16	0.04	0.13	2	43
Benzo(a)anthracene	µg/g		0.02	0.25	0.08	<0.02	0.21	0.05	0.15	2	36
Benzo(a)pyrene	µg/g		0.05	0.19	0.07	<0.05	0.16	0.05	0.11	5	22
Benzo(b)fluoranthene	µg/g		0.02	0.10	0.03	<0.02	0.09	0.03	0.06	2	11
Benzo(j)fluoranthene	µg/g		0.02	0.06	0.02	<0.02	0.04	<0.02	0.04	2	6
Benzo(g,h,i)perylene	µg/g		0.05	0.11	<0.05	<0.05	0.08	<0.05	0.05	5	9
Benzo(k)fluoranthene	µg/g		0.02	0.05	0.02	<0.02	0.04	<0.02	0.03	2	7
Chrysene	µg/g		0.05	0.25	0.09	<0.05	0.21	0.05	0.16	5	34
Dibenzo(a,h)anthracene	µg/g		0.02	0.04	<0.02	<0.02	0.06	<0.02	<0.02	2	4
Fluoranthene	µg/g		0.05	0.33	0.12	<0.05	0.28	0.07	0.21	5	52
Fluorene	µg/g		0.02	0.12	0.06	<0.02	0.12	0.02	0.09	2	30
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	0.08	0.02	<0.02	0.07	<0.02	0.04	2	8
Naphthalene	µg/g		0.01	0.10	0.03	<0.01	0.10	0.01	0.10	1	4
Phenanthrene	µg/g		0.02	0.67	0.29	<0.02	0.64	0.13	0.46	2	140
Pyrene	µg/g		0.02	0.44	0.16	<0.02	0.38	0.11	0.28	2	74
Total PAH	µg/g		0.2	3.1	1.3	<0.5	2.8	0.5	2.3	20	506
Moisture Content	%		0.5	12.7	8.20	12.6	16.3	18.0	12.5	0.5	13.6
B[a]P TPE (Soil)	µg/g		0.05	0.28	0.09	<0.05	0.26	0.07	0.15	5	34
IACR CCME (Soil)			0.6	2.9	0.9	<0.6	2.5	0.6	1.7	60	372
High Molecular Weight PAHs	µg/g		0.4	2.7	1.0	<0.4	2.4	0.5	1.7	0.4	446
Low Molecular Weight PAHs	µg/g		0.06	0.54	0.25	<0.06	0.54	0.06	0.45	0.06	53.0
Surrogate	Unit	Acceptable Limits									
Naphthalene - d8	%	50-130		92	108	120	96	87	115		112
2-Fluorobiphenyl	%	50-130		93	107	117	97	88	113		114
P-Terphenyl - d14	%	50-130		96	107	117	104	94	116		94

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AGAT WORK ORDER: 19V428489

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

SNC - PAH Analysis in Soil

DATE RECEIVED: 2019-01-16

DATE REPORTED: 2019-01-31

SAMPLE DESCRIPTION:				TP19-51-01	TP19-51-02		TP19-51-03		TP19-52-01	TP19-52-04	TP19-53-03
SAMPLE TYPE:				Soil	Soil		Soil		Soil	Soil	Soil
DATE SAMPLED:				2019-01-14	2019-01-14		2019-01-14		2019-01-14	2019-01-14	2019-01-14
Parameter	Unit	G / S	RDL	9837395	9837396	RDL	9837397	RDL	9837398	9837401	9837404
2-Methylnaphthalene	µg/g		0.01	0.03	0.01	0.01	2.82	0.01	0.08	0.61	0.20
Acenaphthene	µg/g		0.01	0.03	0.02	0.01	0.97	0.01	0.06	0.19	0.11
Acenaphthylene	µg/g		0.01	<0.01	<0.01	0.01	0.02	0.01	<0.01	<0.01	<0.01
Anthracene	µg/g		0.02	0.08	0.06	0.02	2.02	0.02	0.16	0.44	0.28
Benzo(a)anthracene	µg/g		0.02	0.11	0.05	0.02	1.79	0.02	0.23	0.48	0.26
Benzo(a)pyrene	µg/g		0.05	0.07	<0.05	0.05	1.33	0.05	0.14	0.33	0.19
Benzo(b)fluoranthene	µg/g		0.02	0.05	0.02	0.02	0.67	0.02	0.10	0.19	0.10
Benzo(j)fluoranthene	µg/g		0.02	0.03	<0.02	0.02	0.46	0.02	0.05	0.09	0.05
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05	0.05	0.58	0.05	0.09	0.18	0.09
Benzo(k)fluoranthene	µg/g		0.02	0.03	<0.02	0.02	0.39	0.02	0.05	0.09	0.05
Chrysene	µg/g		0.05	0.09	0.05	0.05	1.80	0.05	0.22	0.44	0.25
Dibenzo(a,h)anthracene	µg/g		0.02	0.02	<0.02	0.02	0.23	0.02	0.04	0.08	0.04
Fluoranthene	µg/g		0.05	0.14	0.08	0.05	2.47	0.05	0.30	0.62	0.35
Fluorene	µg/g		0.02	0.04	0.03	0.02	1.80	0.02	0.11	0.39	0.21
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	0.04	<0.02	0.02	0.48	0.02	0.06	0.14	0.08
Naphthalene	µg/g		0.01	0.03	0.01	0.1	3.87	0.01	0.07	0.66	0.19
Phenanthrene	µg/g		0.02	0.26	0.16	0.02	6.17	0.02	0.61	1.64	0.87
Pyrene	µg/g		0.02	0.23	0.11	0.2	3.27	0.02	0.41	0.85	0.47
Total PAH	µg/g		0.2	1.2	0.6	0.2	33.6	0.2	2.7	7.4	3.7
Moisture Content	%		0.5	12.4	12.8	0.5	18.2	0.5	19.3	14.9	11.4
B[a]P TPE (Soil)	µg/g		0.05	0.11	<0.05	0.05	1.96	0.05	0.23	0.51	0.28
IACR CCME (Soil)			0.6	1.3	<0.6	0.6	20.6	0.6	2.6	5.2	2.8
High Molecular Weight PAHs	µg/g		0.4	1.2	0.5	0.4	21.7	0.4	2.5	5.6	3.1
Low Molecular Weight PAHs	µg/g		0.06	0.16	0.08	0.06	12.3	0.06	0.40	2.46	0.91
Surrogate	Unit	Acceptable Limits									
Naphthalene - d8	%	50-130		95	95		103		98	96	96
2-Fluorobiphenyl	%	50-130		96	95		105		99	99	98
P-Terphenyl - d14	%	50-130		111	102		108		112	103	102

Certified By: D. Solani

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AGAT WORK ORDER: 19V428489

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

SNC - PAH Analysis in Soil

DATE RECEIVED: 2019-01-16

DATE REPORTED: 2019-01-31

		SAMPLE DESCRIPTION:		TP19-54-01	TP19-54-02	TP19-54-03	TP19-54-04	TP19-55-01	TP19-55-02	TP19-55-03	TP19-56-01
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14	2019-01-14
Parameter	Unit	G / S	RDL	9837405	9837406	9837407	9837408	9837410	9837411	9837412	9837413
2-Methylnaphthalene	µg/g		0.01	<0.01	0.01	0.10	<0.01	0.01	0.09	0.05	<0.01
Acenaphthene	µg/g		0.01	<0.01	0.01	0.07	<0.01	<0.01	0.02	0.03	<0.01
Acenaphthylene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	µg/g		0.02	<0.02	0.03	0.14	<0.02	<0.02	<0.02	0.09	<0.02
Benzo(a)anthracene	µg/g		0.02	<0.02	0.03	0.21	<0.02	<0.02	<0.02	0.09	0.02
Benzo(a)pyrene	µg/g		0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05	0.07	<0.05
Benzo(b)fluoranthene	µg/g		0.02	<0.02	<0.02	0.08	<0.02	0.02	<0.02	0.03	0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	0.02	<0.02
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	0.02	<0.02
Chrysene	µg/g		0.05	<0.05	<0.05	0.20	<0.05	<0.05	<0.05	0.09	<0.05
Dibenzo(a,h)anthracene	µg/g		0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
Fluoranthene	µg/g		0.05	<0.05	0.05	0.28	<0.05	<0.05	<0.05	0.13	<0.05
Fluorene	µg/g		0.02	<0.02	<0.02	0.11	<0.02	<0.02	0.03	0.05	<0.02
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02	0.07	<0.02	0.02	<0.02	0.02	<0.02
Naphthalene	µg/g		0.01	<0.01	0.01	0.08	<0.01	0.02	0.15	0.05	<0.01
Phenanthrene	µg/g		0.02	0.02	0.10	0.64	0.03	0.04	0.05	0.28	0.05
Pyrene	µg/g		0.02	<0.02	0.07	0.38	0.02	0.04	<0.02	0.17	0.04
Total PAH	µg/g		0.2	<0.2	0.3	2.6	<0.5	<0.2	0.3	1.1	<0.2
Moisture Content	%		0.5	9.0	13.5	11.0	13.8	9.7	19.6	14.3	13.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05	0.20	<0.05	<0.05	<0.05	0.09	<0.05
IACR CCME (Soil)			0.6	<0.6	<0.6	2.2	<0.6	<0.6	<0.6	1.0	<0.6
High Molecular Weight PAHs	µg/g		0.4	<0.4	<0.4	2.3	<0.4	<0.4	<0.4	1.0	<0.4
Low Molecular Weight PAHs	µg/g		0.06	<0.06	<0.06	0.46	<0.06	<0.06	0.38	0.23	<0.06
Surrogate	Unit	Acceptable Limits									
Naphthalene - d8	%	50-130		93	85	95	101	92	93	95	101
2-Fluorobiphenyl	%	50-130		93	84	96	100	91	92	95	101
P-Terphenyl - d14	%	50-130		101	88	100	104	96	114	101	110

Certified By: D. Solarin

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AGAT WORK ORDER: 19V428489

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

SNC - PAH Analysis in Soil

DATE RECEIVED: 2019-01-16

DATE REPORTED: 2019-01-31

		SAMPLE DESCRIPTION:		TP19-56-03
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2019-01-14
Parameter	Unit	G / S	RDL	9837415
2-Methylnaphthalene	µg/g		0.01	0.09
Acenaphthene	µg/g		0.01	0.04
Acenaphthylene	µg/g		0.01	<0.01
Anthracene	µg/g		0.02	0.07
Benzo(a)anthracene	µg/g		0.02	0.07
Benzo(a)pyrene	µg/g		0.05	0.06
Benzo(b)fluoranthene	µg/g		0.02	0.02
Benzo(j)fluoranthene	µg/g		0.02	0.02
Benzo(g,h,i)perylene	µg/g		0.05	<0.05
Benzo(k)fluoranthene	µg/g		0.02	0.02
Chrysene	µg/g		0.05	0.07
Dibenzo(a,h)anthracene	µg/g		0.02	<0.02
Fluoranthene	µg/g		0.05	0.11
Fluorene	µg/g		0.02	0.06
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	0.02
Naphthalene	µg/g		0.01	0.13
Phenanthrene	µg/g		0.02	0.26
Pyrene	µg/g		0.02	0.15
Total PAH	µg/g		0.2	1.1
Moisture Content	%		0.5	11.0
B[a]P TPE (Soil)	µg/g		0.05	0.08
IACR CCME (Soil)			0.6	0.8
High Molecular Weight PAHs	µg/g		0.4	0.9
Low Molecular Weight PAHs	µg/g		0.06	0.41
Surrogate	Unit	Acceptable Limits		
Naphthalene - d8	%	50-130		98
2-Fluorobiphenyl	%	50-130		98
P-Terphenyl - d14	%	50-130		104

Certified By: D. Solani

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Certificate of Analysis

AGAT WORK ORDER: 19V428489

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

SNC - PAH Analysis in Soil

DATE RECEIVED: 2019-01-16

DATE REPORTED: 2019-01-31

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

9837351-9837357	Results are based on dry weight of sample. Soil sample is visibly heterogeneous.
9837360	Results are based on dry weight of sample. Soil sample is visibly heterogeneous. Total PAH is less than the summation of high molecular weight PAH and low molecular weight PAH; results are within method precision.
9837362-9837369	Results are based on dry weight of sample. Soil sample is visibly heterogeneous.
9837373-9837374	Results are based on dry weight of sample. Soil sample is visibly heterogeneous. Total PAH is less than the summation of high molecular weight PAH and low molecular weight PAH; results are within method precision.
9837376-9837385	Results are based on dry weight of sample. Soil sample is visibly heterogeneous.
9837387	Results are based on dry weight of sample. Soil sample is visibly heterogeneous. Total PAH is less than the summation of high molecular weight PAH and low molecular weight PAH; results are within method precision.
9837389-9837390	Results are based on dry weight of sample. Soil sample is visibly heterogeneous.
9837391	Results are based on dry weight of sample. Soil sample is visibly heterogeneous. Total PAH is less than the summation of high molecular weight PAH and low molecular weight PAH; results are within method precision.
9837392-9837393	Results are based on dry weight of sample. Soil sample is visibly heterogeneous.
9837394	Results are based on dry weight of sample. Soil sample is visibly heterogeneous. PAH detection limits increased due to sample dilution.
9837395	Results are based on dry weight of sample. Soil sample is visibly heterogeneous. Total PAH is less than the summation of high molecular weight PAH and low molecular weight PAH; results are within method precision.
9837396	Results are based on dry weight of sample. Soil sample is visibly heterogeneous.
9837397	Results are based on dry weight of sample. Soil sample is visibly heterogeneous. PAH detection limits increased due to sample dilution.
9837398-9837404	Results are based on dry weight of sample. Soil sample is visibly heterogeneous. Total PAH is less than the summation of high molecular weight PAH and low molecular weight PAH; results are within method precision.
9837405-9837406	Results are based on dry weight of sample.

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SNC - PAH Analysis in Soil

DATE RECEIVED: 2019-01-16

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	Soil sample is visibly heterogeneous.
9837407	Results are based on dry weight of sample. Soil sample is visibly heterogeneous. Total PAH is less than the summation of high molecular weight PAH and low molecular weight PAH; results are within method precision.
9837408-9837410	Results are based on dry weight of sample. Soil sample is visibly heterogeneous.
9837411-9837412	Results are based on dry weight of sample. Soil sample is visibly heterogeneous. Total PAH is less than the summation of high molecular weight PAH and low molecular weight PAH; results are within method precision.
9837413	Results are based on dry weight of sample. Soil sample is visibly heterogeneous.
9837415	Results are based on dry weight of sample. Soil sample is visibly heterogeneous. Total PAH is less than the summation of high molecular weight PAH and low molecular weight PAH; results are within method precision.

Analysis performed at AGAT Vancouver (unless marked by *)

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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V428489

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Jan 31, 2019			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
BC CSR Omnibus Metals in Soil															
Aluminum	9837401		17700	17400	1.7%	< 10	105%	70%	130%	103%	90%	110%			
Antimony	9837401		0.2	0.2	NA	< 0.1	106%	70%	130%	103%	90%	110%			
Arsenic	9837401		3.8	4.4	14.8%	< 0.1	114%	70%	130%	99%	90%	110%			
Barium	9837401		49.5	44.6	10.4%	< 0.5	113%	70%	130%	108%	90%	110%			
Beryllium	9837401		0.2	0.2	NA	< 0.1	87%	70%	130%	93%	90%	110%			
Bismuth	9837401		<0.5	<0.5	NA	< 0.5				100%	90%	110%			
Boron	9837401		1.5	1.5	NA	< 0.5				101%	90%	110%			
Cadmium	9837401		0.32	0.35	8.0%	< 0.01	116%	70%	130%	103%	90%	110%			
Chromium	9837401		26	24	10.9%	< 1	103%	70%	130%	102%	90%	110%			
Cobalt	9837401		10.7	10.3	3.8%	< 0.1	114%	70%	130%	108%	90%	110%			
Copper	9837401		40.3	36.0	11.3%	< 0.2	107%	70%	130%	107%	90%	110%			
Iron	9837401		24200	23300	4.1%	< 10	101%	70%	130%	98%	90%	110%			
Lead	9837401		2.1	2.1	1.7%	< 0.1	85%	70%	130%	92%	90%	110%			
Lithium	9837401		5.8	5.9	1.0%	< 0.5				98%	90%	110%			
Manganese	9837401		399	374	6.5%	< 1	104%	70%	130%	102%	90%	110%			
Mercury	9837401		0.03	0.02	NA	< 0.01	85%	70%	130%	95%	90%	110%			
Molybdenum	9837401		0.2	0.2	NA	< 0.2	98%	70%	130%	104%	90%	110%			
Nickel	9837401		21.6	19.8	8.6%	< 0.5	114%	70%	130%	110%	90%	110%			
Selenium	9837401		0.3	0.3	NA	< 0.1				109%	90%	110%			
Silver	9837401		<0.5	<0.5	NA	< 0.5	128%	70%	130%	103%	90%	110%			
Strontium	9837401		21	21	1.6%	< 1	104%	70%	130%	99%	90%	110%			
Thallium	9837401		<0.1	<0.1	NA	< 0.1	112%	70%	130%	98%	90%	110%			
Tin	9837401		0.5	0.4	NA	< 0.2	93%	70%	130%	101%	90%	110%			
Tungsten	9837401		<0.05	<0.05	NA	< 0.05				102%	90%	110%			
Uranium	9837401		0.2	0.2	NA	< 0.2	95%	70%	130%	99%	90%	110%			
Vanadium	9837401		78	74	5.4%	< 1	106%	70%	130%	105%	90%	110%			
Zinc	9837401		36	36	0.7%	< 1	111%	70%	130%	108%	90%	110%			
Zirconium	9837401		9.8	9.5	3.0%	< 0.1				109%	90%	110%			
pH 1:2	9837401		6.14	6.14	0.0%		101%	90%	110%	100%	95%	105%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By: D. Solomi

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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.
AGAT WORK ORDER: 19V428489
PROJECT: 626268
ATTENTION TO: Ian Mace
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Jan 31, 2019

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
SNC - PAH Analysis in Soil															
2-Methylnaphthalene	70473	9837401	0.61	0.74	19.3%	< 0.01	100%	80%	120%				112%	50%	130%
Acenaphthene	70473	9837401	0.19	0.31	48.0%	< 0.01	99%	80%	120%				119%	50%	130%
Acenaphthylene	70473	9837401	<0.01	<0.01	NA	< 0.01	100%	80%	120%				104%	50%	130%
Anthracene	70473	9837401	0.44	0.59	29.1%	< 0.02	101%	80%	120%				120%	60%	130%
Benzo(a)anthracene	70473	9837401	0.48	0.74	42.6%	< 0.02	100%	80%	120%				101%	60%	130%
Benzo(a)pyrene	70473	9837401	0.33	0.49	39.0%	< 0.05	100%	80%	120%				92%	60%	130%
Benzo(b)fluoranthene	70473	9837401	0.19	0.29	41.7%	< 0.02	93%	80%	120%				99%	60%	130%
Benzo(j)fluoranthene	70473	9837401	0.09	0.15	NA	< 0.02	100%	80%	120%				110%	60%	130%
Benzo(g,h,i)perylene	70473	9837401	0.18	0.24	NA	< 0.05	98%	80%	120%				97%	60%	130%
Benzo(k)fluoranthene	70473	9837401	0.09	0.14	NA	< 0.02	107%	80%	120%				101%	60%	130%
Chrysene	70473	9837401	0.44	0.70	45.6%	< 0.05	100%	80%	120%				102%	60%	130%
Dibenzo(a,h)anthracene	70473	9837401	0.08	0.11	NA	< 0.02	97%	80%	120%				90%	60%	130%
Fluoranthene	70473	9837401	0.62	0.97	44.0%	< 0.05	100%	80%	120%				112%	60%	130%
Fluorene	70473	9837401	0.39	0.57	37.5%	< 0.02	100%	80%	120%				104%	50%	130%
Indeno(1,2,3-c,d)pyrene	70473	9837401	0.14	0.18	25.0%	< 0.02	98%	80%	120%				93%	60%	130%
Naphthalene	70473	9837401	0.66	0.78	16.7%	< 0.01	100%	80%	120%				118%	50%	130%
Phenanthrene	70473	9837401	1.64	2.44	39.2%	< 0.02	99%	80%	120%				91%	60%	130%
Pyrene	70473	9837401	0.85	1.28	40.4%	< 0.02	101%	80%	120%				103%	60%	130%
Naphthalene - d8	70473	9837401	96	98	2.1%		100%	80%	120%				107%	50%	130%
2-Fluorobiphenyl	70473	9837401	99	98	1.0%		101%	80%	120%				107%	50%	130%
P-Terphenyl - d14	70473	9837401	103	98	5.0%		100%	80%	120%				107%	50%	130%
SNC - PAH Analysis in Soil															
2-Methylnaphthalene	70474	9839814	<0.01	<0.01	NA	< 0.01	100%	80%	120%				106%	50%	130%
Acenaphthene	70474	9839814	<0.01	<0.01	NA	< 0.01	100%	80%	120%				108%	50%	130%
Acenaphthylene	70474	9839814	<0.01	<0.01	NA	< 0.01	100%	80%	120%				100%	50%	130%
Anthracene	70474	9839814	<0.02	<0.02	NA	< 0.02	99%	80%	120%				118%	60%	130%
Benzo(a)anthracene	70474	9839814	<0.02	<0.02	NA	< 0.02	100%	80%	120%				98%	60%	130%
Benzo(a)pyrene	70474	9839814	<0.05	<0.05	NA	< 0.05	100%	80%	120%				110%	60%	130%
Benzo(b)fluoranthene	70474	9839814	<0.02	<0.02	NA	< 0.02	102%	80%	120%				76%	60%	130%
Benzo(j)fluoranthene	70474	9839814	<0.02	<0.02	NA	< 0.02	99%	80%	120%				100%	60%	130%
Benzo(g,h,i)perylene	70474	9839814	<0.05	<0.05	NA	< 0.05	101%	80%	120%				114%	60%	130%
Benzo(k)fluoranthene	70474	9839814	<0.02	<0.02	NA	< 0.02	101%	80%	120%				99%	60%	130%
Chrysene	70474	9839814	<0.05	<0.05	NA	< 0.05	99%	80%	120%				116%	60%	130%
Dibenzo(a,h)anthracene	70474	9839814	<0.02	<0.02	NA	< 0.02	100%	80%	120%				108%	60%	130%
Fluoranthene	70474	9839814	<0.05	<0.05	NA	< 0.05	100%	80%	120%				116%	60%	130%
Fluorene	70474	9839814	<0.02	<0.02	NA	< 0.02	100%	80%	120%				101%	50%	130%
Indeno(1,2,3-c,d)pyrene	70474	9839814	<0.02	<0.02	NA	< 0.02	99%	80%	120%				119%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.
AGAT WORK ORDER: 19V428489
PROJECT: 626268
ATTENTION TO: Ian Mace
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jan 31, 2019

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Naphthalene	70474	9839814	<0.01	<0.01	NA	< 0.01	99%	80%	120%				116%	50%	130%
Phenanthrene	70474	9839814	<0.02	<0.02	NA	< 0.02	100%	80%	120%				86%	60%	130%
Pyrene	70474	9839814	<0.02	<0.02	NA	< 0.02	101%	80%	120%				111%	60%	130%
Naphthalene - d8	70474	9839814	89	95	6.5%		99%	80%	120%				103%	50%	130%
2-Fluorobiphenyl	70474	9839814	90	97	7.5%		98%	80%	120%				100%	50%	130%
P-Terphenyl - d14	70474	9839814	101	102	1.0%		97%	80%	120%				103%	50%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

SNC - PAH Analysis in Soil

2-Methylnaphthalene	70554	9860838	<0.01	<0.01	NA	< 0.01	101%	80%	120%				102%	50%	130%
Acenaphthene	70554	9860838	<0.01	<0.01	NA	< 0.01	103%	80%	120%				107%	50%	130%
Acenaphthylene	70554	9860838	<0.01	<0.01	NA	< 0.01	103%	80%	120%				98%	50%	130%
Anthracene	70554	9860838	<0.02	<0.02	NA	< 0.02	97%	80%	120%				106%	60%	130%
Benzo(a)anthracene	70554	9860838	<0.02	<0.02	NA	< 0.02	102%	80%	120%				108%	60%	130%
Benzo(a)pyrene	70554	9860838	<0.05	<0.05	NA	< 0.05	99%	80%	120%				107%	60%	130%
Benzo(b)fluoranthene	70554	9860838	<0.02	<0.02	NA	< 0.02	100%	80%	120%				109%	60%	130%
Benzo(j)fluoranthene	70554	9860838	<0.02	<0.02	NA	< 0.02	97%	80%	120%				118%	60%	130%
Benzo(g,h,i)perylene	70554	9860838	<0.05	<0.05	NA	< 0.05	90%	80%	120%				107%	60%	130%
Benzo(k)fluoranthene	70554	9860838	<0.02	<0.02	NA	< 0.02	102%	80%	120%				106%	60%	130%
Chrysene	70554	9860838	<0.05	<0.05	NA	< 0.05	98%	80%	120%				114%	60%	130%
Dibenzo(a,h)anthracene	70554	9860838	<0.02	<0.02	NA	< 0.02	92%	80%	120%				86%	60%	130%
Fluoranthene	70554	9860838	<0.05	<0.05	NA	< 0.05	100%	80%	120%				111%	60%	130%
Fluorene	70554	9860838	<0.02	<0.02	NA	< 0.02	103%	80%	120%				103%	50%	130%
Indeno(1,2,3-c,d)pyrene	70554	9860838	<0.02	<0.02	NA	< 0.02	92%	80%	120%				94%	60%	130%
Naphthalene	70554	9860838	<0.01	<0.01	NA	< 0.01	102%	80%	120%				109%	50%	130%
Phenanthrene	70554	9860838	<0.02	<0.02	NA	< 0.02	99%	80%	120%				113%	60%	130%
Pyrene	70554	9860838	<0.02	<0.02	NA	< 0.02	99%	80%	120%				113%	60%	130%
Total PAH	70554	9860838	<0.5	<0.5	NA	< 0.2									
Moisture Content	70554	9860838	<0.05	<0.05	NA	< 0.5									
Naphthalene - d8	70554	9860838	101	104	2.9%		103%	80%	120%				109%	50%	130%
2-Fluorobiphenyl	70554	9860838	99	101	2.0%		102%	80%	120%				107%	50%	130%
P-Terphenyl - d14	70554	9860838	108	110	1.8%		101%	80%	120%				116%	50%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Polyaromatic Hydrocarbons Analysis - Leachate

Naphthalene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	102%	80%	120%				84%	50%	130%
2-Methylnaphthalene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	101%	80%	120%				74%	50%	130%
1-Methylnaphthalene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	101%	80%	120%				76%	50%	130%
Acenaphthylene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	103%	80%	120%				88%	50%	130%
Acenaphthene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	103%	80%	120%				96%	50%	130%

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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.
AGAT WORK ORDER: 19V428489
PROJECT: 626268
ATTENTION TO: Ian Mace
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Jan 31, 2019			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Fluorene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	103%	80%	120%				96%	50%	130%
Phenanthrene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	99%	80%	120%				97%	60%	130%
Anthracene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	97%	80%	120%				89%	60%	130%
Fluoranthene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	100%	80%	120%				96%	60%	130%
Pyrene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	99%	80%	120%				97%	60%	130%
Benzo(a)anthracene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	102%	80%	120%				94%	60%	130%
Chrysene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	98%	80%	120%				94%	60%	130%
Benzo(b)fluoranthene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	100%	80%	120%				101%	60%	130%
Benzo(k)fluoranthene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	102%	80%	120%				90%	60%	130%
Benzo(a)pyrene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	99%	80%	120%				94%	60%	130%
Indeno(1,2,3-c,d)pyrene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	92%	80%	120%				77%	60%	130%
Dibenzo(a,h)anthracene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	92%	80%	120%				72%	60%	130%
Benzo(g,h,i)perylene - Leachable	70551	MS1	<0.001	<0.001	NA	< 0.001	90%	80%	120%				81%	60%	130%
Naphthalene - d8	70551	MS1	87	88	1.1%		103%	80%	120%				88%	50%	130%
2-Fluorobiphenyl	70551	MS1	87	85	2.3%		102%	80%	120%				87%	50%	130%
P-Terphenyl - d14	70551	MS1	93	94	1.1%		101%	80%	120%				93%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By: D. Solomi

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Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V428489

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Aluminum	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Antimony	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Arsenic	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Barium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Beryllium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Bismuth	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Boron	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP/MS
Cadmium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Chromium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cobalt	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Copper	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Iron	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Lead	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Lithium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Manganese	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Mercury	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Molybdenum	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Nickel	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Selenium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Silver	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Strontium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Thallium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Tin	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Tungsten	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Uranium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Vanadium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zinc	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V428489

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Zirconium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
pH 1:2	INOR-181-6031	BC MOE Lab Manual B (pH, Electrometric, Soil)	PH METER

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V428489

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
2-Methylnaphthalene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
1-Methylnaphthalene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Acenaphthylene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Acenaphthene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Fluorene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Phenanthrene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Anthracene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Fluoranthene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Pyrene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Benzo(a)anthracene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Chrysene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Benzo(b)fluoranthene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Benzo(k)fluoranthene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Benzo(a)pyrene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Indeno(1,2,3-c,d)pyrene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Dibenzo(a,h)anthracene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Benzo(g,h,i)perylene - Leachable	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
Naphthalene - d8	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
2-Fluorobiphenyl	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
P-Terphenyl - d14	ORG-180-5133, LAB-181-4001	BC Lab Manual Section D, and EPA 1311	GC/MS
2-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V428489

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Benzo(b)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Total PAH	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Moisture Content	INOR-181-6030	SSMA Chapter 70 (2nd Ed)	GRAVIMETRIC
Naphthalene - d8	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Fluorobiphenyl	ORG-180-5102	modified from BC MOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5102	modified from BC MOE Lab Manual Section D (PAH)	GC/MS
B[a]P TPE (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
IACR CCME (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 • F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 0°c
AGAT Job Number: 19V428489
Notes: Please note custody seal.
JAN 16 AM 8:54

Report Information

Company: SNC-Lavalin Inc.
Contact: Ian Mace
Address: 202-890 Crace St.
Nanaimo BC
Phone: 250 716 9000 Fax:
LSD:
Client Project #: 626268

Report Information

1. Name: Ian Mace
Email: Ian.Mace@SNClavalin.com
2. Name: Didi Grimes
Email: Didi.Grimes@SNClavalin.com

Report Format

☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☒ 5 to 7 working days
Rush TAT ☐ Day 2 - 100%
☐ Day 3 - 50%
☐ Day 4 - 25%
Date Required:
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To

Same as above Yes ☐ / No ☐
Company: SNC-Lavalin Inc.
Contact: Ian Mace
Address: 202-890 Crace St.
Nanaimo BC
Phone: 250 716 9000 Fax:
PO/AFE#: PR.BC.555 / 661380

Requirements (Please Check)

☐ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☐ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water
☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 (Please Specify)
CCME (Please Specify) CEQG RL
Other (Please Specify)

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
7051	TP19-41-01	Soil	19/01/14 9:20		X	2			
52	TP19-41-02		9:25			2			X
53	TP19-41-03		9:30			2			X
54	TP19-41-04		9:35			2			X
55	TP19-42-01		9:40		X	2			
56	TP19-42-02		9:40		X	2			
57	TP19-42-03		9:45		X	2			
58	TP19-42-04		9:50			2			X
59	TP19-42-05		9:55			2			X
60	TP19-43-01		10:00	TP19-43-01	X	2			
61	TP19-43-02		10:05			2			X

Samples Relinquished By (Print Name and Sign)	Date/Time	Samples Received By (Print Name and Sign)	Date/Time
Didi Grimes	2019/01/15 16:00		
Samples Relinquished By (Print Name and Sign)	Date/Time	Samples Received By (Print Name and Sign)	Date/Time
Samples Relinquished By (Print Name and Sign)	Date/Time	Samples Received By (Print Name and Sign)	Date/Time

Page 1 of 6
N°: 029259

Document #: DIV-186-1500.004
Date Revised: January 26, 2018

AGAT Laboratories
120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 • F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 0°C
AGAT Job Number: 19V478489
Notes:
JAN 16 AM8:55

Report Information

Company: SNC-Lavalin Inc
Contact: Ian Mace
Address: 202-890 Crace St.
Nanaimo BC V9R 2T3
Phone: 250 716 9000 Fax:
LSD:
Client Project #: 626268

Report Information

1. Name: Ian Mace
Email: Ian.Mace@snclavalin.com
2. Name: Didi Grimes
Email: didi.grimes@snclavalin.com

Report Format

☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☒ 5 to 7 working days
Rush TAT ☐ Day 2 - 100%
☐ Day 3 - 50%
☐ Day 4 - 25%
Date Required:
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To

Same as above Yes ☒ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: PR.BC.555/661380

Requirements (Please Check)

☐ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☐ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water
☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 (Please Specify)
CCME (Please Specify) CEQG RL
Other (Please Specify)

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
9807962	TP19-43-03	Soil	19/01/14 10:10			2			X
63	TP19-43-04		10:15			2			X
64	TP19-44-01		10:20		X	2			
65	TP19-44-02		10:25		X	2			
66	TP19-44-03		10:25			2			X
67	TP19-44-04		10:27			2			X
68	TP19-44-05		10:30			2			X
69	TP19-45-01		10:33		X	2			
70	TP19-45-02		10:35			2			X
71	TP19-45-03		10:40			2			X
72	TP19-45-04		10:45			2			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Grimes	2019/01/15 16:00		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 2 of 6
N°: 029260

Document #: DIV 156 1500.004
Date Revised: January 28, 2015

AGAT Laboratories
120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 · F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 0°c
AGAT Job Number: 19V428489
Notes: JAN 15 PM 8:55

Report Information

Company: SNC-Lavalin Inc
Contact: Ian Mace
Address: 202-890 Crace St
Nanaimo BC V9R 2Z3
Phone: 250 716 9000 Fax:
LSD:
Client Project #: 626268

Invoice To

Same as above Yes ☒ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: PR.BC.555/661380

Report Information

1. Name: Ian Mace
Email: ian.mace@sncLavalin.com
2. Name: Didi Grimes
Email: didi.grimes@sncLavalin.com

Requirements (Please Check)

☐ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☐ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water
☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 (Please Specify)
CCME (Please Specify) CEQG RL
Other (Please Specify)

Report Format

☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☒ 5 to 7 working days
Rush TAT ☐ Day 2 - 100% ☐ Day 3 - 50% ☐ Day 4 - 25%
Date Required:
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
9870770	TP19-46-01	Soil	19/01/14 10:47	PAH	X	2			
71	TP19-46-02		10:47		X	2			
75	TP19-46-03		10:56			2			X
76	TP19-46-04		10:55			2			X
77	TP19-46-05		11:00			2			X
78	TP19-47-01		11:05		X	2			
79	TP19-47-02		11:10			2			X
80	TP19-47-03		11:15			2			X
81	TP19-47-04		11:20			2			X
82	TP19-48-01		11:22		X	2			
83	TP19-48-02		11:22			2			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Grimes	2019/01/15 16:00		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 3 of 6
N°: 029261

Document #: DIV-186-1500-004
Date Revised: January 26, 2018

AGAT Laboratories
120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 · F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 0°C
AGAT Job Number: 19V478469
Notes: JAN 16 AM 8:55

Report Information

Company: SNC-Lavalin Inc
Contact: Ian Mace
Address: 202-890 Crace St
Nanaimo BC V9R 2T3
Phone: 250 716 9000 Fax:
LSD:
Client Project #: 626268

Report Information

1. Name: Ian Mace
Email: ian.mace@snclavalin.com
2. Name: Didi Grimes
Email: didi.grimes@snclavalin.com

Report Format

☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☒ 5 to 7 working days
Rush TAT ☐ Day 2 - 100% ☐ Day 3 - 50% ☐ Day 4 - 25%
Date Required:
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To

Same as above Yes ☐ / No ☐
Company: SNC-Lavalin INC.
Contact: Ian Mace
Address: 202-890 Crace St.
Nanaimo BC V9R 2T3
Phone: 250 716 9000 Fax:
PO/AFE#: PR.BC.555/661380

Requirements (Please Check)

☐ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☐ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water
☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 (Please Specify)
CCME (Please Specify) CEQG RL
Other (Please Specify)

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	Metals	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
78973984	TP19-48-03	Soil	19/01/14 11:25	~~PAH~~			2			X
85	TP19-48-04		11:30				2			X
86	TP19-48-05		11:35				2			X
87	TP19-49-01		11:40		X		2			
88	TP19-49-02		11:45				2			X
89	TP19-49-03		11:50				2			X
90	TP19-49-04		11:55				2			X
91	TP19-50-01		12:00		X		2			
92	TP19-50-02		12:00		X		2			
93	TP19-50-03		12:05				2			X
94	TP19-50-04		12:10		X	X	2			

Samples Relinquished By (Print Name and Sign)	Date/Time	Samples Received By (Print Name and Sign)	Date/Time
Didi Grimes	2019/01/15 16:00		

Page 4 of 6
N°: 029262

Document #: DIV-156-1500.004
Date Revised: January 26, 2018

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 • F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 0°
AGAT Job Number: 19V428489
Notes:
JAN 15 08:55

Report Information
Company: SNC-Lavalin Inc
Contact: Ian Mace
Address: 202-890 Crace St.
Nanaimo BC V9R 2T3
Phone: 250 716 9000 Fax:
LSD:
Client Project #: 626268

Report Information
1. Name: Ian Mace
Email: ian.mace@snclavalin.com
2. Name: Didi Grimes
Email: Didi.grimes@snclavalin.com

Report Format
☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 working days
Rush TAT ☐ Day 2 - 100%
☐ Day 3 - 50%
☐ Day 4 - 25%
Date Required:
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To
Same as above Yes ☐ / No ☐
Company: SNC-Lavalin Inc
Contact: Ian Mace
Address: 202-890 Crace St.
Nanaimo BC V9R 2T3
Phone: 250 716 9000 Fax:
PO/AFE#: PR.BC.555/661380

Requirements (Please Check)
☐ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☐ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water
☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 (Please Specify)
CCME (Please Specify) CEQG RL
Other (Please Specify)

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	Metals	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
9897995	TP19-51-01	Soil	19/01/14 12:46		X		2			
96	TP19-51-02		12:45		X		2			
97	TP19-51-03		12:50				2			X
98	TP19-52-01		12:55		X		2			
99	TP19-52-02		12:55				2			X
9897400	TP19-52-03		13:00				2			X
01	TP19-52-04		13:10		X	X	2			
02	TP19-53-01		13:20				2			X
03	TP19-53-02		13:25				2			X
04	TP19-53-03		13:30		X	X	2			
05	TP19-54-01		13:35		X		2			

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Grimes	2019/01/15 16:00		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 5 of 6
N°: 029263

Document #: DIV-186-1500.004
Date Revised: January 28, 2018

AGAT Laboratories
120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 · F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 0°C
AGAT Job Number: 19V476489
Notes: JAN 16 AM 9:55

Report Information
Company: SNC-Lavalin Inc
Contact: Ian Mace
Address: 202 - 890 Crace St.
Nanaimo BC V9R 2T3
Phone: 250 716 9000 Fax:
LSD:
Client Project #: 626268

Report Information
1. Name: Ian Mace
Email: Ian.Mace@sncLavalin.com
2. Name: Didi Grimes
Email: Didi.grimes@sncLavalin.com

Report Format
☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 working days
Rush TAT ☐ Day 2 - 100% ☐ Day 3 - 50% ☐ Day 4 - 25%
Date Required:
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To Same as above Yes ☐ / No ☐
Company: SNC-Lavalin Inc.
Contact: Ian Mace
Address: 202 - 890 Crace St.
Nanaimo BC V9R 2T3
Phone: 250 716 9000 Fax:
PO/AFE#: PR-BC.555 / 661380

Requirements *(Please Check)*
☐ BC CSR Soil: ☐ AL ☐ IL ☐ PL ☐ CL ☐ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water: ☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 *(Please Specify)*
CCME *(Please Specify)* CEQG RL
Other *(Please Specify)*

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	Metals	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
9867406	TP19-54-02	Soil	19/01/14 13:40		X	X	2			
07	TP19-54-03		13:40		X	X	2			
08	TP19-54-04		13:45				2			X
09	TP19-54-05		13:50				2			X
10	TP19-55-01		13:55		X		2			
11	TP19-55-02		14:00		X		2			
12	TP19-55-03		14:05		X	X	2			
13	TP19-56-01		14:08		X		2			
14	TP19-56-02		14:16				2			X
15	TP19-56-03		14:15		X	X	2			
16	TP19-56-04		14:20				2			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Grimes	2019/01/15 16:00		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 6 of 6
N°: 029264

Document #: DIV-156-1500.004
Date Revised: January 26, 2018

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 19V428489

RECEIVING BASICS:

Received From: LOOMIS Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 3 Containers: 102

TIME SENSITIVE ISSUES:

Earliest Date Sampled: JAN 14, 2019 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 1 + 0 + 0 = 1 °C (2) 0 + 0 + 0 = 0 °C (3) 0 + 0 + 0 = 0 °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

0°C

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

CUSTODY SEALS INTACT

Document #: SR-186-9504.001
Revision Date: July 9, 2014

Page 1 of 1

AGAT Laboratories

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http://www.agatlabs.com

CLIENT NAME: SNC - LAVALIN INC.
#202-890 CRACE STREET
NANAIMO, BC V9R2T3
(250) 756-3527

ATTENTION TO: Ian Mace

PROJECT: 626268

AGAT WORK ORDER: 19V435966

SOIL ANALYSIS REVIEWED BY: Dana Solari, Lab Reporter

TRACE ORGANICS REVIEWED BY: Angela Bond, Technical Reviewer

DATE REPORTED: Feb 21, 2019

PAGES (INCLUDING COVER): 19

VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 2: Sample receipt temperature 3°C. Version 2 issued to report CSR Omnibus Metal scan. Version 2 is an amendment to Version 1.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V435966

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Metals in Soil

DATE RECEIVED: 2019-02-08

DATE REPORTED: 2019-02-21

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: BH19-07-04	BH19-07-05	BH19-09-06
				SAMPLE TYPE: Soil	Soil	Soil
				DATE SAMPLED: 2019-02-06	2019-02-06	2019-02-07
				9890045	9890046	9890075
Aluminum	µg/g	250000	10	18200	19900	14500
Antimony	µg/g	1500	0.1	0.5	0.8	0.2
Arsenic	µg/g	10	0.1	3.4	4.0	2.5
Barium	µg/g	350	0.5	39.0	38.2	32.1
Beryllium	µg/g		0.1	0.2	0.3	0.2
Bismuth	µg/g		0.5	<0.5	<0.5	<0.5
Boron	µg/g	50000	0.5	2.5	2.5	2.2
Cadmium	µg/g		0.01	0.26	0.27	0.24
Chromium	µg/g		1	42	52	23
Cobalt	µg/g	25	0.1	13.2	13.8	8.6
Copper	µg/g		0.2	48.6	55.2	32.0
Iron	µg/g	150000	10	33300	35600	24900
Lead	µg/g		0.1	1.7	1.5	3.3
Lithium	µg/g	450	0.5	6.2	7.0	3.9
Manganese	µg/g	2000	1	454	425	293
Mercury	µg/g		0.01	0.02	0.03	0.02
Molybdenum	µg/g	15	0.2	1.8	2.2	0.5
Nickel	µg/g		0.5	25.9	28.7	16.6
Selenium	µg/g	1	0.1	0.2	0.4	0.1
Silver	µg/g	1500	0.5	<0.5	<0.5	<0.5
Strontium	µg/g	150000	1	25	28	31
Thallium	µg/g		0.1	<0.1	<0.1	<0.1
Tin	µg/g	150000	0.2	0.6	0.7	0.3
Tungsten	µg/g	200	0.05	0.07	0.10	0.54
Uranium	µg/g	30	0.2	<0.2	<0.2	<0.2
Vanadium	µg/g	100	1	89	96	72
Zinc	µg/g		1	39	43	28
Zirconium	µg/g		0.1	12.1	11.9	11.3
pH 1:2	pH units		0.05	8.27	8.58	8.18

Certified By: D. Solani

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V435966

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Metals in Soil

DATE RECEIVED: 2019-02-08

DATE REPORTED: 2019-02-21

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to BC CSR Schedule 3.1 - Commercial (Site-specific factor: Groundwater used for drinking)
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9890045-9890075 Results are based on the dry weight of the sample

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solanki

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V435966

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

CCME BTEX/F1-F4 (Soil)

DATE RECEIVED: 2019-02-08

DATE REPORTED: 2019-02-21

		SAMPLE DESCRIPTION:		BH19-09-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2019-02-07
Parameter	Unit	G / S	RDL	9890073
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1
Benzene	µg/g		0.005	<0.005
Toluene	µg/g		0.05	<0.05
Ethylbenzene	µg/g		0.01	<0.01
m&p-Xylene	µg/g		0.02	<0.02
o-Xylene	µg/g		0.02	<0.02
Styrene	µg/g		0.05	<0.05
F1 (C6-C10)	µg/g		10	<10
F1 minus BTEX (C6-C10)	µg/g		10	<10
F2 (C10-C16)	µg/g		20	<20
F3 (C16-C34)	µg/g		20	26
F4 (C34-C50)	µg/g		20	<20
Moisture	%		0.5	12.0
VH	µg/g		10	<10
VPH	µg/g		10	<10
Total Xylenes	µg/g		0.05	<0.05
Surrogate	Unit	Acceptable Limits		
Bromofluorobenzene	%	60-140		107
Dibromofluoromethane	%	60-140		101
Toluene - d8	%	60-140		116

Certified By: Angela Bond

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V435966

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

CCME BTEX/F1-F4 (Soil)

DATE RECEIVED: 2019-02-08

DATE REPORTED: 2019-02-21

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

9890073 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: Angela Bond

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V435966

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2019-02-08

DATE REPORTED: 2019-02-21

		SAMPLE DESCRIPTION:		BH19-09-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2019-02-07
Parameter	Unit	G / S	RDL	9890073
Naphthalene	µg/g		0.005	0.306
2-Methylnaphthalene	µg/g		0.005	0.278
1-Methylnaphthalene	µg/g		0.005	0.261
Acenaphthylene	µg/g		0.005	0.018
Acenaphthene	µg/g		0.005	0.109
Fluorene	µg/g		0.02	0.18
Phenanthrene	µg/g		0.02	0.73
Anthracene	µg/g		0.004	0.270
Fluoranthene	µg/g		0.01	0.31
Pyrene	µg/g		0.01	0.43
Benzo(a)anthracene	µg/g		0.03	0.21
Chrysene	µg/g		0.05	0.19
Benzo(b)fluoranthene	µg/g		0.02	0.08
Benzo(j)fluoranthene	µg/g		0.02	0.05
Benzo(k)fluoranthene	µg/g		0.02	0.06
Benzo(a)pyrene	µg/g		0.03	0.16
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	0.04
Dibenzo(a,h)anthracene	µg/g		0.005	0.018
Benzo(g,h,i)perylene	µg/g		0.05	<0.05
Quinoline	µg/g		0.05	<0.05
IACR CCME (Soil)			0.6	2.4
B[a]P TPE (Soil)	µg/g		0.05	0.22
EPH C10-C19	µg/g		20	<20
EPH C19-C32	µg/g		20	27
LEPH C10-C19	µg/g		20	<20
HEPH C19-C32	µg/g		20	23
Benzo(b+j)fluoranthene	µg/g		0.05	0.13

Certified By: Angela Bond

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Certificate of Analysis

AGAT WORK ORDER: 19V435966

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2019-02-08

DATE REPORTED: 2019-02-21

		SAMPLE DESCRIPTION:	BH19-09-04
		SAMPLE TYPE:	Soil
		DATE SAMPLED:	2019-02-07
Surrogate	Unit	Acceptable Limits	9890073
Naphthalene - d8	%	50-130	89
2-Fluorobiphenyl	%	50-130	97
P-Terphenyl - d14	%	60-130	104

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

9890073 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: Angela Bond

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V435966

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbons in Soil Low Level

DATE RECEIVED: 2019-02-08

DATE REPORTED: 2019-02-21

		SAMPLE DESCRIPTION:		BH19-07-04	BH19-07-05	BH19-08-01	BH19-08-03	BH19-09-06
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2019-02-06	2019-02-06	2019-02-06	2019-02-06	2019-02-07
Parameter	Unit	G / S	RDL	9890045	9890046	9890052	9890054	9890075
Naphthalene	µg/g	100	0.005	0.009	0.020	0.011	<0.005	0.005
2-Methylnaphthalene	µg/g	950	0.005	0.007	0.017	0.014	<0.005	<0.005
1-Methylnaphthalene	µg/g	1000	0.005	0.005	0.015	0.019	<0.005	<0.005
Acenaphthylene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g	15000	0.005	<0.005	0.006	<0.005	<0.005	<0.005
Fluorene	µg/g	9500	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g	10000	0.02	<0.02	0.04	0.05	<0.02	<0.02
Anthracene	µg/g		0.004	0.009	0.024	0.013	<0.004	0.005
Fluoranthene	µg/g		0.01	<0.01	0.01	0.01	<0.01	<0.01
Pyrene	µg/g	7500	0.01	<0.01	0.01	0.01	<0.01	<0.01
Benzo(a)anthracene	µg/g	300	0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Chrysene	µg/g	4500	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g	300	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g	300	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g	30	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Quinoline	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)			0.6	<0.6	<0.6	<0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Surrogate	Unit	Acceptable Limits						
Naphthalene - d8	%	50-130		104	100	98	95	102
2-Fluorobiphenyl	%	50-130		112	109	103	106	110
P-Terphenyl - d14	%	60-130		121	114	104	109	120

Certified By: Angela Bond

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V435966

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbons in Soil Low Level

DATE RECEIVED: 2019-02-08

DATE REPORTED: 2019-02-21

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to BC CSR Schedule 3.1 - Commercial (Site-specific factor: Groundwater used for drinking)
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9890045 Results are based on dry weight of sample.
Soil sample is visibly heterogeneous.

9890046 Results are based on dry weight of sample.
Soil sample is visibly heterogeneous.

9890052-9890075 Results are based on dry weight of sample.
Soil sample is visibly heterogeneous.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: Angela Bond

AGAT Laboratories

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CANADA V5J 0B6
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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V435966

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Feb 21, 2019			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
BC CSR Omnibus Metals in Soil															
Aluminum	9890075		14500	15000	3.6%	< 10	111%	70%	130%	107%	90%	110%			
Antimony	9890075		0.2	0.1	NA	< 0.1	114%	70%	130%	109%	90%	110%			
Arsenic	9890075		2.5	2.4	2.8%	< 0.1	101%	70%	130%	107%	90%	110%			
Barium	9890075		32.1	34.0	5.9%	< 0.5	103%	70%	130%	102%	90%	110%			
Beryllium	9890075		0.2	0.2	NA	< 0.1	96%	70%	130%	96%	90%	110%			
Bismuth	9890075		<0.5	<0.5	NA	< 0.5				101%	90%	110%			
Boron	9890075		2.2	2.1	NA	< 0.5				99%	90%	110%			
Cadmium	9890075		0.24	0.25	3.5%	< 0.01	97%	70%	130%	96%	90%	110%			
Chromium	9890075		23	23	1.9%	< 1	103%	70%	130%	98%	90%	110%			
Cobalt	9890075		8.6	9.0	4.6%	< 0.1	104%	70%	130%	97%	90%	110%			
Copper	9890075		32.0	34.4	7.3%	< 0.2	101%	70%	130%	96%	90%	110%			
Iron	9890075		24900	26600	6.4%	< 10	111%	70%	130%	106%	90%	110%			
Lead	9898009		62.1	77.5	22.1%	< 0.1	84%	70%	130%	93%	90%	110%			
Lithium	9890075		3.9	4.1	4.7%	< 0.5				101%	90%	110%			
Manganese	9890075		293	320	8.9%	< 1	92%	70%	130%	100%	90%	110%			
Mercury	9890075		0.02	0.02	NA	< 0.01	86%	70%	130%	101%	90%	110%			
Molybdenum	9890075		0.5	0.4	NA	< 0.2	98%	70%	130%	96%	90%	110%			
Nickel	9890075		16.6	17.6	6.1%	< 0.5	103%	70%	130%	97%	90%	110%			
Selenium	9890075		0.1	0.2	NA	< 0.1				99%	90%	110%			
Silver	9890075		<0.5	<0.5	NA	< 0.5	110%	70%	130%	94%	90%	110%			
Strontium	9890075		31	33	5.6%	< 1	106%	70%	130%	101%	90%	110%			
Thallium	9890075		<0.1	<0.1	NA	< 0.1	73%	70%	130%	90%	90%	110%			
Tin	9890075		0.3	0.3	NA	< 0.2	93%	70%	130%	99%	90%	110%			
Tungsten	9890075		0.54	0.54	0.2%	< 0.05				101%	90%	110%			
Uranium	9890075		<0.2	<0.2	NA	< 0.2	94%	70%	130%	97%	90%	110%			
Vanadium	9890075		72	73	1.2%	< 1	104%	70%	130%	91%	90%	110%			
Zinc	9890075		28	28	2.3%	< 1	102%	70%	130%	95%	90%	110%			
Zirconium	9890075		11.3	11.1	1.7%	< 0.1				100%	90%	110%			
pH 1:2	9890075		8.18	8.21	0.4%		100%	90%	110%	100%	95%	105%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

AGAT Laboratories

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Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V435966

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 21, 2019			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
LEPH/HEPH in Soil Low Level															
EPH C10-C19	70628	9890073	<20	<20	NA	< 20	100%	70%	130%				102%	65%	120%
EPH C19-C32	70628	9890073	27	30	NA	< 20	102%	70%	130%				104%	80%	120%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
CCME BTEX/F1-F4 (Soil)															
Methyl tert-butyl ether (MTBE)	70630	9890093	<0.1	<0.1	NA	< 0.1	97%	80%	120%				105%	60%	140%
Benzene	70630	9890093	<0.005	<0.005	NA	< 0.005	100%	80%	120%				100%	60%	140%
Toluene	70630	9890093	<0.05	<0.05	NA	< 0.05	101%	80%	120%				108%	60%	140%
Ethylbenzene	70630	9890093	<0.01	<0.01	NA	< 0.01	100%	80%	120%				108%	60%	140%
m&p-Xylene	70630	9890093	<0.02	<0.02	NA	< 0.02	101%	80%	120%				109%	60%	140%
o-Xylene	70630	9890093	<0.02	<0.02	NA	< 0.02	101%	80%	120%				106%	60%	140%
Styrene	70630	9890093	<0.05	<0.05	NA	< 0.05	101%	80%	120%				100%	60%	140%
F1 (C6-C10)	70630	9890093	<10	<10	NA	< 10									
F2 (C10-C16)	70628	9890073	<20	<20	NA	< 20	102%	80%	120%				81%	60%	140%
F3 (C16-C34)	70628	9890073	26	23	NA	< 20	109%	80%	120%				98%	60%	140%
F4 (C34-C50)	70628	9890073	<20	<20	NA	< 20	104%	80%	120%				88%	60%	140%
Bromofluorobenzene	70630	9890093	107	106	0.9%		101%	60%	140%				100%	60%	140%
Dibromofluoromethane	70630	9890093	96	95	1.0%		100%	60%	140%				91%	60%	140%
Toluene - d8	70630	9890093	113	112	0.9%		100%	60%	140%				104%	60%	140%
VH	70630	9890093	<10	<10	NA	< 10									
VPH	70630	9890093	<10	<10	NA	< 10									

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By: Angela Bond

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Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V435966

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Aluminum	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Antimony	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Arsenic	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Barium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Beryllium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Bismuth	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Boron	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP/MS
Cadmium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Chromium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Cobalt	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Copper	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Iron	MET-181-6106, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP/OES
Lead	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Lithium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Manganese	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Mercury	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Molybdenum	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Nickel	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Selenium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Silver	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Strontium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6010C	ICP-MS
Thallium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Tin	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Tungsten	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Uranium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Vanadium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
Zinc	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS

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Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V435966

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Zirconium	MET-181-6102, LAB-181-4008	BC MOE Lab Manual C (SALM) and EPA 6020A	ICP-MS
pH 1:2	INOR-181-6031	BC MOE Lab Manual B (pH, Electrometric, Soil)	PH METER

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Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V435966

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Methyl tert-butyl ether (MTBE)	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
Benzene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
Toluene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
Ethylbenzene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
m&p-Xylene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
o-Xylene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
Styrene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
F1 (C6-C10)	ORG-180-5100	CCME Tier 1 Method-S	GC/MS/FID
F1 minus BTEX (C6-C10)	ORG-180-5100	CCME Tier 1 Method-S	GC/MS/FID
F2 (C10-C16)	ORG-180-5101	CCME Tier 1 Method-S H	GC/FID
F3 (C16-C34)	ORG-180-5101	CCME Tier 1 Method-S H	GC/FID
F4 (C34-C50)	ORG-180-5101	CCME Tier 1 Method-S H	GC/FID
Moisture	INOR-181-6030	SSMA Chapter 70 (2nd Ed)	GRAVIMETRIC
Bromofluorobenzene	ORG-180-5100	EPA SW-846 8260-S	GC/MS
Dibromofluoromethane	ORG-180-5100	EPA SW-846 8260-S	GC/MS
Toluene - d8	ORG-180-5100	EPA SW-846 8260-S	GC/MS
VH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VPH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

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Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V435966

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Indeno(1,2,3-c,d)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
IACR CCME (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
B[a]P TPE (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Fluorobiphenyl	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS

AGAT Laboratories

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V5J 0B6
P: 778.452.4000 • F: 778.452.4074

Laboratory Use Only

Arrival Temperature: 3°C

AGAT Job Number: 19V459966

Notes:

Chain of Custody Record

Report Information

Company: SNC-Lavalin Inc.

Contact: Ian Mace

Address: 202-210 Comox St.
Nanaimo BC V9R 3T3

Phone: 250-716-9000 Fax:

LSD:

Client Project #: 636362

Report Information

1. Name: Ian Mace
   Email: Ian.Mace@snclavalin.com
2. Name: Didi Grimes
   Email: Didi.Grimes@snclavalin...

Report Format

☐ Single Sample per page

☐ Multiple Samples per page

☐ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☒ 5 to 7 working days

Rush TAT ☐ Day 2 - 100% ☐ Day 3 - 50% ☐ Day 4 - 25%

Date Required:

PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To Same as above Yes ☒ / No ☐

Company:

Contact:

Address:

Phone: Fax:

PO/AFE#: 1175?? / PR. BC. 555

Requirements *(Please Check)*

☒ BC CSR Soil
☐ AL ☐ IL ☐ PL ☒ CL ☐ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R

☐ BC CSR - Water
☐ DW ☐ AW ☐ IW ☐ LW

Schedule 3.3 *(Please Specify)* ~~CSR RL~~

CCME *(Please Specify)* CCG / ~~?~~

Other *(Please Specify)*

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	Metals	PAH	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
9890042	BH19-07-01	Soil	2019/02/06 :00				2			X
43	BH19-07-02	↓	:09				2			X
44	BH19-07-03		11				2			X
45	BH19-07-04		:20		X	X	2			X
46	BH19-07-05		:28		X	X	2			X
47	BH19-07-06		:32				2			X
48	BH19-07-07		1:40				2			X
49	BH19-07-08		1:50				2			X
50	BH19-07-09		[illegible]:00				2			X
51	BH19-07-10		[illegible]:10				2			X
52	BH19-08-01	↓	↓ [illegible]:10			X	2			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Grimes / [signature]	19/02/07 15:00		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 1 of 3

Nº: 029518

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 • F: 778.452.4074

Laboratory Use Only

Arrival Temperature: 7°C

AGAT Job Number: 19V495966

Notes:

Chain of Custody Record

Report Information

Company: SNC-Lavalin Inc.
Contact: Ian Mace
Address: 52-890 Crace St, Nanaimo BC V9R 2T3
Phone: 250 716 9000 Fax:
LSD:
Client Project #: 626268/PR BC 555

Report Information

1. Name: Ian Mace
   Email: ian.mace@snclavalin.com
2. Name: Didi Grimes
   Email: didi.grimes@snclavalin.com

Report Format

☐ Single Sample per page
☒ Multiple Samples per page
☐ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☐ 5 to 7 working days
Rush TAT ☐ Day 2 - 100% ☐ Day 3 - 50% ☐ Day 4 - 25%
Date Required:

PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To Same as above Yes ☒ / No ☐

Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661380 / PR.BC.

Requirements *(Please Check)*

☒ BC CSR Soil: ☐ AL ☐ IL ☐ PL ☒ CL ☐ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water: ☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 *(Please Specify)*
CCME *(Please Specify)* CEQG/CSR
Other *(Please Specify)*

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	Metals	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
9890053	BH19-08-02	soil	2019/08/06 12:50				2			X
54	BH19-08-03	↓	13:00		X		2			X
55	BH19-08-04	↓	13:10				2			X
56	BH19-08-05	↓	13:10				2			X
57	BH19-08-06	↓	13:20				2			X
58	BH19-08-07	↓	13:30				2			X
59	BH19-08-08	↓	13:40				2			X
60	BH19-08-09	↓	13:50				2			X
62	BH19-09-01	↓	2019/08/07 9:30				4			X
71	BH19-09-02	↓	9:40				4			X
72	BH19-09-03	↓	9:50				4			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Grimes / [signature]	19/08/07 15:00		

Page 2 of 3

Nº: 029514

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 · F: 778.452.4074

Chain of Custody Record

Laboratory Use Only

Arrival Temperature:
AGAT Job Number: 19V435966
Notes: 12 empty Jars

Report Information

Company: SNC-Lavalin Inc.
Contact: Ian Mace
Address: #202 - 890 Crace St. Nanaimo, BC
Phone: 250-716-9000 Fax:
LSD:
Client Project #: 626768

Report Information

1. Name: Ian Mace
   Email: Ian.Mace@SNCLavalin.com
2. Name: Didi Grimes
   Email: Didi.Grimes@SNCLavalin.com

Report Format

☐ Single Sample per page
☒ Multiple Samples per page
☐ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☒ 5 to 7 working days
Rush TAT ☐ Day 2 - 100%
☐ Day 3 - 50%
☐ Day 4 - 25%
Date Required:

PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To Same as above Yes ☒ / No ☐

Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661380/PR. BC. 555

Requirements *(Please Check)*

☒ BC CSR Soil
☐ AL
☐ IL
☐ PL
☒ CL
☐ RL-LD ☐ RL-HD
☐ WL-N ☐ WL-R

☐ BC CSR - Water
☐ DW
☐ AW
☐ IW
☐ LW

Schedule 3.3 *(Please Specify)* CEQG
CCME *(Please Specify)*
Other *(Please Specify)*

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	Metals	BTEX VPH	LEPH HEPH	PHC F1-F4	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
5890073	BH19-09-04	Soil	2019/02/07 1000				X	X	X	4			X
74	BH19-09-05	↓	10:10							4			X
75	BH19-09-06	↓	10:20		X	X				4			X
76	BH19-09-07	↓	10:30							4			X
77	BH19-09-08	↓	10:40							4			X
78	BH19-09-09	↓	10:50							4			X
79	BH19-09-10	↓	11:00							4			X

Samples Relinquished By (Print Name and Sign)	Date/Time	Samples Received By (Print Name and Sign)	Date/Time
Didi Grimes / [signature]	19/02/07 1500		

Page 3 of 3

Nº: 029515

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 19V4359766

RECEIVING BASICS:

Received From: LOOMIS Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 2 Containers: 7B

TIME SENSITIVE ISSUES:

Earliest Date Sampled: ~~Jan~~ Feb 6, 2019 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 5 + 3 + 3 = 4 °C (2) 1 + 0 + 4 = 2 °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues: 3°C

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

CUSTODY SEAL INTACT.

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: SNC - LAVALIN INC.
#202-890 CRACE STREET
NANAIMO, BC V9R2T3
(250) 756-3527

ATTENTION TO: Didi Grimes

PROJECT: 626268

AGAT WORK ORDER: 19V440800

WATER ANALYSIS REVIEWED BY: Dana Solari, Lab Reporter

DATE REPORTED: Mar 01, 2019

PAGES (INCLUDING COVER): 10

VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 2: Sample receipt temperature 1°C.

Version 2 issued March 15, 2019 to report updated sample IDs requested by Nadine Schwager of SNC-Lavalin. Version 2 is an amendment to Version 1.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V440800

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Didi Grimes

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Dissolved Metals

DATE RECEIVED: 2019-02-23

DATE REPORTED: 2019-03-01

SAMPLE DESCRIPTION:				MW15-1S-190222	MW15-1D-190222	MW15-2S-190222	MW15-2D-190222	MW15-3-190222	MW15-4-190222	MW15-5-190222	MW18-06S-190222
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water	Water	Water
DATE SAMPLED:				2019-02-22	2019-02-22	2019-02-22	2019-02-22	2019-02-22	2019-02-22	2019-02-22	2019-02-22
Parameter	Unit	G / S	RDL	9925560	9925561	9925562	9925563	9925564	9925565	9925566	9925567
Aluminum Dissolved	µg/L	9500	2	188	4	2	2	15	4	19	4
Antimony Dissolved	µg/L	6	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3
Arsenic Dissolved	µg/L	10	0.1	0.6	1.0	<0.1	1.1	0.1	0.3	0.2	0.8
Barium Dissolved	µg/L	1000	0.2	23.2	8.7	13.7	4.0	7.6	16.8	32.2	29.7
Beryllium Dissolved	µg/L	8	0.01	0.02	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Boron Dissolved	µg/L	5000	2	5	21	5	8	3	77	8	19
Cadmium Dissolved	µg/L	5	0.01	0.08	0.05	0.03	<0.01	0.11	0.11	0.06	<0.01
Calcium Dissolved	µg/L		50	16400	31000	11400	25800	15800	31400	24800	37900
Chromium Dissolved	µg/L		0.5	0.9	1.3	<0.5	1.0	<0.5	<0.5	<0.5	<0.5
Cobalt Dissolved	µg/L	1	0.05	3.63	0.07	<0.05	<0.05	0.68	<0.05	0.14	0.09
Copper Dissolved	µg/L	1500	0.2	4.6	1.3	0.6	0.7	0.7	0.5	3.1	0.7
Iron Dissolved	µg/L	6500	10	654	<10	<10	<10	17	<10	73	<10
Lead Dissolved	µg/L	10	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium Dissolved	µg/L	8	0.5	<0.5	0.7	0.6	0.8	<0.5	1.3	<0.5	3.0
Magnesium Dissolved	µg/L		50	4520	9440	4200	12300	3270	9260	7570	10000
Manganese Dissolved	µg/L	1500	1	1020	47	9	<1	294	<1	305	80
Molybdenum Dissolved	µg/L	250	0.05	0.11	3.07	0.14	0.43	0.16	0.13	0.13	11.2
Nickel Dissolved	µg/L	80	0.2	3.4	0.6	2.5	0.3	0.9	0.8	1.1	0.4
Potassium Dissolved	µg/L		50	663	1800	285	523	355	653	3390	1860
Selenium Dissolved	µg/L	10	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7
Silver Dissolved	µg/L	20	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	16700	13100	5960	8560	8630	31800	3320	19100
Strontium Dissolved	µg/L	2500	0.1	103	200	30.1	57.7	58.1	145	197	127
Thallium Dissolved	µg/L		0.01	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.04
Tin Dissolved	µg/L	2500	0.05	<0.05	0.28	<0.05	0.05	<0.05	<0.05	0.73	0.11
Titanium Dissolved	µg/L		0.5	5.9	2.2	1.7	3.4	1.3	2.1	2.0	2.4
Tungsten Dissolved	µg/L	3	0.01	<0.01	0.69	<0.01	<0.01	<0.01	<0.01	<0.01	0.22
Uranium Dissolved	µg/L	20	0.01	0.04	1.13	0.02	0.07	0.04	0.06	0.02	2.91
Vanadium Dissolved	µg/L	20	0.5	2.4	3.1	<0.5	13.2	0.7	<0.5	<0.5	0.8

Certified By: D. Solani

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V440800

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Didi Grimes

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Dissolved Metals

DATE RECEIVED: 2019-02-23

DATE REPORTED: 2019-03-01

SAMPLE DESCRIPTION:				MW15-1S-190222	MW15-1D-190222	MW15-2S-190222	MW15-2D-190222	MW15-3-190222	MW15-4-190222	MW15-5-190222	MW18-06S-190222
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water	Water	Water
DATE SAMPLED:				2019-02-22	2019-02-22	2019-02-22	2019-02-22	2019-02-22	2019-02-22	2019-02-22	2019-02-22
Parameter	Unit	G / S	RDL	9925560	9925561	9925562	9925563	9925564	9925565	9925566	9925567
Zinc Dissolved	µg/L	3000	2	2	3	3	4	6	2	7	<2
Hardness (calc)	ug CaCO3/L		100	59600	116000	45800	115000	52900	117000	93100	136000

Certified By: D. Solarin

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Certificate of Analysis

AGAT WORK ORDER: 19V440800

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Didi Grimes

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Dissolved Metals

DATE RECEIVED: 2019-02-23

DATE REPORTED: 2019-03-01

SAMPLE DESCRIPTION:				MW18-06D-190222	MW19-A-190222
SAMPLE TYPE:				Water	Water
DATE SAMPLED:				2019-02-22	2019-02-22
Parameter	Unit	G / S	RDL	9925568	9925569
Aluminum Dissolved	µg/L	9500	2	6	<2
Antimony Dissolved	µg/L	6	0.2	0.2	<0.2
Arsenic Dissolved	µg/L	10	0.1	1.0	0.9
Barium Dissolved	µg/L	1000	0.2	15.3	4.1
Beryllium Dissolved	µg/L	8	0.01	<0.01	<0.01
Boron Dissolved	µg/L	5000	2	11	8
Cadmium Dissolved	µg/L	5	0.01	0.02	<0.01
Calcium Dissolved	µg/L		50	35600	25700
Chromium Dissolved	µg/L		0.5	1.5	0.9
Cobalt Dissolved	µg/L	1	0.05	<0.05	<0.05
Copper Dissolved	µg/L	1500	0.2	0.8	16.2
Iron Dissolved	µg/L	6500	10	<10	<10
Lead Dissolved	µg/L	10	0.05	<0.05	<0.05
Lithium Dissolved	µg/L	8	0.5	1.2	0.8
Magnesium Dissolved	µg/L		50	10200	12300
Manganese Dissolved	µg/L	1500	1	<1	<1
Molybdenum Dissolved	µg/L	250	0.05	3.88	0.49
Nickel Dissolved	µg/L	80	0.2	0.2	0.3
Potassium Dissolved	µg/L		50	1440	551
Selenium Dissolved	µg/L	10	0.5	0.7	<0.5
Silver Dissolved	µg/L	20	0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	13000	8550
Strontium Dissolved	µg/L	2500	0.1	105	56.9
Thallium Dissolved	µg/L		0.01	0.05	0.03
Tin Dissolved	µg/L	2500	0.05	<0.05	<0.05
Titanium Dissolved	µg/L		0.5	2.6	3.1
Tungsten Dissolved	µg/L	3	0.01	<0.01	<0.01
Uranium Dissolved	µg/L	20	0.01	1.39	0.07
Vanadium Dissolved	µg/L	20	0.5	0.8	12.2

Certified By: D. Solani

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V440800

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Didi Grimes

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Dissolved Metals

DATE RECEIVED: 2019-02-23

DATE REPORTED: 2019-03-01

				SAMPLE DESCRIPTION:	MW18-06D-190222	MW19-A-190222
				SAMPLE TYPE:	Water	Water
				DATE SAMPLED:	2019-02-22	2019-02-22
Parameter	Unit	G / S	RDL		9925568	9925569
Zinc Dissolved	µg/L	3000	2		<2	3
Hardness (calc)	ug CaCO3/L		100		131000	115000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to BC CSR Schedule 3.2 - Drinking Water in ug/L
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solanki

AGAT Laboratories

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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V440800

PROJECT: 626268

ATTENTION TO: Didi Grimes

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Mar 01, 2019

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
BC CSR Omnibus Dissolved Metals															
Aluminum Dissolved	9918379		4	4	NA	< 2	104%	90%	110%	105%	90%	110%			
Antimony Dissolved	9918379		<0.2	<0.2	NA	< 0.2	98%	90%	110%	101%	90%	110%			
Arsenic Dissolved	9918379		0.3	0.2	NA	< 0.1	97%	90%	110%	100%	90%	110%			
Barium Dissolved	9918379		59.7	61.4	2.7%	< 0.2	91%	90%	110%	96%	90%	110%			
Beryllium Dissolved	9918379		<0.01	0.01	NA	< 0.01	90%	90%	110%	99%	90%	110%			
Boron Dissolved	9918379		23	25	7.4%	< 2	90%	90%	110%	99%	90%	110%			
Cadmium Dissolved	9918379		<0.01	<0.01	NA	< 0.01	98%	90%	110%	100%	90%	110%			
Calcium Dissolved	9918379		172000	171000	0.8%	< 50	97%	90%	110%	99%	90%	110%			
Chromium Dissolved	9918379		<0.5	<0.5	NA	< 0.5	94%	90%	110%	100%	90%	110%			
Cobalt Dissolved	9918379		0.07	<0.05	NA	< 0.05	101%	90%	110%	104%	90%	110%			
Copper Dissolved	9918379		<0.2	<0.2	NA	< 0.2	99%	90%	110%	103%	90%	110%			
Iron Dissolved	9918379		15	14	NA	< 10	90%	90%	110%	103%	90%	110%			
Lead Dissolved	9918379		<0.05	<0.05	NA	< 0.05	95%	90%	110%	94%	90%	110%			
Lithium Dissolved	9918379		29.1	29.7	1.9%	< 0.5				102%	90%	110%			
Magnesium Dissolved	9918379		77400	77100	0.4%	< 50	95%	90%	110%	96%	90%	110%			
Manganese Dissolved	9918379		6	6	0.9%	< 1	103%	90%	110%	101%	90%	110%			
Molybdenum Dissolved	9918379		0.10	0.10	NA	< 0.05	93%	90%	110%	107%	90%	110%			
Nickel Dissolved	9918379		2.4	2.4	3.1%	< 0.2	100%	90%	110%	104%	90%	110%			
Potassium Dissolved	9918379		2640	2680	1.6%	< 50	97%	90%	110%	102%	90%	110%			
Selenium Dissolved	9918379		1.0	0.9	NA	< 0.5	97%	90%	110%	99%	90%	110%			
Silver Dissolved	9918379		<0.02	<0.02	NA	< 0.02				101%	90%	110%			
Sodium Dissolved	9918379		12200	12300	0.7%	< 50	94%	90%	110%	96%	90%	110%			
Strontium Dissolved	9918379		291	291	0.1%	< 0.1	110%	90%	110%	109%	90%	110%			
Thallium Dissolved	9918379		0.04	0.03	NA	< 0.01	92%	90%	110%	104%	90%	110%			
Tin Dissolved	9918379		<0.05	<0.05	NA	< 0.05				104%	90%	110%			
Titanium Dissolved	9918379		1.1	1.2	NA	< 0.5				100%	90%	110%			
Tungsten Dissolved	9918379		< 0.01	< 0.01	NA	< 0.01				102%	90%	110%			
Uranium Dissolved	9918379		5.14	5.00	2.8%	< 0.01	95%	90%	110%	107%	90%	110%			
Vanadium Dissolved	9918379		<0.5	<0.5	NA	< 0.5	93%	90%	110%	99%	90%	110%			
Zinc Dissolved	9918379		2	2	NA	< 2	99%	90%	110%	101%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By: D. Solomi

AGAT Laboratories
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Method Summary

CLIENT NAME: SNC - LAVALIN INC.
AGAT WORK ORDER: 19V440800
PROJECT: 626268
ATTENTION TO: Didi Grimes
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Strontium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Tin Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Tungsten Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

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Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V440800

PROJECT: 626268

ATTENTION TO: Didi Grimes

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

AGAT Laboratories
120 - 8600 Glenlyon Parkway
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V5J 0B6
P: 778.452.4000 · F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 1 °C
AGAT Job Number: 19W4028

Notes:
FEB 23 AM 9:25

Report Information

Company: SNC-Lavalin
Contact:
Address: #202 - 890 Grace St.
Nanaimo, BC
Phone: 250-716-9000 Fax:
LSD: 626268
Client Project #: 661380

Report Information

1. Name: Didi Grimes
Email: Didi.Grimes@SNClavalin.com
2. Name: Ian Mace
Email: Ian.Mace@SNClavalin.com

Report Format

☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☑ 5 to 7 working days
Rush TAT ☐ Day 2 - 100%
☐ Day 3 - 50%
☐ Day 4 - 25%
Date Required:
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To

Same as above Yes ☐ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:

Requirements (Please Check)

☐ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☐ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☑ BC CSR - Water
☑ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 (Please Specify)
CCME (Please Specify) FGQL RL
Other (Please Specify)

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	Dissolved Metals (filtered)	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
9925560	MW15-1S-190222	GW	19/02/22 11:50		X	1	Y		
561	MW15-1D-190222		19/02/22 11:30		X	1			
562	MW15-2S-190222		19/02/22 10:40		X	1			
563	MW15-2D-190222		19/02/22 10:50		X	1			
564	MW15-3-190222		19/02/22 11:00		X	1			
565	MW15-4-190222		19/02/22 12:46		X	1			
566	MW15-5-190222		19/02/22 14:10		X	1			
567	MW18-06S-190222		19/02/22 14:30		X	1			
568	MW18-06D-190222		19/02/22 14:25		X	1			
569	MW15-A-190222	↓	19/02/22 11:60		X	1	↓		

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Troy Parsons	20/02/22 16:00	S Naper	
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 1 of 1
N°: 029700

Document #: DIV-186-1500.004
Date Revised: January 20, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 19V440800

RECEIVING BASICS:
Received From: Loomis Waybill #: _____

SAMPLE QUANTITIES:
Coolers: 1 Containers: 10

TIME SENSITIVE ISSUES:
Earliest Date Sampled: Feb 22, 2019 ALREADY EXCEEDED? Yes ~~No~~

NON-CONFORMANCES:
3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 1 + 1 + 2 = 1 °C (2) ___+___+___=___°C (3) ___+___+___=___°C (4) ___+___+___=___°C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:
Custody seal in tact

AGAT Laboratories

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FAX (778)452-4074
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CLIENT NAME: SNC - LAVALIN INC.
#202-890 CRACE STREET
NANAIMO, BC V9R2T3
(250) 756-3527

ATTENTION TO: Ian Mace

PROJECT: 626268

AGAT WORK ORDER: 19V442894

TRACE ORGANICS REVIEWED BY: Dana Solari, Lab Reporter

WATER ANALYSIS REVIEWED BY: Dana Solari, Lab Reporter

DATE REPORTED: Mar 18, 2019

PAGES (INCLUDING COVER): 22

VERSION*: 3

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 3: Sample receipt temperature 4°C.
Version 3 is issued March 18, 2019 to report Dissolved Metal results for sample 'MW19-07D-190301'. Version 3 is an amendment to all other Versions.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V442894

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

CCME BTEX/F1 (Water)

DATE RECEIVED: 2019-03-02

DATE REPORTED: 2019-03-18

				MW19-07S-	MW19-09S-
		SAMPLE DESCRIPTION:		190228	190228
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2019-02-28	2019-02-28
Parameter	Unit	G / S	RDL	9940443	9940446
Methyl tert-butyl ether (MTBE)	µg/L	15	1	<1	<1
Benzene	µg/L	5	0.5	<0.5	<0.5
Ethylbenzene	µg/L	140	0.5	<0.5	<0.5
Toluene	µg/L	60	0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5
o-Xylene	µg/L		0.5	<0.5	<0.5
Styrene	µg/L		0.5	<0.5	<0.5
F1 (C6-C10)	µg/L		100	<100	<100
F1 minus BTEX (C6-C10)	µg/L		100	<100	<100
VH	µg/L		100	<100	<100
VPH	µg/L		100	<100	<100
Total Xylenes	ug/L		1	<1	<1
Surrogate	Unit	Acceptable Limits			
Bromofluorobenzene	%	70-130		98	100
Dibromofluoromethane	%	70-130		101	102
Toluene - d8	%	70-130		98	100

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME(DW)ug/L(Van)
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9940443-9940446 The F1 (C6 - C10) fraction is determined by integrating the FID chromatogram from the beginning of the n-C6 peak to the apex of the last n-C10 peak.
The C6 - C10 fraction is calculated from the FID toluene response factor.
Quality control for the calibration follows the guidelines set out in the CCME Contaminated Sites Method for Soils.
The (F1 minus BTEX) has been calculated by subtracting the BTEX concentration from Fraction 1.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solani

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Certificate of Analysis

AGAT WORK ORDER: 19V442894

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

CCME BTEX/F1-F2 (Water)

DATE RECEIVED: 2019-03-02

DATE REPORTED: 2019-03-18

				MW19-07D-	MW19-08D-
		SAMPLE DESCRIPTION:		190301	190301
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2019-03-01	2019-03-01
Parameter	Unit	G / S	RDL	9940441	9940445
Methyl tert-butyl ether (MTBE)	µg/L	15	1	<1	<1
Benzene	µg/L	5	0.5	<0.5	<0.5
Ethylbenzene	µg/L	140	0.5	<0.5	<0.5
Toluene	µg/L	60	0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5
o-Xylene	µg/L		0.5	<0.5	<0.5
Styrene	µg/L		0.5	<0.5	<0.5
F1 (C6-C10)	µg/L		100	<100	<100
F1 minus BTEX (C6-C10)	µg/L		100	<100	<100
F2 (C10-C16)	µg/L		200	<200	<200
VH	µg/L		100	<100	<100
VPH	µg/L		100	<100	<100
Total Xylenes	ug/L		1	<1	<1
Surrogate	Unit	Acceptable Limits			
Bromofluorobenzene	%	70-130		103	98
Dibromofluoromethane	%	70-130		106	99
Toluene - d8	%	70-130		103	99

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 19V442894

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

CCME BTEX/F1-F2 (Water)

DATE RECEIVED: 2019-03-02

DATE REPORTED: 2019-03-18

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME(DW)ug/L(Van)
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9940441-9940445 The F1 (C6 - C10) fraction is determined by integrating the FID chromatogram from the beginning of the n-C6 peak to the apex of the last n-C10 peak.
The C6 - C10 fraction is calculated from the FID toluene response factor.
Quality control for the calibration follows the guidelines set out in the CCME Contaminated Sites Method for Soils.
The (F1 minus BTEX) has been calculated by subtracting the BTEX concentration from Fraction 1.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solarin

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AGAT WORK ORDER: 19V442894

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

CCME F2 (Water)

DATE RECEIVED: 2019-03-02

DATE REPORTED: 2019-03-18

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: MW19-07S-190301	SAMPLE DESCRIPTION: MW19-09S-190301
				SAMPLE TYPE: Water	SAMPLE TYPE: Water
				DATE SAMPLED: 2019-03-01	DATE SAMPLED: 2019-03-01
				9940444	9940447
F2 (C10-C16)	µg/L		200	<200	<200

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME(DW)ug/L(Van)
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9940444 The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

9940447 The C10 - C16 (F2) fraction is calculated using the average response factor for n-C10, n-C16, and n-C34.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solarin

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AGAT WORK ORDER: 19V442894

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

LEPH in Water Low Level

DATE RECEIVED: 2019-03-02

DATE REPORTED: 2019-03-18

SAMPLE DESCRIPTION:				MW19-07D-190301	MW19-07S-190301	MW19-08D-190301	MW19-09S-190301
SAMPLE TYPE:				Water	Water	Water	Water
DATE SAMPLED:				2019-03-01	2019-03-01	2019-03-01	2019-03-01
Parameter	Unit	G / S	RDL	9940441	9940444	9940445	9940447
Naphthalene	µg/L		0.05	0.08	<0.05	<0.05	2.11
Quinoline	µg/L		0.05	<0.05	2.89	<0.05	<0.05
Acenaphthylene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	µg/L		0.02	0.03	8.64	<0.02	0.16
Fluorene	µg/L		0.02	0.04	9.68	<0.02	0.27
Phenanthrene	µg/L		0.04	0.06	11.1	0.05	0.78
Anthracene	µg/L		0.01	0.02	1.87	0.01	0.22
Acridine	µg/L		0.05	<0.05	1.85	<0.05	<0.05
Fluoranthene	µg/L		0.02	0.03	2.72	<0.02	0.34
Pyrene	µg/L		0.02	0.04	3.57	<0.02	0.47
Benzo(a)anthracene	µg/L		0.01	0.01	1.21	<0.01	0.19
Chrysene	µg/L		0.01	0.01	1.09	<0.01	0.16
Benzo(b)fluoranthene	µg/L		0.01	<0.01	0.41	<0.01	0.06
Benzo(j)fluoranthene	µg/L		0.01	<0.01	0.24	<0.01	0.04
Benzo(k)fluoranthene	µg/L		0.01	<0.01	0.30	<0.01	0.05
Benzo(a)pyrene	µg/L	0.01	0.01	<0.01	0.74	<0.01	0.12
Indeno(1,2,3-c,d)pyrene	µg/L		0.01	<0.01	0.19	<0.01	0.03
Dibenzo(a,h)anthracene	µg/L		0.01	<0.01	0.09	<0.01	0.01
Benzo(g,h,i)perylene	µg/L		0.01	<0.01	0.24	<0.01	0.04
1-Methylnaphthalene	µg/L		0.05	0.06	36.3	<0.05	0.63
2-Methylnaphthalene	µg/L		0.05	0.05	32.1	<0.05	0.70
EPH C10-C19	µg/L		200	<200	250	<200	<200
LEPH C10-C19	µg/L		200	<200	220	<200	<200
Benzo(b+j)fluoranthene	µg/L		0.01	<0.01	0.65	<0.01	0.10
Surrogate	Unit	Acceptable Limits					
Naphthalene - d8	%	50-130		117	118	115	114
2-Fluorobiphenyl	%	50-130		103	112	111	108
P-Terphenyl - d14	%	60-130		114	119	93	117

Certified By: D. Solani

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AGAT WORK ORDER: 19V442894

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

LEPH in Water Low Level

DATE RECEIVED: 2019-03-02

DATE REPORTED: 2019-03-18

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME(DW)ug/L(Van)
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9940441-9940447 LEPH result has been corrected for PAH contributions.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solarin

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AGAT WORK ORDER: 19V442894

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbons in Water Low Level

DATE RECEIVED: 2019-03-02

DATE REPORTED: 2019-03-18

SAMPLE DESCRIPTION:				MW19-A-190301	MW19-07S-190301	MW19-08D-190301	MW19-09S-190301
SAMPLE TYPE:				Water	Water	Water	Water
DATE SAMPLED:				2019-03-01	2019-03-01	2019-03-01	2019-03-01
Parameter	Unit	G / S	RDL	9940442	9940444	9940445	9940447
Naphthalene	µg/L		0.05	0.09	<0.05	<0.05	2.11
Quinoline	µg/L		0.05	<0.05	2.89	<0.05	<0.05
Acenaphthylene	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	µg/L		0.02	0.03	8.64	<0.02	0.16
Fluorene	µg/L		0.02	0.03	9.68	<0.02	0.27
Phenanthrene	µg/L		0.04	0.08	11.1	0.05	0.78
Anthracene	µg/L		0.01	0.03	1.87	0.01	0.22
Acridine	µg/L		0.05	<0.05	1.85	<0.05	<0.05
Fluoranthene	µg/L		0.02	0.04	2.72	<0.02	0.34
Pyrene	µg/L		0.02	0.05	3.57	<0.02	0.47
Benzo(a)anthracene	µg/L		0.01	0.02	1.21	<0.01	0.19
Chrysene	µg/L		0.01	0.03	1.09	<0.01	0.16
Benzo(b)fluoranthene	µg/L		0.01	0.01	0.41	<0.01	0.06
Benzo(j)fluoranthene	µg/L		0.01	0.02	0.24	<0.01	0.04
Benzo(k)fluoranthene	µg/L		0.01	0.01	0.30	<0.01	0.05
Benzo(a)pyrene	µg/L		0.01	0.02	0.74	<0.01	0.12
Indeno(1,2,3-c,d)pyrene	µg/L		0.01	0.01	0.19	<0.01	0.03
Dibenzo(a,h)anthracene	µg/L		0.01	<0.01	0.09	<0.01	0.01
Benzo(g,h,i)perylene	µg/L		0.01	0.01	0.24	<0.01	0.04
1-Methylnaphthalene	µg/L		0.05	0.06	36.3	<0.05	0.63
2-Methylnaphthalene	µg/L		0.05	0.05	32.1	<0.05	0.70
Benzo(b+j)fluoranthene	µg/L		0.01	0.03	0.65	<0.01	0.10
Surrogate	Unit	Acceptable Limits					
Naphthalene - d8	%	50-130		111	118	115	114
2-Fluorobiphenyl	%	50-130		95	112	111	108
P-Terphenyl - d14	%	60-130		81	119	93	117

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

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solarin

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AGAT WORK ORDER: 19V442894

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Dissolved Metals

DATE RECEIVED: 2019-03-02

DATE REPORTED: 2019-03-18

SAMPLE DESCRIPTION:				MW15-1S-190301	MW15-1D-190301	MW15-2D-190228	MW15-2S-190228	MW15-3-190228	MW15-4-190228	MW15-5-190301	MW18-06D-190228
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water	Water	Water
DATE SAMPLED:				2019-03-01	2019-03-01	2019-02-28	2019-02-28	2019-02-28	2019-02-28	2019-03-01	2019-02-28
Parameter	Unit	G / S	RDL	9940431	9940433	9940434	9940435	9940436	9940437	9940438	9940439
Aluminum Dissolved	µg/L		2	101	3	<2	3	17	<2	28	10
Antimony Dissolved	µg/L		0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2
Arsenic Dissolved	µg/L		0.1	0.6	1.4	1.1	0.1	0.1	0.2	0.1	0.9
Barium Dissolved	µg/L		0.2	28.8	12.0	4.3	13.3	8.6	18.9	24.4	13.9
Beryllium Dissolved	µg/L		0.01	0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01
Boron Dissolved	µg/L		2	6	17	7	5	2	81	8	11
Cadmium Dissolved	µg/L		0.01	0.07	0.10	0.02	0.03	0.02	0.02	0.06	<0.01
Calcium Dissolved	µg/L		50	18600	32800	27400	10800	15800	32600	22700	34900
Chromium Dissolved	µg/L		0.5	<0.5	1.5	0.9	<0.5	<0.5	<0.5	<0.5	1.1
Cobalt Dissolved	µg/L		0.05	3.72	<0.05	<0.05	<0.05	<0.05	<0.05	0.32	<0.05
Copper Dissolved	µg/L		0.2	3.3	2.0	0.3	0.4	0.7	0.4	1.7	0.7
Iron Dissolved	µg/L		10	677	22	25	21	21	<10	76	14
Lead Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium Dissolved	µg/L		0.5	<0.5	<0.5	0.5	0.5	<0.5	1.6	<0.5	1.2
Magnesium Dissolved	µg/L		50	4820	10100	13000	3970	3210	9670	5860	9310
Manganese Dissolved	µg/L		1	1510	18	<1	2	5	<1	1170	<1
Molybdenum Dissolved	µg/L		0.05	0.05	2.38	0.67	0.16	0.12	0.14	0.07	3.92
Nickel Dissolved	µg/L		0.2	3.9	0.4	<0.2	2.1	0.5	0.6	0.7	<0.2
Potassium Dissolved	µg/L		50	660	1710	462	189	223	566	2260	1340
Selenium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver Dissolved	µg/L		0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	20900	13600	8680	6500	6760	33400	2540	12800
Strontium Dissolved	µg/L		0.1	103	185	54.8	24.8	51.2	132	180	90.9
Thallium Dissolved	µg/L		0.01	0.03	0.01	0.01	0.02	0.02	0.01	0.01	0.01
Tin Dissolved	µg/L		0.05	<0.05	0.58	<0.05	<0.05	<0.05	<0.05	<0.05	0.13
Titanium Dissolved	µg/L		0.5	4.1	1.7	2.9	1.5	1.1	1.9	1.9	2.3
Tungsten Dissolved	µg/L		0.01	<0.01	0.56	0.30	0.04	0.03	0.01	0.02	0.10
Uranium Dissolved	µg/L		0.01	0.03	1.03	0.06	0.02	0.03	0.05	0.02	1.09
Vanadium Dissolved	µg/L		0.5	0.9	2.5	11.7	<0.5	<0.5	<0.5	<0.5	0.7

Certified By: D. Solarin

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V442894

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Dissolved Metals

DATE RECEIVED: 2019-03-02

DATE REPORTED: 2019-03-18

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: MW15-1S-190301	MW15-1D-190301	MW15-2D-190228	MW15-2S-190228	MW15-3-190228	MW15-4-190228	MW15-5-190301	MW18-06D-190228
				SAMPLE TYPE: Water	Water	Water	Water	Water	Water	Water	Water
				DATE SAMPLED: 2019-03-01	2019-03-01	2019-02-28	2019-02-28	2019-02-28	2019-02-28	2019-03-01	2019-02-28
				9940431	9940433	9940434	9940435	9940436	9940437	9940438	9940439
Zinc Dissolved	µg/L		2	2	4	4	2	<2	<2	5	3
Hardness (calc)	ug CaCO3/L		100	66300	123000	122000	43300	52700	121000	80800	125000

Certified By:

AGAT Laboratories

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AGAT WORK ORDER: 19V442894

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Dissolved Metals

DATE RECEIVED: 2019-03-02

DATE REPORTED: 2019-03-18

SAMPLE DESCRIPTION:				MW18-06S-190228	MW19-07D-190301	MW19-A-190301	MW19-07S-190228	MW19-08D-190301	MW19-09S-190228
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water
DATE SAMPLED:				2019-02-28	2019-03-01	2019-03-01	2019-02-28	2019-03-01	2019-02-28
Parameter	Unit	G / S	RDL	9940440	9940441	9940442	9940443	9940445	9940446
Aluminum Dissolved	µg/L		2	2	6	6	876	9	73
Antimony Dissolved	µg/L		0.2	0.3	0.9	0.9	2.0	0.2	0.5
Arsenic Dissolved	µg/L		0.1	0.8	2.2	2.1	3.2	1.1	0.8
Barium Dissolved	µg/L		0.2	29.3	14.7	14.6	13.5	24.7	16.7
Beryllium Dissolved	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Boron Dissolved	µg/L		2	17	36	35	14	16	10
Cadmium Dissolved	µg/L		0.01	0.01	0.03	0.04	0.02	0.05	0.03
Calcium Dissolved	µg/L		50	35900	53800	54300	84400	56200	35000
Chromium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	14.0	<0.5	0.7
Cobalt Dissolved	µg/L		0.05	0.07	2.27	2.36	0.38	2.45	1.11
Copper Dissolved	µg/L		0.2	0.5	2.9	2.6	9.3	1.3	1.9
Iron Dissolved	µg/L		10	<10	49	20	17	16	17
Lead Dissolved	µg/L		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium Dissolved	µg/L		0.5	2.5	2.0	1.5	0.5	1.8	9.4
Magnesium Dissolved	µg/L		50	9340	11200	11400	83	12600	2890
Manganese Dissolved	µg/L		1	71	1400	1420	<1	1310	125
Molybdenum Dissolved	µg/L		0.05	10.0	15.8	15.7	4.80	10.5	1.72
Nickel Dissolved	µg/L		0.2	<0.2	5.4	5.4	2.9	4.9	3.5
Potassium Dissolved	µg/L		50	1630	1730	1800	4870	2710	2320
Selenium Dissolved	µg/L		0.5	0.8	0.6	0.6	1.1	0.5	<0.5
Silver Dissolved	µg/L		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	17200	40500	41600	51800	23600	18000
Strontium Dissolved	µg/L		0.1	104	161	163	228	230	199
Thallium Dissolved	µg/L		0.01	0.02	0.02	0.02	0.02	0.02	0.02
Tin Dissolved	µg/L		0.05	<0.05	0.36	0.38	1.75	0.79	0.31
Titanium Dissolved	µg/L		0.5	1.8	1.9	2.1	1.4	2.9	1.6
Tungsten Dissolved	µg/L		0.01	0.65	<0.01	0.12	0.44	0.14	0.08
Uranium Dissolved	µg/L		0.01	2.11	2.14	2.17	0.03	1.19	0.58
Vanadium Dissolved	µg/L		0.5	<0.5	2.1	1.5	13.2	0.6	1.3

Certified By: D. Solani

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Certificate of Analysis

AGAT WORK ORDER: 19V442894

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

BC CSR Omnibus Dissolved Metals

DATE RECEIVED: 2019-03-02

DATE REPORTED: 2019-03-18

				MW18-06S-190228	MW19-07D-190301	MW19-A-190301	MW19-07S-190228	MW19-08D-190301	MW19-09S-190228
SAMPLE DESCRIPTION:				MW18-06S-190228	MW19-07D-190301	MW19-A-190301	MW19-07S-190228	MW19-08D-190301	MW19-09S-190228
SAMPLE TYPE:				Water	Water	Water	Water	Water	Water
DATE SAMPLED:				2019-02-28	2019-03-01	2019-03-01	2019-02-28	2019-03-01	2019-02-28
Parameter	Unit	G / S	RDL	9940440	9940441	9940442	9940443	9940445	9940446
Zinc Dissolved	µg/L		2	<2	4	4	3	5	114
Hardness (calc)	ug CaCO3/L		100	128000	180000	183000	211000	192000	99300

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

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solarin

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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V442894

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Mar 18, 2019			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
CCME BTEX/F1-F2 (Water)															
F2 (C10-C16)	70763	W-MS1	14700	14700	0.0%	< 200	107%	80%	120%				83%	70%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
LEPH in Water Low Level															
Naphthalene	70763	W-MS1	1.07	1.16	8.1%	< 0.05	105%	80%	120%				87%	50%	130%
Quinoline	70763	W-MS1	1.42	1.42	0.0%	< 0.05	100%	80%	120%				113%	50%	130%
Acenaphthylene	70763	W-MS1	1.37	1.39	1.4%	< 0.02	101%	80%	120%				110%	50%	130%
Acenaphthene	70763	W-MS1	1.29	1.35	4.5%	< 0.02	99%	80%	120%				103%	50%	130%
Fluorene	70763	W-MS1	1.39	1.34	3.7%	< 0.02	99%	80%	120%				111%	50%	130%
Phenanthrene	70763	W-MS1	1.43	1.49	4.1%	< 0.04	101%	80%	120%				118%	60%	130%
Anthracene	70763	W-MS1	1.36	1.34	1.5%	< 0.01	100%	80%	120%				110%	60%	130%
Acridine	70763	W-MS1	1.33	1.36	2.2%	< 0.05	99%	80%	120%				107%	50%	130%
Fluoranthene	70763	W-MS1	1.50	1.56	3.9%	< 0.02	99%	80%	120%				122%	60%	130%
Pyrene	70763	W-MS1	1.54	1.58	2.6%	< 0.02	99%	80%	120%				125%	60%	130%
Benzo(a)anthracene	70763	W-MS1	1.49	1.55	3.9%	< 0.01	101%	80%	120%				119%	60%	130%
Chrysene	70763	W-MS1	1.32	1.36	3.0%	< 0.01	99%	80%	120%				106%	60%	130%
Benzo(b)fluoranthene	70763	W-MS1	1.56	1.54	1.3%	< 0.01	105%	80%	120%				125%	60%	130%
Benzo(j)fluoranthene	70763	W-MS1	1.26	1.39	9.8%	< 0.01	99%	80%	120%				101%	60%	130%
Benzo(k)fluoranthene	70763	W-MS1	1.57	1.46	7.3%	< 0.01	98%	80%	120%				126%	60%	130%
Benzo(a)pyrene	70763	W-MS1	1.40	1.38	1.4%	< 0.01	101%	80%	120%				112%	60%	130%
Indeno(1,2,3-c,d)pyrene	70763	W-MS1	1.28	1.31	2.3%	< 0.01	104%	80%	120%				103%	60%	130%
Dibenzo(a,h)anthracene	70763	W-MS1	1.31	1.35	3.0%	< 0.01	104%	80%	120%				105%	60%	130%
Benzo(g,h,i)perylene	70763	W-MS1	1.20	1.24	3.3%	< 0.01	104%	80%	120%				96%	60%	130%
1-Methylnaphthalene	70763	W-MS1	1.09	1.18	7.9%	< 0.05	103%	80%	120%				88%	50%	130%
2-Methylnaphthalene	70763	W-MS1	1.03	1.08	4.7%	< 0.05	104%	80%	120%				82%	50%	130%
EPH C10-C19	70763	W-MS1	24400	25000	2.4%	< 200	103%	70%	130%				98%	70%	130%
Naphthalene - d8	70763	W-MS1	108	119	9.7%		105%	80%	120%				108%	50%	130%
2-Fluorobiphenyl	70763	W-MS1	110	115	4.4%		103%	80%	120%				110%	50%	130%
P-Terphenyl - d14	70763	W-MS1	110	120	8.7%		104%	80%	120%				110%	60%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Polyaromatic Hydrocarbons in Water Low Level															
Naphthalene	70792	W-MS1	1.27	1.21	4.8%	< 0.05	98%	80%	120%				104%	50%	130%
Quinoline	70792	W-MS1	1.32	1.30	1.5%	< 0.05	100%	80%	120%				106%	50%	130%
Acenaphthylene	70792	W-MS1	1.21	1.22	0.8%	< 0.02	100%	80%	120%				97%	50%	130%
Acenaphthene	70792	W-MS1	1.24	1.24	0.0%	< 0.02	100%	80%	120%				99%	50%	130%
Fluorene	70792	W-MS1	1.15	1.22	5.9%	< 0.02	98%	80%	120%				92%	50%	130%
Phenanthrene	70792	W-MS1	1.31	1.33	1.5%	< 0.04	102%	80%	120%				105%	60%	130%
Anthracene	70792	W-MS1	1.29	1.32	2.3%	< 0.01	98%	80%	120%				103%	60%	130%
Acridine	70792	W-MS1	1.32	1.33	0.8%	< 0.05	100%	80%	120%				106%	50%	130%

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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.
AGAT WORK ORDER: 19V442894
PROJECT: 626268
ATTENTION TO: Ian Mace
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Mar 18, 2019			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Fluoranthene	70792	W-MS1	1.34	1.34	0.0%	< 0.02	100%	80%	120%				107%	60%	130%
Pyrene	70792	W-MS1	1.38	1.38	0.0%	< 0.02	101%	80%	120%				111%	60%	130%
Benzo(a)anthracene	70792	W-MS1	1.34	1.39	3.7%	< 0.01	100%	80%	120%				107%	60%	130%
Chrysene	70792	W-MS1	1.30	1.27	2.3%	< 0.01	99%	80%	120%				104%	60%	130%
Benzo(b)fluoranthene	70792	W-MS1	1.20	1.27	5.7%	< 0.01	101%	80%	120%				96%	60%	130%
Benzo(j)fluoranthene	70792	W-MS1	1.22	1.39	13.0%	< 0.01	97%	80%	120%				98%	60%	130%
Benzo(k)fluoranthene	70792	W-MS1	1.29	1.24	4.0%	< 0.01	97%	80%	120%				103%	60%	130%
Benzo(a)pyrene	70792	W-MS1	1.33	1.30	2.3%	< 0.01	99%	80%	120%				107%	60%	130%
Indeno(1,2,3-c,d)pyrene	70792	W-MS1	1.36	1.28	6.1%	< 0.01	100%	80%	120%				109%	60%	130%
Dibenzo(a,h)anthracene	70792	W-MS1	1.26	1.33	5.4%	< 0.01	101%	80%	120%				101%	60%	130%
Benzo(g,h,i)perylene	70792	W-MS1	1.36	1.37	0.7%	< 0.01	101%	80%	120%				109%	60%	130%
1-Methylnaphthalene	70792	W-MS1	1.17	1.18	0.9%	< 0.05	100%	80%	120%				93%	50%	130%
2-Methylnaphthalene	70792	W-MS1	1.04	1.05	1.0%	< 0.05	101%	80%	120%				83%	50%	130%
Naphthalene - d8	70792	W-MS1	105	109	3.7%		100%	80%	120%				105%	50%	130%
2-Fluorobiphenyl	70792	W-MS1	99	101	2.0%		96%	80%	120%				99%	50%	130%
P-Terphenyl - d14	70792	W-MS1	106	107	0.9%		99%	80%	120%				106%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By: D. Solomi

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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.
AGAT WORK ORDER: 19V442894
PROJECT: 626268
ATTENTION TO: Ian Mace
SAMPLING SITE:
SAMPLED BY:

Water Analysis

RPT Date: Mar 18, 2019

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
BC CSR Omnibus Dissolved Metals															
Aluminum Dissolved	9940431		101	102	0.8%	< 2	98%	90%	110%	107%	90%	110%			
Antimony Dissolved	9940431		<0.2	<0.2	NA	< 0.2	103%	90%	110%	102%	90%	110%			
Arsenic Dissolved	9940431		0.6	0.6	1.0%	< 0.1	95%	90%	110%	101%	90%	110%			
Barium Dissolved	9940431		28.8	29.3	1.6%	< 0.2	98%	90%	110%	100%	90%	110%			
Beryllium Dissolved	9940431		0.01	0.01	NA	< 0.01	91%	90%	110%	94%	90%	110%			
Boron Dissolved	9940431		6	6	NA	< 2	90%	90%	110%	101%	90%	110%			
Cadmium Dissolved	9940431		0.07	0.07	0.4%	< 0.01	99%	90%	110%	100%	90%	110%			
Calcium Dissolved	9940431		18600	18600	0.1%	< 50	102%	90%	110%	106%	90%	110%			
Chromium Dissolved	9940431		<0.5	0.5	NA	< 0.5	91%	90%	110%	101%	90%	110%			
Cobalt Dissolved	9940431		3.72	3.61	3.1%	< 0.05	91%	90%	110%	104%	90%	110%			
Copper Dissolved	9940431		3.3	3.1	5.4%	< 0.2	91%	90%	110%	105%	90%	110%			
Iron Dissolved	9940431		677	709	4.5%	< 10	90%	90%	110%	107%	90%	110%			
Lead Dissolved	9940431		<0.05	<0.05	NA	< 0.05	99%	90%	110%	102%	90%	110%			
Lithium Dissolved	9940431		<0.5	<0.5	NA	< 0.5				90%	90%	110%			
Magnesium Dissolved	9940431		4820	4850	0.6%	< 50	102%	90%	110%	103%	90%	110%			
Manganese Dissolved	9940431		1510	1520	0.5%	< 1	105%	90%	110%	105%	90%	110%			
Molybdenum Dissolved	9940431		0.05	0.06	NA	< 0.05	92%	90%	110%	103%	90%	110%			
Nickel Dissolved	9940431		3.9	3.8	1.5%	< 0.2	91%	90%	110%	105%	90%	110%			
Potassium Dissolved	9940431		660	660	0.0%	< 50	95%	90%	110%	99%	90%	110%			
Selenium Dissolved	9940431		<0.5	<0.5	NA	< 0.5	92%	90%	110%	103%	90%	110%			
Silver Dissolved	9940431		0.03	<0.02	NA	< 0.02				107%	90%	110%			
Sodium Dissolved	9940431		20900	20800	0.5%	< 50	98%	90%	110%	100%	90%	110%			
Strontium Dissolved	9940431		103	106	2.1%	< 0.1	102%	90%	110%	102%	90%	110%			
Thallium Dissolved	9940431		0.03	0.03	NA	< 0.01	103%	90%	110%	102%	90%	110%			
Tin Dissolved	9940431		<0.05	<0.05	NA	< 0.05				101%	90%	110%			
Titanium Dissolved	9940431		4.1	4.0	3.0%	< 0.5				100%	90%	110%			
Tungsten Dissolved	9940431		<0.01	<0.01	NA	< 0.01				101%	90%	110%			
Uranium Dissolved	9940431		0.03	0.03	NA	< 0.01	99%	90%	110%	101%	90%	110%			
Vanadium Dissolved	9940431		0.9	0.9	NA	< 0.5	92%	90%	110%	95%	90%	110%			
Zinc Dissolved	9940431		2	<2	NA	< 2	92%	90%	110%	100%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By: D. Solomi

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Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V442894

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Methyl tert-butyl ether (MTBE)	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
Benzene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
Ethylbenzene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
Toluene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
m&p-Xylene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
o-Xylene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
Styrene	ORG-180-5130	EPA SW-846 8260	GC/MS/FID
F1 (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
F1 minus BTEX (C6-C10)	ORG-180-5130	CCME Tier 1 Method	GC/MS/FID
Bromofluorobenzene			GC/MS
Dibromofluoromethane			GC/MS
Toluene - d8			GC/MS
VH	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
VPH	ORG-180-5130	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
F2 (C10-C16)	ORG-180-5134	CCME Tier 1 Method	GC/FID
Bromofluorobenzene		EPA SW-846 8260	GC/MS
Dibromofluoromethane		EPA SW-846 8260	GC/MS
Toluene - d8		EPA SW-846 8260	GC/MS
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acridine	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D	GC/MS

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Method Summary

CLIENT NAME: SNC - LAVALIN INC.

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SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Indeno(1,2,3-c,d)pyrene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8		Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
2-Fluorobiphenyl	ORG-180-5133	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Naphthalene - d8			GC/MS

AGAT Laboratories

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Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V442894

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Strontium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Tin Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Tungsten Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

Unit 120, 8600 Glenlyon Parkway
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Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V442894

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 • F: 778.452.4074

Chain of Custody Record

Laboratory Use Only	
Arrival Temperature:	4°
AGAT Job Number:	19V442894
Notes:	MAR 2 @ 10:42

Report Information

Company: SNC-Lavalin
Contact: Ian Mace
Address: #202 - 840 Grace Street, Nanaimo, BC
Phone: 250-716-9000 Fax:
LSD: ~~PR, BC, 555~~
Client Project #: 626268 PO# 661380

Report Information

1. Name: Ian Mace
   Email: Ian.Mace@SNCLavalin.com
2. Name: Didi Grimes
   Email: Didi.Grimes@SNCLavalin.com

Report Format

☐ Single Sample per page
☑ Multiple Samples per page
☑ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☑ 5 to 7 working days
Rush TAT ☐ Day 2 - 100%
☐ Day 3 - 50%
☐ Day 4 - 25%
Date Required: ____

PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To

Same as above Yes ☑ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661380, PR.BC, 555

Requirements (Please Check)

☐ BC CSR Soil
☐ AL
☐ IL
☐ PL
☐ CL
☐ RL-LD ☐ RL-HD
☐ WL-N ☐ WL-R

☑ BC CSR - Water
☑ DW
☐ AW
☐ IW
☐ LW

Schedule 3.3 (Please Specify)
CCME (Please Specify) FGQG RL
Other (Please Specify)

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	Dissolved Metals	BTEX	PAH	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
4940431	MW15-1S ~~MW15~~ - 190301	GW	2019/03/01 10:00		X			1			
432	MW15-1D-190301	↓	2019/03/01 9:30		X			1			
434	MW15-2D-190228		2019/02/28 11:15		X			1			
435	MW15-2S-190228		11:30		X			1			
436	MW15-3-190228		13:30		X			1			
437 ~~435~~	MW15-4-190228		↓ 13:00		X			1			
438 ~~436~~	MW15-5-190301		2019/03/01 8:30		X			1			
439 ~~437~~	MW18-06D-190228		2019/02/28 12:00		X			1			
440 ~~438~~	MW18-06S-190228		2019/02/28 12:30		X			1			
441 ~~439~~	MW19-07D-190301		2019/03/01 11:00		X	X	X	6			X
442 ~~440~~	MW19-A-190301	↓	2019/03/01		X		X	3			

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Chris MacLean [signature]	19/03/01 14:00	S. Naper [signature]	
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 1 of 2

Nº: 029702

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Burnaby, BC
V5J 0B6
P: 778.452.4000 - F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 4°C
AGAT Job Number: 19V442804
Notes: MAR 2 2019 10:42

Report Information

Company: SNC-Lavalin
Contact: Ian Mace
Address: #202 890 Crace Street
Nanaimo, BC
Phone: 250-716-9000 Fax:
LSD:
Client Project #: 626268 PO # 661380

Report Information

1. Name: Ian Mace
Email: Ian.Mace@snclavalin.com
2. Name: Didi Grimes
Email: Didi.Grimes@snclavalin.com

Report Format

- ☐ Single Sample per page
- ☑ Multiple Samples per page
- ☑ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☑ 5 to 7 working days
Rush TAT ☐ Day 2 - 100%
☐ Day 3 - 50%
☐ Day 4 - 25%
Date Required:
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To

Same as above Yes ☑ No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661380, PR.BC.555

Requirements (Please Check)

☐ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☐ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☑ BC CSR - Water
☑ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 (Please Specify)
CCME (Please Specify) FAOG RL
Other (Please Specify)

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	Dissolved Metals	BTEX	PAH	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
443	MW19-07S-190228	GW	2019/02/28 10:00	BTEX only on Hold.	X	X		4			X
444	MW19-07S-190301		2019/03/01 11:15				X	2			
445	MW19-08D-190301		2019/03/01 10:15	BTEX on hold only.	X	X	X	6			X
446	MW19-09S-190228		2019/02/28 10:30	BTEX on hold only.	X	X		4			X
447	MW19-09S-190301		2019/03/01 10:30				X	2			
	~~MW19-09~~										

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Chris MacLean	19/03/01 14:00		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 2 of 2
N°: 029701

Document #: DIV 156-3500.004
Date Revised: January 28, 2019

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 19V442894

RECEIVING BASICS:

Received From: Loomis Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 1 Containers: 26

TIME SENSITIVE ISSUES:

Earliest Date Sampled: Feb 28, 2019 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) ***use jars when available**

(1) 4 + 3 + 4 = 4 °C (2) ___ + ___ + ___ = ___ °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

Custody Seal in tact

AGAT Laboratories

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FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: SNC - LAVALIN INC.
#202-890 CRACE STREET
NANAIMO, BC V9R2T3
(250) 756-3527

ATTENTION TO: Ian Mace

PROJECT: 626268

AGAT WORK ORDER: 19V445538

TRACE ORGANICS REVIEWED BY: Dana Solari, Lab Reporter

DATE REPORTED: Mar 18, 2019

PAGES (INCLUDING COVER): 25

VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 2: Sample receipt temperature 1°C. Version 2 issued March 18, 2019 to report F2-F4 on sample 'TP19-57-04'. Version 2 is an amendment to Version 1.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V445538

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

CCME BTEX/F1-F4 (Soil)

DATE RECEIVED: 2019-03-12

DATE REPORTED: 2019-03-18

		SAMPLE DESCRIPTION:		TP19-57-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2019-03-11
Parameter	Unit	G / S	RDL	9958545
Methyl tert-butyl ether (MTBE)	µg/g		0.1	<0.1
Benzene	µg/g		0.005	<0.005
Toluene	µg/g		0.05	<0.05
Ethylbenzene	µg/g		0.01	0.01
m&p-Xylene	µg/g		0.02	<0.02
o-Xylene	µg/g		0.02	<0.02
Styrene	µg/g		0.05	<0.05
F1 (C6-C10)	µg/g		10	<10
F1 minus BTEX (C6-C10)	µg/g		10	<10
F2 (C10-C16)	µg/g		20	197
F3 (C16-C34)	µg/g		20	808
F4 (C34-C50)	µg/g		20	205
Moisture	%		0.5	12.0
VH	µg/g		10	<10
VPH	µg/g		10	<10
Total Xylenes	µg/g		0.05	<0.05
Surrogate	Unit	Acceptable Limits		
Bromofluorobenzene	%	60-140		102
Dibromofluoromethane	%	60-140		106
Toluene - d8	%	60-140		122

Certified By: D. Solano

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V445538

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

CCME BTEX/F1-F4 (Soil)

DATE RECEIVED: 2019-03-12

DATE REPORTED: 2019-03-18

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

9958545 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
Sample container inappropriate as per analysis requirements for BTEX/VPH.
Soil sample is visibly heterogeneous.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solarin

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V445538

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

CCME F2-F4 (Soil)

DATE RECEIVED: 2019-03-12

DATE REPORTED: 2019-03-18

		SAMPLE DESCRIPTION:		TP19-57-05
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2019-03-11
Parameter	Unit	G / S	RDL	9958546
F2 (C10-C16)	µg/g		20	42
F3 (C16-C34)	µg/g		20	71
F4 (C34-C50)	µg/g		20	<20
Moisture	%		0.5	15.0

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME (IL) (Van)
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9958546 Results are based on the dry weight of the sample.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50, and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solarin

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V445538

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2019-03-12

DATE REPORTED: 2019-03-18

		SAMPLE DESCRIPTION:		TP19-57-04
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2019-03-11
Parameter	Unit	G / S	RDL	9958545
Naphthalene	µg/g		0.5	49.3
2-Methylnaphthalene	µg/g		0.5	32.8
1-Methylnaphthalene	µg/g		0.5	23.8
Acenaphthylene	µg/g		0.5	<0.5
Acenaphthene	µg/g		0.5	8.71
Fluorene	µg/g		2	15.5
Phenanthrene	µg/g		2	52.7
Anthracene	µg/g		0.4	17.8
Fluoranthene	µg/g		1	18.6
Pyrene	µg/g		1	24.8
Benzo(a)anthracene	µg/g		3	12.6
Chrysene	µg/g		0.5	13.5
Benzo(b)fluoranthene	µg/g		0.2	4.65
Benzo(j)fluoranthene	µg/g		0.2	3.46
Benzo(k)fluoranthene	µg/g		0.2	3.02
Benzo(a)pyrene	µg/g		0.3	9.09
Indeno(1,2,3-c,d)pyrene	µg/g		0.2	3.07
Dibenzo(a,h)anthracene	µg/g		0.5	0.864
Benzo(g,h,i)perylene	µg/g		0.5	3.02
Quinoline	µg/g		0.05	0.24
IACR CCME (Soil)			0.6	144
B[a]P TPE (Soil)	µg/g		0.05	12.8
EPH C10-C19	µg/g		20	400
EPH C19-C32	µg/g		20	692
LEPH C10-C19	µg/g		20	400
HEPH C19-C32	µg/g		20	634
Benzo(b+j)fluoranthene	µg/g		0.05	8.11

Certified By: D. Solani

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 19V445538

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2019-03-12

DATE REPORTED: 2019-03-18

		SAMPLE DESCRIPTION:	TP19-57-04
		SAMPLE TYPE:	Soil
		DATE SAMPLED:	2019-03-11
Surrogate	Unit	Acceptable Limits	9958545
Naphthalene - d8	%	50-130	88
2-Fluorobiphenyl	%	50-130	91
P-Terphenyl - d14	%	60-130	109

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

9958545 Results are based on dry weight of sample.
LEPH & HEPH results have been corrected for PAH contributions.
Soil sample is visibly heterogeneous.
PAH detection limits increased due to sample dilution.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solarin

AGAT Laboratories

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TEL (778)452-4000
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Certificate of Analysis

AGAT WORK ORDER: 19V445538

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbons in Soil Low Level

DATE RECEIVED: 2019-03-12

DATE REPORTED: 2019-03-18

		SAMPLE DESCRIPTION:		TP19-57-05		TP19-58-01	TP19-58-02	TP19-58-03	TP19-59-01	TP19-59-04	TP19-60-01
		SAMPLE TYPE:		Soil		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2019-03-11		2019-03-11	2019-03-11	2019-03-11	2019-03-11	2019-03-11	2019-03-11
Parameter	Unit	G / S	RDL	9958546	RDL	9958547	9958548	9958549	9958552	9958555	9958556
Naphthalene	µg/g		0.05	8.94	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2-Methylnaphthalene	µg/g		0.05	5.27	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1-Methylnaphthalene	µg/g		0.05	4.08	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthylene	µg/g		0.05	<0.05	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.05	0.88	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.2	1.3	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g		0.2	4.6	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Anthracene	µg/g		0.04	1.46	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.1	1.1	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	µg/g		0.1	1.4	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/g		0.3	0.6	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.5	0.5	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.2	0.2	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(j)fluoranthene	µg/g		0.2	<0.2	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.2	<0.2	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.3	0.4	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.2	0.2	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.05	0.15	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.5	<0.5	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Quinoline	µg/g		0.5	<0.5	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)			6	7	0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.5	0.7	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b+j)fluoranthene	µg/g		0.05	0.20	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Surrogate	Unit	Acceptable Limits									
Naphthalene - d8	%	50-130		99		93	103	100	101	99	105
2-Fluorobiphenyl	%	50-130		100		89	90	92	90	102	103
P-Terphenyl - d14	%	60-130		103		107	103	107	103	103	105

Certified By: D. Solani

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Certificate of Analysis

AGAT WORK ORDER: 19V445538

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbons in Soil Low Level

DATE RECEIVED: 2019-03-12

DATE REPORTED: 2019-03-18

		SAMPLE DESCRIPTION:		TP19-60-02	TP19-60-03	TP19-60-04	TP19-61-01	TP19-61-02	TP19-61-04	TP19-62-01	TP19-62-02
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2019-03-11	2019-03-11	2019-03-11	2019-03-11	2019-03-11	2019-03-11	2019-03-11	2019-03-11
Parameter	Unit	G / S	RDL	9958557	9958558	9958559	9958560	9958561	9958563	9958564	9958565
Naphthalene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2-Methylnaphthalene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1-Methylnaphthalene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthylene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g		0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02
Anthracene	µg/g		0.004	<0.004	<0.004	<0.004	0.008	<0.004	<0.004	<0.004	<0.004
Fluoranthene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	µg/g		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/g		0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	<0.005	<0.005	0.011	<0.005	0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05	<0.05	0.10	<0.05	<0.05	<0.05	<0.05
Quinoline	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)			0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Surrogate	Unit	Acceptable Limits									
Naphthalene - d8	%	50-130		104	107	106	115	105	109	106	110
2-Fluorobiphenyl	%	50-130		96	97	93	109	102	110	104	96
P-Terphenyl - d14	%	60-130		104	110	103	110	108	111	112	115

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Certificate of Analysis

AGAT WORK ORDER: 19V445538

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbons in Soil Low Level

DATE RECEIVED: 2019-03-12

DATE REPORTED: 2019-03-18

		SAMPLE DESCRIPTION:		TP19-63-02	TP19-63-03	TP19-63-04	TP19-63-05	TP19-64-01	TP19-64-03	TP19-64-04	TP19-64-05
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2019-03-11	2019-03-11	2019-03-11	2019-03-11	2019-03-11	2019-03-11	2019-03-11	2019-03-11
Parameter	Unit	G / S	RDL	9958568	9958569	9958570	9958571	9958572	9958574	9958575	9958576
Naphthalene	µg/g		0.005	0.057	0.059	0.081	<0.005	0.005	0.030	0.009	<0.005
2-Methylnaphthalene	µg/g		0.005	0.062	0.062	0.086	<0.005	<0.005	0.034	0.011	<0.005
1-Methylnaphthalene	µg/g		0.005	0.089	0.084	0.105	0.005	0.008	0.043	0.017	<0.005
Acenaphthylene	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	0.035	0.033	0.042	<0.005	<0.005	0.022	0.008	<0.005
Fluorene	µg/g		0.02	0.04	0.04	0.05	<0.02	<0.02	0.03	<0.02	<0.02
Phenanthrene	µg/g		0.02	0.32	0.28	0.36	0.02	0.04	0.20	0.08	<0.02
Anthracene	µg/g		0.004	0.089	0.074	0.093	0.009	0.012	0.058	0.021	<0.004
Fluoranthene	µg/g		0.01	0.15	0.13	0.16	0.01	0.02	0.11	0.05	<0.01
Pyrene	µg/g		0.01	0.19	0.17	0.20	0.01	0.02	0.14	0.06	0.01
Benzo(a)anthracene	µg/g		0.03	0.10	0.09	0.11	<0.03	<0.03	0.06	<0.03	<0.03
Chrysene	µg/g		0.05	0.09	0.08	0.10	<0.05	<0.05	0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	0.04	0.03	0.04	<0.02	<0.02	0.02	<0.02	<0.02
Benzo(j)fluoranthene	µg/g		0.02	0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	0.03	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	0.07	0.05	0.07	<0.03	<0.03	0.04	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	0.014	0.013	0.015	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Quinoline	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)			0.6	1.1	0.9	1.1	<0.6	<0.6	<0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	0.10	0.08	0.10	<0.05	<0.05	0.05	<0.05	<0.05
Benzo(b+j)fluoranthene	µg/g		0.05	0.06	0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05
Surrogate	Unit	Acceptable Limits									
Naphthalene - d8	%	50-130		114	109	108	102	111	99	107	100
2-Fluorobiphenyl	%	50-130		114	105	116	105	104	104	105	106
P-Terphenyl - d14	%	60-130		114	111	118	115	113	124	126	118

Certified By: D. Solani

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Certificate of Analysis

AGAT WORK ORDER: 19V445538

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbons in Soil Low Level

DATE RECEIVED: 2019-03-12

DATE REPORTED: 2019-03-18

		SAMPLE DESCRIPTION:		TP19-65-01	TP19-65-03	TP19-65-04
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2019-03-11	2019-03-11	2019-03-11
Parameter	Unit	G / S	RDL	9958577	9958579	9958580
Naphthalene	µg/g		0.005	<0.005	<0.005	<0.005
2-Methylnaphthalene	µg/g		0.005	<0.005	<0.005	<0.005
1-Methylnaphthalene	µg/g		0.005	<0.005	<0.005	<0.005
Acenaphthylene	µg/g		0.005	<0.005	<0.005	<0.005
Acenaphthene	µg/g		0.005	<0.005	<0.005	<0.005
Fluorene	µg/g		0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g		0.02	0.02	<0.02	<0.02
Anthracene	µg/g		0.004	0.007	<0.004	<0.004
Fluoranthene	µg/g		0.01	0.01	<0.01	<0.01
Pyrene	µg/g		0.01	0.01	<0.01	<0.01
Benzo(a)anthracene	µg/g		0.03	<0.03	<0.03	<0.03
Chrysene	µg/g		0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02
Benzo(j)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02
Benzo(k)fluoranthene	µg/g		0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene	µg/g		0.03	<0.03	<0.03	<0.03
Indeno(1,2,3-c,d)pyrene	µg/g		0.02	<0.02	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g		0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	µg/g		0.05	<0.05	<0.05	<0.05
Quinoline	µg/g		0.05	<0.05	<0.05	<0.05
IACR CCME (Soil)			0.6	<0.6	<0.6	<0.6
B[a]P TPE (Soil)	µg/g		0.05	<0.05	<0.05	<0.05
Benzo(b+j)fluoranthene	µg/g		0.05	<0.05	<0.05	<0.05
Surrogate	Unit	Acceptable Limits				
Naphthalene - d8	%	50-130		110	99	112
2-Fluorobiphenyl	%	50-130		108	106	110
P-Terphenyl - d14	%	60-130		127	117	127

Certified By: D. Solani

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Certificate of Analysis

AGAT WORK ORDER: 19V445538

PROJECT: 626268

CLIENT NAME: SNC - LAVALIN INC.

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbons in Soil Low Level

DATE RECEIVED: 2019-03-12

DATE REPORTED: 2019-03-18

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

9958546 Results are based on dry weight of sample.
PAH detection limits increased due to sample dilution.
Soil sample is visibly heterogeneous.

9958547-9958580 Results are based on dry weight of sample.
Soil sample is visibly heterogeneous.

Analysis performed at AGAT Vancouver (unless marked by *)

Certified By: D. Solarin

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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V445538

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Mar 18, 2019			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
LEPH/HEPH in Soil Low Level															
Naphthalene	70767	9956263	<0.005	<0.005	NA	< 0.005	105%	80%	120%				105%	50%	130%
2-Methylnaphthalene	70767	9956263	<0.005	<0.005	NA	< 0.005	104%	80%	120%				99%	50%	130%
1-Methylnaphthalene	70767	9956263	<0.005	<0.005	NA	< 0.005	103%	80%	120%				107%	50%	130%
Acenaphthylene	70767	9956263	<0.005	<0.005	NA	< 0.005	101%	80%	120%				98%	50%	130%
Acenaphthene	70767	9956263	<0.005	<0.005	NA	< 0.005	99%	80%	120%				97%	50%	130%
Fluorene	70767	9956263	<0.02	<0.02	NA	< 0.02	99%	80%	120%				98%	50%	130%
Phenanthrene	70767	9956263	<0.02	<0.02	NA	< 0.02	101%	80%	120%				102%	60%	130%
Anthracene	70767	9956263	<0.004	<0.004	NA	< 0.004	100%	80%	120%				105%	60%	130%
Fluoranthene	70767	9956263	<0.01	<0.01	NA	< 0.01	99%	80%	120%				106%	60%	130%
Pyrene	70767	9956263	<0.01	<0.01	NA	< 0.01	99%	80%	120%				101%	60%	130%
Benzo(a)anthracene	70767	9956263	<0.03	<0.03	NA	< 0.03	101%	80%	120%				104%	60%	130%
Chrysene	70767	9956263	<0.05	<0.05	NA	< 0.05	99%	80%	120%				106%	60%	130%
Benzo(b)fluoranthene	70767	9956263	<0.02	<0.02	NA	< 0.02	105%	80%	120%				98%	60%	130%
Benzo(j)fluoranthene	70767	9956263	<0.02	<0.02	NA	< 0.02	99%	80%	120%				111%	60%	130%
Benzo(k)fluoranthene	70767	9956263	<0.02	<0.02	NA	< 0.02	98%	80%	120%				104%	60%	130%
Benzo(a)pyrene	70767	9956263	<0.03	<0.03	NA	< 0.03	101%	80%	120%				103%	60%	130%
Indeno(1,2,3-c,d)pyrene	70767	9956263	<0.02	<0.02	NA	< 0.02	104%	80%	120%				106%	60%	130%
Dibenzo(a,h)anthracene	70767	9956263	<0.005	<0.005	NA	< 0.005	104%	80%	120%				106%	60%	130%
Benzo(g,h,i)perylene	70767	9956263	<0.05	<0.05	NA	< 0.05	104%	80%	120%				109%	60%	130%
Quinoline	70767	9956263	<0.05	<0.05	NA	< 0.05	100%	80%	120%				112%	50%	130%
EPH C10-C19	70769	9955797	<20	<20	NA	< 20	101%	70%	130%				94%	65%	120%
EPH C19-C32	70769	9955797	<20	<20	NA	< 20	103%	70%	130%				105%	80%	120%
Naphthalene - d8	70767	9956263	96	97	1.0%		105%	80%	120%				107%	50%	130%
2-Fluorobiphenyl	70767	9956263	94	94	0.0%		103%	80%	120%				105%	50%	130%
P-Terphenyl - d14	70767	9956263	97	103	6.0%		104%	80%	120%				105%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

CCME BTEX/F1-F4 (Soil)															
Methyl tert-butyl ether (MTBE)	70772	9958545	<0.1	<0.1	NA	< 0.1	98%	80%	120%				103%	60%	140%
Benzene	70772	9958545	<0.005	<0.005	NA	< 0.005	100%	80%	120%				95%	60%	140%
Toluene	70772	9958545	<0.05	<0.05	NA	< 0.05	100%	80%	120%				107%	60%	140%
Ethylbenzene	70772	9958545	0.01	0.01	NA	< 0.01	99%	80%	120%				109%	60%	140%
m&p-Xylene	70772	9958545	<0.02	<0.02	NA	< 0.02	99%	80%	120%				110%	60%	140%
o-Xylene	70772	9958545	<0.02	<0.02	NA	< 0.02	99%	80%	120%				106%	60%	140%
Styrene	70772	9958545	<0.05	<0.05	NA	< 0.05	100%	80%	120%				100%	60%	140%
F1 (C6-C10)	70772	9958545	<10	<10	NA	< 10									
F1 minus BTEX (C6-C10)	70772	9958545	<10	<10	NA	< 10									
F2 (C10-C16)	70767	9956263	<20	<20	NA	< 20	105%	80%	120%				87%	60%	140%
F3 (C16-C34)	70767	9956263	<20	<20	NA	< 20	101%	80%	120%				111%	60%	140%

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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.
AGAT WORK ORDER: 19V445538
PROJECT: 626268
ATTENTION TO: Ian Mace
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Mar 18, 2019			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
F4 (C34-C50)	70767	9956263	<20	<20	NA	< 20	103%	80%	120%				112%	60%	140%
Bromofluorobenzene	70772	9958545	102	104	1.9%		101%	60%	140%				96%	60%	140%
Dibromofluoromethane	70772	9958545	106	105	0.9%		101%	60%	140%				99%	60%	140%
Toluene - d8	70772	9958545	122	122	0.0%		99%	60%	140%				113%	60%	140%
VH	70772	9958545	<10	<10	NA	< 10									
VPH	70772	9958545	<10	<10	NA	< 10									

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Polyaromatic Hydrocarbons in Soil Low Level

Naphthalene	70773	9958572	0.005	0.022	NA	< 0.005	97%	80%	120%				101%	50%	130%
2-Methylnaphthalene	70773	9958572	<0.005	0.016	NA	< 0.005	99%	80%	120%				96%	50%	130%
1-Methylnaphthalene	70773	9958572	0.008	0.020	NA	< 0.005	101%	80%	120%				105%	50%	130%
Acenaphthylene	70773	9958572	<0.005	<0.005	NA	< 0.005	101%	80%	120%				95%	50%	130%
Acenaphthene	70773	9958572	<0.005	0.007	NA	< 0.005	101%	80%	120%				99%	50%	130%
Fluorene	70773	9958572	<0.02	<0.02	NA	< 0.02	99%	80%	120%				82%	50%	130%
Phenanthrene	70773	9958572	0.04	0.07	NA	< 0.02	101%	80%	120%				93%	60%	130%
Anthracene	70773	9958572	0.012	0.019	NA	< 0.004	99%	80%	120%				98%	60%	130%
Fluoranthene	70773	9958572	0.02	0.03	NA	< 0.01	96%	80%	120%				108%	60%	130%
Pyrene	70773	9958572	0.02	0.04	NA	< 0.01	96%	80%	120%				101%	60%	130%
Benzo(a)anthracene	70773	9958572	<0.03	<0.03	NA	< 0.03	101%	80%	120%				99%	60%	130%
Chrysene	70773	9958572	<0.05	<0.05	NA	< 0.05	101%	80%	120%				96%	60%	130%
Benzo(b)fluoranthene	70773	9958572	<0.02	<0.02	NA	< 0.02	99%	80%	120%				107%	60%	130%
Benzo(j)fluoranthene	70773	9958572	<0.02	<0.02	NA	< 0.02	100%	80%	120%				95%	60%	130%
Benzo(k)fluoranthene	70773	9958572	<0.02	<0.02	NA	< 0.02	103%	80%	120%				99%	60%	130%
Benzo(a)pyrene	70773	9958572	<0.03	<0.03	NA	< 0.03	101%	80%	120%				95%	60%	130%
Indeno(1,2,3-c,d)pyrene	70773	9958572	<0.02	<0.02	NA	< 0.02	101%	80%	120%				102%	60%	130%
Dibenzo(a,h)anthracene	70773	9958572	<0.005	<0.005	NA	< 0.005	101%	80%	120%				94%	60%	130%
Benzo(g,h,i)perylene	70773	9958572	<0.05	<0.05	NA	< 0.05	100%	80%	120%				114%	60%	130%
Quinoline	70773	9958572	<0.05	<0.05	NA	< 0.05	102%	80%	120%				105%	50%	130%
Naphthalene - d8	70773	9958572	111	108	2.7%		98%	80%	120%				103%	50%	130%
2-Fluorobiphenyl	70773	9958572	104	108	3.8%		105%	80%	120%				102%	50%	130%
P-Terphenyl - d14	70773	9958572	113	118	4.3%		94%	80%	120%				103%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Polyaromatic Hydrocarbons in Soil Low Level

Naphthalene	70770	9958279	0.009	0.008	NA	< 0.005	97%	80%	120%				105%	50%	130%
2-Methylnaphthalene	70770	9958279	0.009	0.009	NA	< 0.005	99%	80%	120%				88%	50%	130%
1-Methylnaphthalene	70770	9958279	0.008	0.007	NA	< 0.005	101%	80%	120%				97%	50%	130%
Acenaphthylene	70770	9958279	0.008	0.008	NA	< 0.005	101%	80%	120%				82%	50%	130%
Acenaphthene	70770	9958279	0.005	<0.005	NA	< 0.005	101%	80%	120%				93%	50%	130%

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
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TEL (778)452-4000
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Quality Assurance

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V445538

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Mar 18, 2019			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Fluorene	70770	9958279	<0.02	<0.02	NA	< 0.02	99%	80%	120%				76%	50%	130%
Phenanthrene	70770	9958279	0.09	0.06	NA	< 0.02	101%	80%	120%				83%	60%	130%
Anthracene	70770	9958279	0.019	0.015	NA	< 0.004	99%	80%	120%				91%	60%	130%
Fluoranthene	70770	9958279	0.18	0.12	40.0%	< 0.01	96%	80%	120%				99%	60%	130%
Pyrene	70770	9958279	0.15	0.10	40.0%	< 0.01	96%	80%	120%				105%	60%	130%
Benzo(a)anthracene	70770	9958279	0.09	0.06	NA	< 0.03	101%	80%	120%				86%	60%	130%
Chrysene	70770	9958279	0.10	0.06	NA	< 0.05	101%	80%	120%				92%	60%	130%
Benzo(b)fluoranthene	70770	9958279	0.10	0.07	NA	< 0.02	99%	80%	120%				99%	60%	130%
Benzo(j)fluoranthene	70770	9958279	0.04	0.03	NA	< 0.02	100%	80%	120%				92%	60%	130%
Benzo(k)fluoranthene	70770	9958279	0.05	0.03	NA	< 0.02	103%	80%	120%				82%	60%	130%
Benzo(a)pyrene	70770	9958279	0.10	0.06	NA	< 0.03	101%	80%	120%				87%	60%	130%
Indeno(1,2,3-c,d)pyrene	70770	9958279	0.07	0.05	NA	< 0.02	101%	80%	120%				84%	60%	130%
Dibenzo(a,h)anthracene	70770	9958279	0.020	0.016	NA	< 0.005	101%	80%	120%				85%	60%	130%
Benzo(g,h,i)perylene	70770	9958279	0.10	0.07	NA	< 0.05	100%	80%	120%				87%	60%	130%
Quinoline	70770	9958279	<0.05	<0.05	NA	< 0.05	102%	80%	120%				109%	50%	130%
Naphthalene - d8	70770	9958279	102	88	14.7%		98%	80%	120%				80%	50%	130%
2-Fluorobiphenyl	70770	9958279	101	93	8.2%		105%	80%	120%				89%	50%	130%
P-Terphenyl - d14	70770	9958279	103	98	5.0%		94%	80%	120%				93%	60%	130%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

CCME F2-F4 (Soil)															
F2 (C10-C16)	70796	9968359	<20	<20	NA	< 20	102%	80%	120%				101%	60%	140%
F3 (C16-C34)	70796	9968359	<20	<20	NA	< 20	102%	80%	120%				89%	60%	140%
F4 (C34-C50)	70796	9968359	<20	<20	NA	< 20	100%	80%	120%				82%	60%	140%
Moisture	70796	9968359	6.0	6.0	0.0	< 0.5									

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By: D. Solomi

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http://www.agatlabs.com

Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V445538

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Methyl tert-butyl ether (MTBE)	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
Benzene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
Toluene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
Ethylbenzene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
m&p-Xylene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
o-Xylene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
Styrene	ORG-180-5100	EPA SW-846 8260-S	GC/MS/FID
F1 (C6-C10)	ORG-180-5100	CCME Tier 1 Method-S	GC/MS/FID
F1 minus BTEX (C6-C10)	ORG-180-5100	CCME Tier 1 Method-S	GC/MS/FID
F2 (C10-C16)	ORG-180-5101	CCME Tier 1 Method-S H	GC/FID
F3 (C16-C34)	ORG-180-5101	CCME Tier 1 Method-S H	GC/FID
F4 (C34-C50)	ORG-180-5101	CCME Tier 1 Method-S H	GC/FID
Moisture	INOR-181-6030	SSMA Chapter 70 (2nd Ed)	GRAVIMETRIC
Bromofluorobenzene	ORG-180-5100	EPA SW-846 8260-S	GC/MS
Dibromofluoromethane	ORG-180-5100	EPA SW-846 8260-S	GC/MS
Toluene - d8	ORG-180-5100	EPA SW-846 8260-S	GC/MS
VH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VPH	ORG-180-5100	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
F2 (C10-C16)	ORG-180-5101	CCME Tier 1 Method-S	GC/FID
F3 (C16-C34)	ORG-180-5101	CCME Tier 1 Method-S	GC/FID
F4 (C34-C50)	ORG-180-5101	CCME Tier 1 Method-S	GC/FID
Naphthalene	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
1-Methylnaphthalene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Acenaphthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluorene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Phenanthrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(a)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Chrysene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(b)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(j)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(k)fluoranthene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS

Unit 120, 8600 Glenlyon Parkway
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TEL (778)452-4000
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Method Summary

CLIENT NAME: SNC - LAVALIN INC.

AGAT WORK ORDER: 19V445538

PROJECT: 626268

ATTENTION TO: Ian Mace

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Benzo(a)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Indeno(1,2,3-c,d)pyrene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Dibenzo(a,h)anthracene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Benzo(g,h,i)perylene	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
Quinoline	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
IACR CCME (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
B[a]P TPE (Soil)	ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
EPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
LEPH C10-C19	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
HEPH C19-C32	ORG-180-5101	Modified from BCMOE Lab Manual Section D (EPH)	GC/FID
Naphthalene - d8	ORG-180-5102	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
2-Fluorobiphenyl	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
P-Terphenyl - d14	ORG-180-5102	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 • F: 778.452.4074

Laboratory Use Only
Arrival Temperature: 1°C
AGAT Job Number: 19V445538
Notes:

Chain of Custody Record

Report Information
Company: SNC-Lavalin Inc
Contact: Ian Mace
Address: 202 - 290 Crace Street
Nanaimo BC
Phone: 250-716-9000 Fax: 604-515-5150
AGAT Quote #:
Client Project #: 636268

Invoice To Same as above Yes ☒ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661380 / PR.BC.555

Report Information
1. Name: Ian Mace
Email: [illegible]
2. Name: [illegible]
Email: [illegible]@snclavalin.com

Report Format
☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Requirements *(Please Check)*
☐ BC CSR Soil: ☐ AL ☐ IL ☐ PL ☐ CL ☒ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water: ☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 *(Please Specify)*
CCME *(Please Specify)* CEQG
Other *(Please Specify)*

Turnaround Time Required (TAT)
Regular TAT ☐ 5 to 7 working days
Rush TAT ☐ Same Business Day - 200%
☒ 1 Business Day - 100%
☐ 2 Business Days - 50%
☐ 3 Business Days - 25%
Date Required: 19/03/14
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED		COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	BTEX, VPH	LEPH/HEPH	F1-F4	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
9958542	TP19-S7-01	Soil	19/03/11	9:55						2			X
43	TP19-S7-02	↓	↓	10:06						2			X
44	TP19-S7-03			10:00						2			X
45	TP19-S7-04			10:10		X	X	X	X	2			X
46	TP19-S7-05			10:15		X				2			X
47	TP19-S8-01			10:26		X				2			X
48	TP19-S8-02			10:2[illegible]		X				2			X
49	TP19-S8-03			10:25		X				2			X
50	TP19-S8-04			10:30						2			X
51	TP19-S8-05			10:35						2			X
52	TP19-S9-01			10:50		X				2			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
[illegible] Graham	19/03/11 16:00	[signature]	

Page 1 of 4
Nº: 033081

AGAT Laboratories

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V5J 0B6
P: 778.452.4000 • F: 778.452.4074

Laboratory Use Only
Arrival Temperature: 1°c
AGAT Job Number: 19V445538
Notes:

Chain of Custody Record

Report Information
Company: SNC-Lavalin Inc.
Contact: Ian Mace
Address: 207 - 890 Cruce Street, Nanaimo BC V9R 2T3
Phone: 250-716-9066 Fax: 604-515-5150
AGAT Quote #:
Client Project #: 626262

Invoice To Same as above Yes ☒ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661380 / PR.BC.555

Report Information
1. Name: Ian Mace
Email: ian.mace@snclavalin.com
2. Name: Didi Grimes
Email: didi.grimes@snclavalin.com

Requirements *(Please Check)*
☒ BC CSR Soil
☐ AL
☐ IL
☐ PL
☐ CL
☒ RL-LD ☐ RL-HD
☐ WL-N ☐ WL-R

☐ BC CSR - Water
☐ DW
☐ AW
☐ IW
☐ LW

Schedule 3.3 *(Please Specify)*
CCME *(Please Specify)* CEQG
Other *(Please Specify)*

Report Format
☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)
Regular TAT ☐ 5 to 7 working days
Rush TAT ☐ Same Business Day - 200%
☐ 1 Business Day - 100%
☐ 2 Business Days - 50%
☐ 3 Business Days - 25%
Date Required: 19/03/14
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED		COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
9958553	TP19-59-02	Soil	19/03/11	10:55			2			X
54	TP19-59-03	↓	↓	10:55			2			X
55	TP19-59-04			11:00		X	2			X
56	TP19-60-01			11:15		X	2			X
57	TP19-60-02			11:15		X	2			X
58	TP19-60-03			11:20		X	2			X
59	TP19-60-04			11:30		X	2			X
60	TP19-61-01			11:40		X	2			X
61	TP19-61-02			11:45		X	2			X
62	TP19-61-03			11:45			2			X
63	TP19-61-04			11:50		X	2			X

Samples Relinquished By (Print Name and Sign): Didi Grimes [signature] Date/Time: 2019/03/11 16:00
Samples Received By (Print Name and Sign): Date/Time
Samples Relinquished By (Print Name and Sign): Date/Time
Samples Received By (Print Name and Sign): Date/Time
Samples Relinquished By (Print Name and Sign): Date/Time
Samples Received By (Print Name and Sign): Date/Time

Page 2 of 4
Nº: 033082

Document #: DIV-158-1500.005
Date Revised: January 17, 2019

AGAT Laboratories
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Burnaby, BC
V5J 0B6
P: 778.452.4000 · F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 1°C.
AGAT Job Number: 19U445538
Notes:

Report Information

Company: ENC-Lavalin Inc.
Contact: Ian Mace
Address: 202 - 290 Craig Street
Nanaimo BC V9R 2T3
Phone: 250 716 9009 Fax: 604 515 5150
AGAT Quote #:
Client Project #: 626262

Invoice To

Same as above Yes ☒ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661380 / PR. BC.555

Report Information

1. Name: Ian Mace
Email: ian.mace@enclavalin.com
2. Name: Didi Grimes
Email: didi.grimes@enclavalin.com

Requirements (Please Check)

☒ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☒ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water
☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 (Please Specify):
CCME (Please Specify): CEQG
Other (Please Specify):

Report Format

☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☐ 5 to 7 working days
Rush TAT
☐ Same Business Day - 200%
☒ 1 Business Day - 100%
☐ 2 Business Days - 50%
☐ 3 Business Days - 25%
Date Required: 19/03/14
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
9958564	TP19-62-01	Soil	19/03/11 11:55		X	2			X
65	TP19-62-02		12:00		X	2			X
66	TP19-62-03		12:05			2			X
67	TP19-63-01		12:10			2			X
68	TP19-63-02		12:15		X	2			X
69	TP19-63-03		12:15		X	2			X
70	TP19-63-04		12:25		X	2			X
71	TP19-63-05		12:25		X	2			X
72	TP19-64-01		12:45		X	2			X
73	TP19-64-02		12:40			2			X
74	TP19-64-03		12:05		X	2			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Grimes	19/03/11 16:00		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 3 of 3
N°: 033083

Document #: DIV-188-1500.006
Date Revised: January 17, 2019

AGAT Laboratories

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Laboratory Use Only

Arrival Temperature: 1°C
AGAT Job Number: 19V445538
Notes:

Chain of Custody Record

Report Information

Company: SNC - Lavalin Inc.
Contact: Ian Mace
Address: 202 - 290 Crace Street, Nanaimo BC V9R 2T3
Phone: 250 716 9000 Fax: ~~250~~ 604 515 5150
AGAT Quote #:
Client Project #: 626268

Invoice To Same as above Yes ☒ / No ☐

Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661386 /PR.BC.555

Report Information

1. Name: Ian Mace
   Email: ian.mace@snclavalin.com
2. Name: Didi Gomes
   Email: didi.gomes@snclavalin.com

Requirements *(Please Check)*

☒ BC CSR Soil
- ☐ AL
- ☐ IL
- ☐ PL
- ☐ CL
- ☒ RL-LD ☐ RL-HD
- ☐ WL-N ☐ WL-R

☐ BC CSR - Water
- ☐ DW
- ☐ AW
- ☐ IW
- ☐ LW

Schedule 3.3 *(Please Specify)*
CCME *(Please Specify)* CEQG
Other *(Please Specify)*

Report Format

☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☐ 5 to 7 working days
Rush TAT ☐ Same Business Day - 200%
☒ 1 Business Day - 100%
☐ 2 Business Days - 50%
☐ 3 Business Days - 25%

Date Required: 19/03/14

PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	PAH	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
9958575	TP19-64-04	Soil	19/3/11 12:50		X	2			X
76	TP19-64-05	↓	↓ 12:55		X	2			X
77	TP19-65-01	↓	↓ 13:00		X	2			X
78	TP19-65-02	↓	↓ 13:10			2			X
79	TP19-65-03	↓	↓ 13:20		X	2			X
80	TP19-65-04	↓	↓ 13:30		X	2			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Gomes [signature]	19/03/11 16:10	[signature]	
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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Nº: 033084

Document #: DIV-188-1500.008
Date Revised: January 17, 2019

AGAT Laboratories
120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 · F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 1°C
AGAT Job Number: 19U445538
Notes: MAR 12 AM8:48

Report Information

Company: SNC-Lavalin Inc.
Contact: Ian Mace
Address: 202-890 Crace Street
Nanaimo BC
Phone: 250-716-9000 Fax: 604-515-5150
AGAT Quote #:
Client Project #: 626268

Report Information

1. Name: Ian Mace
Email: Ian.Mace@snclavalin.com
2. Name: Didi Grimes
Email: didi.grimes@snclavalin.com

Report Format

☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☒ 5 to 7 working days
Rush TAT
☐ Same Business Day - 200%
☒ 1 Business Day - 100%
☐ 2 Business Days - 50%
☐ 3 Business Days - 25%
Date Required: 19/03/14
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To

Same as above Yes ☒ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661380 / PR.BC.555

Requirements (Please Check)

☒ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☒ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water
☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 (Please Specify)
CCME (Please Specify) CEQG
Other (Please Specify)

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
	TP19-57-01	Soil	19/03/11 9:55		2			X
	TP19-57-02		10:00		2			X
	TP19-57-03		10:00		2			X
	TP19-57-04		10:10		2			X
	TP19-57-05		10:15		2			X
	TP19-58-01		10:20		2			X
	TP19-58-02		10:20		2			X
	TP19-58-03		10:25		2			X
	TP19-58-04		10:36		2			X
	TP19-58-05		10:35		2			X
	TP19-59-01		10:50		2			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Grimes	19/03/11 16:00	Rebecca Little	
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 1 of 4
N°: 033081

Document #: DIV-186-1500.005
Date Revised: January 17, 2019

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 • F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 1 °C
AGAT Job Number: 19U485538
Notes: MAR 12 AM 8:48

Report Information
Company: SNC-Lavalin Inc.
Contact: Ian Mace
Address: 202 - 890 Crace Street
Nanaimo BC V9R 2T3
Phone: 250-716-9000 Fax: 604-515-5156
AGAT Quote #:
Client Project #: 626268

Report Information
1. Name: Ian Mace
Email: Ian.Mace@sncLavalin.com
2. Name: Didi Grimes
Email: didi.grimes@sncLavalin.com

Report Format
☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)
Regular TAT ☐ 5 to 7 working days
Rush TAT
☐ Same Business Day - 200%
☒ 1 Business Day - 100%
☐ 2 Business Days - 50%
☐ 3 Business Days - 25%
Date Required: 19/03/14
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To Same as above Yes ☒ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661380 / PR.BC.555

Requirements *(Please Check)*
☒ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☒ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water
☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 *(Please Specify)*
CCME *(Please Specify)* CEQG
Other *(Please Specify)*

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
	TP19-59-02	Soil	19/03/11 10:55		2			X
	TP19-59-03		10:55		2			X
	TP19-59-04		11:00		2			X
	TP19-60-01		11:15		2			X
	TP19-60-02		11:15		2			X
	TP19-60-03		11:20		2			X
	TP19-60-04		11:30		2			X
	TP19-61-01		11:40		2			X
	TP19-61-02		10:45		2			X
	TP19-61-03		11:45		2			X
	TP19-61-04		11:50		2			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Grimes	2019/03/11 16:00		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 2 of 4
N°: 033082

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 · F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 1 °C
AGAT Job Number: 19V445538
Notes: MAR 12 PM 3:48

Report Information
Company: SNC-Lavalin Inc.
Contact: Ian Mace
Address: 202 - 890 Crace Street
Nanaimo BC V9R 2T3
Phone: 250 716 9000 Fax: 604 515 5150
AGAT Quote #:
Client Project #: 626268

Report Information
1. Name: Ian Mace
Email: ian.mace@snclavalin.com
2. Name: Didi Grimes
Email: didi.grimes@snclavalin.com

Report Format
☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)
Regular TAT ☐ 5 to 7 working days
Rush TAT ☐ Same Business Day - 200%
☒ 1 Business Day - 100%
☐ 2 Business Days - 50%
☐ 3 Business Days - 25%
Date Required: 19/03/14
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To Same as above Yes ☒ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661380 / PR. BC.555

Requirements *(Please Check)*
☒ BC CSR Soil ☐ BC CSR - Water
☐ AL ☐ DW
☐ IL ☐ AW
☐ PL ☐ IW
☐ CL ☐ LW
☒ RL-LD ☐ RL-HD
☐ WL-N ☐ WL-R
Schedule 3.3 *(Please Specify)*
CCME *(Please Specify)* CEQG
Other *(Please Specify)*

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
	TP19-62-01	Soil	19/03/11 11:55		2			X
	TP19-62-02		12:00		2			X
	TP19-62-03		12:05		2			X
	TP19-63-01		12:10		2			X
	TP19-63-02		12:15		2			X
	TP19-63-03		12:15		2			X
	TP19-63-04		12:25		2			X
	TP19-63-05		12:30		2			X
	TP19-64-01		12:40		2			X
	TP19-64-02		12:40		2			X
	TP19-64-03	↓	12:45		2			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Grimes	19/03/11 16:00		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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N°: 033083

Document #: DIV-186-1500,005
Date Revised: January 17, 2019

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
P: 778.452.4000 • F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 1°C
AGAT Job Number: 19U445538
Notes: MAR 12 AM 8:48

Report Information
Company: SNC-Lavalin Inc.
Contact: Ian Mace
Address: 202-890 Crace Street
Nanaimo BC V9R 2T3
Phone: 250 716 9000 Fax: ~~250~~ 604 515 5566
AGAT Quote #:
Client Project #: 626268

Report Information
1. Name: Ian Mace
Email: Ian.Mace@snclavalin.com
2. Name: Didi Grimes
Email: didi.grimes@snclavalin.com

Report Format
☐ Single Sample per page
☒ Multiple Samples per page
☒ Excel Format Included

Turnaround Time Required (TAT)
Regular TAT ☐ 5 to 7 working days
Rush TAT
☐ Same Business Day - 200%
☒ 1 Business Day - 100%
☐ 2 Business Days - 50%
☐ 3 Business Days - 25%
Date Required: 19/03/14
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To Same as above Yes ☒ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: 661380 / PR.BC.555

Requirements *(Please Check)*
☒ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☒ RL-LD ☐ RL-HD ☐ WL-N ☐ WL-R
☐ BC CSR - Water
☐ DW ☐ AW ☐ IW ☐ LW
Schedule 3.3 *(Please Specify)*
CCME *(Please Specify)* CEQG
Other *(Please Specify)*

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
	TP19-64-04	soil	19/03/11 12:50		2			X
	TP19-64-05		12:55		2			X
	TP19-65-01		13:00		2			X
	TP19-65-02		13:16		2			X
	TP19-65-03		13:20		2			X
	TP19-65-04		13:30		2			X

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Didi Grimes	19/03/11 16:00		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Page 4 of 4
N°: 033084

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 19V445538

RECEIVING BASICS:
Received From: LOOMIS Waybill #: _____

SAMPLE QUANTITIES:
Coolers: 2 Containers: 78

TIME SENSITIVE ISSUES:
Earliest Date Sampled: Mar 11, 2019 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:
3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 1 + 0 + 0 = 1 °C (2) 0 + 0 + 0 = 0 °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No (1°C)

Integrity Issues:
Sample "TP19-57-04" submitted using incorrect container for BTX/VPH.

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:
CUSTODY SEALS INTACT

SNC-Lavalin Inc.
#202 - 890 Crace Street
Nanaimo, British Columbia, Canada V9R 2T3
250.716.9000 604.515.5150
www.snclavalin.com

SNC·LAVALIN

Annex E. Legal Duty to Consult Worksheet

Government of Canada | Gouvernement du Canada

Aboriginal Consultation and Accommodation

Updated Guidelines for Federal Officials to Fulfill the Duty to Consult

March 2011

Canada

www.aandc-aadnc.gc.ca
1-800-567-9604
TTY only 1-866-553-0554

QS-7105-002-BB-A1
Catalogue No. R3-111/2012E-PDF
ISBN 978-1-100-20350-8

EXECUTIVE SUMMARY

In the Haida and Taku River decisions in 2004, and the Mikisew Cree decision in 2005, the Supreme Court of Canada held that the Crown has a duty to consult and, where appropriate, accommodate when the Crown contemplates conduct that might adversely impact potential or established Aboriginal or Treaty rights. The Court explained that the duty stems from the Honour of the Crown and the Crown's unique relationship with Aboriginal peoples.

To demonstrate Canada's commitment to address issues of Aboriginal consultation and accommodation, a federal Action Plan was announced in November 2007. The Consultation and Accommodation Unit (CAU) was established within Aboriginal Affairs and Northern Development Canada (AANDC) in early 2008 to implement the Action Plan. Some of the accomplishments of the Action Plan were the release of the February 2008 Interim Guidelines, the training provided to over 1700 federal officials across the country, the engagement with Aboriginal communities and organizations, provinces and territories and industry representatives and the development of tools to support officials in their consultation and accommodation activities.

In more recent decisions, the Court further explained that: the duty to consult is a constitutional duty; applies in the context of modern treaties; officials must look at treaty provisions first; and where treaty consultation provisions do not apply to a proposed activity, a "parallel" duty to consult exists. The Court has also clarified, that depending on their mandate, entities such as boards and tribunals may also play a role in fulfilling the duty to consult; that high level strategic decisions may now trigger the duty to consult; and, that the duty applies to current and future activities and not historical infringements.

The Interim Guidelines have been updated with the collaboration of federal departments and agencies. This document reflects evolving case law and engagement with Aboriginal organizations and communities, provinces and territories and industry representatives. A key element of the Updated Guidelines is the Guiding Principles and Consultation Directives which provide clearer direction on the government-wide responsibility of departments and agencies to fulfill the duty to consult. The Updated Guidelines focus on the increased need for policy leadership, coordination and collaboration, federal accountability, strengthening partnerships and strategic and practical guidance, training and support. These new or enhanced elements demonstrate the progress made by the federal government to address consultation and accommodation issues.

Departments are responsible for integrating the Guiding Principles and Directives within their own day-to-day activities. The Updated Guidelines also reference the Consultation Information Service and the Aboriginal and Treaty Rights Information System and other tools developed to assist officials in determining the scope and nature of consultations.

Additional information can be found on the AANDC Consultation and Accommodation Unit web site:
http://www.aandc-aadnc.gc.ca/eng/1100100014649

TABLE OF CONTENTS

PART A – OVERVIEW

PART B – GETTING READY FOR CONSULTATION AND ACCOMMODATION

PART C – STEP-BY-STEP GUIDE TO CONSULTATION AND ACCOMMODATION

ANNEXES

PART A

Overview

I INTRODUCTION

The Government of Canada consults with Canadians on matters of interest and concern to them. Consulting is an important part of good governance, sound policy development and decision-making. Through consultation, the Crown seeks to strengthen relationships and partnerships with Aboriginal peoples and thereby achieve reconciliation objectives. In addition to pursuing policy objectives, the federal government consults with Aboriginal peoples for legal reasons. Canada has statutory, contractual and common law obligations to consult with Aboriginal groups. The process leading to a decision on whether to consult includes a consideration of all of these factors and their interplay.

The Updated Guidelines provide practical advice and guidance to federal departments and agencies in determining when the duty to consult may arise and how it may be fulfilled, as described by the Supreme Court of Canada in the *Haida, Taku River* and *Mikisew Cree* decisions (See Annex B Legal Case Summaries).

The Guidelines are informed by Canada's understanding of the legal parameters of the duty and provide policy-based guidance to assist officials in their efforts to effectively incorporate consultations and, where appropriate, accommodation into government activities and processes.

The Guidelines are divided into three parts: Part A – Overview; Part B – Getting Ready for Consultation and Accommodation; Part C – Step-by-Step Guide to Consultation and Accommodation. Part C includes a detailed list of questions and considerations to assist departments and agencies when managing their consultation and accommodation activities.

Good governance / Policy Reasons

- Make informed and appropriate decisions
- Create and improve working relations with all those affected
- Address new business and policy developments

Legal Reasons

- S. 35 Common law requirements
- Statutory requirements
- Agreements / Contractual requirements

II COMMON LAW DUTY TO CONSULT

The common law duty to consult is based on judicial interpretation of the obligations of the Crown (federal, provincial and territorial governments) in relation to potential or established Aboriginal or Treaty rights of the Aboriginal peoples of Canada, recognized and affirmed in section 35 of the *Constitution Act,* 1982. The duty cannot be delegated to third parties.

Section 35 of the *Constitution Act, 1982* provides that:

(1) The existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed.

(2) In this Act, "aboriginal peoples of Canada" includes the Indian, Inuit and Métis peoples of Canada.

(3) For greater certainty, in subsection (1) "treaty rights" includes rights that now exist by way of land claims agreements or may be so acquired.

(4) Notwithstanding any other provision of this Act, the aboriginal and treaty rights referred to in subsection (1) are guaranteed equally to male and female persons.

In the *Haida* and *Taku River* decisions in 2004, and the *Mikisew Cree* decision in 2005, the Supreme Court of Canada (SCC) held that the Crown has a duty to consult and, where appropriate, accommodate when the Crown contemplates conduct that might adversely impact potential or established Aboriginal or Treaty rights. This duty has been applied to an array of Crown actions and in relation to a variety of potential or established Aboriginal or Treaty rights.

In these decisions, the SCC determined that the duty to consult stems from the Honour of the Crown and the Crown's unique relationship with Aboriginal peoples. The Court explained that it will look at how the Crown manages its relationships with Aboriginal groups and how it conducts itself when making decisions that may adversely impact the rights recognized and affirmed by section 35. In the more recent decisions of *Rio Tinto* and *Little Salmon Carmacks* the Court has further explained that the duty to consult is a constitutional duty that invokes the Honour of the Crown and that it must be met. The context will inform what is required to meet the duty and demonstrate honourable dealings.

The duty to consult and, where appropriate, accommodate is part of a process of fair dealing and reconciliation that begins with the assertion of sovereignty by the Crown and continues beyond formal claims resolution through to the application and implementation of Treaties. The Crown's efforts to consult and, where appropriate accommodate Aboriginal groups whose potential or established Aboriginal or Treaty rights may be adversely affected should be consistent with the overarching objectives of reconciliation.

Reconciliation has two main objectives: 1) the reconciliation between the Crown and Aboriginal peoples and; 2) the reconciliation by the Crown of Aboriginal and other societal interests. Consultation and accommodation play a key role in the fulfillment of these two objectives.

As the consultation and accommodation processes are being developed and implemented, the Crown will be guided by principles that have emerged from the case law and from government consultation practices. The Guiding Principles and Consultation Directives set out below highlight how these key principles may be applied in the planning and design of government activities (Refer to Part A, Section VI of the Updated Guidelines).

III GOVERNMENT'S RESPONSE

The courts have generally left to government the detailed exercise of implementing processes that seek to fulfill the duty to consult. An awareness of the duty and a consideration of when and how it might apply must become part of the government's daily business. A wide array of consultation practices exist and are being implemented by federal departments and agencies across the country to better fulfill the duty to consult and, where appropriate, accommodate. Examples include consultations with Aboriginal groups that occur within the context of environmental assessments and regulatory processes as well as separate consultation activities undertaken in relation to specific projects and agreed to processes set out within treaties.

Since 2004, the federal government has been engaging in dialogue with First Nations, Inuit and Métis communities and organizations as well as provinces, territories and industry representatives to address key consultation and accommodation issues. Discussions have focussed on the scope of the duty, what constitutes meaningful consultation, capacity to participate in a consultation process, Crown coordination, consultation guidelines and protocols, accommodation, and the reconciliation of the evolving duty with other legal obligations to consult such as statutory requirements and provisions in comprehensive land claim agreements and self-government agreements.

An Action Plan on consultation and accommodation was announced in November 2007 led by Aboriginal Affairs and Northern Development Canada (AANDC) and Justice Canada. A Consultation and Accommodation Unit was established within AANDC in early 2008 to implement Canada's Action Plan on consultation and accommodation. Interim Consultation Guidelines were released in February 2008 and related training has been provided to over 1700 federal officials across the country.

Within AANDC, a Consultation Information Service and an information system on the location and nature of potential and established Aboriginal and Treaty rights has been created to provide baseline information to federal officials. As well, the Regional Consultation Coordinators within AANDC will act as liaison between federal departments, provincial and territorial governments and aboriginal organizations and communities to facilitate relationships on key consultation files and to ensure that Canada's interests are addressed.

Guiding Principles and Directives have been developed to further guide federal officials in implementing the duty and are included in the Updated Guidelines. Initiatives to better integrate Aboriginal consultation with environmental assessments and regulatory processes were also undertaken, including in relation to major natural resources and infrastructure projects.

These elements of Canada's approach to consultation and accommodation are being expanded upon and others will continue to be developed over time to enable the Crown to fulfill the duty in a more consistent, coherent, and efficient way across the federal government.

IV CONTEXT ACROSS CANADA

Consultation with First Nations, Métis and Inuit communities must be understood in the broader context of the evolving relationship between Aboriginal Peoples and the Crown.

Departmental and agency approaches to consultation should integrate, to the extent possible, the fulfilment of consultation obligations with departmental policy objectives and with other overarching government policy objectives. For example, in pursuing reconciliation objectives, Canada continues its efforts to improve its relationship with Aboriginal peoples. This includes through its historic apology in 2008 to former students of the residential school system, the subsequent establishment of the Truth and Reconciliation Commission and the recent Apology for relocation of Inuit families to the High Arctic. These important steps build on progress that has been made in negotiating Aboriginal self-government and land claims agreements; and, partnership approaches to economic development, education, health and other issues.

The development of a federal approach to consultation and accommodation is not intended to be a one-size-fits-all approach. Differences in history, geography, demographics, governance, relationships and other circumstances of Aboriginal communities and organizations in Canada are relevant when considering how to address any consultation obligations that may arise. Thus, understanding the historical, geographic and legal context relevant to Crown activities is essential. Differences in contexts can require different approaches to fulfilling the duty to consult and, where appropriate, accommodate.

1. Historical and Geographical

The application of common approaches to consultation and, where appropriate, accommodation across the country must be reconciled with the fact that potential or established Aboriginal or Treaty rights vary in both scope and content. Such rights vary depending on the historical presence of Aboriginal groups, including the historical relationship between particular Aboriginal communities and between the Aboriginal communities and the Crown, in different areas of the country. For example, Aboriginal communities may be signatories to historic treaties, comprehensive land claim agreements, and self-government agreements or be claiming many different kinds of Aboriginal rights and overlapping territories.

Issues addressed in consultation are specific to the location and nature of the activity. Consultation procedures and approaches must be adapted to address the different kinds of rights and Crown obligations that are at issue. There is significant variability across the country.

For example, in British Columbia and Quebec, there are a few Treaties but many overlapping assertions of Aboriginal rights and title, when compared with the Peace and Friendship Treaties in the Maritimes and the historic Treaties in Ontario and in the Prairie provinces. This landscape differs from the modern Treaties in the territories, northern B.C., and in James Bay, some of which contain specific consultation provisions.

2. Legal

In addition to the common law duty to consult, there are a number of other legal reasons for the Crown to consult with Aboriginal groups, including specific requirements to consult that are set out in statutes and regulations as well as provisions in land claim agreements, self-government agreements and consultation agreements.

It is important to identify the legal source of potential consultation obligations as this will inform and guide what is required in the particular context, including the interplay between these other legal reasons to consult with Aboriginal groups and the common law duty. Departments and agencies should work with their counsel to understand what legal considerations are relevant to their activities.

3. International

On November 12, 2010 Canada issued a Statement of Support endorsing the United Nations Declaration on the Rights of Indigenous peoples (Declaration), an aspirational document, in a manner fully consistent with Canada's Constitution and laws. The Declaration describes a number of principles such as equality, partnership, good faith and mutual respect. Canada strongly supports these principles and believes that they are consistent with the Government's approach to working with Aboriginal peoples.

However, Canada has concerns with some of the principles in the Declaration and has placed on record its concerns with free, prior and informed consent when interpreted as a veto. As noted in Canada's Statement of Support, the Declaration is a non-legally binding document that does not change Canadian laws. Therefore, it does not alter the legal duty to consult. A copy of Canada's statement of support, along with other materials, can be found at: http://www.aandc-aadnc.gc.ca/eng/1309374407406

V UPDATED CONSULTATION GUIDELINES

The Interim Guidelines were developed to provide direction to federal departments and agencies when assessing the common law requirements for consultation and, where appropriate, accommodation with Aboriginal groups, including how to prepare for meaningful consultations.

Since the release of the Interim Guidelines in February 2008, much has been learned about consultation and accommodation which is reflected in these Updated Guidelines. Changes to the Guidelines have been informed by developments in the case law and engagement with Aboriginal organizations and communities, provinces and territories and industry representatives. Discussions and information-sharing during training sessions held with federal officials across the country have also contributed to these changes.

This updated edition provides a more detailed step-by-step guide to consultation and accommodation. It also stresses the importance for departments and agencies to prepare, in advance, to effectively carry out their consultation and accommodation responsibilities by developing a departmental or agency wide approach instead of addressing consultation files simply on a case by case basis.

The evolution of case law and federal policy development combined with "lessons learned" and best practices from within and outside the federal government will continue to influence the content of the Guidelines, which will evolve over time. As part of this ongoing process, departments and agencies need to continue reviewing their Aboriginal consultation and accommodation approaches to ensure that they are consistent with the Guidelines and with evolving legal and policy developments.

In many instances, departments and agencies have developed departmental or agency specific policies or guidelines to support their officials in handling consultation files. The implementation of these Guidelines is a step towards greater consistency in federal practices and approaches.

The objective of the Guidelines is to provide an approach to consultation and accommodation that:

- acknowledges and respects the Crown's unique relationships with Aboriginal peoples;
- promotes reconciliation of Aboriginal and other societal interests;
- integrates consultation into government day-to-day activities, e.g. environmental and regulatory processes;
- reconciles the need for consistency in fulfilling the Crown's duty to consult with the desired flexibility, responsibility and accountability of departments and agencies in determining how best to do so; and
- fosters better relations between the federal government and Aboriginal peoples, provinces, territories, industry and the public.

VI GUIDING PRINCIPLES AND CONSULTATION DIRECTIVES

As part of its on-going efforts to better address Aboriginal consultation and accommodation, the federal government approved the following *Guiding Principles and Consultation Directives* which will guide federal officials in their efforts to address the duty to consult and, where appropriate, accommodate.

The Government of Canada consults with First Nation, Métis and Inuit people for many reasons, including: statutory and contractual; policy and good governance; and the common law duty to consult. The Supreme Court of Canada affirmed, in a number of landmark decisions, such as *Haida* (2004), *Taku River* (2004) and *Mikisew Cree* (2005) that the Crown has a duty to consult when three elements are present:

- Contemplated Crown conduct;
- Potential adverse impact; and
- Potential or established Aboriginal or Treaty rights recognized and affirmed under section 35 of the *Constitution Act, 1982.*

GUIDING PRINCIPLE NO. 1

The Government of Canada, in carrying out its activities, will respect the potential or established Aboriginal or Treaty rights of First Nation, Métis and Inuit people by consulting with Aboriginal groups whose rights and related interests may be adversely impacted by a proposed Government of Canada activity.

Consultation Directive

The Government of Canada, in its consultation with Aboriginal groups, seeks to identify potential adverse impacts of federal activities on potential or established Aboriginal or Treaty rights and related interests and find ways to avoid or minimize these adverse impacts. If there is information available or that becomes available during the planning or implementation of the proposed activity about potential adverse impacts on potential or established rights exercised by an Aboriginal group in the area of an activity, federal officials must undertake the appropriate consultations.

Government actions that may adversely impact Aboriginal and Treaty rights can include decisions with respect to a pipeline that may affect wildlife movement, supply and access; decisions with respect to pollution from construction or use that may affect flora or animal populations; change in regulation or policy that may restrict land use; federal life cycle of land management that may affect legal obligations and relationships with Aboriginal groups; or decisions with respect to use of natural resources that may limit supply and use by Aboriginal groups.

Officials from federal departments and agencies can gather information on Aboriginal and Treaty rights assertions in their proposed activity area by accessing the following resources at all stages of a consultation and accommodation process:

- Officials within your department or agency;
- The Consultation Information Service, which includes the Aboriginal and Treaty Rights Information System, at AANDC – this service provides a single point of access to information on Aboriginal and Treaty rights assertions held by AANDC. The information includes contact information for Aboriginal groups and their leadership, information on multipartite agreements, historic Treaties, comprehensive land claim agreements, self-government agreements, Treaty Land Entitlement agreements, comprehensive and specific claims and other assertions;

- Aboriginal groups in the area of your activity with which your department or agency has relationships;
- AANDC's Consultation Information Service, Treaties and Aboriginal Government and the Department of Justice, which can assist with more detailed assessments of complex situations, overlapping claims to lands or resources, title, etc.; or,
- Other government departments and agencies, provinces, territories and industry with which your department or agency has relationships.

GUIDING PRINCIPLE NO. 2

The Government of Canada will assess how proposed federal activities may adversely impact on potential or established Aboriginal or Treaty rights, Aboriginal groups and their related interests. As part of this assessment, the Government of Canada will identify when consultation should form part of their operations and ensure that consultations are initiated early in the planning, design or decision making processes.

Consultation Directive

Departments and agencies must assess their activities, policies and programs that may adversely impact potential or established Aboriginal or Treaty rights and related interests. Based on this review, federal officials will ensure that appropriate consultation activities with Aboriginal groups are carried out. Key departments involved in Aboriginal consultation should develop a consultation approach that is responsive to the needs of the department or agency and reflects its operational realities. This approach should build from the guidance set out in the Updated Guidelines.

GUIDING PRINCIPLE NO. 3

Early consultations will assist the Government of Canada in seeking to identify and address Aboriginal concerns, avoid or minimize any adverse impacts on potential or established Aboriginal or Treaty rights as a result of a federal activity and assess and implement mechanisms that seek to address their related interests, where appropriate.

Consultation Directive

Federal officials must be able to demonstrate in decision making processes that Aboriginal concerns have been addressed or incorporated into the planning of proposed federal activities. As such, early discussions with the Aboriginal groups who may be adversely impacted by a federal activity are crucial. It is possible that there could be multiple Aboriginal groups impacted by a proposed activity, therefore they should be part of the consultation process.

GUIDING PRINCIPLE NO. 4

Consultation and accommodation will be carried out in a manner that seeks to balance Aboriginal interests with other societal interests, relationships and positive outcomes for all partners. A meaningful consultation process is one which is:

- *carried out in a timely, efficient and responsive manner;*
- *transparent and predictable;*
- *accessible, reasonable, flexible and fair;*
- *founded in the principles of good faith, respect and reciprocal responsibility;*
- *respectful of the uniqueness of First Nation, Métis and Inuit communities; and,*
- *includes accommodation (e.g. changing of timelines, project parameters), where appropriate*

Consultation Directive

The Government of Canada and its officials are required to carry out a fair and reasonable process for consultations. A meaningful consultation process is characterized by good faith and an attempt by parties to understand each other's concerns, and move to address them. Federal officials can begin a consultation process by applying the Updated Guidelines in concert with any tools, policies or guidelines developed by their department or agency. Federals officials, during a consultation process, must reasonably ensure that Aboriginal groups have an opportunity to express their interests and concerns, and that they are seriously considered and, wherever possible, clearly reflected in a proposed activity. Aboriginal groups also have a reciprocal responsibility to participate in consultation processes.

The Government of Canada will conduct consultation activities, in a timely and efficient manner, including, when appropriate, the development of a consultation plan and the provision of relevant information to Aboriginal groups, to inform and support decision-making processes. Federal officials must seek to develop processes that move beyond a project-by-project approach to consultation and move towards one that facilitates the inclusion of Aboriginal perspectives, timely decision making, integrates with and strengthens regulatory processes and promotes economic benefits for all Canadians.

GUIDING PRINCIPLE NO. 5

The Government of Canada recognizes that Aboriginal consultation is a Crown responsibility that flows from Government activities. The Government of Canada will ensure that a lead federal department or agency is identified and made accountable for any consultation processes that may be carried out for federal government activities. Should a consultation process move a department or agency beyond their mandate, mechanisms will be in place to address additional issues raised in a consultation process.

Consultation Directive

To manage Aboriginal consultation and accommodation, the Government of Canada will facilitate efficient and effective cooperation among and within federal departments and agencies via senior federal official governance structures which will assign a lead in a consultation process where the lead is not clear. When consultation and accommodation activities move a department or agency beyond their identified mandate, memorandum of understanding and other processes will be developed to coordinate other departments and agencies and processes whose function and expertise can support an effective consultation process.

GUIDING PRINCIPLE NO. 6

The Government of Canada will use and rely on, where appropriate, existing consultation mechanisms, processes and expertise, such as environmental assessment and regulatory approval processes in which Aboriginal consultation will be integrated, to coordinate decision making and will assess if additional consultation activities may be necessary.

Consultation Directive

A whole of government approach for Aboriginal consultation will be used in the regulatory review process for major natural resource projects. Consultation will be integrated into environmental assessment and regulatory approval processes. To assist in this approach, each major project will have a Crown consultation coordinator, who will develop and use a consultation plan to integrate the activities of all departments throughout the environmental assessment and regulatory processes. The interdepartmental committee process and interdepartmental memoranda of understanding will assist in providing clarity to these issues. The Government of Canada may rely on, where possible, existing consultation mechanisms, processes and expertise (e.g. provincial or territorial government or industry consultations) to streamline decision making and will assess if additional consultation activities may be necessary.

Federal officials must align consultation processes to existing regulatory or legislative processes, to the extent possible. Officials should, however, consider that:

- issues that arise during the consultation may be beyond the mandate of the existing process therefore additional consultation activities may need to occur;
- the existing process must allow for appropriate, meaningful consultation; and,
- consultation may be required throughout the lifecycle of an activity, thus they must ensure that any existing process is appropriate for all stages of the activity.

GUIDING PRINCIPLE NO. 7

The Government of Canada will coordinate consultation and accommodation activities with its partners (e.g. Aboriginal groups, provinces, territories and industry). While the Crown cannot delegate its obligation, the Government of Canada will, where appropriate, use consultation processes and accommodation measures carried out by its partners to assist it in meeting its commitments and responsibilities.

Consultation Directive

The Government of Canada and its officials can rely on its partners, such as Aboriginal groups, industry and provinces and territories, to carry out procedural aspects of a consultation process (e.g. information sessions or consultations with Aboriginal groups, mitigation measures and other forms of accommodation, etc.). The information collected during these processes can be used by the Government of Canada and its officials in meeting its consultation obligations.

GUIDING PRINCIPLE NO. 8

The Government of Canada will carry out its activities and related consultation processes in accordance with its commitments and processes involving Aboriginal groups. The Government of Canada will seek out opportunities to develop and maintain a meaningful dialogue with Aboriginal groups in support of building relationships with its partners.

Consultation Directive

The Government of Canada, in carrying out consultation processes, must act in accordance with its existing commitments and processes (e.g. Treaties, Treaty land entitlement agreements, settlements and consultation agreements). Federal officials need to inform themselves and be aware of Canada's policy approach and legal commitments to Aboriginal groups and how these commitments and processes may be aligned with department and agency consultation processes. Federal officials should also seek to develop positive, long-term relationships with Aboriginal groups. These positive relationships and the dialogue that results from them will assist the federal government in moving forward on future activities.

PART B

Getting Ready for Consultation and Accommodation

I ROLES & RESPONSIBILITIES

Federal Departments and Agencies

An effective consultation process requires collaboration with Aboriginal groups and coordination and cooperation within the federal government and with other jurisdictions and stakeholders, as appropriate.

The Crown as a whole must fulfill its duty to consult and, where appropriate, accommodate. In turn, each federal department or agency must support the Crown's efforts in meeting this obligation. To do so, departments and agencies must assess the consultation requirements that relate to their respective activities and develop approaches to consultation and accommodation that will allow the Crown as a whole to meet its duty. Some departments and agencies may have existing processes and/or mandates which may assist in fulfilling the duty.

Coordination between the relevant federal departments and agencies is essential to ensure that the Crown is responsive and able to relate effectively with the Aboriginal groups involved. Limitations on the mandate of any one department, agency or other federal entity will not limit what is required of the whole Crown in the circumstances (Refer to Guiding Principle and Directive # 5).

The designation of a lead department, agency or committee is recommended to oversee and track all consultation efforts and the issues raised by Aboriginal groups. The lead will follow up with relevant departments and agencies to ensure that they take appropriate action in relation to any consultation processes that may be carried out for federal government activities. The lead will also act as the federal point of contact for Aboriginal groups, industry representatives and various stakeholders.

As mentioned in Guiding Principle and Directive # 6, in seeking to ensure that its obligations towards Aboriginal groups are satisfied, Canada will use and rely on, where appropriate, existing consultation mechanisms, processes and expertise, such as environmental assessments and regulatory approval processes that allow it to gather information and address issues raised by Aboriginal groups.

Agencies, boards, commissions and tribunals, including the National Energy Board (NEB) and the Canadian Nuclear Safety Commission (CNSC) have a role to play in assisting the Crown in discharging, in whole or in part, the duty to consult. The role to be played by any given board, commission or tribunal is determined by its statutory mandate or its terms of reference. More specifically, an ability to address questions of law and an ability to remedy or address consultation related issues will inform the role of such boards, tribunals and commissions in Crown consultation processes.

Departments with responsibilities for real property management such as disposal should be aware of Aboriginal interests in federal Crown land under their management. While decisions to dispose of federal Crown land is the most common trigger for a duty to consult in real property matters, there are other aspects of land management, such as access restrictions, management of burial sites and infrastructure. Guidance on this subject can be found in the Treasury Board Secretariat's *Guide to Real Property Management: Aboriginal Context* http://www.tbs-sct.gc.ca/rpm-gbi/doc/grpmac-ggbica/grpmac-ggbica-eng.aspx

Provinces and Territories

The Crown's duty to consult applies to provincial and territorial governments. Some have instituted their own Crown consultation processes, policies and guidelines for projects within their jurisdictions. Departments and agencies should look at provincial, territorial and community websites for additional information on provincial, territorial, regional or community-specific consultation agreements and protocols, processes and policies. They can also contact the AANDC Regional Consultation Coordinator. Inquiries can be sent to CAU-UCA@aandc-aadnc.gc.ca

Guiding Principle and Directive # 7 speaks to Canada coordinating its consultation and accommodation activities with those of its partners (e.g. Aboriginal groups, provinces, territories and industry). For initiatives involving federal, provincial and territorial governments, opportunities to coordinate efforts between jurisdictions should be pursued to the maximum extent possible, to increase efficiency by minimizing duplication.

Departments and agencies are encouraged to develop long-term working relationships and processes rather than work together only on an *ad hoc* or case-by-case basis. Where both federal and provincial or territorial governments are involved in an activity, their consultation efforts should be coordinated. In some instances, Canada, with their agreement, may wish to use provincial or territorial consultation processes to fulfill, in whole or in part, its consultation obligations. Federal departments and agencies will need to assess these processes to ensure that they lead to a meaningful consultation and are capable of addressing matters related to federal activities.

AANDC, on behalf of Canada, will engage with provincial and territorial partners to explore the potential for developing memoranda of understanding aimed at reducing duplication, working collaboratively, sharing information and improving collaboration on Aboriginal consultation. Consultation agreements with provinces/territories and First Nation, Métis or Inuit groups may also assist in addressing consultation and accommodation issues.

In 2007, federal, provincial and territorial Deputy Ministers Responsible for Aboriginal Affairs agreed to establish an ongoing information- and priority-sharing process on Aboriginal consultation and accommodation across their respective jurisdictions. The Federal/Provincial/Territorial working group has made real progress in relation to the duty to consult. Key areas that have been explored include: capacity, the duty to consult and the Métis, traditional land use studies as a tool to inform consultation processes, developing information repositories, coordination, inter-jurisdictional challenges and approaches to dealing with municipalities.

Aboriginal Groups

In keeping with court decisions on consultation, Guiding Principle and Directive # 4 makes it clear that First Nation, Métis and Inuit groups have a reciprocal duty to participate in reasonable processes and Crown efforts to consult and accommodate them. It is in the interest of all concerned parties to develop effective processes and agreements that reflect shared interests and contribute to a consultation process that creates clarity, certainty, trust and reliability. In that respect, the Crown may reasonably expect Aboriginal groups to:

- clearly outline in a timely manner any potential adverse impacts of the Crown activity, or that of a third party, on the nature and scope of their potential or established Aboriginal or Treaty rights and related interests;
- make their concerns known to the Crown and share any other relevant information that can assist in assessing the strength of their claim or the seriousness of any impacts on their potential or established Aboriginal or Treaty rights and related interests;
- attempt to resolve any issues with any other Aboriginal groups with overlapping claims and interests;
- attempt to reach a mutually satisfactory resolution to a particular situation;
- consider that they do not have a veto over the proposed project; that consultation may not always lead to accommodation or that there may not always be agreement on what accommodation measures may be appropriate.

Third Parties

All industry sectors seek predictable timelines, clarity on the respective roles of parties, certainty and criteria to determine the adequacy of consultation and accommodation. Industry representatives indicate that earlier government consultations at the federal, provincial and territorial levels would help to establish a transparent process for the proponent, Aboriginal communities and the Crown.

The Crown could discuss with industry proponents early in the process about the possibility and extent to which it may rely on the proponent's engagement with Aboriginal groups as part of the formal consultation and accommodation process. Creating this understanding early in the planning stages of a project could help to define each party's roles and responsibilities and expectations.

Third parties, such as proponents, do not have a legal obligation to consult Aboriginal groups. The Crown may delegate to the proponent such aspects of consultation as the gathering of information about the impact of the proposed project on the potential or established Aboriginal or Treaty rights. The Crown should clearly communicate what is expected of third parties to industry proponents, Aboriginal groups and various stakeholders. The role that a third party can play in carrying out consultation and accommodation processes should be incorporated into any Crown consultation plans and efforts. The information collected during these processes, for example, can be used by the federal government and its officials in its decision-making process.

Industry's overall relationship with Aboriginal groups, including its business practices, can assist the Crown's overall consultation and accommodation efforts. Industry proponents are often in the best position to accommodate an Aboriginal group for any adverse impacts on its potential or established Aboriginal or Treaty rights, for example, by modifying the design or routing of a project. Canada will seek to benefit from the outcomes of a third-party consultation process and any accommodation measures undertaken by third parties. However, the ultimate responsibility for consultation and accommodation rests with the Crown as the Honour of the Crown cannot be delegated.

There are some formalized processes for industry involvement in Aboriginal consultation such as in the case of oil and gas development in the Treaty 8 area within B.C.'s north-east. Ontario's new mining legislation includes measures to ensure that proponents consider Aboriginal consultation.

II DEVELOPING A DEPARTMENTAL OR AGENCY APPROACH TO CONSULTATION AND ACCOMMODATION

This section outlines how departments and agencies should prepare for consultation and accommodation and, building on the Updated Guidelines, develop a departmental or agency approach that assists the Crown in fulfilling the duty while supporting other departmental and agency objectives.

Creating an approach that is consistent with the Updated Guidelines allows departments and agencies to integrate Aboriginal consultation into their activities and ensures consistency in addressing consultation and accommodation issues (refer to Guiding Principle and Directive # 8). Such an approach can support the overall objective of reconciliation highlighted by the Supreme Court of Canada in decisions such as *Haida* and *Taku River.*

1) Identify Crown conduct in relation to the duty to consult

Crown conduct refers to the Crown's own activities, such as land disposal, park creation, infrastructure development, Treaty implementation, or to Crown activities and authorizations and permits for projects to be carried out by a third party. Refer to Guiding Principle and Directive # 1 for some examples of government actions that may adversely impact potential or established Aboriginal or Treaty rights.

The duty extends to "strategic, higher level decisions" that may have an impact on potential or established Aboriginal or Treaty Rights. These could include structural or organisational changes that reduce the Crown's oversight and decision-making ability.

By becoming familiar with their departmental or agency mandate and objectives and the related activities that may adversely impact on the rights of Aboriginal groups, departments and agencies will:

a) be able to identify which of their activities, policies and programs may give rise to the duty to consult;

b) be able to support a department or agency to support the consultation or accommodation activities of other departments or agencies whose Crown conduct has given rise to a duty to consult. This may apply even when their own activities do not give rise to a duty to consult.

See "Part C, Phase 2 – Crown Consultation Process" for a detailed list of questions for consideration.

2) Assess potential adverse impacts of departmental and agency activities

As highlighted in Guiding Principle and Directive # 3, by assessing, in advance, what might be the adverse impacts of their activities, departments and agencies can determine how these impacts could be avoided or mitigated and what related measures may be taken by the federal, provincial and territorial governments and/or industry.

Departmental and agency officials should anticipate the types of accommodation measures that may be needed to address the kinds of adverse impacts that their activities may have on potential or established Aboriginal or Treaty rights and related interests. This will help managers and officials prepare for consultation processes, as the department or agency will define, in advance, the role it can generally play in relation to accommodation, examine the potential role of other federal departments and agencies or other governments, the role of the proponent, the steps that can be taken by each, the approvals that may need to be sought, the authorities required, etc. See "Part C, Phase 3 – Accommodation" for more information on accommodation.

3) Identify potential or established Aboriginal or Treaty rights and related interests

Managers should be familiar with the nature and location of these rights in their respective regions so that they are able to anticipate how these rights may be adversely impacted by their Crown conduct. A departmental approach must also take into account the diversity of potential or established Aboriginal or Treaty rights in each region across Canada.

Canada's Treaty relationship with groups is an important consideration in assessing how to proceed with Crown conduct in a Treaty area. Departments and agencies will also need to obtain information about relevant Treaty land entitlement agreements, comprehensive land claims agreements, self-government agreements or negotiations in a region.

An Aboriginal group may also have interests related to its potential or established Aboriginal or Treaty rights that may be adversely impacted by the proposed Crown conduct. The Crown may, for policy reasons, seek to address these related interests. As a result of a consultation process, the Crown may determine that there is no duty to accommodate, however it may still choose, for policy reasons, to address a related interest that is expressed by the Aboriginal group in the context of the activity.

For example:

a) An Aboriginal group may have an established hunting right that could be impacted by an activity and express a related interest in declaring a certain area of their traditional territory as a wildlife conservation zone to maintain a viable population of the wildlife.

b) The Crown is implementing measures to mitigate an adverse impact on an Aboriginal right. It can decide at the same time to address an expressed related interest from the Aboriginal group for economic development funding to take part in the project.

c) In the context of claims negotiations, an Aboriginal group expresses a related interest for federal lands that are being considered for disposal. After assessing any requirement to consult, the Crown may also choose to engage with the group for policy reasons.

4) Develop a departmental or agency approach to consultation and accommodation

The four previous steps lay the groundwork for the development of a departmental or agency approach to consultation and accommodation that is consistent with the Updated Guidelines and appropriate for the different types of activities of a department or agency. However, given the breadth of activities carried out by most departments, a departmental approach may have to include elements that would be specific to various programs and directorates.

Principle # 4 states that officials should seek to develop consultation processes that move beyond a project-by-project approach to a comprehensive approach that will support their officials when making case-specific decisions. Developing consultation processes that can be consistently applied is more effective than consulting on a one-off basis. Some existing consultation practices may already be in place within a region or department or agency and may offer a foundation upon which to build effective consultation processes.

The overall relationship between the Crown and an Aboriginal group will influence, and be influenced, by how consultation and accommodation issues are being addressed by each department and agency. Managers must keep an eye on the "big picture" as their department's handling of a consultation file may strengthen or weaken Canada's relationship with a particular First Nation, Métis or Inuit group, thereby influencing not only their own department's or agency's future dealings with that community, but also the future dealings of other departments and agencies.

Determine whether there are any statutes or regulations that require the department or agency to consult with Aboriginal groups in relation to their activities or consider traditional knowledge (such as provisions in the *Species at Risk Act, Canada National Parks Act*).

Determine whether there are contractual requirements to consult in relation to departmental and agency activities such as consultation agreements or consultation provisions in comprehensive land claim agreements.

It is the responsibility of departments and agencies to develop consultation processes that respect consultation agreements or modern Treaty obligations. There may be other agreements, such as interim measures agreements or notification agreements, that contain guidance related to how the parties should be notified about Crown activities or how the parties can work together to resolve issues.

EXAMPLES OF CONSULTATION AGREEMENTS

Mi'kmaq/Nova Scotia/Canada consultation process – A province-wide consultation process was established as part of a larger tri-partite negotiations process dealing with Aboriginal and Treaty rights issues. Although the consultation process established therein is optional, the Parties hope that the Terms of Reference for a Mi'kmaq/Nova Scotia/Canada consultation will become the preferred choice for government departments and agencies whenever the duty to consult with the Mi'kmaq in Nova Scotia arises.

Algonquins of Ontario Consultation Process Interim Measures Agreement – In 2009, Canada, Ontario and the Algonquins of Ontario reached an agreement on consultation that sets out a means for Canada and Ontario to consult the Algonquins of Ontario and the ten Algonquin communities they represent on proposed activities or projects within the claimed territory while negotiations of an Agreement-in-Principle are ongoing to resolve the Algonquin land claim in eastern Ontario. For the Algonquins of Ontario, this process is coordinated by a new Algonquin consultation office (ACO).

Consultation Protocols with the Dene Tha' First Nation – In July 2007, as part of an out-of-court settlement to resolve the Dene Tha' First Nation's concerns related to the Mackenzie Gas Project (MGP), two consultation protocols were signed between Canada and the First Nation – one for the MGP and Connecting Facilities and the other (the Federal Authorization Consultation Protocol) for other projects where federal authorizations are required.

MODERN TREATIES

Some modern Treaties include consultation provisions in relation to Crown activities and officials must consult in accordance with the consultation terms of those Treaties. Implementing Treaties is a responsibility of the Crown as a whole.

The duty to consult operates in law independently from the terms of a Treaty and can therefore apply where Crown actions have the potential to adversely impact Treaty rights provided for under a Treaty or Modern Land Claims Agreements. However consultation can be shaped and even fully addressed by the terms of an agreement for specific situations where such is made clear. Therefore, the first step for federal officials is to determine whether there are relevant consultation provisions within the Treaty itself.

Departments and agencies should contact the Aboriginal Affairs and Northern Development Canada Implementation Branch, Justice Canada and, in some cases, the AANDC regional offices to obtain advice and assistance in developing approaches for consulting Treaty groups.

Treaties are an important part of the process of reconciliation and provide guidance for the on-going relationship of the Crown and Aboriginal groups.

Developing effective working relationships through networks and forums with Aboriginal communities as well as with other departments and agencies in the region, with provincial and territorial counterparts and with industry will, in the long run, assist federal managers and their officials in leading consultation and accommodation efforts.

Departments and agencies with the advice of AANDC may also want to consider whether consultation agreements could support consultation activities. These arrangements between the Crown and Aboriginal groups can help to define roles and responsibilities, identify points of contact, determine timelines and steps to be followed and sometime address capacity needs. They can create clarity for the parties, and allow them to strengthen their relationship while making consultation more efficient.

Consultation agreements can facilitate the coordination of consultation processes that involve multiple departments and agencies (federal, provincial and territorial) and stakeholders. The AANDC Regional Consultation Coordinators will explore and negotiate consultation arrangements and protocols with Aboriginal groups and provinces and territories to achieve coordinated and efficient processes for Crown consultations.

Officials should assess whether provisions in land claim agreements or self-government agreements require that consultation take place in relation to legally binding international instruments. Second, officials must determine whether legislation requires Canada to consult on international instruments. Officials should seek legal advice, which will support the broader departmental or agency assessments and decision-making processes.

Federal horizontal policies

Horizontal policy objectives such as those related to Gender Equity, Sustainable Development and Official Language Minority Communities need to be considered during any interaction between Canada and Aboriginal peoples. These are Treasury Board policies that should be reflected in any activities, processes, programs and policies related to consultation and accommodation.

National Aboriginal Organizations such as the Native Women's Association of Canada, Pauktuutit and the Assembly of First Nations have created Culturally-relevant Gender-Based Analysis tools to promote fairness and equity of federal programs, services and processes directed at Aboriginal women and men. In the context of the engagement process on consultation and accommodation, Native Women's Association of Canada and Pauktuutit have examined Aboriginal consultation and accommodation using the Culturally-relevant Gender-Based Analysis lense and proposed some questions to be considered when preparing for consultations with Aboriginal communities such as:

1. At what stage of a consultation process should gender issues be considered? How can a Culturally-relevant Gender-Based Analysis be used to ensure adequate consideration of gender?
2. What should be the role of the Crown, if any, in ensuring that a consultation process and any ensuing agreements between a community and industry are inclusive of gender issues? How can this be achieved?
3. What questions and issues should the proponent and an Aboriginal community routinely consider in any consultation process to ensure that the perspective of both women and men are sought in the examination of the nature and extent of impacts on the community and options for addressing them?

5) Coordinate with partners, and/or rely on other consultation processes

Federal coordination and designation of lead

More than one federal department or agency may be involved in Crown conduct that requires consultation or may have a role in consulting or accommodating potential adverse impacts. It is important that all departments and agencies work collaboratively, as the Crown, to assess roles and responsibilities, manage the consultation process together and address accommodation, where appropriate (Refer to Guiding Principle and Directive # 5). To accomplish this, departmental or agency officials must:

- 'Map out' all elements of the Crown conduct, including all of the potential decisions; roles and responsibilities of the federal, provincial and territorial departments and agencies, boards and tribunals that may be involved; subject areas or focus of each entity; any limitations on timelines or mandates etc.;
- Determine which departments and agencies or provincial and territorial ministries may have responsibility to consult and, where appropriate, accommodate. Designate a federal lead department to coordinate with partners;
- Identify whether there are gaps that may need to be filled to address consultation and accommodation issues.

Further to Guiding Principles and Consultation Directives # 5 and # 6 in Part A, the Canadian Environmental Assessment Agency serves as the Crown consultation coordinator for major resource projects and comprehensive studies under the *Canadian Environmental Assessment Act*. This lead role is fulfilled in cooperation with federal departments and agencies who serve as responsible authorities and federal authorities under the *Act* as well as the Major Projects Management Office.

In cases where these existing processes are not sufficient to fulfill the Crown's duty to consult and additional consultation activities are required, the Agency, in collaboration with federal departments and agencies, should ensure that any additional consultation activities supplement but do not duplicate the environmental assessment and regulatory review processes.

The *Canadian Environmental Assessment Act* was amended in July 2010 to improve timeliness of federal environmental assessment, establish clear accountability and focus resources where they would produce the greatest benefit to the environment and the economy. For comprehensive studies under the *Act,* the Canadian Environmental Assessment Agency will exercise the powers and perform the duties and functions of a responsible authority, except for those regulated by the National Energy Board and Canadian Nuclear Safety Commission.

For projects which are subject to public review processes under the *National Energy Board Act* or the *Canadian Nuclear Safety Act,* the National Energy Board and the Canadian Nuclear Safety Commission processes are used. Supplementary Crown consultation activities may be required to address the concerns of Aboriginal communities that fall outside the mandate of the National Energy Board or the Canadian Nuclear Safety Commission processes.

Use of existing federal processes

The Courts have not required a separate process for Crown consultation where the assessment or review or regulatory, statutory or contractual process that is in place can provide a sufficient consultation process (e.g., *Taku River* – B.C.'s *Environmental Assessment Act* process as implemented was sufficient. By contrast, in the *Mikisew Cree* case, while the statutory requirements of the relevant Acts were all met, the involvement of the Aboriginal community in the public review process was found not to be sufficient). Where a board or tribunal is involved, legal advice as to what role it may play may be needed early on in the planning process. The Crown must be satisfied that it can or that it has, through these processes, fulfilled its duty to consult.

Consultation or accommodation issues can arise during an existing review process or assessment or during any regulatory, statutory or contractual process by a federal department or agency. Departments and agencies should consider whether any of these issues are beyond the mandate of the given process or of the responsible federal department or agency.

Consequently, additional consultation and accommodation activities may need to occur. Departments and agencies have the ultimate responsibility for identifying and filling any gaps that could prevent the Crown from fulfilling its duty. The consultation process must allow for meaningful consultation throughout the lifecycle of an activity and must be adaptable to all stages of the activity to allow federal officials to respond to any Aboriginal concerns, and if appropriate, accommodate any adverse impacts on potential or established Aboriginal or Treaty rights. (Guiding Principle and Directive # 6).

The environmental review process is generally viewed by Aboriginal groups and third parties (See Summary of Input from Aboriginal Communities and Organizations on Consultation and Accommodation) as the most effective method managed by the Crown to identify environmental effects of proposed activities and related changes. Officials should assess early in the planning stages for proposed activities whether reliance on existing processes such as environmental assessments will be sufficient to fulfill the duty. If not, the Crown's efforts may need to include additional consultation activities or further efforts to address accommodation, where appropriate.

Environmental assessment, regulatory decision making, and Aboriginal consultation

Canada takes a whole-of-government approach to Crown consultation. With respect to major resource projects (See definition below), and all projects that are assessed as Comprehensive Studies under the *Canadian Environmental Assessment Act,* this approach involves the federal Crown integrating its Aboriginal consultation activities into the environmental assessment and regulatory process to the greatest extent possible.

Note: A major resource project is defined as a large-scale resource project south of 60 that is subject to a comprehensive study, review panel, or a complex (or multi-jurisdictional) screening under the *Canadian Environmental Assessment Act.* Resource sectors typically include mineral and metal mining, oil sands development and processing, and energy generation and transmission.

This approach capitalizes on the strength of the federal environmental assessment and regulatory process to gather information about potential impacts of Crown conduct on Aboriginal and Treaty rights in a consistent and coordinated way. It enables the efficient use of departmental resources and facilitates effective communication and relationship-building with Aboriginal groups. The approach also supports ongoing Crown efforts to satisfy the duty to consult before federal decisions are made. There should be timely efforts to coordinate with provincial and territorial environmental assessment processes.

The whole-of-government approach typically begins once the Crown becomes aware of a proposed project for which Crown conduct may be contemplated (e.g. submission of a Project Description). This phase commences with an analysis of the project's potential adverse impacts in the geographic area in which Aboriginal groups could have rights. The scope of the consultation is determined by the severity of the adverse impacts and the strength of the claims and any other relevant considerations.

This analysis is intended to support the establishment of an appropriate consultation process and to inform the development of an Aboriginal consultation work plan. All Aboriginal groups identified for involvement in the environmental assessment process are contacted to inform them of the intended consultation approach. Aboriginal groups should have the opportunity to provide the Crown with information about their potential or established Aboriginal or Treaty rights and any adverse impacts of the proposed activity. As well, Aboriginal groups may be invited to participate in the Environmental Assessment project committee as a way of better integrating Aboriginal consultation into the Environmental Assessment process.

Where government is seeking to rely on an environmental assessment process for identifying, assessing and guiding consultations, it will be necessary to determine what kinds of Aboriginal concerns may be considered or addressed through that process and to what extent it can assist the Crown in discharging its duty.

Once the environmental assessment commences, the Crown should continue to consider and address the potential need to consult additionally and, where appropriate, seek to accommodate potential adverse impacts of the Crown conduct. Consultation obligations that cannot be fulfilled in the course of the environmental assessment are to be undertaken prior to any final regulatory decisions that are being issued for the project.

Prior to the completion of the environmental assessment process, the Crown determines whether or not it has, so far, honourably discharged its duty to consult. Outstanding issues are summarized and carried forward into the regulatory approvals phase, where appropriate consultation and/or accommodation may be considered by the suitable regulatory authorities.

The consultation process should then carry on to the end of the project life cycle, as the Crown has a responsibility to ensure that measures put in place to accommodate impacts to potential or established Aboriginal or Treaty rights and related interests, are implemented. Throughout the environmental assessment, an official Crown consultation record is created and maintained. The Major Projects Management Office keeps a centralized database while relevant federal departments and agencies keep the original documents of their consultations.

Beyond the duty to consult, there are other reasons for including Aboriginal groups in the environmental assessment process. These include obligations under the *Canadian Environmental Assessment Act* to consider "environmental effects," including any change in the environment that affects the current use of lands and resources for traditional purposes by Aboriginal persons (s. 2 of the *Act*). Also, s. 16.1 of the *Act* provides the opportunity to include Aboriginal traditional knowledge in the environmental assessment. Finally, the federal government may have obligations relating to the environmental assessment under modern Treaties and self-government agreements.

Due to the complexity and size of major natural resources projects, the federal government has put in place the Major Projects Management Office to fulfill a Crown coordinating function.

Major Projects Management Office

The Major Projects Management Office (housed within Natural Resources Canada) was created in 2008 to provide a single point of entry into the federal regulatory system as well as to provide overarching management of the federal regulatory process for major resource projects in the provinces south of 60, in both operational and policy areas.

The Major Projects Management Office initiative was launched to foster a more accountable, efficient, transparent, and effective whole-of-government approach to the review of major resource projects in Canada. The Government's initiative was targeted at providing additional capacity and expertise to key federal regulatory departments and agencies to enable these organizations to deliver their environmental assessment, regulatory and Aboriginal consultation responsibilities in a timely and predictable manner.

The primary role of Major Projects Management Office is to provide overall project management, accountability and policy leadership with respect to the performance of the overall regulatory system. Working collaboratively with federal departments and agencies, the Major Projects Management Office serves as a single window into the federal regulatory process, coordinating project agreements and timelines between federal departments and agencies and tracking the progress of major resource projects through the federal regulatory review process.

The Major Projects Management Office also oversees the implementation of the whole of government approach to Crown consultation on major resource projects. The Major Projects Management Office works closely with the Canadian Environmental Assessment Agency, Aboriginal Affairs and Northern Development Canada and other federal departments and agencies to ensure that the federal government fulfills its consultation responsibilities for these projects in a consistent, adequate and meaningful manner.

Regional project-specific teams of federal and, where relevant, provincial officials are established on a project-by-project basis to ensure the consistent and coordinated delivery of any Crown consultation requirements. These

teams are coordinated by the Canadian Environmental Assessment Agency or other relevant environmental assessment manager (as Crown Consultation Coordinator) throughout the environmental assessment process. Crown reliance and oversight mechanisms have been established for National Energy Board projects under the Major Projects Management Office. The Canadian Nuclear Safety Commission takes on the Crown Consultation Coordinator role when it is a Responsible Authority. Once the environmental assessment phase has been completed, a lead federal department or agency may be assigned to carry out outstanding consultation requirements in respect of their regulatory decision-making responsibilities.

Northern Projects Management Office

The Northern Projects Management Office (NPMO) was established in September 2009 within the Canadian Northern Economic Development Agency (CanNor). The mandate of the Northern Projects Management Office is to provide government-wide leadership in developing a systematic approach for federal participation in the environmental assessment and regulatory review and approvals of northern projects.

The Northern Projects Management Office is responsible for federal coordination, project management, project tracking and coordination of consultations for northern projects in the three territories. It ensures the federal government meets its obligations to consult. Its main functions are to:

- provide clear direction and assistance to proponents regarding the regulatory review and consultation process;
- coordinate the work of federal regulatory departments and agencies during the environmental assessment and permitting phases;
- create and maintain a repository of Crown consultation records for projects that fall within its mandate.

For the purposes of Crown consultation the Northern Projects Management Office proposes to act as a coordinator or facilitator for northern projects that include all projects that undergo an environmental assessment, joint or panel review. Also included are smaller scale projects that the Northern Projects Management Office considers to be of potential economic interest or complex projects that could benefit from the coordination of the Northern Projects Management Office.

Individual departments or agencies are responsible for determining which Aboriginal groups may be impacted by a project, for carrying out strength of claim assessments, for monitoring and evaluating the robustness of third party consultations and where required for undertaking targeted Crown consultations. As well, departments or agencies are responsible for accommodating, when appropriate.

The mandate of the Northern Projects Management Office in the territories complements the mandate of the Major Projects Management Offices in the provinces south of 60. However, because of the differences and complexities of the northern regulatory environment, the Northern Projects Management Office was established as a separate entity.

The Northern Projects Management Office is headquartered in Yellowknife, Northwest Territories, with staff in each of the other two territories. These regional offices coordinate the early engagement of all federal players in resource development, work with territorial governments and boards, and coordinate federal Aboriginal consultation efforts with relevant federal departments.

Use of existing provincial and territorial processes

In developing and implementing a departmental or agency approach, managers and their officials are encouraged to learn as much as possible about provincial and territorial approaches as set out in consultation policies, guidelines and practices with the view to better coordinating federal consultation and accommodation efforts with those of its provincial and territorial partners.

In the planning phase of any Crown conduct (See Part C, Phase 1 for a full list of pre-consultation activities), federal officials must assess the Aboriginal consultation requirements related to the conduct. The federal department or agency may be able to use provincial or territorial consultation processes to assist in fulfilling, in whole or in part, its consultation obligations.

Federal departments and agencies are encouraged to learn about any concurrent provincial or territorial conduct and relevant consultation processes and discuss how these processes might assist the Crown in meeting its consultation obligations.

A departmental approach might include details of how and when a provincial or territorial consultation process may be relied on to fulfill the federal Crown's duty.

Federal officials may consider the following factors:

- Can federal issues be discussed (e.g. fish habitat, migratory birds, safe and accessible waterways)?
- Will the federal, provincial or territorial process include meaningful participation of all Aboriginal groups whose involvement is required to fulfill the federal duty?
- What is the mandate of the provincial or territorial department or agency and are there any limits to it that could have an impact on consultation activities, specifically in the case of boards or commissions?
- Will federal departments and agencies need to anticipate additional consultation activities?
- Are there any accommodation measures that have been established within the provincial or territorial process on which the federal Crown could rely?

Memoranda of understanding may be in place with certain provinces or territories to guide how federal, provincial and territorial governments can work together on Aboriginal consultation.

Reliance on industry consultations

Where departments and agencies are responsible for approving third-party activity, Crown decision makers will need to determine the role that third parties, such as industry proponents, will play in relation to consultation and accommodation.

Departments and agencies will need to inquire about the following before they decide whether or not and to what extent they can rely on third party consultation:

- To what extent have the proponents consulted Aboriginal groups? With which groups have they consulted?
- Does the Crown have access to the consultation record to date?
- Are future consultations anticipated and what are the timelines?
- Should federal officials attend the consultation sessions and if so, what would be their role?
- What procedural aspects of the consultation is the Crown delegating, if any?
- Will there be a consultation record for future consultations and will the Crown have access to that record?

The Crown is ultimately responsible for ensuring that the duty to consult and, where appropriate, accommodate is fulfilled. Therefore, it will need to evaluate whether the proponent has adequately consulted with Aboriginal groups and whether further consultations are required to be undertaken by the Crown to fulfill its consultation obligations.

III ORGANIZING YOUR DEPARTMENT OR AGENCY FOR CONSULTATION AND ACCOMMODATION

This section identifies some issues to be addressed by managers to organize their department or agency for consultation and accommodation. This includes evaluating financial, human resources and training requirements, as well as assessing the need to involve Department of Justice counsel. Step-by-step tasks to be undertaken by managers and practitioners will be described in Part C.

1) General considerations

- Ensure that officials are adequately equipped with the appropriate tools, resources and training to carry out meaningful and reasonable consultation efforts in each case. The development of a departmental or agency approach will support them in addressing case-specific issues.
- Put into place a records management system and procedure to document and file agendas, meeting notes, correspondence, actions, decisions, and ensure that procedures are used consistently by officials. Recording in a consistent format and storing in an accessible and retrievable location all relevant consultation meeting records and correspondence with Aboriginal groups is important to ensure that a complete record of the process, the concerns raised and the efforts to address such concerns are documented. Where more than one department or agency is involved, departments and agencies are encouraged to use a central or shared document storage system, wherever possible.
- Ensure officials are aware that all meetings and correspondence are "on the record" to enable the Crown to rely on such information, if necessary, in court. Information provided to government may be subject to *Access to Information Act* requests. Therefore specific measures may be required before agreeing to any confidential or off-the-record discussions or treatment of documents. Consult Department of Justice Counsel before determining how discussions or particular materials exchanged in the course of the consultation process may be treated or classified.

2) Organizational, financial and human resources considerations

Throughout the development and implementation of Crown activities and any corresponding consultation processes, officials must ensure meaningful consultation such as: timely sharing of detailed information about the activity; providing support, as required, to Aboriginal groups to achieve the objective of meaningful participation in consultation processes; providing enough time for Aboriginal groups to assess adverse impacts and present their concerns, promoting discussion with communities about impacts and ways these can be avoided or mitigated, etc.

To achieve this, departments and agencies need to have access to financial, human and technological resources that can be used for consultation and accommodation activities. They must also identify what role could be played by other partners to support the fulfillment of the duty.

Departmental or agency approaches should take into account the following:

- Assessment of departmental and agency activities that may give rise to a duty to consult;
- Assessment of any potential adverse impacts of departmental and agency activities, the severity of impact and the strength of any potential or established Aboriginal or Treaty rights to determine the scope of the duty to consult and related consultation processes;
- Frequency of consultation-related activities;
- Assessment and documentation of resource requirements for Aboriginal consultation and accommodation activities. For example, departments and agencies should consider the cost implications for the participation of Aboriginal groups, which includes determining whether their program and financial authorities can assist them in funding Aboriginal consultation-related activities;

- Records management systems to document the consultation and accommodation process;
- Human resources required to plan, research, implement and monitor reasonable and meaningful consultation processes, namely a skilled, trained and informed staff;
- Other departmental and agency policies, programs, initiatives that may complement and support the fulfillment of the duty;
- Opportunities, through protocols or Memoranda of Understanding, for collaboration, relationship building and sharing costs of consultation and accommodation with other federal departments and agencies, provincial and territorial governments and industry, and opportunities to better integrate consultation processes;
- Internal and external communications related to consultation activities;
- Approval processes and procedures;
- Evaluation of consultation and accommodation activities undertaken;
- Existing financial authorities that can support internal or external consultation and accommodation related expenditures such as capacity funding to Aboriginal groups, where appropriate. For example, the Canadian Nuclear Safety Commission and the National Energy Board have participant funding programs to support Aboriginal consultation in the review of major energy projects. The Canadian Environmental Assessment Agency can provide funding in relation to projects that are assessed by a review panel or a comprehensive study under the *Canadian Environmental Assessment Act*. The Canadian Environmental Assessment Agency participant funding program includes an Aboriginal funding envelope to provide support to Aboriginal groups to assist them with regard to Aboriginal or public consultation activities;
- Financial resources at the disposal of the departments and agencies and opportunities to seek additional resources (e.g. Treasury Board submissions). For example, federal officials can refer to legislation and to Treasury Board Secretariat guidelines on expenditures as well as departmental or agency-specific policies, directives, guidelines and practices; and,
- Other consultation-related needs such as dispute resolution processes.

In some instances, First Nation, Métis or Inuit groups may seek financial assistance to support their participation in the consultation process. Officials should first determine if there are other means available to support Aboriginal capacity to participate in the consultation process, for example, whether other partners are able to contribute to capacity funding or other forms of assistance to Aboriginal groups.

See “Part C, Phase II – Crown Consultation Process” for more details on ways to support meaningful consultation.

3) Training considerations

Training of federal officials is critical to a consistent understanding and implementation of the duty to consult and, where appropriate, accommodate. It should:

- increase awareness and understanding of what the duty to consult, and accommodate entails;
- situate the duty to consult and accommodate in the larger context of the relationship between the Crown and Aboriginal peoples, including how the duty relates to other reasons to engage with Aboriginal groups;
- promote an understanding of the roles and responsibilities of the entities involved in the consultation process such as the Crown, Aboriginal groups and third parties;
- allow officials to understand how the duty to consult may apply in the context of their departmental or agency mandates and activities and how they can fulfill it;
- identify the specific implications of developments in case law, consultation policies and practices and the public environment for their departments and agencies and for the Crown as a whole;

- explain where officials can obtain information and practical tools that will support their consultation and accommodation activities;
- provide examples of best practices and opportunities for federal officials to share their experiences of implementing the duty to consult and accommodate;
- promote the development and efficient implementation of mechanisms for interdepartmental and intergovernmental coordination and collaboration; and,
- provide a basis for the development of common consultation approaches and practices within federal departments and agencies and across government.

Training on consultation and accommodation continues to be offered by the Consultation and Accommodation Unit of AANDC in conjunction with the Department of Justice. Federal officials or their managers seeking more information on training or wishing to register for the training sessions may contact: consultation-sessions@aandc-aadnc.gc.ca

Various departments and agencies have also developed department and agency specific training on consultation and accommodation. For example, the Canadian Environmental Assessment Agency offers training on the integration of Aboriginal consultation into the environmental assessment process.

4) Engaging Justice counsel in the consultation and accommodation process

The Department of Justice is not responsible for conducting consultations or collecting the appropriate factual information regarding potential or established Aboriginal or Treaty rights and potential adverse impacts of an activity. However, the duty to consult is a legal obligation and raises a number of legal issues. Therefore, it is important to work closely with Justice when assessing if and how consultation may need to be incorporated into departmental or agency activities and approaches for identifying and addressing this duty.

In addition there will be situations where departments and agencies will need to engage counsel to assist in reviewing or advising on how best to do the various assessments discussed in Part C of these Guidelines. Justice provides an important advisory role to departments and agencies on the legal aspects of consultation policy choices, especially as it relates to consistency in legal advice across government and as the case law in this area continues to develop.

As departments and agencies become more familiar with the consultation requirements associated with their operations and build Aboriginal consultation and accommodation into their operations through these Guidelines as well as other policies and procedures, the need for legal advice on routine matters may decrease.

Remember:

- When identifying consultation requirements related to general departmental and agency activities or other factors that may influence consultation requirements, managers should seek their counsel's assistance. By keeping Justice informed at the outset about your approach to consultation and the nature of departmental activities, you may reduce the need for your officials to seek guidance from Justice late in the process or for every consultation process. It is also important to work with them to establish and maintain good record-keeping processes.
- Developing standard departmental and agency consultation approaches will reduce the need for advice on a case-by-case basis.
- Make sure that your officials gather all relevant information about their anticipated activities and related assessments as to how these activities may adversely impact potential or established Aboriginal or Treaty rights and related interests. Counsel will be available to review such assessments and provide advice based on the factual information provided.

- When your officials gather information and do their initial assessment of a situation, make sure they identify the legal issues and questions that may need to be answered. **Not everything is a legal question.** Your department could also benefit from prioritizing questions needing legal clarification on various files and from relevant departments and agencies working on a common consultation file, thereby streamlining requests for legal advice.
- In most instances, depending on the information gathered and the initial assessment made, departmental officials will be able to determine whether a duty is triggered and consultation is required. Identifying, in advance, which departmental activities may trigger a duty to consult will help officials more efficiently make case-specific initial assessments. As this question is a question of law, it will be assessed on a standard of correctness should this assessment be reviewed by a court.
- The information gathered by your officials from relevant sources such as others in the federal government, provincial and territorial governments, affected Aboriginal groups will allow them to 1) identify if their activities may adversely impact any potential or established Aboriginal or Treaty rights; 2) assess the severity of the potential adverse impact and the nature and/or strength of claims; 3) determine the appropriate approach and scope of consultation required; and 4) develop a reasonable approach to consultation. Counsel could assist in ensuring that a statement of a government's intentions and planned undertakings is reasonable and appropriate from a legal perspective.
- Officials will need to seek counsel's advice to answer specific legal questions such as how to address title and exclusive use claims, treaty interpretation, sufficiency of Crown responsiveness, gaps in regulatory or environmental assessment processes, linkages to litigation or negotiations files and other novel legal questions.
- Departments need to do a preliminary assessment of a claim and determine whether groups in the area have raised any concerns regarding the activity or notified the Crown that any activities in a given territory require consultation. Justice can assist in the determination of whether that Crown or third party activity requires consultation and assist in addressing new or novel claims that raise new legal or policy issues that may arise with new kinds of proposed activities or in the course of consultation processes.
- Assess whether a more detailed strength of claim analysis from Justice or other appropriate experts or other key legal analysis are warranted in the circumstances and plan accordingly (baseline information to provide to Justice, delay to obtain analysis, costs, etc.).
- Justice does not make decisions on how departments and agencies should carry out their mandates and activities. Legal advice will complement the broader departmental or agency assessments and decision-making processes which will include good governance and other policy considerations.
- Departments and agencies should keep their counsel informed of their adverse impact assessments for their various activities. As well, departments and agencies can seek Justice advice on their consultation approaches and plans, consultation records, consultation adequacy assessments and accommodation measures that are being considered.
- Where appropriate, discuss document disclosure and the creation and maintenance of a record of the consultation with your counsel.
- Where appropriate, seek counsel's advice when assessing the implementation of an activity and determining whether adjustments are required.

PART C

Step-by-step Guide to Consultation and Accommodation

INTRODUCTION

Part C provides a step-by-step, chronological guide for federal officials when fulfilling the Crown's duty to consult and, where appropriate, accommodate. The same basic steps are appropriate for consultation for good governance and other policy reasons.

Crown activities that may trigger the duty vary and therefore the consultation and accommodation approach taken may vary as well. The steps, tips and factors outlined below will apply to a wide variety of government conduct. Such conduct may involve, for example, management of federal real property (e.g. the disposal of a federal building or a change in the use of federal lands). It may also involve government approvals and authorizations for an activity proposed by a third party (e.g., issuance of licenses, permits, authorizations for the use of lands or resource extraction).

Officials can use this step-by-step guide when developing and implementing their overall departmental or agency approach to consultation and accommodation (See Part B).

Depending on the circumstances, a process for consultation and accommodation with Aboriginal groups may involve up to four phases. The following sections will discuss each phase and provide guidance on the steps to consider in each one. Where there is more than one federal department or agency or other government(s) involved, the steps should be carried out collaboratively.

The positive relationships that departments and agencies develop with Aboriginal groups over time and the resulting dialogue will assist the federal government to implement the following phases.

PHASE 1: PRE-CONSULTATION ANALYSIS AND PLANNING

The departmental or agency approach to consultation and accommodation (See Part B) will be useful in this phase. As early as possible, officials need to assemble information to assess whether the Crown has a duty to consult, the scope of that duty, and how to design a consultation process. Officials will first need to assess the potential adverse impacts of the proposed Crown conduct and then determine if there are any potential or established Aboriginal or Treaty rights in the area of the activity that may be adversely affected.

Step 1: Describe and "map out" the proposed Crown conduct

The first step involves describing the contemplated Crown conduct such as a Crown activity or an approval of a third party activity and determining which department or agency is responsible for the conduct. In their departmental or agency consultation and accommodation policy approaches or assessments, departments and agencies should have already identified activities, policies, programs or strategic, higher level decisions that may give rise to a duty to consult (See Part B).

Departments and agencies should identify other federal departments and agencies and other orders of government that may be involved in the activity, including the decisions they are responsible for making and any regulatory, statutory and other program timelines that may apply. Where multiple departments and agencies are involved, a lead department must be identified and the contact information communicated to the relevant departments and agencies and to Justice.

Some questions to consider at this step include:

- What is the nature of the proposed Crown conduct? For example a) Crown activity such as the construction of a building, the creation of a park, the disposal of Crown land; b) Crown authorization of a third party project, issuance of a permit; c) other Crown activity that enables the project to proceed such as funding; d) strategic higher level decisions such as structural or organizational changes that reduce the Crown's oversight and decision-making ability.
- What is the purpose of the initiative?
- What are the details of the project? What is the project's geographic scope? Identify all of its components. Is there more information that is needed to fully understand the project?
- Where the proponent is a third party, has it provided a detailed project description?
- What are the key decisions to be made and related timelines?
- Are there any maps of the project site and surrounding areas?
- What other departments and agencies and other orders of government, corporation(s), or authorities are involved? Who is responsible for authorizing the project or carrying it out?
- Have Aboriginal groups in the area raised concerns about the proposed activity or any other activities (in the past/present)?

Step 2: Identify potential adverse impacts of Crown conduct

Officials must anticipate the potential adverse impacts of the proposed activity. The nature and severity of adverse impacts depends on a variety of factors including: the scope and size of the activity, its environmental effects, and whether the impact is permanent or temporary.

Officials must determine whether the current Crown conduct in question may have an adverse impact on potential or established Aboriginal or Treaty rights. Where departments and agencies are responsible for approving third-party activity, a detailed understanding of the nature and scope of that activity will assist Crown officials to anticipate its potential adverse impacts.

Where adverse impacts are uncertain, it is important to identify those groups whose potential or established Aboriginal or Treaty rights may be impacted. Early engagement with them regarding the proposed activity will enable them to articulate any concerns they may have about the

activity. This provides officials with time to adequately assess potential adverse impacts, and identify measures to avoid or mitigate such impacts (Guiding Principle and Directive # 3).

Questions and issues for consideration include:

- What is the likely or potential impact of the activity on the land, water and resources? If there are any impacts, what changes to the current condition or use of lands, water or resources are likely to occur as a result of the activity? Are these changes significant?
- Are departmental or agency officials aware of any communication from groups which are raising concerns about the particular activity or similar activities in the area?
- Have any groups notified Canada of any concerns about the proposed activity and suggested any remedial measures that may accommodate the adverse impacts on their rights? Discussing accommodation options with the relevant decision-makers as early as possible in the consultation process will allow federal officials to discuss them appropriately with Aboriginal groups later in the process.
- Does the activity involve lands or resources that are currently the subject of treaty negotiations or are part of existing comprehensive land claim agreements or self-government agreements?
- Are the potential adverse impacts you've identified likely to be of a temporary or permanent nature?
- Have any environmental or other assessments of the proposed activity been carried out? Have any environmental or other assessments been undertaken for similar activities in the vicinity of the proposed activity? If so, what adverse impacts on rights are revealed, if any, by these assessments?
- Are there any other activities occurring in the same area? Is this activity likely to have any cumulative effects in combination with other activities in the same or surrounding area?

In the design or planning stages of contemplated Crown conduct, in the federal environmental assessment process and throughout the consultation process, managers and officials need to identify measures that could be implemented to avoid or mitigate potential adverse impacts of the project on potential or established Aboriginal or Treaty rights and related interests.

The Courts have emphasized the need for flexibility and responsiveness; for an ability and willingness to adjust the activity in question; to provide options for addressing the interests and concerns raised in the course of consultations; and to do so in good faith. It is also important to be clear and explain the limits to what changes can be made to the proposed activity. In the end, the Crown must demonstrate that it sought to reconcile Aboriginal concerns with other societal interests and that its consultation process was carried out with a view to reconciliation.

Step 3: Identify which Aboriginal groups are in the area of the proposed Crown conduct and ascertain their respective potential or established Aboriginal or Treaty rights and related interests

To assess whether the proposed Crown conduct will have any potential adverse impacts on potential or established Aboriginal or Treaty rights in the area(s), officials must gather information about those specific rights. These may include the right to hunt, fish, trap, gather and trade and may either be established by a court or in a Treaty, or may be asserted by an Aboriginal group, for example, in litigation or for the purpose of Treaty negotiations.

Where Aboriginal rights are asserted, the Crown must make a preliminary assessment as to whether there is a credible basis for such claims and compare their assessment with the information gathered through consultation with Aboriginal groups. In the event that the proposed activity may have adverse impacts on the rights of Aboriginal groups living in the area, learn more about the potential or established Aboriginal or Treaty rights in question such as: what are their traditional practices; when and where were these practices historically carried out; are these practices still carried out today; where, by what means, and at what time of the year?

Departments and agencies are encouraged to obtain and to share, internally and with other federal departments and agencies, information about the potential and established

rights of Aboriginal groups in various regions of the country. The exchange of regional information will help officials to anticipate potential adverse impacts on rights, and plan proposed federal activity in such a way as to avoid or mitigate those impacts.

Information about potential or established Aboriginal or Treaty rights across the country will also help officials to design and tailor their consultation approach and could support broader departmental or agency priorities to establish and maintain long-term working relationships with First Nation, Métis and Inuit groups.

Keep in mind that even if only one department or agency is aware of an asserted right, the federal Crown as a whole (i.e. every department and agency) is deemed to have knowledge of it. The Crown and its officials are also deemed to know about established Aboriginal and Treaty rights.

Managers must ensure officials can obtain relevant information on potential or established Aboriginal or Treaty rights and related interests, which includes having access to the Aboriginal and Treaty Rights Information System and the Consultation Information Service at AANDC.

Aboriginal and Treaty Rights Information System

The Aboriginal and Treaty Rights Information System is an electronic system that will bring together information on the location of Aboriginal communities and information pertaining to their potential or established Aboriginal or Treaty rights. It is a web-based application that leverages Geomatic Information System technology to geo-reference electronic data that is stored in existing AANDC databases.

The purpose of the Aboriginal and Treaty Rights Information System is to display this information using one system and to make it available to federal officials. It will display baseline information on First Nation, Métis and Inuit communities. The Aboriginal and Treaty Rights Information System has the ability to display maps to assist federal officials to locate information on communities, claims, Treaties and litigation. The Aboriginal and Treaty Rights Information System may evolve over time to include information from other federal sources.

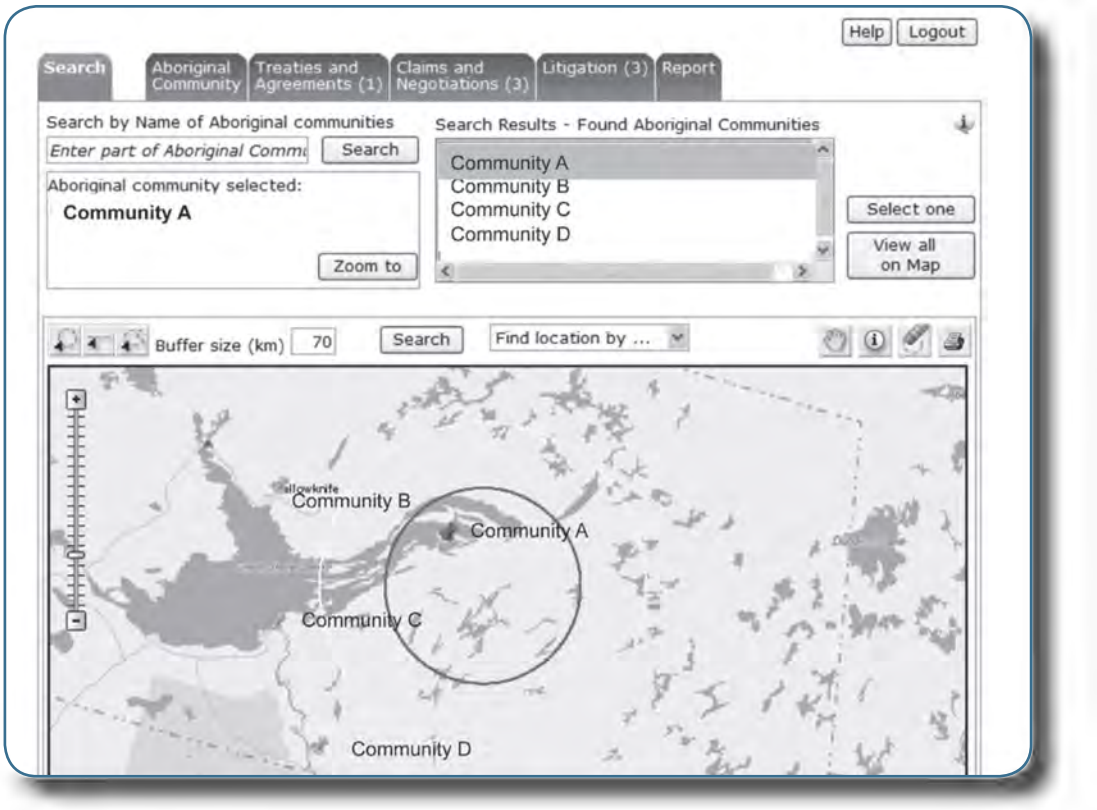
Consultation Information Service

The Consultation Information Service of AANDC – which will be responsible for the Aboriginal and Treaty Rights Information System – provides a single point of access for other government departments and external stakeholders, particularly those which do not have access to the Aboriginal and Treaty Rights Information System or require additional AANDC information on potential or established Aboriginal or Treaty rights in Canada.

The Consultation Information Service will provide contact information for Aboriginal groups and their leadership, information on multipartite agreements, historic and modern Treaties and their provisions, comprehensive and specific claims, litigation and other assertions. Queries regarding specific projects can be sent to: CAU-UCA@aandc-aadnc.gc.ca. Officials will first seek information through the Aboriginal and Treaty Rights Information System before sending queries for additional information to the Consultation Information Service.

Other sources of information include:

- departmental and agency records on Aboriginal claims asserted in litigation, in negotiations, or through prior consultation or other transactions with the department;
- the AANDC Regional Consultation Coordinators should be contacted to assist in the coordination of consultation efforts as they may be aware of on-going or contemplated consultation processes;
- information provided by proponents to departments and agencies and specific boards and tribunals involved in the decision making process;
- traditional Use Studies, for example, those prepared in the context of Environmental Assessments and in land disposal contexts;
- colleagues who have worked with or consulted with Aboriginal groups in the area;
- the databases and records of other government departments and agencies, provinces and territories;
- the websites and information of Aboriginal groups;



- ❖ records of consultations between federal, provincial or territorial, industry and Aboriginal groups;
- ❖ court websites (federal, provincial and territorial) listing decisions, proceedings on Aboriginal and Treaty rights assertions and interpretation of potential and established rights; and,
- ❖ press coverage and public statements, in which Aboriginal groups have asserted rights, expressed concerns and proposed desired outcomes.

Federal officials must gather all relevant information. Justice can then assist with legal issues that may arise in an assessment of the strength of the claim, overlapping claims, and assertions of rights and title. Justice counsel can also advise on the appropriate consultation approach when the Crown is involved in litigation or negotiations with an Aboriginal group with whom the Crown may also need to consult.

Step 4: Make an initial determination as to whether there is a duty to consult

Next, an initial assessment of the information gathered in Steps 1, 2 and 3 must be undertaken to determine whether or not there is a common law duty to consult. This information will also lay the groundwork for determining, in Step 5, the extent of the duty and, in Step 6, an appropriate consultation process.

Three factors are required to trigger the common law duty to consult:

(1) There is a proposed Crown conduct;

(2) The proposed Crown conduct could potentially have an adverse impact on potential or established Aboriginal or Treaty rights; and

(3) There are potential or established Aboriginal or Treaty rights in the area.

For a duty to consult to exist, all three factors must be present.

CROWN CONDUCT	+	POTENTIAL TO ADVERSELY IMPACT ON RIGHTS	+	EXISTENCE OF POTENTIAL OR ESTABLISHED ABORIGINAL OR TREATY RIGHTS	=	DUTY TO CONSULT

The threshold to determine if a duty is triggered is low. The objective of the duty is to ascertain if conduct that is being contemplated by the Crown may adversely impact potential or established Aboriginal or Treaty rights before any adverse impacts are caused. To do so will require knowledge of the rights that may be affected by departmental or agency specific activities and a process for discussing any potential concerns early in the planning phases and decision making process.

Departments and agencies can seek Justice's advice when determining whether such a duty exists. For good governance and other policy reasons, your department or agency may decide to consult regardless of whether there is a duty, and this approach should be expressed to the Aboriginal groups being consulted.

(i) No Duty to Consult

The initial analysis indicates that there is no duty to consult. For example:

- There is no Crown conduct;
- No adverse impact is anticipated;
- No credible basis to support a claim;
- The claim does not include Treaty rights or activities or practices that could meet the test for Aboriginal Rights.

It is important to remember that the threshold to assert a credible claim to Aboriginal rights, informed by the need to maintain the Honour of the Crown, is not high. While the existence of a potential claim is essential, proof that the claim will succeed is not. The courts have consistently stated that the Crown must adopt a generous and purposive approach when assessing whether it has a duty to consult.

The department or agency may want to communicate its determination to the Aboriginal group. If the Aboriginal group brings forward new evidence supporting a claim or if they provide new information on potential adverse impacts, then the Crown must re-examine its determination that there is no duty to consult.

(ii) Uncertainty about the Duty to Consult

Where it is uncertain from the initial analysis whether the proposed Crown conduct is likely to have adverse impacts on potential or established Aboriginal or Treaty rights, the Crown may wish to verify the results of their initial analysis with the Aboriginal group.

Further discussions about the potential adverse impacts of the proposed Crown conduct on their potential or established Aboriginal or Treaty rights and related interests as well as the nature and basis for those rights and interests may assist the Crown when determining whether there is a duty to consult and what role, if any, consultations may play in the planning of the proposed activity.

If it is uncertain whether a duty to consult exists, officials must consider whether there are other legal reasons or policy considerations for consulting.

(iii) A Duty to Consult Exists

If the analysis indicates that the proposed Crown activity may adversely impact potential or established Aboriginal or Treaty rights, the Crown has a duty to consult and, where appropriate, accommodate.

Step 5: Assess the scope of the duty to consult and, where appropriate, accommodate

The scope of the consultation and any appropriate accommodation will be informed by the strength of the claim and the severity of adverse impacts on potential or established Aboriginal or Treaty rights. A number of factors should be considered.

Where rights have been established (e.g. in a Treaty or where a court has found an Aboriginal right), a strength of claim assessment is not usually necessary and a more extensive consultation process is generally required.

Where potential rights are claimed, the scope of consultation will need to be proportionate to the seriousness of the potential adverse impact(s) of the proposed Crown conduct and the strength of the potential Aboriginal right(s) claimed (See Figures 1 and 2 below).

Determine the level of seriousness of the potential adverse impact on the right(s), as depicted in Figure 1 below, keeping in mind that re-assessment may be required as the consultation process proceeds and new information comes to light.

Figure 1

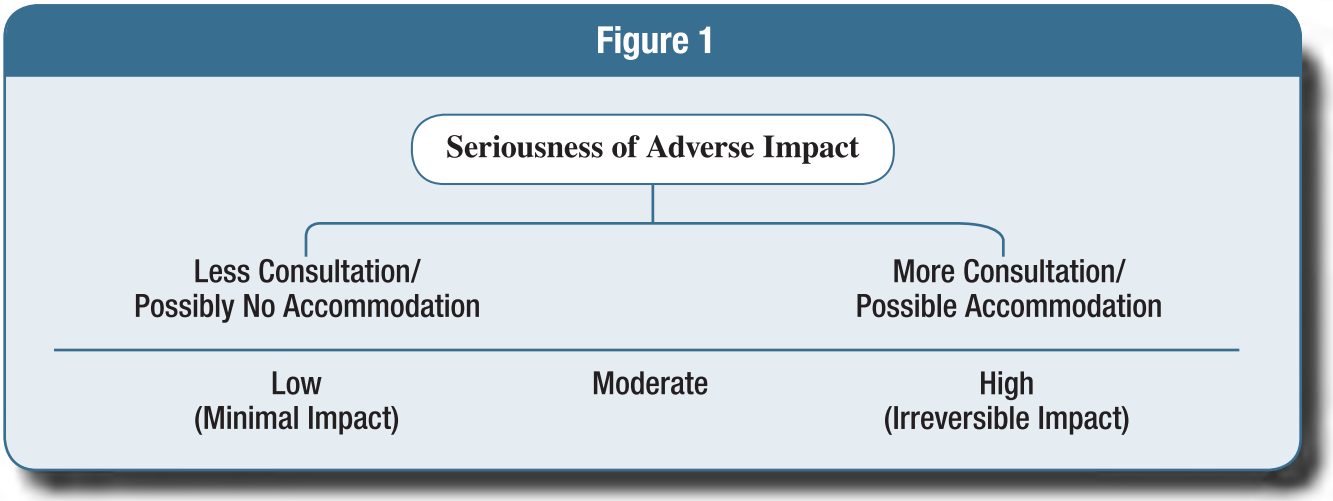
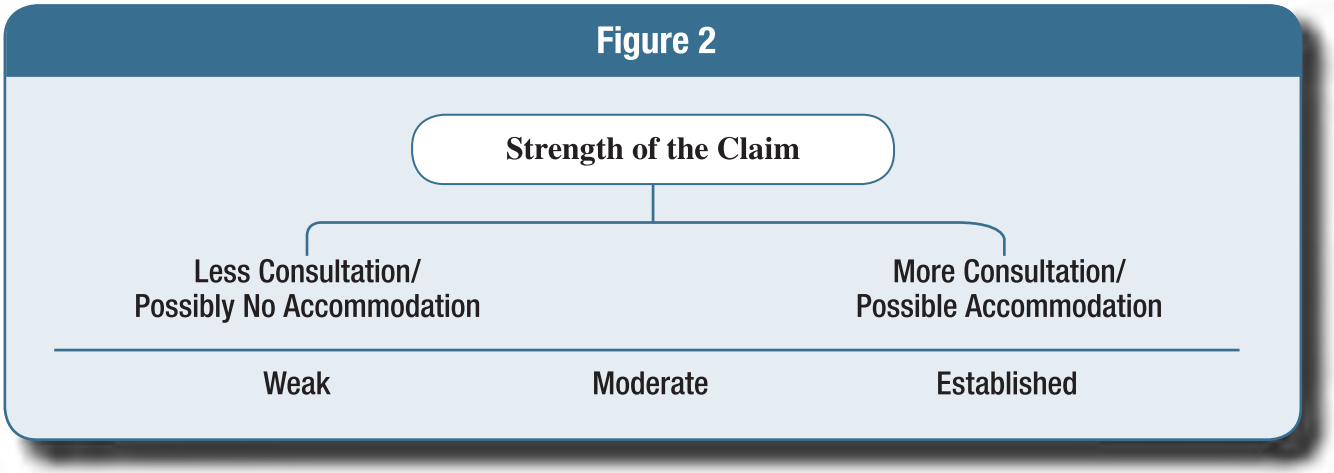


Figure 2



Based on experience, officials should be able to anticipate the potential adverse impacts of the Crown conduct in which their departments and agencies typically engage (See Part B). The nature and seriousness of potential adverse impacts of a proposed activity will become more apparent to officials as information from Aboriginal groups is gathered as part of an on-going relationship and information sharing, or during a consultation process.

Strength of claim assessment is an historical and anthropological analysis of the facts of a particular claim asserted by an Aboriginal group in the area of the proposed activity. In conducting the assessment, federal officials should gather the following information:

- What are the nature and scope of these asserted rights?
- Has the Aboriginal group(s) continually occupied the area?
- Does the group still occupy the area? If the Aboriginal group does not still occupy the area, at what period of time did they occupy it?
- What were their traditional practices historically and what are their practices today?
- Is the Aboriginal group alleging that the claimed rights were exercised prior to European contact (or for the Métis, prior to effective control)? Do they continue to exercise these rights today in a traditional or modernized form?

Justice can advise managers and their officials as to when to seek legal advice in the development of strength of claim analysis.

Documents that may alert the Crown to the existence of a claim or contain historical information in support of a claim include: protective writs and other court actions filed by Aboriginal groups; public statements made by Aboriginal groups or their letters to the Crown about their potential or established Aboriginal or Treaty rights; ethno-historical research and reports or similar research submitted by Aboriginal groups for the purposes of a claims negotiation process; traditional knowledge and use studies prepared by Aboriginal groups for an environmental assessment process; or materials prepared by Aboriginal groups for the purposes of litigation. Confidentiality issues related to the above-noted sources of information may need to be addressed.

Other factors may influence the Crown's decision to consult with an Aboriginal group such as participation of the group in a comprehensive or specific claims negotiation process.

When the Crown is dealing with an Aboriginal group with a modern land claim treaty, the first step is to look at its provisions and try to determine the parties' respective obligations, and whether there is some form of consultation provided for in the treaty itself. It is important to be aware that, while consultation may be shaped by agreement of the parties in a treaty, the Crown cannot contract out of its duty of honourable dealing with Aboriginal people – it is a doctrine that applies independently of the treaty itself.

In some cases the treaty itself will set out the elements the parties regarded as an appropriate level of consultation (where the treaty requires consultation) including proper notice of a matter to be decided in sufficient form and detail to allow that party to prepare its view on the matter; a reasonable period of time in which the party to be consulted, and an opportunity to present such views to the party obliged to consult; and full and fair consideration by the party obliged to consult of any views presented.

Once it has been established that the Crown has a duty to consult, departments and agencies involved in the activity need to work together to assess the scope of that duty. The initial assessment of the scope of consultation may change as the consultation unfolds and more information comes to light about the potential adverse impacts of the proposed activity on the community's Aboriginal or Treaty rights.

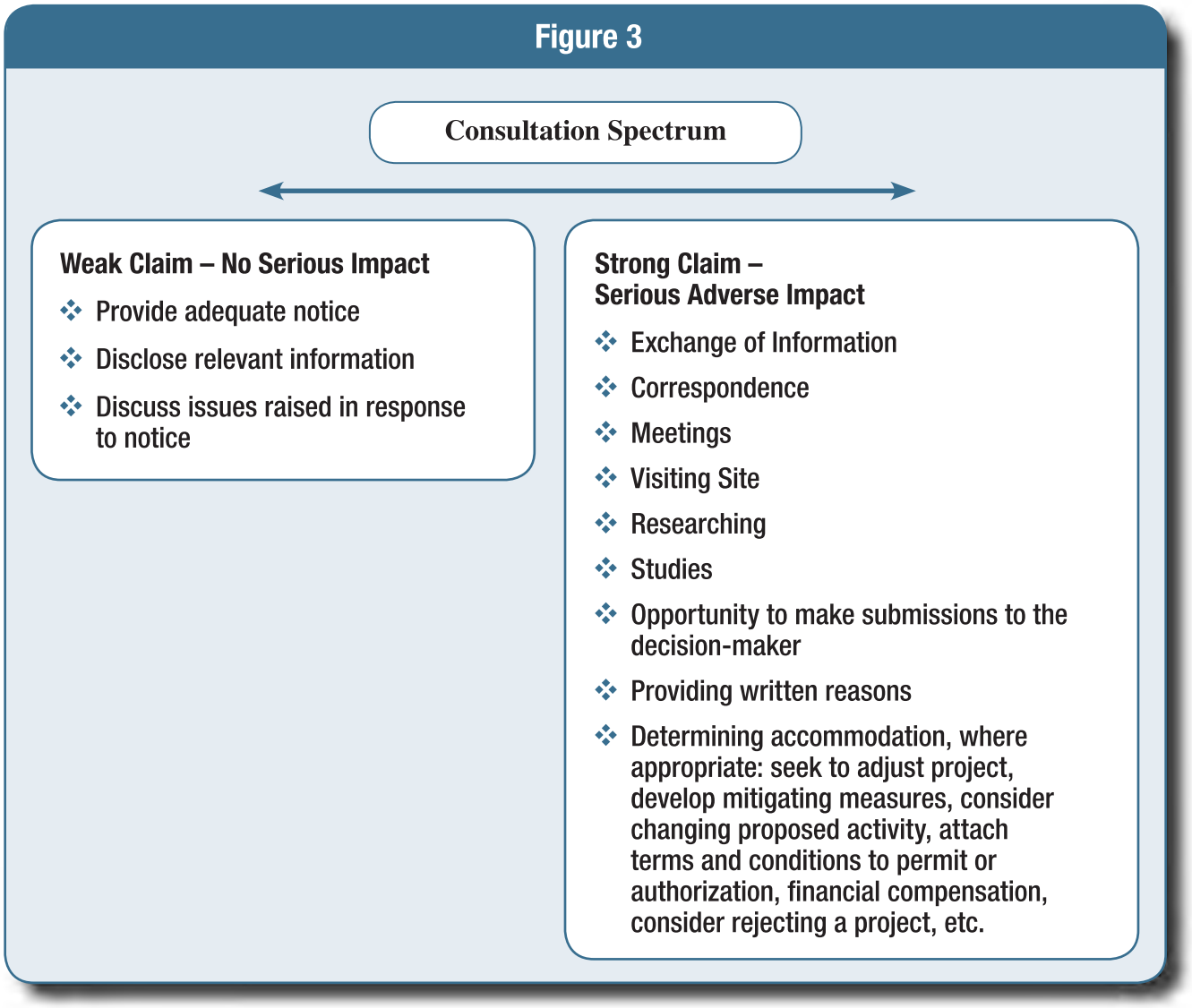
Departments and agencies must ensure that assessments of the scope of the duty are well documented. Managers can support officials to assess the scope of the duty to consult by ensuring they have access to previous assessments of similar activities in the vicinity. However, it is important to remember that Crown consultation, including strength of claim analysis, is not a rights determination process designed to establish the rights of an Aboriginal group.

The design of the consultation process should reflect the assessment and any changes made to it (See Figure 3 below).

Step 6: Design the form and content of the consultation process

The Crown's assessment of the scope of the duty to consult, and where appropriate, accommodate together with departmental and agency approaches to consultation (See Part B) will guide the development of a consultation process. As the consultation process unfolds, and new information becomes available, its form and content may also evolve to reflect resulting changes to the scope of consultation. The consultation process must therefore be flexible. When designing a consultation process, officials should become aware of existing

Figure 3



interactions, processes and dealings between the relevant Aboriginal groups and other federal departments and agencies that may support an effective consultation process.

It is important to establish goals and objectives and develop evaluation questions that will assist federal officials in determining the effectiveness of actions and decisions made at key stages of the process. Further, as officials prepare to implement their activity, they should focus the consultation process on avoiding or minimizing adverse impacts of the Crown conduct on the potential or established Aboriginal or Treaty rights and addressing any related interests, to the greatest extent possible.

Guiding Principle and Directive # 4 sums up the key elements of a meaningful consultation process and reflects what Aboriginal groups across the country have stated during the preparatory discussions (2005-06), the engagement process under Canada's Action Plan (2008-10) and in other forums on consultation and accommodation as follows:

- A Crown approach that is forthcoming, flexible and responsive;
- Inclusive processes to manage issues, decision-making and ensure accountability;
- Early consultation and policy-based discussions with communities on accommodation with the objective of avoiding or minimizing adverse impacts;
- Pro-active solicitation of Aboriginal involvement and active listening to their concerns;
- Real opportunities to inform and influence decisions before they are made;
- Assistance to support Aboriginal groups' meaningful participation in a consultation process;
- Time lines for information-sharing and responses that are appropriate and adapted to the specific circumstance;
- Serious consideration of feedback during the consultation process and prior to any decisions being final;
- Clear and direct responses on how concerns have been addressed or why they cannot be addressed;
- Better coordination, cooperation and collaboration between Crown and industry with respect to Aboriginal consultations;
- Consideration of accommodation as part of a meaningful consultation process. When looking at accommodation options, seriously consider Aboriginal perspectives, concerns and options for addressing impacts on potential or established Aboriginal or Treaty rights and related interests;
- Sustainable economic development balanced by an awareness of cumulative impacts and environmental stewardship;
- Openness to altering the original proposal and if necessary, not going forward at all with the project or decision.

Identify roles and responsibilities and opportunities for coordination

Where more than one department or agency is involved in Crown consultations for a proposed activity, officials should determine the contribution that their departments and agencies could make to the consultation and accommodation effort, having regard to their respective mandates. Effective collaboration and coordination mechanisms such as inter-departmental teams and memoranda of understanding will be essential in carrying out consultations. Coordination mechanisms should be reviewed periodically by managers to address challenges and ensure efficiency. As set out in Guiding Principle and Directive # 5, coordination includes the identification of a lead department for consultation.

Federal officials must determine:

- if other departments and agencies need to be involved, based on their mandates. If more than one federal department or agency is involved, has an inter-departmental team been assembled? For example, have the First Nation or AANDC been contacted when the proposed activity is to be located on a reserve, or could possibly affect a reserve or when the lands are the subject of Treaty settlements or negotiations, Self-Government or Specific Claims?

- if other Crown entities such as federal Crown corporations and Canadian Port Authorities, and provincial or territorial governments or third parties may be involved. If so, do they have jurisdiction over the land or resources that may be affected by the federal activity in question?
- if boards and tribunals will be involved in the Aboriginal consultation process and, if so, how? What are their mandates and terms of reference?
- if the proposed Crown conduct is subject to statutory or non-statutory timelines. In the case of an activity initiated by a third party proponent, inquire about the timelines for the project;
- a lead for the Crown consultation process. The lead may change as the project shifts from the environmental assessment process to a regulatory permitting phase. When identifying a lead department or agency, consider which department or agency is: undertaking the proposed activity, such as a Crown infrastructure project or real property disposal; responsible for issuing any form of approval for the proposed activity; likely to cause more significant adverse impacts; best positioned to assume the responsibility for leading the consultations and addressing Aboriginal concerns;
- the contact information for the lead federal department or agency. Has this information been clearly communicated to all parties involved in the consultation?
- what federal programs and policies might inform or otherwise be relevant to the consultation process or to addressing the concerns of Aboriginal groups (comprehensive claims negotiations, specific claims negotiations, self-government negotiations, treaty land entitlement, additions to reserve, economic development, procurement policies, relevant Treasury Board Guidelines on transfer payments, etc.)?
- if the proposed activity is contemplated to take place on a reserve, or could have adverse impacts on a reserve. It is important to note that the Crown's obligation to consult applies in these circumstances. However, decisions about activities on reserves may also be subject to various legislation such as the *Indian Act,* the *First Nations Land Management Act* or the *First Nations Commercial and Industrial Development Act* as well as approval processes. By-laws enacted by First Nations may also apply. Contact the First Nation directly for information on their laws, land codes and administrative procedures. You may contact the AANDC Regional Lands Officer to find out which legislation applies;
- if a proposed activity that is contemplated to take place on a reserve may have potential adverse impacts on the rights or interests of other communities? If so, they may also need to be consulted;
- in relation to other Crown activities, what consultation processes within your or in another department or agency are ongoing with the same Aboriginal groups? Is it possible to coordinate your efforts with theirs to avoid consultation fatigue?
- are there any existing working forums and relationships between the Crown and Aboriginal groups (e.g. committees, Councils, round tables, consultation agreements) that can assist you when you need to undertake consultations?

Reliance on other processes to support decision-making

Officials should find out whether other processes with a consultation component have been or will be carried out by federal, provincial or territorial entities including boards, panels and tribunals or by third parties. Officials can then determine the extent to which the Crown can use information gathered in processes such as environmental assessments, other public review or regulatory processes that include Aboriginal consultation to assist them in fulfilling their duty to consult. If the processes that the Crown is seeking to rely on do not result in meaningful consultation, federal officials will need to undertake additional consultations. Please refer to Guiding Principles and Directives # 6 and # 7.

Communication and coordination throughout the consultation process is important in the early identification of issues and solutions.

Federal officials must determine:

- if there are any statutes or agreements that require Aboriginal consultation. Consultation requirements under these statutes or agreements must be fulfilled. Identify the degree to which they can assist in fulfilling the Crown's duty to consult and, where appropriate, accommodate;
- if the third party proponent or the provincial or territorial government plans to consult with potentially affected Aboriginal groups. For example, a provincial or territorial government may consult as part of an environmental assessment process or other public review process;
- if there are opportunities for the federal department or agency to participate in the third party or provincial or territorial consultation process, or to rely on the information gathered during any of those processes to assist it in fulfilling its duty to consult. Did the process that the Crown is seeking to rely on include all of the elements necessary for a meaningful consultation process? (Refer to Guiding Principle and Consultation Directive # 4);
- if the proposed activity will be subject to a federal environmental assessment process, a National Energy Board or Canadian Nuclear Safety Commission hearing or a regulatory review process. Seek to incorporate the results of those processes into your departmental or agency consultation;
- if there are limits to the extent to which the federal department or agency can rely on third party, federal, provincial or territorial processes and the information generated by these processes to meet the duty? If so, what is the nature of those limitations?
- if, in specific circumstances, it is possible to access the relevant consultation records of third parties (i.e. industry), the provincial or territorial Crown or Boards. Determine the usefulness of these consultation records in assisting the Crown to fulfill its duty to consult.

Federal and provincial or territorial collaboration

Once a lead contact has been established at the provincial or territorial level, develop an approach for collaboration. This discussion may include:

- agreement on the roles of the federal departments and provincial or territorial ministries during the consultation process (e.g. federal presence at consultation sessions, federal department or agency hosting some sessions and the province or territory hosting others, federal department or agency relying, in whole or in part, on provincial consultation report, inclusion in agreements or other arrangements of measures to address concerns related to the potential adverse impacts, etc.);
- agreement on how information is going to be shared between federal, provincial or territorial departments and agencies. There may be strategic or policy reasons why information cannot be fully shared between levels of government. Federal officials should not assume that they will be privy to all information gathered during a provincial consultation process;
- agreement on how to notify Aboriginal groups of the proposed activity. This notification can be joint with the province or territory, separate notification letters or other communication can be sent. The notification must be provided in advance of the consultation so that Aboriginal groups are aware of the process;
- agreement on timelines.

Aboriginal groups that would be consulted must be notified that Canada intends to rely, in whole or in part, on the provincial or territorial consultation process and on any accommodation measures or agreement that may be reached to fulfill its consultation obligations. Aboriginal group(s) may opt to share different information in a provincial or territorial process than in a federal one. If the provincial process does not include meaningful participation of all Aboriginal groups required to discharge the federal duty to consult, it may be necessary for a federal department or agency to expand upon the provincial process.

Taking into account the information gathered through other processes, federal officials must determine what else needs to be included in the design of the Crown consultation process. What type of information is still needed? What issues may still need to be discussed with Aboriginal groups? Taking into account any expertise required to address outstanding issues, are there other departments and agencies that need to participate in this consultation?

Determine with whom to consult

The Crown must consult directly with the Aboriginal communities with potential or established Aboriginal or Treaty rights. It is important to remember that political organizations are not necessarily the rights holders although they may be authorized to speak on behalf of the Aboriginal communities which hold the rights.

Prior to consulting with any representative organization of affected rights holders, the Crown needs to ensure that the leadership and their members agree. For example, the representative organization can provide the department or agency with a letter confirming the community's acceptance to be represented by them in relation to the activity. The role of such organizations is generally to provide informational, organizational, administrative and political support to the Aboriginal communities they represent. If it is difficult to ascertain who are the appropriate spokespersons for the rights holders, or if there appears to be differences of opinion within the groups as to who represents or speaks on behalf of the communities, seek legal advice.

Verify if there are any Aboriginal groups with overlapping claims in the area of the proposed activity. If so, you may need to invite them to participate in the consultation process.

Determine if the project is going to be carried out on, or may have effects on a reserve. If so, consult with the relevant First Nation. If the activity may have impacts off the reserve in question, for example, on the rights of any other Aboriginal groups located in the area, consultation may also need to take place with these groups.

Learn about and understand the context and current situation of the Aboriginal groups with which you will be consulting (e.g. language, geography, cultural practices, seasonal activities, interactions with departmental and agency officials). For example:

- What are the characteristics of the community (e.g. language, history, culture, socio-economic conditions, location or remoteness)?
- What is important to community leadership and community members (e.g. interests, aspirations, consultation policies or guidelines they may have developed, etiquette as to how to approach meetings and relationship building, etc.)?
- What are their relationships with neighbouring communities?
- Have memoranda of understanding, agreements or protocols been negotiated between the Crown and the communities?
- Are they currently involved in litigation with the federal or provincial Crown?
- Are there any other considerations?

For the purpose of developing appropriate consultations, a strong knowledge of community and regional issues can assist federal officials in accurately assessing the impacts of the proposed activity on individual communities and their traditional territories and their claims.

Knowledge of the Aboriginal groups with which you will be consulting is important, as is early engagement with them regarding the proposed activity, so that they have an opportunity to outline how their potential or established Aboriginal or Treaty rights and any related interests may be adversely affected by the proposed activity.

Questions and issues for consideration include:

- Which Aboriginal communities might be affected by the activity?
- What is known about the Aboriginal communities which live in the area and assert or hold Aboriginal or Treaty rights?
- What knowledge does the Crown have about the potential or established rights of the Aboriginal groups?

- What are the current and past uses by Aboriginal groups of the land, water or other natural resources potentially affected by the proposed activity? Are there traditional use studies for this area that have been shared, in whole or part, with the Crown?
- Is there more than one Aboriginal group that is claiming rights to the same area (i.e. overlapping claims)? If so, what rights are claimed for which areas and by which Aboriginal groups? Is any Aboriginal group claiming title (e.g. exclusive occupation and rights to the land, water or other natural resources in the location and area of the activity)?
- Is the Aboriginal group in Self-Government, Treaty or Specific Claims negotiations? Inform yourself about the history, nature and status of those negotiations;
- Have the Aboriginal rights been declared by a court? Have Treaty rights been negotiated in an historic Treaty or a comprehensive land claim agreement? Has the Aboriginal group concluded a self-government agreement?
- What are the potential adverse impacts of the proposed activity on potential or established Aboriginal or Treaty rights such as hunting, fishing, trapping, gathering and trade, and on related interests? For example, will there be any impacts on wildlife or habitat, water quality or temperature, restricted access to lands or water ways, disruption of traditional techniques or timing of harvesting activities?
- What is the potential adverse impact of the proposed activity on Aboriginal archaeological sites, burial grounds, or other areas of Aboriginal interest?
- Are there any reserves in the area? Does the activity overlap or have an adverse impact on reserve lands?

Design effective consultation processes

When designing a consultation process, consider the following:

- Consider involving Aboriginal groups in the design of effective consultation processes. For example, agreeing on meeting objectives, in advance, can help all parties to focus their efforts and develop effective working relations.
- Where possible adapt the content and the process to respect the circumstances of the Aboriginal group. Identify potential challenges to the Crown consultation process in this regard.
- Many First Nation, Métis or Inuit groups have developed consultation policies, guidelines or protocols and request that the Crown adhere to them. Officials must follow the Updated Guidelines and their departmental or agency approaches. However, understanding the policies, guidelines or protocols of the Aboriginal group may become the starting point for a discussion on an effective and meaningful consultation process.
- Establish reasonable timelines for consultation activities. Meaningful consultation may require more time than anticipated; ensure that your plan is flexible.
- Design the consultation process to begin as early as possible. Take into account existing federal, provincial or territorial processes such as environmental assessments or regulatory reviews.
- Consider board and tribunal hearings that are involved in the decision-making and that the Crown may rely on to fulfill its duty. In some circumstances, the Crown could be required to demonstrate adequate consultation efforts to boards or tribunals. Early consultation enables parties to: determine whether changes to Crown conduct and other appropriate accommodation measures are needed; explore what these changes could be; and provide sufficient time to make appropriate changes (Guiding Principles and Directives # 2 and # 3).
- The duty to consult does not require the Crown and the Aboriginal communities to agree on how to resolve the issues raised during the consultation process. Nevertheless, there may be benefit in considering various means to overcome disagreements, such as dispute resolution mechanisms, to minimize conflicts, as they arise, and provide alternatives to litigation in the course of consultation or during the implementation of accommodation measures.
- In the context of established Aboriginal and Treaty rights, given the strength of those rights, federal departments and agencies must work closely with Aboriginal groups to seek ways to avoid adverse impacts on those rights. Federal officials should do the same when there is a severe adverse impact.

Anticipating requests for support

As noted earlier, in some instances, Aboriginal groups may seek support (financial or otherwise) to participate in the consultation process. As a general rule, the courts have indicated that consultation must be meaningful and that the process must be reasonable. Courts look favourably upon government providing assistance, where needed, to support Aboriginal participation in the consultation process.

Support can take many forms, including in-kind assistance that could be provided by the Crown (federal, provincial or territorial) or, in many instances, by the proponent. This could include proponent or other expert technical expertise and information; assuming the costs of translation and interpretation; document production; travel; providing Aboriginal groups with access to government technical expertise or other relevant contextual data about the resource sectors and related statutes; organizing meetings; and modifying timelines that will assist Aboriginal groups to assess the potential adverse impacts on their rights.

If financial support is requested, departments and agencies must assess whether financial support should be provided and the extent of that support. Where a department or agency seeks to transfer funds to Aboriginal groups, it must ensure it has the appropriate departmental program and financial authorities in place. Officials should identify departmental authorities or potential programs or initiatives that may assist in providing capacity to Aboriginal groups, where appropriate. Financial support may also come from the participant funding programs of the Canadian Environmental Assessment Agency, National Energy Board or Canadian Nuclear Safety Commission.

The following provides a list of capacity areas for which financial support has been provided to Aboriginal groups in the context of consultation and accommodation processes:

- information-sharing and awareness-raising;
- participation at meetings including honorarium for elders and others;
- travel costs;
- preparation of scientific, technical and legal reviews to provide advice in relation to the consultation;
- analysis and reporting related to the consultation and accommodation activities and to potential impacts on potential or established Aboriginal or Treaty rights and related interests;
- training;
- professional fees (for example, for facilitation, writing of documents, translation and interpretation);
- communications and printing;
- research and development;
- land use, traditional knowledge and use or targeted resource planning, management and implementation;
- administrative fees.

Officials must:

- monitor transfers of funding for consultation purposes and reporting, as directed by legislation and Treasury Board Secretariat policies, directives, guidelines and practices;
- seek opportunities, through protocols or memorandum of understanding with other federal departments and agencies, provincial and territorial governments and industry, to share capacity requirements for consultation. Open dialogue and transparency can enhance efficiencies and reduce costs for all involved in a consultation process;
- seek opportunities, where appropriate, to foster aggregations among Aboriginal groups (if they do not already exist) to enhance efficiencies and reduce costs through collective efforts. However, caution should be exercised not to impose aggregations as a cost and time saving measure at the risk of alienating the concerned Aboriginal groups.

Step 7: Ensure that a records management and filing system is in place

Federal departments and agencies should approach Aboriginal consultation with the awareness that they may be required to (1) access their own or other Crown records during the consultation process and (2) demonstrate the completeness and integrity of the process at a later date. To this end, federal departments and agencies that do not have a record management system for Aboriginal-Crown consultations should develop and maintain a consistent approach and format to record keeping for each step in the consultation and accommodation process.

An efficient record keeping system should ensure that the information is accessible, searchable, retrievable and reliable. It should also enable the sharing of documents between federal departments and agencies, and take into account security classification levels and privacy issues. Where multiple departments and agencies are involved in a consultation process, a centralized record keeping system is essential to maintain a complete record of consultations. For example, the Major Projects Management Office and the Canadian Environmental Assessment Agency have created a centralized Crown consultation records management system for federal departments and agencies working on Aboriginal-Crown consultations on major resource projects.

Examples of information that qualifies as a Crown record may include:

- background/technical information about the proposed project;
- any relevant information about the Aboriginal group(s) which might be affected by the proposed activity;
- a consultation plan;
- correspondence and meeting notes between federal departments and agencies and the Aboriginal group(s) in relation to the proposed activity;
- correspondence detailing each contact made with Aboriginal group(s) in relation to the proposed activity (e.g. letters, phone calls);
- letters of opinion from Aboriginal groups related to the proposed project or Crown conduct;
- an adverse impact assessment of the proposed activity;
- a strength of claim analysis on asserted Aboriginal rights;
- legal advice sought at any point during the consultation process;
- notices of consultation sessions or funding issuance (e.g. participant funding program);
- issues management tracking table.

A consultation record typically includes:

- date and time of correspondence or meeting;
- where the meeting took place and who attended;
- information shared with Aboriginal group(s) regarding the proposed activity and related consultation process;
- feedback received from Aboriginal groups;
- departmental or agency responses to the concerns and information requests made by Aboriginal group(s) related to the consultation process;
- rationale for key decisions taken in relation to the activity.

All correspondence with the Aboriginal groups (e.g. letters, e-mail messages, notes on telephone calls, notes from each meeting with the Aboriginal group) should be recorded and filed in their records management system.

It is also recommended practice for federal officials to indicate who created the record and who performed the activity recorded.

PHASE 2: CROWN CONSULTATION PROCESS

Officials will need to implement their consultation plan and corresponding process and adjust it as may be appropriate. The departmental or agency approach and the work done during the "Pre-Consultation Analysis and Planning" phase will help officials to anticipate and address issues and carry out a meaningful consultation process.

Step 1: Implement the consultation process

- Notify the Aboriginal group(s) of the proposed activity, provide a government contact for any questions or concerns, and, where appropriate, offer to meet to discuss the proposed activity and any concerns they may have about it;
- In a timely manner, provide Aboriginal groups with clear and relevant information relating to the proposed activity and any adverse impacts that may be anticipated, to enable them to provide meaningful feedback;
- To ensure that Aboriginal groups are adequately notified and able to meet timelines, federal departments and agencies should send information to them by a variety of means including registered mail, email and fax. Using registered mail ensures that recipients have an original copy on file; however, this method of correspondence can be slow. E-mails and faxes ensure timely receipt of documents. Follow-up phone calls are recommended. Timely communication facilitates an open and respectful dialogue between the Aboriginal community and the Crown;
- Confirm who is authorized to represent Aboriginal group(s) in relation to their Aboriginal or Treaty Rights and related interests;
- Identify and determine the nature of any overlapping claims that may exist in the area of the activity;
- Provide the Aboriginal group(s) with enough time to assess any adverse impacts of the proposed activity on their rights and to prepare their views on the matter. Officials should follow-up to discuss concerns, as necessary;
- Ensure that the Crown responds in a coordinated and timely fashion to communication received from Aboriginal groups. To facilitate these efforts, managers may wish to establish service standards or letter templates;
- Consider the concerns of Aboriginal groups, and respond in a meaningful way by ensuring that the Crown's responses consider and address Aboriginal representations, questions and concerns;
- Throughout the consultation process, consider ways and means to avoid or mitigate potential adverse impacts of the activity on potential or established Aboriginal or Treaty rights and related interests;
- Depending on the nature of the concerns, ensure that the third party proponent is involved in the discussion of measures to prevent or reduce any potential adverse impacts of the project. A proponent is typically in the best position to alter the project to avoid or mitigate adverse impacts (e.g., placement of docks, routing of pipelines, alignment of roads, etc.);
- Review periodically, throughout the consultation process, the extent to which environmental assessments or regulatory processes, as they are implemented, can be relied upon and how the information generated in those processes can be used to fulfill the Crown's duty in whole or in part;
- Review periodically whether the Crown has demonstrated to the board or tribunal, where appropriate, that adequate consultation has occurred;
- Ensure that throughout the consultation process, all relevant information is shared with government departments and agencies involved in the consultation. To achieve effectiveness, managers are encouraged to periodically review coordination and information sharing practices;
- Follow agreed upon dispute resolution mechanisms to resolve conflicts as they arise, and to avoid litigation related to the consultation and accommodation process.

Step 2: Document, catalogue and store all Crown consultation meeting records and other correspondence

Good practices to consider in relation to record keeping include:

- update records regularly;
- provide the same level of information detail consistently and as needed to relevant departments and agencies involved in Crown consultations;
- share information in a timely way with departments and agencies;
- ensure that the records are filed according to a set standard in a records management system that is accessible by all departments and agencies involved in the consultation process;
- ensure that all records are easily accessible and filed using an appropriate security classification; and,
- preserve corporate memory of a consultation file.

Step 3: Develop and maintain an issues management tracking table

An issues management table should be created and should include a summary of:

- Aboriginal concerns about potential adverse impacts of an activity on potential or established Aboriginal or Treaty rights, as conveyed to government decision makers;
- Crown's efforts to address concerns raised by Aboriginal groups about potential adverse impacts of the activity on potential or established Aboriginal or Treaty rights;
- any communication sent to Aboriginal groups informing them of steps taken to address their concerns;
- any outstanding issues remaining between the Crown and Aboriginal groups with information about why these issues have not been resolved and some of the challenges encountered in relation to these issues. If the intention is to address these issues at a later date, provide a rationale for the timing and a plan for implementation and follow-up.

Step 4: Adjust the consultation and accommodation process, as necessary

The consultation process should be responsive and flexible. Officials need to adjust the process as new information about the strength of claim or the severity of adverse impacts comes to light, or if a new Aboriginal group, with a credible claim, alleges that their potential or established Aboriginal or Treaty rights may be impacted by the project. If the processes being relied on by the Crown will not allow it to fulfill its consultation obligations, additional steps must be taken.

PHASE 3: ACCOMMODATION

The courts have said that consultation would be meaningless if, from the outset, it excluded any consideration of the potential need to accommodate the concerns raised by Aboriginal groups. Consultation may reveal a need to accommodate. Accommodation may take many forms.

The primary goal of accommodation is to avoid, eliminate, or minimize the adverse impacts on potential or established Aboriginal or Treaty rights, and when this is not possible, to compensate the Aboriginal community for those adverse impacts. In some circumstances, appropriate accommodation may be a decision not to proceed with the proposed activity. The Crown may be able to rely on what the industry proponent does in terms of accommodation, to fulfill, in whole or in part, the Crown's duty to consult, and where appropriate, accommodate.

The examples included below are not an exhaustive list but present a range of accommodation options. Making changes to the project design early in the planning stages of the project can help avoid or eliminate adverse impacts.

When such impacts are unavoidable or cannot be eliminated, the focus of accommodation must turn to mitigating those impacts. Sometimes this may be accomplished by making changes to the activity. The proponent is often in the best position to modify the project to avoid, eliminate or minimize the adverse impacts.

In its regulatory role, the Crown may also place terms or conditions on any permits, licences or authorizations to avoid or minimize adverse impacts. It can also enter into agreements with the proponent pursuant to which the proponent undertakes to carry out measures designed to reduce the adverse impacts.

Where it is not possible to avoid, eliminate, or substantially reduce adverse impacts, it may be appropriate to compensate the Aboriginal group for any adverse impacts on their potential or established Aboriginal or Treaty rights. Compensation could take a variety of forms including habitat replacement; providing skills, training or employment opportunities for members of the Aboriginal group; land exchanges; impact-benefit agreements; or cash compensation.

Where accommodation is appropriate, departments and agencies should work with the Aboriginal group to identify solutions that balance the interests of the Aboriginal group with the societal interests of all Canadians. While there is no obligation on the Crown and Aboriginal group to agree on what is appropriate accommodation (i.e. Aboriginal groups do not have a veto), all parties must make reasonable efforts to find solutions that will accommodate the adverse impacts of the project on potential or established Aboriginal or Treaty rights.

Where accommodation measures proposed by the proponent or other parties are acceptable to the Aboriginal group, the federal Crown will need to determine if it is appropriate to rely on these measures in the fulfilment of its duty to consult (Guiding Principle and Directive # 7). In relying on accommodation measures proposed by a proponent or other parties, the Crown needs to be satisfied that these measures appropriately accommodate the Aboriginal group for the adverse impacts on their Aboriginal and Treaty rights.

When considering appropriate accommodation options, departments and agencies need to:

- work collaboratively to understand how the mandates of participating federal departments and agencies can be used to assist the Crown to accommodate the adverse impacts on potential or established Aboriginal or Treaty rights (Guiding Principle and Directive # 5);
- determine whether it is appropriate to involve other departments and agencies or other orders of government when any proposed accommodation measures fall outside your department's or agency's mandate. The mandates of federal departments and agencies should not limit the options for accommodation available to Aboriginal groups;
- understand and be aware of how the approval and decision-making processes within each department or agency may serve as a vehicle for accommodation; and,

- assess the extent to which the mitigation measures proposed through environmental assessment, regulatory or other consultation processes may serve as accommodation.

The following section outlines four steps for identifying appropriate accommodation measures during and following the consultation process. This section will be informed by future policy direction and practical experience in dealing with accommodation.

Step 1: Gather and analyze information supporting the basis for accommodation

The following factors are relevant when federal departments and agencies consider whether accommodation is appropriate in the circumstances. This information will be gathered during the "Pre-consultation Analysis and Planning" and the 'Crown Consultation Process' phases of the process (See Phases 1 and 2). Some of this information will be contained in the issues management tracking table.

- What potential or established Aboriginal or Treaty rights stand to be adversely impacted by the project?
- In the case of potential Aboriginal rights, what is the strength of the claim?
- What is the degree and severity of the adverse impacts on the potential or established Aboriginal or Treaty rights and related interests?

Step 2: Identify possible accommodation measures and options

After determining that accommodation is appropriate in the circumstances, the next step is to assess the range of possible accommodation measures and discuss these measures with Aboriginal groups. In identifying possible accommodation measures, officials may take into account:

- options identified by Aboriginal groups or the proponents to eliminate or reduce the adverse impacts of the proposed project (e.g. changes to the design or approach to the project);
- the extent to which any proposed accommodation measures may reduce the adverse impacts of the proposed activity on potential or established Aboriginal or Treaty rights;
- whether the adverse impacts of the proposed activity on potential or established Aboriginal or Treaty rights can be eliminated or reduced, and if not, whether some sort of compensation may be appropriate;
- the cost to the Crown of each possible accommodation measure and the existing sources of funds (e.g. Treasury Board submissions, existing authorities, shared cost with other federal departments and agencies, other levels of government or industry);
- whether there are consultation protocols with Aboriginal groups that serve as a basis to discuss, and where appropriate, to implement accommodation measures;
- whether there are any existing or new financial authorities that are necessary to implement accommodation measures?
- whether the mandates of federal departments and agencies enable them to proceed with selected accommodation options?
- what other departments and agencies can offer in terms of accommodation, having regard to their mandates, financial authorities and legislation. For example, Human Resources and Social Development Canada – job training; Public Works Government Services Canada – sale or purchase of lands; Parks Canada – commemoration of Aboriginal sacred sites; such measures may meet the concerns and interests without requiring new resources.

This assessment allows the Crown to identify accommodation options for discussion with rights holders. It is essential that federal departments and agencies have the appropriate internal approvals in place. It is also important that proposed accommodation measures are approved by senior management with decision-making and financial authority. Federal officials must ensure that internal approvals are obtained prior to presenting accommodation options to Aboriginal groups.

The mandates and processes of boards, tribunals or commissions and other regulatory, statutory or contractual processes that may be relied on by the Crown may not be sufficient to address certain accommodation measures or options. Therefore, the Crown may need to supplement these processes.

A clear distinction is required between accommodation of potential or established Aboriginal or Treaty Rights by avoiding or mitigating any adverse impacts on those rights and other socio-economic measures that are offered to address the Aboriginal communities' interests in relation to the activity. These latter activities are business initiatives that are linked to the project or other corporate or governmental programs that support communities. They do not always serve as accommodation measures necessary for the Crown to fulfill its duty.

Step 3: Select appropriate accommodation options

Informed by its discussions with Aboriginal groups during the consultation process, the Crown must select appropriate accommodation option(s). Generally, the most appropriate measure(s) are those which are most effective in eliminating or reducing adverse impacts on potential or established Aboriginal or Treaty rights while taking into account broader societal interests.

The duty to consult does not include an obligation on the Crown to agree with Aboriginal groups on how the concerns raised during consultations will be resolved.

Selecting accommodation measures requires cooperation amongst federal departments and agencies and effective inter-departmental mechanisms for collaboration.

Step 4: Communicate and document selected accommodation measures

It is important to document and communicate to all parties, in writing, the accommodation measures. The following factors may assist departments and agencies in communicating accommodation decisions:

- A description of the steps in the consultation process that led to the accommodation decision;
- Evidence that the selected options are supported by information provided to the Crown during the consultation process;
- Evidence that the consultation process was meaningful and reasonable and that the Crown acted in good faith;
- The reasons for selecting the chosen accommodation measure(s);
- How Aboriginal concerns and suggestions for accommodation measures were addressed or the reasons why the accommodation options suggested by Aboriginal groups were not selected;
- Roles and responsibilities of all parties involved in implementing the accommodation measures (e.g. Crown, rights holders, third parties); and,
- How to communicate the selected accommodation measures to all parties. Such communication should be coordinated if more than one federal department or agency or the provincial or territorial government is involved in the consultation process. In the issues management tracking table, the federal lead department or agency should maintain a list of the various accommodation measures proposed by all participants in the consultation process.

PHASE 4: IMPLEMENTATION, MONITORING AND FOLLOW-UP

In this Phase, departments and agencies will implement the Crown's decision and accommodation measures. This typically involves taking steps to put the accommodation measures in place and carrying out monitoring or other follow-up activities. Officials should verify whether the accommodation measures are in place and advise whether they are effective in eliminating or mitigating the adverse impacts of the activity on potential or established Aboriginal or Treaty rights and related interests.

Step 1: Communicate and implement the decision(s)

In some circumstances, departments and agencies will find it helpful to develop, in collaboration with the Aboriginal groups and other parties, if appropriate, an implementation plan that sets out the steps necessary to put the accommodation measures in place, and to guide and track the Crown's monitoring and follow-up activities. Departments and agencies can look to their departmental or agency approaches to consultation (See Part B) and the issues management tracking table for guidance in the development of an implementation plan.

Step 2: Monitor and follow-up

Departments and agencies need to coordinate their roles in carrying out monitoring or other follow-up activities. A coordinated effort will help them assess whether accommodation measures are effective in eliminating or mitigating the adverse impacts of the project.

If monitoring and follow-up activities reveal that some accommodation measures are ineffective in mitigating the adverse impacts, the Crown needs to work collaboratively with Aboriginal groups, the proponent and other parties to find appropriate accommodation measures, and monitor the effectiveness of the new measures. The Crown discharges its duty to consult, and, where appropriate, accommodate, and strengthens its working relationship with Aboriginal groups when it puts in place effective accommodation measures. (Refer to Guiding Principle and Directive # 8).

This could be facilitated by an implementation plan to guide and track the Crown's monitoring and follow-up activities. The plan may include:

- designation of a federal lead for the reporting and issues management tracking process, and for on-going communication with Aboriginal groups and proponent, as necessary. Where more than one department or agency is involved, the lead is responsible for ensuring that appropriate action is taken;
- requirements and measures that ensure that adverse impacts on rights continue to be addressed during the life cycle of the activity; and
- existing or newly developed tracking and reporting processes for each of the accommodation measures implemented, federal and regulatory activities, management and disposal of Crown land, financial requirements.

Step 3: Evaluate the consultation process

Following the implementation of the selected accommodation measures, departments and agencies should evaluate the results of their consultation and accommodation activities. A Crown consultation record, if well developed and consistently maintained, will facilitate the analysis of whether or not Aboriginal concerns about any adverse impacts on potential or established Aboriginal or Treaty rights and related interests have been adequately addressed.

Evaluating a process as it proceeds enables officials to verify the effectiveness of actions and decisions taken along the way and to correct them in a timely fashion. Therefore, undertaking an evaluation of a consultation and accommodation process at key stages will allow the Crown to ensure that it continues to act in accordance with the goals and objectives or to adjust them as new developments occur or new information becomes available. The Audit and Evaluation Unit Staff of the departments and agencies involved can assist in developing a useful evaluation process that can be shared to improve various aspects of future consultations.

When developing a process for evaluating the consultation and accommodation process, departments and agencies should take into consideration the:

- design of evaluation criteria at the outset so the goals, objectives and outcomes are clear and can be tracked over a reasonable period of time;
- advice and guidance from the Audit and Evaluation units of the departments and agencies involved on how to effectively evaluate a consultation and accommodation process; and
- potential involvement of Aboriginal groups in the development of the evaluation criteria.

Some evaluation questions to be considered:

- What Crown processes were used? What worked, what didn't?
- Were all the relevant parties properly identified and appropriately involved?
- Were roles and responsibilities in the process appropriate and understood?
- Did the consultation plan and process reflect the respective objectives and interests of the parties?
- Was the consultation process reasonable, meaningful, flexible and achievable?
- Did the consultation process reflect the nature, scope and complexity of the intended project, activity or decision?
- Were all parties clear on process objectives and outcomes?
- On what proponent activities did the Crown rely? To what extent did they assist in fulfilling the Crown's consultation obligations?
- Was the consultation process well documented in an official record and is the information generated during the process easily accessible?
- Were decisions justified and clearly communicated to the appropriate parties?
- Was legal advice sought appropriately?

The evaluation should also include information about whether or not the Crown acted in a manner consistent with the following standards, principles and relevant legal tests:

1. Has consultation been meaningful? Is the depth of consultation adequate given the circumstances? Has it been carried out in a timely and reasonable manner? Has the Crown been responsive to the concerns raised?
2. Have any concerns raised by Aboriginal groups not been addressed? Have any concerns been overlooked?
3. Is the recorded response to a concern meaningful? Is there any sense of lack of clarity or avoidance in the response? Has the Aboriginal group raised any concerns about the response?
4. Are there accommodation measures that should be implemented now? Can the consultation to date be deemed adequate, even if accommodation has not been undertaken or has been put off to a later stage of the project?
5. In the event of new information, was the scope of the consultations reassessed? Specifically, does the new information affect the strength of the claim or the significance of the adverse impact?

Evaluation questions on the procedural aspects of a consultation process to determine if the Crown has conducted a thorough and reasonable consultation process could include:

1. Has each Aboriginal group's concern been consistently considered and followed-up on?
2. Has each response been communicated to the Aboriginal group(s)?
3. Has the Crown tried to solicit Aboriginal views and concerns?
4. Has there been a good flow of information? Have all Aboriginal groups been appropriately informed through such means as information packages?
5. Have there been face-to-face meetings and, if not, were they necessary? Did groups request such meetings? If so, what was the response?

6. Is there a good correspondence record? For example, copies of correspondence, phone calls and face-to-face meetings?
7. Is there a good consultation record?
8. Was a particular board or tribunal relied on for the consultation process? Was a provincial or territorial process relied on? Was it sufficient to address the Aboriginal groups' concerns?
9. Is a third party proponent involved? Who was it and what was their role?
10. What concerns were raised and how has the third party proponent responded? What was the follow-up and monitoring process used?
11. Were the affected Aboriginal groups able to participate in the consultation and accommodation process? How were issues of capacity addressed? Was it through monetary or non monetary means or both? Were funding authorities in place? Was funding available in the department or agency to support capacity? Is a funding agreement in place? Were other departments and agencies or governments contributing to support capacity? Were final and financial reports provided in relation to transfer payments? Have transfer payments contributed to consultation objectives? Have recommendations been made for future consultations?
12. Did your department or agency lead the consultation? If so, what follow-up and monitoring processes were implemented? If not, was a lead department or agency identified?

Annexes

ANNEX A – DEFINITIONS

Aboriginal group: A community of First Nations, Inuit or Métis people that holds or may hold Aboriginal and Treaty rights under section 35 of the *Constitution Act, 1982.*

Aboriginal rights: Practices, traditions and customs integral to the distinctive culture of the Aboriginal group claiming the right that existed prior to contact with the Europeans (*Van der Peet*). In the context of Métis groups, Aboriginal rights means practices, traditions and customs integral to the distinctive culture of the Métis group that existed prior to effective European control, that is, prior to the time when Europeans effectively established political and legal control in the claimed area (*Powley*). Generally, these rights are fact and site specific.

Aboriginal title: An Aboriginal right to the exclusive use and occupation of land. It is possible that two or more Aboriginal groups may be able to establish Aboriginal title to the same land.

Activity: Any Crown or proponent undertaking, application, proposal, project, regulatory, policy or other initiative or decision that is contemplated and may have an adverse impact on potential or established Aboriginal or Treaty rights and related interests.

Capacity: It is the ability of Aboriginal groups to understand the nature of the activity the Crown or proponent is contemplating and how that activity might adversely impact their potential or established Aboriginal or Treaty rights.

Common law: In general, a body of law that develops through judicial decisions, as distinguished from legislative enactments.

Comprehensive land claim: Comprehensive claims deal with the unfinished business of treaty-making in Canada through a negotiation process. These claims arise in areas of Canada where Aboriginal land rights have not been dealt with by past treaties or through other legal means. In these areas, forward-looking modern treaties are negotiated between the Aboriginal group, Canada and the province or territory. Comprehensive land claim negotiations address concerns raised by Aboriginal peoples, governments and third parties about who has the legal right to own or use the lands and resources in areas under claim.

Constructive knowledge: *Black's Law Dictionary (Eighth Edition)* states: "Knowledge that one using reasonable care or diligence should have, and therefore that is attributed by law to a given person". Therefore, if one part of the Crown has knowledge of potential rights, other Crown entities will be deemed to know.

Crown: Refers to all government departments, ministries (both federal, provincial and territorial) and Crown agencies.

Crown conduct: Means the exercise of the Crown's jurisdiction and authority whether the Crown may be in charge of the activity or may be approving an activity through permits and authorizations. In either context, its actions would constitute Crown conduct.

Crown knowledge: The Supreme Court of Canada stated that the duty to consult arises when the Crown contemplates conduct that might adversely impact potential or established Aboriginal or Treaty rights of which the Crown has real or constructive knowledge.

Cumulative Environmental Effects: "The concept of cumulative environmental effects recognizes that the environmental effects of individual human activities can combine and interact with each other to cause aggregate effects that may be different in nature or extent from the effects of the individual activities. Cumulative environmental effects can be characterized as the effect on the environment of a proposed project when combined with those of other past, existing and imminent projects and activities, and which may occur over a certain period of time and distance" http://www.ceaa.gc.ca/9742C481-21D8-4D1F-AB14-555211160443/Addressing_Cumulative_Environmental_Effects.pdf

Duty to Consult: The duty to consult is an obligation of the government as a whole. In *Haida, Taku River* and *Mikisew Cree,* the Supreme Court of Canada held that provincial and federal governments have a legal obligation to consult when the Crown contemplates conduct that might adversely impact potential or established Aboriginal or Treaty rights.

Engagement: Examples of engagement includes discussion groups and formal dialogue, sharing knowledge and seeking input on activities such as policy, legislation, program development or renewal.

Existing Aboriginal and Treaty rights: "Existing" includes potential or established Aboriginal or Treaty rights.

First Nation: A term that came into common usage in the 1970s to replace the word "Indian" which some people found offensive. Although the term First Nation is widely used, no legal definition of it exists. Among its uses, the term "First Nations peoples" refers to the Indian peoples in Canada, both Status and non-Status. Some Indian peoples have also adopted the term "First Nation" to replace the word "band" in the name of their community.

Inuit: An Aboriginal people in Northern Canada, who live in Nunavut, Northwest Territories, Northern Quebec and Northern Labrador. The word means "people" in the Inuit language, Inuktitut. The singular of Inuit is Inuk.

Métis: For purposes of section 35 rights, the term Métis refers to distinctive peoples who, in addition to their mixed First Nation, Inuit and European ancestry, developed their own customs, and recognizable group identity separate from their First Nation or Inuit and European forebears. A Métis community is a group of Métis with a distinctive collective identity, living together in the same geographical area and sharing a common way of life.

Proponent: In the Updated Guidelines, proponent refers to industry, foreign governments or any other parties which initiate or propose an activity.

Reserve: As specified by the *Indian Act,* a tract of land, the legal title to which is vested in Her Majesty the Queen in Right of Canada and that has been set apart by Her Majesty for the use and benefit of a First Nation.

Traditional territory: Any designated lands and boundaries to which First Nations, Métis and Inuit communities claim or have established traditional use or occupation.

Treaty rights: Rights that are defined by the terms of a historic Treaty, rights set out in a modern land claims agreement or certain aspects of some self-government agreements. In general, Treaties (historic and modern) are characterized by the intention to create obligations, the presence of mutually binding obligations and a measure of solemnity (*Simon, Sioui*). A treaty right may be an expressed term in a Treaty, an implied term or reasonably incidental to the expressed Treaty right. The scope of Treaty rights will be determined by their wording, which must be interpreted in accordance with the principles enunciated by the Supreme Court of Canada (*Badger* 1996, *Sundown* 1999, *Marshall* 1999)

Where the parties disagree on the scope of obligations or what rights are provided for, a number of principles unique to Treaty interpretation apply. For example, Treaties should be liberally construed; ambiguities ought to be resolved in favour of the signatories in the context of historic Treaties; the goal of Treaty interpretation is to find the common intention and the result that best reconciles the interests of both parties at the time the Treaty was signed; the integrity and Honour of the Crown is presumed in such interpretations; the courts cannot alter the terms of the Treaty and Treaty rights cannot be interpreted in a rigid or static way as they must be updated to provide for modern exercise (*Marshall* 1999; 2005).

Trigger: Any of the three elements that are necessary for a duty to consult to exist. Specifically, a Crown conduct, a potential adverse impact and potential or established Aboriginal or Treaty rights that might be adversely affected.

With or Without Prejudice: Describes communication, either written or verbal. To designate a communication as "without prejudice" is to declare that the party does not waive its right to non-disclosure of the communication. Such communications may be referred to as being "off- the-record". This term is often used during negotiations and litigation. Should there be a request for without prejudice or off-the-record discussion, advice from legal counsel should be sought.

In the context of consultation, if agreements or protocols are being entered into for the purposes of meeting Crown obligations to consult as per the *Haida, Taku River, Mikisew Cree* or *Sparrow* cases, it is recommended that the agreement be "with prejudice". With prejudice means that the Crown can use this documentation in court as evidence that it has fulfilled its duty to consult obligations, and that the Aboriginal group may use the documentation in relation to its legal positions. Such communications may be referred to as being "on-the-record".

ANNEX B – LEGAL CASE SUMMARIES

The case law outlined below relate to consultation and accommodation matters. However, federal officials should also consider judgements or cases that speak to potential or established Aboriginal or Treaty rights and title. These cases may influence or dictate government decisions on questions such as who to consult as well as the nature and extent of consultations and the requirement for accommodation.

1. Duty to Consult

Seminal Supreme Court of Canada cases

Haida Nation v. *British Columbia (Minister of Forests),* 2004 SCC 73

The Supreme Court of Canada dismissed the Province's appeal and allowed the appeal of Weyerhaeuser Company Ltd. The Court held that the Province has a duty to consult with the Haida about decisions relating to the harvest of timber from an area of the Queen Charlotte Islands over which the Haida have asserted, but have not yet proven, Aboriginal rights and title. The Court stated that good faith consultation may in turn lead to an obligation to accommodate Haida concerns in the harvesting of timber, although what accommodation if any may be required could not yet be ascertained. The Court found that the Province had failed to engage in any meaningful consultation. The Court also found that Weyerhaeuser did not owe the Haida any duty to consult or accommodate. The Court held that the duty to consult does not extend to third parties.

The Court stated that the Crown's duty to consult with Aboriginal peoples and accommodate their interests is grounded in the Honour of the Crown which derives from the Crown's assertion of sovereignty in the face of prior Aboriginal occupation. The duty arises when the Crown has knowledge, real or constructive, of the potential existence of the Aboriginal right or title and contemplates conduct that might adversely affect it.

The scope of the duty is proportionate to a preliminary assessment of the strength of the case supporting the existence of the right or title, and to the seriousness of the potentially adverse effect upon the right or title claimed. As to the content of the duty, the Court said that, at all stages, good faith on both sides is required and sharp dealing is not permitted. The effect of good faith consultation may be to reveal a duty to accommodate.

The Court said that this process does not give Aboriginal groups a veto over what can be done with land pending final proof of the claim; nor does it impose a duty to reach an agreement. The Court also stated that, although the Crown may delegate procedural aspects of consultation to industry proponents of a particular development, the ultimate legal responsibility for consultation and accommodation rests with the Crown. The Honour of the Crown cannot be delegated.

Taku River Tlingit First Nation v. *British Columbia (Project Assessment Director),* 2004 SCC 74

The Supreme Court of Canada, applying its analysis in *Haida Nation* v. *British Columbia (Minister of Forests),* [2004] SCC 73, released concurrently with this decision, allowed the Province's appeal and held that the process engaged in by the Province under the *Environmental Assessment Act* fulfilled the requirements of the Crown's duty to consult with the First Nation and to accommodate its concerns.

At issue was whether the Crown had a duty to consult prior to approving the re-opening of a mine and the construction of an access road to the mine through territory over which the First Nation claimed, but had not yet proven, Aboriginal rights and title. In *Haida,* the Court confirmed the existence of the Crown's duty to consult Aboriginal peoples prior to proof of rights or title claims. The Court found that the Crown's duty to consult was engaged in this case because the Province was aware of the First Nation's claims through its involvement in the Treaty negotiation process and knew that the decision to reopen the mine and to build the access road had the potential to adversely affect the substance of the rights and title claims.

The Court concluded that the Crown had fulfilled its duty to consult on the basis that the First Nation was part of the Project Committee, participating fully in the environmental review process; its views were put before

the appropriate Ministers and; the final project approval contained measures designed to address both immediate and long-term concerns of the First Nation.

The Court also stated that the Province was not under a duty to reach agreement with the First Nation and its failure to do so did not breach its duty of good faith consultations. The Court also confirmed that the Honour of the Crown cannot be interpreted narrowly or technically, but must be given full effect in order to promote the process of reconciliation between the Crown and Aboriginal peoples as mandated by s. 35(1) of the *Constitution Act, 1982.*

***Mikisew Cree First Nation* v. *Canada (Minister of Canadian Heritage),* 2005 SCC 69**

The Supreme Court of Canada allowed the First Nation's appeal, quashed the Minister's decision to approve the construction of a winter road through Wood Buffalo National Park, Alberta, and returned the matter to the Minister for further consultation and consideration.

The Court held that the Crown's duty of consultation, which the Court said flows from the Honour of the Crown and its obligation to respect the existing Treaty rights of Aboriginal peoples, was breached in this case because the Minister failed to adequately consult with the First Nation in advance of the decision to build the road. The Court stated that when the Crown exercises its right under Treaty 8 to "take up" land, it is not correct to move directly to a *Sparrow* justification analysis even if the proposed measure, if implemented, would infringe a Treaty right. Rather, the Court said that it must first consider the process by which the "taking up" is planned and whether it is compatible with the Honour of the Crown.

The question in each case is to determine the degree to which conduct contemplated by the Crown would adversely affect the rights of the Aboriginal people so as to trigger the duty to consult. In this case, the Court found that the duty to consult was triggered because the impacts of the proposed road were clear, established, and demonstrably adverse to the continued exercise of the First Nation's hunting and trapping rights over the lands in question.

The Court found that the Crown's duty to consult in this case lies at the lower end of the spectrum because the proposed road is fairly minor and situated on surrendered lands where the First Nation's treaty rights are expressly subject to the "taking up" limitation in Treaty 8.

With respect to the content of the duty to consult, the Court found that the Crown was required to provide notice to the First Nation and to engage it directly. This engagement should have included the provision of information about the project, addressing what the Crown knew to be First Nation's interests and what the Crown anticipated might be the potential adverse impact on those interests.

The Crown was also required to solicit and to listen carefully to the First Nation's concerns and to attempt to minimize adverse impacts on the First Nation's hunting, fishing and trapping rights. Had the consultation process gone ahead, the Court confirmed that it would not have given the First Nation a veto over the alignment of the road. The Court reiterated that consultation will not always lead to accommodation and accommodation may or may not result in an agreement.

***David Beckman, in his capacity as Director, Agriculture Branch, Department of Energy Mines and Resources et al. v. Little Salmon/Carmacks First Nation et al.,* 2010 SCC 53**

This decision builds on the prior *Mikisew Cree* decision (2005) by setting out how the duty to consult applies to federal, provincial and territorial government conduct that may adversely impact lands and resources covered by more recent Land Claim Agreements. The Court held that the duty of consultation stems from the honour of the Crown and operates in law independently to treaties. A duty to consult can apply where Crown conduct may adversely impact treaty rights. The Little Salmon Carmacks First Nation (LSCFN) Treaty was not a "complete code" of all of the obligations that may exists as between the parties.

When assessing how the duty to consult applies to matters covered by a treaty, the first place to look is the at the specific treaty terms. Treaties may shape how consultation is to be addressed.

The Court reiterated the importance of the honour of the Crown as a constitutional principle that inform all Crown dealings with Aboriginal people, including the interpretation and implementation of treaties. The Court reiterated the importance of treaties as part of the process of reconciliation and as providing guidance for the on-going relationship of the Crown and Aboriginal groups.

Treaty Interpretation Principles

Marshall: R. v. *Marshall, [1999]* 3 S.C.R. 456

The accused, a Mi'kmaq Indian, was charged with three offences set out in the federal fishery regulations: the selling of eels without a licence, fishing without a licence and fishing during the close season with illegal nets. The only issue at trial was whether he possessed a treaty right to catch and sell fish under the treaties of 1760-61 that exempted him from compliance with the regulations.

The court held that extrinsic evidence of the historical and cultural context of a treaty may be received even if the treaty document purports to contain all of the terms and even absent any ambiguity on the face of the treaty. Thirdly, where a treaty was concluded orally and afterwards written up by representatives of the Crown, it would be unconscionable for the Crown to ignore the oral terms while relying on the written ones. There was more to the treaty entitlement than merely the right to bring fish and wildlife to truck-houses. While the treaties set out a restrictive covenant and do not say anything about a positive Mi'kmaq right to trade, they do not contain all the promises made and all the terms and conditions mutually agreed to.

Nowegijick: Nowegijick v. *The Queen, [1983]* 1 S.C.R. 29

Mr. Nowegijick is an Indian within the meaning of the *Indian Act* and a member of the Gull Bay (Ontario) Indian Band. During the 1975 taxation year Mr. Nowegijick was an employee of the Gull Bay Development Corporation, a company without share capital, having its head office and administrative offices on the Gull Bay Reserve. All the directors, members and employees of the Corporation live on the Reserve and are registered Indians.

The Federal Court of Appeal concluded that the tax imposed on Mr. Nowegijick under the *Income Tax Act* was not taxation in respect of personal property within the meaning of s. 87 of the Indian Act. Indians are citizens and, in affairs of life not governed by treaties or the *Indian Act,* they are subject to all of the responsibilities, including payment of taxes, of other Canadian citizens.

Ted Moses: Attorney General of Quebec v. *Grand Chief Dr. Ted Moses, et al.,* 2010 SCC 17

The Vanadium case concerns the applicability of the *Canadian Environmental Assessment Act* ("CEAA") to a proposed mine project located in the territory contemplated by s. 22 of the James Bay and Northern Quebec Agreement ("JBNQA"). While the Vanadium case is nominally about environmental assessments, it is also relevant as the first Supreme Court decision to interpret the provisions of a modern treaty. While both sets of reasons are clear in taking the position that the JBNQA is a treaty covered by s. 35 of the *Constitution Act, 1982,* they diverge in the amount of analysis they provide as to how a modern treaty should be interpreted. It is clear that the Court sees a difference between how historic treaties and modern treaties are to be interpreted.

While it would seem to be correct to continue to posit that modern treaties are not to be interpreted in the exact same way as historic treaties, it will be interesting to see if the dissent's approach is adopted by a majority of the Court in a future decision, as that would help to clarify how the interpretation of modern treaties should differ.

The majority clearly took a contractual approach to interpreting the provisions of the JBNQA and sought to discern the common intention of the parties, but it remains to be seen whether they would take the same approach in other cases. Based on the Vanadium decision, it is clear that courts should pay careful attention to the terms of the agreement that comprises the modern treaty.

Interpretation and Application of Duty to Consult by Lower Courts

Since the seminal Supreme Court decisions noted above, lower courts across Canada have been assessing and applying the duty to consult to a variety of different kinds of Crown conduct and in relation to a number of different Aboriginal and Treaty rights. For a listing and greater details on these decisions contact your legal advisor.

2. Legal Tests for Assessing Interference with and Existence of Aboriginal and Treaty Rights

Interpretation of s. 35 (1): Test for Crown justification for infringement of s. 35(1) rights

***R.* v. *Sparrow,* [1990] 1 S.C.R. 1075**

Mr. Sparrow was prosecuted by the Attorney General of Canada under the federal *Fisheries Act* for fishing contrary to the terms of his Band's food fishing licence. The Supreme Court of Canada held that Mr. Sparrow enjoyed an Aboriginal right to fish for food which was protected by section 35 of the *Constitution Act, 1982.* According to the Court, the Crown must demonstrate a "clear and plain" intention to extinguish Aboriginal rights. In this case, the test had not been met by the Crown's evidence.

The Court also found that there is a fiduciary relationship between the Crown and Aboriginal peoples based on the need for the Crown to act honourably. Therefore, section 35 must be interpreted in a manner consistent with this relationship. The Court placed a high burden on the Crown to justify any infringement with the enjoyment of Aboriginal rights protected by s. 35.

See also *R. v. Badger* wherein the Court held that the justification test developed in *R. v. Sparrow* applied to Treaty rights.

Test for Aboriginal Title

***Delgamuukw* v. *British Columbia,* [1997] 3 S.C.R. 1010**

This action involved a claim by the Gitskan and Wet'suwet'en hereditary Chiefs for Aboriginal title and an inherent right to self-government over 58,000 square kilometers of British Columbia. The Supreme Court of Canada ruled that, due to evidentiary problems with the case, a new trial is required to determine whether the plaintiffs enjoy the claimed Aboriginal title and self-government rights.

While not providing any guidance on the issue of rights of self-government, the Court made general pronouncements on the scope and content of Aboriginal title. In essence, if an Aboriginal group can establish that, at time of sovereignty, it exclusively occupied a territory to which a substantial connection has been maintained, then it has the communal right to exclusive use and occupation of such lands. The Aboriginal group can use the lands for far ranging purposes including economic exploitation. The only limitations are that the lands can not be disposed of without surrender to the Crown nor can they be used in such a fashion that would destroy the Aboriginal group's special bond with the land.

The Court also ruled that both the federal and provincial Crown can justifiably interfere with an Aboriginal group's Aboriginal title. The Court rejected the province's counter-claim regarding provincial power to extinguish Aboriginal rights in finding that, since Confederation, only the federal Crown has such a power.

Roles of Boards and Tribunals

***Rio Tinto Alcan Inc. et al* v. *Carrier Sekani Tribal Council,* [2010] SCC 43**

The Supreme Court of Canada unanimously held that the BC Utilities Commission (the Commission) had properly exercised its jurisdiction in relation to the duty to consult and had correctly determined that a duty to consult did not arise in this case.

The Supreme Court of Canada set out guidelines for determining whether a tribunal can assess the adequacy of consultation, when it can do consultation and when it cannot do either. The Court provided further guidance on what is required to engage a duty to consult and explained that it applies to current and future activities and impacts, not historical infringements.

In this case, the Commission had the authority to assess whether adequate consultation had occurred because it could decide questions of law and determine if the contract in issue was in the public interest. It also had the authority to consider any "other relevant factors" and make any order it considered advisable in the circumstances. These features of its statutory mandate authorized and required the Commission to address whether the duty to consult was triggered and if there had been adequate Crown consultation and accommodation. The Commission did not, however, have jurisdiction to engage in consultation itself.

The Court confirmed that the duty to consult is a constitutional duty.

Tests for Aboriginal Rights

***R.* v. *Van der Peet,* [1996] 2 S.C.R. 507; *R.* v. *Gladstone,* [1996] 2 S.C.R. 723;**

***R.* v. *NTC Smokehouse Ltd,* [1996] 2 S.C.R. 672**

These cases involve the question of whether section 35 of the *Constitution Act, 1982* includes, as an Aboriginal right, a right to fish commercially. In the *R* v. *Van der Peet* case, the Court outlined the test for identifying Aboriginal rights protected under section 35. Essentially, an Aboriginal group must establish that, at time of contact with Europeans, the particular activity claimed as an Aboriginal right was a practice, tradition or custom that was integral to the society's distinctive culture.

Applying the above test to the facts of the cases, the Court ruled that the accused in *R.* v. *Gladstone* had established an Aboriginal commercial fishing right. However, the Court also indicated that, in the context of Aboriginal commercial fishing rights, there are no internal limitations to the right. As such, the *R.* v. *Sparrow* justification test had to be refined for Aboriginal commercial fishing rights. Other considerations, apart from conservation goals, are to be taken into account in determining whether governmental restrictions were justified.

Objectives such as the pursuit of economic and regional fairness, as well as, the historic non-native participation in the fishery are relevant objectives in the context of the justification analysis. Aboriginal rights have to be given priority but they also have to be reconciled with other rights and interests. The case was remitted for trial on the question of whether the regulation of the accused's Aboriginal commercial fishing rights could be justified.

***R* v. *Powley,* [2003] SCC 43**

The accused were charged with unlawfully hunting moose and possessing game contrary to ss. 46 and 47(1) of the *Ontario Game and Fish Act.* The central issue was whether two individuals from the Sault Ste. Marie area, who self-identify as Métis, can establish Métis Aboriginal rights to hunt that are protected by s. 35 of the *Constitution Act, 1982.*

The Supreme Court of Canada held that the impugned legislation was of no force or effect with respect to the accused on the basis that, as members of the Métis community in and around Sault Ste. Marie, the accused have an Aboriginal right to hunt for food under s. 35(1). The Court concluded that the lack of recognition of any Métis right to hunt for food in the legislation infringed the Métis Aboriginal right and conservation concerns did not justify the infringement. The Court held that, to support a site-specific Aboriginal rights claim, the claimant must demonstrate membership in an identifiable Métis community with some degree of continuity and stability as established through evidence of shared customs, traditions and collective identity, as well as demographic evidence.

The Court modified the pre-contact aspect of the *R.* v. *Van der Peet* test to reflect the distinctive history and post-contact ethnogenesis of the Métis. The test for Métis rights should focus on identifying those practices, customs and traditions that are integral to the Métis community's distinctive existence and relationship to the land after a particular Métis community arose but before it came under the effective control of European laws and customs.

The Court found that the term "Métis" in s. 35 does not encompass all individuals with mixed Indian and European heritage; rather, it refers to distinctive peoples who, in addition to their mixed ancestry, developed their own customs, and recognizable group identity separate from their Indian or Inuit and European forebears. While not setting down a comprehensive definition of who is a Métis for the purpose of asserting a claim under s. 35, of the *Constitution Act, 1982,* the Court cited three broad factors as indicia of Métis identity: self-identification, ancestral connection and community acceptance.

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Annex G. Health and Safety

- Fire Orders and Regulations for Contractors
- Base Fire Safety Policy
- CFB Esquimalt – Safety & Environment for Contractors

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CFB Esquimalt Fire Rescue
Fire Prevention Division

Project: _____ **Location: CFB Esquimalt** _____

Fire Orders and Regulations for Contractors

All personnel are to be thoroughly familiar with the contents of this order and in addition are to be conversant with relevant regulations pertaining to:

Fire Safety Plans

- Prior to commencement of construction or demolition, the Contractor shall prepare for the site a Fire Safety Plan conforming to the *National Fire Code of Canada Section 2.8 Emergency Planning*.

- Prior to commencement of construction or demolition, the Contractor and their personnel shall be familiar with the *National Building Code of Canada Section 8.2 Protection of the Public and Fire Safety* or *British Columbia Building Codes section* 8.2.

Reporting Fires

- Report immediately all fire incidents to the Fire Department as follows:
  - Activate nearest fire alarm and
  - Telephone 911
  - Telephone the Fire Department 363-1990/1991

- When reporting a fire by telephone, give location of fire, name or number of building and be prepared to verify the location.
  - When reporting by cellular phone, inform the operator your location as CFB Esquimalt**,** (Bldg #) Colwood, Wilfert Road. You may initially receive a 911 operator from another jurisdiction depending on your cellular phone.

Fire Precautions

- Fire safety will be maintained in accordance with Canadian Forces Base (CFB) Esquimalt Fire Orders.

- Fire watchers provided with sufficient fire equipment (Company Owned) to control or extinguish fire shall be provided:
  - Whenever work is being carried out in dangerous or hazardous areas involving the use of heat.
  - For the duration of cutting, welding, and roofing operations and for a period of 1 HR thereafter…2 HR for roofing. Before leaving, he/she shall inspect the site to ensure that all is in order.

- On a scale established in conjunction with the engineer prior to commencing work.

- Hot works permits are required from the Fire Prevention Division, **363-1911 or 250-213-8250** in all cases involving welding, cutting, grinding, roofing or the use of blowtorches, salamanders, etc. Regulations in the Hot Works permit will be strictly adhered to.

- The contractor shall supply fire extinguishers, as scaled by the Chief Fire Inspector, necessary to protect the work in progress and the contractor's physical plant on site.

Interior and Exterior Fire Protection Systems and Alarm Systems

- Fire hydrants, sprinklers systems, and fire protection and alarm systems will not be:
  - Obstructed;
  - Tampered with, shut-off; or
  - Left inactive at the end of a working day or shift without authorization from the Chief Fire Inspector.
  - The Chief Fire Inspector must be notified before disconnecting the power to buildings with fire alarm systems.

- Fire hydrants, standpipes and hose systems will not be used for other than firefighting purposes unless authorized by the Chief Fire Inspector **363-1911**.

Blocking of Roadways or Access/Egress

- Blocking of Roadways: in all area the Chief Fire Inspector is to be advised prior to the erection of barricades or the digging of trenches which might impede fire apparatus. The Contractor shall provide an emergency access road as required and as directed by the Chief Fire Inspector.

- Blocking of Access/Egress: The Chief Fire Inspector shall be advised of any work that would restrict access/egress or block a door to an area of the building. The Contractor shall provide an emergency access route as directed by the Chief Fire Inspector.

Flammable Liquids

- Flammable liquids such as gasoline, kerosene, naphtha, etc., may be kept for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing the Underwriters Laboratory or Factory Mutual Seal of Approval.

- Transfer of flammable liquids is prohibited within buildings. In all cases where the transfer of such liquids is necessary, care is to be taken to provide adequate bonding between containers and ground.

- The transfer of flammable liquids shall not be carried out in the vicinity of open flame or any type of heat producing devices.

- Storage of quantities of flammable liquids exceeding 45 litres for work purposes requires the permission of the Chief Fire Inspector. Flammable liquids having a flash point below 38°C (100°F) such as gasoline or naphtha, etc., shall not be used in solvents or cleaning agents.

- Disposal of flammable liquids shall be in a safe approved manner.

Smoking Precautions

- Although smoking is not permitted in hazardous areas, care must still be exercised in the use of smoking materials in non-restricted areas. Smoking is not permitted in Department of National Defence buildings.

Storage and Removal of Rubbish and Waste Materials

- Accumulations of rubbish and waste materials are to be kept to a minimum, and removed from buildings at the end of the workday or shift.

- Flammable waste materials shall not be stored in the work area without the consent of the Chief Fire Inspector.

- The burning of rubbish is prohibited

Quality Control
Automatic Fire Protection and Detection Systems (AFP and DS)

- The Chief Fire Inspector, Fire Prevention Division, CFB Esquimalt Fire Rescue, shall be informed in advance of acceptance inspections or tests of new AFP and DS.

- A copy of the applicable manufacturer's operating maintenance, parts list manual, one set of keys for new alarm panels in addition to any other manuals, and keys called for in this specification, shall be provided to the Chief Fire Inspector at the time of acceptance.

- The Contractor shall arrange a briefing from a manufacturer's representative for the Chief Fire Inspector prior to or at the time of acceptance of new AFP and DS.

- When existing AFP and DS are modified, required repair, or are being expanded, the Chief Fire Inspector shall be notified prior to commencement of work and kept informed of progress. On completion, the Chief Fire Inspector shall be informed to enable Fire Department staff to test the system.

I acknowledge I am aware of these regulations requiring compliance with CFB Esquimalt Fire Safety Orders and Directives in connection with the work to be performed.

Inspector: _____ Date: _____

Contractor: Date:
Phone # _____ _____

BSO 7665-0
Base Fire Safety Policy

1. Identification

Date of Issue	27-04-2018
Date of Modification	27-04-2018
Application	This order and directive applies to those members of the Canadian Armed Forces (CAF) and employees of the Department of National Defence (DND), NPF employees, contractors and all individuals that reside in Canadian Forces Base Esquimalt. This is inclusive of Lodger units and all properties for which the Base Commander is responsible.
Supersession	This Base Standing Order (BSO) supersedes BSO 2-314 through 322 inclusive.
Approval Authority	This BSO is issued pursuant to the authority of the Commanding Officer Canadian Forces Base Esquimalt.
Enquiries	Commanding Officer Port Operations and Emergency Services

2. Definitions

Building Custodian	The person in charge (CF or DND) of real property for the department. The Commanding Officer or the senior officer responsible for the building.
Emergency Operations	Activities of fire protection services which relate to, but are not limited to: infrastructure, aircraft, shipboard, wild land, rescue, hazardous materials, CBRN and emergency medical response.
Fire Prevention	Fire Protection Services and enforcement dealing with preventing the outbreak of fire through identification and recommendations to eliminate fire hazards through activities such as inspection, code enforcement, education, training, and investigation programs.
Fire Warden	The official tasked with ensuring that workplace fire hazards are identified, reported and corrected.

3. Direction/Policy

Context **3.1**	The Fire Protection Program (FPP) rests on the pillars of prevention and intervention. Fire protection is a continuous risk management process which focuses on identifying and reducing risks to federal real property and to the public; minimizing and containing the costs and consequences of harmful or damaging incidents.
Policy **3.2**	All personnel employed at CFB Esquimalt are required to comply with the requirements of this order. All fires must be reported to the Base Fire Department regardless of size or if extinguished. The Fire Department will investigate the circumstances and recommend appropriate action as required. The non-emergency number is 363-1990 or 363-1991.

4. Requirements

Fire protection for CFB Esquimalt and its integral lodger units is

Fire Protection Stations
4.1

provided by the DND (Civilian) Base Fire Department with a central fire station at Naden 141, district fire stations at CFMETR and the Canadian Forces Ammunition Depot, Rocky Point.

Building Fire Safety Plans
4.2

Occupied buildings are required to have posted Fire Safety Plans (FSP) and Fire Emergency Evacuation Plans (FEEP) in accordance with the Canadian Occupational Health and Safety Regulations.

Fire Reporting
4.3

For any emergency call 911. Using an office/building phone (pre-fix 363), will come directly to CFB Esquimalt Fire Dispatch Centre. Cell phones will be connected to Victoria Dispatch Centre. Explain to Dispatch Centre you are at CFB Esquimalt and you will be transferred to the CFB Esquimalt Fire Dispatch Centre. If possible, meet the Fire Department on arrival.

Fire Precautions in Buildings – Building Custodian and Fire Warden
4.4

Building custodians are responsible for safeguarding each building and fixed installations from fire. They are responsible for appointing the fire emergency organization for their building and monthly fire warden reports (CF-1416), which are to be completed and provided to the fire prevention division. Those duties can be delegated to fire wardens.

Evacuation Procedures

4.5.

Upon Discovery of a Fire:

- Leave fire area immediately (only attempt to fight the fire with an extinguisher, if safe to do so)
- Close (do not lock) doors behind you. Close windows if possible
- Sound the fire alarm via manual station (if applicable) or "Fire-Fire-Fire!"
- Call the fire department – 911
- Leave building via nearest and safest exit towards the assembly area
- Do **not** use elevators!
- Upon Hearing Fire Alarm
- Leave building via nearest and safest exit towards the assembly area
- Close (do not lock) doors behind you. Close windows if possible
- Remain calm

Electrical Equipment and Appliances
4.6

All electrical equipment and appliances shall be listed by an organization recognized by the Standards Council of Canada.

Electrical installations or modifications to existing installations shall not be carried out by personnel other than authorized electricians.

Privately owned electrical appliances shall not be installed in DND Buildings. Real Property Operations electricians or fire protection personnel on inspection duties shall order unsafe electrical appliances removed.

The use of extension (flexible) cords shall not be used as a substitute for the fixed wiring of structures, permanently secured to any structural member, run through holes in walls, ceilings, floors,

doorways, windows or similar openings. Extension cords are to be unplugged at the end of each work day.

Personal portable electrical heaters are only permitted on an interim basis. While in use, they shall not be placed under furnishings or in a location where clothing, paper, or other combustible material may come in contact with them. They must be listed by an approved company from the Standards Council of Canada, have an automatic shut-off switch in the event of an accidental tip-over and unplugged at the end of each work day.

Permanent Decorations

4.7

Draperies, curtains and similar furnishings used in buildings shall meet the requirements for flame resistance as specified in the National Fire Code of Canada (NFCC). Furnishings, decorations and other objects shall not be placed so as to obstruct, conceal or obscure exits, access to or egress there from. Flame-proofing treatment of decorations shall follow the guidelines of the NFCC.

Temporary Decorations
4.8

Decorations which are readily combustible shall not be used on DND Property unless suitably flame proofed.

Decorations shall not be placed on electric fixtures or within 3 feet (1 meter) of electric lamps or heating appliances.

Decorations shall not impede any egress or access.

Decorations shall not obstruct any fire protection systems or their components.

Only artificial trees are to be used in any DND facility.

Hot Work

4.9

Whenever possible, hot work operations shall be carried out in a designated area such as a machine shop or similar safe location.

Ensure the hot work permit procedure for your building, ship or work space is followed. If unsure what your procedure is, give the Chief Fire Prevention Officer a call at 250-363-1911.

Portable Fire Extinguishers
4.10

Portable Fire Extinguishers shall be installed in buildings in accordance with CFS-12 D12-102 Scales of Issue, and NFPA Standard No. 10.

Extinguishers shall be conspicuously located and distributed so as to be readily accessible. They shall be hung on hangers or set on brackets or shelves so that the top of the extinguisher is not more than five feet above the floor. Extinguishers may also be placed in special cabinets. Extinguishers are not to be moved or relocated without authorization of the CFB Esquimalt Base Fire Prevention Division. Tampering with firefighting equipment and fire protection systems is a chargeable offence under the Criminal Code section 430 (mischief).

The Building Custodian, Fire Warden or vehicle operator shall inspect all portable extinguishers under their control at intervals not exceeding one month to ensure that the extinguishers:

- are unobstructed and accessible
- are in clean and serviceable condition
- have not been subject to physical damage

Défense nationale | National Defence

CFB ESQUIMALT

Safety & Environment for Contractors

Produced: February 2015

Canada

EMERGENCY SERVICES - 911

Formation Level Contacts	
Base Construction Engineering Help Desk	250-363-2009
Base Logistics Hazardous Material Facility	250-363-2654
Harbour Control Office	250-363-2160
Queen's Harbour Master (duty cell)	250-889-0444
Formation Safety Officer Ionizing Radiation Safety Laser System Safety Radio Frequency Safety (RadHaz)	250-363-7500 250-363-7500 250-363-7500 250-363-7500
Formation Environment Officer	250-363-5063
Military Police Dispatch (non-emergency)	250-363-4032
External Contacts	
WorkSafe BC	1-888-WORKERS 1-888-967-5377
Provincial Emergency Program	1-800-663-3456

EMERGENCY SERVICES - 911

“Notwithstanding that contractual work is conducted on DND land, the work of private contractors and their employees is normally subject to the laws of the Province or Territory in which the work is being conducted. However, this does not relieve the Department of all responsibility and special provisions must be incorporated to safeguard our employees and protect DND’s and the CAF’s legal liability”.
DND General Safety Program Vol 1, Chap 2.

This infoflip® is designed to assist contractors and their employees in meeting their Safety and Environmental responsibilities as well as providing some guidance when working on DND property. It also contains information on when, how and who to contact for questions or guidance. It covers many facets of working with DND and can be used as a guide for commencement of work and a tool to contact the appropriate personnel for questions and advice.

General Safety Program

The Department of National Defence (DND) has a General Safety Program in place to ensure the safety and well-being of its employees and members. While a contractor is not considered an employee of DND, there are many aspects of the General Safety Program that will apply to non-employees, including contractors.

The General Safety program aims to:

- ❒ Minimize personal suffering and financial losses;
- ❒ Add to the efficiency of DND and the operational effectiveness of the Canadian Armed Forces (CAF); and
- ❒ Meet legislative requirements; and contributes to the morale and well-being of all DND employees and CAF members.

Formation/Ship Safety and Environment Management Systems

The Formation and Ship Class Safety and Environment Management Systems provide guidance to DND personnel on implementation of the Maritime Forces Pacific Safety and Environment policy that is specific to the Formation or Ship Class.

The Safety and Environment Management System (SEMS) manual is used to satisfy the requirements of DND, Command and Formation Safety and Environmental policies and directions. It also provides the guidance to ensure employees and workers are compliant with Formation, Base, Provincial and National policy and legislation for the protection and safety of all workers on DND property.

In most cases, contractors should request a full copy of any SEMS directive that relates to the type of work or hazards they may encounter. This infoflip® merely highlights the key points.

Injury Prevention

The goal of any safety program is the prevention of accidents and injuries. This infoflip® contains information on several of the programs covered by the Formation or Ship Safety and Environment Management Systems.

Many of these programs outline the use of specific **Personal Protective Equipment**. It is expected that contractors will comply with applicable legislation as well as DND standards where required.

Accessing DND Property

Most defence establishments have set procedures for accessing DND property. CFB Esquimalt is no exception. The security levels may change from time to time in response to potential threats, or as part of a training activity. Contractor ID cards may be required for access to most DND properties, and potentially building sites within it. Ensure you carry your Contractor ID with you at all times and be prepared to show it. **All personnel accessing DND property are subject to search.**

Parking

Vehicles require an access pass to enter most DND property. Be aware that there is little open parking on the base and you will be subject to ticketing/towing if you park improperly. Look for parking spots designated for contractors.

Secure Zones

Certain areas may be designated as Operations, Security, or High Security Zones and there are additional security requirements in these areas. For example, cell phones are not permitted in these areas and must be powered off, or secured elsewhere. You may also require a visitors pass or escort to access and move around these areas.

All contractor personnel should be aware of security requirements in the areas that they will be working in.

Designated or Controlled Materials

It is possible that your work as a contractor may require you to access documents or materials that are designated or controlled. This means there are additional requirements to protect the security of these documents or materials. For example, documents containing personal information on an individual may have a security designation of Protected A or Protected B. A user manual or set of schematics may be controlled if they are for systems that could affect national security if the details fell into the wrong hands. As well, ship equipment may be controlled and have special disposal requirements.

Be sure you are clear about the designation of documents or materials you have access to, and know whether it's a controlled item or document. Ask for direction on the standards for access, security and disclosure of these items

WorkSafeBC Workplace Inspections

If you or your organization is subject to a Worksafe BC inspection or investigation on CFB Esquimalt property, ensure you contact Formation Safety at 250-363-7500 so appropriate DND coordination is provided.

Although the goal is to eliminate accidents, there is still a chance one could happen, in spite of best efforts. When an accident happens, it's important to report it in a timely manner once the immediate requirement for first aid or emergency responders has been initiated.

First Aid

While contractors are responsible for providing their own first aid services for their workers, if immediate medical attention is required, there are first aid services available in many areas of CFB Esquimalt. It's advisable to enquire about the availability of first aid services in your work area so that you are familiar with its location and how to access it.

If emergency services are required, call **911**. **Note: many areas of the base have limited cell-phone coverage.** Ensure you indicate CFB Esquimalt when talking to the 911 operator. If calling from a DND landline, you will also dial **911**.

Automatic external defibrillator's (AEDs) are placed throughout CFB Esquimalt and in most cases, there is external signage on the buildings where they are located.

WorkSafeBC

All workers in BC are covered under the *Workers Compensation Act* and all accidents resulting in an injury must be reported to WorkSafeBC within three working days.

Refer to **WorkSafeBC.com** for detailed instructions on reporting an injury or death.

Hazardous Occurrence Reporting

In addition to the requirement to report an accident resulting in an injury to WorkSafe BC, accidents that result in a DND employee or military member being injured have additional reporting requirements under the General Safety Program. This also applies to accidents resulting in damage to DND property.

In the event of a severe injury, notify the Formation Safety Officer immediately at 250-363-7500.

While it isn't a contractor's responsibility to initiate the DND Hazardous Occurrence Reporting process, it's possible or likely that witness statements will be required, or the Hazardous Occurrence Investigator may contact you for more information. It is expected that contractors will cooperate to the best of their ability in all investigations.

Report all known or suspected injuries to the appropriate authorities.

Fall Arrest Systems

Canada Occupational Health and Safety Regulations state that fall protection equipment (FPE) must be worn by all workers working 2.4 meters or more above a permanent safe level. The harnesses shall be CSA approved and must be inspected prior to each use.

Ladder Safety

In some instances, portable ladders are the more practical way to carry out the work required. Used correctly, they can be a very handy tool; used incorrectly, they can be a source of injury. The following are some useful points for the correct use of a portable ladder.

1. The base of the ladder should be placed no less than one-quarter and no more than one-third of the length of the ladder from a point directly below the top of the ladder.
2. Where possible, the ladder should be secured in place.
3. A portable ladder that provides access from one level to another shall extend at least three rungs above the higher level.
4. No person shall work from any of the three top rungs of any single or extension portable ladder or from the two top rungs of any portable step ladder.
5. Metal or wire-bound portable ladders shall not be used where there is potential to come into contact with a live electrical circuit or equipment.

Mobile Elevated Work Structures

Caution is to be used when working from a mobile elevated work structure and in particular, when moving or repositioning the structure. There are many overhead obstructions and certain areas, such as dock yard, are very busy and often cluttered as supplies are moved on and off ships. FPE is required for all personnel.

Ship Safety

The same safety standards apply aboard any Royal Canadian Navy (RCN) vessel. If work must be done at height, the appropriate fall arrest system must be used. Ship's personnel can provide detailed guidance and direction specific to their ship.

Warning Signs

If any work at height poses a secondary danger to other personnel, warning signs shall be placed in a conspicuous place, and at a sufficient distance from the job.

All work done in a confined space is considered risky due to the many potential hazards that may be present. Under no circumstances should a contractor enter a confined space unless they have been authorized to do so and have been briefed on procedures.

Contractors are required to follow the requirements of the applicable regulatory body. (Canada Labour Code, Province).

The Entry Supervisor completes their assessment of the space and level of risk. This will include atmospheric testing to determine if a hazardous condition exists. The Entry Supervisor initiates a Confined Space Entry Permit and briefs the Entry Team prior to the commencement of any work.

The contractor's Emergency Response Team (ERT) is notified prior to and after the commencement of work. If the ERT is not available, the work may be postponed. If the ERT becomes unavailable while the confined space work is being done, the work must stop immediately and personnel must exit the confined space.

DND is not mandated to provide rescue teams for confined space entry, but will respond, if available. All confined space entries shall have a hazard assessment completed and a written safe to enter certificate completed by a qualified person.

Confined Space Entry Procedures

1. Ensure all energy sources have been isolated/locked out.
2. Ensure adequate ventilation is provided and the atmosphere tested.
3. Implement your company's confined space procedure.
4. Ensure entrant, rescue team and sentry are qualified.
5. Ensure hazard assessment completed.
6. Ensure entry plan completed.
7. Ensure rescue plan completed.
8. Ensure personnel are briefed on hazards and work to be conducted.
9. Ensure entry log is in place and used.
10. Ensure safe to enter certificate is completed and posted by qualified person.
11. Ensure rescue team and equipment are in place.

Report all known or suspected injuries to the appropriate authorities. Accident Reporting (3)

Radio Frequency (RF) radiation, also known as non-ionizing radiation, can pose a health hazard to personnel who are exposed to levels higher than Health Canada recommendations. These levels are individually known as the **Maximum Exposure Limit (MEL).**

Through measurement, the distances (MEL distances) one must remain away from any given radiating emitter have been determined. These distances are held by the ship or unit owning these RF emitters.

Contractor personnel will be briefed on the applicable MEL distances and emitter control procedures prior to accessing a site with RF emitters in it. This briefing will be given by the Officer of the Day on ships

Buildings with RF emitters will have a DND/CAF employee appointed to grant access to the roof and this person will provide the briefing on RF hazards resident there.

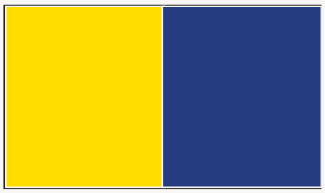
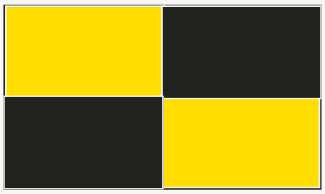
Sources of Radio Frequency (RF) Radiation

The more obvious source of RF radiation is from ship board equipment such as radar and communication antennas.

There are also RF emitters located on various buildings. These include D250, D199, D211, D100, D218, N92A, and N50. Proper roof access procedures, obtained from the contracting authority, must be described to personnel prior to commencing work on any roof.

Indicators for Radio Frequency (RF) Radiation Hazard

Ships will use a series of coloured flags to indicate the status of their RF transmitting capabilities.

FLAG ECHO Indicates that the vessel is rotating an antenna without radiating RF Energy.	
FLAG KILO Indicates that a person is working aloft and/or over the side.	
FLAG LIMA Indicates that the vessel is radiating RF Energy.	

Hazards of Electromagnetic Radiation

1. **Hazards of Electromagnetic Radiation to Fuel (HERF):** There is potential for **RF radiation** to cause spark ignition of volatile combustibles such as gasoline, fuels or solvents.
2. **Hazards of Electromagnetic Radiation to Ordnance (HERO): RF radiation** may cause ordnance or ammunition to inadvertently fire without notice or indication.
3. **Hazards of Electromagnetic Radiation to Personnel (HERP): RF radiation** can heat and burn body tissue and may occur through exposure to a nearby source, or through direct contact with an antenna wire, cable or metal railings that may be reradiating fields.

Suspected or Confirmed Exposure

Any personnel who suspect that they are being over exposed to radio frequency radiation should immediately move away from the source of radiation. **Any personnel who suspect or confirm they have been exposed to radio frequency radiation should seek immediate medical attention.** Medical personnel are to be advised that there may have been an RF over exposure.

Report all known or suspected injuries to the appropriate authorities. Accident Reporting (3)

Hot Work is defined as "any activity which has the potential of generating a source of ignition." This includes welding, burning, grinding, or the use of any spark-producing equipment.

Before any Hot Work can be carried out, a Hot Work Certificate must be issued. Contact the Base Fire Hall **250-363-1906** to receive a permit and a copy of **Fire Orders and Regulations for Contractors.**

Prior to the Hot Work Certificate being issued, a hazard assessment must occur, including the following:

- ❒ Remove all combustible or flammable materials
- ❒ Ensure fire cloth, smoke curtains and ventilation are in place
- ❒ Ensure all areas where a spark could land are protected
- ❒ If applicable, ensure the compartment(s) has been certified gas free
- ❒ Ensure electrical cables liable to be damaged have been covered with protective material

Once the Hot Work is to begin, the Fire Sentry(s) are to be briefed and will ensure the appropriate fire extinguisher(s) are on site.

Note: Gas free testing along with a new Hot Work Certificate must be conducted every 24 hours.

Completion of Hot Work

Once the Hot Work has been completed, the Fire Sentry(s) are required to stay on site for a minimum of 30 minutes. After inspecting the area, the Fire Sentry(s) will report to the customer or Fire Hall that the operation is complete.

Prohibited Hot Work

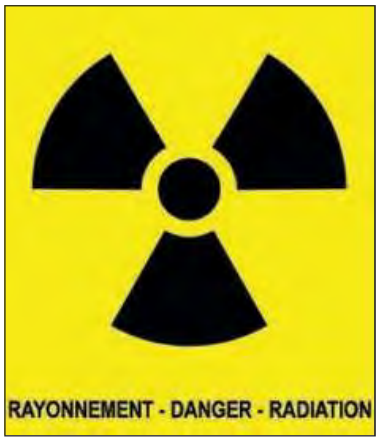
- ❒ In compartments containing unsealed flammable material
- ❒ On pipes containing any trace of fuel or lube oil
- ❒ Within two (2) meters of a magazine or fittings that enter the magazine
- ❒ On pipes containing any trace of sewage inside

In the event a fire is detected: Shout "FIRE, FIRE, FIRE" and exit the area in an orderly fashion. Notify the Base Fire Hall (911), no matter how small the fire.

Exposure to ionizing radiation can be harmful as it damages the internal structures of living cells. High doses can cause death over a short period of time, or other long term health issues from low doses over longer periods of time.

Sources of Ionizing Radiation

Potential sources of radiation can be specialized monitoring equipment, aircraft gauges, X-rays and even smoke detectors. The international symbol for ionizing radiation is the trefoil. In Canada, X-rays are identified by a different symbol.



Trefoil

X-Ray

Radiological Hazardous Occurrence (RHO) Procedures

- ❒ Hold your breath.
- ❒ **Attempt to breathe only once in fresh air!**
- ❒ Vacate the immediate area.
- ❒ Secure the area if possible.
- ❒ Call the Radiation Safety Officer.
- ❒ Remain nearby until released.

Report all known or suspected injuries to the appropriate authorities. Accident Reporting (3)

Suspected/Confirmed Contamination and/or Exposure

If there has been a suspected or confirmed over exposure, the person **MUST be sent to the hospital.** Ensure medical authorities are advised that the individual may have had a possible ionizing radiation over exposure and if applicable, that the source may be on the person's clothing.

As with any other injury or accident, the details must be reported to WorkSafe BC. It is the contractors responsibility to ensure this happens. **Accident Reporting (3).**

Containment and Clean-up

If DND/CAF personnel are not yet aware of the contamination, ensure they are notified immediately. Units holding radioactive materials will have a Unit Radiation Safety Officer who must be notified of the contamination.

Areas must be evacuated and cordoned off until the clean-up has been completed. Only qualified personnel are permitted to do the clean-up; contractors should not attempt to clean a contaminated area.

Industrial Radiography

Contractors must be licensed by the Canadian Nuclear Safety Commission (CNSC) for Nuclear Gauges (e.g. Troxler Gauges) and Gamma Radiography and they must be able to present these licenses upon demand when on DND/CAF property.

For X-ray Radiography, the contractor must have one person on staff who is a CGSB Level II radiographer (licensed by NRCan).

For Gamma Radiography, there must be one operator who is both CNSC - Certified Exposure Device Operator (CEDO) and NRCan - CGSB Level II certified.

XRF operators must be licensed by NRCan as at least a Level I XRF Operator.

All contractors must have an emergency plan that is accessible to the Base RadSO. Moreover, any contracted services intending to use ionizing radiation must inform the Base RadSO.

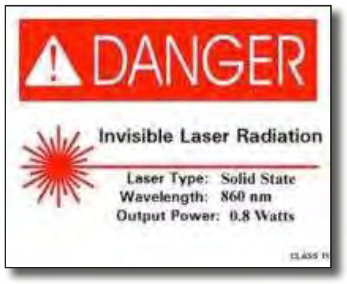
Report all known or suspected injuries to the appropriate authorities. Accident Reporting (3)

Exposure to high power laser light can be hazardous to eyes as well as skin. Lasers range from Class 1 to Class 4. Class 1 are not considered hazardous to skin, or eyes. Class 2 may be hazardous to the eyes but protection is normally afforded by the eye's natural aversion response to bright light. Class 3 lasers may be potentially harmful if under direct and specular viewing conditions. Class 4 lasers are capable of causing serious injury to both eye and skin, and could cause combustion of flammable materials.

Ships such as the Halifax Class contain a Class 4 laser system. Where a ship or unit has Class 3B or 4 laser systems, they will have a Unit Laser System Safety Officer (ULSSO) appointed who will ensure personnel are trained and briefed and that all laser safety policies, standards and procedures are adhered to. Contractor personnel should ensure they are familiar with these policies and procedures prior to commencement of work.

Area Control Where Laser Hazard Exists

Any area where a laser will be operated shall be well defined. In most situations, a laser warning sign such as the one shown here should be in place. All personnel must follow posted instructions and use appropriate Personal Protective Equipment (PPE) as required.



Optical Viewing Devices

Optical viewing devices such as binoculars, big eyes or telescopes shall not be carried or used in any controlled area without prior approval of the ULSSO. If laser operations are to be viewed with such devices, appropriate attenuating filters must be used in the optical viewing device.

Suspected or Confirmed Over Exposure

If there has been a suspected or confirmed over exposure involving laser radiation, the person **MUST be examined by a physician**. Ensure the medical authorities treating the person have been advised that there may have been a laser over exposure.

Report all known or suspected injuries to the appropriate authorities. Accident Reporting (3)

Spill Response and Reporting

All contractors who will have their own vehicles on DND property and/or will be using hazardous materials, must have response equipment, such as a spill kit, and personnel trained in their location and use. In the event of a spill, the contractor is responsible for immediately implementing spill response procedures. If a spill cannot be easily contained or cleaned up, the contractor must call the Base Fire Hall at **911**. Contractors must also report all spills to their contract authorities and the Formation Environment Officer at 250-363-5063, as soon as possible

Contractors are responsible for the cost of cleaning up a spill they generated.

Sick, Injured or Abandoned Wildlife

Do not touch or disturb wildlife on DND properties, including wildlife that appear dead or injured. If you encounter:

- ❒ dangerous animals, such as a bear or a cougar, report it to the Military Police at 250-363-4032 immediately; and
- ❒ sick, injured, abandoned or dead wildlife, report it to the Base CE Help Desk at 250-363-2009.

Waste Disposal

Contractors are responsible for removing and appropriately treating/ disposing of all wastes in accordance with contract documentation. This includes all liquid wastes generated during project activities. Disposal of any waste in DND waste bins is prohibited. Disposal of untreated liquid wastes to the environment and/or storm/ sanitary sewers is prohibited.

Archaeological Features

Contractor personnel should be aware of the mitigation measures prior to commencement of work and ensure they are being implemented throughout the duration of the project. Prior to commencing any land alteration activities, contractor personnel should receive an archaeological briefing which their contract authority will coordinate.

Contractors working on systems requiring lockout or tagout procedures will be expected to follow the existing policy as outlined in **Formation Safety and Environment Systems (FSEMS) Directive S14** The lockout / tagout procedures will be used in conjunction with other work safety standards (**Confined Space Entry (5), Burning and Welding (8)**) but not in lieu of their safety standards.

Approved Padlocks or Lockout Devices

Locks shall be sequentially numbered and will be identified as belonging to the contractor. The customer will have locks meeting the same standard and identified as belonging to them. The contractor must coordinate LOTO requirements with the applicable unit owning the equipment and keep a register of locks issued, including the date, person's name, contractor name, system worked on and the location of the lock or device.

Only one key shall be issued with a padlock and in the event of a lost key, the lock must be destroyed once it has been removed in accordance with procedures. Replacement keys will not be produced.

Zero Energy Checks must be completed before starting work to ensure the lockout is effective.

Removal of Locks

Normally the person who applied a lock is the only one who can remove it. In exceptional circumstances, the MSE and CSE Department Heads (or their delegates) may authorize the removal of the lock under the following circumstances:

- ❒ The machinery / equipment / system shall be verified safe to operate
- ❒ The owner identified on the tag shall be contacted for permission to remove his/her lock
- ❒ Details shall be entered in the Lockout Register

In the case of critical systems onboard the submarines, the owner of a lock will leave the key for his/her lock with the LOTO Coordinator if they leave the sub (ie, leave after working hours), and will draw the key prior to commencing work the following shift.

Contractor Responsibilities

"The unit Contract Officer/Coordinator is to ensure the contractor is aware of the Lockout/Tagout procedures detailed in this Directive. Contractors shall report immediately to the relevant department to be provided a Point of Contact and to be briefed on the procedure to be followed while working onboard."
FSEMS Directive SD14

Due to the risk of a significant emergency occurring such as an earthquake or tsunami, the base has stood up a **Mass Notification System** to give warning to all personnel. In the event that the Tsunami Warning System has detected a tsunami threat, an audible warning system will sound throughout the base. Immediately head for higher ground. Look for signs to indicate tsunami evacuation routes:

There is more than one tsunami evacuation site; be sure you are familiar with the one closest, and most accessible to your location. It's important to remember that personnel are expected to travel to the evacuation sites by foot except in cases when an individual is physically unable to walk. Roads will become congested very quickly otherwise.

Tsunami Hazard Zones

Areas most at risk for a tsunami are indicated by warning signs. These signs are marking what is referred to as the inundation zones, or the areas of lower elevation most likely to be affected by a tsunami.

Mass Notification System

The **Mass Notification System** is also intended to deliver an audible signal to indicate other emergency situations such as an active aggressor. The Mass Notification System will be tested on the first Wednesday of each month for approximately 1 minute commencing at 11:00 am.

Threat of Violence or Terrorism

In the event there is a threat of violence requiring lock-down procedures:

- ❒ Escape or hide out; call **911**.
- ❒ Secure self and location; lock doors, windows.
- ❒ Mitigate vulnerabilities; close blinds, turn off lights.
- ❒ Stay put; wait for authorities to release you.
- ❒ Take action as a last resort.

Situations that may trigger a requirement to call Emergency Services can include medical, fire or even a threat of violence. CFB Esquimalt Emergency Services works with municipal Emergency Services to support all locations occupied by DND. In the event of an emergency, call **911. If calling from a cell phone, inform the dispatcher that you are calling from Canadian Forces Base (CFB) Esquimalt.** Provincial Dispatchers will notify and dispatch the appropriate Emergency Services in your area. Emergency procedures must be discussed with the contracting authority prior to commencing work and be included in the contractor's safety plan.

Major Disasters

There are protocols in place to deal with large scale emergencies such as earthquakes. It's important in such a situation to follow the directions of DND/CAF personnel on muster points and protocols to follow. A full accounting of all personnel is to be completed after buildings have been evacuated, and this includes registering non-DND personnel such as contractors and cleaners.

In the absence of clear instructions, look for the closest E-Box and proceed there. The E-Boxes are placed throughout DND property and can easily be identified by their **orange colour and letter E on the side.**

NOTE: Do not depart your location until you have registered with one of the base's E-Boxes. If you fail to do so, valuable time may be spent searching for you.

Building Evacuations

All personnel, including contractors, should be familiar with the evacuation procedures for the site they are working in. Diagrams will be found in all buildings showing exits and locations of emergency equipment such as fire extinguishers and first aid kits. Take the time to review the diagrams and ask questions if you're unsure of local procedures.

Workplace violence constitutes any action, conduct, threat or gesture of a person towards an employee in their workplace that can reasonably be expected to cause harm, injury or illness to that employee. It includes, but is not limited to, the following:

Threatening behaviour - such as shaking fists, destroying property or throwing objects.

Verbal or written threats - any expression of an intent to inflict harm, including:

- **Direct threats** - clear and explicit communication which distinctly indicates that the potential offender intends to do harm, for example: "I am going to make you pay for what you did to me".
- **Conditional threats** - involves a condition, for example: "If you don't get off my back, you'll regret it".
- **Veiled threats** - usually involves body language or behaviours that leave little doubt in the mind of the victim that the perpetrator intends harm, for example: "Do you think anyone would care if someone beats up the boss?"

Harassment - any behaviour that demeans, embarrasses, humiliates, annoys, alarms, or verbally abuses a person and that is known to be, or would be expected to be unwelcome. This includes words, gestures, intimidation, bullying, or other inappropriate behaviours.

Verbal abuse - including swearing, insults, or condescending language.

Physical attacks - including hitting, shoving, pushing or kicking the victim, or inciting a dog to attack.

National Defence Policy

"The Canadian Forces and the Department of National Defence have a zero tolerance for all forms of work place violence."

"Incidents of work place violence, should they occur, will be responded to promptly by responsible and competent authorities to ensure that the work place remains a respectful and safe environment for everyone."

National Defence Occupational Health and Safety - Prevention of Violence in the Work Place Policy Statement.

Report all known or suspected injuries to the appropriate authorities. Accident Reporting (3)

This publication was produced for Contractors and their employees as a guide to Department of National Defence and CFB Esquimalt Safety and Environment programs. While every effort has been made to provide current and relevant information, Contractors must remain vigilant about ensuring they are fully informed of current legislation as it pertains to worker safety; occupational health and safety; and environmental controls.

This infoflip® is intended to be a quick reference and in many cases, Contractors will require access to the full directives or procedures to ensure they are compliant.

Produced under the authority of Formation Safety and Environment, CFB Esquimalt.

Recommendations for changes or improvements can be directed to:

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CFB Esquimalt
PO Box 17000 Stn Forces
+ESQ FSE Safety@FSE@Esquimalt (internal email)
250-363-7500