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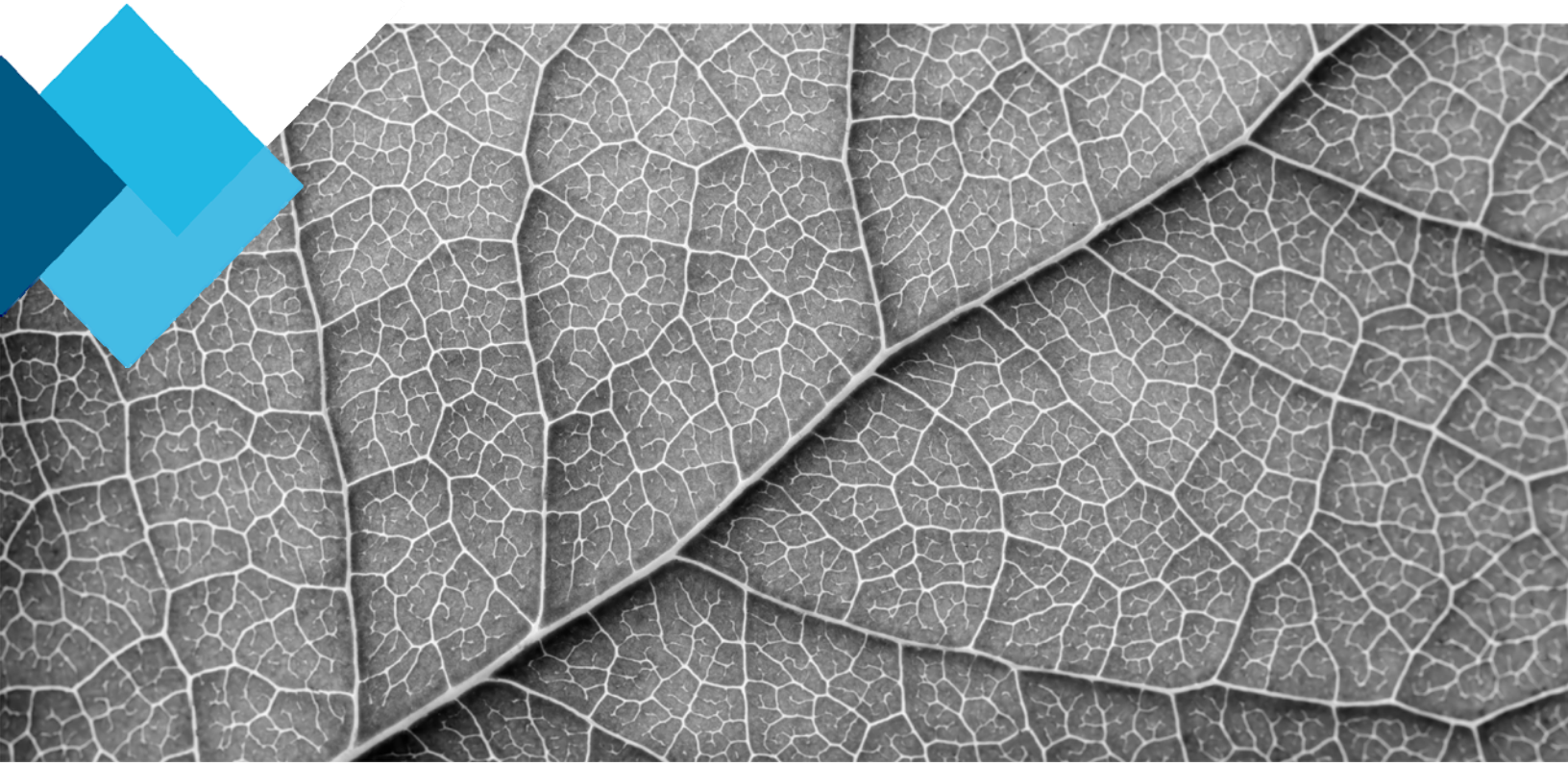
REVISED DRAFT - Trent-Severn Waterway Sediment Assessment in Support of Construction Activities

Port Severn Sites, Port Severn, Ontario

Public Works and Government Services Canada



Environment & Geoscience

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Executive Summary

The Environment and Geoscience business unit of SNC-Lavalin Inc. (SNC-Lavalin) was retained by Public Works and Government Services Canada (PWGSC), on behalf of Parks Canada Agency (PCA), to conduct an environmental sediment and surface water assessment program in support of assessing environmental performance objectives (EPOs) to be applied during construction activities associated with structural upgrades at various sites along the Trent-Severn Waterway in Ontario (herein referred to as the "project"). The investigation addressed five (5) proposed construction locations (herein referred to as "work areas") within the community of Port Severn, Ontario: Little Chute Dam G; Bayview Dam E & Bayview Dam E Bridge; Main Dam & Blind Dam D & Fixed Bridge; Port Severn Blind Dam C; and Port Severn Blind Dam A (referred to as Dam A).

The primary objective of the investigation was to characterize sediment quality in the vicinity of the proposed construction work areas for the purpose of assessing EPOs and proposing mitigation measures and best management practices (BMP) for construction which would prevent or minimize adverse environmental and human health impacts during post-construction activities. A secondary objective was to evaluate sediment quality in the context of disposal in Ontario.

The field components of the investigation were completed in November 2017 (Site Reconnaissance), December 2017 (Stage 1 Sediment and Surface Water Sampling) and February 2018 (Stage 2 Sediment and Surface Water Sampling). In December 2017, sediment samples were collected from shore (dams, locks or shoreline) either using a petite ponar or a manual core sampler. In February 2018, sediment samples were collected through the ice surface by a manual drilling crew. A total of twelve (12) sediment samples were collected from Dam G, Dam E, Dam D and Dam C work areas. Sampling attempts were made at an additional twenty-three (23) locations and the absence of sediment or inability to successfully collect a sediment sample was documented. Sediment samples were analysed for potential contaminants of concern (PCOCs) including: metals; inorganics; total organic carbon (TOC); benzene, toluene, ethylbenzene and xylenes (BTEX); petroleum hydrocarbons (PHCs); polycyclic aromatic hydrocarbons (PAHs) and/or organochlorine pesticides. Concentrations of cyanide, metals (lead and nickel), petroleum hydrocarbons and PAHs exceeded screening criteria and were identified as contaminants of potential concern (COPCs) for further assessment of potential adverse effects to the aquatic environment and to human health.

PCA has established an EPO of 25 mg/L above background for TSS for application at the point of discharge during construction activities in the waterway. In addition, an upper discharge limit for TSS of 75 mg/L has been established to protect fish from the physical effects of suspended particles. Measured sediment concentrations were used to verify that these EPOs would be protective of human health and the aquatic environment. Concentrations of COPC in surface water resulting from the suspension of sediments during construction activities were predicted and compared to ambient water quality guidelines for protection of aquatic life, recreational use, and drinking water. This evaluation verified that a primary EPO of 25 mg/L of TSS (equivalent to a site-specific turbidity measurement of 14 NTU) would be protective of aquatic biota and downstream users, with a maximum upper discharge limit of 75 mg/L of TSS (equivalent to a site-specific turbidity measurement of 40 NTU).

Best management practices (BMP) and mitigation measures to reduce the potential for exposure to contaminated sediment from the work areas and for the protection of aquatic life are detailed in

Section 8.1. Monitoring of *in situ* turbidity measurements was recommended for day-to-day assessment of water quality and to inform the Contractor of the potential need to implement management actions. These are detailed in Section 8.2 and include:

- monitoring at the point of discharge, and upstream and downstream of the work area to verify that EPOs are being met;
- collection of surface water samples for laboratory analysis to verify water quality predictions;
- monitoring and inspections during construction activities;
- testing of imported material used to restore the river bed to grade; and
- spill response measures should an accidental release of water containing a TSS of 75 mg/L (32 NTU) or greater occur or should sheen or other visual evidence of contamination be observed.

Table of Contents

Figures

Tables

Appendices

1 Introduction

The Environment and Geoscience business unit of SNC-Lavalin Inc. (SNC-Lavalin) was retained by Public Works and Government Services Canada (PWGSC), on behalf of Parks Canada Agency (PCA), to conduct an environmental sediment and surface water assessment program in support of assessing environmental performance objectives (EPOs) to be applied during construction activities associated with structural upgrades at various sites along the Trent-Severn Waterway in Ontario (herein referred to as the "project"). The investigation addressed five (5) proposed construction locations (herein referred to as "work areas") within the community of Port Severn, Ontario:

- Little Chute Dam G (referred to as Dam G);
- Bayview Dam E & Bayview Dam E Bridge (collectively referred to as Dam E);
- Main Dam & Blind Dam D & Fixed Bridge (collectively referred to as Dam D);
- Port Severn Blind Dam C (referred to as Dam C); and
- Port Severn Blind Dam A (referred to as Dam A).

The work was completed by SNC-Lavalin in accordance with: Public Works and Government Services Canada Standing Offer Agreement (SOA) Number EQ447-141528/002/TOR for Environmental Services (Stream 3); the PWGSC Statement of Work (Revision 1) dated October 20, 2017; SNC-Lavalin's proposal dated November 3, 2017 (Revision 1); and subsequent discussions.

1.1 Site Description

Port Severn is a community at the northern inlet of Georgian Bay within the Township of Severn, Ontario. The work areas targeted in the current assessment form part of the Trent-Severn Waterway and are located north of Highway 400, between Tug Channel and Severn Sound to the south and Little Lake to the north (Figures 1 and 2).

The Trent-Severn Waterway historically has been an area where a wide range of industrial activities took place, such as mining, lumber, foundries, milling, manufacturing and commercial transport. Within the community of Port Severn, a sawmill operated near the mouth of the Severn River until it was destroyed by fire in 1896. Since this time, the local economy has shifted from lumber to tourism. Currently, Port Severn is primarily a recreational community with tourism as the prime industry, including recreational swimming. Multiple marinas and docks supporting tourism in the community are present upstream of the work areas. Land uses downstream of the work areas are primarily residential and recreational (e.g. cottages).

1.2 Project Background

From 2016 to 2020, PCA is undertaking an asset renewal program to replace, upgrade or repair a number of the water management structures (which include dams, locks and bridges) along the Trent-Severn Waterway and Rideau Canal. PCA's overall project includes a total of 94 Lock, Dam or Bridge structures. The project includes identifying, characterizing and assessing potentially contaminated sediments in order to identify monitoring and best management practices (BMP) to minimize impacts to construction workers, individuals that may use the waterways for recreational purposes or as a source of potable water, as well as to the aquatic environment during construction activities.

Areas warranting investigation of sediment quality were identified in a report entitled "*Site Prioritization Tool for Sediment Sampling in Advance of Construction Activities Along the Trent-Severn Waterway and Rideau Canal*" (RMC & BluMetric, 2017). The purpose of the report was to facilitate the identification of priority sites for sediment assessment prior to construction through a screening matrix approach. The focus of the screening was to identify sites that may pose potential risks to construction workers conducting in-water activities, as well as sites where there is potential to mobilize contaminated sediment and have the potential to impact human users and/or have ecological effects downstream. The sites were classified as high, medium or low risk. The site classification and prioritization matrix was developed to include scoring categories and ranking criteria based on PCA project goals, and included the review of historical reports, aerial photography, and other available documentation as well as direct input from PCA on site usage and species at risk.

Based on the results of the site prioritization matrix, work plans outlining targeted sampling areas were developed for higher priority sites, including the Port Severn work areas (BluMetric, 2017). The Port Severn work plan identified metals and inorganics; benzene, toluene, ethylbenzene and xylenes (BTEX); petroleum hydrocarbons (PHC); and polycyclic aromatic hydrocarbons (PAHs) as potential contaminants of concern (PCOC) at the site based on the possible point sources of contamination identified in the area including current and historical marinas, and a historic sawmill.

1.3 Construction Scope

The construction scope includes a comprehensive rehabilitation or reconstruction of many of the dams and associated assets within the Trent-Severn Waterway Northern Sector in the Port Severn Area, including the five (5) work areas being assessed herein (BluMetric, 2017). Construction activities in Port Severn are scheduled to begin in 2018. Rehabilitation construction activities and methods may vary at different work areas, but are expected to include cofferdams and an associated dewatering system to isolate the construction zone. Constructability plans with proposed cofferdam placement are included as Appendix A. Cofferdam and berm details based on these rehabilitation plans (dated March to August 2017) were included in figures presenting investigation areas. It should be noted that construction design was ongoing at the time of completion of this report and construction details depicted in these figures may not accurately reflect final construction plans.

1.4 Previous Investigations

No previous environmental sediment quality investigation reports pertaining to the work areas or surrounding area were available for review. A copy of the geotechnical investigation completed in 2017 in support of construction planning for the work areas (AECOM, 2017) was reviewed and relevant information was incorporated into the planning and reporting for the current environmental investigation.

1.5 Report Structure

The objectives and scope of work for the current investigation are outlined in Section 2. The rationale applied in selecting regulatory criteria for comparison to analytical results is provided in Section 3. Section 4 documents investigation methodologies followed for the field program. Investigation results are provided in Section 5. Section 6 details a preliminary Conceptual Site Model (CSM) for the work areas.

Environmental Protection Objectives (EPOs) for water quality management are discussed in Section 7. Recommendations for mitigation measures and best management practices as well as monitoring requirements during construction area provided in Section 8. The report authors are listed in Section 9 and references are provided in Section 10.

2 Objectives and Scope of Work

2.1 Objectives

The primary objective of the investigation was to characterize sediment quality in the vicinity of the proposed construction work areas for the purpose of assessing EPOs and proposing mitigation measures and BMP for construction which would prevent or minimize adverse environmental and human health impacts both during and post-construction. A secondary objective was to evaluate sediment quality in the context of disposal in Ontario.

2.2 Scope of Work

To address this objective and in consideration of the PWGSC Statement of Work (Revision 1) dated October 20, 2017, SNC-Lavalin's work program included the following tasks:

- Project planning and coordination, including access approval, utility locates and health and safety considerations;
- Sediment sampling;
- Surface water sampling;
- Laboratory analysis;
- Data interpretation relative to federal and provincial regulatory criteria and standards;
- Development of a preliminary Conceptual Site Model (CSM) for the work areas;
- Assessment of site-specific EPOs; and
- Recommendations for mitigation measures, BMP and monitoring during construction activities.

Deviations from the initial scope of work are discussed the following sections.

3 Regulatory Context

Since the site is under federal jurisdiction, federal guidelines were preferentially applied in evaluating the environmental quality of sediment and surface water characterized as part of the current investigation. In the absence of federal guidelines for specific parameters, applicable Ontario provincial site condition standards and guidelines from other jurisdictions were applied as described in the following sections. In Section 5, sediment and surface water quality are described relative to the guidelines and standards outlined in the following sections for comparison purposes. A description of the screening process applied in evaluation of site-specific EPOs is provided in Section 7 and the following sections.

3.1 Sediment Quality

3.1.1 Ecologically-Based Guidelines

Sediment analytical results were compared to the following federal guidelines:

- Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG; CCME, 1999, as updated), Canadian Sediment Quality Guidelines for the Protection of Aquatic Life:
    - Interim freshwater sediment quality guidelines (ISQGs); and
    - Probable effect levels (PEL).

CCME ISQGs represent threshold effects concentrations below which adverse biological effects are expected to occur rarely. CCME PELs represent concentrations above which adverse effects are expected to occur frequently. The ISQG/PEL guidelines are based on statistically-derived percentiles from a database of co-occurrence data (i.e. biological effects and sediment chemistry), which includes studies containing both effects and no-effects biological data (CCME, 1995). An exceedance of these statistically derived guideline values should not be interpreted as concentrations that will cause an adverse effect. Rather they are intended to be used as benchmarks for identifying situations that have the potential to be harmful to aquatic life.

Sediment analytical data were also compared to the following provincial standards and guidelines where CCME ISQGs/PELs were not available:

- Ontario Ministry of the Environment (MOE) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (MOE, 2011), sediment standards applicable to all property uses in Tables 1, 8 and 9.
- MOE Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario (MOE, 2008), provincial sediment quality guidelines.

The MOE (2008) sediment quality guidelines were established for three levels of effect – no effect level (NEL), lowest effect level (LEL), and severe effect level (SEL). The NEL is based on a chemical concentration where there is negligible transfer of chemicals through the food chain and no effect on water quality. The LEL represents the level of contamination that can be tolerated by the majority of sediment-dwelling organisms. The SEL indicates the level of contamination that is expected to be detrimental to the majority of sediment dwelling organisms. Based on these descriptions, the LELs are considered to be similar to the CCME ISQGs, while the SELs are considered to be similar to the CCME

PELs. Similar to the ISQG/PEL derivation, the LEL/SEL values are also statistically derived as a percentile from a database of co-occurrence field data, where as the NEL values are derived for non-polar organic chemicals from chemical equilibrium portioning equations (MOE, 2008).

The MOE (2011) sediment standards, which apply under the Ontario Regulation (O.Reg.) 153/04, represent the MOE (2008) LEL guidelines. MOE (2008) provides LEL guidelines for total organic carbon (TOC) and Total PAH, which are not available in MOE (2011). All other MOE (2011) sediment standards represent MOE (2008) LEL guidelines.

The CCME and MOE have not developed sediment quality guidelines protective of aquatic life for BTEX and PHCs. These petroleum hydrocarbon parameters in sediment were evaluated relative to Atlantic Risk-Based Corrective Action (RBCA) screening levels (APIRI, 2012a). As the RBCA petroleum hydrocarbon fraction ranges differ from those used by the CCME (2008), the following comparisons were applied:

- RBCA Modified TPH "Gas" = >C5-C12 applied to CCME F1 = >C6-C12;
- RBCA Diesel #21 = >C8-C34 applied to both CCME F2 = >C10-C16 and F3 = >C16-C34; and
- RBCA Max Management Limit applied to Total PHC (C6-C50) and the calculated sum of PHC F1 to F4 (including F4 gravimetric where analysed).

Although the RBCA screening values for TPH gas and diesel are equilibrium partitioning based and can be adjusted using the sample fraction organic carbon content (foc), however, RBCA screening levels were not adjusted for foc in this report. These sediment quality guidelines for PHC are derived using a quantitative structure activity relationship (QSAR) model, based on a chronic concentration considered to have no deleterious effects to less than 5% of the aquatic species (APIRI, 2012b).

For the current assessment, maximum contaminant concentrations in sediment were screened relative to CCME CEQG PEL (1999 as updated) to identify contaminants of potential concern (COPC) for assessment of EPOs (Section 7.1), as the CCME PELs represent concentrations above which adverse effects are likely to occur. As discussed, the CCME ISQG values are conservative and were not used to identify COPC for further assessment, as adverse effects are not expected at the ISQG concentrations. This approach is consistent with federal guidance for assessing aquatic sites under federal jurisdiction, as recommended in the Fisheries and Oceans Canada National Procedure for Assessing Aquatic Sites (DFO, 2016). In the absence of CCME PELs for specific parameters, regulatory criteria from Ontario MOE and Atlantic RBCA were applied. Although the MOE (2008) SEL values are considered to be similar to CCME PEL values, the LEL values were used to screen for COPC as these are the values listed under O. Reg. 153/04; the use of the LELs (vs. the SELs) is considered conservative, and did not significantly impact the conclusions of the subject assessment.

3.1.2 Human-Health Based Guidelines

Currently there are no human health-based sediment criteria or guidelines established for a Canadian jurisdiction. In the absence of applicable human health-based sediment quality guidelines, Health Canada (2017a) indicates that the relevant CCME Canadian Soil Quality Guidelines (SQGs) for human health are

[1] As RBCA Diesel #2 or #6 Oil/Lube span the combined CCME PHC F2 and F3 ranges, PHC F2 and F3 were conservatively compared to the lowest of the two (2) RBCA screening values.

considered to be the most appropriate screening values for human exposure to sediments. As outlined in Section 7, the applicable exposure pathways for human receptors include direct contact with the sediment. As such, sediment analytical results were compared to the following federal guidelines:

- CCME CEQG (CCME, 1999, as updated) SQGs for the Protection of Human Health, for residential/parkland land use, fine or coarse grained soil, direct contact exposure pathways (including soil ingestion and dermal contact).

3.1.3 Disposal in Ontario

Construction work may result in excess sediment requiring disposal on land. To identify suitable disposal options, sediment quality was compared to the following provincial criteria:

- Ontario Environmental Protection Act, R.R.O 1990, Regulation 347 (as amended), General – Waste Management, Schedule 4 leachate quality criteria.

For comparison to O.Reg. 347 leachate quality criteria, sediment samples were anlaysed by toxicity characteristic leaching procedure (TCLP) for all PCOCs identified for the work areas.

3.2 Surface Water Quality

Surface water samples were collected for the purpose of establishing a site-specific relationship between total suspended solids (TSS) concentrations and sample turbidity to support water quality monitoring during construction activities. In this context, surface water TSS analysed concentrations and field readings of TSS and turbidity were compared to the following federal guidelines:

- CCME CEQG (CCME, 1999, as updated) Water Quality Guidelines (WQG) for the Protection of Aquatic Life, Freshwater; and,
- Department of Fisheries and Oceans (DFO) Land Development Guidelines for the Protection of Aquatic Habitat (DFO, 1992).

4 Field Methodology

The field components of the investigation were completed in December 2017 and February 2018 and consisted of the following elements:

- Preliminary Planning Activities;
- Sediment Sampling;
- Surface Water Sampling; and
- Quality Assurance and Quality Control.

Field work was conducted following established industry protocols and specific guidance provided in the following documents:

- Canada-Ontario Agreement (COA) Sediment Task Group, Canada-Ontario Decision-Making Framework for Assessment of Great Lakes Contaminated Sediment (COA, 2008);
- CCME Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment, Volumes I to IV (CCME, 2016); and
- Canadian Standards Association (CSA) Z769-00 Standard, Phase II Environmental Site Assessment (CSA, 2000, as updated).

4.1 Project Set-up/Coordination

Prior to initiating any field work, SNC-Lavalin developed Site-Specific Health and Safety Plans (HASPs) for each stage of the work. The HASPs outlined potential hazards associated with the work, the Codes/Statutes to be met, rules of behavior, personal protective equipment to be worn, responsible individuals, and all related matters. All tasks completed as part of the investigation were conducted in compliance with the HASPs as well as with applicable statutory requirements and industry standards. Onsite health and safety procedures included an initial kick-off meeting and daily health and safety meetings with all field personnel and subcontractors onsite.

A site reconnaissance was conducted by SNC-Lavalin staff on November 27, 2017 to confirm accessibility in proposed sediment sampling areas. At this time, surface water depths and, where possible, the likely presence of sediment deposits was recorded and used in planning subsequent sediment sampling events.

Prior to any intrusive activities, Underground Service Locators Inc. (USL) Ottawa, Ontario was retained by SNC-Lavalin to locate private and public underground utilities (e.g. water, gas, hydro, sewers, telephone, etc.) at each work area. USL was contracted to provide re-marks as needed throughout the investigation to maintain valid utility clearances during each intrusive event. Copies of the utility clearance reports were kept on-file with field personnel during sediment sampling events.

4.2 Sediment Sampling

Sediment samples were collected from December 11 to 18, 2017 and from February 6 to 8, 2018. In December 2017, sediment samples were collected from shore (dams, locks or shoreline) either using a petite ponar or a manual core sampler. The petite ponar is a clam shell type sampler with a targeted

penetration depth of up to 7 cm. The manual core sampler was provided by Pine Environmental (Pine) of Toronto, Ontario and consisted of a stainless steel push type sampler equipped, as needed with dedicated liners, core catchers and end caps for sampler retention. In February 2018, sediment samples were collected through the ice surface by a manual drilling crew provided by Marathon Drilling Co. Ltd. (Marathon) of Greely, Ontario contracted by SNC-Lavalin. Following testing procedures to confirm ice thicknesses in the work area, sediment samples were collected using split spoon samplers advanced using a ½ weight (70 lb) hammer. Sediment sampling equipment (i.e. ponar, core sampler or split spoon) were decontaminated between sample locations by rinsing with water, followed by Alconox™, and a subsequent water rinse.

Within each work zone, sediment sampling locations were selected in proximity to the various structures where upgrades were proposed (i.e across all areas of the work zone including near locks, lock approaches and dams). During the planning stages of the sampling program, construction design was ongoing; therefore all potential construction areas were targeted. At the time of sampling, some of these targeted sampling areas were inaccessible due to strong currents, shoreline areas obscured by snow and/or unstable ice conditions. Figures 3 to 6 illustrate accessible sampling locations where sample retrieval was attempted.

Of thirty-five (35) sediment sampling locations where sampling attempts were made, a total of twelve (12) sediment samples were collected. Samples were collected to depths ranging from 10 cm to 60 cm below the mudline. The absence of sediment, low recovery or inability to successfully collect a sediment sample was documented at the remaining twenty-three (23) attempted sampling locations by recording the number of attempts and observations made using an underwater camera. GPS measurements were recorded at each sampling location.

Copies of field logs are provided in Appendix B and a photographic log of sampling activities is provided in Appendix C. Table 1 summarizes successful and unsuccessful sediment sampling attempts, including GPS coordinates, water levels and sampling depths. No sampling attempts were made at the Dam A work area due to accessibility restrictions (deep snow, obscured shoreline and lack of access roads for transporting equipment).

Sediment samples were identified using the following nomenclature:

PS-X-SED-Y, where:

- PS = Port Severn work area;
- X = Dam location (Dam G, Dam E, Dam D and Dam C as described in Section 1);
- SED = indicating sediment sample; and
- Y = sequential sediment sampling location

For sediment samples collected during the February 2018 event, a suffix of ‘S’ was applied for shallow sediment samples (0 to 0.6 m below the mud line).

Each sample was logged for stratigraphy (i.e. gravel, sand, silt, clay and colour) and inspected for visual and/or olfactory evidence of contamination. Sediment samples collected for volatile parameters (i.e. BTEX/F1) were transferred directly to laboratory supplied sample jars. Sediment samples for all other parameters were homogenized in a stainless steel bowl using a stainless steel spoon prior to transfer to

laboratory supplied sample jars. All samples for chemical analyses were placed in coolers with ice and transported following chain of custody protocols to ALS Laboratories (ALS) in Mississauga, Ontario. Samples for grain size analysis were transferred to Ziploc bags and transported to SNC-Lavalin GEM Ontario Inc.'s laboratory in Vaughn, Ontario.

Consistent with the PCOCs identified in the work plans (BluMetric, 2017), sediment samples were analysed for metals, inorganics, TOC, BTEX, PHC F1 to F4 and PAHs. In addition to the identified PCOCs, a subset of sediment samples were also analysed for organochlorine pesticides given historical agricultural land use in the area.

For comparison to O.Reg. 347 leachate quality criteria, three (3) sediment samples were analysed for metals and inorganics, volatiles, semi-volatiles, phenols and organochlorine pesticides by toxicity characteristic leaching procedure (TCLP).

ALS is recognized as accredited for the specific tests by the Canadian Analytical Laboratories Association (CALA). As indicated on the laboratory certificates of analyses in Appendix D, laboratory analyses were completed in accordance with standard methods.

4.3 Surface Water Sampling

Surface water samples were collected from December 11 to 18, 2017 and from February 6 to 8, 2018. A total of thirty-one (31) surface water samples were collected:

- ten (10) from the Dam G work area;
- nine (9) from the Dam E work area;
- six (6) from the Dam D work area; and
- six (6) surface water sampling locations at Dam C.

Surface water sampling locations are shown in Figures 3 to 6. Surface water samples were collected using dedicated bailers. Where possible, surface water sampling locations were co-located with sediment sampling locations and collected both prior to disruption of the river bed (i.e. prior to sediment sample collection) and post disruption (i.e. immediately following sediment sample collection). Surface water samples were collected to assess the relationship between total suspended solids (TSS) and field-measured turbidity readings and pre- and post-disruption samples were collected to provide a range of anticipated TSS and turbidity readings.

Surface water samples were identified using the following nomenclature:

PS-X-SW-Y, where:

- PS = Port Severn work area;
- X = Dam location (Dam G, Dam E, Dam D and Dam C as described in Section 1);
- SW = indicating surface water sample; and
- Y = sequential surface water sampling location

A suffix of 'D' was applied to indicate surface water samples collected after sediment disturbance.

Each collected surface water sample was field screened for TSS using an AYXS TSS meter and for turbidity using a HACH turbidity meter, each supplied by Maxim Environmental & Safety Inc. (Maxim) of Mississauga, Ontario. Field screening meters were calibrated by the supplier and calibrated in the field following manufacturer recommended procedures. Following field screening, samples were transferred directly to laboratory supplied sample bottles, placed in coolers with ice and transported following chain of custody protocols to ALS for TSS analysis.

4.4 Quality Assurance/Quality Control

A QA/QC program was implemented to minimize and quantify impacts introduced during sample collection, handling, shipping and analysis. Details of the QA/QC program are discussed in Appendix E.

5 Results

5.1 Water Depths and River Bed Conditions

Water depths measured in accessible sections of the work areas are provided in Table 1 and generally ranged from 1.1 m to 2.5 m. The exceptions were Dam G with a minimum water depth of 0.1 m and Dam D with a maximum water depth of 4.6 m. Insufficient data was collected to characterize the bathymetric profile of the project site or work areas.

Figures 19 to 22 generally illustrate an interpretation of the substrate at the Dam G, Dam E, Dam D and Dam C work areas, respectively. These figures represent a coarse interpretation of anticipated sediment depositional areas based on field observations during the site reconnaissance and field sampling events, including observations from shore and by underwater camera and the results of sampling attempts (i.e. the presence or absence of sediment, low recovery or inability to successfully collect a sediment sample by various sampling methods). These observations were then extrapolated to inaccessible areas (e.g. strong currents, shoreline obscured by snow and/or unstable ice conditions) and based on operational and construction details shared by PCA (e.g. concrete substrate in locks and dam operations). Based on the limited number of accessible sampling locations, substrate characterizations cannot be further inferred to areas upstream or downstream of the work areas. Observations are summarized in Table 1. Copies of field logs are provided in Appendix B and a photographic log of sampling activities is provided in Appendix C.

Areas of sediment accumulations were primarily confirmed at the Dam G and Dam C work area. Localized or limited deposits were also encountered east of the main dam at Dam D and near the east shoreline at the Dam E work area. Where sediment deposits were encountered, substrate materials in the Port Severn work area generally consisted of coarse sediment deposits, often interspersed with surficial cobbles or boulders. The substrate was littered with a discontinuous layer of aquatic vegetation, decaying leaves and other terrestrial vegetation and shells.

Refusal depths during the February 2018 sampling event ranged from 0.1 m to 0.6 m below the mudline (mbm). Refusal at these locations is inferred to be on bedrock based on observed bedrock at surface along work area shorelines. Sampling attempts and visual observations (i.e. from shore or with underwater video) confirmed the absence of significant sediment accumulations overlying the concrete floor of the lock at Dam D and the presence of a hard, rocky bottom along shorelines. The hard bottom encountered consisted of piled rocks or sloped rip-rap with moss / algae growth. Given the volume and flow rates of water passing through the Port Severn dams (in particular Dam D), the areas surrounding the flood gates are expected to be scoured (i.e. no appreciable sediment accumulation).

5.2 Sediment Grain Size Distribution

As shown in Table 2, eleven (11) of the twelve (12) sediment samples collected were submitted for grain size distribution analysis by hydrometer. There was insufficient sediment volume recovered at sampling location PS-G-SED-5 for grain size determination at this location; however, field observations suggest sediment composition at this location was similar to other samples collected from the Dam G work area. Copies of grain size distribution reports are included as Appendix F.

Shallow sediment characterized during the current investigation generally consisted of sand and gravel deposits with minor silt and clay (5 to 25% fines). The exception was the deepest sample collected at Dam G to a depth of 0.6 mbm comprised of relatively equal parts clay (33%), silt (33%) and sand (31%) and trace gravel (3%).

5.3 Sediment Chemistry

A total of twelve (12) sediment samples and three (3) blind field duplicates were analysed for metals, inorganics, TOC, BTEX, PHC F1 to F4 and PAHs. Nine (9) sediment samples and three (3) blind field duplicates were analysed for organochlorine pesticides. Three (3) sediment samples were analysed for TCLP waste characterization parameters. Sediment chemistry results are provided alongside regulatory comparison criteria in Tables 3A and 3B and concentrations exceeding regulatory criteria are summarized in Tables 4A through 4E and Figures 7 to 18. Waste characterization results are provided in Table 5.

The following subsections describe sediment chemistry quality with respect to the applicable federal and provincial regulatory guidelines and standards, following the rationale described in Section 3. To note, the laboratory reported concentrations of organochlorine pesticides were less than laboratory reportable detection limits (RDL) for all analysed samples; however, some RDLs exceeded regulatory comparison criteria as shown in Table 3A. Laboratory RDLs satisfying these stringent sediment quality criteria in samples with high moisture content is commonly not achievable by commercial laboratories. The raised RDLs have been further discussed in Section 7.1.

5.3.1 CCME CEQG – Probable Effect Levels

Sediment samples with concentrations greater than CCME CEQG PEL (1999, as updated) are presented in Table 4A.

Analysed PAH concentrations in four (4) sediment samples collected from Dam G exceeded CCME PEL.

Of analysed metals concentrations, lead in one (1) sediment sample collected from Dam G exceeded CCME PEL.

5.3.2 Atlantic Risk-Based Corrective Action screening levels

Sediment samples with concentrations greater than Atlantic RBCA screening levels (APIRI, 2012a) are presented in Table 4B.

Analysed petroleum hydrocarbon concentrations in seven (7) sediment samples exceeded RBCA screening levels for PHC F3, PHC F4 (based on gravimetric analyses) and maximum/total PHC concentrations. Of those seven (7) sediment samples, four (4) samples were collected from Dam G and three (3) samples were collected from Dam C.

5.3.3 CCME CEQG - Interim Sediment Quality Guidelines

Sediment samples with concentrations greater than CCME CEQG ISQG (1999, as updated) are presented in Table 3C.

Analysed PAH concentrations in eight (8) sediment samples exceeded CCME ISQG. Of those eight (8) sediment samples, five (5) samples were collected from Dam G, one (1) was collected from Dam D and two (2) samples were collected from Dam C.

Of analysed metals concentrations, lead in four (4) sediment samples exceeded CCME ISQG. Of those four (4) sediment samples, one (1) was collected from Dam G and three (3) samples were collected from Dam C.

5.3.4 MOE LEL Sediment Standards

Sediment samples with concentrations greater than MOE (2008 or 2011) sediment standards are presented in Table 3D.

Analysed TOC concentrations in eight (8) sediment samples exceeded the MOE standard. Of those eight (8) samples, four (4) samples were collected from Dam G, one (1) sample was collected from Dam D and three (3) samples were collected from Dam C.

Analysed PAH concentrations in four (4) sediment samples collected from Dam G exceeded MOE standards.

Analysed cyanide concentrations in two (2) sediment samples exceeded the MOE standard. Of those two (2) sediment samples, one (1) sample was collected from Dam G and one (1) sample was collected from Dam C.

Of analysed metals concentrations, nickel in one (1) sediment sample collected from Dam G exceeded the MOE standard.

5.3.5 Waste Characterization

Sediment samples analysed for waste characterization by TCLP analyses are presented alongside Ontario Regulation 347 (as amended) leachate quality criteria in Table 5. Concentrations of all analysed leachable parameters for the three (3) sediment samples analysed were less than laboratory RDLs and satisfied leachate quality criteria. The results indicate that excess sediment generated from construction activities would be classified as non-hazardous waste for the purpose of offsite disposal at a landfill in the Province of Ontario. The material would potentially require dewatering in order to pass a slump test and be considered a solid suitable for disposal. Should other management options for excess sediment be contemplated (e.g. onsite or offsite re-use), additional assessment would be required.

5.4 Surface Water Results

A total of thirty-one (31) surface water samples and three (3) blind field duplicate samples were analysed for TSS. Analytical results are presented in Table 6 alongside field screening results and CCME WQG (1999, as updated) and DFO guidelines (1992).

Of the seventeen (17) surface water samples collected pre-disruption, field turbidity screening results for two (2) of the samples marginally exceeded the CCME WQG. Field and laboratory measurements of TSS satisfied DFO guidelines for all pre-disruption surface water samples.

The remaining fourteen (14) surface water samples were collected after lake bed sediment was disrupted and are indicated with a “D” suffix. As expected, field turbidity and field and laboratory measured TSS exceeded CCME WQG and/or DFO guidelines for the majority of post-disruption samples. Exceptions were PS-G-SW-2D and PS-E-SW-3D, both at locations where limited to no sediment was recovered.

Surface water samples were collected for the purpose of establishing a site-specific relationship between TSS concentrations and sample turbidity to support water quality monitoring during construction activities. The TSS-turbidity relationship is further discussed in Section 7.8.

6 Conceptual Site Model

A conceptual site model (CSM) was developed for the site based on the results of the sediment and surface water investigation. The CSM is summarized in the following Table A and Figure 19 provides a visual representation of the CSM.

Table A. Conceptual Site Model

Physical Setting	
Site Setting	Port Severn is located within the Lakes Simcoe & Couchiching/Black River Source Protection Area and immediately upstream of the Severn Sound Source Protection Area. Both areas included in the South Georgian Bay Lake Simcoe Source Protection Region (South Georgian Bay, 2015).
Surface Water	The site is located between Severn Sound of Georgian Bay to the south, and Little Lake to the northeast. Surface water flow is from Little Lake toward Tug Channel to the south, and ultimately discharges into Georgian Bay via Severn Sound. Flow from Little Lake is regulated by Dams G, E and D and Lock 45 near Dam D.
Site Geology	The site is located within the Georgian Bay Fringe physiograsphic region characterized as a low-relief, driftless plain with local accumulations of winnowed till, glaciolacustrine sediments and organic soils with maximum thicknesses ranging from 2.0 to 3.0 m. Regional bedrock consists of Precambrian quartzofeldspathic gneissic and migmatitic rocks metamorphosed to upper amphibolite and granulite facies (AECOM, 2017). The results of the geotechnical investigation completed in 2017 identified approximately 1.5 m of lake sediments in the area of Dam D. Sediment consisted of sand and gravel with inclusions of organics and wood debris. No other boreholes were completed in submerged areas. Sediment was underlain by migmatite gneiss bedrock with weathered bedrock encountered at the interface of the overburden and bedrock (AECOM, 2017).
Water Depth	The following water depths were measured during field programs in December 2017 and February 2018: › Dam G: 0.1 m to 2.5 m › Dam E: 1.1 m to 2.5 m › Dam D: 1.2 m to 4.6 m › Dam C: 1.2 m to 2.5 m Insufficient data was collected to characterize the bathymetric profile

Physical Setting	
	of the site or sub-areas.
Sediment Stratigraphy	Shallow sediment characterized during the current investigation generally consisted of sand and gravel deposits with minor silt and clay (5 to 25% fines). The exception was the deepest sample collected at Dam G to a depth of 0.6 metres below mudline (mbm) comprised of relatively equal parts clay (33%), silt (33%) and sand (31%) and trace gravel (3%). Refusal depths during sampling activities ranged from 0.1 m to 0.6 m mbm. Refusal at these locations is inferred to be on bedrock based on observed bedrock at surface along work area shorelines. Figures 19 to 22 generally illustrate an interpretation of anticipated sediment depositional areas at the Dam G, Dam E, Dam D and Dam C work areas, respectively. It should be noted that characterization of sediment quality in proposed construction zones was limited by accessibility of targeted sampling locations and sampling methods. As such a limited number of sediment samples were collected and no deep samples were collected (maximum sampling depth of 0.6 mbm). There is the potential that sediments are present beneath hard bottoms encountered during sampling or in inaccessible areas (e.g. Dam D as demonstrated in the 2017 geotechnical investigation (AECOM, 2017).

Land Use	
Surrounding Land Use	Primary land uses in the Port Severn area consist of 77% forest, 15% residential, 7% wetland and 1 % commercial/other building (BluMetric, 2017). Downstream land uses are primarily residential and recreational (e.g. cottages) with docks within 1 km downstream (BluMetric, 2017).
Environmentally Sensitive Areas	Provincially significant wetlands are identified immediately downstream of the site, including south of Highway 400 immediately downstream of Dam G and along the east shore of Tug Channel immediately downstream of Dam D (OMNRF, 2018). Severn Sound supports a warmwater and migratory coldwater fishery and important fish habitat identified in the area includes walleye spawning habitat in Tug Channel immediately downstream of the site (where water exits from Gloucester Pool) and muskellunge nursery habitat are present scattered along the north short of Severn Sound

Land Use	
	between Waubaushene and Honey Harbour (SSRAPT, 1988).
Potable Water Use/Surface Water Vulnerability	The South Georgian Bay Lake Simcoe Source Protection Region (South Georgian Bay, 2015) identifies: › the municipal surface water intake for Port Severn immediately upstream of the site › Rope Subdivision municipal surface water intake in Tug Channel, immediately downstream of the site › Victoria Harbour municipal surface water intake in Severn Sound approximately 5 km to the south

Site History and Operations	
Possible Contaminant Sources	A wide range of past industrial activities are associated with the Trent-Severn Waterway including mining, lumber, foundries, milling, manufacturing and commercial transport. Upstream potential point sources of contamination specific to Port Severn include commercial marinas immediately upstream or surrounding the site, and a historic sawmill at the mouth of the Severn River in Port Severn that burnt down in 1896 (BluMetric, 2017).

Site Characterization	
Previous Investigations	No sediment characterization data from previous investigations in the Port Severn area were available.
Site Condition Standard Applied	For the current assessment, maximum contaminant concentrations in sediment were screened relative to CCME CEQG PEL (1999 as updated) for freshwater to identify contaminants of potential concern (COPC) as the CCME PELs represent concentrations above which adverse effects are expected to occur frequently. In the absence of CCME PELs for specific parameters, regulatory criteria from other jurisdictions were applied. These consisted of MOE (2008 and 2011) sediment standards and Atlantic RBCA (2012) screening levels as discussed in Section 3.0. To determine COPCs for the protection of human health, as per Health Canada guidance, the sediment concentrations were compared to the CCME SQG derived to be protective of human health direct contact exposures.
Contaminants of Potential Concern (COPC)	Contaminant concentrations exceeding CCME PEL or alternate screening benchmark (when a CCME PEL was not available) include:

Site Characterization	
	› PAHs o Acenaphthylene o Anthracene o Benzo(a)anthracene o Benzo(a)pyrene o Benzo(k)fluoranthene o Benzo(g,h,i)perylene o Chrysene o Dibenzo(a,h)anthracene o Fluoranthene o Fluorene o Indeno(1,2,3-cd)pyrene o Phenanthrene o Pyrene o Total PAHs › Metals o Lead o Nickel › Cyanide › Petroleum Hydrocarbons o PHC F3 o PHC F4 o Total PHC (C6-C50) Contaminant concentrations exceeding CCME SQG for human health include: › Lead These parameters were identified as COPC for further evaluation as discussed in Section 7.0.
Areas of Impact	PAH and lead concentrations exceeding CCME PEL, PHC concentrations exceeding Atlantic RBCA and nickel and cyanide concentrations exceeding MOE standards (for which there are no CCME guidelines) were identified in shallow sediment collected from Dam G. PHC concentrations exceeding Atlantic RBCA and a cyanide concentration exceeding the MOE standard were also identified in shallow sediment collected from Dam C. As contamination in the proposed construction areas is believed to be the result of historical upstream industrial activities, with no onsite sources identified, it is assumed that data for sediment accumulations in depositional areas identified at the work areas would be

Site Characterization	
	representative of sediment encountered during construction.
Receptors (Refer to Section 7.0 for further discussion)	
Human Receptors	Primary human receptors include construction workers, recreational users (swimmers, boaters, anglers) and residential users (potable water supply).
Sensitive Ecological Receptors	A species at risk assessment was not completed by SNC-Lavalin; however, PCA identified high quality fish habitat in the area and potential Species at Risk turtle habitat in downstream wetlands (BluMetric, 2017)
Exposure Pathways (Refer to Section 7.0 for further discussion)	
Human Receptors	Construction workers – exposure to COPC mitigated through PPE and other controls expected to be in place during construction Recreational Users – exposure to COPC in sediment through dermal contact with sediment and suspended sediment in surface water, and incidental ingestion of sediment suspended in surface water Residential Users – ingestion of water (potable water)
Aquatic Receptors	Direct contact with sediment and suspended sediments in surface water
Contaminant Migration	As no onsite contaminant sources have been identified and historical upstream sources have been identified as the primary source of any potential contamination, contaminants at the site are expected to be in constant flux (i.e. deposition and re-suspension). Figures 19 to 22 generally illustrate an interpretation of anticipated sediment depositional areas at the Dam G, Dam E, Dam D and Dam C work areas, respectively. Sediment migration within each sub-area is primarily influenced by strong currents associated with the dams and the nature of the substrate. Sediment was generally absent in close proximity to the flowing dams, within and surrounding the lock and along the rocky shoreline at Dam D and within the Dam E work area. Sediment accumulations were encountered in areas peripheral to flowing dams (e.g. east of Dam D) and in the Dam G and Dam C work areas.

7 Environmental Performance Objectives for Water Quality Management

This section provides verification that the environmental performance objectives (EPOs) used to assess water quality during construction activities along the Trent-Severn Waterway will provide adequate protection of human health and the aquatic environment at the point of discharge and in the receiving environment. This verification process generally follows the methodology established by Golder Associates (Golder) described in "Environmental Management Planning Considerations – Ottawa Wall Repairs Rideau Canal, Ottawa, Ontario" prepared for Public Service and Procurement Canada – Ontario Region in September 2017. Deviations from the Golder (2017) approach included:

- the use of additional guidelines to screen for COPC in the absence of CCME sediment quality guidelines;
- consideration of surface water as a potable water source; and
- the use of a more conservative method to estimate the exposure point concentrations in sediment to address limitations with the available dataset.

7.1 Summary of COPC Identified in Sediment

A statistical summary of the sediment results obtained from the sediment assessment carried out at Dams C, D, E, and G at Port Severn is provided in Appendix G (Table G.1). Maximum sediment concentrations were compared against federal and provincial sediment quality guidelines to identify COPC for further assessment of potential adverse effects to the aquatic environment and to human health as follows:

- The CCME PEL[2] and Atlantic RBCA sediment guidelines were used to identify COPC that warranted further assessment for potential adverse effects to freshwater aquatic life. In the absence of CCME or Atlantic RBCA sediment guidelines, Ontario MOE sediment[3] standards were applied.
- The CCME soil quality guidelines[4] for residential land use for direct contact were used to identify COPC that warranted further assessment for potential adverse effects for human health.

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[2] CCME sediment quality guidelines are available at two levels: the interim sediment quality guidelines (ISQG) and probable effects level (PEL). The ISQGs are intended to represent a concentration below which adverse biological effects are expected to rarely occur, whereas the PEL represents a concentration below which adverse effects may occasionally occur (CCME, 1995). The use of the PELs as a benchmark to screen for contaminants of potential concern (COPC) is considered appropriate and is consistent with the approach recommended by Fisheries and Oceans Canada in their National Procedure for Assessing Aquatic Sites (DFO, 2016).

[3] The lowest effect level (LEL) values were used to screen for COPC in the absence of CCME PEL values. Although severe effect level (SEL) values are considered to be more comparable to the PEL values, the LEL values were used because they are provided as the sediment quality guidelines in Ontario Regulations 153/04. The approach is considered conservative.

[4] There are currently no human health-based sediment guidelines established by a Canadian jurisdiction. In the absence of applicable human health-based sediment guidelines, Health Canada (2017a) recommends using soil quality guidelines (SQG) for

The COPC in sediment identified for further assessment of potential adverse effects to aquatic life include:

- Cyanide;
- Metals (lead and nickel);
- PHCs (F3, F4, and total PHCs); and
- PAHs (Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, Phenanthrene, Pyrene and total PAHs).

Total PHCs and total PAHs were identified as COPC; as such, all individual PHC and PAH parameters were also carried forward as COPCs and were included in the assessment of potential adverse effects to aquatic life.

Pesticides analyzed in sediment were all below reportable detection limits (RDLs), however for several pesticide parameters the RDLs were elevated above the sediment quality guidelines in all samples. Pesticides were not retained as COPC for further assessment of potential adverse effects to human health or the aquatic environment as there is no evidence to suggest the presence of “contamination”. In addition, pesticides are generally of low solubility, and very few of the parameters analyzed for in sediment have available surface water quality guidelines to screen predicted surface water concentrations against. On this basis, even if pesticides were carried forward as COPCs based on the elevated RDLs, the results of the assessment would not change.

Although the maximum concentration of lead in sediment collected from Dam G exceeds the soil quality guideline for residential/parkland land use, further assessment of this exposure pathway was not deemed to be warranted due to the limited number of exceedances (i.e. only one sample) and the magnitude of the exceedance (i.e. 1.3 times the SQG).

7.2 Potential Exposure to Disturbed Sediment

The potential exposure pathways for human and ecological receptors to come into contact with disturbed sediment during the construction activities along the Trent-Severn Waterway are summarized in Table B, and are similar to the exposure pathways identified by Golder (2017) for Ottawa Wall Repairs along the Rideau Canal. Controls will be expected to be put in place to mitigate sediment exposure to workers during the construction activities (refer to Section 8.0). As summarized in Table B, there is potential for freshwater aquatic life, as well as recreational/residential users of Port Severn to come into contact with disturbed sediment in the water column as well as surface water containing contaminants released from sediments from the Port Severn work area. The potential for effects from this contact was evaluated through water quality predictions and comparisons to applicable water quality guidelines as described in Section 7.3. It is noted that although risk based approaches were used to evaluate potential risk from sediment exposure, this document is not intended to be an ecological or human health risk assessment.

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residential/parkland land use for direct contact exposure pathways (i.e. soil ingestion and dermal contact). It is acknowledged that human exposure to soil may be different than human exposure to sediments (i.e. potentially greater dermal adherence and ingestion rates of sediments). However, for the purpose of this report, the SQG were considered to be relevant and appropriate to use as a screening tool.

Table B. Potential Contact with Disturbed Sediment

Receptor	Exposure Pathway	Potential for Contact	Addressed in Assessment?
Freshwater aquatic life	Suspended sediments in water discharged from the work areas	Possible	Yes, through comparison to WQGs
	Contaminants released from suspended sediments in water discharged from work areas	Possible	Yes, through comparison to WQGs
Workers	Dermal contact with sediments from the work areas	No – all workers are expected to wear personal protective equipment (PPE) (Section 8.1)	No
	Dermal contact with water from the work areas containing contaminants released from sediments	No – all workers are expected to wear PPE (Section 8.1)	No
	Incidental ingestion of water	No – considered to be an insignificant exposure pathway. Additionally, controls expected to be in place (Section 8.1)	No
Recreational Users	Dermal contact with sediment from the work areas	No – controls expected to be in place to prevent the general public from entering the work area (Section 8.1)	No
	Dermal contact with suspended sediments in water discharged from the work areas	Possible	Yes, through comparison to WQGs
	Contaminants released from suspended sediments in water discharged from the work areas	Possible	Yes, through comparison to WQGs
	Incidental ingestion of water	Possible	Yes, through comparison to WQGs

Receptor	Exposure Pathway	Potential for Contact	Addressed in Assessment?
	Dermal contact with disturbed sediments that have migrated and resettled as bedded sediment downstream of work areas	Possible	Yes, through comparison to soil quality guidelines
Residential Users	Ingestion of water (potable water source)	Yes – Rope Subdivision municipal surface water intake in Tug Channel, immediately downstream of the site	Yes, through comparison of WQGs

7.3 Regulatory Context

The management of the Trent-Severn Waterway is governed by the Historic Canals Regulations (under the *Department of Transportation Act*), which designates the waterway as being under the jurisdiction of PCA. PCA has established an environmental performance objective (EPO) for the management of water quality at the point of discharge for TSS of 25 mg/L above background during construction activities in the waterway. In addition, an upper discharge limit for TSS of 75 mg/L (absolute value) has been established to protect fish from the physical effects of suspended particles (DFO, 1992).

Although the Trent-Severn Waterway is under federal jurisdiction, provincial regulations such as the *Ontario Environmental Protection Act* and *Water Resources Act* are valuable resources used in planning water quality management programs to be implemented during a construction projects to ensure that aquatic resources are protected. These provincial acts have a shared goal of preventing the discharge of contaminants into the natural environment that cause adverse effect to human health or the environment. Ambient water quality guidelines (WQGs), such as the CCME Environmental Quality Guidelines and Health Canada's Drinking Water Quality Guidelines, can be used as screening tools for assessing the potential for adverse effects. WGQs are intended for long-term protection of human health and the environment and typically have a high level of conservatism (i.e. safety factors) for broad application to water bodies/potable water sources across the country. WQGs do not have a legal standing and are not intended to be applied directly to effluent discharges, rather they are intended to be applied at the point of exposure (i.e. in the receiving environment, to tap water) and provide a generic indication of concentrations at which specific levels of protection may be achieved. WQGs have been derived for the protection of several uses including aquatic life, drinking water, and recreational use. These WQGs are summarized in Appendix G (Table G.2) and have been used in this assessment to evaluate the potential for effects to the aquatic environment and human health in the receiving environment.

The regulatory driver for establishing EPOs for environmental management of the construction activities along the Trent-Severn Waterway are related to Section 36 of the *Fisheries Act*, which contains a general prohibition against the deposit of a deleterious substance into water frequented by fish or in any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the original deleterious substance, may enter such water. The *Fisheries Act* applies to the

point of discharge. The *Fisheries Act* does not specify what a deleterious substance is, with the exception of certain sector-based regulations such as the Metal Mining Effluent Regulations. Rather, the concentration or properties of a substance considered to be deleterious under the *Fisheries Act* are left to interpretation by professionals. Environment and Climate Change Canada (ECCC) have frequently applied the 96-hr LC_{50} rainbow trout toxicity test[5] as a defining endpoint where 96-hr $LC_{50} \geq 100\%$ is required to comply. As such, the fish acute toxicity benchmarks are primarily based on 96-hr LC_{50} for fish species, and have been used to assess the potential for acute lethality to fish (Appendix G, Table G.3).

7.4 Approach to Water Quality Assessment

To ensure the protection of human health and the aquatic environment during construction activities within the Trent-Severn Waterway, the PCA EPO was evaluated based on concentrations of COPC identified in sediment at the project site. As indicated in Section 7.3, the PCA EPO for TSS of 25 mg/L is intended to be applied as "above background". However for the purpose of this assessment, the TSS of 25 mg/L was treated as an absolute value to provide a consistent evaluation across each work area within the Trent-Severn Waterway, as the background value of TSS is likely to vary between work areas. Verification of the PCA EPO (TSS of 25 mg/L) for application at the point of discharge followed the step-wise approach taken by Golder (2017), which is detailed below.

1. Individual contaminant concentrations in water were predicted for the project site using a mass balance model based on sediment chemistry data from the sediment assessment program included in this report (Section 7.5). A range of TSS concentrations (5 to 100 mg/L) was incorporated into the mass balance model to account for potential physical effects to aquatic organisms and habitat from suspended sediments.
2. Predicted water concentrations were screened against ambient WQGs for freshwater aquatic life, recreational use, and drinking water (Section 7.5).
    1. Where ambient WQGs for freshwater aquatic life were exceeded, the safety factor incorporated into the WQG derivation was reviewed. Where the predicted water concentration was within the safety factor, the exceedance was not considered to represent an environmentally relevant risk of adverse effects at the point of discharge (Section 7.5).
    2. The potential for mixture toxicity was evaluated for the project site using an additivity model and fish acute toxicity benchmarks (Section 7.6).
    3. Provide an evaluation of whether the PCA EPO of 25 mg/L during construction activities will be protective of aquatic biota and downstream users of the surface waters of Port Severn (Section 7.7). In the event that the EPO is found to not be sufficiently protective of human health and/or the aquatic environment, project-specific EPO(s) for TSS will be calculated.
    4. A site-specific TSS-turbidity relationship was calculated using the data collected during the sediment assessment (Section 7.8). Based on the site-specific TSS:turbidity relationship, turbidity levels that will be associated with the EPO(s) to be used as real-time measurements to manage environmental issues during construction activities were determined.
    5. The uncertainty (Section 7.9) associated with the derivation of the EPO was evaluated and mitigations (Section 8.1) to help address potential uncertainties were identified. Considerations for monitoring are provided in Section 8.2.

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[5] A 96-hour LC_{50} rainbow trout toxicity test is a laboratory-based test in which 10 rainbow trout juveniles are placed in the test water (Environment Canada, 1990). To pass the test, more than half of the individuals must remain alive in undiluted test water by the end of the four day test.

7.5 Water Quality Estimates

Predicted concentrations of COPC in surface water resulting from the suspension of sediments during construction activities were estimated according to the methodology established by Golder (2017) as the product of the concentration in sediments and a potential TSS concentration in water, as follows:

$$Conc_{COPC\ in\ water} = \frac{Conc_{COPC\ in\ sediment} \times Conc_{TSS\ in\ water}}{1{,}000{,}000}$$

Where:

$Conc_{COPC\ in\ water}$ = concentration of the COPC in water (mg/L)

$Conc_{COPC\ in\ sediment}$ = concentration of COPC in sediment (mg/kg)

$Conc_{TSS\ in\ water}$ = concentration of total suspended solids in water (mg/L)

1,000,000 = conversion from kilograms to milligrams of sediment

Predicted water concentrations were based on:

- Concentrations in sediments identified in each work area were screened against federal and provincial sediment and soil quality guidelines to identify COPC for further assessment (Appendix G, Table G.3), as summarized below:
- Characterization of sediment quality in proposed construction zones at each work area was limited by inaccessible areas (e.g. strong currents, shoreline obscured by snow and/or unstable ice conditions). As contamination in the proposed construction areas is believed to be the result of historical upstream industrial activities, with no onsite sources identified, it is assumed that data for sediment accumulations in depositional areas identified at the work areas is representative of sediment that will be encountered during construction. It should be noted that no deep sediment samples were collected due to shallow refusal (maximum sampling depth of 0.6 m) and sediment samples were successfully collected from accumulations at a limited number of sampling locations. As noted in Section 5.1, due to the volume and flow rates of water passing through the flood gates at each dam, the areas surrounding the flood gates are expected to be scoured (i.e. no appreciable sediment accumulations). Therefore, it is assumed that the sediment samples collected from each work area would be representative of the sediment conditions within the construction zone. As the dataset for the Port Severn project site was limited for each work area, the following decision rule was used for water quality estimates at each work area:
    - If the number of samples at the work area was less than 5, the 90th percentile concentration in sediment from the entire project site (Dams G, E, D and C) was used to predict water concentrations. The 90th percentile concentrations were assumed to be representative of sediment that may be disturbed. Suspended sediments in water in a given work area are expected to be a mix of sediments disturbed from multiple points and depths. Due to the limited data set for the Port Severn project site, the 90th percentile was conservatively calculated rather than the mean or median to weight the concentration towards the higher concentrations observed at the project site. The 90th

percentile concentrations were calculated using linear interpolation within the ranked data set.

- If the number of samples at the work area was greater than 5, the 90th percentile concentration in sediment at the specific work area was used to predict water concentrations.

› Concentrations were evaluated based on a range of possible TSS encountered during construction activities (from 5 to 100 mg/L). Although the maximum allowable TSS concentration at point of discharge will be set at the CCME WQG for short-term exposure of 25 mg/L, higher TSS concentrations were also used to provide an evaluation of the potential for effects if discharges have higher levels of TSS than 25 mg/L.

The results of the modelling for each work area are presented in Appendix G (Tables G.4 and G.5). As outlined in the decision rule above, Dam G was the only area with an adequate number of samples collected to characterize the given work area; as such the 90th percentile concentration from Dam G was used to predict water concentrations associated with construction activities at Dam G, while the 90th percentile from the entire project site was used to predict water concentrations associated with construction activities at the remaining work areas (Dam E, D, and C).

The predicted water concentrations were compared to ambient WQG for protection of aquatic life, recreational use, and drinking water. Based on a TSS of 25 mg/L and the 90th percentile sediment concentration at Dam G, the predicted water concentrations exceed the WQG for aquatic life for several PAHs (Appendix G, Table G.4), However, as noted in Section 7.3, ambient WQGs are not intended to be applied directly to the point of discharge and thus have been used as a screening tool to identify which parameters warrant further assessment. For PAHs, the greatest exceedances (i.e. up to 8 times the respective WQG at Dam G) were for anthracene, benzo(a)anthracene, benzo(a)pyrene, fluoranthene, and pyrene. However, all these exceedances of the WQGs at each of the TSS levels assessed were within the 100-fold safety factor incorporated into the guideline derivation.

The predicted water concentrations based on a TSS of 25 mg/L and the 90th percentile sediment concentration from the entire project site were below the WQG for freshwater aquatic life for all COPC except pyrene (i.e. 1 times the WQG), which was within the safety factor used in the derivation of the WQG for pyrene (Appendix G, Table G.5). Based on a TSS of 75 mg/L and the 90th percentile sediment concentration from all work areas, the predicted water concentrations of cyanide and metals were all below the respective WQGs for protection of aquatic life. At a TSS of 100 mg/L, a marginal exceedance of the WQG for lead was predicted based on 90th percentile sediment concentrations from the entire site.

The predicted benzo(a)pyrene concentration in water also exceeds the drinking water quality guideline based on a TSS of 50 mg/L and the 90th percentile sediment concentrations at Dam G (Appendix G, Table G4) and based on a TSS of 100 mg/L and the 90th percentile sediment concentrations across the site (Appendix G, Table G5). The drinking water quality guideline for benzo(a)pyrene is not expected to be exceeded at a TSS of 25 mg/L at any of the work areas. Based on the predicted exceedance of the potable groundwater guideline at higher TSS concentrations (i.e. TSS of 50 mg/L or greater) extra caution should be used during construction activities, especially at Dam G, to ensure the TSS in the receiving environment does not exceed 25 mg/L.

The predicted water concentrations did not exceed the WQGs for recreational use. As such, the construction activities at Port Severn are not expected to cause incremental risk to recreational users downstream of the work areas.

Based on the evaluation of individual COPCs, the PCA EPO of 25 mg/L is considered to be protective of human health and aquatic life in the receiving environment at Port Severn.

7.6 Potential for Toxicity Mixture

The water at the point of discharge from a given work area could contain several COPCs at various concentrations, plus additional parameters for which WQGs and toxicity data may not exist. The assessment of individual effects from each of these COPC assessed individually could potentially underestimate the potential toxicity of the mixture of COPCs. According to the methodology established by Golder (2017), the potential toxicity of the mixture of COPCs was assessed using an additivity model of the sum of Toxic Units (TUs)[6]to assess whether the predicted water concentrations could result in acute effects when additivity is taken into account.

The model assumes a similar mode of toxicity among the COPCs included in the sum of TU. The toxic mode of action of the COPCs identified in sediment at Port Severn is summarized in Table C.

Table C. Mechanism of Toxic Action

Contaminant of Potential Concern	Mechanism of Toxic Action	Reference
Cyanide	Respiratory Toxicant	BC MOE, 1986
Lead	Ionoregulatory Disruption	Rogers *et al.,* 2003
Nickel	Respiratory Toxicant	Pane *et al.,* 2003
PHCs	Narcosis	APIRI, 2012b
PAHs	Narcosis, Endocrine Disruption, Photo-toxicity	DiToro *et al.,* 2000; Oris and Giesy, 1987

The TU for each COPC is calculated by dividing the predicted water concentration by the acute toxicity value, as follows:

[6] The Toxic Unit (TU) approach normalizes the contribution of each COPC relative to its acute toxicity value (LC_{50} for fish) (Rand and Petrocelli, 1985). When the sum of individual COPC TUs (∑TUs) is less than one, acute mixture toxicity is not expected. Where ∑TUs is greater than one, acute mixture toxicity could occur.

$$TU_{COPC} = \frac{Conc_{COPC\ in\ water}}{LC50_{COPC}}$$

Where TU_{COPC} = toxic unit of a given COPC

$Conc_{COPC\ in\ water}$ = concentration in water of a given COPC

$LC50_{COPC}$ =Acute lethality concentration of a given COPC (for fish)

Based on the mechanism of toxicity, the sum of TU was determined for respiratory, ionregulatory, and narcotic toxicants. Where ∑TU <1, then acute toxic effects are not expected. If the ∑TU > 1, acute toxic effects may be predicted for fish.

The assessment of acute lethality to fish was based on a worst case scenario of COPC concentrations in water attributed to construction activities (i.e. TSS of 100 mg/L and the 90th percentile sediment concentrations at both Dam G and the entire project site). The results of this assessment are provided in Appendix G, Tables G.6 and G.7. The ∑TU for respiratory, ionoregulatory, and narcotic toxicants are all less than one, which suggests that the mixture toxicity is not expected to cause acute lethality to fish. The ∑TU is also notably lower than one, which allows for some uncertainty with how other parameters may contribute to toxicity at the point of discharge. Where the TSS concentration at the point of discharge is less than 100 mg/L, mixture toxicity would not be expected. Therefore, the PCA EPO of 25 mg/L TSS is expected to be protective against acute lethality to fish.

7.7 Project Environmental Performance Objectives

7.7.1 Point of Discharge

The above evaluation verified that the use of the CCME short-term TSS WQG of 25 mg/L will be protective of human health and the aquatic environment. Therefore, a TSS of 25 mg/L is proposed as the primary EPO for application of discharge from the work areas.

Recommended responses to exceedances of the recommended EPO at the point of discharge are as follows:

- In the event that the maximum TSS value of 75 mg/L is exceeded at the point of discharge, or TSS is < 75 mg/L but more than 25 mg/L above background for > 24 hours, the construction work should be stopped and the work site and methods reviewed to determine appropriate mitigation measures to reduce TSS. Once the mitigations are implemented, work can resume.
- In the event that the TSS is < 75 mg/L but more than 25 mg/L above background for < 24 hours, the work site and work activities should be reviewed to determine appropriate mitigation measures to reduce TSS.
- Additional monitoring recommendations are provided in Section 8.2 to address routine activities and accidents/malfunctions.

7.7.2 Receiving Environment

For the receiving environment outside the work area, the EPOs are intended to be ambient WQGs for parameters indicative of dewatering effluent from the work area (i.e. parameters identified as having the

potential to exceed the WQGs based on predicted water concentrations). For TSS, this value is the CCME WQG for short-term exposure (i.e. < 24 hours) of 25 mg/L above background and 5 mg/L above background on average for long-term exposure (i.e. 30 days).

For other parameters, the potential WQG exceedances will also need to consider the potential for WQG exceedances upstream of the work area. For example, metals and petroleum hydrocarbons (including PAHs) could enter the Trent-Severn Waterway from releases at marinas, poorly maintained boats travelling in the waterway or from surface runoff from roadways through storm drains during rain events. Intermittent exceedances above the WQG protective of aquatic life due to incremental additions from the project should not automatically be assumed to represent adverse effects to the aquatic environment. Rather, the contractor's qualified professional should take into account the magnitude and duration of the exceedance, and provide a professional opinion regarding the potential for adverse effect on the aquatic environment and the appropriate mitigation measures that may need to be undertaken.

Notwithstanding the above discussion, WQG exceedances above the drinking water quality guideline (i.e. benzo(a)pyrene) should be addressed immediately, due to the potable water intake at Tug Channel, immediately downstream from the work area.

Recommended responses to exceedances of the recommended EPOs for the receiving environment are as follows:

- In the event that the TSS value is > 25 mg/L above background for > 24 hours (and an absolute maximum of 75 mg/L at the point of discharge has not been exceeded), the construction work should be stopped and the work site and methods reviewed to determine appropriate mitigation measures to reduce TSS. Once the mitigations are implemented, work can resume.
- In the event that the WQG for drinking water quality has been exceeded downstream of the work area, the work should be stopped and the work site and methods reviewed to determine appropriate mitigation measures to reduces TSS. Once the mitigations are implemented, work can resume.
- In the event that the TSS value is > 25 mg/L above background for < 24 hours (and an absolute maximum of 75 mg/L at the point of discharge has not been exceeded), the work site and work activities should be reviewed to determine appropriate mitigation measures to reduce TSS.
- In the event that TSS in the receiving environment is on average > 5 mg/L above background for > 30 days (i.e. if the work in a given area lasts longer than 30 days), the contractor should inspect the work site and work activities should be reviewed to determine appropriate mitigation measures to reduce TSS.
- It is noted that at Dam G, a WQG exceedance of the drinking water guideline for benzo(a)pyrene was predicted at TSS > 25 mg/L. When all data was considered, benzo(a)pyrene concentrations were predicted to be above the drinking water guideline at TSS of 100 mg/L. As noted above, a potable water intake is present at Tug Channel, proximate to the work area. While it is anticipated that some treatment of the water would occur prior to consumption, responses should be cautiously implemented. Furthermore, if there is uncertainty regarding the potential for elevated TSS concentrations to have resulted in impacts to potable water, point of exposure (i.e. tap water) samples should be collected.
- The above criteria should be used to guide responses to exceedances. Additional monitoring recommendations are provided in Section 8.2 to address routine activities and accidental releases.

7.8 Site-Specific TSS: Turbidity Relationship

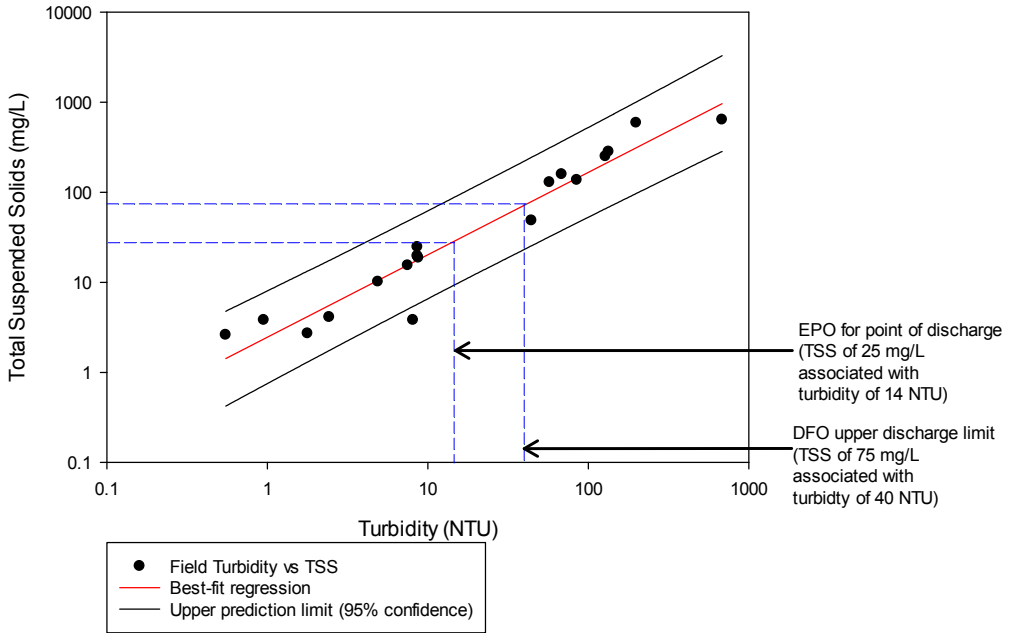
A site-specific relationship between TSS and turbidity was developed based on field measurements of turbidity and analytical results for TSS collected during the sediment assessment at Port Severn (Figure A). A linear regression line was fit to the data, and the following equation represents the relationship between TSS and turbidity at the Port Severn project site:

$$y = 0.9160x + 0.3896 \quad (r^2 = 0.92)$$

Based on the above equation, the turbidity associated with the PCA EPO of 25 mg/L of TSS is 14 Nephelometric turbidity units (NTU), while the DFO upper discharge limit of 75 mg/L is associated with an equivalent turbidity of 40 NTU.

Both turbidity and TSS are intended to be applied as “above background” levels. Based on the data collected in the field prior to sediment collection (i.e. predisturbance samples), the average background TSS was less than the reportable detection limit of 2 mg/L, while the average background turbidity was approximately 2 NTU.

Figure A: Site-specific relationship between TSS and turbidity at Port Severn Project Site



7.9 Uncertainty Assessment

This technical assessment was a predictive exercise to validate the use of PCA EPO of 25 mg/L during construction activities in the Trent-Severn Waterway for the protection of the aquatic environment and recreational/residential users. Although predictive tools are useful for the planning and management of likely conditions encountered during construction activities, it is important to recognize the major uncertainties associated with the modeling and to consider the implications of these uncertainties on the predictions made. The identification of the uncertainties will assist in the recommendation of appropriate mitigation measures and monitoring tools for the project. The main uncertainties are summarized in Table D.

Table D. Summary of the Uncertainty Assessment

Assumption	Uncertainty	Under- / over-estimate of impact	Rationale
Sediment assessment of work areas is representative of current conditions	Moderate	Under to over	In some work areas, relatively few samples were collected (i.e. only 1 sample collected at both Dam D and E). However, the 90th percentile of sediment concentrations for the entire project site were used to weight the assessment to higher concentrations. Monitoring will be conducted to confirm the findings of the assessment (Section 8.2).

Assumption	Uncertainty	Under- / over-estimate of impact	Rationale
All of the contaminant mass in the bulk sediment is associated with particles	Moderate	Over	A conservative assumption of the water quality model is that all of the contaminant mass in the bulk sediment is associated with particles. In reality, contaminants in bedded sediments may be bound to particles or be in the porewater (i.e. as a complex with organic carbon or other binding phases). As such, the assumption for partitioning the sediment-borne contaminants may result in an over estimate of water-borne concentrations. Monitoring will be conducted to confirm the findings of the assessment (Section 8.2).
Water quality at the point of discharge will be equivalent to the predicted concentrations of COPCs in water	Moderate	Over to Neutral	The assessment assumed that the 90th percentile concentration of each COPC would occur in the suspended sediments at the point of discharge. Monitoring will be conducted to confirm the findings of the assessment (Section 8.2).
Interaction of contaminants in the mixture will not result in effects greater than estimated through the use of WQGs	Low	Over to Neutral	The WQGs used in the initial screening of predicted water quality estimates were conservative and applicable to chronic exposures. Monitoring will be conducted to confirm the findings of the assessment (Section 8.2).
Interaction of contaminants in the mixture will not result in effects greater than estimated through the additivity model	Low	Over to Neutral	The additivity model was based on a worst case scenario of a TSS of 100 mg/L and 90th percentile sediment concentrations. The results suggest that acute lethality to fish would not occur at or close to the PCA EPO of 25 mg/L. Monitoring will be conducted to confirm the findings of the assessment (Section 8.2).

8 Mitigation Measures and Monitoring Requirements

It was deemed appropriate that the different contractors hired to complete structural upgrades of various dam and lock structures on the Trent-Severn Waterway would follow consistent procedures in selecting and implementing mitigation measures to deal with potentially contaminated sediments which might be encountered at the different sites. Similarly, consistent monitoring requirements during construction activities would be identified. General mitigation measures and monitoring requirements which may apply to these construction activities are detailed in Appendix H. Site-specific considerations are summarized in the following sections.

8.1 Mitigation Measures

General mitigation measures to reduce the potential for remobilization of work-site contaminated sediment due to construction activities in the Trent-Severn Waterway and to protect aquatic life within the Waterway are described in Appendix H. Table E summarizes site-specific considerations in implementing these mitigation measures.

Table E. Summary of Site-Specific Considerations for Mitigation Measures

Related Mitigation Measure	Site-Specific Consideration
Environmental Performance Objectives (EPOs)	Point of Discharge: Turbidity <14 NTU or TSS <25 mg/L (refer to Section 7.7.1) Receiving environment: Turbidity <14 NTU or TSS <25 mg/L (refer to Section 7.7.2)
MOECC Spills Action Centre Reporting Threshold	Based on the assessment in this report, it is recommended that a TSS > 75 mg/L (40 NTU) be considered a threshold for reporting of a release of sediment-laden water.
Contaminants of Potential Concern (COPCs)	Should additional testing or characterization be required, as a minimum, samples should be analysed for cyanide, metals (lead and nickel), PHC F1 to F4 and PAHs. Samples may be analysed for additional characterization parameters at the discretion of the qualified professional retained by the Contractor.
Potential for COPCs to Exceed Potable Water Quality Guidelines	Based on the predicted exceedance of the potable groundwater guideline at higher TSS concentrations (i.e. TSS of 50 mg/L or greater) extra caution should be used during construction activities, especially at Dam G, to ensure the TSS in the receiving environment does not exceed 25 mg/L (14 NTU).
Potential for Volatile Contaminants	While no volatile COPCs were identified in sediment, the potential for vapours to emanate from contaminated sediment is noted. The Contractor will need to evaluate Health and Safety protocols,

Related Mitigation Measure	Site-Specific Consideration
	including worker exposure to contaminants and vapours not included in the current assessment, in accordance with applicable health and safety regulations.
Work Areas Requiring Additional Mitigation	The highest levels of contaminants have been identified in sediment at Dam G. A barrier should be placed on the sediment surface to minimize disruption of the sediment during construction activities after the work area is dewatered.
Characterization of Imported Material	Imported material used to restore the grade of the river bed to pre-construction elevations should be tested for a minimum analytical suite consisting of cyanide, metals, PHC F1 to F4 and PAHs. Additional parameters may be analyzed at the discretion of the Contractor's qualified professional. Imported material will be confirmed to be clean if it satisfies sediment quality guidelines (refer to Section 3.1). DFO and other regulators should be consulted to determine if other requirements would also apply (e.g. matching substrate grain size).
Species at Risk	A Species at Risk Assessment has not been completed for the project site. Section 6.0 provides a description of sensitive ecological receptors identified for the site.

8.2 Monitoring Requirements

Minimum monitoring requirements representing expected outcomes and general considerations for the development of work-specific monitoring programs relating to construction activities in the Trent Severn Waterway are detailed in Appendix H. Table F summarizes site-specific consideration in developing these monitoring programs:

Table F. Summary of Site-Specific Considerations for Monitoring

Related Mitigation Measure	Site Specific Consideration
Environmental Performance Objectives (EPOs)	Point of Discharge: Turbidity <14 NTU or TSS <25 mg/L (refer to Section 7.7.1) Receiving environment: Turbidity <14 NTU or TSS <25 mg/L (refer to Section 7.7.2)
Sampling following an Exceedance of the EPO in the Receiving Environment	To assess the potential impacts to potable water following an exceedance of the EPO in the receiving environment, samples should be collected at the point of exposure (i.e. treated potable water at the finished water sampling

Related Mitigation Measure	Site Specific Consideration
	port at the Water Treatment Plant, and at a sampling location representative of the raw water intake for the potable water source and analyzed for PAHs. Analysed concentrations in tap water will be confirmed acceptable if they do not exceed water quality guidelines for drinking water (refer to Table G2).
Surface Water Sampling	Surface water samples will be submitted for chemical analysis of cyanide, total and dissolved metals, PHC F1 to F4, PAHs, and TSS to verify the water quality predictions made in this report. Analysed concentrations in surface water collected at the point of discharge and downstream of construction activities will be confirmed acceptable if they satisfy water quality guidelines and screening benchmarks summarized in Table G2.
Characterization of Imported Material	Imported material used to restore the grade of the river bed to pre-construction elevations should be tested for a minimum analytical suite consisting of cyanide, metals, PHC F1 to F4 and PAHs. Additional parameter may be analysed at the discretion of the Contractor's qualified professional. Imported material will be confirmed to be acceptable if analysed concentrations satisfy sediment quality guidelines (refer to Section 3.1).
MOECC Spills Action Centre Reporting Threshold	Based on the assessment in this report, it is recommended that a TSS > 75 mg/L (40 NTU) be considered a threshold for reporting of a release of sediment-laden water.
Sampling following a Reportable Release of Sediment-Laden Water	To assess the potential impact of a release of sediment-laden water exceeding the reporting threshold, samples of the discharge water should be collected and analysed for cyanide, total and dissolved metals, PHC F1 to F4, PAHs, and TSS, as well as acute toxicity testing for rainbow trout or fathead minnows. Concurrently, water quality samples in the Trent Severn Waterway upstream and downstream of the discharge should be collected and analysed for cyanide, total and dissolved metals, PHC F1 to F4, PAHs, and TSS.
Sampling following Observation of a Sheen	To assess the potential impact of a sheen, a minimum of three sediment samples will be collected from the affected area and analysed for PHC F1 to F4. Analysed concentrations in sediment will be confirmed acceptable if they do not exceed site-specific maximum concentrations (refer to Table G1).

Related Mitigation Measure	Site Specific Consideration
Sampling following Other Visual or Olfactory Evidence of Contamination	To assess the potential impact of other observed contamination, a minimum of three sediment samples will be collected from the affected area and analysed for the relevant contaminants of concern as dictated by the qualified professional. Analysed concentrations in sediment will be confirmed acceptable if they do not exceed site-specific maximum concentrations (refer to Table G1).

9 Closure

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10 References

AECOM Canada Ltd. (AECOM), 2017. Geotechnical Investigation for Port Severn Area Dams, Fixed Bridge and Lock Rehabilitation, Port Severn, Ontario. May, 2017.

Atlantic Partnership in RBCA Implementation (APIRI), 2012a. Atlantic RBCA (Risk-Based Corrective Action) for Petroleum Impacted Sites in Atlantic Canada, Version 3, User Guidance. Appendix 2: Ecological Screening Protocol for Petroleum Impacted Sites in Atlantic Canada. July, 2012.

APIRI. 2012b. Atlantic RBCA (Risk-Based Corrective Action) for Petroleum Impacted Sites in Atlantic Canada, Version 3, Scientific Rationale. Scientific Rationale to Support Adoption/Development of Tier 1 Ecological Screening Levels for Soil, Surface Water, Groundwater and Sediment.

Black, J.A., W.J. Birge, A.G. Westerman, and P.C. Francis. 1983. Comparative aquatic toxicology of aromatic hydrocarbons. Fundam Appl Toxicol 3: 353-358.

BluMetric Environmental (BluMetric), 2017. Sediment Sampling Work Plan for Port Severn – Main Dam, Blind Dam D and Fixed Bridge, Bayview Dam E and Bridge, Little Chute Dam G, and Blind Dam C. July 19.

British Columbia Ministry of Environment, Lands, and Parks (BC MELP). 1999. Ambient water quality guidelines for zinc: overview. Water Protection Branch, Ministry of Environment.

British Columbia Ministry of the Environment (BC MOE). 1986. Water Quality Criteria for Cyanide. Technical Appendix. Resource Quality Sector, Water Management Branch, Victoria, BC.

Call, D.J., L.T. Brook, S.L, Harting, S.H. Poirer, and D.J. McCauley. 1986. Toxicity of phenanthrene to several freshwater species. Center for Lake Superior Environmental Studies, University of Wisconsin-Superior.

Canadian Council of Ministers of the Environment (CCME), 1995. Protocol for the Derivation of Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Canadian Council of Ministers of the Environment. 1995.

Canadian Council of Ministers of the Environment (CCME), 1999 (as updated). Canadian Environmental Quality Guidelines available online at http://ceqg-rcqe.ccme.ca/en/index.html. Current to March 2018.

Canadian Council of Ministers of the Environment (CCME), 1999b. Canadian water quality guideline for the protection of aquatic life: polycyclic aromatic hydrocarbons. Canadian Council of Ministers of the Environment, Winnipeg.

Canadian Council of Ministers of the Environment (CCME), 2008. Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil. First published in 2001, revised in January 2008.

Canadian Council of Ministers of the Environment (CCME), 2016. Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment, Volume 1 to 4. 2016.

Canadian Council of Resource and Environment Ministers. 1987. Canadian Water Quality Guidelines. Chapter 3 – Freshwater aquatic life.

Canada Ontario Agreement Sediment Task Group (COA), 2008. Canada-Ontario Decision-Making Framework for Assessment of Great Lakes Contaminated Sediment. March, 2008.

CSA International (CSA), 2000. Z769-00 Phase II Environmetnal Site Assessment. Published 2000, most recently updated in 2003 and reaffirmed in 2013.

Demayo, A., and M.C. Taylor, and S.W. Reeder, 1981. Copper. In Guidelines for Surface Water Quality. Vol. 1. Inorganic Chemical Substances. Water Quality Branch, Inland Waters Directorate, Environment Canada, Ottawa.

Department of Fisheries and Oceans (DFO), 1992. Land Development Guidelines for the Protection of Aquatic Habitat. May, 1992 (Second Printing September 1993).

Department of Fisheries and Oceans (DFO). 2016. National Procedure for Assessing Aquatic Sites. Version 1.0. March, 2016.DiToro, D.M., J.A. McGrath, and D.J. Hansen. 2000. Technical basis for narcotic chemicals and polycyclic aromatic hydrocarbon criteria. I. Water and tissue. Environ Toxicol Chem 19(8): 1951-1970.

Environment Canada. 1990. Biological test method: acute lethality test using rainbow trout. Environmental Protection Series EPS 1/RM/9.

Finger, S.E., E.F., Little, M.G. Henry, J.F. Fairchild, and T.P. Boyle. 1985. Comparison of laboratory and field assessment of fluorine. Part I. Effects of fluorine on the survival, growth, reproduction, and behavior of aquatic organisms in laboratory tests. In: Validation and predictability of laboratory methods for assessing the fate and effects of contaminants in aquatic ecosystems, ASTM STP 865. T.P. Boyle, ed Philadelphia.

Golder Associates Ltd. (Golder), 2017. Environmental Management Planning Considerations. Ottawa Wall Repairs Rideau Canal, Ottawa, Ontario. Submitted to Public Works and Government Services Canada on September 7, 2017.

Health Canada. 2012. Guidelines for Canadian Recreation Water Quality. Third Edition. Water, Air, and Climate Change Bureau, Health Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

Health Canada, 2017a. Supplemental Guidance on Human Health Risk Assessment of Contaminated Sediments: Direct Contact Pathway. Contaminated Sites Division, Safe Environments Directorate, Healthy Environments and Consumer Product Safety, Health Canada. Ottawa, Ontario.

Health Canada. 2017b. Guidelines for Canadian Drinking Water Quality – Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

Holcombe, G.W., G.L. Phipps, and J.T. Fiandt. 1983. Toxicity of selected priority pollutants to various aquatic organisms. Ecotoxicol Environ Saf 7: 400-409

Ontario Ministry of the Environment (MOE), 2008. Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario: An Integrated Approach. May, 2008.

Ontario Ministry of the Environment (MOE), 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. April 15, 2011.

Ontario Ministry of Natural Resources and Forestry (OMNRF), 2018. Natural Heritage Areas. Retrieved on March 3, 2018 from: http://www.gisapplication.lrc.gov.on.ca/mamnh/Index.html?site=MNR_NHLUPS_NaturalHeritage&viewer=NaturalHeritage&locale=en-US.

Oris, J.T. and J.P. Giesy. 1987. The photo-induced toxicity of polycyclic aromatic hydrocarbons to larvae of the fathead minnow (Pimephales promelas). Chemosphere 16: 1395-1404.

Pane, E.F., J.G. Richards, and C.M. Woods. 2003. Acute waterborne nickel toxicity in the rainbow trout (Oncorhynchus mykiss) occurs by a respiratory rather than ionoregulatory mechanism. Aquat. Toxicol. 63: 65 – 82.

Rand, G.M and S.R. Petrocelli. 1985. Fundamentals of aquatic toxicology: Methods and applications. United States.

Rogers, J.T., J.G. Richards, and C.M. Wood. 2003. Ionoregulatory disruption as the acute toxic mechanism for lead in the rainbow trout (*Oncorhynchus mykiss*). Aquatic Toxicol 64: 215-234.

Royal Military College (RMC) and BluMetric Environmental (BluMetric), 2017. Site Prioritization Tool for Sediment Sampling in Advance of Construction Activities Along the Trent-Severn Waterway and Rideau Canal. March. 2017.

South Georgian Bay Lake Simcoe Region (South Georgian Bay), 2015. Approved South Georgian Bay Lake Simcoe Source Protection Plan, including Lakes Simcoe and Couchiching/Black River Source and Severn Sound Source Protection Areas Chapters. Prepared by Lake Simcoe Regional and Nottawasaga Valley Conservation Authorities and Severn Sound Environmental Association. Amended February 15, 2018.

Spear, P.A. and R.C. Pierce. 1979. Copper in the aquatic environment: chemistry, distribution, and toxicology. National Research Council of Canada. Associate Committee on Scientific Criteria for Environmental Quality, Pub. No. 16454.

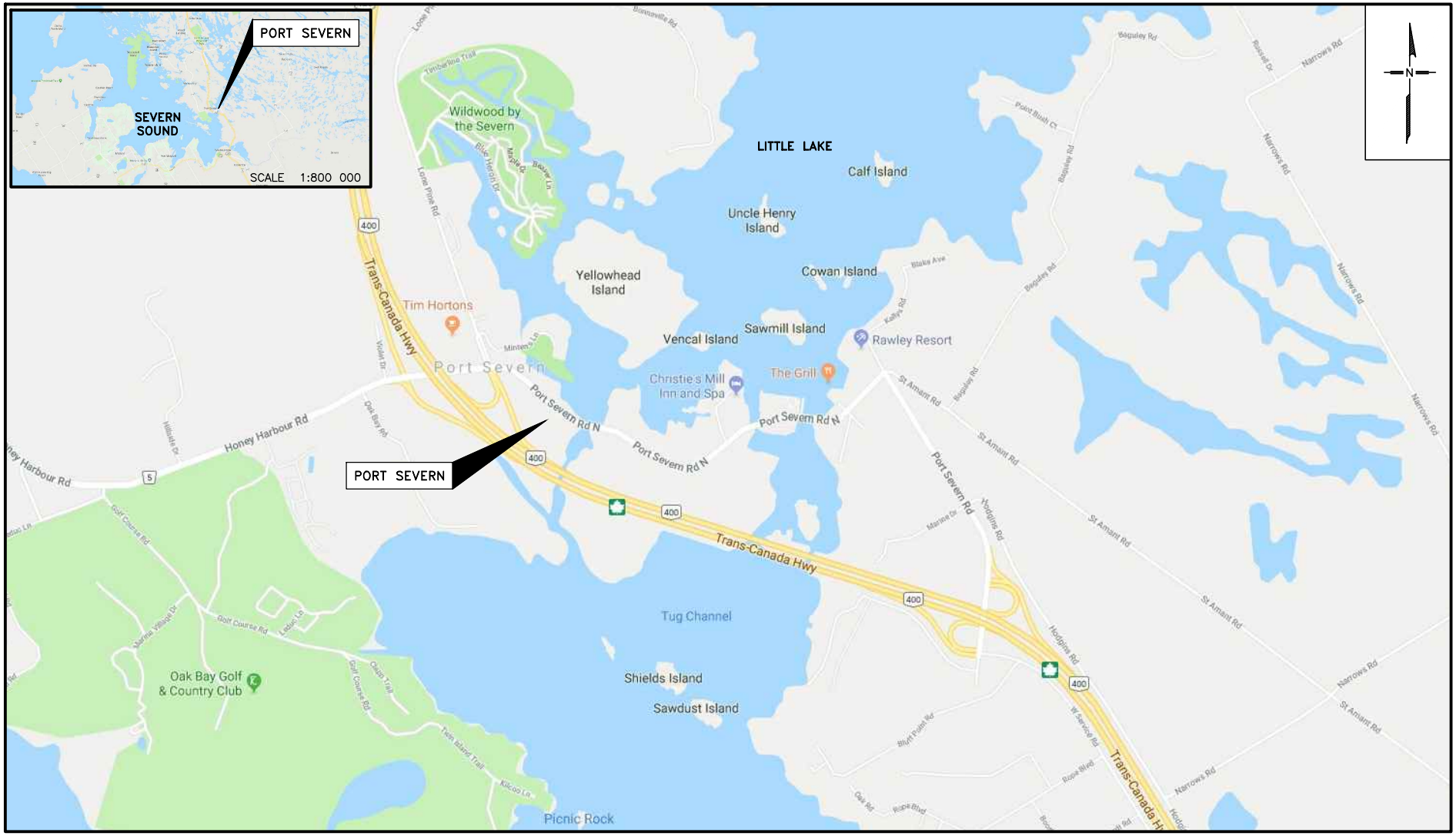
Spehar R.L., S. Poucher, L.T. Brook, D.J. Hansen, D. Champlin, and D.A. Cox. 1999. Comparative toxicity of fluoranthene to freshwater and saltwater species under fluorescent and ultraviolet light. Arch Environ Contam Toxicol 37: 496-502

US EPA, 1985. Ambient Water Quality Criteria for Lead – 1984. Criteria and Standards Division, US EPA, Washington, DC. EPA-440/5-84-027.

US EPA. 2017. Regional Screening Levels. Available online at https://www.epa.gov/risk/regional-screening-levels-rsls. Date accessed March 14, 2018.

World Health Organization (WHO). 2003. Guidelines for safe recreational water environments. Volume 1, Coastal and Fresh Waters. Geneva, Switzerland.

Figures



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- SEDIMENT SAMPLE (SNCL, 2017)
- UNSUCCESSFUL ATTEMPT SAMPLE LOCATION (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (MARCH, 2017)
- PROPOSED DEWATERED ZONE

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SNC·LAVALIN

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- PROPOSED DEWATERED ZONE

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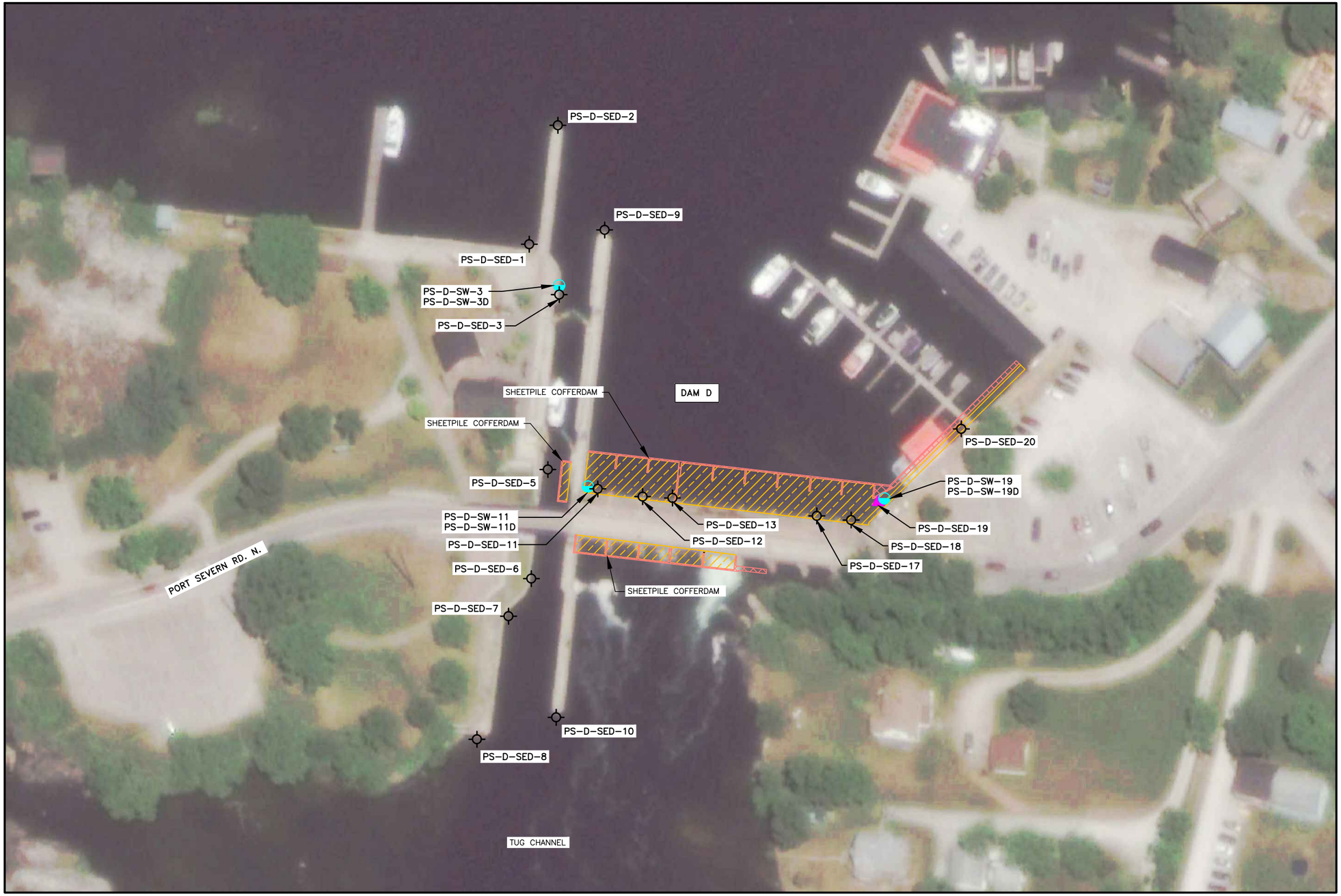
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. HERITAGE CANALS AND ENGINEERING WORKS, PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E, SITE i, DAM E (BAYVIEW), REF#R.076951.039, DWG#314, AUGUST 15, 2017

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUNDLE PORT SEVERN, ONTARIO		Title: SAMPLING LOCATIONS (DAM E)	
Project No: 651954	Filename: 651954-PS-ESA-2.DWG	Date: MAY 2018	Dwg No: FIGURE 4
Drawn: EM	Verified: MS	Project Manager: MS	

PAGE FORMAT: 11x17

FILENAME: P:\PWGSC\651954 - Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\651954-PS-ESA-2.dwg



LEGEND

- SURFACE WATER SAMPLE (SNCL, 2017)
- SEDIMENT SAMPLE (SNCL, 2017)
- UNSUCCESSFUL ATTEMPT SAMPLE LOCATION (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (MARCH, 2017)
- PROPOSED DEWATERED ZONE

SCALE 1:1000

0 20 40m

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

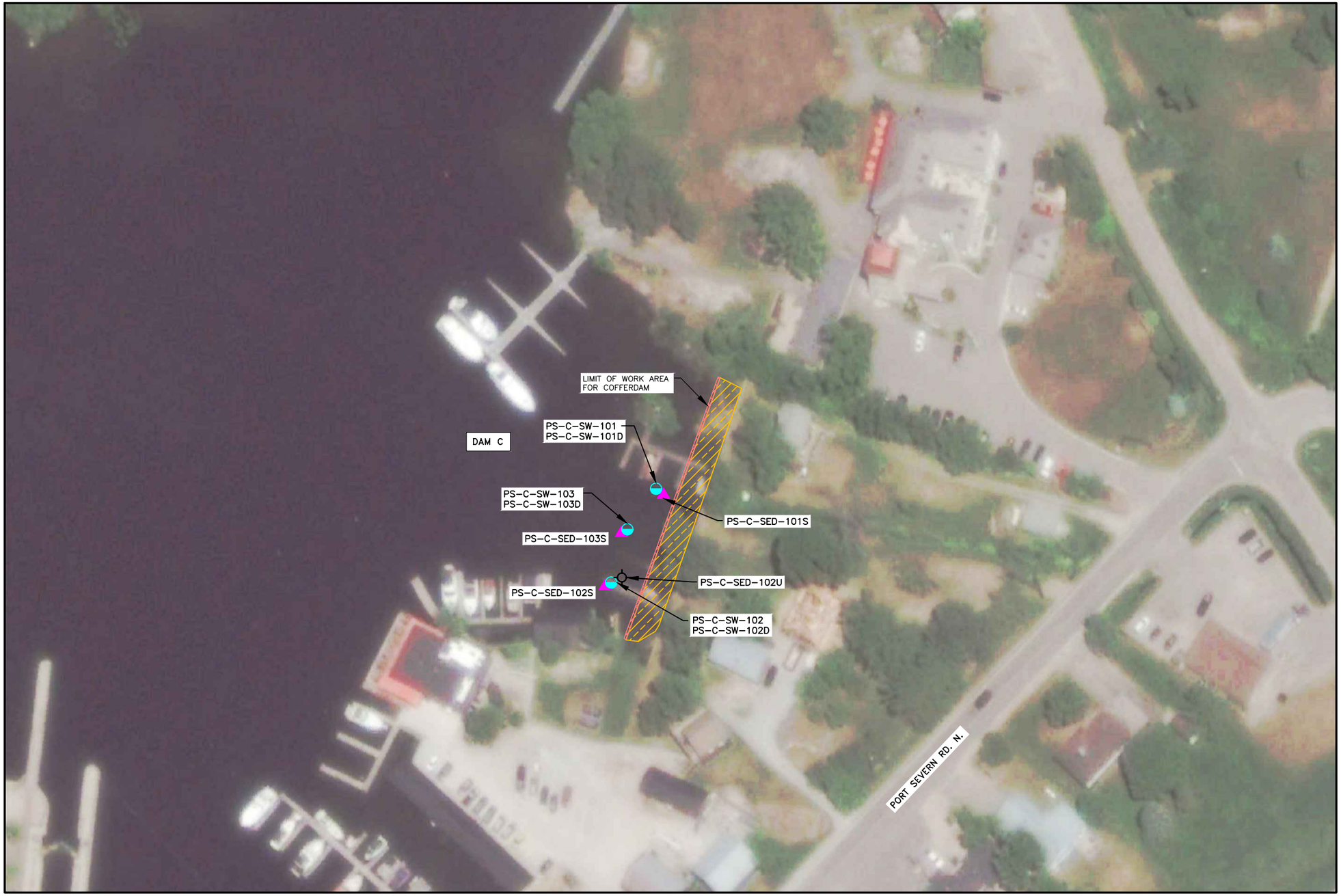
SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. AECOM, PORT SEVERN AREA DAMS, SITE L, SITE M AND SITE K – COMMON WALL CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES L/M/K, MARCH 8, 2017
3. AECOM, PORT SEVERN AREA DAMS, SITE H – DAM D CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES H, MARCH 8, 2017

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUDNLE PORT SEVERN, ONTARIO		Title: SAMPLING LOCATIONS (DAM D)
Project No: 651954	Filename: 651954-PS-DSA-1.DWG	Date: MAY 2018 / Dwg No: FIGURE 5
Drawn: EM	Verified: MS	Project Manager: MS

PAGE FORMAT: 11x17

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\651954-PS-DSA-1.dwg



N

LEGEND

- SURFACE WATER SAMPLE (SNCL, 2017)
- SEDIMENT SAMPLE (SNCL, 2017)
- UNSUCCESSFUL ATTEMPT SAMPLE LOCATION (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (SEPTEMBER, 2017)
- PROPOSED DEWATERED ZONE

SCALE 1:1000

0 20 40m

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

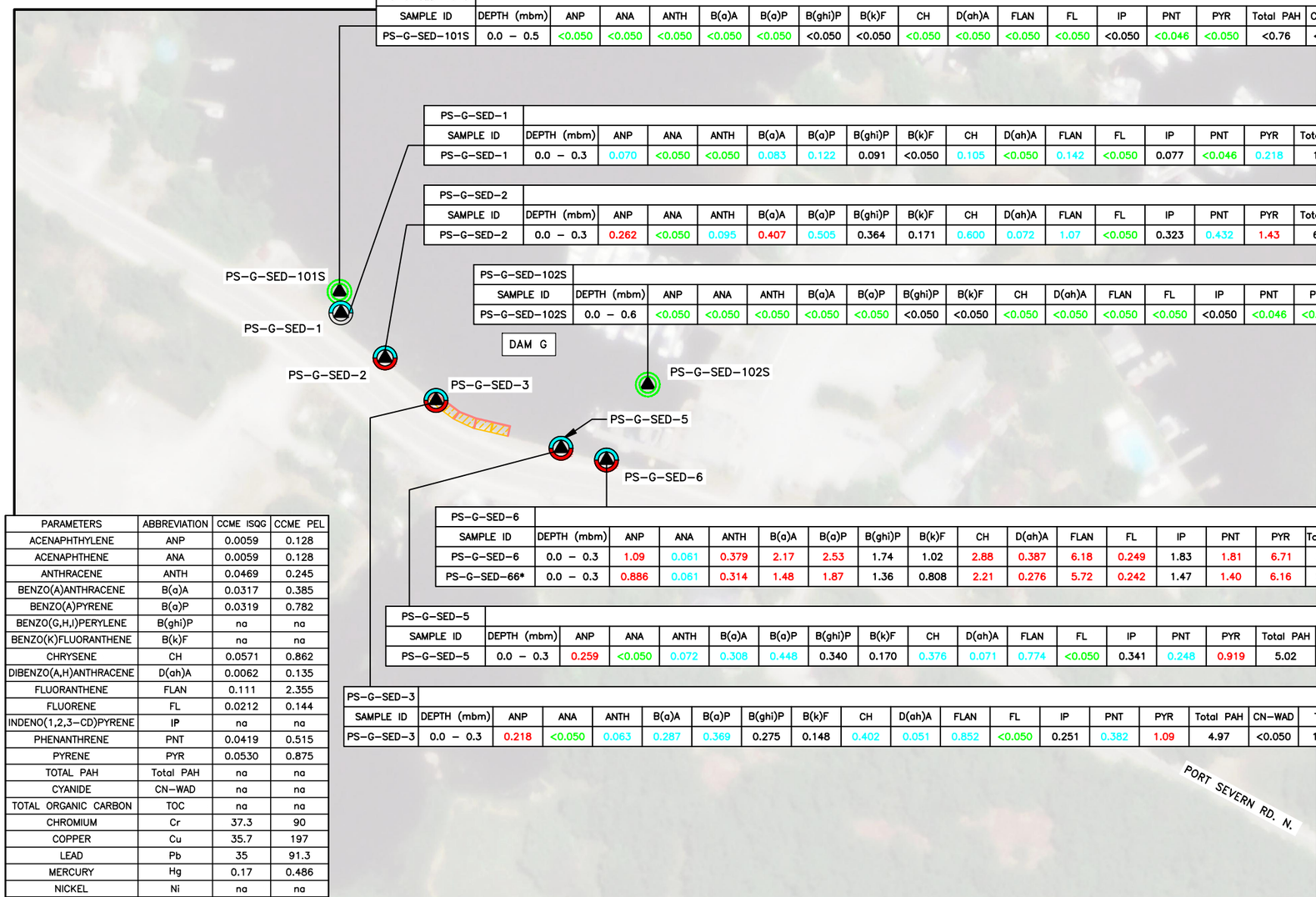
SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. HERITAGE CANALS AND ENGINEERING WORKS, PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E, SITE G DAM C GENERAL ARRANGEMENT, REF#R.076951.039, DWG#200, SEPTEMBER 15, 2017

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUDNLE PORT SEVERN, ONTARIO		Title: SAMPLING LOCATIONS (DAM C)
Project No: 651954	Filename: 651954-PS-CSA-1.DWG	Date: MAY 2018 / Dwg No: FIGURE 6
Drawn: EM	Verified: MS	Project Manager: MS

FILENAME: P:\PWGSC\651954 - Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\651954-PS-CSA-1.dwg

PAGE FORMAT: 11x17



PS-G-SED-101S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-G-SED-101S	0.0 – 0.5	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.21	0.20	0.23	18.4	11.4	23.5	9.1	<50	<72	<72

PS-G-SED-1																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-G-SED-1	0.0 – 0.3	0.070	<0.050	<0.050	0.083	0.122	0.091	<0.050	0.105	<0.050	0.142	<0.050	0.077	<0.046	0.218	1.36	<0.050	0.21	0.23	5.0	4.8	2.9	3.0	<50	<72	<72

PS-G-SED-2																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-2	0.0 – 0.3	0.262	<0.050	0.095	0.407	0.505	0.364	0.171	0.600	0.072	1.07	<0.050	0.323	0.432	1.43	6.44	1.76	0.87	0.98	6.1	3.9	18.9	3.8	124	690	286	814

PS-G-SED-102S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-G-SED-102S	0.0 – 0.6	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.31	0.27	32.7	22.9	5.6	19.1	<50	<72	<72

PS-G-SED-6																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-6	0.0 – 0.3	1.09	0.061	0.379	2.17	2.53	1.74	1.02	2.88	0.387	6.18	0.249	1.83	1.81	6.71	32.37	<0.050	2.48	2.80	12.6	18.4	182	9.2	175	720	345	895
PS-G-SED-66*	0.0 – 0.3	0.886	0.061	0.314	1.48	1.87	1.36	0.808	2.21	0.276	5.72	0.242	1.47	1.40	6.16	26.94	<0.050	2.63	2.78	11.9	14.8	191	8.9	172	760	332	932

PS-G-SED-5																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-5	0.0 – 0.3	0.259	<0.050	0.072	0.308	0.448	0.340	0.170	0.376	0.071	0.774	<0.050	0.341	0.248	0.919	5.02	<0.050	0.87	1.12	10.7	9.9	11.5	6.9	98	730	251	828

PS-G-SED-3																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-3	0.0 – 0.3	0.218	<0.050	0.063	0.287	0.369	0.275	0.148	0.402	0.051	0.852	<0.050	0.251	0.382	1.09	4.97	<0.050	1.43	1.50	12.8	10.4	21.3	7.8	154	580	307	734

PARAMETERS	ABBREVIATION	CCME ISQG	CCME PEL
ACENAPHTHYLENE	ANP	0.0059	0.128
ACENAPHTHENE	ANA	0.0059	0.128
ANTHRACENE	ANTH	0.0469	0.245
BENZO(A)ANTHRACENE	B(a)A	0.0317	0.385
BENZO(A)PYRENE	B(a)P	0.0319	0.782
BENZO(G,H,I)PERYLENE	B(ghi)P	na	na
BENZO(K)FLUORANTHENE	B(k)F	na	na
CHRYSENE	CH	0.0571	0.862
DIBENZO(A,H)ANTHRACENE	D(ah)A	0.0062	0.135
FLUORANTHENE	FLAN	0.111	2.355
FLUORENE	FL	0.0212	0.144
INDENO(1,2,3-CD)PYRENE	IP	na	na
PHENANTHRENE	PNT	0.0419	0.515
PYRENE	PYR	0.0530	0.875
TOTAL PAH	Total PAH	na	na
CYANIDE	CN-WAD	na	na
TOTAL ORGANIC CARBON	TOC	na	na
CHROMIUM	Cr	37.3	90
COPPER	Cu	35.7	197
LEAD	Pb	35	91.3
MERCURY	Hg	0.17	0.486
NICKEL	Ni	na	na
PHC F2	F2	na	na
PHC F3	F3	na	na
PHC F4 (GRAVIMETRIC)	F4G	na	na
TOTAL PHC C6–C50	PHC (tot)	na	na
TOTAL PHC (F1–F4)	PHC (tot+g)	na	na

STANDARDS:
- CCME CEQG INTERIM SEDIMENT QUALITY GUIDELINE (ISQG), GUIDELINE TO PROTECT FRESHWATER AQUATIC LIFE
- CCME CEQG PROBABLE EFFECT LEVEL (PEL) GUIDELINE, GUIDELINE TO PROTECT FRESHWATER AQUATIC LIFE

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
4. 'mbm' : METRES BELOW MUDLINE
5. '2011/04/15' : DATE FORMAT YYYY MM DD

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. AECOM, PORT SEVERN AREA DAMS, SITE G – DAM G (LITTLE CHUTE) CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES G, MARCH 7, 2017

LEGEND

- SEDIMENT SAMPLE (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (MARCH, 2017)
- PROPOSED DEWATERED ZONE
- BLACK — BLACK CONCENTRATION DOES NOT HAVE ANY FEDERAL GUIDELINES APPLICABLE
- BLUE — BLUE CONCENTRATION EXCEEDS CCME ISQG
- RED — RED CONCENTRATION EXCEEDS CCME PEL AND ISQG
- LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY FEDERAL GUIDELINES
- LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE PARAMETER THAT WAS ANALYSED
  - > CCME ISQG
  - > CCME PEL

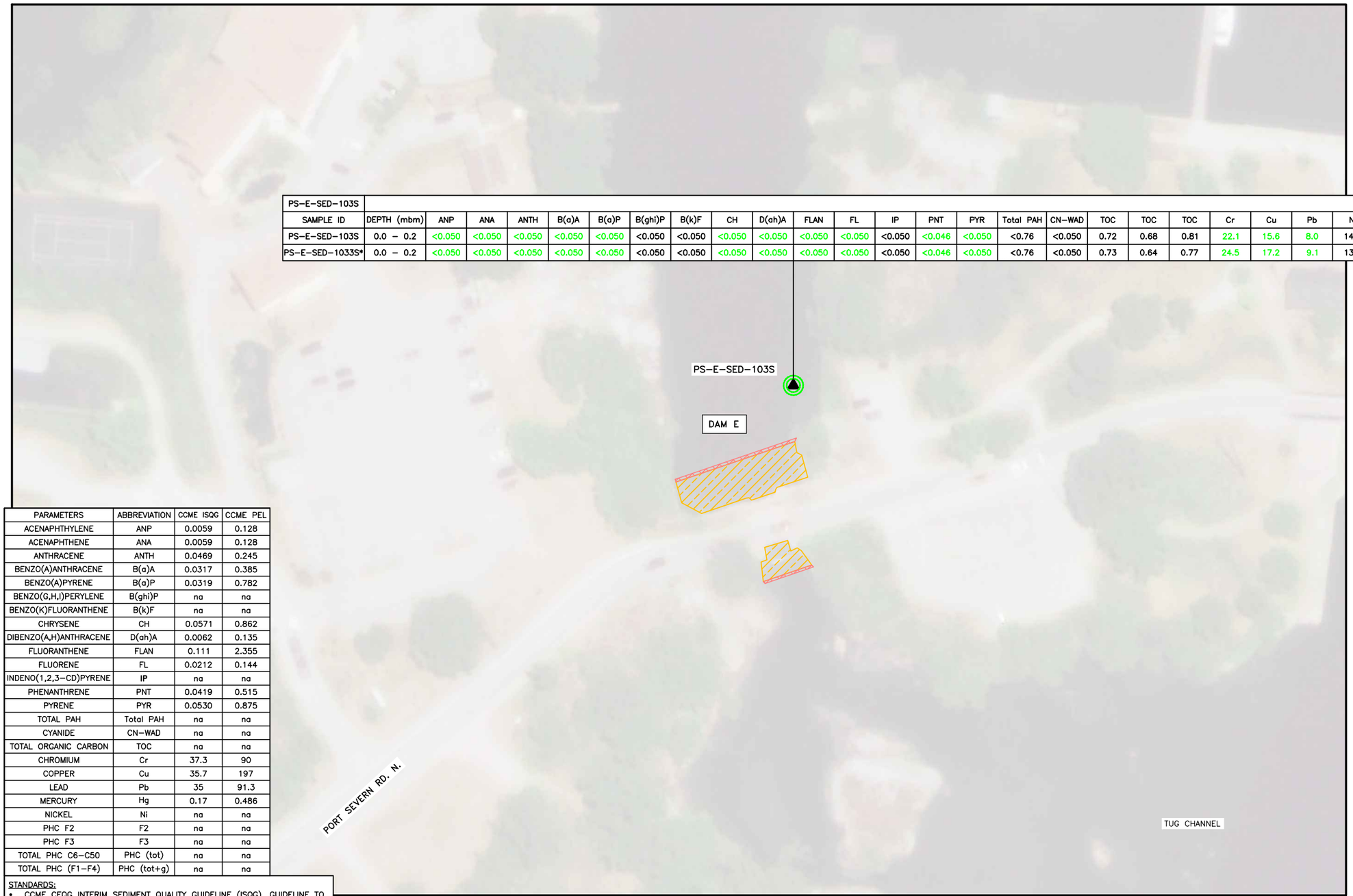
SCALE 1:1500
0 30 60m

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUNDLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO FEDERAL GUIDELINES (DAM G)	
Project No: 651954	Filename: 651954-PS-GSE-POP-F2	Date: MAY 2018	Dwg No: FIGURE 7
Drawn: EM	Verified: MS	Project Manager: MS	

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\POP\651954-PS-GSE-POP-F2.dwg

PAGE FORMAT: 11x17



PS-E-SED-103S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-E-SED-103S	0.0 – 0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.72	0.68	0.81	22.1	15.6	8.0	14.4	<50	<72	<72
PS-E-SED-1033S*	0.0 – 0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.73	0.64	0.77	24.5	17.2	9.1	13.8	<50	<72	<72

PARAMETERS	ABBREVIATION	CCME ISQG	CCME PEL
ACENAPHTHYLENE	ANP	0.0059	0.128
ACENAPHTHENE	ANA	0.0059	0.128
ANTHRACENE	ANTH	0.0469	0.245
BENZO(A)ANTHRACENE	B(a)A	0.0317	0.385
BENZO(A)PYRENE	B(a)P	0.0319	0.782
BENZO(G,H,I)PERYLENE	B(ghi)P	na	na
BENZO(K)FLUORANTHENE	B(k)F	na	na
CHRYSENE	CH	0.0571	0.862
DIBENZO(A,H)ANTHRACENE	D(ah)A	0.0062	0.135
FLUORANTHENE	FLAN	0.111	2.355
FLUORENE	FL	0.0212	0.144
INDENO(1,2,3-CD)PYRENE	IP	na	na
PHENANTHRENE	PNT	0.0419	0.515
PYRENE	PYR	0.0530	0.875
TOTAL PAH	Total PAH	na	na
CYANIDE	CN-WAD	na	na
TOTAL ORGANIC CARBON	TOC	na	na
CHROMIUM	Cr	37.3	90
COPPER	Cu	35.7	197
LEAD	Pb	35	91.3
MERCURY	Hg	0.17	0.486
NICKEL	Ni	na	na
PHC F2	F2	na	na
PHC F3	F3	na	na
TOTAL PHC C6-C50	PHC (tot)	na	na
TOTAL PHC (F1-F4)	PHC (tot+g)	na	na

STANDARDS:
- CCME CEQG INTERIM SEDIMENT QUALITY GUIDELINE (ISQG), GUIDELINE TO PROTECT FRESHWATER AQUATIC LIFE
- CCME CEQG PROBABLE EFFECT LEVEL (PEL) GUIDELINE, GUIDELINE TO PROTECT FRESHWATER AQUATIC LIFE

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
4. 'mbm' : METRES BELOW MUDLINE
5. '2011/04/15' : DATE FORMAT YYYY MM DD

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. HERITAGE CANALS AND ENGINEERING WORKS, PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E, SITE i, DAM E (BAYVIEW), REF#R.076951.039, DWG#314, AUGUST 15, 2017

LEGEND

- SEDIMENT SAMPLE (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (AUGUST, 2017)
- PROPOSED DEWATERED ZONE
- BLACK — BLACK CONCENTRATION DOES NOT HAVE ANY FEDERAL GUIDELINES APPLICABLE
- BLUE — BLUE CONCENTRATION EXCEEDS CCME ISQG
- RED — RED CONCENTRATION EXCEEDS CCME PEL AND ISQG
- LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY FEDERAL GUIDELINES
- LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE PARAMETER THAT WAS ANALYSED
  - > CCME ISQG
  - > CCME PEL

SCALE 1:1000
0 20 40m

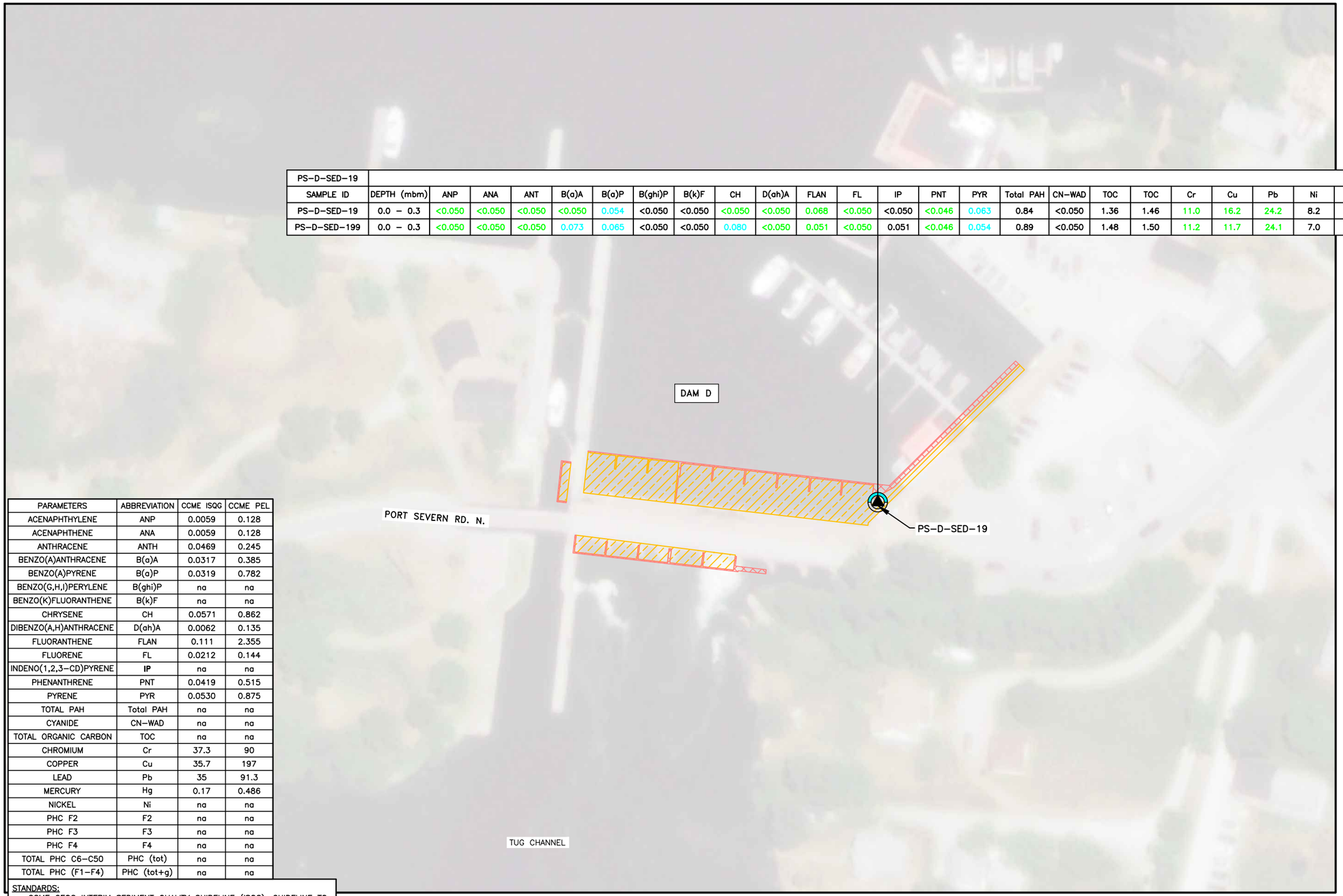
SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUNDLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO FEDERAL GUIDELINES (DAM E)	
Project No: 651954	Filename: 651954-PS-ESE-POP-F2	Date: MAY 2018	Dwg No: FIGURE 8
Drawn: EM	Verified: MS	Project Manager: MS	

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\POP\651954-PS-ESE-POP-F2.dwg

PAGE FORMAT: 11x17

PS-D-SED-19																										
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANT	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-D-SED-19	0.0 – 0.3	<0.050	<0.050	<0.050	<0.050	0.054	<0.050	<0.050	<0.050	<0.050	0.068	<0.050	<0.050	<0.046	0.063	0.84	<0.050	1.36	1.46	11.0	16.2	24.2	8.2	<50	<72	<72
PS-D-SED-199	0.0 – 0.3	<0.050	<0.050	<0.050	0.073	0.065	<0.050	<0.050	0.080	<0.050	0.051	<0.050	0.051	<0.046	0.054	0.89	<0.050	1.48	1.50	11.2	11.7	24.1	7.0	<50	<72	<72



PARAMETERS	ABBREVIATION	CCME ISQG	CCME PEL
ACENAPHTHYLENE	ANP	0.0059	0.128
ACENAPHTHENE	ANA	0.0059	0.128
ANTHRACENE	ANTH	0.0469	0.245
BENZO(A)ANTHRACENE	B(a)A	0.0317	0.385
BENZO(A)PYRENE	B(a)P	0.0319	0.782
BENZO(G,H,I)PERYLENE	B(ghi)P	na	na
BENZO(K)FLUORANTHENE	B(k)F	na	na
CHRYSENE	CH	0.0571	0.862
DIBENZO(A,H)ANTHRACENE	D(ah)A	0.0062	0.135
FLUORANTHENE	FLAN	0.111	2.355
FLUORENE	FL	0.0212	0.144
INDENO(1,2,3-CD)PYRENE	IP	na	na
PHENANTHRENE	PNT	0.0419	0.515
PYRENE	PYR	0.0530	0.875
TOTAL PAH	Total PAH	na	na
CYANIDE	CN-WAD	na	na
TOTAL ORGANIC CARBON	TOC	na	na
CHROMIUM	Cr	37.3	90
COPPER	Cu	35.7	197
LEAD	Pb	35	91.3
MERCURY	Hg	0.17	0.486
NICKEL	Ni	na	na
PHC F2	F2	na	na
PHC F3	F3	na	na
PHC F4	F4	na	na
TOTAL PHC C6-C50	PHC (tot)	na	na
TOTAL PHC (F1-F4)	PHC (tot+g)	na	na

STANDARDS:
- CCME CEQG INTERIM SEDIMENT QUALITY GUIDELINE (ISQG), GUIDELINE TO PROTECT FRESHWATER AQUATIC LIFE
- CCME CEQG PROBABLE EFFECT LEVEL (PEL) GUIDELINE, GUIDELINE TO PROTECT FRESHWATER AQUATIC LIFE

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS
2. 'RDL' : REPORTABLE DETECTION LIMIT
3. 'NS' : NO STANDARD
4. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
5. 'mbm' : METRES BELOW MUDLINE

NOTE(S):
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2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. AECOM, PORT SEVERN AREA DAMS, SITE L, SITE M AND SITE K – COMMON WALL CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES L/M/K, MARCH 8, 2017
3. AECOM, PORT SEVERN AREA DAMS, SITE H – DAM D CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES H, MARCH 8, 2017

LEGEND

- SEDIMENT SAMPLE (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (MARCH, 2017)
- PROPOSED DEWATERED ZONE
- BLACK — BLACK CONCENTRATION DOES NOT HAVE ANY FEDERAL GUIDELINES APPLICABLE
- BLUE — BLUE CONCENTRATION EXCEEDS CCME ISQG
- RED — RED CONCENTRATION EXCEEDS CCME PEL AND ISQG
- LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY FEDERAL GUIDELINES
- LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE PARAMETER THAT WAS ANALYSED
  - > CCME ISQG
  - > CCME PEL

SCALE 1:1000
0 20 40m

SNC·LAVALIN

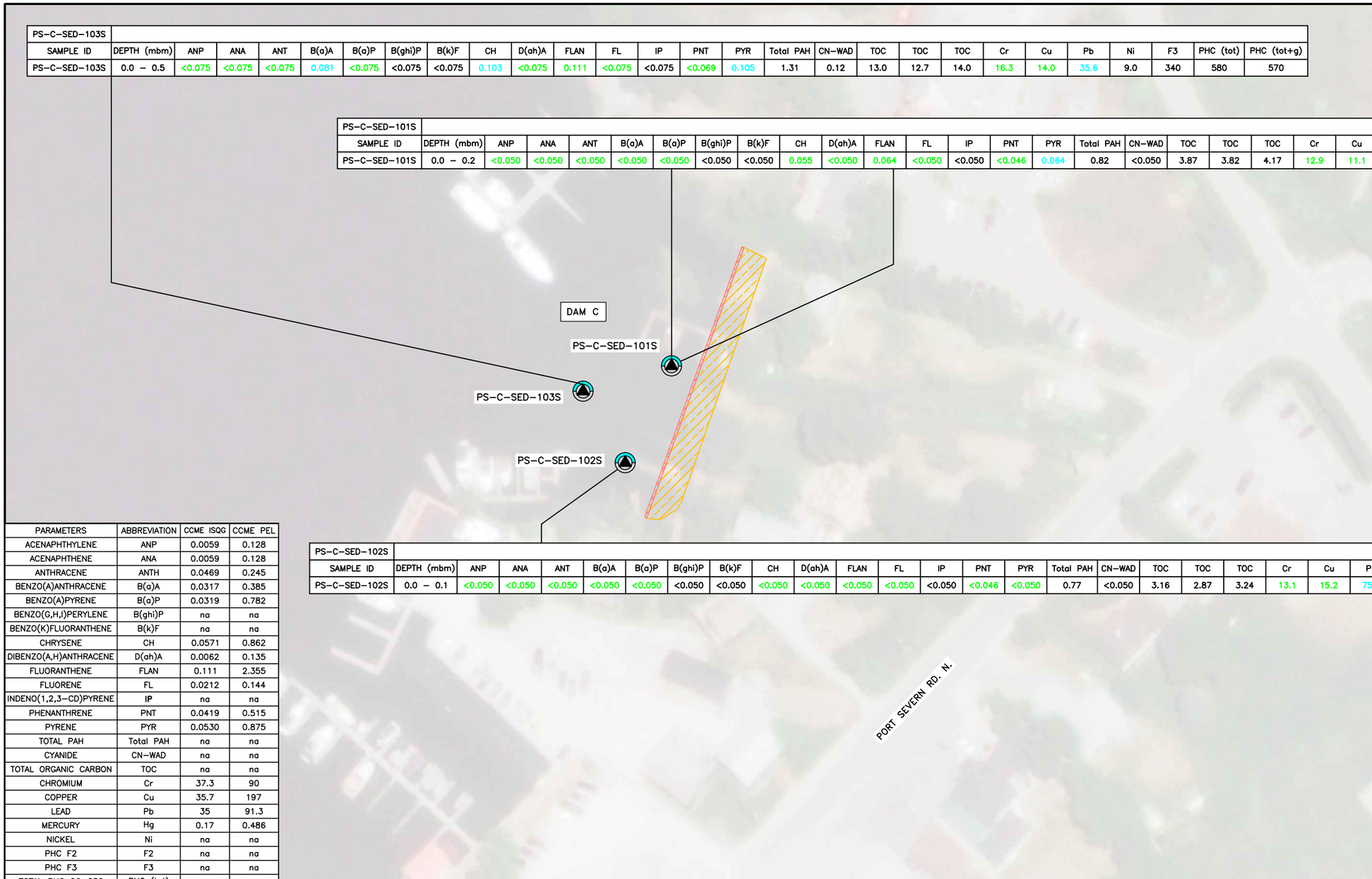
Client/Location: PWGSC PORT SEVERN BUDNLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO FEDERAL GUIDELINES (DAM D)	
Project No: 651954	Filename: 651954-PS-DSE-POP-F2	Date: MAY 2018	Dwg No: FIGURE 9
Drawn: EM	Verified: MS	Project Manager: MS	

PAGE FORMAT: 11x17

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\POP\651954-PS-DSE-POP-F2.dwg

PS-C-SED-103S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANT	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-C-SED-103S	0.0 – 0.5	<0.075	<0.075	<0.075	0.081	<0.075	<0.075	<0.075	0.103	<0.075	0.111	<0.075	<0.075	<0.069	0.105	1.31	0.12	13.0	12.7	14.0	16.3	14.0	35.6	9.0	340	580	570

PS-C-SED-101S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANT	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-C-SED-101S	0.0 – 0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.055	<0.050	0.064	<0.050	<0.050	<0.046	0.064	0.82	<0.050	3.87	3.82	4.17	12.9	11.1	42.1	8.1	62	<72	62



PS-C-SED-102S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANT	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-C-SED-102S	0.0 – 0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	0.77	<0.050	3.16	2.87	3.24	13.1	15.2	75.2	8.0	93	93	93

PARAMETERS	ABBREVIATION	CCME ISQG	CCME PEL
ACENAPHTHYLENE	ANP	0.0059	0.128
ACENAPHTHENE	ANA	0.0059	0.128
ANTHRACENE	ANTH	0.0469	0.245
BENZO(A)ANTHRACENE	B(a)A	0.0317	0.385
BENZO(A)PYRENE	B(a)P	0.0319	0.782
BENZO(G,H,I)PERYLENE	B(ghi)P	na	na
BENZO(K)FLUORANTHENE	B(k)F	na	na
CHRYSENE	CH	0.0571	0.862
DIBENZO(A,H)ANTHRACENE	D(ah)A	0.0062	0.135
FLUORANTHENE	FLAN	0.111	2.355
FLUORENE	FL	0.0212	0.144
INDENO(1,2,3-CD)PYRENE	IP	na	na
PHENANTHRENE	PNT	0.0419	0.515
PYRENE	PYR	0.0530	0.875
TOTAL PAH	Total PAH	na	na
CYANIDE	CN-WAD	na	na
TOTAL ORGANIC CARBON	TOC	na	na
CHROMIUM	Cr	37.3	90
COPPER	Cu	35.7	197
LEAD	Pb	35	91.3
MERCURY	Hg	0.17	0.486
NICKEL	Ni	na	na
PHC F2	F2	na	na
PHC F3	F3	na	na
TOTAL PHC C6–C50	PHC (tot)	na	na
TOTAL PHC (F1–F4)	PHC (tot+g)	na	na

STANDARDS:
- CCME CEQG INTERIM SEDIMENT QUALITY GUIDELINE (ISQG), GUIDELINE TO PROTECT FRESHWATER AQUATIC LIFE
- CCME CEQG PROBABLE EFFECT LEVEL (PEL) GUIDELINE, GUIDELINE TO PROTECT FRESHWATER AQUATIC LIFE

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
4. 'mbm' : METRES BELOW MUDLINE
5. '2011/04/15' : DATE FORMAT YYYY MM DD

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. HERITAGE CANALS AND ENGINEERING WORKS, PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E, SITE G DAM C GENERAL ARRANGEMENT, REF#R.076951.039, DWG#200, SEPTEMBER 15, 2017

LEGEND

- SEDIMENT SAMPLE (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (SEPTEMBER, 2017)
- PROPOSED DEWATERED ZONE
- BLACK — BLACK CONCENTRATION DOES NOT HAVE ANY FEDERAL GUIDELINES APPLICABLE
- BLUE — BLUE CONCENTRATION EXCEEDS CCME ISQG
- RED — RED CONCENTRATION EXCEEDS CCME PEL AND ISQG
- LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY FEDERAL GUIDELINES
- LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE PARAMETER THAT WAS ANALYSED
  - > CCME ISQG
  - > CCME PEL

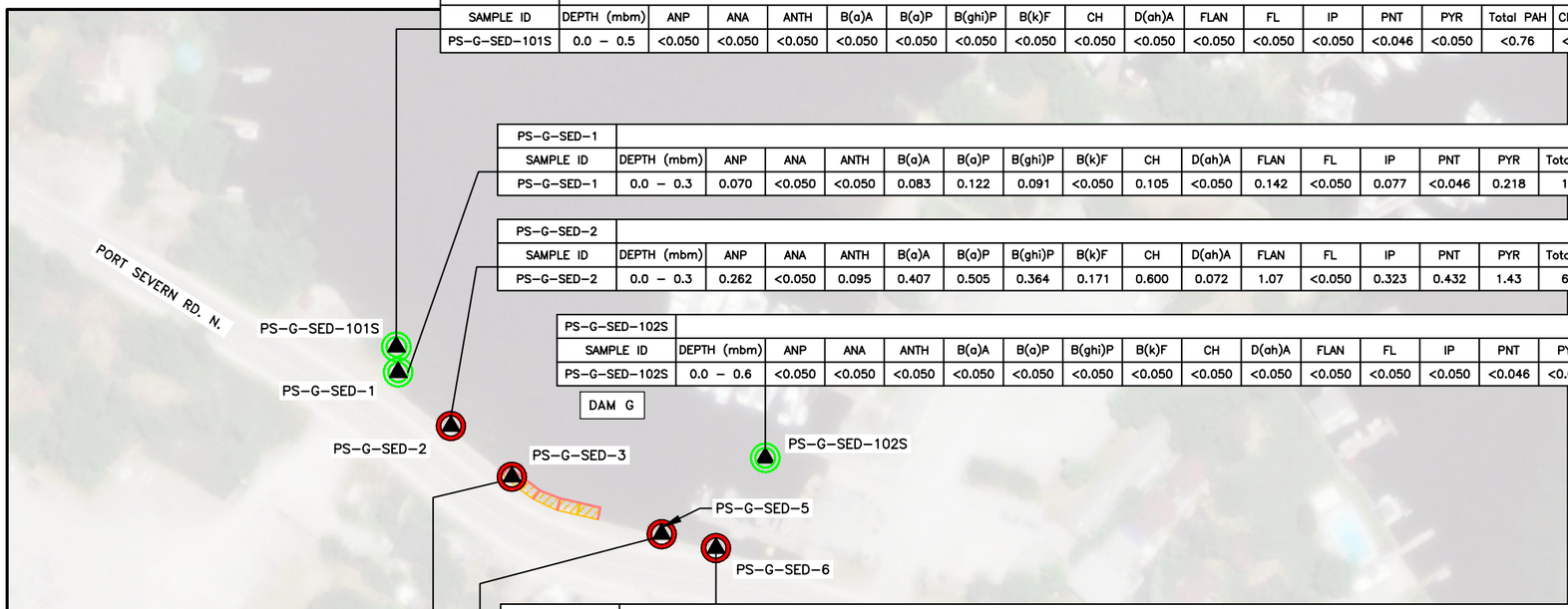
SCALE 1:1000
0 20 40m

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUDNLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO FEDERAL GUIDELINES (DAM C)	
Project No: 651954	Filename: 651954-PS-CSE-POP-F2	Date: MAY 2018	Dwg No: FIGURE 10
Drawn: EM	Verified: MS	Project Manager: MS	

PAGE FORMAT: 11x17

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\POP\651954-PS-CSE-POP-F2.dwg



PS-G-SED-101S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-G-SED-101S	0.0 – 0.5	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.21	0.20	0.23	18.4	11.4	23.5	9.1	<50	<72	<72

PS-G-SED-1																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-G-SED-1	0.0 – 0.3	0.070	<0.050	<0.050	0.083	0.122	0.091	<0.050	0.105	<0.050	0.142	<0.050	0.077	<0.046	0.218	1.36	<0.050	0.21	0.23	5.0	4.8	2.9	3.0	<50	<72	<72

PS-G-SED-2																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-2	0.0 – 0.3	0.262	<0.050	0.095	0.407	0.505	0.364	0.171	0.600	0.072	1.07	<0.050	0.323	0.432	1.43	6.44	1.76	0.87	0.98	6.1	3.9	18.9	3.8	124	690	286	814

PS-G-SED-102S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-G-SED-102S	0.0 – 0.6	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.31	0.27	32.7	22.9	5.6	19.1	<50	<72	<72

PS-G-SED-6																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-6	0.0 – 0.3	1.09	0.061	0.379	2.17	2.53	1.74	1.02	2.88	0.387	6.18	0.249	1.83	1.81	6.71	32.37	<0.050	2.48	2.80	12.6	18.4	182	9.2	175	720	345	895
PS-G-SED-66*	0.0 – 0.3	0.886	0.061	0.314	1.48	1.87	1.36	0.808	2.21	0.276	5.72	0.242	1.47	1.40	6.16	26.94	<0.050	2.63	2.78	11.9	14.8	191	8.9	172	760	332	932

PS-G-SED-5																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-5	0.0 – 0.3	0.259	<0.050	0.072	0.308	0.448	0.340	0.170	0.376	0.071	0.774	<0.050	0.341	0.248	0.919	5.02	<0.050	0.87	1.12	10.7	9.9	11.5	6.9	98	730	251	828

PS-G-SED-3																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-3	0.0 – 0.3	0.218	<0.050	0.063	0.287	0.369	0.275	0.148	0.402	0.051	0.852	<0.050	0.251	0.382	1.09	4.97	<0.050	1.43	1.50	12.8	10.4	21.3	7.8	154	580	307	734

PARAMETERS	ABBREVIATION	RBCA
ACENAPHTHENE	ANP	na
ACENAPHTHYLENE	ANA	na
ANTHRACENE	ANTH	na
BENZO(A)ANTHRACENE	B(a)A	na
BENZO(A)PYRENE	B(a)P	na
BENZO(G,H,I)PERYLENE	B(ghi)P	na
BENZO(K)FLUORANTHENE	B(k)F	na
CHRYSENE	CH	na
DIBENZO(A,H)ANTHRACENE	D(ah)A	na
FLUORANTHENE	FLAN	na
FLUORENE	FL	na
INDENO(1,2,3-CD)PYRENE	IP	na
PHENANTHRENE	PNT	na
PYRENE	PYR	na
TOTAL PAH	Total PAH	na
CYANIDE	CN-WAD	na
TOTAL ORGANIC CARBON	TOC	na
CHROMIUM	Cr	na
COPPER	Cu	na
LEAD	Pb	na
MERCURY	Hg	na
NICKEL	Ni	na
PHC F3	F3	25
PHC F4 (GRAVIMETRIC)	F4G	500
TOTAL PHC C6-C50	PHC (tot)	500
TOTAL PHC (F1-F4)	PHC (tot+g)	500

STANDARDS:
- ATLANTIC RISK-BASED CORRECTIVE ACTION (RBCA) (APIRI, 2012), NOT ADJUSTED FOR FRACTION OF ORGANIC CARBON (FOC).

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS, EXCEPT FOR TOC WHICH IS REPORTED IN PERCENT (%)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
6. 'PHC': PETROLEUM HYDROCARBONS
7. 'mbm' : METRES BELOW MUDLINE
8. '2011/04/15' : DATE FORMAT YYYY MM DD

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. AECOM, PORT SEVERN AREA DAMS, SITE G – DAM G (LITTLE CHUTE) CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES G, MARCH 7, 2017

LEGEND

▲	SEDIMENT SAMPLE (SNCL, 2017)	GREEN	GREEN CONCENTRATION DID NOT EXCEED THE RBCA
	CONCEPTUAL COFFERDAM DETAILS (MARCH, 2017)	RED	RED CONCENTRATION EXCEEDS AT LEAST ONE RBCA
	PROPOSED DEWATERED ZONE		LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY RBCA
BLACK	BLACK CONCENTRATION/HYPHEN DOES NOT EXCEED THE RBCA OR WAS NOT ANALYSED		LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE RBCA

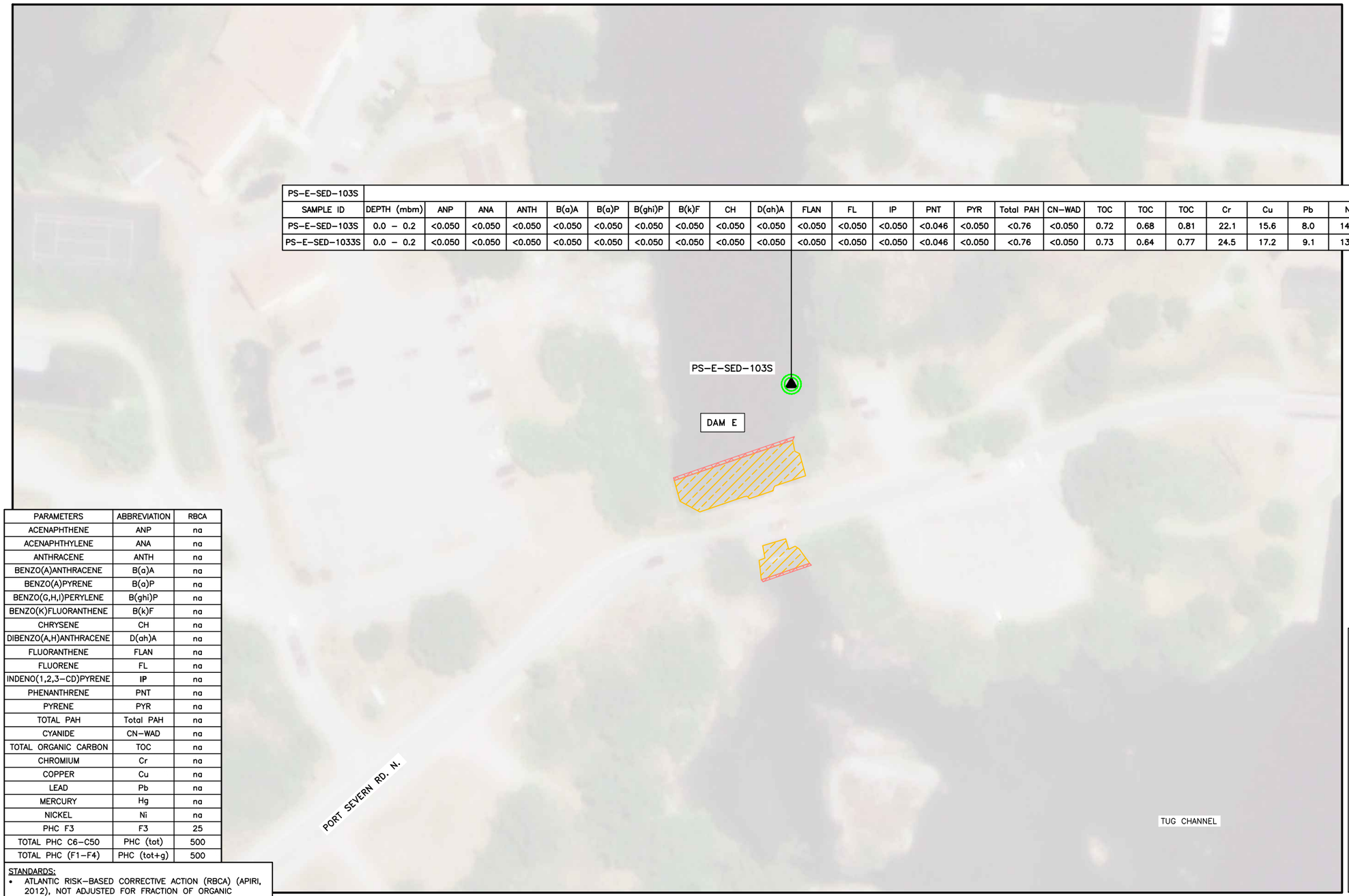
SCALE 1:1500
0 30 60m

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUNDLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO RBCA (DAM G)
Project No: 651954	Filename: 651954-PS-GSE-POP-R2	Date: MAY 2018
Drawn: EM	Verified: MS	Project Manager: MS
		Dwg No: FIGURE 11

PAGE FORMAT: 11x17

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\POP\651954-PS-GSE-POP-R2.dwg



PS-E-SED-103S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-E-SED-103S	0.0 – 0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.72	0.68	0.81	22.1	15.6	8.0	14.4	<50	<72	<72
PS-E-SED-1033S	0.0 – 0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.73	0.64	0.77	24.5	17.2	9.1	13.8	<50	<72	<72

PARAMETERS	ABBREVIATION	RBCA
ACENAPHTHENE	ANP	na
ACENAPHTHYLENE	ANA	na
ANTHRACENE	ANTH	na
BENZO(A)ANTHRACENE	B(a)A	na
BENZO(A)PYRENE	B(a)P	na
BENZO(G,H,I)PERYLENE	B(ghi)P	na
BENZO(K)FLUORANTHENE	B(k)F	na
CHRYSENE	CH	na
DIBENZO(A,H)ANTHRACENE	D(ah)A	na
FLUORANTHENE	FLAN	na
FLUORENE	FL	na
INDENO(1,2,3-CD)PYRENE	IP	na
PHENANTHRENE	PNT	na
PYRENE	PYR	na
TOTAL PAH	Total PAH	na
CYANIDE	CN-WAD	na
TOTAL ORGANIC CARBON	TOC	na
CHROMIUM	Cr	na
COPPER	Cu	na
LEAD	Pb	na
MERCURY	Hg	na
NICKEL	Ni	na
PHC F3	F3	25
TOTAL PHC C6-C50	PHC (tot)	500
TOTAL PHC (F1-F4)	PHC (tot+g)	500

STANDARDS:
- ATLANTIC RISK-BASED CORRECTIVE ACTION (RBCA) (APIRI, 2012), NOT ADJUSTED FOR FRACTION OF ORGANIC CARBON (FOC).

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS, EXCEPT FOR TOC WHICH IS REPORTED IN PERCENT (%)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
6. 'PHC': PETROLEUM HYDROCARBONS
7. 'mbm' : METRES BELOW MUDLINE
8. '2011/04/15' : DATE FORMAT YYYY MM DD

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. HERITAGE CANALS AND ENGINEERING WORKS, PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E, SITE i, DAM E (BAYVIEW), REF#R.076951.039, DWG#314, AUGUST 15, 2017

LEGEND

- SEDIMENT SAMPLE (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (SEPTEMBER, 2017)
- PROPOSED DEWATERED ZONE
- BLACK — BLACK CONCENTRATION/HYPHEN DOES NOT EXCEED THE RBCA OR WAS NOT ANALYSED
- GREEN — GREEN CONCENTRATION DID NOT EXCEED THE RBCA
- RED — RED CONCENTRATION EXCEEDS AT LEAST ONE RBCA
- LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY RBCA
- LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE RBCA

SCALE 1:1000
0 20 40m

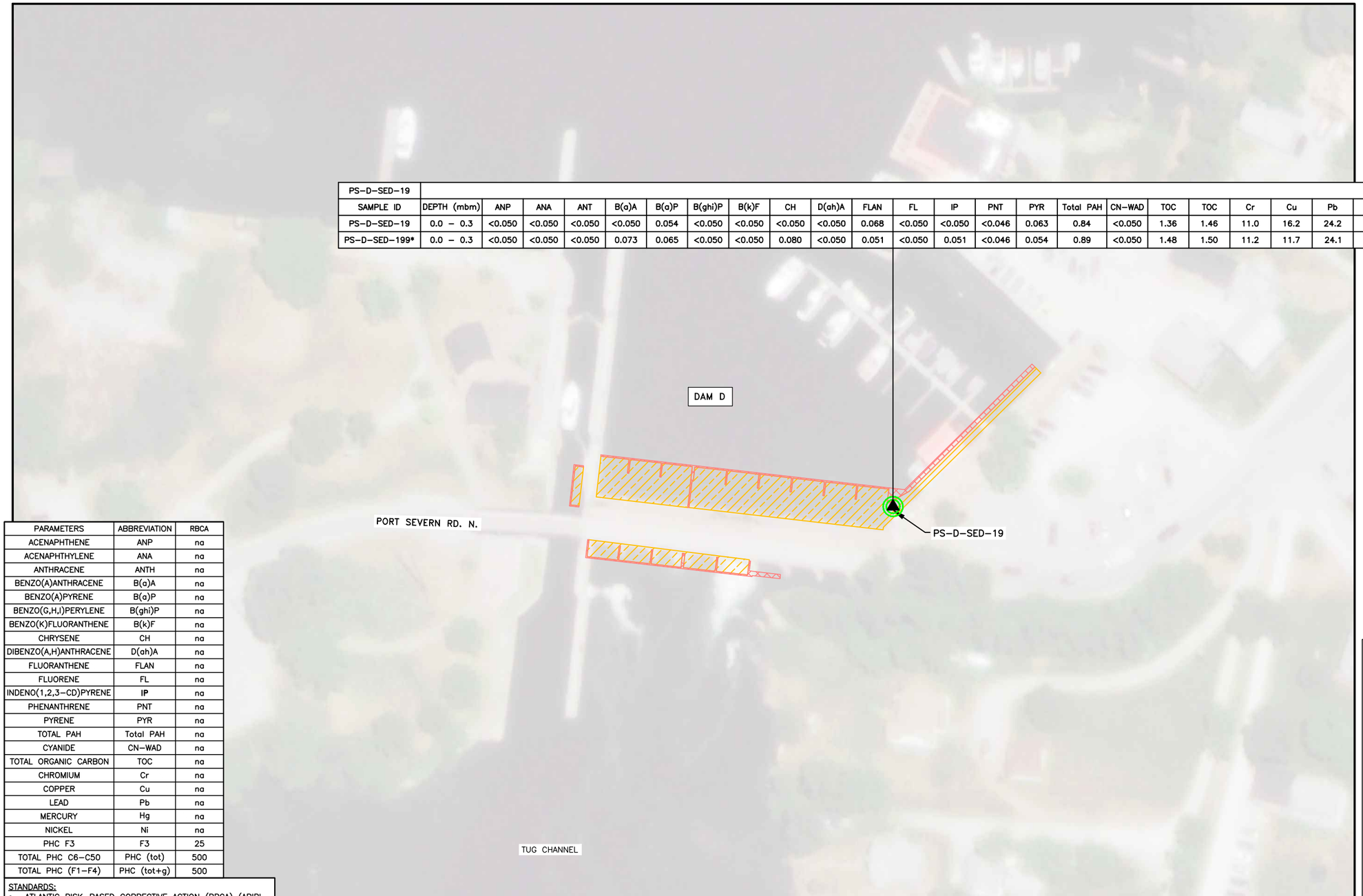
SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUNDLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO RBCA (DAM E)	
Project No: 651954	Filename: 651954-PS-ESE-POP-R2	Date: MAY 2018	Dwg No: FIGURE 12
Drawn: EM	Verified: MS	Project Manager: MS	

PAGE FORMAT: 11x17

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\POP\651954-PS-ESE-POP-R2.dwg

PS-D-SED-19																										
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANT	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-D-SED-19	0.0 – 0.3	<0.050	<0.050	<0.050	<0.050	0.054	<0.050	<0.050	<0.050	<0.050	0.068	<0.050	<0.050	<0.046	0.063	0.84	<0.050	1.36	1.46	11.0	16.2	24.2	8.2	<50	<72	<72
PS-D-SED-199*	0.0 – 0.3	<0.050	<0.050	<0.050	0.073	0.065	<0.050	<0.050	0.080	<0.050	0.051	<0.050	0.051	<0.046	0.054	0.89	<0.050	1.48	1.50	11.2	11.7	24.1	7.0	<50	<72	<72



PARAMETERS	ABBREVIATION	RBCA
ACENAPHTHENE	ANP	na
ACENAPHTHYLENE	ANA	na
ANTHRACENE	ANTH	na
BENZO(A)ANTHRACENE	B(a)A	na
BENZO(A)PYRENE	B(a)P	na
BENZO(G,H,I)PERYLENE	B(ghi)P	na
BENZO(K)FLUORANTHENE	B(k)F	na
CHRYSENE	CH	na
DIBENZO(A,H)ANTHRACENE	D(ah)A	na
FLUORANTHENE	FLAN	na
FLUORENE	FL	na
INDENO(1,2,3-CD)PYRENE	IP	na
PHENANTHRENE	PNT	na
PYRENE	PYR	na
TOTAL PAH	Total PAH	na
CYANIDE	CN-WAD	na
TOTAL ORGANIC CARBON	TOC	na
CHROMIUM	Cr	na
COPPER	Cu	na
LEAD	Pb	na
MERCURY	Hg	na
NICKEL	Ni	na
PHC F3	F3	25
TOTAL PHC C6-C50	PHC (tot)	500
TOTAL PHC (F1-F4)	PHC (tot+g)	500

STANDARDS:
- ATLANTIC RISK-BASED CORRECTIVE ACTION (RBCA) (APIRI, 2012), NOT ADJUSTED FOR FRACTION OF ORGANIC CARBON (FOC).

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS, EXCEPT FOR TOC WHICH IS REPORTED IN PERCENT (%)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
6. 'PHC': PETROLEUM HYDROCARBONS
7. 'mbm' : METRES BELOW MUDLINE
8. '2011/04/15' : DATE FORMAT YYYY MM DD

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. AECOM, PORT SEVERN AREA DAMS, SITE L, SITE M AND SITE K – COMMON WALL CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES L/M/K, MARCH 8, 2017
3. AECOM, PORT SEVERN AREA DAMS, SITE H – DAM D CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES H, MARCH 8, 2017

LEGEND

- SEDIMENT SAMPLE (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (MARCH, 2017)
- PROPOSED DEWATERED ZONE
- BLACK — BLACK CONCENTRATION/HYPHEN DOES NOT EXCEED THE RBCA OR WAS NOT ANALYSED
- GREEN — GREEN CONCENTRATION DID NOT EXCEED THE RBCA
- RED — RED CONCENTRATION EXCEEDS AT LEAST ONE RBCA
- LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY RBCA
- LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE RBCA

SCALE 1:1000
0 20 40m

SNC·LAVALIN

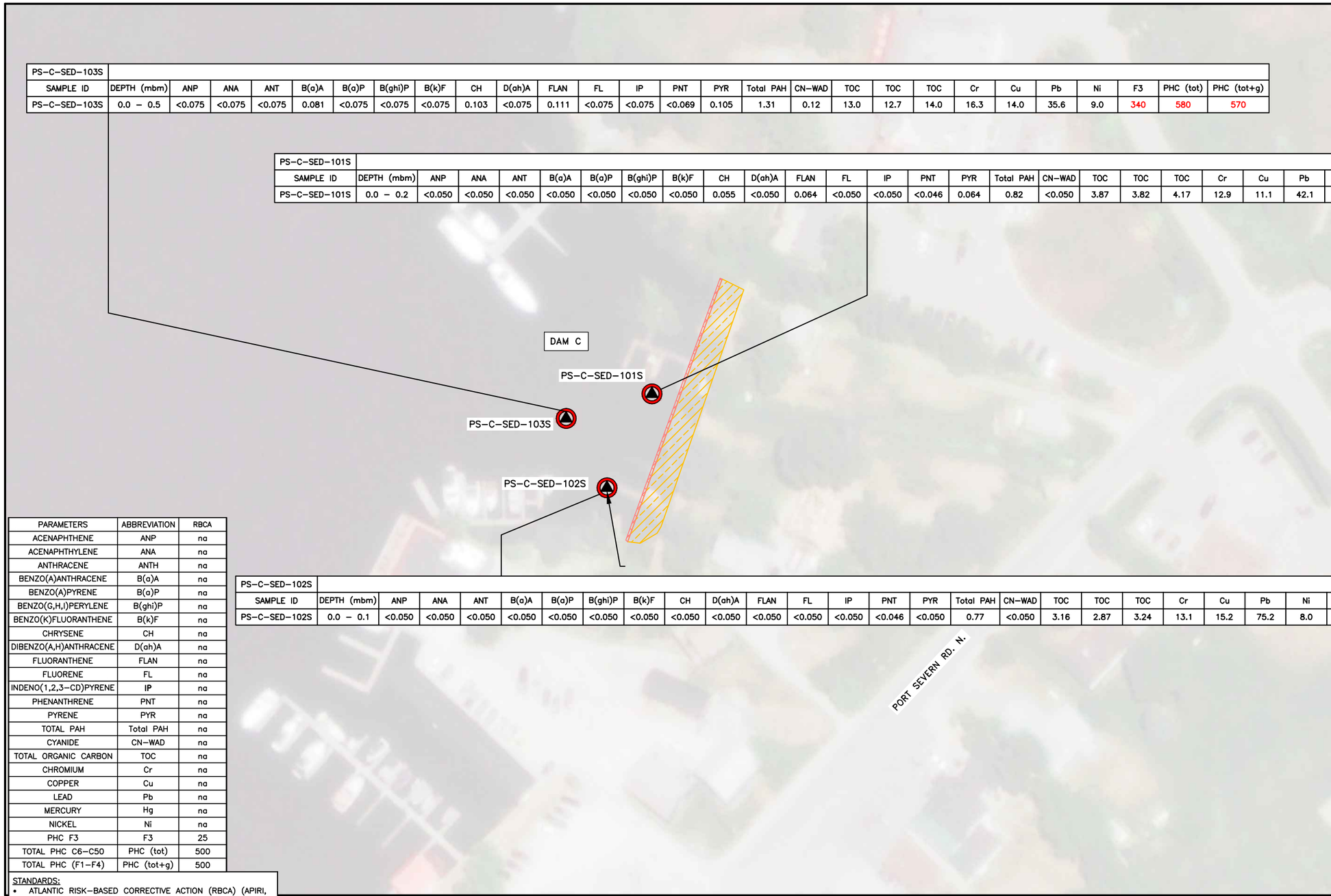
Client/Location: PWGSC PORT SEVERN BUDNLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO RBCA (DAM D)	
Project No: 651954	Filename: 651954-PS-DSE-POP-R2	Date: MAY 2018	Dwg No: FIGURE 13
Drawn: EM	Verified: MS	Project Manager: MS	

PAGE FORMAT: 11x17

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\POP\651954-PS-DSE-POP-R2.dwg

PS-C-SED-103S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANT	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-C-SED-103S	0.0 – 0.5	<0.075	<0.075	<0.075	0.081	<0.075	<0.075	<0.075	0.103	<0.075	0.111	<0.075	<0.075	<0.069	0.105	1.31	0.12	13.0	12.7	14.0	16.3	14.0	35.6	9.0	340	580	570

PS-C-SED-101S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANT	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-C-SED-101S	0.0 – 0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.055	<0.050	0.064	<0.050	<0.050	<0.046	0.064	0.82	<0.050	3.87	3.82	4.17	12.9	11.1	42.1	8.1	62	<72	62



PS-C-SED-102S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANT	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-C-SED-102S	0.0 – 0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	0.77	<0.050	3.16	2.87	3.24	13.1	15.2	75.2	8.0	93	93	93

PARAMETERS	ABBREVIATION	RBCA
ACENAPHTHENE	ANP	na
ACENAPHTHYLENE	ANA	na
ANTHRACENE	ANTH	na
BENZO(A)ANTHRACENE	B(a)A	na
BENZO(A)PYRENE	B(a)P	na
BENZO(G,H,I)PERYLENE	B(ghi)P	na
BENZO(K)FLUORANTHENE	B(k)F	na
CHRYSENE	CH	na
DIBENZO(A,H)ANTHRACENE	D(ah)A	na
FLUORANTHENE	FLAN	na
FLUORENE	FL	na
INDENO(1,2,3-CD)PYRENE	IP	na
PHENANTHRENE	PNT	na
PYRENE	PYR	na
TOTAL PAH	Total PAH	na
CYANIDE	CN-WAD	na
TOTAL ORGANIC CARBON	TOC	na
CHROMIUM	Cr	na
COPPER	Cu	na
LEAD	Pb	na
MERCURY	Hg	na
NICKEL	Ni	na
PHC F3	F3	25
TOTAL PHC C6-C50	PHC (tot)	500
TOTAL PHC (F1-F4)	PHC (tot+g)	500

STANDARDS:
- ATLANTIC RISK-BASED CORRECTIVE ACTION (RBCA) (APIRI, 2012), NOT ADJUSTED FOR FRACTION OF ORGANIC CARBON (FOC).

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS, EXCEPT FOR TOC WHICH IS REPORTED IN PERCENT (%)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
6. 'PHC': PETROLEUM HYDROCARBONS
7. 'mbm' : METRES BELOW MUDLINE
8. '2011/04/15' : DATE FORMAT YYYY MM DD

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. HERITAGE CANALS AND ENGINEERING WORKS, PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E, SITE G DAM C GENERAL ARRANGEMENT, REF#R.076951.039, DWG#200, SEPTEMBER 15, 2017

LEGEND

- SEDIMENT SAMPLE (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (SEPTEMBER, 2017)
- PROPOSED DEWATERED ZONE
- BLACK — BLACK CONCENTRATION/HYPHEN DOES NOT EXCEED THE RBCA OR WAS NOT ANALYSED
- GREEN — GREEN CONCENTRATION DID NOT EXCEED THE RBCA
- RED — RED CONCENTRATION EXCEEDS AT LEAST ONE RBCA
- LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY RBCA
- LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE RBCA

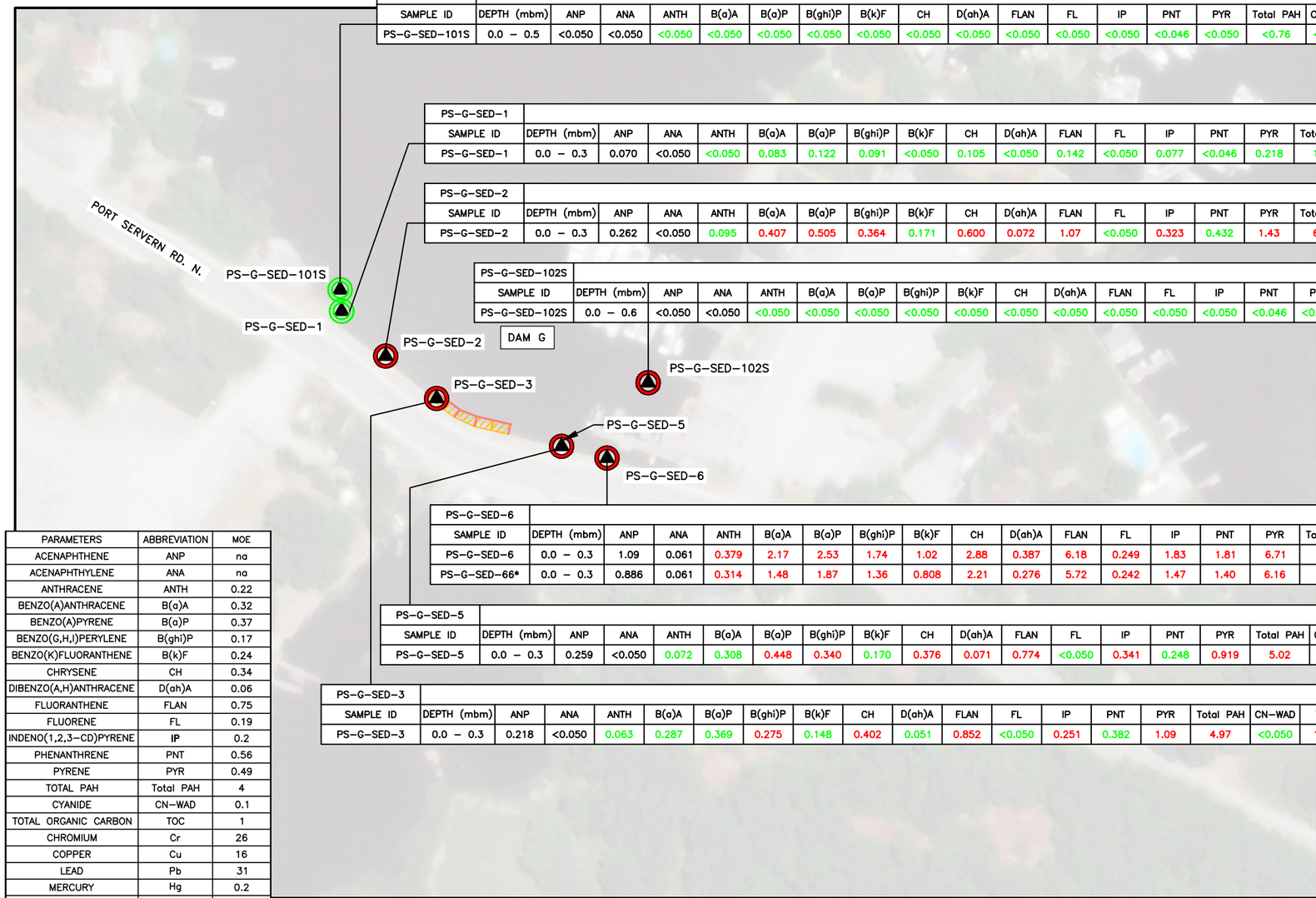
SCALE 1:1000
0 20 40m

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUDNLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO RBCA (DAM C)	
Project No: 651954	Filename: 651954-PS-CSE-POP-R2	Date: MAY 2018	Dwg No: FIGURE 14
Drawn: EM	Verified: MS	Project Manager: MS	

PAGE FORMAT: 11x17

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\POP\651954-PS-CSE-POP-R2.dwg



PS-G-SED-101S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-G-SED-101S	0.0 – 0.5	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.21	0.20	0.23	18.4	11.4	23.5	9.1	<50	<72	<72

PS-G-SED-1																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-G-SED-1	0.0 – 0.3	0.070	<0.050	<0.050	0.083	0.122	0.091	<0.050	0.105	<0.050	0.142	<0.050	0.077	<0.046	0.218	1.36	<0.050	0.21	0.23	5.0	4.8	2.9	3.0	<50	<72	<72

PS-G-SED-2																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-2	0.0 – 0.3	0.262	<0.050	0.095	0.407	0.505	0.364	0.171	0.600	0.072	1.07	<0.050	0.323	0.432	1.43	6.44	1.76	0.87	0.98	6.1	3.9	18.9	3.8	124	690	286	814

PS-G-SED-102S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-G-SED-102S	0.0 – 0.6	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.31	0.27	32.7	22.9	5.6	19.1	<50	<72	<72

PS-G-SED-6																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-6	0.0 – 0.3	1.09	0.061	0.379	2.17	2.53	1.74	1.02	2.88	0.387	6.18	0.249	1.83	1.81	6.71	32.37	<0.050	2.48	2.80	12.6	18.4	182	9.2	175	720	345	895
PS-G-SED-66*	0.0 – 0.3	0.886	0.061	0.314	1.48	1.87	1.36	0.808	2.21	0.276	5.72	0.242	1.47	1.40	6.16	26.94	<0.050	2.63	2.78	11.9	14.8	191	8.9	172	760	332	932

PS-G-SED-5																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-5	0.0 – 0.3	0.259	<0.050	0.072	0.308	0.448	0.340	0.170	0.376	0.071	0.774	<0.050	0.341	0.248	0.919	5.02	<0.050	0.87	1.12	10.7	9.9	11.5	6.9	98	730	251	828

PS-G-SED-3																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	F4G	PHC (tot)	PHC (tot+g)
PS-G-SED-3	0.0 – 0.3	0.218	<0.050	0.063	0.287	0.369	0.275	0.148	0.402	0.051	0.852	<0.050	0.251	0.382	1.09	4.97	<0.050	1.43	1.50	12.8	10.4	21.3	7.8	154	580	307	734

PARAMETERS	ABBREVIATION	MOE
ACENAPHTHENE	ANP	na
ACENAPHTHYLENE	ANA	na
ANTHRACENE	ANTH	0.22
BENZO(A)ANTHRACENE	B(a)A	0.32
BENZO(A)PYRENE	B(a)P	0.37
BENZO(G,H,I)PERYLENE	B(ghi)P	0.17
BENZO(K)FLUORANTHENE	B(k)F	0.24
CHRYSENE	CH	0.34
DIBENZO(A,H)ANTHRACENE	D(ah)A	0.06
FLUORANTHENE	FLAN	0.75
FLUORENE	FL	0.19
INDENO(1,2,3-CD)PYRENE	IP	0.2
PHENANTHRENE	PNT	0.56
PYRENE	PYR	0.49
TOTAL PAH	Total PAH	4
CYANIDE	CN-WAD	0.1
TOTAL ORGANIC CARBON	TOC	1
CHROMIUM	Cr	26
COPPER	Cu	16
LEAD	Pb	31
MERCURY	Hg	0.2
NICKEL	Ni	16
PHC F3	F3	na
PHC F4 (GRAVIMETRIC)	F4G	na
TOTAL PHC C6–C50	PHC (tot)	na
TOTAL PHC (F1–F4)	PHC (tot+g)	na

STANDARDS:
- ONTARIO MINISTRY OF ENVIRONMENT LOWEST EFFECT LEVEL (LEL) SEDIMENT STANDARD (MOE, 2008 AND 2011)

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS, EXCEPT FOR TOC WHICH IS REPORTED IN PERCENT (%)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
6. 'PHC': PETROLEUM HYDROCARBONS
7. 'mbm' : METRES BELOW MUDLINE
8. '2011/04/15' : DATE FORMAT YYYY MM DD

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. AECOM, PORT SEVERN AREA DAMS, SITE G – DAM G (LITTLE CHUTE) CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES G, MARCH 7, 2017

LEGEND

▲	SEDIMENT SAMPLE (SNCL, 2017)	GREEN	GREEN CONCENTRATION DID NOT EXCEED THE MOE STANDARD
	CONCEPTUAL COFFERDAM DETAILS (MARCH, 2017)	RED	RED CONCENTRATION EXCEEDS AT LEAST ONE MOE STANDARD
	PROPOSED DEWATERED ZONE		LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY MOE STANDARD
BLACK	BLACK CONCENTRATION/HYPHEN DOES NOT EXCEED THE MOE STANDARDS OR WAS NOT ANALYSED		LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE MOE STANDARD

SCALE 1:1500
0 30 60m

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUNDLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO PROVINCIAL STANDARDS (DAM G)	
Project No: 651954	Filename: 651954-PS-GSE-POP-P2	Date: MAY 2018	Dwg No: FIGURE 15
Drawn: EM	Verified: MS	Project Manager: MS	

PAGE FORMAT: 11x17

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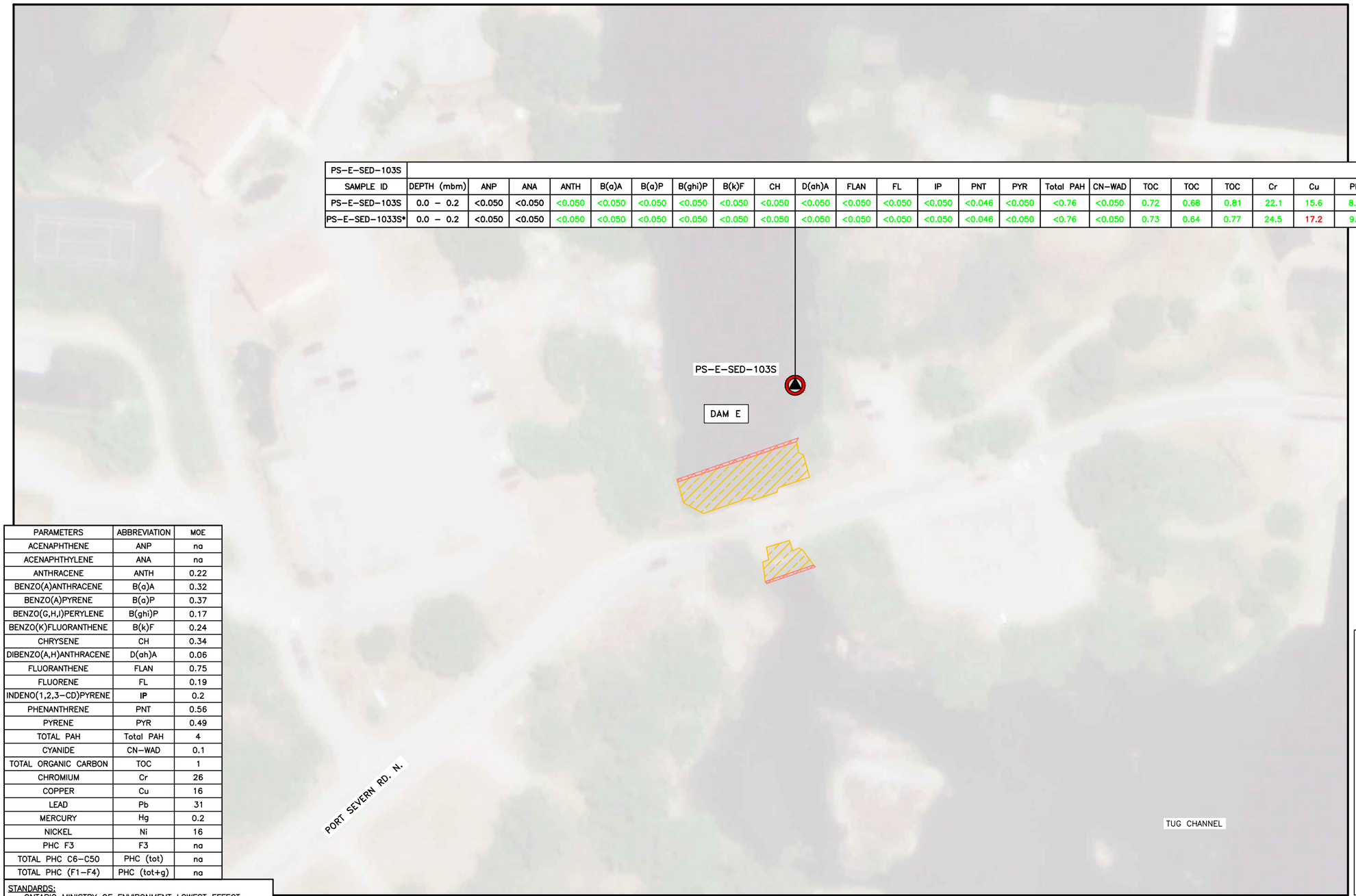


PS-E-SED-103S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-E-SED-103S	0.0 – 0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.72	0.68	0.81	22.1	15.6	8.0	14.4	<50	<72	<72
PS-E-SED-1033S*	0.0 – 0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	<0.76	<0.050	0.73	0.64	0.77	24.5	17.2	9.1	13.8	<50	<72	<72

PARAMETERS	ABBREVIATION	MOE
ACENAPHTHENE	ANP	na
ACENAPHTHYLENE	ANA	na
ANTHRACENE	ANTH	0.22
BENZO(A)ANTHRACENE	B(a)A	0.32
BENZO(A)PYRENE	B(a)P	0.37
BENZO(G,H,I)PERYLENE	B(ghi)P	0.17
BENZO(K)FLUORANTHENE	B(k)F	0.24
CHRYSENE	CH	0.34
DIBENZO(A,H)ANTHRACENE	D(ah)A	0.06
FLUORANTHENE	FLAN	0.75
FLUORENE	FL	0.19
INDENO(1,2,3-CD)PYRENE	IP	0.2
PHENANTHRENE	PNT	0.56
PYRENE	PYR	0.49
TOTAL PAH	Total PAH	4
CYANIDE	CN-WAD	0.1
TOTAL ORGANIC CARBON	TOC	1
CHROMIUM	Cr	26
COPPER	Cu	16
LEAD	Pb	31
MERCURY	Hg	0.2
NICKEL	Ni	16
PHC F3	F3	na
TOTAL PHC C6-C50	PHC (tot)	na
TOTAL PHC (F1-F4)	PHC (tot+g)	na

STANDARDS:
- ONTARIO MINISTRY OF ENVIRONMENT LOWEST EFFECT LEVEL (LEL) SEDIMENT STANDARD (MOE, 2008 AND 2011)

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS, EXCEPT FOR TOC WHICH IS REPORTED IN PERCENT (%)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
6. 'PHC': PETROLEUM HYDROCARBONS
7. 'mbm' : METRES BELOW MUDLINE
8. '2011/04/15' : DATE FORMAT YYYY MM DD

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. HERITAGE CANALS AND ENGINEERING WORKS, PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E, SITE i, DAM E (BAYVIEW), REF#R.076951.039, DWG#314, AUGUST 15, 2017

LEGEND

- SEDIMENT SAMPLE (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (AUGUST, 2017)
- PROPOSED DEWATERED ZONE
- BLACK — BLACK CONCENTRATION/HYPHEN DOES NOT EXCEED THE MOE STANDARDS OR WAS NOT ANALYSED
- GREEN — GREEN CONCENTRATION DID NOT EXCEED THE MOE STANDARD
- RED — RED CONCENTRATION EXCEEDS AT LEAST ONE MOE STANDARD
- LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY MOE STANDARD
- LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE MOE STANDARD

SCALE 1:1000
0 20 40m

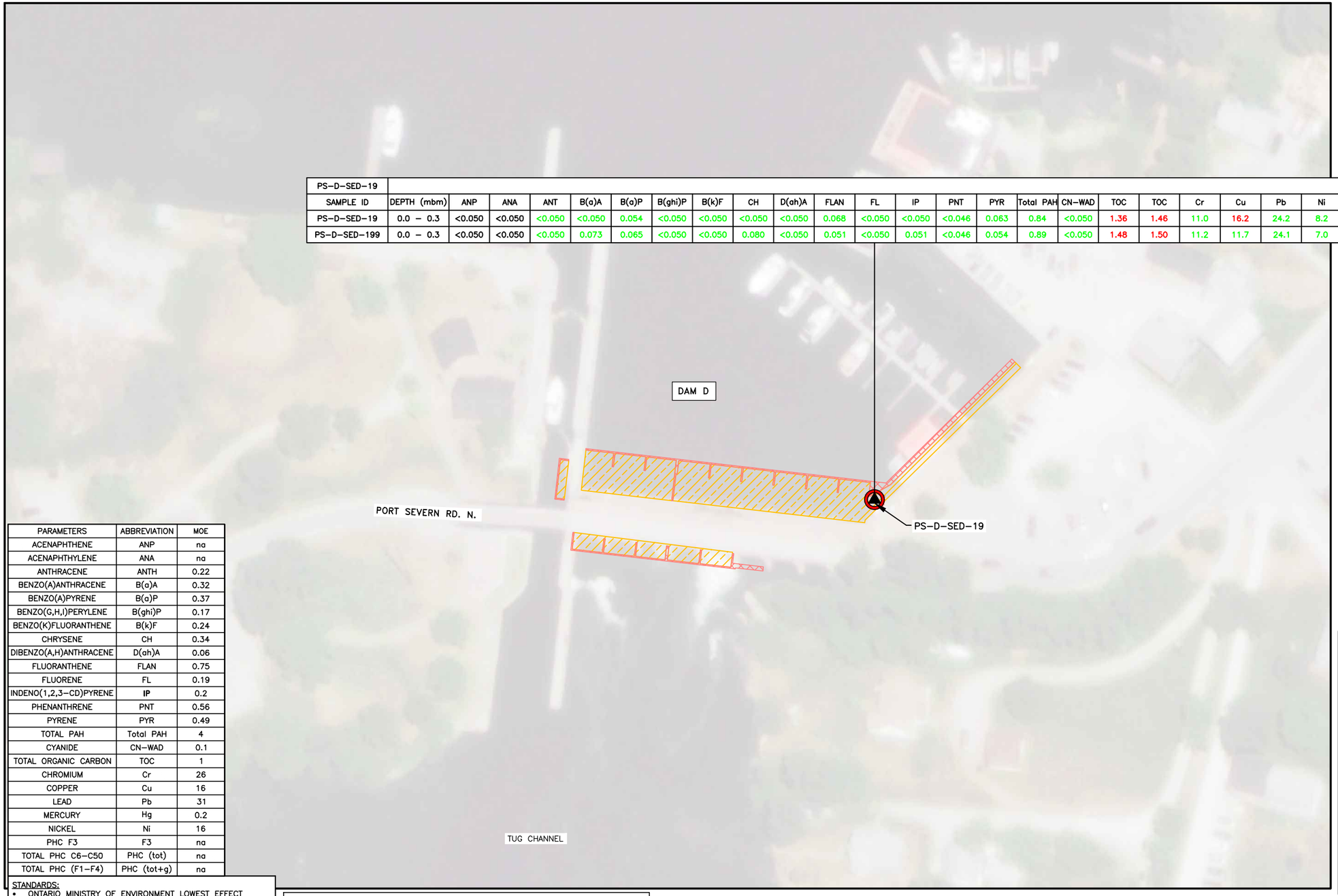
SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUNDLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO PROVINCIAL STANDARDS (DAM E)
Project No: 651954	Filename: 651954-PS-ESE-POP-P2	Date: MAY 2018
Drawn: EM	Verified: MS	Project Manager: MS
		Dwg No: FIGURE 16

PAGE FORMAT: 11x17

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\POP\651954-PS-ESE-POP-P2.dwg

PS-D-SED-19																										
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANT	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-D-SED-19	0.0 – 0.3	<0.050	<0.050	<0.050	<0.050	0.054	<0.050	<0.050	<0.050	<0.050	0.068	<0.050	<0.050	<0.046	0.063	0.84	<0.050	1.36	1.46	11.0	16.2	24.2	8.2	<50	<72	<72
PS-D-SED-199	0.0 – 0.3	<0.050	<0.050	<0.050	0.073	0.065	<0.050	<0.050	0.080	<0.050	0.051	<0.050	0.051	<0.046	0.054	0.89	<0.050	1.48	1.50	11.2	11.7	24.1	7.0	<50	<72	<72



PARAMETERS	ABBREVIATION	MOE
ACENAPHTHENE	ANP	na
ACENAPHTHYLENE	ANA	na
ANTHRACENE	ANTH	0.22
BENZO(A)ANTHRACENE	B(a)A	0.32
BENZO(A)PYRENE	B(a)P	0.37
BENZO(G,H,I)PERYLENE	B(ghi)P	0.17
BENZO(K)FLUORANTHENE	B(k)F	0.24
CHRYSENE	CH	0.34
DIBENZO(A,H)ANTHRACENE	D(ah)A	0.06
FLUORANTHENE	FLAN	0.75
FLUORENE	FL	0.19
INDENO(1,2,3-CD)PYRENE	IP	0.2
PHENANTHRENE	PNT	0.56
PYRENE	PYR	0.49
TOTAL PAH	Total PAH	4
CYANIDE	CN-WAD	0.1
TOTAL ORGANIC CARBON	TOC	1
CHROMIUM	Cr	26
COPPER	Cu	16
LEAD	Pb	31
MERCURY	Hg	0.2
NICKEL	Ni	16
PHC F3	F3	na
TOTAL PHC C6-C50	PHC (tot)	na
TOTAL PHC (F1-F4)	PHC (tot+g)	na

STANDARDS:
- ONTARIO MINISTRY OF ENVIRONMENT LOWEST EFFECT LEVEL (LEL) SEDIMENT STANDARD (MOE, 2008 AND 2011)

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS, EXCEPT FOR TOC WHICH IS REPORTED IN PERCENT (%)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
6. 'PHC': PETROLEUM HYDROCARBONS
7. 'mbm' : METRES BELOW MUDLINE
8. '2011/04/15' : DATE FORMAT YYYY MM DD

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. AECOM, PORT SEVERN AREA DAMS, SITE L, SITE M AND SITE K – COMMON WALL CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES L/M/K, MARCH 8, 2017
3. AECOM, PORT SEVERN AREA DAMS, SITE H – DAM D CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES H, MARCH 8, 2017

LEGEND

- SEDIMENT SAMPLE (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (MARCH, 2017)
- PROPOSED DEWATERED ZONE
- BLACK — BLACK CONCENTRATION/HYPHEN DOES NOT EXCEED THE MOE STANDARDS OR WAS NOT ANALYSED
- GREEN — GREEN CONCENTRATION DID NOT EXCEED THE MOE STANDARD
- RED — RED CONCENTRATION EXCEEDS AT LEAST ONE MOE STANDARD
- LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY MOE STANDARD
- LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE MOE STANDARD

SCALE 1:1000
0 20 40m

SNC·LAVALIN

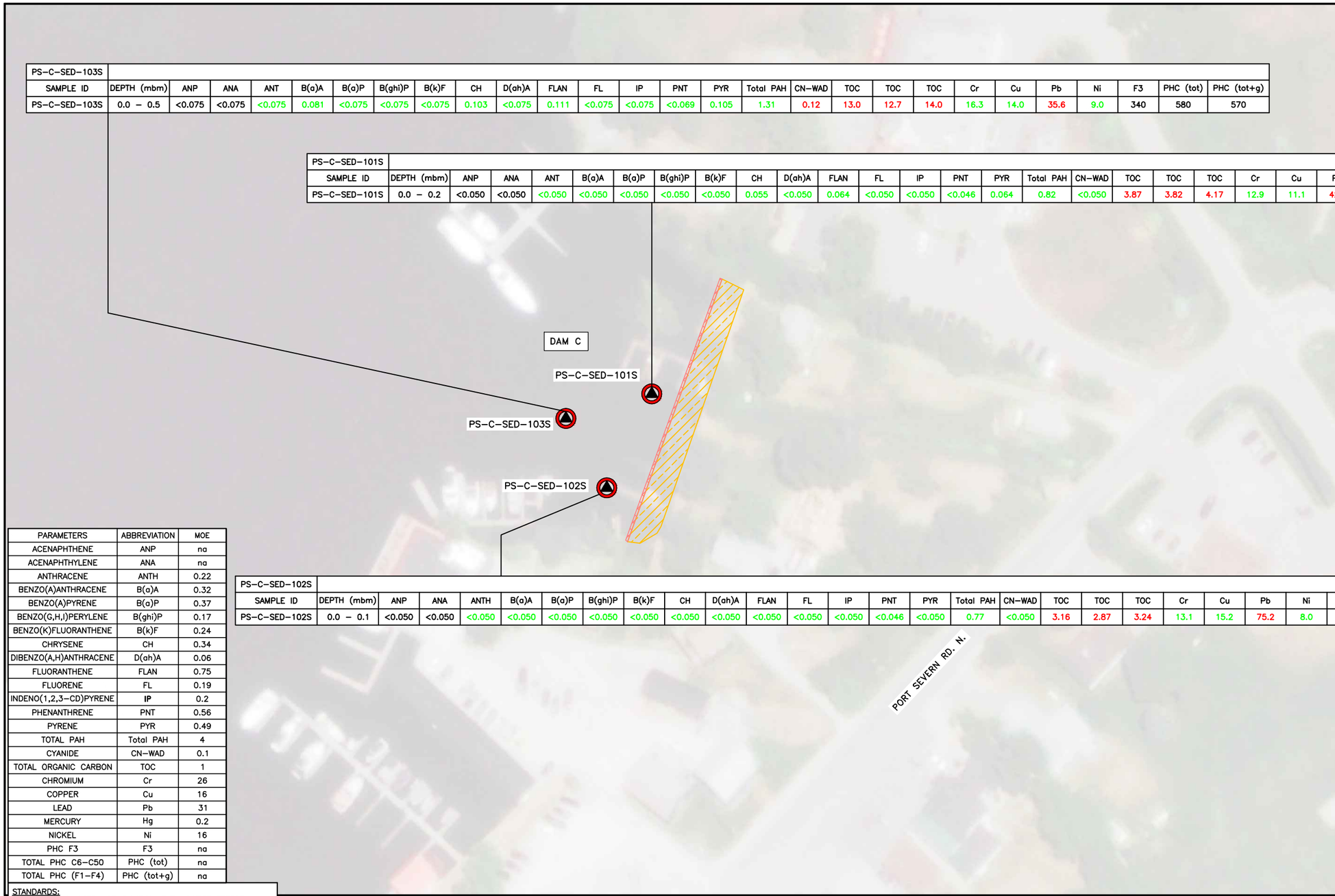
Client/Location: PWGSC PORT SEVERN BUDNLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO PROVINCIAL GUIDELINES (DAM D)	
Project No: 651954	Filename: 651954-PS-DSE-POP-P2	Date: MAY 2018	Dwg No: FIGURE 17
Drawn: EM	Verified: MS	Project Manager: MS	

PAGE FORMAT: 11x17

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\POP\651954-PS-DSE-POP-P2.dwg

PS-C-SED-103S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANT	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-C-SED-103S	0.0 – 0.5	<0.075	<0.075	<0.075	0.081	<0.075	<0.075	<0.075	0.103	<0.075	0.111	<0.075	<0.075	<0.069	0.105	1.31	0.12	13.0	12.7	14.0	16.3	14.0	35.6	9.0	340	580	570

PS-C-SED-101S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANT	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-C-SED-101S	0.0 – 0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.055	<0.050	0.064	<0.050	<0.050	<0.046	0.064	0.82	<0.050	3.87	3.82	4.17	12.9	11.1	42.1	8.1	62	<72	62



PS-C-SED-102S																											
SAMPLE ID	DEPTH (mbm)	ANP	ANA	ANTH	B(a)A	B(a)P	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	PNT	PYR	Total PAH	CN-WAD	TOC	TOC	TOC	Cr	Cu	Pb	Ni	F3	PHC (tot)	PHC (tot+g)
PS-C-SED-102S	0.0 – 0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.046	<0.050	0.77	<0.050	3.16	2.87	3.24	13.1	15.2	75.2	8.0	93	93	93

PARAMETERS	ABBREVIATION	MOE
ACENAPHTHENE	ANP	na
ACENAPHTHYLENE	ANA	na
ANTHRACENE	ANTH	0.22
BENZO(A)ANTHRACENE	B(a)A	0.32
BENZO(A)PYRENE	B(a)P	0.37
BENZO(G,H,I)PERYLENE	B(ghi)P	0.17
BENZO(K)FLUORANTHENE	B(k)F	0.24
CHRYSENE	CH	0.34
DIBENZO(A,H)ANTHRACENE	D(ah)A	0.06
FLUORANTHENE	FLAN	0.75
FLUORENE	FL	0.19
INDENO(1,2,3-CD)PYRENE	IP	0.2
PHENANTHRENE	PNT	0.56
PYRENE	PYR	0.49
TOTAL PAH	Total PAH	4
CYANIDE	CN-WAD	0.1
TOTAL ORGANIC CARBON	TOC	1
CHROMIUM	Cr	26
COPPER	Cu	16
LEAD	Pb	31
MERCURY	Hg	0.2
NICKEL	Ni	16
PHC F3	F3	na
TOTAL PHC C6–C50	PHC (tot)	na
TOTAL PHC (F1–F4)	PHC (tot+g)	na

STANDARDS:
* ONTARIO MINISTRY OF ENVIRONMENT LOWEST EFFECT LEVEL (LEL) SEDIMENT STANDARD (MOE, 2008 AND 2011)

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/GRAM (µg/g) BY DRY WEIGHT BASIS, EXCEPT FOR TOC WHICH IS REPORTED IN PERCENT (%)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
6. 'PHC': PETROLEUM HYDROCARBONS
7. 'mbm' : METRES BELOW MUDLINE
8. '2011/04/15' : DATE FORMAT YYYY MM DD

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. HERITAGE CANALS AND ENGINEERING WORKS, PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E, SITE G DAM C GENERAL ARRANGEMENT, REF#R.076951.039, DWG#200, SEPTEMBER 15, 2017

LEGEND

▲	SEDIMENT SAMPLE (SNCL, 2017)
	CONCEPTUAL COFFERDAM DETAILS (SEPTEMBER, 2017)
	PROPOSED DEWATERED ZONE
BLACK	BLACK CONCENTRATION/HYPHEN DOES NOT EXCEED THE MOE STANDARDS OR WAS NOT ANALYSED
GREEN	GREEN CONCENTRATION DID NOT EXCEED THE MOE STANDARD
RED	RED CONCENTRATION EXCEEDS AT LEAST ONE MOE STANDARD
◎	LOCATION WHERE THE SEDIMENT SAMPLE DID NOT EXCEED ANY MOE STANDARD
◎	LOCATION WHERE THE SEDIMENT SAMPLE EXCEEDED AT LEAST ONE MOE STANDARD

SCALE 1:1000
0 20 40m

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUDNLE PORT SEVERN, ONTARIO		Title: SEDIMENT – COMPARISON TO PROVINCIAL STANDARDS (DAM C)	
Project No: 651954	Filename: 651954-PS-CSE-POP-P2	Date: MAY 2018	Dwg No: FIGURE 18
Drawn: EM	Verified: MS	Project Manager: MS	

FILENAME: P:\PWGSC\651954 – Trent Severn Sediment\4.0 Execution\4.7 Working Versions\4.7.3 Figures\Port Severn\POP\651954-PS-CSE-POP-P2.dwg

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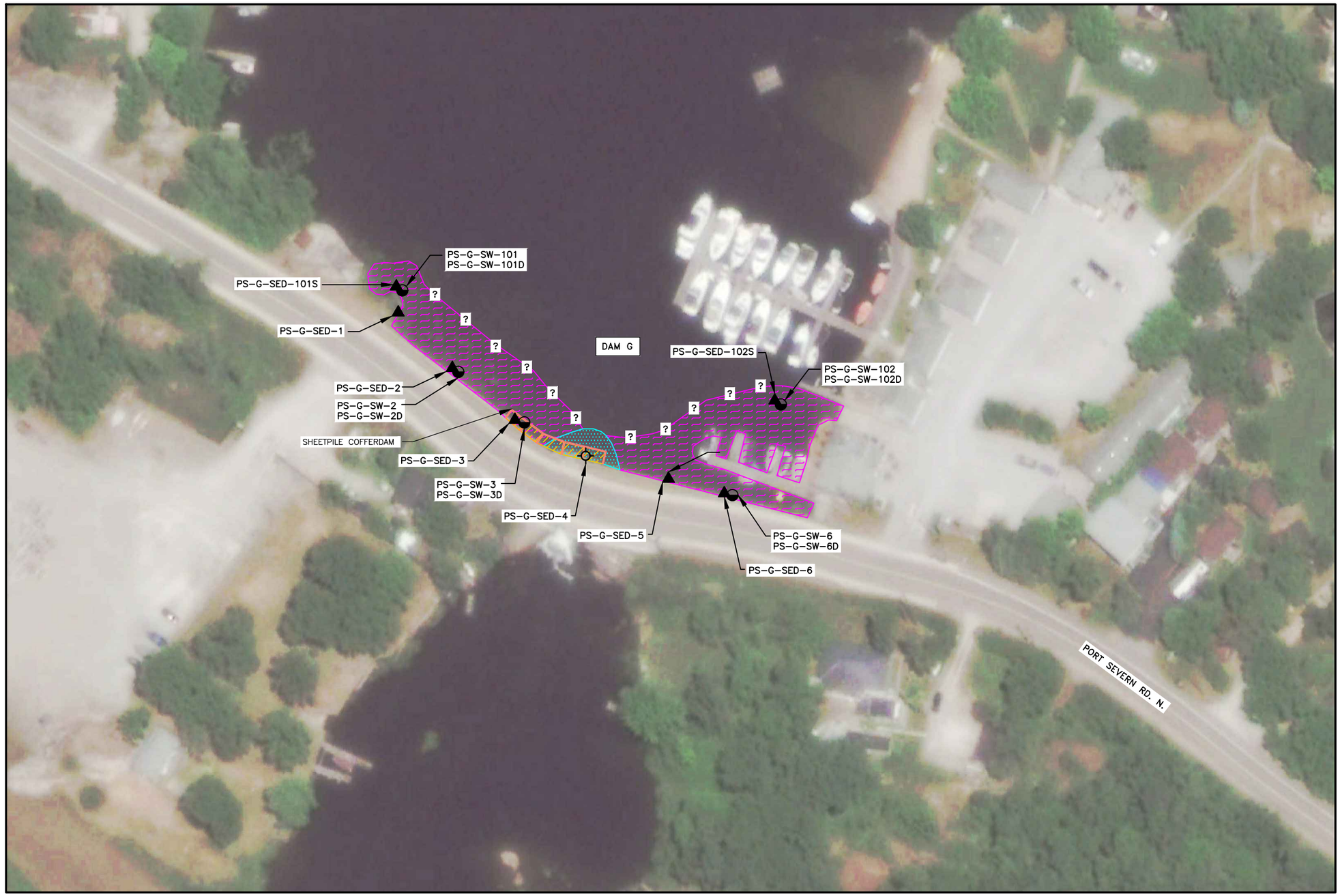

LEGEND

- SURFACE WATER SAMPLE (SNCL, 2017)
- SEDIMENT SAMPLE (SNCL, 2017)
- UNSUCCESSFUL ATTEMPT SAMPLE LOCATION (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (MARCH, 2017)
- PROPOSED DEWATERED ZONE
- CONCRETE BOTTOM WITH MINIMAL SEDIMENT ACCUMULATION
- ROCKY BOTTOM WITH MINIMAL SEDIMENT ACCUMULATION
- HARD BOTTOM POTENTIALLY SCOURED DUE TO PROXIMITY TO DAMS
- INTERPRETED DEPOSITIONAL AREA

SCALE 1:1000

0 20 40m

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. AECOM, PORT SEVERN AREA DAMS, SITE G – DAM G (LITTLE CHUTE) CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES G, MARCH 7, 2017

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUNDLE PORT SEVERN, ONTARIO		Title: INTERPRETED DEPOSITIONAL AREAS (DAM G)	
Project No: 651954	Filename: 651954-PS-GIDA-1.DWG	Date: MAY 2018	Dwg No: FIGURE 19
Drawn: EM	Verified: MS	Project Manager: MS	

PAGE FORMAT: 11x17

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N

LEGEND

- SURFACE WATER SAMPLE (SNCL, 2017)
- SEDIMENT SAMPLE (SNCL, 2017)
- UNSUCCESSFUL ATTEMPT SAMPLE LOCATION (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (AUGUST, 2017)
- PROPOSED DEWATERED ZONE
- CONCRETE BOTTOM WITH MINIMAL SEDIMENT ACCUMULATION
- ROCKY BOTTOM WITH MINIMAL SEDIMENT ACCUMULATION
- HARD BOTTOM POTENTIALLY SCOURED DUE TO PROXIMITY TO DAMS
- INTERPRETED DEPOSITIONAL AREA

SCALE 1:1000

0 20 40m

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. HERITAGE CANALS AND ENGINEERING WORKS, PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E, SITE i, DAM E (BAYVIEW), REF#R.076951.039, DWG#314, AUGUST 15, 2017

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUNDLE PORT SEVERN, ONTARIO		Title: INTERPRETED DEPOSITIONAL AREAS (DAM E)	
Project No: 651954	Filename: 651954-PS-EIDA-1.DWG	Date: MAY 2018	Dwg No: FIGURE 20
Drawn: EM	Verified: MS	Project Manager: MS	

PAGE FORMAT: 11x17

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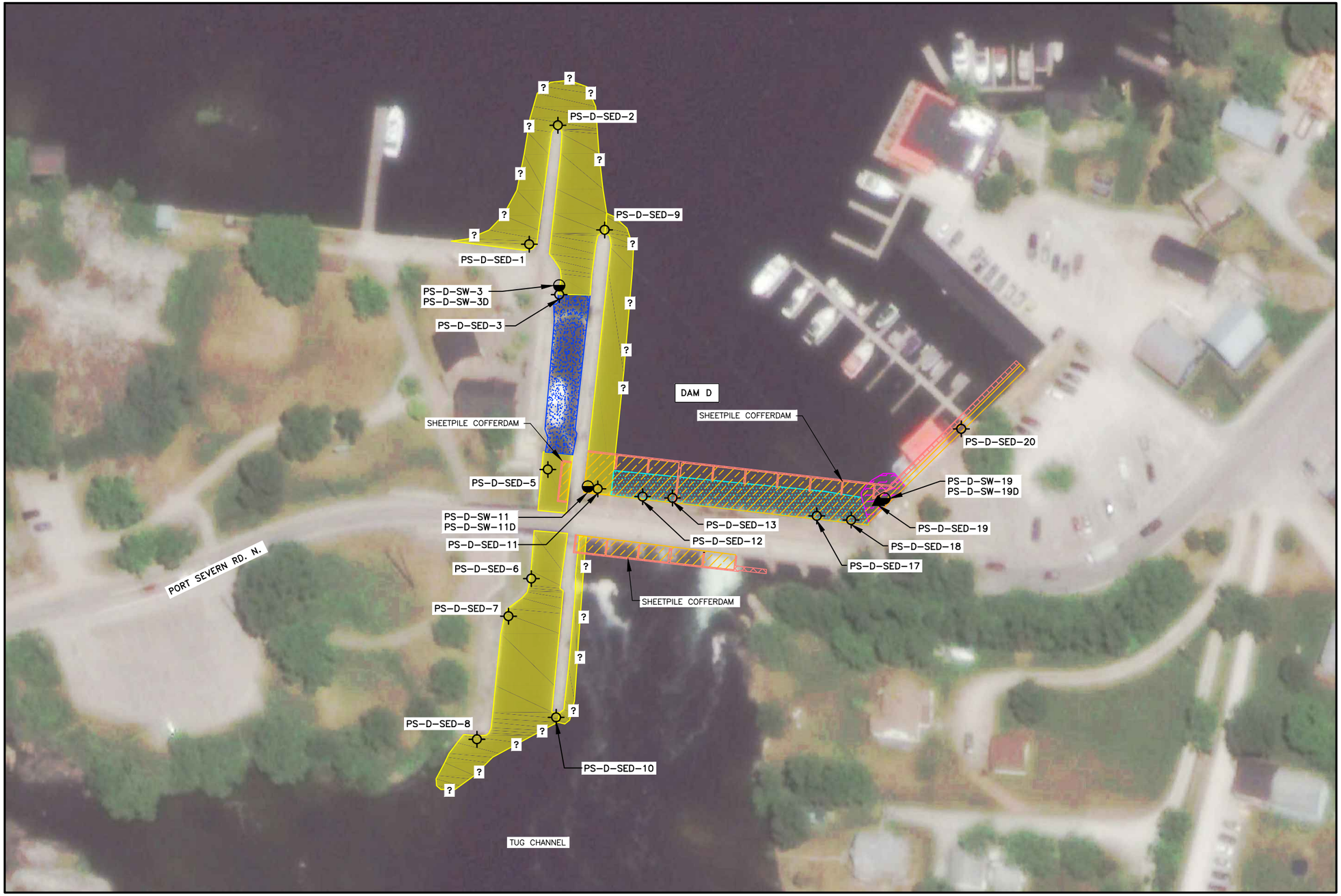

LEGEND

- SURFACE WATER SAMPLE (SNCL, 2017)
- SEDIMENT SAMPLE (SNCL, 2017)
- UNSUCCESSFUL ATTEMPT SAMPLE LOCATION (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (MARCH, 2017)
- PROPOSED DEWATERED ZONE
- CONCRETE BOTTOM WITH MINIMAL SEDIMENT ACCUMULATION
- ROCKY BOTTOM WITH MINIMAL SEDIMENT ACCUMULATION
- HARD BOTTOM POTENTIALLY SCOURED DUE TO PROXIMITY TO DAMS
- INTERPRETED DEPOSITIONAL AREA

SCALE 1:1000

0 20 40m

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. AECOM, PORT SEVERN AREA DAMS, SITE L, SITE M AND SITE K – COMMON WALL CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES L/M/K, MARCH 8, 2017
3. AECOM, PORT SEVERN AREA DAMS, SITE H – DAM D CONSTRUCTIBILITY PLAN, REF#6052256, DWG#C-SITES H, MARCH 8, 2017

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUDNLE PORT SEVERN, ONTARIO		Title: INTERPRETED DEPOSITIONAL AREAS (DAM D)
Project No: 651954	Filename: 651954-PS-DIDA-1.DWG	Date: MAY 2018 / Dwg No: FIGURE 21
Drawn: EM	Verified: MS	Project Manager: MS

PAGE FORMAT: 11x17

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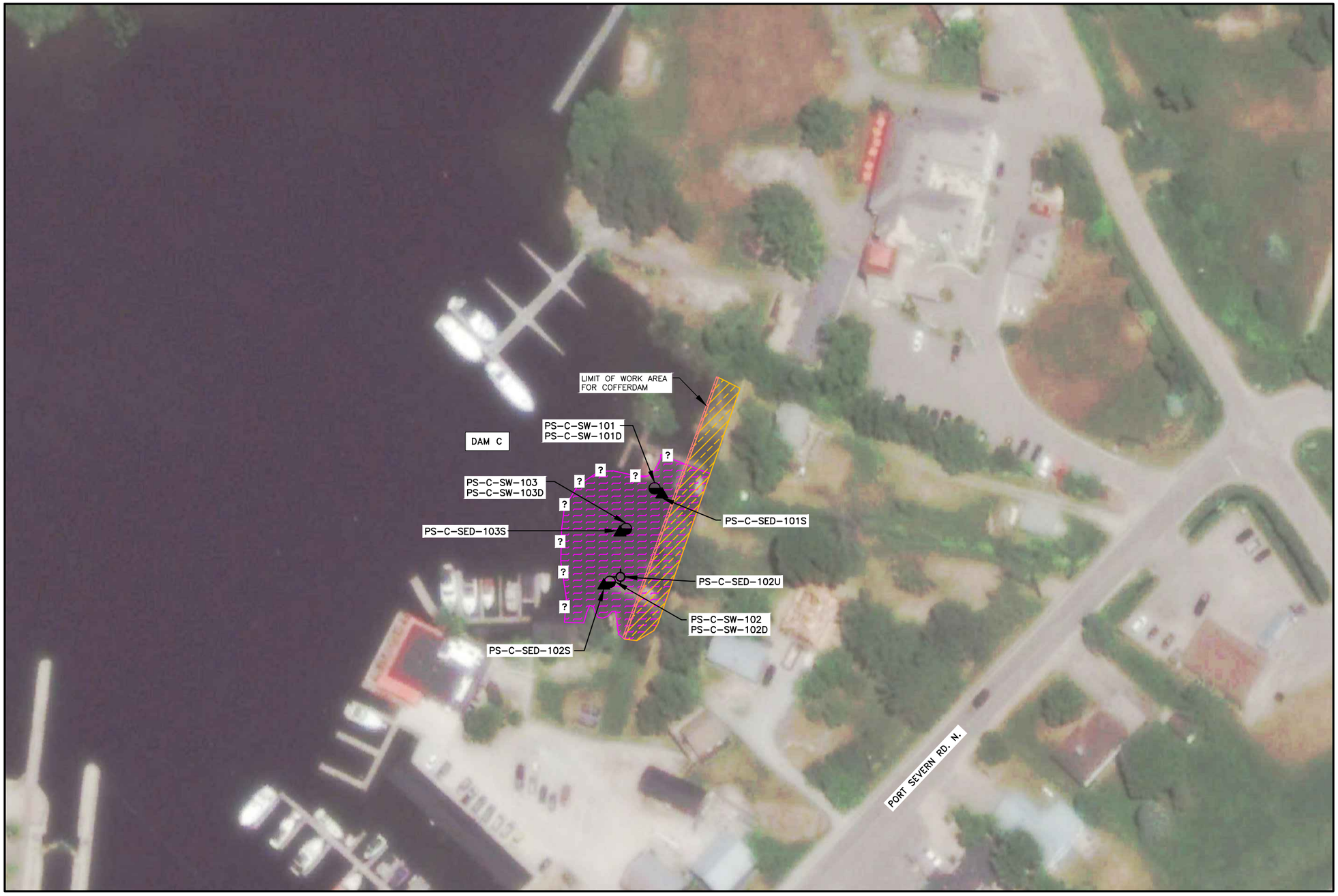

LEGEND

- SURFACE WATER SAMPLE (SNCL, 2017)
- SEDIMENT SAMPLE (SNCL, 2017)
- UNSUCCESSFUL ATTEMPT SAMPLE LOCATION (SNCL, 2017)
- CONCEPTUAL COFFERDAM DETAILS (SEPTEMBER, 2017)
- PROPOSED DEWATERED ZONE
- CONCRETE BOTTOM WITH MINIMAL SEDIMENT ACCUMULATION
- ROCKY BOTTOM WITH MINIMAL SEDIMENT ACCUMULATION
- HARD BOTTOM POTENTIALLY SCOURED DUE TO PROXIMITY TO DAMS
- INTERPRETED DEPOSITIONAL AREA

SCALE 1:1000

0 20 40m

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. GOOGLE EARTH AIR PHOTO, JUNE 21, 2016
2. HERITAGE CANALS AND ENGINEERING WORKS, PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E, SITE G DAM C GENERAL ARRANGEMENT, REF#R.076951.039, DWG#200, SEPTEMBER 15, 2017

SNC·LAVALIN

Client/Location: PWGSC PORT SEVERN BUDNLE PORT SEVERN, ONTARIO		Title: INTERPRETED DEPOSITIONAL AREAS (DAM C)
Project No: 651954	Filename: 651954-PS-CIDA-1.DWG	Date: MAY 2018 / Dwg No: FIGURE 22
Drawn: EM	Verified: MS	Project Manager: MS

PAGE FORMAT: 11x17

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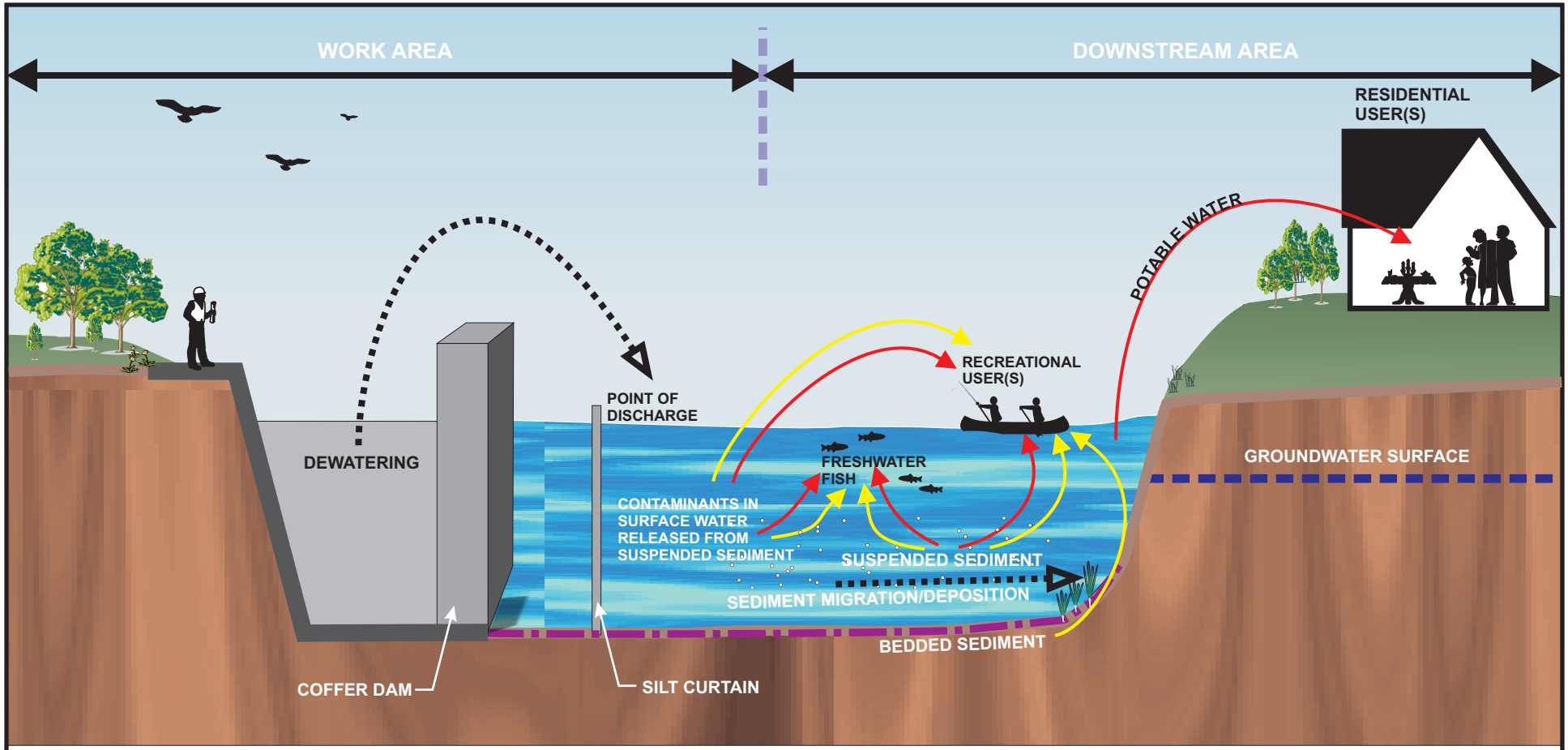

LEGEND

- POTENTIALLY IMPACTED SEDIMENT
- DIRECT/DERMAL CONTACT
- INGESTION
- FATE & TRANSPORT MECHANISM

NOTE(S):
1. THIS FIGURE IS NOT TO SCALE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED, FAXED OR PRINTED IN OTHER THAN ITS ORIGINAL SIZE AND COLOURS

SNC·LAVALIN

Client/Location: PWGSC TRENT SEVERN WATERWAY SEDIMENT SAMPLING PROGRAM		Title: CONCEPTUAL SITE MODEL	
Project No: 651954	Filename: 651964-PS-CSM-1.CDR	Date: MAY 2018	Dwg No: FIGURE 23
Drawn/Design: EM	Verified: JP	Project Manager: MS	

Tables

TABLE 1: **Sediment Sampling Locations, Depths and Descriptions**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

Location		ID	Sampling Method	Number of Retrievals	Number of Sampling Location Attempts *	Easting	Northing	Water Depth (m)	Sample Depth (m below mudline)	Underwater Video (Yes/No)	Description of Sample Location
Dam G	1	PS-G-SED-1	Manual Core	1	na	600408.95	4961955.57	0.1	0-0.25	No	Sediment present for collection.
	2	PS-G-SED-2	Manual Core	4	na	600423.76	4961940.99	0.2	0-0.25	No	Sediment present for collection.
	3	PS-G-SED-3	Manual Core	4	na	600439.95	4961928.58	0.7	0-0.25	No	Sediment present for collection.
	4	PS-G-SED-4	No Recovery/Ponar	na	4	600455.04	4961920.37	2.5	na	No	Hard bottom with shells / Fast moving water.
	5	PS-G-SED-5	Manual Core	1	na	600475.38	4961914.73	2.2	0-0.25	No	Sediment present for collection.
	6	PS-G-SED-6	Manual Core	5	na	600491.09	4961910.73	1.0	0-0.25	No	Sediment present for collection.
	101	PS-G-SED-101S	Split Spoon	3	na	600410.00	4961961.00	2.1	0-0.50	Yes	Sediment present for collection.
	102	PS-G-SED-102S	Split Spoon	3	na	600503.00	4961933.00	1.7	0-0.60	Yes	Sediment present for collection.
	102	PS-G-SED-102U	No Recovery/Split Spoon	na	1	650503.00	4961933.00	2.1	na	Yes	Unable to collect sediment. Successful on 2nd attempt in shallower water.
Dam E	2	PS-E-SED-2	No Recovery/Ponar	na	4	601017.06	4961920.74	2.5	na	Yes	Vegetation and rocks / Unable to collect sediment.
	3	PS-E-SED-3	No Recovery/Ponar	na	4	601020.67	4961922.35	2.5	na	Yes	Vegetation, shells and rocks / Unable to collect sediment.
	101	PS-E-SED-101S	No Recovery/Split Spoon	na	10	601017.00	4961944.00	1.0 to 3.5	na	Yes	Shells on rocky bottom / Unable to collect sediment.
	102	PS-E-SED-102S	No Recovery/Split Spoon	na	5	601016.19	4961924.00	2.5 to 3.4	na	No	Hard bottom / Unable to collect sediment
	103	PS-E-SED-103S	Split Spoon	9	na	601040.00	4961950.00	1.2	0-0.20	Yes	Sediment present for collection on 2nd Location Attempt
	103	PS-E-SED-103U	No Recovery/Split Spoon	na	3	601040.00	4961950.00	1.1 to 1.6	na	Yes	Rocky bottom / Unable to collect sediment.
Dam D	1	PS-D-SED-1	No Recovery/Ponar	na	3	601176.61	4962013.42	3.0	na	Yes	Cobbles and boulders with algae and shells/ Unable to collect sediment.
	2	PS-D-SED-2	No Recovery/Ponar	na	3	601183.62	4962042.59	4.3	na	Yes	Vegetation and shells on hard rocky bottom / Unable to collect sediment.
	3	PS-D-SED-3	No Recovery/Ponar	na	3	601183.95	4962003.29	3.0	na	Yes	Vegetation and shells on hard rocky bottom / Unable to collect sediment.
	5	PS-D-SED-5	No Recovery/Ponar	na	3	601181.15	4961958.15	3.2	na	Yes	Vegetation and shells on hard rocky bottom / Unable to collect sediment.
	6	PS-D-SED-6	No Recovery/Ponar	na	3	601177.11	4961931.40	3.0	na	Yes	Vegetation and shells on hard rocky bottom / Unable to collect sediment.

TABLE 1: **Sediment Sampling Locations, Depths and Descriptions**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

Location		ID	Sampling Method	Number of Retrievals	Number of Sampling Location Attempts *	Easting	Northing	Water Depth (m)	Sample Depth (m below mudline)	Underwater Video (Yes/No)	Description of Sample Location
Dam D	7	PS-D-SED-7	No Recovery/Ponar	na	3	601171.51	4961922.19	3.0	na	Yes	Vegetation and shells on hard bottom / Unable to collect sediment.
	8	PS-D-SED-8	No Recovery/Ponar	na	3	601163.76	4961891.99	2.0	na	Yes	Cobbles and boulders with algae / Unable to collect sediment.
	9	PS-D-SED-9	No Recovery/Ponar	na	3	601195.08	4962016.91	4.0	na	Yes	Hard rocky bottom with shells / Unable to collect sediment.
	10	PS-D-SED-10	No Recovery/Ponar	na	3	601183.18	4961897.37	3.2	na	Yes	Cobbles and boulders with algae / Unable to collect sediment.
	11	PS-D-SED-11	No Recovery/Ponar	na	3	601191.00	4961953.98	4.6	na	Yes	Hard rocky bottom with shells / Unable to collect sediment.
	12	PS-D-SED-12	No Recovery/Ponar	na	3	601204.42	4961951.51	4.0	na	No	Fast current / Unable to collect sediment
	13	PS-D-SED-13	No Recovery/Ponar	na	3	601211.71	4961951.18	nm	na	No	Fast current / Unable to collect sediment
	17	PS-D-SED-17	No Recovery/Ponar	3	na	601247.12	4961946.77	3.0	na	No	Fast current / Unable to collect sediment
	18	PS-D-SED-18	No Recovery/Ponar	3	na	601255.54	4961945.77	3.1	na	No	Fast current / Unable to collect sediment
	19	PS-D-SED-19	Ponar/Manual Core	3	na	601263.70	4961951.07	1.2	0-0.25	No	Sediment present for collection.
	20	PS-D-SED-20	No Recovery/Ponar	na	2	601282.56	4961968.13	Frozen	na	No	Frozen / Unable to collect sediment
Dam C	101	PS-C-SED-101S	Split Spoon	9	na	601333.00	4962084.00	1.5	0-0.15	Yes	Sediment present for collection.
	102	PS-C-SED-102S	Split Spoon	8	na	601322.00	4962061.00	1.2	0-0.10	Yes	Sediment present for collection.
	102	PS-C-SED-102U	No Recovery/Split Spoon	na	3	601322.00	4962061.00	1.2	na	Yes	Bottom obscurred by vegetation
	103	PS-C-SED-103S	Split Spoon	5	na	601325.98	4962074.06	2.5	0-0.50	No	Sediment present for collection.

na Not applicable
nm Not measured
* Number of attempts within a 10 m diameter area

TABLE 2: **Grain Size Analysis Results**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

Sampling Location	%Gravel		%Sand			%Fines		Sample Depth (mbm)
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
Predominantly Sand and Gravel								
PS-G-SED-1	17	5	4	18	51	3	2	0-0.25
PS-G-SED-2	0	20	11	28	33	5	3	0-0.25
PS-G-SED-3	0	21	11	25	30	8	5	0-0.25
PS-G-SED-5	2	16	10	25	35	8	4	0-0.25
PS-G-SED-6	Insufficient Sample							0-0.25
PS-D-SED-19	6	37	12	28	12	3	2	0-0.25
PS-C-SED-102S	23	14	6	21	26	8	2	0-0.10
PS-C-SED-103S	21	18	4	15	26	13	3	0-0.50
Predominantly Sand with Silt and Clay								
PS-G-SED-101S	0	1	3	23	50	13	10	0-0.50
PS-E-SED-103S	4	10	8	21	38	13	6	0-0.20
PS-C-SED-101S	0	17	6	22	34	19	2	0-0.15
Clay, Silt and Sand								
PS-G-SED-102S	0	3	1	7	23	33	33	0-0.60

mbm metres below mudline

TABLE 3A: **Sediment Results - Comparison to Sediment Quality Criteria**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			CCME CEQG Interim Sediment Quality (ISQG)[2]	CCME CEQG Probable Effect Level (PEL)[3]	MOE Sediment Standards[4]	RBCA[5]	PS-G-SED-1	PS-G-SED-2	PS-G-SED-3	PS-G-SED-5
Sample Location							PS-G-SED-1	PS-G-SED-2	PS-G-SED-3	PS-G-SED-5
Laboratory Sample ID							L2036241-1	L2036241-2	L2036241-4	L2036241-13
SNC-Lavalin Sample ID							PS-G-SED-1	PS-G-SED-2	PS-G-SED-3	PS-G-SED-5
Sampling Date (yyyy/mm/dd)							2017/12/12	2017/12/12	2017/12/12	2017/12/13
Depth Interval (mbm)							0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25
Parameter	**RDL**	**Units**								
General Chemistry										
Cyanide (WAD)	0.050	µg/g	na	na	0.1	na	< 0.050	**1.76**	< 0.050	< 0.050
Electrical Conductivity	0.0040	mS/cm	na	na	na	na	0.131	0.225	0.222	0.217
Moisture	0.10	%	na	na	na	na	23.6	22.3	32.7	30.7
pH	0.10	pH	na	na	na	na	7.55	7.69	7.53	7.35
Sodium Adsorption Ratio	0.10	None	na	na	na	na	0.61	0.44	0.65	0.63
							-	-	-	-
Fraction of Organic Carbon	0.0010	None	na	na	na	na	0.0023	0.0098	0.0150	0.0112
							0.0021	0.0087	0.0143	0.0087
Fraction of Organic Carbon (Average)	0.0010	None	na	na	na	na	0.0023	0.0115	0.0151	0.0104
							-	-	-	-
Total Organic Carbon	0.10	%	na	na	1	na	0.21	0.87	**1.43**	0.87
							0.23	0.98	**1.50**	**1.12**
Total Metals										
Antimony	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic	1.0	µg/g	5.9	17	6	na	< 1.0	< 1.0	1.6	1.9
Barium	1.0	µg/g	na	na	na	na	16.9	47.6	143	97.0
Beryllium	0.50	µg/g	na	na	na	na	< 0.50	< 0.50	< 0.50	< 0.50
Boron	5.0	µg/g	na	na	na	na	< 5.0	< 5.0	< 5.0	< 5.0
Boron (Hot Water Soluble)	0.10	µg/g	na	na	na	na	< 0.10	< 0.10	0.52	0.22
Cadmium	0.50	µg/g	0.6	3.5	0.6	na	< 0.50	< 0.50	< 0.50	< 0.50
Chromium (total)	1.0	µg/g	37.3	90	26	na	5.0	6.1	12.8	10.7
Chromium (VI)	0.20	µg/g	na	na	na	na	< 0.20	< 0.20	< 0.20	< 0.20
Cobalt	1.0	µg/g	na	na	50	na	1.7	2.5	5.4	4.0
Copper	1.0	µg/g	35.7	197	16	na	4.8	3.9	10.4	9.9
Lead	1.0	µg/g	35	91.3	31	na	2.9	18.9	21.3	11.5
Mercury	0.0050	µg/g	0.17	0.486	0.2	na	0.0060	0.0105	0.0171	0.0167
Molybdenum	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	1.0	µg/g	na	na	16	na	3.0	3.8	7.8	6.9
Selenium	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0
Silver	0.20	µg/g	na	na	0.5	na	< 0.20	< 0.20	< 0.20	< 0.20
Thallium	0.50	µg/g	na	na	na	na	< 0.50	< 0.50	< 0.50	< 0.50
Uranium	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	1.0	µg/g	na	na	na	na	13.6	17.3	29.8	22.2
Zinc	5.0	µg/g	123	315	120	na	12.9	29.2	77.3	58.8
Petroleum Hydrocarbon (PHC) Fractions										
PHC F1	5.0	µg/g	na	na	na	15	< 5.0	< 5.0	< 5.0	< 5.0
PHC F2	10	µg/g	na	na	na	25	< 10	< 10	< 10	< 10
PHC F3	50	µg/g	na	na	na	25	< 50[1]	**124**	**154**	**98**
PHC F4	50	µg/g	na	na	na	500	< 50	161	153	153
PHC F4 (gravimetric)	250	µg/g	na	na	na	500	-	**690**	**580**	**730**
Total PHC C6-C50	72	µg/g	na	na	na	500	< 72	286	307	251
Total PHC (F1-F4)	72	µg/g	na	na	na	500	< 72	**814**	**734**	**828**
Volatile Organic Compounds										
Benzene	0.00020	µg/g	na	na	na	1.2	< 0.0068	< 0.0068	< 0.0068	< 0.0068
Ethylbenzene	0.018	µg/g	na	na	na	1.2	< 0.018	< 0.018	< 0.018	< 0.018
Hexachlorobutadiene	0.010	µg/g	na	na	na	na	< 0.010	< 0.010	< 0.010	< 0.010
Toluene	0.080	µg/g	na	na	na	1.4	< 0.080	< 0.080	< 0.080	< 0.080
Xylenes, m+p-	0.030	µg/g	na	na	na	na	< 0.030	< 0.030	< 0.030	< 0.030
Xylenes, o-	0.020	µg/g	na	na	na	na	< 0.020	< 0.020	< 0.020	< 0.020
Xylenes	0.050	µg/g	na	na	na	1.3	< 0.050	< 0.050	< 0.050	< 0.050
PAHs										
Acenaphthene	0.050	µg/g	0.00671	0.0889	na	na	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]
Acenaphthylene	0.050	µg/g	0.00587	0.128	na	na	**0.070**	**0.262**	**0.218**	**0.259**
Anthracene	0.050	µg/g	0.0469	0.245	0.22	na	< 0.050[1]	**0.095**	**0.063**	**0.072**
Benzo(a)anthracene	0.050	µg/g	0.0317	0.385	0.32	na	**0.083**	**0.407**	**0.287**	**0.308**
Benzo(a)pyrene	0.050	µg/g	0.0319	0.782	0.37	na	**0.122**	**0.505**	**0.369**	**0.448**
Benzo(b)fluoranthene	0.050	µg/g	na	na	na	na	0.139	0.597	0.467	0.580
Benzo(g,h,i)perylene	0.050	µg/g	na	na	0.17	na	0.091	**0.364**	**0.275**	**0.340**
Benzo(k)fluoranthene	0.050	µg/g	na	na	0.24	na	< 0.050	0.171	0.148	0.170
Chrysene	0.050	µg/g	0.0571	0.862	0.34	na	**0.105**	**0.600**	**0.402**	**0.376**
Dibenzo(a,h)anthracene	0.050	µg/g	0.00622	0.135	0.06	na	< 0.050[1]	**0.072**	**0.051**	**0.071**
Fluoranthene	0.050	µg/g	0.111	2.355	0.75	na	**0.142**	**1.07**	**0.852**	**0.774**
Fluorene	0.050	µg/g	0.0212	0.144	0.19	na	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]
Indeno(1,2,3-cd)pyrene	0.050	µg/g	na	na	0.2	na	0.077	**0.323**	**0.251**	**0.341**
Methylnaphthalene, 1-	0.030	µg/g	na	na	na	na	< 0.030	< 0.030	< 0.030	< 0.030
Methylnaphthalene, 2-	0.030	µg/g	0.0202	0.201	na	na	< 0.030[1]	< 0.030[1]	< 0.030[1]	< 0.030[1]
Methylnaphthalene, 1- & 2-	0.042	µg/g	na	na	na	na	< 0.042	< 0.042	< 0.042	< 0.042
Naphthalene	0.013	µg/g	0.0346	0.391	na	na	< 0.013	< 0.013	< 0.013	< 0.013
Phenanthrene	0.046	µg/g	0.0419	0.515	0.56	na	< 0.046[1]	**0.432**	**0.382**	**0.248**
Pyrene	0.050	µg/g	0.053	0.875	0.49	na	**0.218**	**1.43**	**1.09**	**0.919**
Total PAH	0.76	µg/g	na	na	4	na	1.36	**6.44**	**4.97**	**5.02**
Organochlorine Pesticides										
Aldrin	0.020	µg/g	na	na	0.002	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
Chlordane, alpha-	0.020	µg/g	0.0045	0.00887	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
Chlordane, gamma-	0.020	µg/g	0.0045	0.00887	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
Chlordane (Total)	0.028	µg/g	0.0045	0.00887	0.007	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	< 0.028[1]
DDD, o,p-	0.020	µg/g	0.00354	0.00851	0.008	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
DDD, p,p-	0.020	µg/g	0.00354	0.00851	0.008	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
DDD (Total)	0.028	µg/g	0.00354	0.00851	0.008	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	< 0.028[1]
DDE, o,p-	0.020	µg/g	0.00142	0.00675	0.005	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
DDE, p,p-	0.020	µg/g	0.00142	0.00675	0.005	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
DDE (Total)	0.028	µg/g	0.00142	0.00675	0.005	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	< 0.028[1]
DDT, o,p-	0.020	µg/g	0.00119	0.00477	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
DDT, p,p-	0.020	µg/g	0.00119	0.00477	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
DDT (Total)	0.028	µg/g	0.00119	0.00477	0.007	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	< 0.028[1]
Dieldrin	0.020	µg/g	0.00285	0.00667	0.002	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
Endosulfan I	0.020	µg/g	na	na	na	na	< 0.020	< 0.020	< 0.020	< 0.020
Endosulfan II	0.020	µg/g	na	na	na	na	< 0.020	< 0.020	< 0.020	< 0.020
Endosulfan (Total)	0.028	µg/g	na	na	na	na	< 0.028	< 0.028	< 0.028	< 0.028
Endrin	0.020	µg/g	0.00267	0.0624	0.003	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
Heptachlor	0.020	µg/g	0.0006	0.00274	na	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
Heptachlor Epoxide	0.020	µg/g	0.0006	0.00274	0.005	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]
Hexachlorobenzene	0.010	µg/g	na	na	0.02	na	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobutadiene	0.010	µg/g	na	na	na	na	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorocyclohexane, gamma- (Lindane)	0.010	µg/g	0.00094	0.00138	0.003	na	< 0.010[1]	< 0.010[1]	< 0.010[1]	< 0.010[1]
Hexachloroethane	0.010	µg/g	na	na	na	na	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	0.020	µg/g	na	na	na	na	< 0.020	< 0.050	< 0.020	< 0.020

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mbm - metres below mudline
% - percent
µg/g - micrograms per gram, dry weight basis
mS/cm - milliSiemens per centimetre

UNDERLINE	Concentration greater than CCME CEQG Interim Sediment Quality Guideline (ISQG)
SHADED	Concentration greater than CCME CEQG Probable Effect Level (PEL) Guideline
RED	Concentration greater than MOE Sediment Standards
SHADOW	Concentration greater than RBCA

[1] Laboratory detection limit exceeds regulatory standard/guideline.
[2] CCME Interim Sediment Quality Guideline (ISQG) to protect freshwater aquatic life (1999, as updated).
[3] CCME Probable Effect Levels (PEL) Sediment Quality Guideline to protect freshwater aquatic life (1999, as updated).
[4] Ontario Ministry of Environment Lowest Effect Level (LEL) Sediment Standard (MOE, 2008 and 2011).
[5] Atlantic Risk-Based Corrective Action (RBCA) (APIRI, 2012), not adjusted for Fraction of Organic Carbon (FOC).
[6] Benzo[a]pyrene Total Potency Equivalents (BaP TPE) is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs (CCME, 2010).
Safety factor of 3 for coal tar or creosote mixtures not applied.

TABLE 3A: **Sediment Results - Comparison to Sediment Quality Criteria**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			CCME CEQG Interim Sediment Quality (ISQG)[2]	CCME CEQG Probable Effect Level (PEL)[3]	MOE Sediment Standards[4]	RBCA[5]	PS-G-SED-6	PS-G-SED-6	PS-G-SED-101S	PS-G-SED-102S
Sample Location							PS-G-SED-6	PS-G-SED-6	PS-G-SED-101S	PS-G-SED-102S
Laboratory Sample ID							L2036241-5	L2036241-6	L2054623-6	L2054623-7
SNC-Lavalin Sample ID							PS-G-SED-6	PS-G-SED-66	PS-G-SED-101S	PS-G-SED-102S
Sampling Date (yyyy/mm/dd)							2017/12/12	2017/12/12	2018/02/07	2018/02/08
Depth Interval (mbm)							0.0 - 0.25	0.0 - 0.25	0.0 - 0.50	0.0 - 0.60
								Duplicate of PS-G-SED-6		
Parameter	**RDL**	**Units**								
General Chemistry										
Cyanide (WAD)	0.050	µg/g	na	na	0.1	na	< 0.050	< 0.050	< 0.050	< 0.050
Electrical Conductivity	0.0040	mS/cm	na	na	na	na	0.309	0.353	0.202	0.0951
Moisture	0.10	%	na	na	na	na	34.0	35.5	22.7	26.0
pH	0.10	pH	na	na	na	na	7.43	7.26	7.51	5.75
Sodium Adsorption Ratio	0.10	None	na	na	na	na	0.58	0.48	1.63	0.45
							-	-	0.0021	-
Fraction of Organic Carbon	0.0010	None	na	na	na	na	0.0280	0.0278	0.0023	0.0031
							0.0248	0.0263	0.0020	0.0027
Fraction of Organic Carbon (Average)	0.0010	None	na	na	na	na	0.0272	0.0281	0.0021	0.0028
							-	-	0.21	0.31
Total Organic Carbon	0.10	%	na	na	1	na	**2.48**	**2.63**	0.20	0.27
							2.80	**2.78**	0.23	-
Total Metals										
Antimony	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic	1.0	µg/g	5.9	17	6	na	3.6	3.7	1.2	1.7
Barium	1.0	µg/g	na	na	na	na	55.7	59.2	80.2	196
Beryllium	0.50	µg/g	na	na	na	na	< 0.50	< 0.50	< 0.50	0.67
Boron	5.0	µg/g	na	na	na	na	< 5.0	< 5.0	5.4	5.2
Boron (Hot Water Soluble)	0.10	µg/g	na	na	na	na	0.30	0.31	< 0.10	< 0.10
Cadmium	0.50	µg/g	0.6	3.5	0.6	na	< 0.50	< 0.50	< 0.50	< 0.50
Chromium (total)	1.0	µg/g	37.3	90	26	na	12.6	11.9	18.4	**32.7**
Chromium (VI)	0.20	µg/g	na	na	na	na	< 0.20	< 0.20	0.41	0.68
Cobalt	1.0	µg/g	na	na	50	na	3.9	4.1	5.0	9.4
Copper	1.0	µg/g	35.7	197	16	na	**18.4**	14.8	11.4	**22.9**
Lead	1.0	µg/g	35	91.3	31	na	**182**	**191**	23.5	5.6
Mercury	0.0050	µg/g	0.17	0.486	0.2	na	0.0267	0.0281	0.0052	0.0098
Molybdenum	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	1.0	µg/g	na	na	16	na	9.2	8.9	9.1	**19.1**
Selenium	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0
Silver	0.20	µg/g	na	na	0.5	na	< 0.20	< 0.20	< 0.20	< 0.20
Thallium	0.50	µg/g	na	na	na	na	< 0.50	< 0.50	< 0.50	< 0.50
Uranium	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	1.0	µg/g	na	na	na	na	19.6	19.0	38.8	49.2
Zinc	5.0	µg/g	123	315	120	na	107	115	26.4	55.2
Petroleum Hydrocarbon (PHC) Fractions										
PHC F1	5.0	µg/g	na	na	na	15	< 5.0	< 5.0	< 5.0	< 5.0
PHC F2	10	µg/g	na	na	na	25	< 10	< 10	< 10	< 10
PHC F3	50	µg/g	na	na	na	25	**175**	**172**	< 50[1]	< 50[1]
PHC F4	50	µg/g	na	na	na	500	170	161	< 50	< 50
PHC F4 (gravimetric)	250	µg/g	na	na	na	500	**720**	**760**	-	-
Total PHC C6-C50	72	µg/g	na	na	na	500	345	332	< 72	< 72
Total PHC (F1-F4)	72	µg/g	na	na	na	500	**895**	**932**	< 72	< 72
Volatile Organic Compounds										
Benzene	0.00020	µg/g	na	na	na	1.2	< 0.0068	< 0.0068	< 0.0068	< 0.0068
Ethylbenzene	0.018	µg/g	na	na	na	1.2	< 0.018	< 0.018	< 0.018	< 0.018
Hexachlorobutadiene	0.010	µg/g	na	na	na	na	< 0.010	< 0.010	< 0.010	-
Toluene	0.080	µg/g	na	na	na	1.4	< 0.080	< 0.080	< 0.080	< 0.080
Xylenes, m+p-	0.030	µg/g	na	na	na	na	< 0.030	< 0.030	< 0.030	< 0.030
Xylenes, o-	0.020	µg/g	na	na	na	na	< 0.020	< 0.020	< 0.020	< 0.020
Xylenes	0.050	µg/g	na	na	na	1.3	< 0.050	< 0.050	< 0.050	< 0.050
PAHs										
Acenaphthene	0.050	µg/g	0.00671	0.0889	na	na	**0.061**	**0.061**	< 0.050[1]	< 0.050[1]
Acenaphthylene	0.050	µg/g	0.00587	0.128	na	na	**1.09**	**0.886**	< 0.050[1]	< 0.050[1]
Anthracene	0.050	µg/g	0.0469	0.245	0.22	na	**0.379**	**0.314**	< 0.050[1]	< 0.050[1]
Benzo(a)anthracene	0.050	µg/g	0.0317	0.385	0.32	na	**2.17**	**1.48**	< 0.050[1]	< 0.050[1]
Benzo(a)pyrene	0.050	µg/g	0.0319	0.782	0.37	na	**2.53**	**1.87**	< 0.050[1]	< 0.050[1]
Benzo(b)fluoranthene	0.050	µg/g	na	na	na	na	3.32	2.67	< 0.050	< 0.050
Benzo(g,h,i)perylene	0.050	µg/g	na	na	0.17	na	**1.74**	**1.36**	< 0.050	< 0.050
Benzo(k)fluoranthene	0.050	µg/g	na	na	0.24	na	**1.02**	**0.808**	< 0.050	< 0.050
Chrysene	0.050	µg/g	0.0571	0.862	0.34	na	**2.88**	**2.21**	< 0.050	< 0.050
Dibenzo(a,h)anthracene	0.050	µg/g	0.00622	0.135	0.06	na	**0.387**	**0.276**	< 0.050[1]	< 0.050[1]
Fluoranthene	0.050	µg/g	0.111	2.355	0.75	na	**6.18**	**5.72**	< 0.050	< 0.050
Fluorene	0.050	µg/g	0.0212	0.144	0.19	na	**0.249**	**0.242**	< 0.050[1]	< 0.050[1]
Indeno(1,2,3-cd)pyrene	0.050	µg/g	na	na	0.2	na	**1.83**	**1.47**	< 0.050	< 0.050
Methylnaphthalene, 1-	0.030	µg/g	na	na	na	na	< 0.030	< 0.030	< 0.030	< 0.030
Methylnaphthalene, 2-	0.030	µg/g	0.0202	0.201	na	na	< 0.030[1]	< 0.030[1]	< 0.030[1]	< 0.030[1]
Methylnaphthalene, 1- & 2-	0.042	µg/g	na	na	na	na	< 0.042	< 0.042	< 0.042	< 0.042
Naphthalene	0.013	µg/g	0.0346	0.391	na	na	0.015	0.016	< 0.013	< 0.013
Phenanthrene	0.046	µg/g	0.0419	0.515	0.56	na	**1.81**	**1.40**	< 0.046[1]	< 0.046[1]
Pyrene	0.050	µg/g	0.053	0.875	0.49	na	**6.71**	**6.16**	< 0.050	< 0.050
Total PAH	0.76	µg/g	na	na	4	na	**32.37**	**26.94**	< 0.76	< 0.76
Organochlorine Pesticides										
Aldrin	0.020	µg/g	na	na	0.002	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Chlordane, alpha-	0.020	µg/g	0.0045	0.00887	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Chlordane, gamma-	0.020	µg/g	0.0045	0.00887	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Chlordane (Total)	0.028	µg/g	0.0045	0.00887	0.007	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	-
DDD, o,p-	0.020	µg/g	0.00354	0.00851	0.008	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDD, p,p-	0.020	µg/g	0.00354	0.00851	0.008	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDD (Total)	0.028	µg/g	0.00354	0.00851	0.008	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	-
DDE, o,p-	0.020	µg/g	0.00142	0.00675	0.005	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDE, p,p-	0.020	µg/g	0.00142	0.00675	0.005	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDE (Total)	0.028	µg/g	0.00142	0.00675	0.005	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	-
DDT, o,p-	0.020	µg/g	0.00119	0.00477	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDT, p,p-	0.020	µg/g	0.00119	0.00477	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDT (Total)	0.028	µg/g	0.00119	0.00477	0.007	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	-
Dieldrin	0.020	µg/g	0.00285	0.00667	0.002	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Endosulfan I	0.020	µg/g	na	na	na	na	< 0.060	< 0.050	< 0.020	-
Endosulfan II	0.020	µg/g	na	na	na	na	< 0.020	< 0.020	< 0.020	-
Endosulfan (Total)	0.028	µg/g	na	na	na	na	< 0.063	< 0.054	< 0.028	-
Endrin	0.020	µg/g	0.00267	0.0624	0.003	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Heptachlor	0.020	µg/g	0.0006	0.00274	na	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Heptachlor Epoxide	0.020	µg/g	0.0006	0.00274	0.005	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Hexachlorobenzene	0.010	µg/g	na	na	0.02	na	< 0.010	< 0.010	< 0.010	-
Hexachlorobutadiene	0.010	µg/g	na	na	na	na	< 0.010	< 0.010	< 0.010	-
Hexachlorocyclohexane, gamma- (Lindane)	0.010	µg/g	0.00094	0.00138	0.003	na	< 0.010[1]	< 0.010[1]	< 0.010[1]	-
Hexachloroethane	0.010	µg/g	na	na	na	na	< 0.010	< 0.010	< 0.010	-
Methoxychlor	0.020	µg/g	na	na	na	na	< 0.10	< 0.15	< 0.020	-

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mbm - metres below mudline
% - percent
µg/g - micrograms per gram, dry weight basis
mS/cm - milliSiemens per centimetre

UNDERLINE	Concentration greater than CCME CEQG Interim Sediment Quality Guideline (ISQG)
SHADED	Concentration greater than CCME CEQG Probable Effect Level (PEL) Guideline
RED	Concentration greater than MOE Sediment Standards
SHADOW	Concentration greater than RBCA

[1] Laboratory detection limit exceeds regulatory standard/guideline.
[2] CCME Interim Sediment Quality Guideline (ISQG) to protect freshwater aquatic life (1999, as updated).
[3] CCME Probable Effect Levels (PEL) Sediment Quality Guideline to protect freshwater aquatic life (1999, as updated).
[4] Ontario Ministry of Environment Lowest Effect Level (LEL) Sediment Standard (MOE, 2008 and 2011).
[5] Atlantic Risk-Based Corrective Action (RBCA) (APIRI, 2012), not adjusted for Fraction of Organic Carbon (FOC).
[6] Benzo[a]pyrene Total Potency Equivalents (BaP TPE) is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs (CCME, 2010).
Safety factor of 3 for coal tar or creosote mixtures not applied.

TABLE 3A: **Sediment Results - Comparison to Sediment Quality Criteria**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			CCME CEQG Interim Sediment Quality (ISQG)[2]	CCME CEQG Probable Effect Level (PEL)[3]	MOE Sediment Standards[4]	RBCA[5]	PS-E-SED-103S	PS-E-SED-103S	PS-D-SED-19	PS-D-SED-19	PS-C-SED-101S
		Sample Location					PS-E-SED-103S	PS-E-SED-103S	PS-D-SED-19	PS-D-SED-19	PS-C-SED-101S
		Laboratory Sample ID					L2054623-4	L2054623-5	L2036241-26	L2036241-28	L2054623-1
		SNC-Lavalin Sample ID					PS-E-SED-103S	PS-E-SED-1033S	PS-D-SED-19	PS-D-SED-199	PS-C-SED-101S
		Sampling Date (yyyy/mm/dd)					2018/02/07	2018/02/07	2017/12/14	2017/12/14	2018/02/06
		Depth Interval (mbm)					0.0 - 0.20	0.0 - 0.20	0.0 - 0.25	0.0 - 0.25	0.0 - 0.15
								Duplicate of PS-E-SED-103S		Duplicate of PS-D-SED-19	
Parameter	**RDL**	**Units**									
General Chemistry											
Cyanide (WAD)	0.050	µg/g	na	na	0.1	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Electrical Conductivity	0.0040	mS/cm	na	na	na	na	0.167	0.194	0.297	0.211	0.202
Moisture	0.10	%	na	na	na	na	19.6	20.1	26.2	21.6	28.3
pH	0.10	pH	na	na	na	na	7.16	7.29	7.40	7.36	6.34
Sodium Adsorption Ratio	0.10	None	na	na	na	na	0.64	0.69	0.36	0.48	0.80
							0.0072	0.0073	-	-	0.0387
Fraction of Organic Carbon	0.0010	None	na	na	na	na	0.0081	0.0077	0.0146	0.0150	0.0417
							0.0068	0.0064	0.0136	0.0148	0.0382
Fraction of Organic Carbon (Average)	0.0010	None	na	na	na	na	0.0074	0.0071	0.0146	0.0150	0.0395
							0.72	0.73	-	-	**3.87**
Total Organic Carbon	0.10	%	na	na	1	na	0.68	0.64	**1.36**	**1.48**	**3.82**
							0.81	0.77	**1.46**	**1.50**	**4.17**
Total Metals											
Antimony	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic	1.0	µg/g	5.9	17	6	na	1.8	1.9	2.2	2.0	1.6
Barium	1.0	µg/g	na	na	na	na	97.3	108	75.7	59.5	70.4
Beryllium	0.50	µg/g	na	na	na	na	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Boron	5.0	µg/g	na	na	na	na	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Boron (Hot Water Soluble)	0.10	µg/g	na	na	na	na	< 0.10	< 0.10	0.12	0.14	0.35
Cadmium	0.50	µg/g	0.6	3.5	0.6	na	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chromium (total)	1.0	µg/g	37.3	90	26	na	22.1	24.5	11.0	11.2	12.9
Chromium (VI)	0.20	µg/g	na	na	na	na	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Cobalt	1.0	µg/g	na	na	50	na	6.9	7.4	3.7	3.6	3.8
Copper	1.0	µg/g	35.7	197	16	na	15.6	**17.2**	**16.2**	11.7	11.1
Lead	1.0	µg/g	35	91.3	31	na	8.0	9.1	24.2	24.1	**42.1**
Mercury	0.0050	µg/g	0.17	0.486	0.2	na	0.0082	0.0116	0.0190	0.0187	0.0593
Molybdenum	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	1.0	µg/g	na	na	16	na	14.4	13.8	8.2	7.0	8.1
Selenium	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Silver	0.20	µg/g	na	na	0.5	na	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Thallium	0.50	µg/g	na	na	na	na	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Uranium	1.0	µg/g	na	na	na	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	1.0	µg/g	na	na	na	na	39.7	44.0	22.8	21.9	20.8
Zinc	5.0	µg/g	123	315	120	na	49.4	49.7	62.1	62.3	71.6
Petroleum Hydrocarbon (PHC) Fractions											
PHC F1	5.0	µg/g	na	na	na	15	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
PHC F2	10	µg/g	na	na	na	25	< 10	< 10	< 10	< 10	< 10
PHC F3	50	µg/g	na	na	na	25	< 50[1]	< 50[1]	< 50[1]	< 50[1]	**62**
PHC F4	50	µg/g	na	na	na	500	< 50	< 50	< 50	< 50	< 50
PHC F4 (gravimetric)	250	µg/g	na	na	na	500	-	-	-	-	-
Total PHC C6-C50	72	µg/g	na	na	na	500	< 72	< 72	< 72	< 72	< 72
Total PHC (F1-F4)	72	µg/g	na	na	na	500	< 72	< 72	< 72	< 72	62
Volatile Organic Compounds											
Benzene	0.00020	µg/g	na	na	na	1.2	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068
Ethylbenzene	0.018	µg/g	na	na	na	1.2	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018
Hexachlorobutadiene	0.010	µg/g	na	na	na	na	< 0.010	< 0.010	< 0.010	< 0.010	-
Toluene	0.080	µg/g	na	na	na	1.4	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080
Xylenes, m+p-	0.030	µg/g	na	na	na	na	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Xylenes, o-	0.020	µg/g	na	na	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Xylenes	0.050	µg/g	na	na	na	1.3	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
PAHs											
Acenaphthene	0.050	µg/g	0.00671	0.0889	na	na	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]
Acenaphthylene	0.050	µg/g	0.00587	0.128	na	na	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]
Anthracene	0.050	µg/g	0.0469	0.245	0.22	na	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]
Benzo(a)anthracene	0.050	µg/g	0.0317	0.385	0.32	na	< 0.050[1]	< 0.050[1]	< 0.050[1]	**0.073**	< 0.050[1]
Benzo(a)pyrene	0.050	µg/g	0.0319	0.782	0.37	na	< 0.050[1]	< 0.050[1]	**0.054**	**0.065**	< 0.050[1]
Benzo(b)fluoranthene	0.050	µg/g	na	na	na	na	< 0.050	< 0.050	0.093	0.111	0.077
Benzo(g,h,i)perylene	0.050	µg/g	na	na	0.17	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(k)fluoranthene	0.050	µg/g	na	na	0.24	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chrysene	0.050	µg/g	0.0571	0.862	0.34	na	< 0.050	< 0.050	< 0.050	**0.080**	0.055
Dibenzo(a,h)anthracene	0.050	µg/g	0.00622	0.135	0.06	na	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]
Fluoranthene	0.050	µg/g	0.111	2.355	0.75	na	< 0.050	< 0.050	0.068	0.051	0.064
Fluorene	0.050	µg/g	0.0212	0.144	0.19	na	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]	< 0.050[1]
Indeno(1,2,3-cd)pyrene	0.050	µg/g	na	na	0.2	na	< 0.050	< 0.050	< 0.050	0.051	< 0.050
Methylnaphthalene, 1-	0.030	µg/g	na	na	na	na	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Methylnaphthalene, 2-	0.030	µg/g	0.0202	0.201	na	na	< 0.030[1]	< 0.030[1]	< 0.030[1]	< 0.030[1]	< 0.030[1]
Methylnaphthalene, 1- & 2-	0.042	µg/g	na	na	na	na	< 0.042	< 0.042	< 0.042	< 0.042	< 0.042
Naphthalene	0.013	µg/g	0.0346	0.391	na	na	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013
Phenanthrene	0.046	µg/g	0.0419	0.515	0.56	na	< 0.046[1]	< 0.046[1]	< 0.046[1]	< 0.046[1]	< 0.046[1]
Pyrene	0.050	µg/g	0.053	0.875	0.49	na	< 0.050	< 0.050	**0.063**	**0.054**	**0.064**
Total PAH	0.76	µg/g	na	na	4	na	< 0.76	< 0.76	0.84	0.89	0.82
Organochlorine Pesticides											
Aldrin	0.020	µg/g	na	na	0.002	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Chlordane, alpha-	0.020	µg/g	0.0045	0.00887	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Chlordane, gamma-	0.020	µg/g	0.0045	0.00887	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Chlordane (Total)	0.028	µg/g	0.0045	0.00887	0.007	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	< 0.028[1]	-
DDD, o,p-	0.020	µg/g	0.00354	0.00851	0.008	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDD, p,p-	0.020	µg/g	0.00354	0.00851	0.008	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDD (Total)	0.028	µg/g	0.00354	0.00851	0.008	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	< 0.028[1]	-
DDE, o,p-	0.020	µg/g	0.00142	0.00675	0.005	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDE, p,p-	0.020	µg/g	0.00142	0.00675	0.005	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDE (Total)	0.028	µg/g	0.00142	0.00675	0.005	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	< 0.028[1]	-
DDT, o,p-	0.020	µg/g	0.00119	0.00477	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDT, p,p-	0.020	µg/g	0.00119	0.00477	0.007	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
DDT (Total)	0.028	µg/g	0.00119	0.00477	0.007	na	< 0.028[1]	< 0.028[1]	< 0.028[1]	< 0.028[1]	-
Dieldrin	0.020	µg/g	0.00285	0.00667	0.002	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Endosulfan I	0.020	µg/g	na	na	na	na	< 0.020	< 0.020	< 0.020	< 0.020	-
Endosulfan II	0.020	µg/g	na	na	na	na	< 0.020	< 0.020	< 0.020	< 0.020	-
Endosulfan (Total)	0.028	µg/g	na	na	na	na	< 0.028	< 0.028	< 0.028	< 0.028	-
Endrin	0.020	µg/g	0.00267	0.0624	0.003	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Heptachlor	0.020	µg/g	0.0006	0.00274	na	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Heptachlor Epoxide	0.020	µg/g	0.0006	0.00274	0.005	na	< 0.020[1]	< 0.020[1]	< 0.020[1]	< 0.020[1]	-
Hexachlorobenzene	0.010	µg/g	na	na	0.02	na	< 0.010	< 0.010	< 0.010	< 0.010	-
Hexachlorobutadiene	0.010	µg/g	na	na	na	na	< 0.010	< 0.010	< 0.010	< 0.010	-
Hexachlorocyclohexane, gamma- (Lindane)	0.010	µg/g	0.00094	0.00138	0.003	na	< 0.010[1]	< 0.010[1]	< 0.010[1]	< 0.010[1]	-
Hexachloroethane	0.010	µg/g	na	na	na	na	< 0.010	< 0.010	< 0.010	< 0.010	-
Methoxychlor	0.020	µg/g	na	na	na	na	< 0.020	< 0.020	< 0.020	< 0.020	-

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Laboratory analysis by ALS, Mississauga, ON
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
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mbm - metres below mudline
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µg/g - micrograms per gram, dry weight basis
mS/cm - milliSiemens per centimetre

UNDERLINE	Concentration greater than CCME CEQG Interim Sediment Quality Guideline (ISQG)
SHADED	Concentration greater than CCME CEQG Probable Effect Level (PEL) Guideline
RED	Concentration greater than MOE Sediment Standards
SHADOW	Concentration greater than RBCA

[1] Laboratory detection limit exceeds regulatory standard/guideline.
[2] CCME Interim Sediment Quality Guideline (ISQG) to protect freshwater aquatic life (1999, as updated).
[3] CCME Probable Effect Levels (PEL) Sediment Quality Guideline to protect freshwater aquatic life (1999, as updated).
[4] Ontario Ministry of Environment Lowest Effect Level (LEL) Sediment Standard (MOE, 2008 and 2011).
[5] Atlantic Risk-Based Corrective Action (RBCA) (APIRI, 2012), not adjusted for Fraction of Organic Carbon (FOC).
[6] Benzo[a]pyrene Total Potency Equivalents (BaP TPE) is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs (CCME, 2010).
Safety factor of 3 for coal tar or creosote mixtures not applied.

TABLE 3A: **Sediment Results - Comparison to Sediment Quality Criteria**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			CCME CEQG Interim Sediment Quality (ISQG)[2]	CCME CEQG Probable Effect Level (PEL)[3]	MOE Sediment Standards[4]	RBCA[5]	PS-C-SED-102S	PS-C-SED-103S
		Sample Location					PS-C-SED-102S	PS-C-SED-103S
		Laboratory Sample ID					L2054623-2	L2054623-3
		SNC-Lavalin Sample ID					PS-C-SED-102S	PS-C-SED-103S
		Sampling Date (yyyy/mm/dd)					2018/02/06	2018/02/06
		Depth Interval (mbm)					0.0 - 0.10	0.0 - 0.50
Parameter	**RDL**	**Units**						
General Chemistry								
Cyanide (WAD)	0.050	µg/g	na	na	0.1	na	< 0.050	**0.12**
Electrical Conductivity	0.0040	mS/cm	na	na	na	na	0.177	0.293
Moisture	0.10	%	na	na	na	na	31.7	70.2
pH	0.10	pH	na	na	na	na	6.51	6.33
Sodium Adsorption Ratio	0.10	None	na	na	na	na	0.67	0.72
							0.0316	0.130
Fraction of Organic Carbon	0.0010	None	na	na	na	na	0.0324	0.140
							0.0287	0.127
Fraction of Organic Carbon (Average)	0.0010	None	na	na	na	na	0.0309	0.132
							3.16	**13.0**
Total Organic Carbon	0.10	%	na	na	1	na	**2.87**	**12.7**
							3.24	**14.0**
Total Metals								
Antimony	1.0	µg/g	na	na	na	na	< 1.0	< 1.0
Arsenic	1.0	µg/g	5.9	17	6	na	2.5	3.0
Barium	1.0	µg/g	na	na	na	na	72.7	102
Beryllium	0.50	µg/g	na	na	na	na	< 0.50	< 0.50
Boron	5.0	µg/g	na	na	na	na	< 5.0	5.7
Boron (Hot Water Soluble)	0.10	µg/g	na	na	na	na	0.23	1.12
Cadmium	0.50	µg/g	0.6	3.5	0.6	na	< 0.50	0.52
Chromium (total)	1.0	µg/g	37.3	90	26	na	13.1	16.3
Chromium (VI)	0.20	µg/g	na	na	na	na	< 0.20	< 0.40
Cobalt	1.0	µg/g	na	na	50	na	5.1	5.7
Copper	1.0	µg/g	35.7	197	16	na	15.2	14.0
Lead	1.0	µg/g	35	91.3	31	na	**75.2**	**35.6**
Mercury	0.0050	µg/g	0.17	0.486	0.2	na	0.0375	0.0529
Molybdenum	1.0	µg/g	na	na	na	na	< 1.0	< 1.0
Nickel	1.0	µg/g	na	na	16	na	8.0	9.0
Selenium	1.0	µg/g	na	na	na	na	< 1.0	< 1.0
Silver	0.20	µg/g	na	na	0.5	na	< 0.20	< 0.20
Thallium	0.50	µg/g	na	na	na	na	< 0.50	< 0.50
Uranium	1.0	µg/g	na	na	na	na	< 1.0	< 1.0
Vanadium	1.0	µg/g	na	na	na	na	25.2	28.3
Zinc	5.0	µg/g	123	315	120	na	85.8	105
Petroleum Hydrocarbon (PHC) Fractions								
PHC F1	5.0	µg/g	na	na	na	15	< 5.0	< 15
PHC F2	10	µg/g	na	na	na	25	< 10	< 30[1]
PHC F3	50	µg/g	na	na	na	25	**93**	**340**
PHC F4	50	µg/g	na	na	na	500	< 50	230
PHC F4 (gravimetric)	250	µg/g	na	na	na	500	-	-
Total PHC C6-C50	72	µg/g	na	na	na	500	93	**580**
Total PHC (F1-F4)	72	µg/g	na	na	na	500	93	**570**
Volatile Organic Compounds								
Benzene	0.00020	µg/g	na	na	na	1.2	< 0.0068	< 0.00020
Ethylbenzene	0.018	µg/g	na	na	na	1.2	< 0.018	< 0.054
Hexachlorobutadiene	0.010	µg/g	na	na	na	na	< 0.010	-
Toluene	0.080	µg/g	na	na	na	1.4	< 0.080	< 0.24
Xylenes, m+p-	0.030	µg/g	na	na	na	na	< 0.030	< 0.090
Xylenes, o-	0.020	µg/g	na	na	na	na	< 0.020	< 0.060
Xylenes	0.050	µg/g	na	na	na	1.3	< 0.050	< 0.11
PAHs								
Acenaphthene	0.050	µg/g	0.00671	0.0889	na	na	< 0.050[1]	< 0.075[1]
Acenaphthylene	0.050	µg/g	0.00587	0.128	na	na	< 0.050[1]	< 0.075[1]
Anthracene	0.050	µg/g	0.0469	0.245	0.22	na	< 0.050[1]	< 0.075[1]
Benzo(a)anthracene	0.050	µg/g	0.0317	0.385	0.32	na	< 0.050[1]	**0.081**
Benzo(a)pyrene	0.050	µg/g	0.0319	0.782	0.37	na	< 0.050[1]	< 0.075[1]
Benzo(b)fluoranthene	0.050	µg/g	na	na	na	na	0.060	0.150
Benzo(g,h,i)perylene	0.050	µg/g	na	na	0.17	na	< 0.050	< 0.075
Benzo(k)fluoranthene	0.050	µg/g	na	na	0.24	na	< 0.050	< 0.075
Chrysene	0.050	µg/g	0.0571	0.862	0.34	na	< 0.050	**0.103**
Dibenzo(a,h)anthracene	0.050	µg/g	0.00622	0.135	0.06	na	< 0.050[1]	< 0.075[1]
Fluoranthene	0.050	µg/g	0.111	2.355	0.75	na	< 0.050	0.111
Fluorene	0.050	µg/g	0.0212	0.144	0.19	na	< 0.050[1]	< 0.075[1]
Indeno(1,2,3-cd)pyrene	0.050	µg/g	na	na	0.2	na	< 0.050	< 0.075
Methylnaphthalene, 1-	0.030	µg/g	na	na	na	na	< 0.030	< 0.045
Methylnaphthalene, 2-	0.030	µg/g	0.0202	0.201	na	na	< 0.030[1]	< 0.045[1]
Methylnaphthalene, 1- & 2-	0.042	µg/g	na	na	na	na	< 0.042	< 0.064
Naphthalene	0.013	µg/g	0.0346	0.391	na	na	< 0.013	< 0.020
Phenanthrene	0.046	µg/g	0.0419	0.515	0.56	na	< 0.046[1]	< 0.069[1]
Pyrene	0.050	µg/g	0.053	0.875	0.49	na	< 0.050	**0.105**
Total PAH	0.76	µg/g	na	na	4	na	0.77	1.31
Organochlorine Pesticides								
Aldrin	0.020	µg/g	na	na	0.002	na	< 0.020[1]	-
Chlordane, alpha-	0.020	µg/g	0.0045	0.00887	0.007	na	< 0.020[1]	-
Chlordane, gamma-	0.020	µg/g	0.0045	0.00887	0.007	na	< 0.020[1]	-
Chlordane (Total)	0.028	µg/g	0.0045	0.00887	0.007	na	< 0.028[1]	-
DDD, o,p-	0.020	µg/g	0.00354	0.00851	0.008	na	< 0.020[1]	-
DDD, p,p-	0.020	µg/g	0.00354	0.00851	0.008	na	< 0.020[1]	-
DDD (Total)	0.028	µg/g	0.00354	0.00851	0.008	na	< 0.028[1]	-
DDE, o,p-	0.020	µg/g	0.00142	0.00675	0.005	na	< 0.020[1]	-
DDE, p,p-	0.020	µg/g	0.00142	0.00675	0.005	na	< 0.020[1]	-
DDE (Total)	0.028	µg/g	0.00142	0.00675	0.005	na	< 0.028[1]	-
DDT, o,p-	0.020	µg/g	0.00119	0.00477	0.007	na	< 0.020[1]	-
DDT, p,p-	0.020	µg/g	0.00119	0.00477	0.007	na	< 0.020[1]	-
DDT (Total)	0.028	µg/g	0.00119	0.00477	0.007	na	< 0.028[1]	-
Dieldrin	0.020	µg/g	0.00285	0.00667	0.002	na	< 0.020[1]	-
Endosulfan I	0.020	µg/g	na	na	na	na	< 0.020	-
Endosulfan II	0.020	µg/g	na	na	na	na	< 0.020	-
Endosulfan (Total)	0.028	µg/g	na	na	na	na	< 0.028	-
Endrin	0.020	µg/g	0.00267	0.0624	0.003	na	< 0.020[1]	-
Heptachlor	0.020	µg/g	0.0006	0.00274	na	na	< 0.020[1]	-
Heptachlor Epoxide	0.020	µg/g	0.0006	0.00274	0.005	na	< 0.020[1]	-
Hexachlorobenzene	0.010	µg/g	na	na	0.02	na	< 0.010	-
Hexachlorobutadiene	0.010	µg/g	na	na	na	na	< 0.010	-
Hexachlorocyclohexane, gamma- (Lindane)	0.010	µg/g	0.00094	0.00138	0.003	na	< 0.010[1]	-
Hexachloroethane	0.010	µg/g	na	na	na	na	< 0.010	-
Methoxychlor	0.020	µg/g	na	na	na	na	< 0.020	-

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mbm - metres below mudline
% - percent
µg/g - micrograms per gram, dry weight basis
mS/cm - milliSiemens per centimetre

UNDERLINE	Concentration greater than CCME CEQG Interim Sediment Quality Guideline (ISQG)
SHADED	Concentration greater than CCME CEQG Probable Effect Level (PEL) Guideline
RED	Concentration greater than MOE Sediment Standards
SHADOW	Concentration greater than RBCA

[1] Laboratory detection limit exceeds regulatory standard/guideline.
[2] CCME Interim Sediment Quality Guideline (ISQG) to protect freshwater aquatic life (1999, as updated).
[3] CCME Probable Effect Levels (PEL) Sediment Quality Guideline to protect freshwater aquatic life (1999, as updated).
[4] Ontario Ministry of Environment Lowest Effect Level (LEL) Sediment Standard (MOE, 2008 and 2011).
[5] Atlantic Risk-Based Corrective Action (RBCA) (APIRI, 2012), not adjusted for Fraction of Organic Carbon (FOC).
[6] Benzo[a]pyrene Total Potency Equivalents (BaP TPE) is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs (CCME, 2010).
Safety factor of 3 for coal tar or creosote mixtures not applied.

TABLE 3B: **Sediment Results - Comparison to Soil Quality Criteria**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			CCME CEQG Residential Surface[1]	CCME CEQG Residential Subsurface[1]	PS-G-SED-1	PS-G-SED-2	PS-G-SED-3	PS-G-SED-5	PS-G-SED-6	PS-G-SED-6	PS-G-SED-101S
Sample Location											
Laboratory Sample ID					L2036241-1	L2036241-2	L2036241-4	L2036241-13	L2036241-5	L2036241-6	L2054623-6
SNC-Lavalin Sample ID					PS-G-SED-1	PS-G-SED-2	PS-G-SED-3	PS-G-SED-5	PS-G-SED-6	PS-G-SED-66	PS-G-SED-101S
Sampling Date (yyyy/mm/dd)					2017/12/12	2017/12/12	2017/12/12	2017/12/13	2017/12/12	2017/12/12	2018/02/07
Depth Interval (mbm)					0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.50
Parameter	**RDL**	**Units**								Duplicate of PS-G-SED-6	
General Chemistry											
Cyanide (WAD)	0.050	µg/g	na	na	< 0.050	1.76	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Electrical Conductivity	0.0040	mS/cm	na	na	0.131	0.225	0.222	0.217	0.309	0.353	0.202
Moisture	0.10	%	na	na	23.6	22.3	32.7	30.7	34.0	35.5	22.7
pH	0.10	pH	na	na	7.55	7.69	7.53	7.35	7.43	7.26	7.51
Sodium Adsorption Ratio	0.10	None	na	na	0.61	0.44	0.65	0.63	0.58	0.48	1.63
					-	-	-	-	-	-	0.0021
Fraction of Organic Carbon	0.0010	None	na	na	0.0023	0.0098	0.0150	0.0112	0.0280	0.0278	0.0023
					0.0021	0.0087	0.0143	0.0087	0.0248	0.0263	0.0020
Fraction of Organic Carbon (Average)	0.0010	None	na	na	0.0023	0.0115	0.0151	0.0104	0.0272	0.0281	0.0021
					-	-	-	-	-	-	0.21
Total Organic Carbon	0.10	%	na	na	0.21	0.87	1.43	0.87	2.48	2.63	0.20
					0.23	0.98	1.50	1.12	2.80	2.78	0.23
Total Metals											
Antimony	1.0	µg/g	na	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic	1.0	µg/g	12	na	< 1.0	< 1.0	1.6	1.9	3.6	3.7	1.2
Barium	1.0	µg/g	6,800	na	16.9	47.6	143	97.0	55.7	59.2	80.2
Beryllium	0.50	µg/g	75	na	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Boron	5.0	µg/g	na	na	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	5.4
Boron (Hot Water Soluble)	0.10	µg/g	na	na	< 0.10	< 0.10	0.52	0.22	0.30	0.31	< 0.10
Cadmium	0.50	µg/g	14	na	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chromium (total)	1.0	µg/g	220	na	5.0	6.1	12.8	10.7	12.6	11.9	18.4
Chromium (VI)	0.20	µg/g	na	na	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.41
Cobalt	1.0	µg/g	na	na	1.7	2.5	5.4	4.0	3.9	4.1	5.0
Copper	1.0	µg/g	1,100	na	4.8	3.9	10.4	9.9	18.4	14.8	11.4
Lead	1.0	µg/g	140	na	2.9	18.9	21.3	11.5	**182**	**191**	23.5
Mercury	0.0050	µg/g	6.6	na	0.0060	0.0105	0.0171	0.0167	0.0267	0.0281	0.0052
Molybdenum	1.0	µg/g	na	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	1.0	µg/g	200	na	3.0	3.8	7.8	6.9	9.2	8.9	9.1
Selenium	1.0	µg/g	80	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Silver	0.20	µg/g	na	na	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Thallium	0.50	µg/g	1	na	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Uranium	1.0	µg/g	23	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	1.0	µg/g	na	na	13.6	17.3	29.8	22.2	19.6	19.0	38.8
Zinc	5.0	µg/g	na	na	12.9	29.2	77.3	58.8	107	115	26.4
Petroleum Hydrocarbon (PHC) Fractions											
PHC F1	5.0	µg/g	12,000	na	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
PHC F2	10	µg/g	6,800	na	< 10	< 10	< 10	< 10	< 10	< 10	< 10
PHC F3	50	µg/g	15,000	na	< 50	124	154	98	175	172	< 50
PHC F4	50	µg/g	21,000	na	< 50	161	153	153	170	161	< 50
PHC F4 (gravimetric)	250	µg/g	21,000	na	-	690	580	730	720	760	-
Total PHC C6-C50	72	µg/g	na	na	< 72	286	307	251	345	332	< 72
Total PHC (F1-F4)	72	µg/g	na	na	< 72	814	734	828	895	932	< 72
Volatile Organic Compounds											
Benzene	0.00020	µg/g	1103	na	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068
Ethylbenzene	0.018	µg/g	10,000	na	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018
Hexachlorobutadiene	0.010	µg/g	na	na	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Toluene	0.080	µg/g	22,000	na	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080
Xylenes, m+p-	0.030	µg/g	na	na	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Xylenes, o-	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Xylenes	0.050	µg/g	150,000	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
PAHs											
Acenaphthene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	0.061	0.061	< 0.050
Acenaphthylene	0.050	µg/g	na	na	0.070	0.262	0.218	0.259	1.09	0.886	< 0.050
Anthracene	0.050	µg/g	na	na	< 0.050	0.095	0.063	0.072	0.379	0.314	< 0.050
Benzo(a)anthracene	0.050	µg/g	na	na	0.083	0.407	0.287	0.308	2.17	1.48	< 0.050
Benzo(a)pyrene	0.050	µg/g	na	na	0.122	0.505	0.369	0.448	2.53	1.87	< 0.050
Benzo(b)fluoranthene	0.050	µg/g	na	na	0.139	0.597	0.467	0.580	3.32	2.67	< 0.050
Benzo(g,h,i)perylene	0.050	µg/g	na	na	0.091	0.364	0.275	0.340	1.74	1.36	< 0.050
Benzo(k)fluoranthene	0.050	µg/g	na	na	< 0.050	0.171	0.148	0.170	1.02	0.808	< 0.050
Chrysene	0.050	µg/g	na	na	0.105	0.600	0.402	0.376	2.88	2.21	< 0.050
Dibenzo(a,h)anthracene	0.050	µg/g	na	na	< 0.050	0.072	0.051	0.071	0.387	0.276	< 0.050
Fluoranthene	0.050	µg/g	na	na	0.142	1.07	0.852	0.774	6.18	5.72	< 0.050
Fluorene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	0.249	0.242	< 0.050
Indeno(1,2,3-cd)pyrene	0.050	µg/g	na	na	0.077	0.323	0.251	0.341	1.83	1.47	< 0.050
Methylnaphthalene, 1-	0.030	µg/g	na	na	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Methylnaphthalene, 2-	0.030	µg/g	na	na	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Methylnaphthalene, 1- & 2-	0.042	µg/g	na	na	< 0.042	< 0.042	< 0.042	< 0.042	< 0.042	< 0.042	< 0.042
Naphthalene	0.013	µg/g	na	na	< 0.013	< 0.013	< 0.013	< 0.013	0.015	0.016	< 0.013
Phenanthrene	0.046	µg/g	na	na	< 0.046	0.432	0.382	0.248	1.81	1.40	< 0.046
Pyrene	0.050	µg/g	na	na	0.218	1.43	1.09	0.919	6.71	6.16	< 0.050
B(a)P TPE[2]	0.12	µg/g	5.3	na	0.2	0.7	0.5	0.7	3.8	2.8	< 0.12
Organochlorine Pesticides											
Aldrin	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chlordane (Total)	0.028	µg/g	na	na	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Chlordane, alpha-	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Chlordane, gamma-	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
DDD, o,p-	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
DDD, p,p-	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
DDD (Total)	0.028	µg/g	na	na	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
DDE, o,p-	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
DDE, p,p-	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
DDE (Total)	0.028	µg/g	na	na	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
DDT, o,p-	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
DDT, p,p-	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
DDT (Total)	0.028	µg/g	na	na	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028	< 0.028
Dieldrin	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Endosulfan I	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.060	< 0.050	< 0.020
Endosulfan II	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Endosulfan (Total)	0.028	µg/g	na	na	< 0.028	< 0.028	< 0.028	< 0.028	< 0.063	< 0.054	< 0.028
Endrin	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Heptachlor	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Heptachlor Epoxide	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Hexachlorobenzene	0.010	µg/g	na	na	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobutadiene	0.010	µg/g	na	na	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorocyclohexane, gamma- (Lindane)	0.010	µg/g	na	na	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachloroethane	0.010	µg/g	na	na	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	0.020	µg/g	na	na	< 0.020	< 0.050	< 0.020	< 0.020	< 0.10	< 0.15	< 0.020
Chlordane, gamma-	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mbm - metres below mudline
% - percent
µg/g - micrograms per gram, dry weight basis
mS/cm - milliSiemens per centimetre

UNDERLINE	Concentration greater than CCME CEQG Residential Surface (Soil) Guideline
SHADED	Concentration greater than CCME CEQG Residential Subsurface (Soil) Guideline

[1] Canadian Soil Quality Guidelines for the Protection of Human Health (direct contact), Residential Land Use, coarse-grained soil
[2] Benzo[a]pyrene Total Potency Equivalents (BaP TPE) is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs (CCME, 2010). Safety factor of 3 for coal tar or creosote mixtures not applied.
[3] Guidelines use 10^{-5} incremental risk.

TABLE 3B: **Sediment Results - Comparison to Soil Quality Criteria**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			CCME CEQG Residential Surface[1]	CCME CEQG Residential Subsurface[1]	PS-G-SED-102S	PS-E-SED-103S	PS-E-SED-103S	PS-D-SED-19	PS-D-SED-19	PS-C-SED-101S	PS-C-SED-102S
Sample Location					PS-G-SED-102S	PS-E-SED-103S	PS-E-SED-103S	PS-D-SED-19	PS-D-SED-19	PS-C-SED-101S	PS-C-SED-102S
Laboratory Sample ID					L2054623-7	L2054623-4	L2054623-5	L2036241-26	L2036241-28	L2054623-1	L2054623-2
SNC-Lavalin Sample ID					PS-G-SED-102S	PS-E-SED-103S	PS-E-SED-1033S	PS-D-SED-19	PS-D-SED-199	PS-C-SED-101S	PS-C-SED-102S
Sampling Date (yyyy/mm/dd)					2018/02/08	2018/02/07	2018/02/07	2017/12/14	2017/12/14	2018/02/06	2018/02/06
Depth Interval (mbm)					0.0 - 0.60	0.0 - 0.20	0.0 - 0.20	0.0 - 0.25	0.0 - 0.25	0.0 - 0.15	0.0 - 0.10
							Duplicate of PS-E-SED-103S		Duplicate of PS-D-SED-19		
Parameter	**RDL**	**Units**									
General Chemistry											
Cyanide (WAD)	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Electrical Conductivity	0.0040	mS/cm	na	na	0.0951	0.167	0.194	0.297	0.211	0.202	0.177
Moisture	0.10	%	na	na	26.0	19.6	20.1	26.2	21.6	28.3	31.7
pH	0.10	pH	na	na	5.75	7.16	7.29	7.40	7.36	6.34	6.51
Sodium Adsorption Ratio	0.10	None	na	na	0.45	0.64	0.69	0.36	0.48	0.80	0.67
					-	0.0072	0.0073	-	-	0.0387	0.0316
Fraction of Organic Carbon	0.0010	None	na	na	0.0031	0.0081	0.0077	0.0146	0.0150	0.0417	0.0324
					0.0027	0.0068	0.0064	0.0136	0.0148	0.0382	0.0287
Fraction of Organic Carbon (Average)	0.0010	None	na	na	0.0028	0.0074	0.0071	0.0146	0.0150	0.0395	0.0309
					0.31	0.72	0.73	-	-	3.87	3.16
Total Organic Carbon	0.10	%	na	na	0.27	0.68	0.64	1.36	1.48	3.82	2.87
					-	0.81	0.77	1.46	1.50	4.17	3.24
Total Metals											
Antimony	1.0	µg/g	na	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic	1.0	µg/g	12	na	1.7	1.8	1.9	2.2	2.0	1.6	2.5
Barium	1.0	µg/g	6,800	na	196	97.3	108	75.7	59.5	70.4	72.7
Beryllium	0.50	µg/g	75	na	0.67	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Boron	5.0	µg/g	na	na	5.2	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Boron (Hot Water Soluble)	0.10	µg/g	na	na	< 0.10	< 0.10	< 0.10	0.12	0.14	0.35	0.23
Cadmium	0.50	µg/g	14	na	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chromium (total)	1.0	µg/g	220	na	32.7	22.1	24.5	11.0	11.2	12.9	13.1
Chromium (VI)	0.20	µg/g	na	na	0.68	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Cobalt	1.0	µg/g	na	na	9.4	6.9	7.4	3.7	3.6	3.8	5.1
Copper	1.0	µg/g	1,100	na	22.9	15.6	17.2	16.2	11.7	11.1	15.2
Lead	1.0	µg/g	140	na	5.6	8.0	9.1	24.2	24.1	42.1	75.2
Mercury	0.0050	µg/g	6.6	na	0.0098	0.0082	0.0116	0.0190	0.0187	0.0593	0.0375
Molybdenum	1.0	µg/g	na	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	1.0	µg/g	200	na	19.1	14.4	13.8	8.2	7.0	8.1	8.0
Selenium	1.0	µg/g	80	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Silver	0.20	µg/g	na	na	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Thallium	0.50	µg/g	1	na	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Uranium	1.0	µg/g	23	na	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	1.0	µg/g	na	na	49.2	39.7	44.0	22.8	21.9	20.8	25.2
Zinc	5.0	µg/g	na	na	55.2	49.4	49.7	62.1	62.3	71.6	85.8
Petroleum Hydrocarbon (PHC) Fractions											
PHC F1	5.0	µg/g	12,000	na	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
PHC F2	10	µg/g	6,800	na	< 10	< 10	< 10	< 10	< 10	< 10	< 10
PHC F3	50	µg/g	15,000	na	< 50	< 50	< 50	< 50	< 50	62	93
PHC F4	50	µg/g	21,000	na	< 50	< 50	< 50	< 50	< 50	< 50	< 50
PHC F4 (gravimetric)	250	µg/g	21,000	na	-	-	-	-	-	-	-
Total PHC C6-C50	72	µg/g	na	na	< 72	< 72	< 72	< 72	< 72	< 72	93
Total PHC (F1-F4)	72	µg/g	na	na	< 72	< 72	< 72	< 72	< 72	62	93
Volatile Organic Compounds											
Benzene	0.00020	µg/g	1103	na	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068
Ethylbenzene	0.018	µg/g	10,000	na	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018
Hexachlorobutadiene	0.010	µg/g	na	na	-	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010
Toluene	0.080	µg/g	22,000	na	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080
Xylenes, m+p-	0.030	µg/g	na	na	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Xylenes, o-	0.020	µg/g	na	na	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Xylenes	0.050	µg/g	150,000	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
PAHs											
Acenaphthene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthylene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Anthracene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(a)anthracene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	0.073	< 0.050	< 0.050
Benzo(a)pyrene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	0.054	0.065	< 0.050	< 0.050
Benzo(b)fluoranthene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	0.093	0.111	0.077	0.060
Benzo(g,h,i)perylene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(k)fluoranthene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chrysene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	0.080	0.055	< 0.050
Dibenzo(a,h)anthracene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluoranthene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	0.068	0.051	0.064	< 0.050
Fluorene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Indeno(1,2,3-cd)pyrene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	< 0.050	0.051	< 0.050	< 0.050
Methylnaphthalene, 1-	0.030	µg/g	na	na	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Methylnaphthalene, 2-	0.030	µg/g	na	na	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Methylnaphthalene, 1- & 2-	0.042	µg/g	na	na	< 0.042	< 0.042	< 0.042	< 0.042	< 0.042	< 0.042	< 0.042
Naphthalene	0.013	µg/g	na	na	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013
Phenanthrene	0.046	µg/g	na	na	< 0.046	< 0.046	< 0.046	< 0.046	< 0.046	< 0.046	< 0.046
Pyrene	0.050	µg/g	na	na	< 0.050	< 0.050	< 0.050	0.063	0.054	0.064	< 0.050
B(a)P TPE[2]	0.12	µg/g	5.3	na	< 0.12	< 0.12	< 0.12	0.12	0.14	0.12	0.12
Organochlorine Pesticides											
Aldrin	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
Chlordane (Total)	0.028	µg/g	na	na	-	< 0.028	< 0.028	< 0.028	< 0.028	-	< 0.028
Chlordane, alpha-	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
Chlordane, gamma-	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
DDD, o,p-	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
DDD, p,p-	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
DDD (Total)	0.028	µg/g	na	na	-	< 0.028	< 0.028	< 0.028	< 0.028	-	< 0.028
DDE, o,p-	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
DDE, p,p-	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
DDE (Total)	0.028	µg/g	na	na	-	< 0.028	< 0.028	< 0.028	< 0.028	-	< 0.028
DDT, o,p-	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
DDT, p,p-	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
DDT (Total)	0.028	µg/g	na	na	-	< 0.028	< 0.028	< 0.028	< 0.028	-	< 0.028
Dieldrin	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
Endosulfan I	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
Endosulfan II	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
Endosulfan (Total)	0.028	µg/g	na	na	-	< 0.028	< 0.028	< 0.028	< 0.028	-	< 0.028
Endrin	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
Heptachlor	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
Heptachlor Epoxide	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
Hexachlorobenzene	0.010	µg/g	na	na	-	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010
Hexachlorobutadiene	0.010	µg/g	na	na	-	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010
Hexachlorocyclohexane, gamma- (Lindane)	0.010	µg/g	na	na	-	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010
Hexachloroethane	0.010	µg/g	na	na	-	< 0.010	< 0.010	< 0.010	< 0.010	-	< 0.010
Methoxychlor	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020
Chlordane, gamma-	0.020	µg/g	na	na	-	< 0.020	< 0.020	< 0.020	< 0.020	-	< 0.020

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mbm - metres below mudline
% - percent
µg/g - micrograms per gram, dry weight basis
mS/cm - milliSiemens per centimetre

UNDERLINE	Concentration greater than CCME CEQG Residential Surface (Soil) Guideline
SHADED	Concentration greater than CCME CEQG Residential Subsurface (Soil) Guidelir

[1] Canadian Soil Quality Guidelines for the Protection of Human Health (direct contact), Residential Land Use, coarse-grained soil
[2] Benzo[a]pyrene Total Potency Equivalents (BaP TPE) is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs (CCME, 2010). Safety factor of 3 for coal tar or creosote mixtures not applied.
[3] Guidelines use 10^{-5} incremental risk.

TABLE 3B: **Sediment Results - Comparison to Soil Quality Criteria**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			CCME CEQG Residential Surface[1]	CCME CEQG Residential Subsurface[1]	PS-C-SED-103S
		Sample Location			PS-C-SED-103S
		Laboratory Sample ID			L2054623-3
		SNC-Lavalin Sample ID			PS-C-SED-103S
		Sampling Date (yyyy/mm/dd)			2018/02/06
		Depth Interval (mbm)			0.0 - 0.50
Parameter	**RDL**	**Units**			
General Chemistry					
Cyanide (WAD)	0.050	µg/g	na	na	0.12
Electrical Conductivity	0.0040	mS/cm	na	na	0.293
Moisture	0.10	%	na	na	70.2
pH	0.10	pH	na	na	6.33
Sodium Adsorption Ratio	0.10	None	na	na	0.72
					0.130
Fraction of Organic Carbon	0.0010	None	na	na	0.140
					0.127
Fraction of Organic Carbon (Average)	0.0010	None	na	na	0.132
					13.0
Total Organic Carbon	0.10	%	na	na	12.7
					14.0
Total Metals					
Antimony	1.0	µg/g	na	na	< 1.0
Arsenic	1.0	µg/g	12	na	3.0
Barium	1.0	µg/g	6,800	na	102
Beryllium	0.50	µg/g	75	na	< 0.50
Boron	5.0	µg/g	na	na	5.7
Boron (Hot Water Soluble)	0.10	µg/g	na	na	1.12
Cadmium	0.50	µg/g	14	na	0.52
Chromium (total)	1.0	µg/g	220	na	16.3
Chromium (VI)	0.20	µg/g	na	na	< 0.40
Cobalt	1.0	µg/g	na	na	5.7
Copper	1.0	µg/g	1,100	na	14.0
Lead	1.0	µg/g	140	na	35.6
Mercury	0.0050	µg/g	6.6	na	0.0529
Molybdenum	1.0	µg/g	na	na	< 1.0
Nickel	1.0	µg/g	200	na	9.0
Selenium	1.0	µg/g	80	na	< 1.0
Silver	0.20	µg/g	na	na	< 0.20
Thallium	0.50	µg/g	1	na	< 0.50
Uranium	1.0	µg/g	23	na	< 1.0
Vanadium	1.0	µg/g	na	na	28.3
Zinc	5.0	µg/g	na	na	105
Petroleum Hydrocarbon (PHC) Fractions					
PHC F1	5.0	µg/g	12,000	na	< 15
PHC F2	10	µg/g	6,800	na	< 30
PHC F3	50	µg/g	15,000	na	340
PHC F4	50	µg/g	21,000	na	230
PHC F4 (gravimetric)	250	µg/g	21,000	na	-
Total PHC C6-C50	72	µg/g	na	na	580
Total PHC (F1-F4)	72	µg/g	na	na	570
Volatile Organic Compounds					
Benzene	0.00020	µg/g	1103	na	< 0.00020
Ethylbenzene	0.018	µg/g	10,000	na	< 0.054
Hexachlorobutadiene	0.010	µg/g	na	na	-
Toluene	0.080	µg/g	22,000	na	< 0.24
Xylenes, m+p-	0.030	µg/g	na	na	< 0.090
Xylenes, o-	0.020	µg/g	na	na	< 0.060
Xylenes	0.050	µg/g	150,000	na	< 0.11
PAHs					
Acenaphthene	0.050	µg/g	na	na	< 0.075
Acenaphthylene	0.050	µg/g	na	na	< 0.075
Anthracene	0.050	µg/g	na	na	< 0.075
Benzo(a)anthracene	0.050	µg/g	na	na	0.081
Benzo(a)pyrene	0.050	µg/g	na	na	< 0.075
Benzo(b)fluoranthene	0.050	µg/g	na	na	0.150
Benzo(g,h,i)perylene	0.050	µg/g	na	na	< 0.075
Benzo(k)fluoranthene	0.050	µg/g	na	na	< 0.075
Chrysene	0.050	µg/g	na	na	0.103
Dibenzo(a,h)anthracene	0.050	µg/g	na	na	< 0.075
Fluoranthene	0.050	µg/g	na	na	0.111
Fluorene	0.050	µg/g	na	na	< 0.075
Indeno(1,2,3-cd)pyrene	0.050	µg/g	na	na	< 0.075
Methylnaphthalene, 1-	0.030	µg/g	na	na	< 0.045
Methylnaphthalene, 2-	0.030	µg/g	na	na	< 0.045
Methylnaphthalene, 1- & 2-	0.042	µg/g	na	na	< 0.064
Naphthalene	0.013	µg/g	na	na	< 0.020
Phenanthrene	0.046	µg/g	na	na	< 0.069
Pyrene	0.050	µg/g	na	na	0.105
B(a)P TPE[2]	0.12	µg/g	5.3	na	0.19
Organochlorine Pesticides					
Aldrin	0.020	µg/g	na	na	-
Chlordane (Total)	0.028	µg/g	na	na	-
Chlordane, alpha-	0.020	µg/g	na	na	-
Chlordane, gamma-	0.020	µg/g	na	na	-
DDD, o,p-	0.020	µg/g	na	na	-
DDD, p,p-	0.020	µg/g	na	na	-
DDD (Total)	0.028	µg/g	na	na	-
DDE, o,p-	0.020	µg/g	na	na	-
DDE, p,p-	0.020	µg/g	na	na	-
DDE (Total)	0.028	µg/g	na	na	-
DDT, o,p-	0.020	µg/g	na	na	-
DDT, p,p-	0.020	µg/g	na	na	-
DDT (Total)	0.028	µg/g	na	na	-
Dieldrin	0.020	µg/g	na	na	-
Endosulfan I	0.020	µg/g	na	na	-
Endosulfan II	0.020	µg/g	na	na	-
Endosulfan (Total)	0.028	µg/g	na	na	-
Endrin	0.020	µg/g	na	na	-
Heptachlor	0.020	µg/g	na	na	-
Heptachlor Epoxide	0.020	µg/g	na	na	-
Hexachlorobenzene	0.010	µg/g	na	na	-
Hexachlorobutadiene	0.010	µg/g	na	na	-
Hexachlorocyclohexane, gamma- (Lindane)	0.010	µg/g	na	na	-
Hexachloroethane	0.010	µg/g	na	na	-
Methoxychlor	0.020	µg/g	na	na	-
Chlordane, gamma-	0.020	µg/g	na	na	-

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mbm - metres below mudline
% - percent
µg/g - micrograms per gram, dry weight basis
mS/cm - milliSiemens per centimetre

UNDERLINE	Concentration greater than CCME CEQG Residential Surface (Soil) Guideline
SHADED	Concentration greater than CCME CEQG Residential Subsurface (Soil) Guidelir

[1] Canadian Soil Quality Guidelines for the Protection of Human Health (direct contact), Residential Land Use, coarse-grained soil
[2] Benzo[a]pyrene Total Potency Equivalents (BaP TPE) is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs (CCME, 2010). Safety factor of 3 for coal tar or creosote mixtures not applied.
[3] Guidelines use 10^{-5} incremental risk.

TABLE 4A: **Sediment Exceedances - Comparison to CCME CEQG PEL**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

		Location ID:		**PS-G-SED-2**	**PS-G-SED-3**	**PS-G-SED-5**	**PS-G-SED-6**	**PS-G-SED-6**
		Lab. Number:		L2036241-2	L2036241-4	L2036241-13	L2036241-5	L2036241-6
		Sample Date:		2017/12/12	2017/12/12	2017/12/13	2017/12/12	2017/12/12
		Depth Interval (mbm) :		0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25
								Duplicate of PS-G-SED-6
Parameter	**CCME CEQG Probable Effect Levels (PEL)[1]**	**Units**	**Maximum Concentration**					
Acenaphthylene	0.128	µg/g	1.09	**0.262**	**0.218**	**0.259**	**1.09**	**0.886**
Anthracene	0.245	µg/g	0.379				**0.379**	**0.314**
Benzo(a)anthracene	0.385	µg/g	2.17	**0.407**			**2.17**	**1.48**
Benzo(a)pyrene	0.782	µg/g	2.53				**2.53**	**1.87**
Chrysene	0.862	µg/g	2.88				**2.88**	**2.21**
Dibenz(a,h)anthracene	0.135	µg/g	0.387				**0.387**	**0.276**
Fluoranthene	2.355	µg/g	6.18				**6.18**	**5.72**
Fluorene	0.144	µg/g	0.249				**0.249**	**0.242**
Phenanthrene	0.515	µg/g	1.81				**1.81**	**1.4**
Pyrene	0.875	µg/g	6.71	**1.43**	**1.09**	**0.919**	**6.71**	**6.16**
Lead	91.3	µg/g	191				**182**	**191**

mbm - metres below mudline
µg/g - micrograms per gram, dry weight basis

BOLD Concentration greater than CCME CEQG Probable Effect Level (PEL) Guideline

[1] CCME Probable Effect Levels (PEL) Sediment Quality Guideline to protect freshwater aquatic life (1999, as updated).

TABLE 4B: **Sediment Exceedances - Comparison to RBCA**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			Location ID:	**PS-G-SED-2**	**PS-G-SED-3**	**PS-G-SED-5**	**PS-G-SED-6**	**PS-G-SED-6**	**PS-C-SED-101S**	**PS-C-SED-102S**	**PS-C-SED-103S**
			Lab. Number:	L2036241-2	L2036241-4	L2036241-13	L2036241-5	L2036241-6	L2054623-1	L2054623-2	L2054623-3
			Sample Date:	2017/12/12	2017/12/12	2017/12/13	2017/12/12	2017/12/12	2018/02/06	2018/02/06	2018/02/06
			Depth Interval (mbm) :	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0 - 0.15	0 - 0.1	0 - 0.5
								Duplicate of PS-G-SED-6			
Parameter	**RBCA[1]**	**Units**	**Maximum Concentration**								
PHC F3	25	µg/g	340	**124**	**154**	**98**	**175**	**172**	**62**	**93**	**340**
PHC F4 (gravimetric)	500	µg/g	760	**690**	**580**	**730**	**720**	**760**			
Total PHC C6-C50	500	µg/g	580								**580**
Total PHC (F1-F4)	500	µg/g	932	**814**	**734**	**828**	**895**	**932**			**570**

mbm - metres below mudline
µg/g - micrograms per gram, dry weight basis

BOLD Concentration greater than RBCA

[1] Atlantic Risk-Based Corrective Action (RBCA) (APIRI, 2012), not adjusted for Fraction of Organic Carbon (FOC).

TABLE 4C: **Sediment Exceedances - Comparison to CCME CEQG ISQG**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

		Location ID:		**PS-G-SED-1**	**PS-G-SED-2**	**PS-G-SED-3**	**PS-G-SED-5**	**PS-G-SED-6**	**PS-G-SED-6**
		Lab. Number:		L2036241-1	L2036241-2	L2036241-4	L2036241-13	L2036241-5	L2036241-6
		Sample Date:		2017/12/12	2017/12/12	2017/12/12	2017/12/13	2017/12/12	2017/12/12
		Depth Interval (mbm)		0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25
									Duplicate of PS-G-SED-6
Parameter	**CCME CEQG Interim Sediment Quality Guideline (ISQG)[1]**	**Units**	**Maximum Concentration**						
Acenaphthene	0.007	µg/g	0.061					**0.061**	**0.061**
Acenaphthylene	0.006	µg/g	1.09	**0.07**	**0.262**	**0.218**	**0.259**	**1.09**	**0.886**
Anthracene	0.047	µg/g	0.379		**0.095**	**0.063**	**0.072**	**0.379**	**0.314**
Benzo(a)anthracene	0.032	µg/g	2.17	**0.083**	**0.407**	**0.287**	**0.308**	**2.17**	**1.48**
Benzo(a)pyrene	0.032	µg/g	2.53	**0.122**	**0.505**	**0.369**	**0.448**	**2.53**	**1.87**
Chrysene	0.057	µg/g	2.88	**0.105**	**0.6**	**0.402**	**0.376**	**2.88**	**2.21**
Dibenz(a,h)anthracene	0.006	µg/g	0.387		**0.072**	**0.051**	**0.071**	**0.387**	**0.276**
Fluoranthene	0.111	µg/g	6.18	**0.142**	**1.07**	**0.852**	**0.774**	**6.18**	**5.72**
Fluorene	0.021	µg/g	0.249					**0.249**	**0.242**
Phenanthrene	0.042	µg/g	1.81		**0.432**	**0.382**	**0.248**	**1.81**	**1.4**
Pyrene	0.053	µg/g	6.71	**0.218**	**1.43**	**1.09**	**0.919**	**6.71**	**6.16**
Lead	35	µg/g	191					**182**	**191**

mbm - metres below mudline
µg/g - micrograms per gram, dry weight basis

BOLD Concentration greater than CCME CEQG Interim Sediment Quality Guideline (ISQG)

[1] CCME Interim Sediment Quality Guideline (ISQG) to protect freshwater aquatic life (1999, as updated).

TABLE 4C: **Sediment Exceedances - Comparison to CCME CEQG ISQG**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

		Location ID:		**PS-D-SED-19**	**PS-D-SED-19**	**PS-C-SED-101S**	**PS-C-SED-102S**	**PS-C-SED-103S**
		Lab. Number:		L2036241-26	L2036241-28	L2054623-1	L2054623-2	L2054623-3
		Sample Date:		2017/12/14	2017/12/14	2018/02/06	2018/02/06	2018/02/06
		Depth Interval (mbm)		0.0 - 0.25	0.0 - 0.25 Duplicate of PS-D-SED-19	0.0 - 0.15	0.0 - 0.10	0.0 - 0.50
Parameter	**CCME CEQG Interim Sediment Quality Guideline (ISQG)[1]**	**Units**	**Maximum Concentration**					
Acenaphthene	0.007	µg/g	0.061					
Acenaphthylene	0.006	µg/g	1.09					
Anthracene	0.047	µg/g	0.379					
Benzo(a)anthracene	0.032	µg/g	2.17		**0.073**			**0.081**
Benzo(a)pyrene	0.032	µg/g	2.53	**0.054**	**0.065**			
Chrysene	0.057	µg/g	2.88		**0.08**			**0.103**
Dibenz(a,h)anthracene	0.006	µg/g	0.387					
Fluoranthene	0.111	µg/g	6.18					
Fluorene	0.021	µg/g	0.249					
Phenanthrene	0.042	µg/g	1.81					
Pyrene	0.053	µg/g	6.71	**0.063**	**0.054**	**0.064**		**0.105**
Lead	35	µg/g	191			**42.1**	**75.2**	**35.6**

mbm - metres below mudline
µg/g - micrograms per gram, dry weight basis

BOLD Concentration greater than CCME CEQG Interim Sediment Quality Guideline (ISQG)

[1] CCME Interim Sediment Quality Guideline (ISQG) to protect freshwater aquatic life (1999, as updated).

TABLE 4D: **Sediment Exceedances - Comparison to MOE Sediment Standards**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			Location ID:	**PS-G-SED-2**	**PS-G-SED-3**	**PS-G-SED-5**	**PS-G-SED-6**	**PS-G-SED-6**	**PS-G-SED-102S**	**PS-E-SED-103S**
			Lab. Number:	L2036241-2	L2036241-4	L2036241-13	L2036241-5	L2036241-6	L2054623-7	L2054623-5
			Sample Date:	2017/12/12	2017/12/12	2017/12/13	2017/12/12	2017/12/12	2018/02/08	2018/02/07
			Depth Interval (mbm) :	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.60	0.0 - 0.20
								Duplicate of PS-G-SED-6		
Parameter	**MOE Sediment Standard[1]**	**Units**	**Maximum Concentration**							
Cyanide	0.1	µg/g	1.76	**1.76**						
Total Organic Carbon	1	%	1.61	**1.61**	**1.43** **1.50** **1.59**	**1.12**	**2.48** **2.80** **2.89**	**2.63** **2.78** **3.02**		
Anthracene	0.22	µg/g	0.379				**0.379**	**0.314**		
Benzo(a)anthracene	0.32	µg/g	2.17	**0.407**			**2.17**	**1.48**		
Benzo(a)pyrene	0.37	µg/g	2.53	**0.505**		**0.448**	**2.53**	**1.87**		
Benzo(ghi)perylene	0.17	µg/g	1.74	**0.364**	**0.275**	**0.34**	**1.74**	**1.36**		
Benzo[k]fluoranthene	0.24	µg/g	1.02				**1.02**	**0.808**		
Chrysene	0.34	µg/g	2.88	**0.6**	**0.402**	**0.376**	**2.88**	**2.21**		
Dibenz(a,h)anthracene	0.06	µg/g	0.387	**0.072**		**0.071**	**0.387**	**0.276**		
Fluoranthene	0.75	µg/g	6.18	**1.07**	**0.852**	**0.774**	**6.18**	**5.72**		
Fluorene	0.19	µg/g	0.249				**0.249**	**0.242**		
Indeno[1 2 3-cd]pyrene	0.2	µg/g	1.83	**0.323**	**0.251**	**0.341**	**1.83**	**1.47**		
Phenanthrene	0.56	µg/g	1.81				**1.81**	**1.4**		
Pyrene	0.49	µg/g	6.71	**1.43**	**1.09**	**0.919**	**6.71**	**6.16**		
Total PAH	4	µg/g	32.37	**6.44**	**4.97**	**5.02**	**32.37**	**26.94**		
Copper	16	µg/g	22.9				**18.4**		**22.9**	**17.2**
Chromium Total	26	µg/g	32.7						**32.7**	
Lead	31	µg/g	191				**182**	**191**		
Nickel	16	µg/g	19.1						**19.1**	

mbm - metres below mudline
µg/g - micrograms per gram, dry weight basis
% - percent

BOLD Concentration greater than MOE Sediment Standards

[1] Ontario Ministry of Environment Lowest Effect Level (LEL) Sediment Standard (MOE, 2008 and 2011).

TABLE 4D: **Sediment Exceedances - Comparison to MOE Sediment Standards**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			Location ID: **Lab. Number:** **Sample Date:** **Depth Interval (mbm) :**	**PS-D-SED-19** L2036241-26 2017/12/14 0.0 - 0.25	**PS-D-SED-19** L2036241-28 2017/12/14 0.0 - 0.25 Duplicate of PS-D-SED-19	**PS-C-SED-101S** L2054623-1 2018/02/06 0.0 - 0.15	**PS-C-SED-102S** L2054623-2 2018/02/06 0.0 - 0.10	**PS-C-SED-103S** L2054623-3 2018/02/06 0.0 - 0.50
Parameter	**MOE Sediment Standard[1]**	**Units**	**Maximum Concentration**					
Cyanide	0.1	µg/g	1.76					**0.12**
Total Organic Carbon	1	%	1.61	**1.36** **1.46** **1.57**	**1.48** **1.50** **1.52**	**3.82** **3.87** **4.17**	**2.87** **3.16** **3.24**	**12.7** **13.0** **14.0**
Anthracene	0.22	µg/g	0.379					
Benzo(a)anthracene	0.32	µg/g	2.17					
Benzo(a)pyrene	0.37	µg/g	2.53					
Benzo(ghi)perylene	0.17	µg/g	1.74					
Benzo[k]fluoranthene	0.24	µg/g	1.02					
Chrysene	0.34	µg/g	2.88					
Dibenz(a,h)anthracene	0.06	µg/g	0.387					
Fluoranthene	0.75	µg/g	6.18					
Fluorene	0.19	µg/g	0.249					
Indeno[1 2 3-cd]pyrene	0.2	µg/g	1.83					
Phenanthrene	0.56	µg/g	1.81					
Pyrene	0.49	µg/g	6.71					
Total PAH	4	µg/g	32.37					
Copper	16	µg/g	22.9	**16.2**				
Chromium Total	26	µg/g	32.7					
Lead	31	µg/g	191			**42.1**	**75.2**	**35.6**
Nickel	16	µg/g	19.1					

mbm - metres below mudline
µg/g - micrograms per gram, dry weight basis
% - percent

BOLD Concentration greater than MOE Sediment Standards

[1] Ontario Ministry of Environment Lowest Effect Level (LEL) Sediment Standard (MOE, 2008 and 2011).

TABLE 5: **Waste Characterization**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			Leachate Quality Criteria[1]	PS-G-SED-2	PS-D-SED-19	PS-C-SED-101S TCLP
		Sample Location		PS-G-SED-2	PS-D-SED-19	PS-C-SED-101S TCLP
		Laboratory Sample ID		L2036241-3	L2036241-27	L2054623-8
		SNC-Lavalin Sample ID		PS-G-SED-2 (TCLP)	PS-D-SED-19 (TCLP)	PS-C-SED-101S TCLP
		Sampling Date (yyyy/mm/dd)		2017/12/12	2017/12/14	2018/02/06
Parameter	**RDL**	**Units**				
Leachable Organochlorine Pesticides						
Hexachlorobenzene	0.0040	mg/L	0.13	< 0.0040	< 0.0040	< 0.0040
Hexachlorobutadiene	0.0040	mg/L	0.5	< 0.0040	< 0.0040	< 0.0040
Hexachloroethane	0.0040	mg/L	3	< 0.0040	< 0.0040	< 0.0040
Phenols						
2,3,4,6-Tetrachlorophenol	0.0050	mg/L	10	< 0.0050	< 0.0050	< 0.0050
2,4,5-Trichlorophenol	0.0050	mg/L	400	< 0.0050	< 0.0050	< 0.0050
2,4,6-Trichlorophenol	0.0050	mg/L	0.5	< 0.0050	< 0.0050	< 0.0050
2,4-Dichlorophenol	0.0050	mg/L	90	< 0.0050	< 0.0050	< 0.0050
2,4-Dinitrotoluene	0.0040	mg/L	0.13	< 0.0040	< 0.0040	< 0.0040
2-Methylphenol	0.0050	mg/L	200	< 0.0050	< 0.0050	< 0.0050
Cresol	0.015	mg/L	200	< 0.015	< 0.015	< 0.015
Pentachlorophenol	0.0050	mg/L	6	< 0.0050	< 0.0050	< 0.0050
Leachable Inorganics						
Arsenic	0.050	mg/L	2.5	< 0.050	< 0.050	< 0.050
Barium	0.50	mg/L	100	< 0.50	< 0.50	< 0.50
Boron	2.5	mg/L	500	< 2.5	< 2.5	< 2.5
Cadmium	0.0050	mg/L	0.5	< 0.0050	< 0.0050	< 0.0050
Chromium	0.050	mg/L	5	< 0.050	< 0.050	< 0.050
Cyanide (WAD)	0.10	mg/L	20	< 0.10	< 0.10	< 0.10
Fluoride	10	mg/L	150	< 10	< 10	< 10
Lead	0.050	mg/L	5	0.056	< 0.050	< 0.050
Mercury	0.00010	mg/L	0.1	< 0.00010	< 0.00010	< 0.00010
Nitrate-N	2.0	mg/L	na	< 2.0	< 2.0	< 2.0
Nitrite-N	2.0	mg/L	na	< 2.0	< 2.0	< 2.0
Nitrate and Nitrite (as N)	4.0	mg/L	1,000	< 4.0	< 4.0	< 4.0
Selenium	0.025	mg/L	1	< 0.025	< 0.025	< 0.025
Silver	0.0050	mg/L	5	< 0.0050	< 0.0050	< 0.0050
Uranium	0.25	mg/L	10	< 0.25	< 0.25	< 0.25
Leachable Volatiles						
Benzene	0.025	mg/L	0.5	< 0.025	< 0.025	< 0.025
Carbon Tetrachloride	0.025	mg/L	0.5	< 0.025	< 0.025	< 0.025
Chlorobenzene	0.025	mg/L	8	< 0.025	< 0.025	< 0.025
Chloroform	0.10	mg/L	10	< 0.10	< 0.10	< 0.10
1,2-Dichlorobenzene	0.025	mg/L	20	< 0.025	< 0.025	< 0.025
1,4-Dichlorobenzene	0.025	mg/L	0.5	< 0.025	< 0.025	< 0.025
1,2-Dichloroethane	0.025	mg/L	0.5	< 0.025	< 0.025	< 0.025
1,1-Dichloroethylene	0.025	mg/L	1.4	< 0.025	< 0.025	< 0.025
Methylene Chloride	0.50	mg/L	5	< 0.50	< 0.50	< 0.50
Methyl Ethyl Ketone	1.0	mg/L	200	< 1.0	< 1.0	< 1.0
Tetrachloroethylene	0.025	mg/L	3	< 0.025	< 0.025	< 0.025
Trichloroethylene	0.025	mg/L	5	< 0.025	< 0.025	< 0.025
Vinyl Chloride	0.050	mg/L	0.2	< 0.050	< 0.050	< 0.050
Leachable Semi-Volatiles						
Benzo(a)pyrene	0.00020	mg/L	0.001	< 0.00020	< 0.00020	< 0.00020
3&4-Methylphenol (m/p-Cresol)	0.010	mg/L	200	< 0.010	< 0.010	< 0.010
2-Methylphenol (o-Cresol)	0.0050	mg/L	200	< 0.0050	< 0.0050	< 0.0050
Cresol (total)	0.015	mg/L	200	< 0.015	< 0.015	< 0.015
2,4-Dichlorophenol	0.0050	mg/L	90	< 0.0050	< 0.0050	< 0.0050
2,4-Dinitrotoluene	0.0040	mg/L	0.13	< 0.0040	< 0.0040	< 0.0040
Nitrobenzene	0.0040	mg/L	2	< 0.0040	< 0.0040	< 0.0040
Pentachlorophenol	0.0050	mg/L	6	< 0.0050	< 0.0050	< 0.0050
2,3,4,6-Tetrachlorophenol	0.0050	mg/L	10	< 0.0050	< 0.0050	< 0.0050
2,4,5-Trichlorophenol	0.0050	mg/L	400	< 0.0050	< 0.0050	< 0.0050
2,4,6-Trichlorophenol	0.0050	mg/L	0.5	< 0.0050	< 0.0050	< 0.0050

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mg/L - milligrams per litre

UNDERLINE Concentration greater than Leachate Quality Criteria

[1] Ontario Regulation 347 as amended. "Waste Management". Schedule 4 Leachate Quality Criteria.

TABLE 6: **Surface Water Results**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			CCME WQG[1]	DFO[2] Guideline	PS-G-SW-2	PS-G-SW-2D	PS-G-SW-3	PS-G-SW-3D	PS-G-SW-6	PS-G-SW-6D
Sample Location					PS-G-SW-2	PS-G-SW-2D	PS-G-SW-3	PS-G-SW-3D	PS-G-SW-6	PS-G-SW-6D
Laboratory Sample ID					L2036241-7	L2036241-8	L2036241-9	L2036241-10	L2036241-11	L2036241-12
SNC-Lavalin Sample ID					PS-G-SW-2	PS-G-SW-2D	PS-G-SW-3	PS-G-SW-3D	PS-G-SW-6	PS-G-SW-6D
Sampling Date (yyyy/mm/dd)					2017/12/12	2017/12/12	2017/12/12	2017/12/12	2017/12/12	2017/12/12
Parameter	**RDL**	**Units**								
Field Parameters										
Turbidity (field)	na	NTU	8	na	**8.74**	**833**	3.83	**>1,000**	1.26	**682**
Total Suspended Solids (field)	na	mg/L	25	75	2	**450**	2	**>30,000**	6	**342**
General Chemistry										
Total Suspended Solids	2.0	mg/L	25	75	18.8	**2,260**	< 2.0	**4,300**	< 2.0	**640**

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
Field TSS measured using AYXS TSS Meter
Field Turbidity measured using a HACH Turbidity Meter
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mg/L - milligrams per litre
NTU - Nephelometric Turbidity Units

UNDERLINE	Concentration greater than CCME WQG
SHADED	Concentration greater than DFO Guideline

[1] CCME Water Quality Guidelines for the Protection of Aquatic Life, Freshwater (1999, as updated).
[2] DFO Land Development Guidelines for the Protection of Aquatic Habitat (May 1992).

TABLE 6: **Surface Water Results**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

		Sample Location Laboratory Sample ID SNC-Lavalin Sample ID Sampling Date (yyyy/mm/dd)	CCME WQG[1]	DFO[2] Guideline	PS-G-SW-101 L2054541-11 PS-G-SW-101 2018/02/07	PS-G-SW-101D L2054541-12 PS-G-SW-101D 2018/02/07	PS-G-SW-102 L2054541-13 PS-G-SW-102 2018/02/08	PS-G-SW-102D L2054541-14 PS-G-SW-102D 2018/02/08	PS-E-SW-2 L2036241-14 PS-E-SW-2 2017/12/13	PS-E-SW-2D L2036241-15 PS-E-SW-2D 2017/12/13
Parameter	**RDL**	**Units**								
Field Parameters										
Turbidity (field)	na	NTU	8	na	0.74	-	0.95	**57.4**	3.58	7.5
Total Suspended Solids (field)	na	mg/L	25	75	1	-	3	**112**	4	6
General Chemistry										
Total Suspended Solids	2.0	mg/L	25	75	< 2.0	**140**	3.8	**129**	< 2.0	15.4

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
Field TSS measured using AYXS TSS Meter
Field Turbidity measured using a HACH Turbidity Meter
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mg/L - milligrams per litre
NTU - Nephelometric Turbidity Units

UNDERLINE	Concentration greater than CCME WQG
SHADED	Concentration greater than DFO Guideline

[1] CCME Water Quality Guidelines for the Protection of Aquatic Life, Freshwater (1999, as updated).
[2] DFO Land Development Guidelines for the Protection of Aquatic Habitat (May 1992).

TABLE 6: **Surface Water Results**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			CCME WQG[1]	DFO[2] Guideline	PS-E-SW-3	PS-E-SW-3D	PS-E-SW-5	PS-E-SW-101	PS-E-SW-102	PS-E-SW-103
Sample Location					PS-E-SW-3	PS-E-SW-3D	PS-E-SW-5	PS-E-SW-101	PS-E-SW-102	PS-E-SW-103
Laboratory Sample ID					L2036241-16	L2036241-17	L2036241-18	L2054541-9	L2054541-10	L2054541-7
SNC-Lavalin Sample ID					PS-E-SW-3	PS-E-SW-3D	PS-E-SW-5	PS-E-SW-101	PS-E-SW-102	PS-E-SW-103
Sampling Date (yyyy/mm/dd)					2017/12/13	2017/12/13	2017/12/13	2018/02/07	2018/02/07	2018/02/07
Parameter	**RDL**	**Units**								
Field Parameters										
Turbidity (field)	na	NTU	8	na	2.43	4.06	4.89	0.55	0.74	0.62
Total Suspended Solids (field)	na	mg/L	25	75	8	3	5	1	1	2
General Chemistry										
Total Suspended Solids	2.0	mg/L	25	75	4.1	< 2.0	10.1	2.6	< 2.0	< 2.0

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
Field TSS measured using AYXS TSS Meter
Field Turbidity measured using a HACH Turbidity Meter
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mg/L - milligrams per litre
NTU - Nephelometric Turbidity Units

UNDERLINE	Concentration greater than CCME WQG
SHADED	Concentration greater than DFO Guideline

[1] CCME Water Quality Guidelines for the Protection of Aquatic Life, Freshwater (1999, as updated).
[2] DFO Land Development Guidelines for the Protection of Aquatic Habitat (May 1992).

TABLE 6: **Surface Water Results**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			CCME WQG[1]	DFO[2] Guideline	PS-E-SW-103	PS-E-SW-103D	PS-E-SW-103D	PS-D-SW-3D	PS-D-SW-3	PS-D-SW-19D
Sample Location					PS-E-SW-103	PS-E-SW-103D	PS-E-SW-103D	PS-D-SW-3D	PS-D-SW-3	PS-D-SW-19D
Laboratory Sample ID					L2054541-15	L2054541-8	L2054541-16	L2036241-20	L2036241-19	L2036241-25
SNC-Lavalin Sample ID					PS-E-SW-1033	PS-E-SW-103D	PS-E-SW-1033D	PS-D-SW-3D	PS-D-SW-3	PS-D-SW-19D
Sampling Date (yyyy/mm/dd)					2018/02/07	2018/02/07	2018/02/07	2017/12/14	2017/12/14	2017/12/14
					Duplicate of PS-E-SW-103		Duplicate of PS-E-SW-103D			
Parameter	**RDL**	**Units**								
Field Parameters										
Turbidity (field)	na	NTU	8	na	0.62	**8.61**	**8.61**	**84.9**	1.78	**128**
Total Suspended Solids (field)	na	mg/L	25	75	2	17	17	**28**	4	**59**
General Chemistry										
Total Suspended Solids	2.0	mg/L	25	75	< 2.0	24.7	19.6	**137**	2.7	**250**

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
Field TSS measured using AYXS TSS Meter
Field Turbidity measured using a HACH Turbidity Meter
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mg/L - milligrams per litre
NTU - Nephelometric Turbidity Units

UNDERLINE	Concentration greater than CCME WQG
SHADED	Concentration greater than DFO Guideline

[1] CCME Water Quality Guidelines for the Protection of Aquatic Life, Freshwater (1999, as updated).
[2] DFO Land Development Guidelines for the Protection of Aquatic Habitat (May 1992).

TABLE 6: **Surface Water Results**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			CCME WQG[1]	DFO[2] Guideline	PS-D-SW-19	PS-D-SW-11D	PS-D-SW-11	PS-D-SW-11	PS-C-SW-101	PS-C-SW-101D
Sample Location					PS-D-SW-19	PS-D-SW-11D	PS-D-SW-11	PS-D-SW-11	PS-C-SW-101	PS-C-SW-101D
Laboratory Sample ID					L2036241-24	L2036241-23	L2036241-21	L2036241-22	L2054541-1	L2054541-2
SNC-Lavalin Sample ID					PS-D-SW-19	PS-D-SW-11D	PS-D-SW-11	PS-D-SW-111	PS-C-SW-101	PS-C-SW-101D
Sampling Date (yyyy/mm/dd)					2017/12/14	2017/12/14	2017/12/14	2017/12/14	2018/02/06	2018/02/06
								Duplicate of PS-D-SW-11		
Parameter	**RDL**	**Units**								
Field Parameters										
Turbidity (field)	na	NTU	8	na	**8.1**	**44.3**	0.62	0.62	0.76	**68.4**
Total Suspended Solids (field)	na	mg/L	25	75	0	10	0	0	0	**124**
General Chemistry										
Total Suspended Solids	2.0	mg/L	25	75	3.8	**48.4**	< 2.0	< 2.0	< 2.0	**158**

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
Field TSS measured using AYXS TSS Meter
Field Turbidity measured using a HACH Turbidity Meter
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mg/L - milligrams per litre
NTU - Nephelometric Turbidity Units

UNDERLINE	Concentration greater than CCME WQG
SHADED	Concentration greater than DFO Guideline

[1] CCME Water Quality Guidelines for the Protection of Aquatic Life, Freshwater (1999, as updated).
[2] DFO Land Development Guidelines for the Protection of Aquatic Habitat (May 1992).

TABLE 6: **Surface Water Results**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

		Sample Location Laboratory Sample ID SNC-Lavalin Sample ID Sampling Date (yyyy/mm/dd)	CCME WQG[1]	DFO[2] Guideline	PS-C-SW-102 L2054541-3 PS-C-SW-102 2018/02/06	PS-C-SW-102D L2054541-4 PS-C-SW-102D 2018/02/06	PS-C-SW-103 L2054541-5 PS-C-SW-103 2018/02/06	PS-C-SW-103D L2054541-6 PS-C-SW-103D 2018/02/06
Parameter	**RDL**	**Units**						
Field Parameters								
Turbidity (field)	na	NTU	8	na	0.93	**134**	0.9	**199**
Total Suspended Solids (field)	na	mg/L	25	75	19	**264**	0	**529**
General Chemistry								
Total Suspended Solids	2.0	mg/L	25	75	< 2.0	**282**	< 2.0	**589**

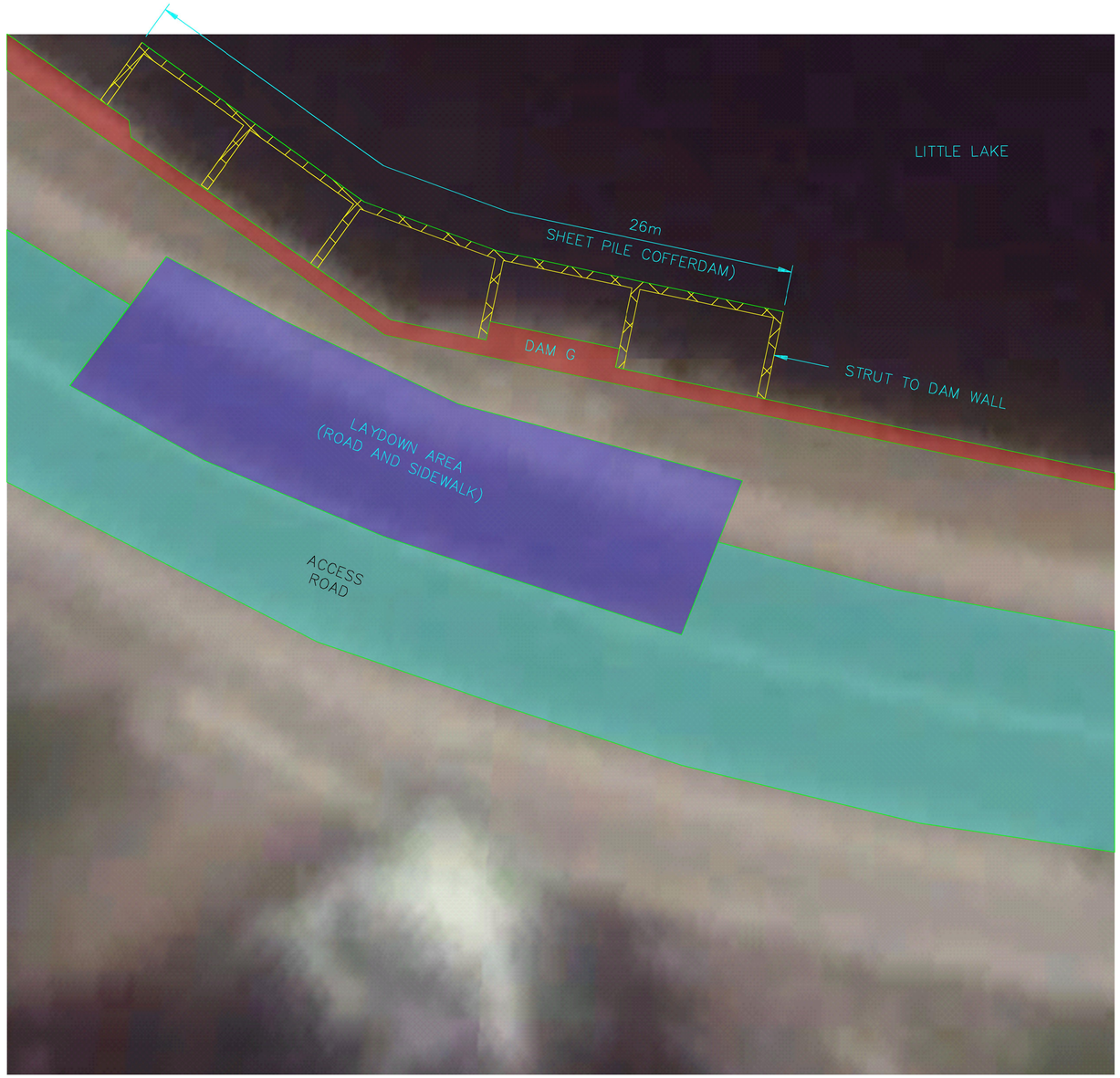
All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
Field TSS measured using AYXS TSS Meter
Field Turbidity measured using a HACH Turbidity Meter
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mg/L - milligrams per litre
NTU - Nephelometric Turbidity Units

UNDERLINE	Concentration greater than CCME WQG
SHADED	Concentration greater than DFO Guideline

[1] CCME Water Quality Guidelines for the Protection of Aquatic Life, Freshwater (1999, as updated).
[2] DFO Land Development Guidelines for the Protection of Aquatic Habitat (May 1992).

Appendix A

Constructibility Plans



SITE G – DAM G (LITTLE CHUTE)
CONSTRUCTIBILITY PLAN
1:100

AECOM

PROJECT

PORT SEVERN
AREA DAMS

CLIENT

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CONSULTANTS

REGISTRATION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

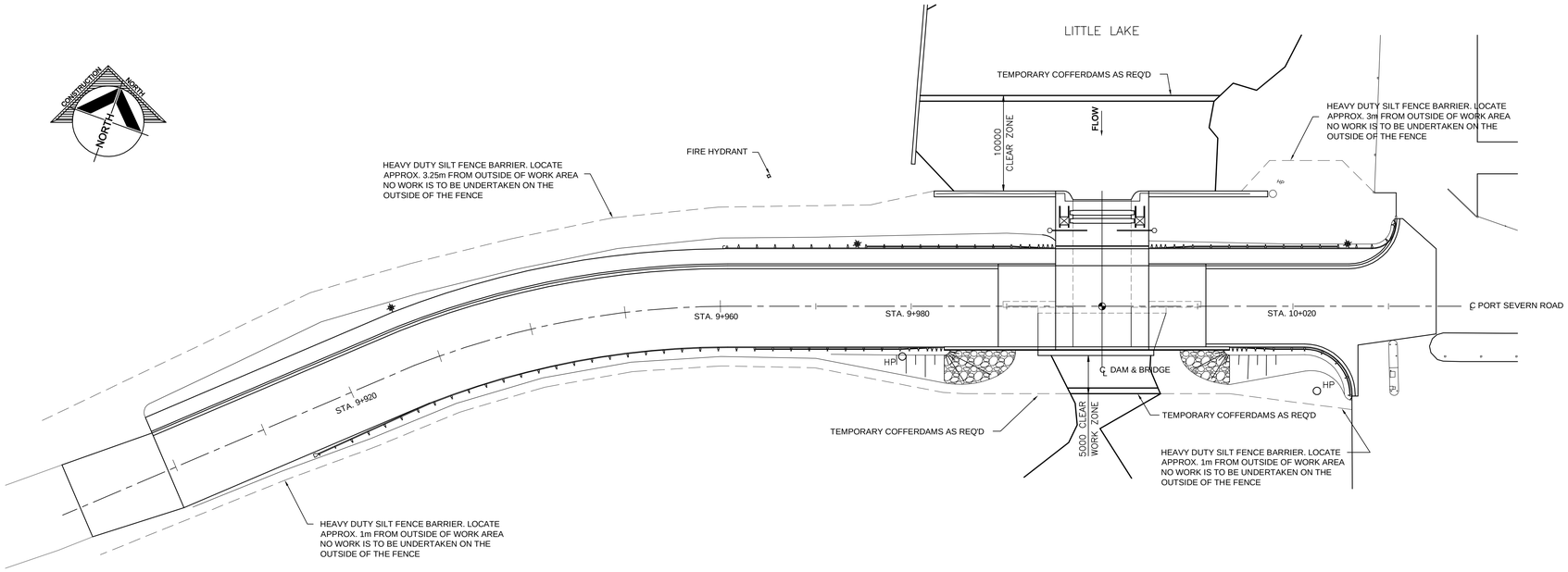
6052256

SHEET TITLE

SITE G - DAM G (LITTLE CHUTE)
CONSTRUCTIBILITY PLAN

SHEET NUMBER

C - SITE G



PLAN
SCALE = 1:250

LEGEND

EL	ELEVATION
TYP	TYPICAL
FIX	FIXED
SHLD	SHOULDER
ABUT	ABUTMENT
BRGS	BEARINGS
WL	WATER LEVEL
CB	CATCHBASIN
C/L	CENTRELINE
SIB	STEEL IRON BAR
HPBP	HYDRO POLE/BELL POLE
B	UNDERGROUND BELL
SWK	SIDEWALK

LEGEND

- HEAVY DUTY SILT FENCE BARRIER
- COFFERDAM
- HP HYDRO POLE

ENVIRONMENTAL PROTECTION NOTES

GENERAL NOTES

1. NO IN WATER WORK SHALL BE COMPLETED BETWEEN MARCH 15 AND JULY 15 OF ANY GIVEN CALENDAR YEAR.
2. INFORMATION PROVIDED ON THIS DRAWING IS A GENERAL ILLUSTRATION OF THE MINIMUM REQUIREMENT AND SHOULD NOT BE SOLELY RELIED ON FOR THE WATER CONTROL DESIGN. THE CONTRACTOR IS FULLY RESPONSIBLE TO PROVIDE ADEQUATE MEASURES TO MANAGE AND CONTROL WATER ON SITE.
3. NO MACHINERY WILL BE ALLOWED TO ENTER THE WATERBODY EXCEPT AS DIRECTED. MOVEMENT OF CONSTRUCTION EQUIPMENT IN THE VICINITY OF ANY WATERBODY WILL BE LIMITED TO THE MINIMUM REQUIRED FOR CONSTRUCTION. THE CONTRACTOR SHALL NOT CARRY OUT EQUIPMENT MAINTENANCE OR REFUELLING OR STORE FUEL CONTAINERS WITHIN 30 METERS OF ANY WATERBODY. THE CONTRACTOR WILL NOT STOCKPILE CONSTRUCTION DEBRIS OR EMPTY FUEL/PESTICIDE CONTAINERS WITHIN THE CONTRACT LIMITS. THE CONTRACTOR SHALL NOT CARRY OUT MAINTENANCE OR CLEANING OF EQUIPMENT IN SUCH A WAY AS TO PERMIT THE DISCHARGE OF SEDIMENT OR OTHER DELETERIOUS MATERIALS INTO THE WATERBODY.

TEMPORARY WATER CONTROL SYSTEM NOTES

1. ALL COFFERDAMS SHALL BE CONSTRUCTED OF CLEAN, NON-ERODIBLE MATERIALS SUCH AS, BUT NOT LIMITED TO: PEA GRAVEL BAGS, CLEAN GRAVEL AND PLASTIC SHEETING, PRECAST BARRIERS AND PLASTIC SHEETING AS WELL AS SHEET STEEL PILING.
2. CONTROL OF WATER DUE TO STORM EVENT RUNOFF AND TEMPORARY COFFERDAM SEEPAGE DURING CONSTRUCTION SHALL BE THE CONTRACTORS RESPONSIBILITY.
3. THE COFFERDAM MUST BE OF SUFFICIENT LENGTH AND HEIGHT SO AS TO COMPLETELY PREVENT ANY FLOWS FROM ENTERING THE SITE.
4. WATER LEVELS VARY DAILY: HIGH WATER = 180.50,
   LOW WATER = 180.20.

DEWATERING NOTES

1. ALL EXCAVATIONS AND SUBSEQUENT WORK SHALL BE UNDERTAKEN IN THE DRY. GROUNDWATER FLOW AND SURFACE FLOW ENTERING ANY EXCAVATION SHALL BE REMOVED FROM THE EXCAVATIONS.
2. SEDIMENT LADEN DEWATERING DISCHARGE SHALL BE PUMPED TO A SETTLING BASIN WELL AWAY FROM THE WATERBODY AND ALLOWED TO SETTLE AND/OR FILTER THROUGH THE RIPARIAN VEGETATION BEFORE RE-ENTERING THE WATERBODY DOWNSTREAM OF THE CONSTRUCTION AREA.

SEDIMENTATION CONTROL NOTES

1. A SEDIMENT CONTROL DEVICE SHALL BE INSTALLED DOWNSTREAM OF THE SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION AND REMAIN IN PLACE UNTIL WORK IS COMPLETED. THE ACCUMULATED SEDIMENTS SHALL BE PUMPED OUT PRIOR TO REMOVAL OF THE TRAP.
2. ALL SEDIMENTATION CONTROLS TO BE INSTALLED PRIOR TO EXECUTING ANY WORK AND SHALL BE INSPECTED DAILY AND REPAIRED/REPLACED AS NECESSARY AND ARE TO REMAIN IN PLACE UNTIL SUCH TIME AS RE-VEGETATIVE MEASURES HAVE GERMINATED AND TAKEN HOLD UNLESS OTHERWISE STATED.
3. THE CONTRACTOR SHALL CONTROL ALL CONSTRUCTION WORK SO AS TO NOT ALLOW SEDIMENT OR OTHER DELETERIOUS MATERIAL TO ENTER THE WATERBODY. NO WASTE OR SURPLUS ORGANIC MATERIALS, INCLUDING TOPSOIL IS TO BE STORED OR DISPOSED OF WITHIN 30 METERS OF ANY WATERBODY. RUN-OFF FROM EXCAVATIONS WILL NOT BE PERMITTED TO DRAIN DIRECTLY INTO WATERBODIES BUT SHALL BE DIFFUSED ONTO VEGETATIVE AREAS A MINIMUM OF 30 METERS FROM THE WATERBODY. WHERE THIS MEASURE IS NOT SUFFICIENT OR FEASIBLE TO CONTROL SEDIMENT ENTERING THE WATERBODY, SEDIMENT TRAPS OR GEOTEXTILE COVERAGE WILL BE REQUIRED.

CONTINGENCY PLANNING

1. THE CONTRACTOR SHALL MONITOR THE WEATHER FORECASTS.
2. WORK IN THE FLOODPLAIN SHALL BE SUSPENDED AND THE WORK AREA STABILIZED WHEN THERE IS A HIGH PROBABILITY OF A CONVECTIVE RAINFALL EVENT.
3. THE CONTRACTOR SHALL PROVIDE SUFFICIENT BACKUP LABOUR, EQUIPMENT AND MATERIALS TO ENSURE UNINTERRUPTED TRANSFER OF STORM EVENT RUNOFF AND TEMPORARY COFFERDAM SEEPAGE DURING CONSTRUCTION.

SITE RESTORATION NOTES

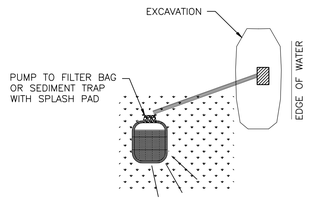
1. ALL DISTURBED AREAS, AS A RESULT OF CONSTRUCTION OPERATIONS SHALL BE RESTORED WITH TOPSOIL, SEED AND EROSION CONTROL BLANKET IN ACCORDANCE WITH OPSS 802 AND 804.
2. ROCK PROTECTION ON EMBANKMENTS SHALL BE PLACED ON GEOTEXTILE FILTER FABRIC (CLASS II NON-WOVEN) AND SHALL HAVE A UNIFORM FINISHED SURFACE.

SPECIES AT RISK

1. CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH KNOWN SPECIES AT RISK NATIVE TO THE AREA..
2. SPECIES AT RISK FOUND ON THE SITE SHALL NOT BE DISTURBED BY THE CONTRACTOR. NOTIFY CONTRACT MANAGER AND OBSERVE ALL REQUIREMENTS IN CONTRACT SPECIFIACTIONS.

INVASIVE SPICIES

1. CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH KNOWN INVASIVE SPECIES IN THE AREA..
2. INVASIVE SPECIES SHALL BE CONTAINED AND EUTHANIZED BY THE CONTRACTOR. NOTIFY CONTRACT MANAGER OF THE ENCOUNTERS.



DISCHARGE FROM DEWATERING MUST BE DISPERSED FROM TRAP THROUGH VEGETATED AREA MIN. 30m FROM WATERCOURSE

SCHEMATIC DEWATERING
N.T.S.

APPLICABLE OPS DRAWINGS

219.130 HEAVY DUTY SILT FENCE BARRIER

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

Heritage Canals and Engineering Works
Heritage Conservation Directorate
Canaux historiques et travaux d'ingenierie
Direction de la conservation du patrimoine

Canadä

No.	Description	Dwn.By Des.Par	Date
1	ISSUED FOR REVIEW	J.W.	SEPT. 8,17
2	ISSUED FOR APPROVAL	J.W.	OCT. 11,17
3	ISSUED FOR TENDER	J.W.	OCT. 19,17

Revision / Révision

A Detail number / Numéro du détail
B Location dwg. number / Numéro sur dessin

Project title / Titre du projet

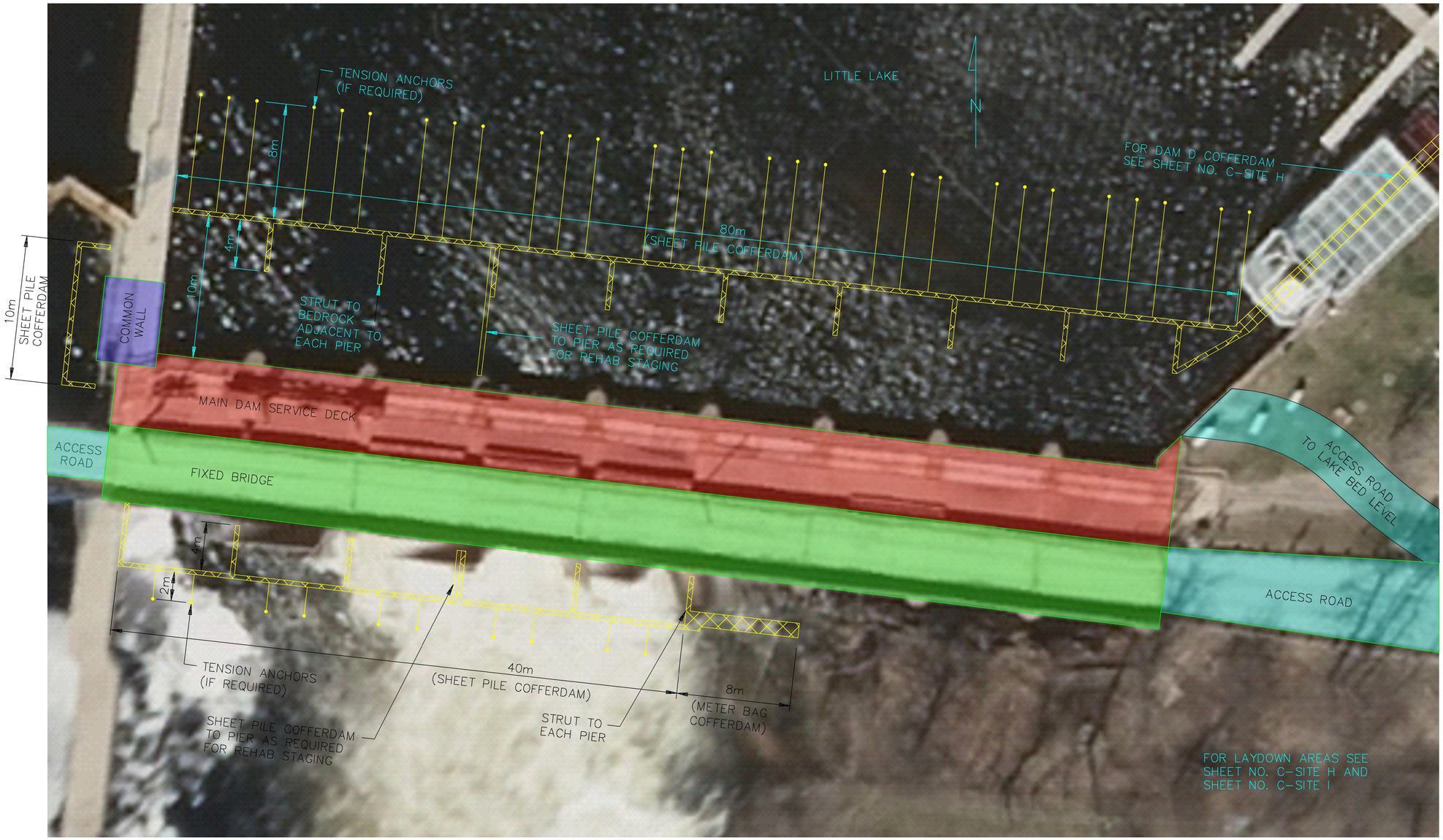
PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E

Drawing title / Titre du dessin

SITE I
DAM E (BAYVIEW)

ENVIRONMENTAL WORKS

Drawn by / Dessiné par: D. McDONALD
Designed by / Conçu par: T.SUN
Approved by / Approuvé par: J. WALLACE
Drawing Date / Date du dessin: 2017/08/15
Project manager / Administrateur de projet: J. WALLACE
File Number / Numéro du Dossier: PWL-6-39059
Project Number / Numéro du projet: R.076951.039
Drawing Number/ Numéro du Dessin: 314
Sheet / Feuille 19 of / du 20



SITE L – MAIN DAM
SITE M – FIXED BRIDGE
SITE K – COMMON WALL
CONSTRUCTIBILITY PLAN
1:150

AECOM

PROJECT

PORT SEVERN
AREA DAMS

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CONSULTANTS

REGISTRATION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

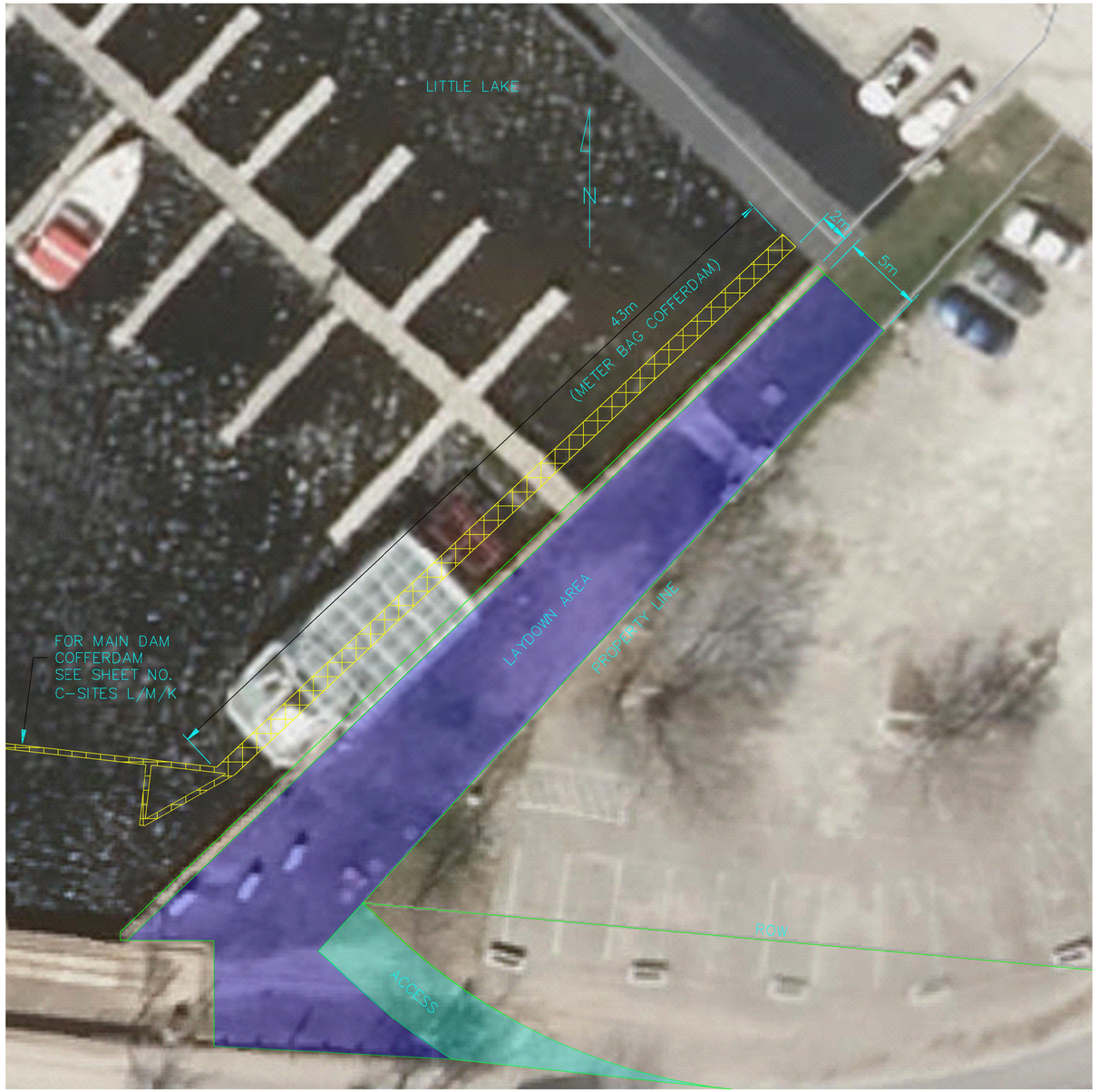
6052256

SHEET TITLE

SITE L, SITE M AND
SITE K - COMMOM WALL
CONSTRUCTIBILITY PLAN

SHEET NUMBER

C - SITES L/M/K



SITE H – DAM D
CONSTRUCTIBILITY PLAN
1:150

AECOM

PROJECT

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AREA DAMS

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AGENCY (PCA)

CONSULTANT

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CONSULTANTS

REGISTRATION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

6052256

SHEET TITLE

SITE H - DAM D
CONSTRUCTIBILITY PLAN

SHEET NUMBER

C - SITE H

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Project Management Initials: Designer: Checked: Approved: ANSI D 864mm x 559mm
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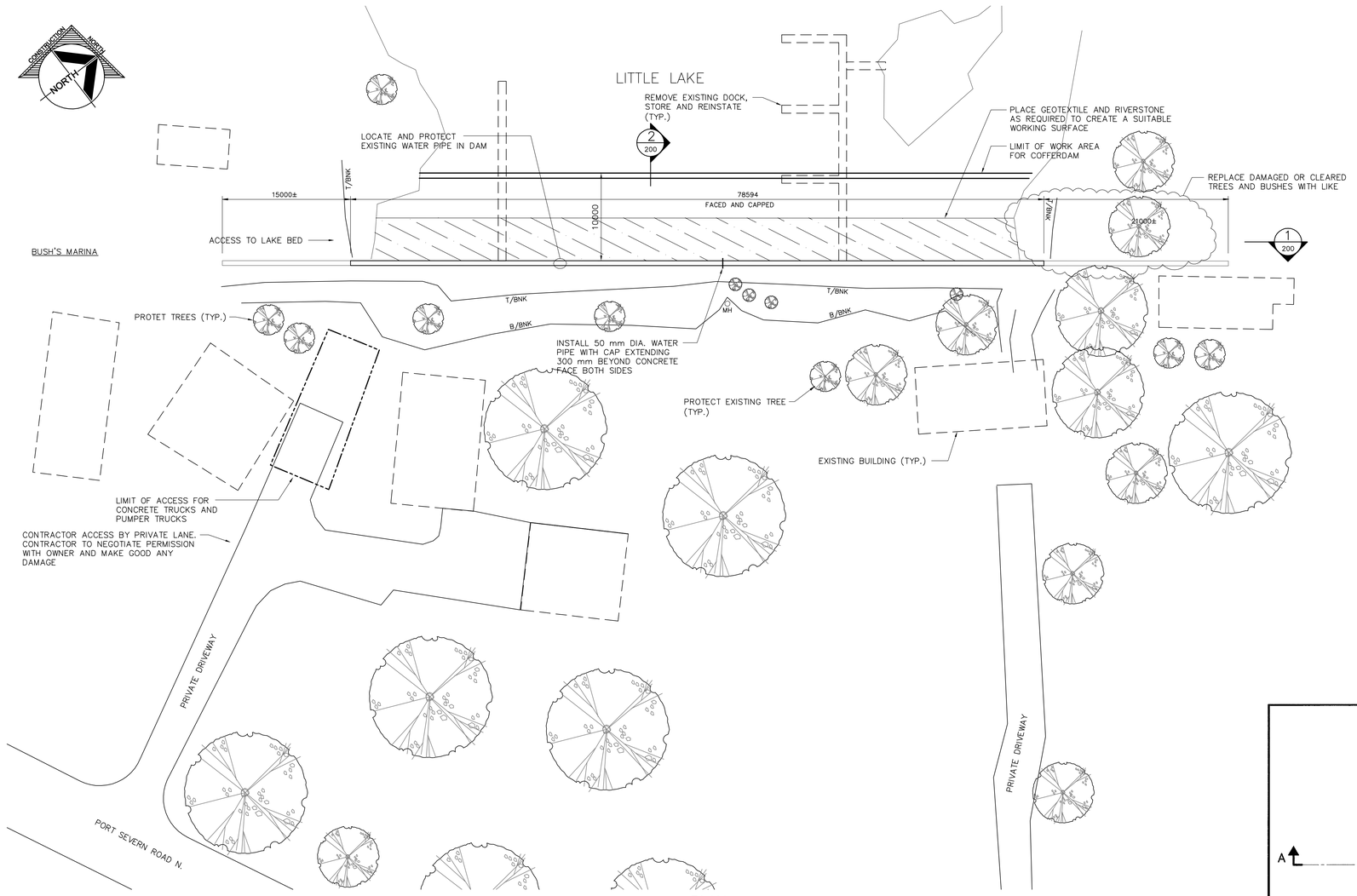

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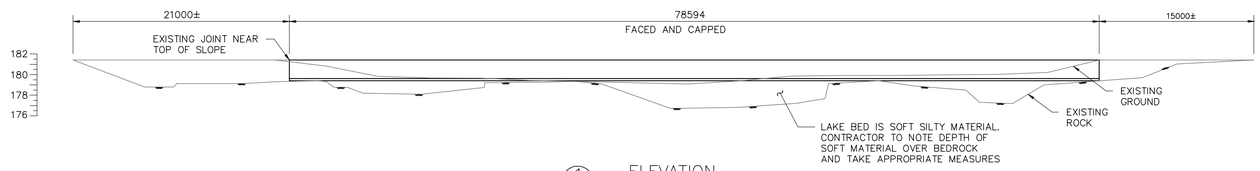
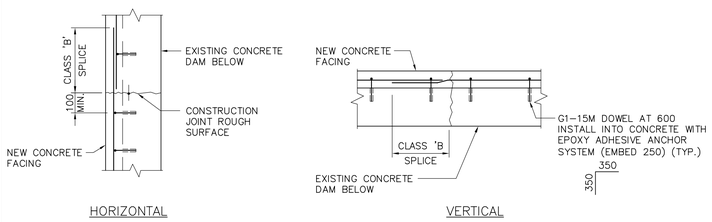
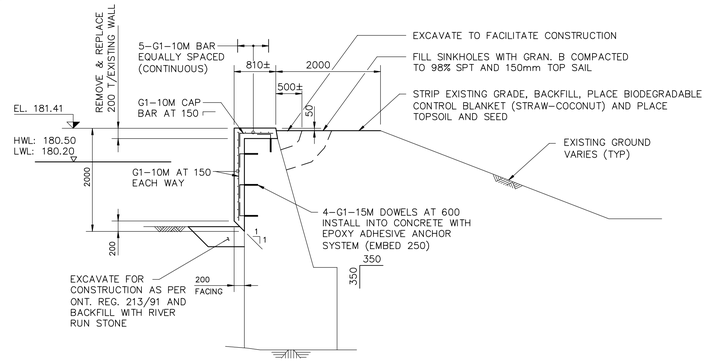


1/200 ELEVATION
SCALE 1:250



NOTE:
PROVIDE CONSTRUCTION JOINTS AT EXISTING JOINT LOCATIONS.

CONSTRUCTION JOINT IN WALLS
N.T.S.



2/200 DAM SECTION
SCALE 1:50

GENERAL NOTES

1. SPECIFICATIONS:
   - ONTARIO PROVINCIAL STANDARD SPECIFICATIONS, DIVISION 9
   - CANADIAN HIGHWAY BRIDGE DESIGN CODE, CAN/CSA-S6-14
   - CANADIAN DAM ASSOCIATION TECHNICAL BULLETINS
2. LIVE LOAD: 4.8 kPa.
3. CLASS OF CONCRETE:
   - 35 MPa EXPOSURE CLASS C-1
4. REINFORCING STEEL:
   - ALL REINFORCING STEEL SHALL BE GLASS FIBRE REINFORCED POLYMER (GFRP) GRADE 1, DENOTED BY THE PREFIX 'G'.
   - TENSION LAP SPLICES SHALL BE CLASS B.
   - BAR HOOKS SHALL HAVE STD. HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS WHILE STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS PER THE RSIC MANUAL.
5. CLEAR COVER TO REINFORCING STEEL:
   - 70±20
6. BACKFILL:
   - BACKFILL SHALL NOT BE PLACED ADJACENT TO THE DAM UNTIL THE CONCRETE HAS REACHED 75% OF ITS DESIGN STRENGTH.
7. ALL EXPOSED CONCRETE EDGES TO HAVE 20mm CHAMFER UNLESS NOTED OTHERWISE.
8. ACCESS TO SITE IS AS PER AGREEMENTS WITH HOME OWNERS AND AS INDICATED.
9. COMPLETE ASSESSMENT REPORT ON CONDITION OF DOCKS PRIOR TO REMOVALS.
10. WATER LEVEL VARIES ON DAILY BASIS.
11. EPOXY ADHESIVE ANCHOR SYSTEM TO BE CAPABLE OF DEVELOPING A FACTORED TENSILE RESISTANCE OF 60 kN ON A 15M BAR EMBEDDED 250 mm INTO 30 MPa CONCRETE.
12. REFER TO DRAWING 101 FOR ENVIRONEMTAL PROTECTION NOTES.

NOTES TO CONTRACTOR

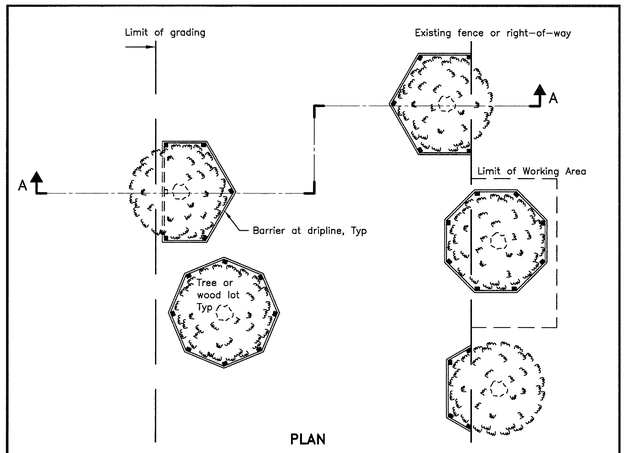
1. LOCATE AND PROTECT EXISTING WATER SUPPLY LINES PENETRATING THE DAM WALL.
2. LOCATE THE CRACK THAT IS CAUSING THE CURRENT LEAKAGE AT MANHOLE AND INSTALL 50 mm DIA. WATER PIPE IN DAM AT THIS LOCATION.

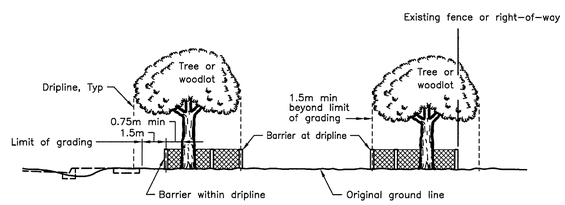
APPLICABLE OPSD DRAWINGS

OPSD 220.010 BARRIER FOR TREE PROTECTION

LEGEND

EXISTING TREE





ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2007	Rev	0
BARRIER FOR TREE PROTECTION			
	OPSD 220.010		

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

Heritage Canals and Engineering Works
Heritage Conservation Directorate
Canaux historiques et travaux d'ingenierie
Direction de la conservation du patrimoine

Canadä

No.	Description	Dwn By Des.Par	Date
1	ISSUED FOR REVIEW	J.W.	SEPT. 8,17
2	ISSUED FOR APPROVAL	J.W.	OCT. 11,17
3	ISSUED FOR TENDER	J.W.	OCT. 19,17

Revision / Révision

A Detail number / Numéro du détail
B Location dwg. number / Numéro sur dessin

Project title / Titre du projet

PORT SEVERN AREA DAMS REHABILITATION OF DAMS A, C AND E

Drawing title / Titre du dessin

SITE G
DAM C

GENERAL ARRANGEMENT

Drawn by / Dessiné par	Designed by / Conçu par
D. McDONALD	T. SUN
Approved by / Approuvé par	Drawing Date / Date du dessin
J. WALLACE	2017/09/15

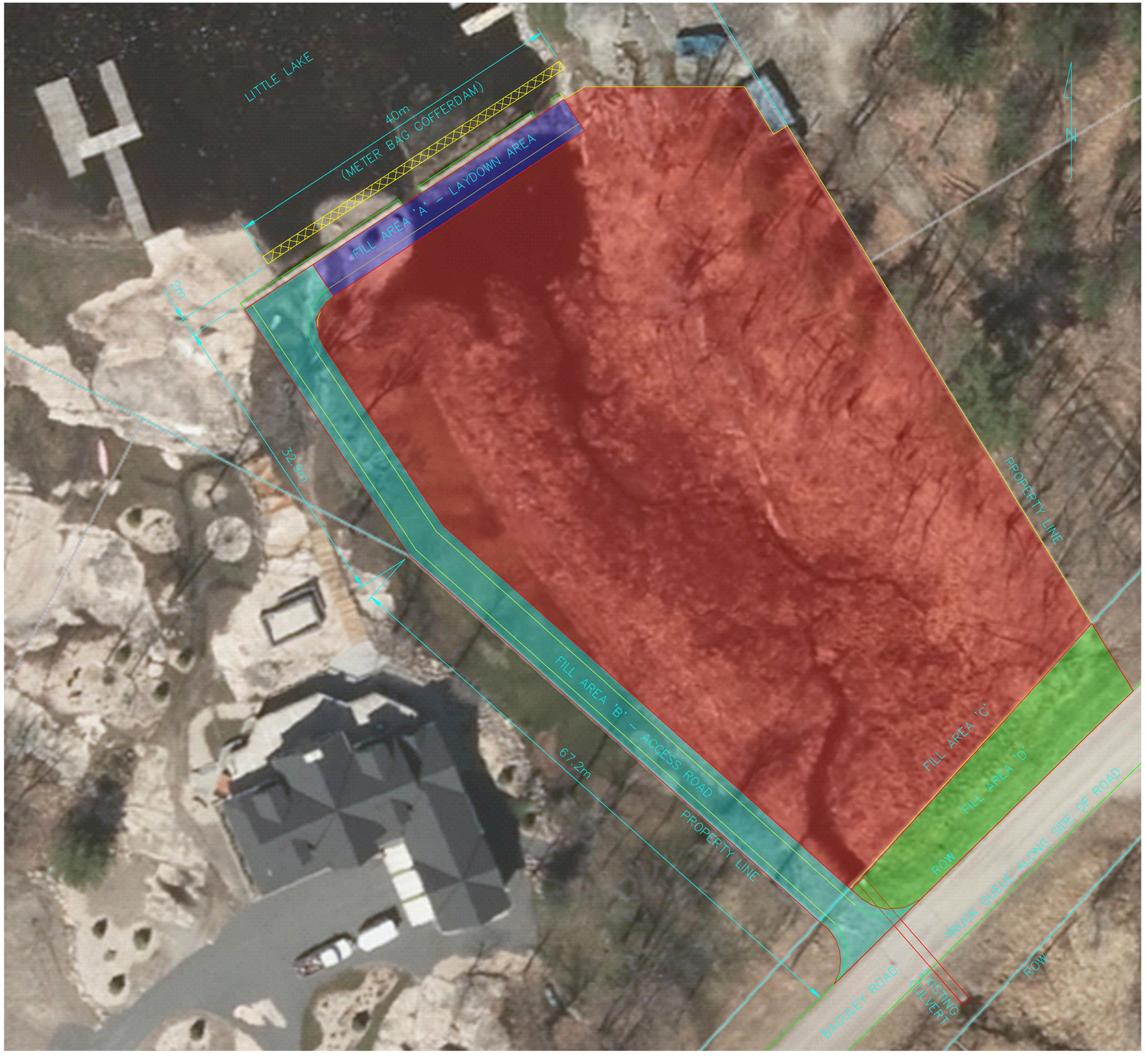
Project manager / Administrateur de projet: J. WALLACE

File Number / Numéro du Dossier: PWL-6-39059

Project Number / Numéro du projet: R.076951.039

Drawing Number/ Numéro du Dessin: 200

Sheet / Feuille 4 of / du 20



SITE F – DAM A
CONSTRUCTIBILITY PLAN
1:250

OPTION 1 INCLUDES:

COFFERDAM
FILL AREA 'A' – LAYDOWN AREA
FILL AREA 'B' – ACCESS ROAD
FILL AREA 'C'
FILL AREA 'D'
REMOVE CULVERT

OPTION 2 INCLUDES:

COFFERDAM
FILL AREA 'A' – LAYDOWN AREA
FILL AREA 'B' – ACCESS ROAD

OPTION 3 INCLUDES:

COFFERDAM
FILL AREA 'A' – LAYDOWN AREA
FILL AREA 'B' – ACCESS ROAD
FILL AREA 'C'

AECOM

PROJECT

PORT SEVERN
AREA DAMS

CLIENT

PARKS CANADA
AGENCY (PCA)

CONSULTANT

AECOM Canada Ltd.
300 Water Street
Whitby, Ontario, Canada
905.668.4021 tel 905.571.1395 fax
www.aecom.com

CONSULTANTS

REGISTRATION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

6052256

SHEET TITLE

SITE F - DAM A
CONSTRUCTIBILITY PLAN

SHEET NUMBER

C - SITE F

Last saved by: MCDONALDD1(2017-03-05) Last Plotted: 2017-03-06
Filename: C:\USERS\MCDONALDD1\DOCUMENTS\60522156 PORT SEVERN\REPORTS\FEB 24 2017 CONCEPT REPORT WITH WORK AREAS\COFFERDAM APPENDIX\60522156 CONSTRUCTIBILITY DWGS.DWG
Project Management Initials: Designer: Checked: Approved: ANSI D 864mm x 559mm

Appendix B

Field Logs

* SUBMITTED SEDIMENT SAMPLE ONLY @ LOCATION 1 (SHALLOW) *

SHORELINE SAMPLE PS-G-SED-1

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** DAM "G"

Date: Dec / 12 /2017 **Sample ID:** (PS-G-SED-1) ~~+ (PS-G-SED-1D)~~

Time: 17:00 **Name:** Chris Rahmer/Zach Macmillan

Weather: SNOWING, -9

Photo Number: 8, 9

Water Depth: 4" 0.10m

Current Speed: NONE

GPS 79.7303864 **E/W** **Datum: NAD** 83 **Zone:** 17N

44.8038854 **N** **Error:** ~1.78

Sediment Depth: 10" 0.25m

Number of Ponar Drops: USED CORER

Volume Recovered:

PHYSICAL OBSERVATIONS:

Grain size: SILTY SAND (FINE) W TRACE GRAVEL (sand, silt, clay proportions)

Density: SOFT (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: D. BROWN

Bio Structures: SHELLS, TUBES/ROOTS (shells, tubes, plants, etc.)

Observations: N/A (e.g. layering, colour changes)

Presence of Debris: NONE (describe)

Odour: NATURAL, DECAYING ORGANICS (odourless, chemical, decay, natural)

Sheen: NO

* COULD NOT OBTAIN DEEP SEDIMENT SAMPLE, REFUSAL @ 10" INTO SEDIMENT + HOLE KEPT FILLING IN.

SHORE WAS FROZEN ON LAND, BUT THAWED JUST IN THE WATER/SHORE (IN ~ 4" OF WATER). WE WERE ABLE TO AUGER ~10" INTO THE SEDIMENT TO COLLECT THE SHALLOW SAMPLE, BUT COULD NOT GO ANY DEEPER FOR REASONS ABOVE (*).

(SURF W) / (SEDIMENT) / (SURF W DISTURBED)

PS-G-SW-2 / PS-G-SED-2 / PS-G-SW-2D

12:40 / 13:30 / 13:35

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** DAM "G"

Date: Dec / 12 /2017 **Sample ID:** (SEE ABOVE)

Time: 12:40 **Name:** Chris Rahmer/Zach Macmillan

Weather: SNOWING, -7°C

Photo Number: DAM G; 3(SURF W), 2

Water Depth: ~8" OF WATER UNTIL BOTTOM (0.20m)

Current Speed: NONE

GPS 79.7302411 E W **Datum:** NAD 83 **Zone:** 17 N

44.8037549° N **Error:** ~2.24m

Sediment Depth: N/A - COULD NOT TELL - ~10"

Number of Ponar Drops: 4 (SAMPLED USING CORER)

Volume Recovered: 1/2 OF A LARGE ZIPLOC BAG

PHYSICAL OBSERVATIONS:

Grain size: FINE ~~SAND/SILT MIXTURE~~, SILTY SAND TRACE GRAVEL

(sand, silt, clay proportions)

Density: SOFT

(cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: D. BROWN

Bio Structures: SHELLS/PLANTS (LEAVES)/TWIGS

(shells, tubes, plants, etc.)

Observations: N/A

(e.g. layering, colour changes)

Presence of Debris: NO

(describe)

Odour: NATURAL/DECAYING ORGANICS

(odourless, chemical, decay, natural)

Sheen: NO

*PS-G-SW-2
- MINOR DISTURBANCE BREAKING THROUGH ~1.5" OF ICE

SURFACE WATER NOTES

PRE DIST; 8.74 NTU (TURB), 2 mg/L (TSS) | POST DIST; 833 NTU, 450 mg/L

(SURF W) / (SEDIMENT) / (SURF W DISTURBED)

PS - G - SW - 3 / PS - G - SED - 3 / PS - G - SW - 3D

15:00 / 15:50 / 16:00

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** DAM "G"

Date: Dec / 12 /2017 **Sample ID:** (SEE TOP)

Time: 13:35 **Name:** Chris Rahmer/Zach Macmillan

Weather: SNOWING, -8°C

Photo Number: DAM "G" - ~~32 (SURF W)~~ 5 (SAMPLING LOCATION), 6

Water Depth: 0.70 m

Current Speed: NONE - FROZE OVER (SURFACE) STILL

GPS 79.7300839 ~~E~~ W **Datum:** NAD 83 **Zone:** 17N

44.8035030 N **Error:** ~ 1.92

Sediment Depth: NA - COULD NOT TELL - ~ 10" (LENGTH OF CORE + 2") (0.25m)

Number of Ponar Drops: 4 (SAMPLED USING CORER)

Volume Recovered: 2/5 OF A LARGE ZIPLOCK

PHYSICAL OBSERVATIONS:

Grain size: SILTY SAND (FINE), TRACE GRAVEL
(sand, silt, clay proportions)

Density: SOFT
(cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: D. BROWN

Bio Structures: SHELLS,
(shells, tubes, plants, etc.)

Observations: N/A
(e.g. layering, colour changes)

Presence of Debris: WOOD DEBRIS
(describe)

Odour: NATURAL, DECAYING VEGETATION
(odourless, chemical, decay, natural)

Sheen: NO

* MINOR DIST. BREAKING THROUGH ~ 1" OF SURFICIAL ICE

SW NOTES

PRE DIST; 3.83 NTU TURB, 2 mg/L TSS | POST DIST; > INSTRUMENT TURB, > 30000 mg/L TSS

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** DAM "G"

Date: Dec / 13 /2017 **Sample ID:** PS - G - SED - 4

Time: 08:00 **Name:** Chris Rahmer/Zach Macmillan

Weather: ~17°C

Photo Number: 10 - 116

Water Depth: ~2.5m

Current Speed:

GPS 79.7297989 ~~E~~ W **Datum:** NAD 83 **Zone:** 17N

44.8036199 N **Error:** ~2.31

Sediment Depth: —

Number of Ponar Drops: 4

Volume Recovered: Ø - ONLY ABLE TO PULL UP MUSCLES + CRABS, NO SEDIMENT RECOVERED

PHYSICAL OBSERVATIONS:

Grain size: N/A
(sand, silt, clay proportions)

Density: N/A
(cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: N/A

Bio Structures: SHELLS
(shells, tubes, plants, etc.)

Observations: N/A
(e.g. layering, colour changes)

Presence of Debris: N/A
(describe)

Odour: N/A
(odourless, chemical, decay, natural)

Sheen: NO

★ COULD NOT OBTAIN SAMPLE ★

- NO ICE COVERAGE @ LOCATION, USED PONAR, BUT ONLY PULLED UP OLD SHELLS, TWIGS, AND CRABS.
- WATER FLOWING OUT OTHER SIDE OF DAM. DID NOT USE GO-PRO @ LOCATION.

* SUBMITTED SEDIMENT SAMPLE @ LOCATION ONLY *

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** DAM "G"

Date: Dec / 13 /2017 **Sample ID:** PS-G-SED-5

Time: 9:30 **Name:** Chris Rahmer/Zach Macmillan

Weather: -17 °C

Photo Number: 11, 12

Water Depth: 2.2 m

Current Speed:

GPS 79.7295357 ~~E~~ W **Datum: NAD** 83 **Zone:** 17N

44.8035421 **N** **Error:** ~2.36

Sediment Depth: 10" (0.25 m)

Number of Ponar Drops: USED CORER

Volume Recovered: 1/2 LARGE ZIPLOC

PHYSICAL OBSERVATIONS:

Grain size: SANDY SILT W TRACE GRAVEL (sand, silt, clay proportions)

Density: FINE, SOFT (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: D. BROWN.

Bio Structures: SHELLS (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: NONE (describe)

Odour: NATURAL, DECAYING ORGANIC (odourless, chemical, decay, natural)

Sheen: NONE

- USED CORER TO BREAK THROUGH ICE SURFACE.
- SWITCHED CORER FOR AUGER / SEDIMENT SAMPLING ATTACHMENT + COLLECTED SAMPLE USING THAT (SO WE DID NOT NEED TO MAKE HOLE BIGGER TO USE PONAR)

(SW) PS-G-SW-6 16:15 / (SEDIMENT) PS-G-SED-6 16:40 / (SURF W DIST) PS-G-SW-6D 16:45

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** DAM "G"

Date: Dec / 12 /2017 **Sample ID:** (SEE ABOVE)

Time: 16:15 **Name:** Chris Rahmer/Zach Macmillan

Weather: SNOWING, -10°C

Photo Number: 7 (SAMPLE LOCATION), 6

Water Depth: ~1m

Current Speed: —

GPS 79.7293710 W **Datum:** NAD 83 **Zone:** 17N

44.8034799 N **Error:** ~2.13

Sediment Depth: NA - COULD NOT TELL ~10" (0.25m)

Number of Ponar Drops: 5 (SAMPLED USING CORER)

Volume Recovered: 2/5 OF A LARGE ZIPLOC

PHYSICAL OBSERVATIONS:

Grain size: FINE, SILTY SAND W TRACE GRAVEL (sand, silt, clay proportions)

Density: SOFT (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: D. BROWN

Bio Structures: SHELLS, PLANTS (shells, tubes, plants, etc.)

Observations: N/A (e.g. layering, colour changes)

Presence of Debris: WOOD DEBRIS (describe)

Odour: NATURAL, DECAYING ORGANICS (odourless, chemical, decay, natural)

Sheen: NO

SW NOTES:

PRE DIST: 6 mg/L TSS, 1.26 NTU TURB | POST DIST: 682 NTU TURB, 342 mg/L TSS

Hole Attempts.	Split Spoon Retrieval
1	1) 25" ice, 2.1 m water — advanced 2' (Refusal) - 12" recovery 2) advanced ~2' (refusal) - 0-4" organic layer (silty sand (shells). 4-10" grey sand fine 10"-14" grey silty clay. 3) refusal @ 2' - 12" recovery

FIELD LOG SHEET

G101

Project: 651954 - Trent Severn Waterways

Site: Port Severn **Sub-Area:** Dam G

Date: Feb/ 7 /2018 **Name:** Jamie Cahill/Renee Hum-Hsiao

Time: 3:00- **Sediment Sample ID:** @ 4:15 SPS-G-SED-101S +OC = 7 bottles

Weather: -8°C, sunny. **SW Sample ID (Pre-Disruption):** PS-G-SW-101

Photo Number: TBD **SW Sample ID (Post-Disruption):** PS-G-SW-101D.

Water Depth: 2.1 m

Current Speed: — Frozen

* Grain size sample is a mixture of sand layer & silty clay layer (composite as directed).

GPS 0600410 **E** **Datum:** NAD 83 **Zone:** 17

496961 **N** **Error:** 3 m

Sediment Sampling Depth/Range: 0-0.5m (Refusal) → no deep sample

Number of Retrievals (combined for sample): 3

Total Volume Recovered: 1 x 250 3/4 full, 1 x 250 1/2 full, 3 x 100ml 2/3 full — 2x Sq. vials + 1 500g. bag for G.S.

PHYSICAL OBSERVATIONS:

Grain size: 0-10" fine sand, 10"-12" silty clay (sand, silt, clay proportions)

Density: sand layer - non-cohesive / silty clay layer - cohesive (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: grey

Bio Structures: shells. (shells, tubes, plants, etc.)

Observations: 1st split spoon: 0-10" fine sand, 10-12" silty clay. (e.g. layering, colour changes)

Presence of Debris: (describe)

Odour: decay / natural (odourless, chemical, decay, natural)

Sheen: none.

SURFACE WATER FIELD MEASUREMENTS:

SW Pre TSS: 1

SW Pre NTU: 0.74

SW Post TSS: —

SW Post NTU: —

Hole Attempts	Split Spoon Retrieval
1	Refusal (16" in) 2.1 m water
2	Advanced 0.5m (Refusal) -1.7m water; 14" rec.
3	Advanced 0.6m, 12" recovery
3	9" recovery

↑N
dock

dock

FIELD LOG SHEET

G-102

Project: 651954 - Trent Severn Waterways

Site: Port Severn **Sub-Area:** Dam G

Date: Feb/ 8 /2018 **Name:** Jamie Cahill/Renee Hum-Hsiao

Time: 8:30-10:00am **Sediment Sample ID:** PS-G-SED-1005 @9:30am = 5 bottles (limited recovery)

Weather: -15°C, overcast **SW Sample ID (Pre-Disruption):** PS-G-SW-1010

Photo Number: TBD. **SW Sample ID (Post-Disruption):** PS-G-SW-1020

Water Depth: 1.7m

Current Speed: — (Frozen)

GPS 0600503 **E** **Datum:** NAD 83 **Zone:** 17T

4961933 **N** **Error:** +/- 3m

Sediment Sampling Depth/Range: 0-0.6 (then refusal on rock)

Number of Retrievals (combined for sample): 3

Total Volume Recovered: 1x250 (3/4 full) 1x250 (1/2 full) 1x100mL (full) 3x vials (5g) + 1 x 5kg bag for GS.

PHYSICAL OBSERVATIONS:

Grain size: (composite) silty clay, trace to some sand (sand, silt, clay proportions)

Density: cohesive, soft (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: grey/brown.

Bio Structures: wood, shells, roots (seaweed) (shells, tubes, plants, etc.)

Observations: ~1" silt & organics, shells; ~10" silty clay; ~1" sand; then rock (bedrock) (e.g. layering, colour changes)

Presence of Debris: (describe)

Odour: decay/natural (odourless, chemical, decay, natural)

Sheen: —

SURFACE WATER FIELD MEASUREMENTS:

SW Pre TSS 3 SW Pre NTU 0.95

SW Post TSS 112 SW Post NTU 57.4

SURFACE WATER / SEDIMENT / SURFACE WATER DISTURBED

PS-E-SW-2 / PS-E-SED-2 / PS-E-SW-2D

11:10 / COULD NOT COLLECT / 13:00

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** DAM E

Date: Dec / 13 /2017 **Sample ID:** ~~PS-E~~ SEE TOP

Time: 11:00 **Name:** Chris Rahmer/Zach Macmillan

Weather: ~17°C, SUNNY

Photo Number: 1-6

Water Depth: 2.5m

Current Speed: N/A - NOT MOVING

GPS 79.7225554 **E** **Datum: NAD** 83 **Zone:** 17N

44.6034770 **N** **Error:** ~2.16

Sediment Depth: —

Number of Ponar Drops: 4

Volume Recovered: Ø

— SEE BACK FOR ADDITIONAL DETAILS

PHYSICAL OBSERVATIONS:

Grain size: N/A (sand, silt, clay proportions)

Density: N/A (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: N/A

Bio Structures: SHELLS/PLANTS (shells, tubes, plants, etc.)

Observations: N/A (e.g. layering, colour changes)

Presence of Debris: N/A (describe)

Odour: ~~NATURAL~~ / N/A (odourless, chemical, decay, natural)

Sheen: NO

* MINOR DISTURBANCE BREAKING THROUGH ~2" OF ICE

SURFACE WATER NOTES

PRE DISTURBANCE, 4 mg/L TSS, 3.58 NTU TURBIDITY / POST DISTURB, 6 mg/L TSS, 7.50 ~~8.83~~ NTU TURB

PTO

- AREA COVERED W/ 2" OF ICE. USED CORER TOOL TO BREAK THROUGH. COLLECTED SW SAMPLE.

- MADE HOLE BIGGER W/ CORER, THEN DEPLOYED PONAR
  - ONLY MUSCLES, SHELLS + LEAVES IN PONAR UPON RETRIEVAL. COULD SEE BOTTOM OF RIVER, WHICH CONFIRMED FINDINGS (SHELLS).
- SINCE WE COULD SEE BOTTOM, WE KNEW WE HAD ENOUGH LENGTH WITH AUGER/CORER TO OBTAIN SAMPLE.
  - BOTTOM HARD, COULDN'T COLLECT USING CORER.
- WE THEN STIRRED UP BOTTOM W/ CORER + COLLECTED DISTURBED SAMPLE.

GO - PRO - CONFIRMED ROCKY BOTTOM W/ LEAF + SHELL COVERAGE USING GO PRO. NO SEDIMENT TO COLLECT.

PS-E-SW-3 / PS-E-SED-3 / PS-E-SW-3D

SURF. WATER 12:00 / SEDIMENT / DISTURBED SW 13:30

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** DAM 'E'

Date: Dec / 13 /2017 **Sample ID:** SEE TOP

Time: SEE ABOVE **Name:** Chris Rahmer/Zach Macmillan

Weather: -17°C

Photo Number: 10 - 13

Water Depth: 2.5m

Current Speed: —

GPS 79.7225091 ~~E~~ W **Datum: NAD** 83 **Zone:** 17N

44.8034911 N **Error:** ~ 1.67

Sediment Depth: N/A

Number of Ponar Drops: 4

Volume Recovered: Ø

* SEE BACK FOR DETAILS. *

PHYSICAL OBSERVATIONS:

Grain size: N/A (sand, silt, clay proportions)

Density: N/A (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: N/A

Bio Structures: N/A (shells, tubes, plants, etc.)

Observations: N/A (e.g. layering, colour changes)

Presence of Debris: N/A (describe)

Odour: N/A (odourless, chemical, decay, natural)

Sheen: N/A

* MINOR DISTURBANCE BREAKING THROUGH ~ 2.5" OF ICE

PTO

SW NOTES;

PRE DISTURB: 2.43 NTU TURB, 8 mg/L TSS

POST DISTURB: 4.06 NTU TURB, 3 mg/L TSS

- BROKE THROUGH ~ 2.5" OF ICE W/ AUGER/CORER.

- COLLECTED SW SAMPLE.

- WATER TO DEEP TO USE AUGER / CORER TO COLLECT SEDIMENT SAMPLE.

- MADE HOLE BIGGER TO USE PONAR.
  - COULD NOT PULL ANYTHING UP USING PONAR (CLOSED + EMPTY, W/ CHUNKS OF ICE).

- BOUNCED PONAR OFF THE BOTTOM BEFORE COLLECTING DISTURBED SAMPLE.

GO-PRO - CAN SEE A HARD ROCKY BOTTOM, WITH LEAVES + SHELLS ON TOP. NO EVIDENCE OF SEDIMENT.

SURFACE WATER
PS - E - SW - 5
12:30

SEDIMENT
PS - E - SED - 5
CNS

SURFACE WATER DISTURBED
PS - E - SW - 5D
~~12:30~~ CNS

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** DAM E

Date: Dec / 13 /2017 **Sample ID:** SEE TOP

Time: 13:00 **Name:** Chris Rahmer/Zach Macmillan

Weather: ~17°C SUNNY

Photo Number: 14, 15

Water Depth:

Current Speed: N/A

GPS 79.7223259 E W **Datum: NAD** 83 **Zone:** 17N

44.8035126 N **Error:** ~1.91

Sediment Depth: N/A

Number of Ponar Drops: Ø

Volume Recovered: Ø

* SEE BACK FOR DETAILS *

PHYSICAL OBSERVATIONS:

Grain size: N/A
(sand, silt, clay proportions)

Density: N/A
(cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: N/A

Bio Structures: N/A
(shells, tubes, plants, etc.)

Observations: N/A
(e.g. layering, colour changes)

Presence of Debris: N/A
(describe)

Odour: N/A
(odourless, chemical, decay, natural)

Sheen: N/A

MINOR DISTURBANCE BREAKING THROUGH ~22" OF ICE

SURFACE WATER NOTES

PRE DISTURBANCE; 4.89 NTU, 5 mg/L
TURB TSS

POST DISTURB

SEE BACK FOR DETAILS

PTO

- USED CORER / AUGER TO PIERCE THROUGH ICE.
- COLLECTED SW SAMPLE.

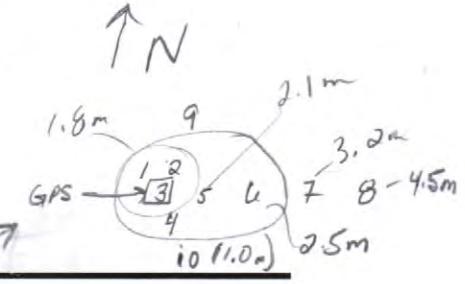
- STARTED USING CORER TO MAKE HOLE BIGGER FOR PONAR.

  - CONNECTIONS FOR RODS ON CORER WERE LOOSENING. NOT MEANT FOR BREAKING THROUGH ICE. WAS WORRIED ABOUT DAMAGING RENTED EQUIPMENT, AND SO STOPPED BANGING ON ICE TO TRY AND BREAK THROUGH

  - SO WE COULD NOT COLLECT SEDIMENT OR DISTURBED SURFACE WATER SAMPLES @ LOCATIONS 5.

- HOLE NOT LARGE ENOUGH TO USE GO-PRO EITHER.

Hole Attempts	Split Spoon Retrieval
=10 total	Refusal @ all
	See sketch for water depths →



FIELD LOG SHEET

E-101

Project: 651954 - Trent Severn Waterways

Site: Port Severn **Sub-Area:** Dam E

Date: Feb/ 7 /2018 **Name:** Jamie Cahill/Renee Hum-Hsiao

Time: 1:30 - 2:15 **Sediment Sample ID:** None - Refusal (rock @ all attempts.

Weather: -8°C, sunny. **SW Sample ID (Pre-Disruption):** PS-E-SW-101

Photo Number: 760 **SW Sample ID (Post-Disruption):** PS-E-SW-101D

Water Depth: Varied

Current Speed: — frozen.

GPS 0601017 E **Datum:** NAD 83 **Zone:** 17T

4961944 N **Error:** +/- 3m

Sediment Sampling Depth/Range: — Refusal

Number of Retrievals (combined for sample):

Total Volume Recovered: None

PHYSICAL OBSERVATIONS: NA.

Grain size: _____ (sand, silt, clay proportions)

Density: _____ (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: _____

Bio Structures: _____ (shells, tubes, plants, etc.)

Observations: _____ (e.g. layering, colour changes)

Presence of Debris: _____ (describe)

Odour: _____ (odourless, chemical, decay, natural)

Sheen: _____

SURFACE WATER FIELD MEASUREMENTS:

SW Pre TSS 1

SW Pre NTU 0.55

SW Post TSS —

SW Post NTU —

* Rock shelf that slopes east-west @ Dam E (west side @ E-101/102 locations)

Hole Attempts	Split Spoon Retrieval
= 5 total	Refusal @ all

↑ N

E-101
10 (1.0m)
11 (3.5m)
12 (3.0)
13 (3.0)
(2.5) 14 15 (3.0) } E-102

FIELD LOG SHEET

E-102

Project: 651954 - Trent Severn Waterways

Site: Port Severn **Sub-Area:** Dam E

Date: Feb/ 7 /2018 **Name:** Jamie Cahill/Renee Hum-Hsiao

Time: 2:15-2:50pm **Sediment Sample ID:** None - Refusal @ all attempts

Weather: -8°C, Sunny **SW Sample ID (Pre-Disruption):** PS-E-SW-102

Photo Number: TBD **SW Sample ID (Post-Disruption):** PS-E-SW-102D

Water Depth: Various

Current Speed: — Frozen

GPS 0601019 **E** **Datum:** NAD 83 **Zone:** 17T

4961924 **N** **Error:** +/- 3m

Sediment Sampling Depth/Range: — Refusal

Number of Retrievals (combined for sample): —

Total Volume Recovered: None

PHYSICAL OBSERVATIONS: NA.

Grain size: _____ (sand, silt, clay proportions)

Density: _____ (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: _____

Bio Structures: _____ (shells, tubes, plants, etc.)

Observations: _____ (e.g. layering, colour changes)

Presence of Debris: _____ (describe)

Odour: _____ (odourless, chemical, decay, natural)

Sheen: _____

SURFACE WATER FIELD MEASUREMENTS:

SW Pre TSS: /

SW Pre NTU: 0.74

SW Post TSS: —

SW Post NTU: —

Hole Attempt #	Split Spoon Retrieval Distance advanced / length recovered
1	Refusal (filmed) 15" ice - 1.2 m water
2	Refusal - 15" ice, 1.1 m water
3	Refusal (15" ice, 1.6 m water)
4	→ 9 retrievals (6-8" ~~recovery~~ each SS) → filmed.

N ↑

3 (4)
2 1

E-103S

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: Port Severn **Sub-Area:** Dam E

Date: Feb/ 7 /2018 **Name:** Jamie Cahill/Renee Hum-Hsiao

Time: 9:00 - 11:30 **Sediment Sample ID:** @ 11:15 am PS-E-SED-103S.

Weather: -11°C, Snowing **SW Sample ID (Pre-Disruption):** PS-E-~~SED~~ SW-103 + dup 10335 (@OC for both)

Photo Number: TBD **SW Sample ID (Post-Disruption):** PS-E-SW-103D.

Water Depth: 1.2m (15" ice) / 15" ice 1.5m water

Current Speed: — Frozen

GPS 0601040 E **Datum:** NAD 83 **Zone:** 17 T

4961950 N **Error:** +/- 3m

Sediment Sampling Depth/Range: ~0 - 0.2m

Number of Retrievals (combined for sample): 9 (6 to attempt #4)

Total Volume Recovered: 2x 250mL (3/4 full) 2x 100mL (1/2 full)
2x 250mL (1/2 full) 4 x 5g vials
2x 100 mL (full) ① ~500g bag for GS/TCLP

*Ken advised no TCLP @ Dam E rqd since only 1 sample location.

PHYSICAL OBSERVATIONS:

Grain size: sand, some silt + gravel, some silty clay inclusions (sand, silt, clay proportions)

Density: non-cohesive (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: dark grey / brown, grey - sand, brown - silty clay

Bio Structures: shells, wood fibres (shells, tubes, plants, etc.)

Observations: (e.g. layering, colour changes)

Presence of Debris: (describe)

Odour: decay / natural (odourless, chemical, decay, natural)

Sheen: none

SURFACE WATER FIELD MEASUREMENTS:

SW Pre TSS 2 SW Pre NTU 0.62

SW Post TSS 17 SW Post NTU 8.61

PTO

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS-D-SED-1

Time: 9:30 **Name:** Chris Rahmer/Zach Macmillan

Weather: -20°C

Photo Number: 1-2, 8

Water Depth: 3.0 m

Current Speed: N/A (WATER NOT FLOWING @ LOCATION).

GPS 79.7205741 E W **Datum:** NAD 83 **Zone:** 17N

44.8042961 N **Error:** ~1.51

Sediment Depth: —

Number of Ponar Drops: 3

Volume Recovered: Ø

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: SHELLS / ROCKS - SEE PHOTO (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe) —

Odour: — (odourless, chemical, decay, natural)

Sheen:

COULD NOT PULL UP ANYTHING W/ THE PONAR. AFTER 3 ATTEMPTS, CHRIS LAID ON HIS STOMACH W/ THE CORER. HE WAS ABLE TO PULL UP SHELLS + ROCKS W/ THE AUGER ATTACHMENT - ATTEMPTED TO VIEW BOTTOM W/ GO PRO

GO - PRO - FOOTAGE SHOWED ROCKY BOTTOM W SHELLS + MOSSES @ PONAR ATTEMPT LOCATION. UNCLEAR EXACTLY WHAT LIES ON THE FLOOR FURTHER OUT (DUE TO MOSSY LAYER), BUT SEDIMENT MAY BE PRESENT FURTHER AWAY FROM DOCK/SHORE WALL.

PTO

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS - D - SED - 2

Time: 9:55 **Name:** Chris Rahmer/Zach Macmillan

Weather: ~20°C, OVERCAST

Photo Number: 3-5

Water Depth: 4.3 m

Current Speed: — (NOT DETECTABLE)

GPS 79.7205065 ~~E~~ W **Datum:** NAD 83 **Zone:** 17 N

44.8045423 N **Error:** ~1.73

Sediment Depth: Ø

Number of Ponar Drops: 3

Volume Recovered: Ø

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: — (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe) —

Odour: — (odourless, chemical, decay, natural)

Sheen:

WAS NOT SUCCESSFUL IN BRINGING SEDIMENT (OR ANYTHING) UP W THE PONAR. COULD NOT REACH BOTTOM W CORER/AUGER.

- ATTEMPTED TO VIEW BOTTOM W GO PRO

GO PRO - WAS NOT THE CLEAREST FOOTAGE OF THE BOTTOM (DUE TO DEPTH OF FLOOR VS. LENGTH OF POLE), BUT YOU CAN SEE THE ROCKY BOTTOM (MOSSY LAYER, NO SEDIMENT).

NTU = 1.78 TSS = 4

PS-D-SW-3
(SW - UNDISTURBED)
10:05

PS-D-SED-3
(SEDIMENT)
CNS

NTU = 84.9 TSS = 28

PS-D-SW-3D
(SW - DISTURBED)
10:30

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** SEE TOP

Time: SEE TOP **Name:** Chris Rahmer/Zach Macmillan

Weather: -19°C

Photo Number: 6 - 7

Water Depth: 3 m

Current Speed: —

GPS 79.7205386 E W **Datum:** NAD 83 **Zone:** 17N

44.8042647 N **Error:** ~1.31

Sediment Depth: Ø

Number of Ponar Drops: 3

Volume Recovered: Ø

PHYSICAL OBSERVATIONS:

Grain size: N/A
(sand, silt, clay proportions)

Density: N/A
(cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: N/A

Bio Structures: LEAVES, PLANTS, SHELLS
(shells, tubes, plants, etc.)

Observations: N/A
(e.g. layering, colour changes)

Presence of Debris: N/A
(describe)

Odour: N/A
(odourless, chemical, decay, natural)

Sheen: N/A

COULD NOT COLLECT SEDIMENT. PULLED UP LEAVES, PLANTS, MUSCLES.

CNS - COULD NOT SAMPLE
ATTEMPTED TO VIEW BOTTOM W GO PRO

PTO

GO-PRO - FOOTAGE SHOWS ROCKY BOTTOM W/ A LOT OF LEAVES, MOSS, AND SHELLS. NO EVIDENCE OF SEDIMENT

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS - D - SED - 4

Time: 10:50 **Name:** Chris Rahmer/Zach Macmillan

Weather: ~17°C, SUNNY

Photo Number: 9 - 13

Water Depth: ?

Current Speed: —

GPS 79.7205710 ~~E~~ W **Datum:** NAD 83 **Zone:** 17 N

44.8040341 N **Error:** ~1.30

Sediment Depth: ~~0~~ N/A

Number of Ponar Drops: 3

Volume Recovered: ~~0~~

PHYSICAL OBSERVATIONS:

Grain size: —
(sand, silt, clay proportions)

Density: —
(cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: —
(shells, tubes, plants, etc.)

Observations: —
(e.g. layering, colour changes)

Presence of Debris: —
(describe)

Odour: —
(odourless, chemical, decay, natural)

Sheen: —

★ LOCK COMPLETELY FROZEN, COULD NOT BREAK THROUGH. COULD NOT SAMPLE. SEE PHOTOS OF FROZEN LOCK ★

PTO

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS - D - SED - 5

Time: 11:00 **Name:** Chris Rahmer/Zach Macmillan

Weather: ~ 15°C, SUNNY

Photo Number: 14 - 17

Water Depth: 3.2 m

Current Speed: — NOT MOVING

GPS 79.7205528 E W **Datum:** NAD 83 **Zone:** 17 N

44.8037898 N **Error:** ~ 2.86

Sediment Depth: N/A

Number of Ponar Drops: 3

Volume Recovered: Ø

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: SHELLS (2) (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe)

Odour: — (odourless, chemical, decay, natural)

Sheen: —

UNSUCCESSFUL PULLING UP SEDIMENT W PONAR.
COULD NOT REACH BOTTOM W CORER/AUGER.
WAS ABLE TO PULL UP A COUPLE OF SHELLS.
ATTEMPTED TO CAPTURE BOTTOM W GO PRO.

GO-PRO - FOOTAGE SHOWS HARD/ROCKY BOTTOM W/ LEAVES, NO SEDIMENT.

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS-D-SED-6

Time: 11:38 **Name:** Chris Rahmer/Zach Macmillan

Weather: -18°C

Photo Number: FOLDER FOR LOCATION 6

Water Depth: 3.0 m

Current Speed: —

GPS ~~44.79.7206645~~ 44.8035783 **W** **N** **Datum: NAD** 83 **Zone:** 17N

Error: ~~4.51~~ ~~4.583~~ ~2.35

Sediment Depth: CNA

Number of Ponar Drops: 3

Volume Recovered: Ø

GPS: 79.7206543 W
44.8036048 N

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: — (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe)

Odour: — (odourless, chemical, decay, natural)

Sheen: —

- COULD NOT REACH W AUGER/CORER, NO SUCCESS W PONAR. ATTEMPTED TO CAPTURE BOTTOM W GO PRO

PTO

GO-PRO - FOOTAGE SHOWS HARD/ROCKY BOTTOM W/ MOSS, SHELLS, LEAVES ON SURFACE. NO EVIDENCE OF SEDIMENT.

PTO

1522

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS - D - SED - 7

Time: 13:00 **Name:** Chris Rahmer/Zach Macmillan

Weather: -15°C

Photo Number: LOCATION 7 FOLDER

Water Depth: 3.0 m

Current Speed: —

GPS [illegible] E W **Datum:** NAD 83 **Zone:** 17N

[illegible] N **Error:** [illegible] ~ 1.68

Sediment Depth: CNA

Number of Ponar Drops: 3

Volume Recovered: ∅

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: — (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe) —

Odour: — (odourless, chemical, decay, natural)

Sheen: —

GPS: W 79.7207140
N 44.8035238

NO SUCCESS W PONAR. COULD NOT REACH BOTTOM W CORER/AUGER.
ATTEMPTED TO CAPTURE BOTTOM W GO PRO

GO-PRO - FOOTAGE SHOWED RELATIVELY FLAT BOTTOM ALMOST COMPLETELY COVERED IN LEAVES. COULD SEE AREA WHERE PINAR DISTURBED LEAVES (00:28 MARK OF VIDEO), APPEARS TO BE SMALL ROCKS, MOSS, SHELLS UNDERNEATH. TOUGH TO CONFIRM PRESENCE OR ABSENCE OF SEDIMENT DUE TO LEAF COVERAGE.

PTO

15.47

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS - D - SED - 8

Time: 13:20 **Name:** Chris Rahmer/Zach Macmillan

Weather: -15°C OVERCAST

Photo Number: LOCATION & FOLDER

Water Depth: 2.0m

Current Speed: —

GPS ~~[illegible]~~ **E** **Datum: NAD** 83 **Zone:** 17N

~~[illegible]~~ **N** **Error:** ~~[illegible]~~ 2.06

Sediment Depth: CNA

Number of Ponar Drops: 3

Volume Recovered: Ø

W 79.7207530

N 44.8032649

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: — (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe)

Odour: — (odourless, chemical, decay, natural)

Sheen: —

ROCKS (BOULDERS) SLOPING FROM SHORE
- NO LUCK W PONAR
- COULDN'T REACH BOTTOM W CORER/AUGER
- ATTEMPTED TO CAPTURE BOTTOM W GO PRO

GO-PRO - FOOTAGE SHOWS BOULDERS SLOPING DOWN FROM SHORE. SMALLER ROCKS @ FLOOR. LOTS OF MOSS/ALGAE/OTHER PLANTS ON FLOOR SURFACE, SOME SHELLS/LEAVES. NO SEDIMENT OBSERVED.

9 14:24 (PIC)

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SAVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS-D-SED-9

Time: 13:50 **Name:** Chris Rahmer/Zach Macmillan

Weather: -15°C

Photo Number: FOLDER LOCATION 9

Water Depth: 4.0m

Current Speed: —

GPS 79.7203554 W **Datum:** NAD 83 **Zone:** 17N

44.8043209 N **Error:** ✓ 1.83

Sediment Depth: CNA

Number of Ponar Drops: 3

Volume Recovered: ∅

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: — (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe)

Odour: — (odourless, chemical, decay, natural)

Sheen: —

COULD NOT PULL ANYTHING UP WITH PONAR + COULD NOT REACH BOTTOM W/ CORER/AUGER

- ATTEMPTED TO CAPTURE FLOOR W/ GO PRO

PTO

GO-PRO - FOOTAGE SHOWS A ROCKY BOTTOM W/ SHELL ACCUMULATION. BECAUSE OF DEPTH, HARD TO CONFIRM ABSENCE OR PRESENCE OF SEDIMENT BETWEEN ROCKS.

10 14:28 (PIC)
2:28

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS - D - SED - 10

Time: 14:00 **Name:** Chris Rahmer/Zach Macmillan

Weather: - 16°C, OVERCAST

Photo Number: FOLDER - LOCATION 10

Water Depth: 3.2 m

Current Speed: —

GPS 79.7205277 W **Datum:** NAD 83 **Zone:** 17N

44.8033046 N **Error:** 1.89

Sediment Depth: CNA

Number of Ponar Drops: 3

Volume Recovered: Ø

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: — (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe)

Odour: — (odourless, chemical, decay, natural)

Sheen: —

- NO SEDIMENT COULD BE COLLECTED USING PONAR, COULDN'T REACH FLOOR W CORER/AUGER.
- ATTEMPTED TO CAPTURE FLOOR W GO PRO

PTO

GO-PRO - FOOTAGE CONFIRMED BOULDERS PILED @ FLOOR.
MOSS/ALGAE ON ROCKS. NO SEDIMENT OBSERVED.

NTU = 0.62
TSS = 0 mg/L
PS-D-SW-11
(SURF. W PRE-DIST.)
14:25

~~11 2:44 (AG)~~
PS-D-SED-11
(SEDIMENT)
CN

NTU = 44.3
TSS = 10 mg/L
PS-D-SW-11D
(POST DIST. SW)
14:50

DUP IS PS-D-SW-111 (OF PS-D-SW-11)

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** SEE TOP

Time: SEE TOP **Name:** Chris Rahmer/Zach Macmillan

Weather: -16°C

Photo Number: FOLDER LOC 11

Water Depth: 4.6 m

Current Speed: DAM WALL CLOSED, BUT LEAKING.

GPS 79.7204531 W **Datum:** NAD 83 **Zone:** 17N

44.8037647 N **Error:** 4.47

Sediment Depth: — CNA

Number of Ponar Drops: 3 - USED PONAR TO STIR BOTTOM FOR DISTURBED SW SAMPLE

Volume Recovered: Ø

PHYSICAL OBSERVATIONS:

Grain size: —
(sand, silt, clay proportions)

Density: —
(cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: —
(shells, tubes, plants, etc.)

Observations: —
(e.g. layering, colour changes)

Presence of Debris: —
(describe)

Odour: —
(odourless, chemical, decay, natural)

Sheen: —

NO LUCK COLLECTING SEDS W PONAR, COULDN'T REACH BOTTOM W CORER/AUGER
- ATTEMPTED TO CAPTURE BOTTOM W GO PRO

PTO

GO-PRO - BECAUSE OF THE DEPTH, TOUGH TO TELL EXACTLY WHATS ON FLOOR. APPEARS TO BE LARGE ROCKS W MOSS/ALGAE + SHELLS COVERING. CAN ASLO SEE WHAT MAY BE CONCRETE WALL (NORTH SIDE OF DAM (UPSTREAM SIDE).

12

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS-D-SED-12

Time: 15:00 **Name:** Chris Rahmer/Zach Macmillan

Weather: ~17°C

Photo Number: FOLDER LOC. 12

Water Depth: ~ 4.0 m

Current Speed: —

GPS 79.7202892 W **Datum:** NAD 83 **Zone:** 17N

44.8037450 N **Error:** 1.84

Sediment Depth: CNA - HARD

Number of Ponar Drops: 3

Volume Recovered: 0

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: — (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe) —

Odour: — (odourless, chemical, decay, natural)

Sheen: —

- ALONG MAIN DAM

DIP TAPE GETTING SUCKED IN. ~ 4.0 m. NO LUCK W/ PONAR. COULDN'T REACH W/ AUGER / CORER. DID NOT WANT TO RISK USING GO PRO DUE TO UNDERTOW

13 (4:21)

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN Sub-Area: MAIN DAM D

Date: Dec / 14 /2017 Sample ID: PS-D-SED-13

Time: 15:15 Name: Chris Rahmer/Zach Macmillan

Weather: -18°C

Photo Number: FOLDER LOCATION 13

Water Depth: DID NOT WANT TO TRY. UNDERTOW @ LOCATION 12

Current Speed: —

GPS 79.7201965 W Datum: NAD 83 Zone: 17N

44.8037409 N Error: 1.83

Sediment Depth: —

Number of Ponar Drops: 3

Volume Recovered: Ø

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: — (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe) —

Odour: — (odourless, chemical, decay, natural)

Sheen: —

- ALONG MAIN DAM

COULDN'T PULL ANYTHING UP W PONAR*, COULDN'T REACH W CORER/AUGER. DIDN'T WANT TO RISK USING GO PRO.

* PONAR HEAVIER, WEREN'T TOO WORRIED ABOUT LOSING IT

17 (PIC [redacted])

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS-D-SED-17

Time: 15:30 **Name:** Chris Rahmer/Zach Macmillan

Weather: - 17°C

Photo Number: LOCATION 1B FOLDER

Water Depth: 3.0m

Current Speed: —

GPS 79.7196807 E **Datum:** NAD 83 **Zone:** 17N

44.8037086 N **Error:** ~1.47

Sediment Depth: CNA

Number of Ponar Drops: 3

Volume Recovered: Ø

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: SHELLS (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe)

Odour: — (odourless, chemical, decay, natural)

Sheen: —

- ALONG MAIN DAM
- COULD ONLY PULL UP SHELLS W/ PONAR.
- COULDN'T REACH W/ AUGER/CORER
- DIDN'T WANT TO RISK / COULD ONLY BREAK PLANE OF SURFACE W/ GO PRO

18 (PIC ~~TEST~~)

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS - D - SED - 18

Time: 16:40 **Name:** Chris Rahmer/Zach Macmillan

Weather: -19°C, OVERCAST, SNOWING

Photo Number: FOLDER FOR LOCATION 19

Water Depth: 3.1m

Current Speed: —

GPS 79.7196362 ~~E~~ W **Datum:** NAD 83 **Zone:** 17N

44.8036742 N **Error:** ~1.37

Sediment Depth: CNA

Number of Ponar Drops: 3

Volume Recovered: ∅

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: — (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe)

Odour: — (odourless, chemical, decay, natural)

Sheen: —

- ALONG MAIN DAM

NO LUCK W PONAR, COULDN'T REACH BOTTOM W AUGER/CORER. DIDN'T WANT TO RISK USING GO PRO

PS-D-SW-19 (SURF PRE DIST) 15:00

19 PS-D-SED-19 (SEDIMENT) 15:15

PS-D-SW-19D (DISTURBED SW) 15:20

DUP IS PS-D-SED-199 TCLP ALSO SUBMITTED

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D SEE TOP

Date: Dec / 14 /2017 **Sample ID:** ~~PS-D-SED-20~~

Time: SEE TOP **Name:** Chris Rahmer/Zach Macmillan

Weather: ~ 17°C

Photo Number: FOLDER FOR LOCATION 19

Water Depth: 1.2 m

Current Speed: —

GPS 79.7195125 W **Datum:** NAD 83 **Zone:** 17N

44.8037102 N **Error:** ~1.29

Sediment Depth: 10"

Number of Ponar Drops: 3 - ALSO USED AUGER/CORER TO COLLECT SEDS/DISTURB

Volume Recovered: ~1.25 LARGE ZIPLOC BAGS

PHYSICAL OBSERVATIONS:

Grain size: SILT (sand, silt, clay proportions)

Density: SOFT (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: BLACK

Bio Structures: SHELLS (shells, tubes, plants, etc.)

Observations: SHELLS (e.g. layering, colour changes)

Presence of Debris: — (describe)

Odour: ORGANIC (odourless, chemical, decay, natural)

Sheen: NONE OBSERVED

SURFACE WATER NOTES:

PRE DISTURBANCE READINGS:
8.10 NTU, 0 mg/L
TURB TSS

POST DISTURBANCE READINGS:
128 NTU, 59 mg/L
TURB TSS

20 15:30 (PIC GPS)

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: PORT SEVERN **Sub-Area:** MAIN DAM D

Date: Dec / 14 /2017 **Sample ID:** PS-D-SED-20

Time: 14:50 **Name:** Chris Rahmer/Zach Macmillan

Weather: -17°C, OVERCAST

Photo Number: FOLDER, LOCATION 20

Water Depth: ? FROZEN

Current Speed: —

GPS 79.7192470 W **Datum:** NAD 83 **Zone:** 17N

44.8038874 N **Error:** ~1.34

Sediment Depth: —

Number of Ponar Drops: 2 - DID NOT WANT TO ATTEMPT AGAIN, FROZEN

Volume Recovered: —

PHYSICAL OBSERVATIONS:

Grain size: — (sand, silt, clay proportions)

Density: — (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: —

Bio Structures: — (shells, tubes, plants, etc.)

Observations: — (e.g. layering, colour changes)

Presence of Debris: — (describe)

Odour: — (odourless, chemical, decay, natural)

Sheen: —

AREA FROZEN - SEE PICS, CNA

Hole Attempts #	Split Spoon Refusal Distance Advanced / Length Recovered
1	x6 Refusal @ ~10"; ~4-6" recovery / spoon
2	x3 Refusal @ ~20"/ 05m

C-101

↑N

① ②

Hole locations.

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: Port Severn Sub-Area: Dam C

Date: Feb/ 6 /2018 Name: Jamie Cahill/Renee Hum-Hsiao

Time: 11:15 - 12:30 Sediment Sample ID: PS-C-SED-101S @ 12:30pm (Limited Sample 5 bottles) + TCLP (4 bottles) = 9 total.

Weather: -10°C, Sunny. SW Sample ID (Pre-Disruption): PS-C-SW-101 @ 11:10

Photo Number: TBD. SW Sample ID (Post-Disruption): PS-C-SW-101D. @ 12:00

Water Depth: 1.5m (15" ice)

Current Speed: NA - frozen.

GPS 0601333 E Datum: NAD 83 Zone: 17T

4962034 N Error: +/- 3m

Sediment Sampling Depth/Range: Hole #1: 0-0.15 / Hole #2: 0-0.5m (Refusal) ↳ no deep sample

Number of Retrievals (combined for sample): 9

Total Volume Recovered: 2 x 250mL (3/4 full) 2 x 250mL (1/2 full) 2 x 100mL (full) 4 x 5g vials + ~5kg bag for G.S

PHYSICAL OBSERVATIONS:

Grain size: silty sand (fine), trace clay, trace gravel (sand, silt, clay proportions)

Density: some cohesion, soft (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: dark grey/brown

Bio Structures: wood fibres (peat-like) (shells, tubes, plants, etc.)

Observations: some gravel pieces - quartz? clear/pink. (e.g. layering, colour changes)

Presence of Debris: (describe)

Odour: natural/decay (odourless, chemical, decay, natural)

Sheen: None

SURFACE WATER FIELD MEASUREMENTS:

SW Pre TSS 0 SW Pre NTU 0.76

SW Post TSS 124 SW Post NTU 68.4

Hole Attempts #	Split Spoon Retrieval Distance Advanced / Length Recovered
1	Refusal — no recovery } see GoPro.
2	Refusal — no recovery
3	x4 = ~4" recovery / spoon
4	Refusal
5	x4 = ~4" recovery / spoon

C-102

N

Attempts

4 2 1 5 3

sample recovered.

Rock

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: Port Severn Sub-Area: Dam C

Date: Feb/ 6 /2018 Name: Jamie Cahill/Renee Hum-Hsiao

Time: 9:30-11:00 Sediment Sample ID: @ 11am PS-C-SED-102S (=7 bottles + OC)

Weather: -15°C, snowing. SW Sample ID (Pre-Disruption): @ 9:30am PS-C-SW-102

Photo Number: TBD. SW Sample ID (Post-Disruption): @ 10:50am PS-C-SW-102D.

Water Depth: 1.2 m (15" ice).

Current Speed: NA → Frozen.

GPS 0601322 E Datum: NAD 83 Zone: 17T

4962061 N Error: +/- 3m

Sediment Sampling Depth/Range: ~0-0.1m (Refusal) → no deep sample.

Number of Retrievals (combined for sample): = 8 total for sample collection (5 hole attempts total).

Total Volume Recovered: 6x250mL (3/4 full) + 2 sq. vials
1x250mL (1/2 full) + ~500g for G.S.
2x100mL (full)
1x100mL (1/2 full)

PHYSICAL OBSERVATIONS:

Grain size: silty sand, some gravel (sand, silt, clay proportions)

Density: Some cohesion, soft (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: dark brown/grey

Bio Structures: wood fibres. (shells, tubes, plants, etc.)

Observations: (e.g. layering, colour changes)

Presence of Debris: (describe)

Odour: decay/natural (odourless, chemical, decay, natural)

Sheen: none.

SURFACE WATER FIELD MEASUREMENTS:

SW Pre TSS 19 mg/L SW Pre NTU 0.93

SW Post TSS 264 SW Post NTU 134

Hole Attempt #	Split Spoon Retrieval Distance Advanced / Length Recovered
1	1 - Refusal @~19" / 8" Recovered 2 - Refusal @ ~18" / 5" Rec. 3 - " / 3" rec. 4 - " / 7" rec. 5 - " / 10" rec.

C-103 (Additional Location)

FIELD LOG SHEET

Project: 651954 - Trent Severn Waterways

Site: Port Severn **Sub-Area:** Dam C

Date: Feb/ 6 /2018 **Name:** Jamie Cahill/Renee Hum-Hsiao

Time: 2:30- 4:00pm **Sediment Sample ID:** PS-C-SE10-103S @3:45pm = 6 bottles Limited Recovery.

Weather: -10°C, sunny **SW Sample ID (Pre-Disruption):** PS-C-SW-103 @1:50pm

Photo Number: TBD **SW Sample ID (Post-Disruption):** PS-C-SW-103D @3:00pm

Water Depth: ~2.5m (10" ice)

Current Speed: ~~NA~~ - frozen

GPS 0601312 **E** **Datum:** NAD 83 **Zone:** 17

4962078 **N** **Error:** +/- 3m

Sediment Sampling Depth/Range: 0 - 0.5m

Number of Retrievals (combined for sample): 5

Total Volume Recovered: 1x250mL (3/4 full) 1x250mL (1/2 full) 2x120mL (full) 2x 5g vial + ~500g bag for G.S.

PHYSICAL OBSERVATIONS:

Grain size: silt, some sand (highly organic - lots of wood fibres) (sand, silt, clay proportions)

Density: Some cohesion, soft (cohesive/non-cohesive, soft to hard, coarse to fine)

Colour: dark brown/black → silt; grey → sand

Bio Structures: significant amt. of wood pcs. (shells, tubes, plants, etc.)

Observations: grey sand layer beneath silt/wood layer (e.g. layering, colour changes)

Presence of Debris: (describe)

Odour: natural/decay (odourless, chemical, decay, natural)

Sheen: none

SURFACE WATER FIELD MEASUREMENTS:

SW Pre TSS 0 SW Pre NTU 0.90

SW Post TSS 529 SW Post NTU 199

Appendix C

Photographic Logs

Photo 1: Dam C, at the northern corner, looking south, inaccessible due to snow and ice, December 2017.

Photo 2: Dam C, looking west from between two docks, inaccessible due to snow and ice, December 2017.

Photo 3: Dam C, at the southern corner, looking north, inaccessible due to snow and ice, December 2017.

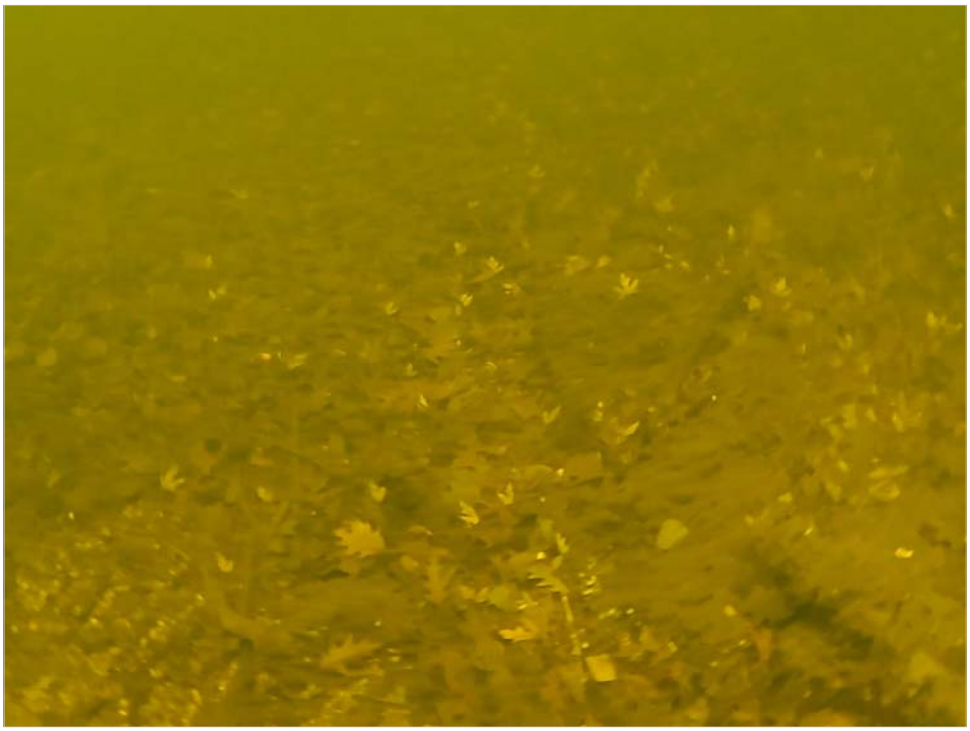


Photo 4: Dam D, Sampling Location 3, bottom with minimal sediment for collection, December 2017.

Photo 5: Dam D, Sampling Location 10, rocky bottom with minimal sediment for collection, December 2017.

Photo 6: Dam D, Sampling Location 17, no recovery using ponar, December 2017.

Photo 7: Dam E, Sampling Location 6, hole following sample collection using manual corer, December 2017.

Photo 8: Dam E, Sampling Location 6, absence of sediment, bedrock at surface, December 2017. Similar to other Dam E locations.

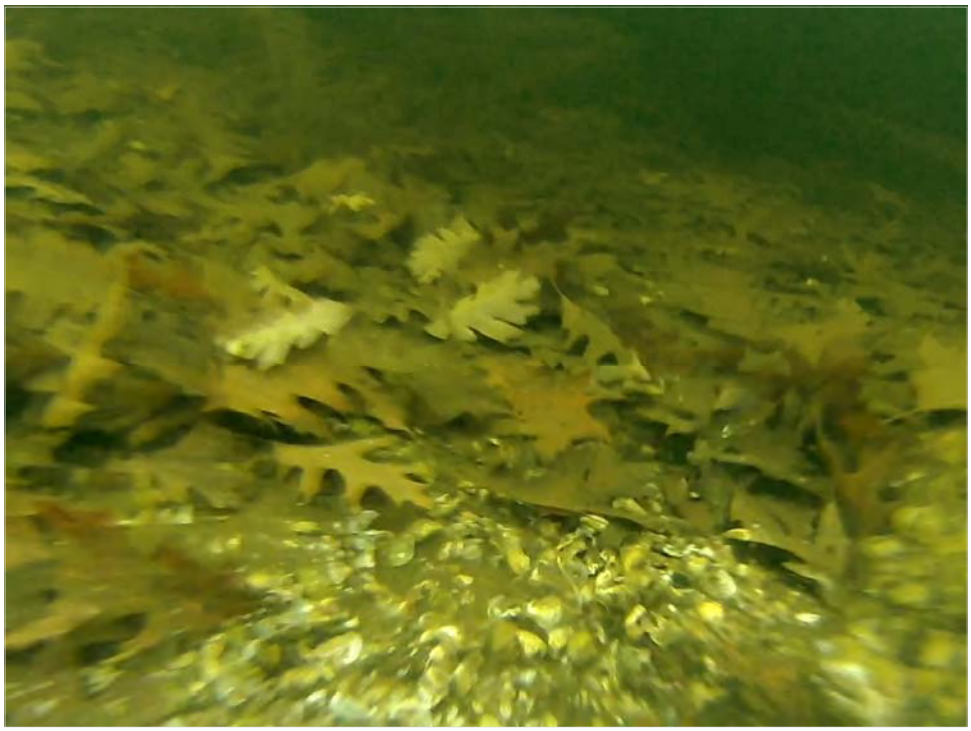


Photo 9: Dam E, Sampling Location 2, leaves and shells on bottom, with minimal sediment, December 2017.

Photo 10: Dam E, Sampling Location 2, absence of sediment using ponar, December 2017.

Photo 11: Dam G, view looking west, snow cover, December 2017.

Photo 12: Dam G, Sampling Location 4, absence of sediment, December 2017.

Photo 13: Dam C, drilling through ice, February 2018. Same technique used in all sampling locations at Dam C.

Photo 14: Dam C, Sample Location 101, surface sediment sample, February 2018. Similar to other sediment samples collected at Dam C.

Photo 15: Dam E, worker is setting up for sample collection, February 2018. Similar set up at other sampling locations.

Photo 16: Dam G, Sampling Location 101, workers setting up for drilling, February 2018.

Photo 17: Dam G, Sampling Location 101, shallow sediment sample in split spoon, February 2018.

Appendix D

Laboratory Certificates of Analyses

SNC- Lavalin Inc. (Sudbury/Toronto)
ATTN: FABIENNE ETIENNE
235 LESMILL ROAD
TORONTO ON M3B 2V1

Date Received: 15-DEC-17
Report Date: 08-JAN-18 08:02 (MT)
Version: FINAL

Client Phone: 416-635-5882

Certificate of Analysis

Lab Work Order #: L2036241

Project P.O. #:	NOT SUBMITTED
Job Reference:	651954
C of C Numbers:	1, 2, 3
Legal Site Desc:	

Mathy Mahadeva
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-1 PS-G-SED-1							
Sampled By: CR/ZM on 12-DEC-17 @ 17:00							
Matrix: SEDIMENT							
BTEX, F1-F4-O.Reg 153/04 (July 2011)							
BTEX-O.Reg 153/04 (July 2011)							
Benzene	<0.0068		0.0068	ug/g	18-DEC-17	19-DEC-17	R3915732
Ethylbenzene	<0.018		0.018	ug/g	18-DEC-17	19-DEC-17	R3915732
m+p-Xylenes	<0.030		0.030	ug/g	18-DEC-17	19-DEC-17	R3915732
o-Xylene	<0.020		0.020	ug/g	18-DEC-17	19-DEC-17	R3915732
Toluene	<0.080		0.080	ug/g	18-DEC-17	19-DEC-17	R3915732
Surrogate: 1,4-Difluorobenzene	95.9		50-140	%	18-DEC-17	19-DEC-17	R3915732
Surrogate: 4-Bromofluorobenzene	96.1		50-140	%	18-DEC-17	19-DEC-17	R3915732
F1-F4 Hydrocarbon Calculated Parameters							
F1-BTEX	<5.0		5.0	ug/g		21-DEC-17	
F2-Naphth	<10		10	ug/g		21-DEC-17	
F3-PAH	<50		50	ug/g		21-DEC-17	
Total Hydrocarbons (C6-C50)	<72		72	ug/g		21-DEC-17	
F1-O.Reg 153/04 (July 2011)							
F1 (C6-C10)	<5.0		5.0	ug/g	18-DEC-17	19-DEC-17	R3915732
Surrogate: 3,4-Dichlorotoluene	85.0		60-140	%	18-DEC-17	19-DEC-17	R3915732
F2-F4-O.Reg 153/04 (July 2011)							
F2 (C10-C16)	<10		10	ug/g	20-DEC-17	21-DEC-17	R3917482
F3 (C16-C34)	<50		50	ug/g	20-DEC-17	21-DEC-17	R3917482
F4 (C34-C50)	<50		50	ug/g	20-DEC-17	21-DEC-17	R3917482
Chrom. to baseline at nC50	YES				20-DEC-17	21-DEC-17	R3917482
Surrogate: 2-Bromobenzotrifluoride	92.9		60-140	%	20-DEC-17	21-DEC-17	R3917482
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.050		0.050	ug/g		20-DEC-17	
Miscellaneous Parameters							
% Moisture	23.6		0.10	%	19-DEC-17	20-DEC-17	R3916328
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		21-DEC-17	
Chlordane (Total)	<0.028		0.028	ug/g		29-DEC-17	
Endosulfan (Total)	<0.028		0.028	ug/g		29-DEC-17	
TOC & FOC-O.Reg 153/04 (July 2011)							
Total Organic Carbon	0.23		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0023		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	0.25		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0025		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	0.21		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0021		0.0010		02-JAN-18	02-JAN-18	R3929771
Average Fraction Organic Carbon	0.0023		0.0010		02-JAN-18	02-JAN-18	R3929771
PAH-O.Reg 153/04 (July 2011)							
1-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	21-DEC-17	R3917380
2-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	21-DEC-17	R3917380
Acenaphthene	<0.050		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Acenaphthylene	0.070		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Anthracene	<0.050		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Benzo(a)anthracene	0.083	R	0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Benzo(a)pyrene	0.122		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Benzo(b)fluoranthene	0.139		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Benzo(g,h,i)perylene	0.091		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Benzo(k)fluoranthene	<0.050		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Chrysene	0.105		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Dibenzo(ah)anthracene	<0.050		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Fluoranthene	0.142		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-1 PS-G-SED-1							
Sampled By: CR/ZM on 12-DEC-17 @ 17:00							
Matrix: SEDIMENT							
PAH-O.Reg 153/04 (July 2011)							
Fluorene	<0.050		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Indeno(1,2,3-cd)pyrene	0.077		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Naphthalene	<0.013		0.013	ug/g	18-DEC-17	21-DEC-17	R3917380
Phenanthrene	<0.046		0.046	ug/g	18-DEC-17	21-DEC-17	R3917380
Pyrene	0.218		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Surrogate: 2-Fluorobiphenyl	82.5		50-140	%	18-DEC-17	21-DEC-17	R3917380
Surrogate: p-Terphenyl d14	87.8		50-140	%	18-DEC-17	21-DEC-17	R3917380
DDD, DDE, DDT sums							
Total DDD	<0.028		0.028	ug/g		29-DEC-17	
Total DDE	<0.028		0.028	ug/g		29-DEC-17	
Total DDT	<0.028		0.028	ug/g		29-DEC-17	
OC Pesticides-O.Reg 153/04 (July 2011)							
Aldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
a-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
g-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
o,p-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Dieldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan I	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan II	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor Epoxide	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobenzene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobutadiene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachloroethane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Methoxychlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Surrogate: 2-Fluorobiphenyl	101.1		50-140	%	18-DEC-17	29-DEC-17	R3923851
Surrogate: d14-Terphenyl	80.2		50-140	%	18-DEC-17	29-DEC-17	R3923851
Metals/Inorg-O. Reg 153/04 (July 2011)							
Boron-HWE-O.Reg 153/04 (July 2011)							
Boron (B), Hot Water Ext.	<0.10		0.10	ug/g	21-DEC-17	21-DEC-17	R3917998
Conductivity (EC)							
Conductivity	0.131		0.0040	mS/cm		21-DEC-17	R3917497
Cyanide (WAD)-O.Reg 153/04 (July 2011)							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	18-DEC-17	19-DEC-17	R3916360
Hexavalent Chromium in Soil							
Chromium, Hexavalent	<0.20		0.20	ug/g	18-DEC-17	19-DEC-17	R3915747
Mercury in Soil by CVAAS							
Mercury (Hg)	0.0060		0.0050	ug/g	21-DEC-17	21-DEC-17	R3917320
Metals in Soil by CRC ICPMS							
Antimony (Sb)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Arsenic (As)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Barium (Ba)	16.9		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Beryllium (Be)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Boron (B)	<5.0		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cadmium (Cd)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-1 PS-G-SED-1							
Sampled By: CR/ZM on 12-DEC-17 @ 17:00							
Matrix: SEDIMENT							
Metals in Soil by CRC ICPMS							
Chromium (Cr)	5.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cobalt (Co)	1.7		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Copper (Cu)	4.8		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Lead (Pb)	2.9		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Molybdenum (Mo)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Nickel (Ni)	3.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Selenium (Se)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Silver (Ag)	<0.20		0.20	ug/g	21-DEC-17	21-DEC-17	R3917988
Thallium (Tl)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Uranium (U)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Vanadium (V)	13.6		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Zinc (Zn)	12.9		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
SAR-O.Reg 153/04 (July 2011)							
Calcium (Ca)	2.8		1.0	mg/L		21-DEC-17	R3917989
Sodium (Na)	3.7		1.0	mg/L		21-DEC-17	R3917989
Magnesium (Mg)	<1.0		1.0	mg/L		21-DEC-17	R3917989
SAR	0.61	SAR:M	0.10	SAR		21-DEC-17	R3917989
pH							
pH	7.55		0.10	pH units		20-DEC-17	R3916772
L2036241-2 PS-G-SED-2 (BULK)							
Sampled By: CR/ZM on 12-DEC-17 @ 13:30							
Matrix: SEDIMENT							
BTEX, F1-F4-O.Reg 153/04 (July 2011)							
BTEX-O.Reg 153/04 (July 2011)							
Benzene	<0.0068		0.0068	ug/g	18-DEC-17	19-DEC-17	R3915732
Ethylbenzene	<0.018		0.018	ug/g	18-DEC-17	19-DEC-17	R3915732
m+p-Xylenes	<0.030		0.030	ug/g	18-DEC-17	19-DEC-17	R3915732
o-Xylene	<0.020		0.020	ug/g	18-DEC-17	19-DEC-17	R3915732
Toluene	<0.080		0.080	ug/g	18-DEC-17	19-DEC-17	R3915732
Surrogate: 1,4-Difluorobenzene	95.7		50-140	%	18-DEC-17	19-DEC-17	R3915732
Surrogate: 4-Bromofluorobenzene	92.4		50-140	%	18-DEC-17	19-DEC-17	R3915732
F1-F4 Hydrocarbon Calculated Parameters							
F1-BTEX	<5.0		5.0	ug/g		21-DEC-17	
F2-Naphth	<10		10	ug/g		21-DEC-17	
F3-PAH	119		50	ug/g		21-DEC-17	
Total Hydrocarbons (C6-C50)	286		72	ug/g		21-DEC-17	
F1-O.Reg 153/04 (July 2011)							
F1 (C6-C10)	<5.0		5.0	ug/g	18-DEC-17	19-DEC-17	R3915732
Surrogate: 3,4-Dichlorotoluene	80.0		60-140	%	18-DEC-17	19-DEC-17	R3915732
F2-F4-O.Reg 153/04 (July 2011)							
F2 (C10-C16)	<10		10	ug/g	18-DEC-17	21-DEC-17	R3917661
F3 (C16-C34)	124		50	ug/g	18-DEC-17	21-DEC-17	R3917661
F4 (C34-C50)	161		50	ug/g	18-DEC-17	21-DEC-17	R3917661
Chrom. to baseline at nC50	NO				18-DEC-17	21-DEC-17	R3917661
Surrogate: 2-Bromobenzotrifluoride	87.0		60-140	%	18-DEC-17	21-DEC-17	R3917661
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.050		0.050	ug/g		20-DEC-17	
Miscellaneous Parameters							
% Moisture	22.3		0.10	%	19-DEC-17	20-DEC-17	R3916328
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		21-DEC-17	
Chlordane (Total)	<0.028		0.028	ug/g		29-DEC-17	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-2 PS-G-SED-2 (BULK)							
Sampled By: CR/ZM on 12-DEC-17 @ 13:30							
Matrix: SEDIMENT							
Endosulfan (Total)	<0.028		0.028	ug/g		29-DEC-17	
F4G-SG (GHH-Silica)	690		250	ug/g	20-DEC-17	20-DEC-17	R3917800
TOC & FOC-O.Reg 153/04 (July 2011)							
Total Organic Carbon	1.61		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0161		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	0.98		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0098		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	0.87		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0087		0.0010		02-JAN-18	02-JAN-18	R3929771
Average Fraction Organic Carbon	0.0115		0.0010		02-JAN-18	02-JAN-18	R3929771
PAH-O.Reg 153/04 (July 2011)							
1-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	21-DEC-17	R3917380
2-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	21-DEC-17	R3917380
Acenaphthene	<0.050		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Acenaphthylene	0.262		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Anthracene	0.095		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Benzo(a)anthracene	0.407	R	0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Benzo(a)pyrene	0.505		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Benzo(b)fluoranthene	0.597		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Benzo(g,h,i)perylene	0.364		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Benzo(k)fluoranthene	0.171		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Chrysene	0.600		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Dibenzo(ah)anthracene	0.072		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Fluoranthene	1.07		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Fluorene	<0.050		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Indeno(1,2,3-cd)pyrene	0.323		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Naphthalene	<0.013		0.013	ug/g	18-DEC-17	21-DEC-17	R3917380
Phenanthrene	0.432		0.046	ug/g	18-DEC-17	21-DEC-17	R3917380
Pyrene	1.43		0.050	ug/g	18-DEC-17	21-DEC-17	R3917380
Surrogate: 2-Fluorobiphenyl	83.8		50-140	%	18-DEC-17	21-DEC-17	R3917380
Surrogate: p-Terphenyl d14	90.0		50-140	%	18-DEC-17	21-DEC-17	R3917380
DDD, DDE, DDT sums							
Total DDD	<0.028		0.028	ug/g		29-DEC-17	
Total DDE	<0.028		0.028	ug/g		29-DEC-17	
Total DDT	<0.028		0.028	ug/g		29-DEC-17	
OC Pesticides-O.Reg 153/04 (July 2011)							
Aldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
a-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
g-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
o,p-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Dieldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan I	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan II	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor Epoxide	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-2 PS-G-SED-2 (BULK)							
Sampled By: CR/ZM on 12-DEC-17 @ 13:30							
Matrix: SEDIMENT							
OC Pesticides-O.Reg 153/04 (July 2011)							
Hexachlorobenzene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobutadiene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachloroethane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Methoxychlor	<0.050	DLQ	0.050	ug/g	18-DEC-17	29-DEC-17	R3923851
Surrogate: 2-Fluorobiphenyl	101.0		50-140	%	18-DEC-17	29-DEC-17	R3923851
Surrogate: d14-Terphenyl	79.3		50-140	%	18-DEC-17	29-DEC-17	R3923851
Metals/Inorg-O. Reg 153/04 (July 2011)							
Boron-HWE-O.Reg 153/04 (July 2011)							
Boron (B), Hot Water Ext.	<0.10		0.10	ug/g	21-DEC-17	21-DEC-17	R3917998
Conductivity (EC)							
Conductivity	0.225		0.0040	mS/cm		21-DEC-17	R3917497
Cyanide (WAD)-O.Reg 153/04 (July 2011)							
Cyanide, Weak Acid Diss	1.76		0.050	ug/g	18-DEC-17	19-DEC-17	R3916360
Hexavalent Chromium in Soil							
Chromium, Hexavalent	<0.20		0.20	ug/g	18-DEC-17	19-DEC-17	R3915747
Mercury in Soil by CVAAS							
Mercury (Hg)	0.0105		0.0050	ug/g	21-DEC-17	21-DEC-17	R3917320
Metals in Soil by CRC ICPMS							
Antimony (Sb)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Arsenic (As)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Barium (Ba)	47.6		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Beryllium (Be)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Boron (B)	<5.0		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cadmium (Cd)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Chromium (Cr)	6.1		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cobalt (Co)	2.5		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Copper (Cu)	3.9		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Lead (Pb)	18.9		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Molybdenum (Mo)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Nickel (Ni)	3.8		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Selenium (Se)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Silver (Ag)	<0.20		0.20	ug/g	21-DEC-17	21-DEC-17	R3917988
Thallium (Tl)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Uranium (U)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Vanadium (V)	17.3		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Zinc (Zn)	29.2		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
SAR-O.Reg 153/04 (July 2011)							
Calcium (Ca)	7.7		1.0	mg/L		21-DEC-17	R3917989
Sodium (Na)	4.4		1.0	mg/L		21-DEC-17	R3917989
Magnesium (Mg)	<1.0		1.0	mg/L		21-DEC-17	R3917989
SAR	0.44	SAR:M	0.10	SAR		21-DEC-17	R3917989
pH							
pH	7.69		0.10	pH units		20-DEC-17	R3916772
L2036241-3 PS-G-SED-2 (TCLP)							
Sampled By: CR/ZM on 12-DEC-17 @ 13:30							
Matrix: SEDIMENT							
O.Reg 347 TCLP Metals and Conventionals							
Cyanide for O. Reg 347							
Cyanide, Weak Acid Diss	<0.10		0.10	mg/L		19-DEC-17	R3916361
Fluoride (F) for O. Reg 347							
Fluoride (F)	<10		10	mg/L		20-DEC-17	R3917490
Leachate Procedure for Reg 347							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-3 PS-G-SED-2 (TCLP)							
Sampled By: CR/ZM on 12-DEC-17 @ 13:30							
Matrix: SEDIMENT							
Leachate Procedure for Reg 347							
Initial pH	9.26		0.10	pH units		19-DEC-17	R3916591
Final pH	5.71		0.10	pH units		19-DEC-17	R3916591
Mercury (CVAA) for O.Reg 347							
Mercury (Hg)	<0.00010		0.00010	mg/L		20-DEC-17	R3916530
Nitrate/Nitrite-N for O. Reg 347							
Nitrate-N	<2.0		2.0	mg/L		20-DEC-17	R3917490
Nitrite-N	<2.0		2.0	mg/L		20-DEC-17	R3917490
Nitrate and Nitrite as N	<4.0		4.0	mg/L		20-DEC-17	R3917490
O.Reg 347 TCLP Leachable Metals							
Silver (Ag)	<0.0050		0.0050	mg/L		19-DEC-17	R3916218
Arsenic (As)	<0.050		0.050	mg/L		19-DEC-17	R3916218
Boron (B)	<2.5		2.5	mg/L		19-DEC-17	R3916218
Barium (Ba)	<0.50		0.50	mg/L		19-DEC-17	R3916218
Cadmium (Cd)	<0.0050		0.0050	mg/L		19-DEC-17	R3916218
Chromium (Cr)	<0.050		0.050	mg/L		19-DEC-17	R3916218
Lead (Pb)	0.056		0.050	mg/L		19-DEC-17	R3916218
Selenium (Se)	<0.025		0.025	mg/L		19-DEC-17	R3916218
Uranium (U)	<0.25		0.25	mg/L		19-DEC-17	R3916218
BNAs for O. Reg 347							
2,3,4,6-Tetrachlorophenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
2,4,5-Trichlorophenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
2,4,6-Trichlorophenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
2,4-Dichlorophenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
2,4-Dinitrotoluene	<0.0040		0.0040	mg/L	20-DEC-17	21-DEC-17	R3917985
2-Methylphenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
3&4-Methylphenol	<0.010		0.010	mg/L	20-DEC-17	21-DEC-17	R3917985
Benzo(a)pyrene	<0.00020		0.00020	mg/L	20-DEC-17	22-DEC-17	R3917985
Hexachlorobenzene	<0.0040		0.0040	mg/L	20-DEC-17	21-DEC-17	R3917985
Hexachlorobutadiene	<0.0040		0.0040	mg/L	20-DEC-17	21-DEC-17	R3917985
Hexachloroethane	<0.0040		0.0040	mg/L	20-DEC-17	21-DEC-17	R3917985
Nitrobenzene	<0.0040		0.0040	mg/L	20-DEC-17	21-DEC-17	R3917985
Pentachlorophenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
Cresols (total)	<0.015		0.015	mg/L	20-DEC-17	21-DEC-17	R3917985
Surrogate: Nitrobenzene d5	99.1		50-150	%	20-DEC-17	21-DEC-17	R3917985
Surrogate: 2-Fluorobiphenyl	96.1		40-160	%	20-DEC-17	21-DEC-17	R3917985
Surrogate: p-Terphenyl d14	128.4		60-140	%	20-DEC-17	21-DEC-17	R3917985
Surrogate: 2,4,6-Tribromophenol	100.8		50-150	%	20-DEC-17	21-DEC-17	R3917985
O.Reg. 347 TCLP VOCs incl leach							
VOC for O. Reg 347							
1,1-Dichloroethylene	<0.025		0.025	mg/L		19-DEC-17	R3915751
1,2-Dichlorobenzene	<0.025		0.025	mg/L		19-DEC-17	R3915751
1,2-Dichloroethane	<0.025		0.025	mg/L		19-DEC-17	R3915751
1,4-Dichlorobenzene	<0.025		0.025	mg/L		19-DEC-17	R3915751
Benzene	<0.025		0.025	mg/L		19-DEC-17	R3915751
Carbon tetrachloride	<0.025		0.025	mg/L		19-DEC-17	R3915751
Chlorobenzene	<0.025		0.025	mg/L		19-DEC-17	R3915751
Chloroform	<0.10		0.10	mg/L		19-DEC-17	R3915751
Dichloromethane	<0.50		0.50	mg/L		19-DEC-17	R3915751
Methyl Ethyl Ketone	<1.0		1.0	mg/L		19-DEC-17	R3915751
Tetrachloroethylene	<0.025		0.025	mg/L		19-DEC-17	R3915751
Trichloroethylene	<0.025		0.025	mg/L		19-DEC-17	R3915751

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-3 PS-G-SED-2 (TCLP)							
Sampled By: CR/ZM on 12-DEC-17 @ 13:30							
Matrix: SEDIMENT							
VOC for O. Reg 347							
Vinyl chloride	<0.050		0.050	mg/L		19-DEC-17	R3915751
Surrogate: 1,4-Difluorobenzene	96.7		70-130	%		19-DEC-17	R3915751
Surrogate: 4-Bromofluorobenzene	94.4		70-130	%		19-DEC-17	R3915751
L2036241-4 PS-G-SED-3							
Sampled By: CR/ZM on 12-DEC-17 @ 15:50							
Matrix: SEDIMENT							
BTEX, F1-F4-O.Reg 153/04 (July 2011)							
BTEX-O.Reg 153/04 (July 2011)							
Benzene	<0.0068		0.0068	ug/g	18-DEC-17	19-DEC-17	R3915732
Ethylbenzene	<0.018		0.018	ug/g	18-DEC-17	19-DEC-17	R3915732
m+p-Xylenes	<0.030		0.030	ug/g	18-DEC-17	19-DEC-17	R3915732
o-Xylene	<0.020		0.020	ug/g	18-DEC-17	19-DEC-17	R3915732
Toluene	<0.080		0.080	ug/g	18-DEC-17	19-DEC-17	R3915732
Surrogate: 1,4-Difluorobenzene	86.4		50-140	%	18-DEC-17	19-DEC-17	R3915732
Surrogate: 4-Bromofluorobenzene	82.8		50-140	%	18-DEC-17	19-DEC-17	R3915732
F1-F4 Hydrocarbon Calculated Parameters							
F1-BTEX	<5.0		5.0	ug/g		22-DEC-17	
F2-Naphth	<10		10	ug/g		22-DEC-17	
F3-PAH	150		50	ug/g		22-DEC-17	
Total Hydrocarbons (C6-C50)	307		72	ug/g		22-DEC-17	
F1-O.Reg 153/04 (July 2011)							
F1 (C6-C10)	<5.0		5.0	ug/g	18-DEC-17	19-DEC-17	R3915732
Surrogate: 3,4-Dichlorotoluene	77.3		60-140	%	18-DEC-17	19-DEC-17	R3915732
F2-F4-O.Reg 153/04 (July 2011)							
F2 (C10-C16)	<10		10	ug/g	18-DEC-17	21-DEC-17	R3917661
F3 (C16-C34)	154		50	ug/g	18-DEC-17	21-DEC-17	R3917661
F4 (C34-C50)	153		50	ug/g	18-DEC-17	21-DEC-17	R3917661
Chrom. to baseline at nC50	NO				18-DEC-17	21-DEC-17	R3917661
Surrogate: 2-Bromobenzotrifluoride	87.3		60-140	%	18-DEC-17	21-DEC-17	R3917661
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.050		0.050	ug/g		20-DEC-17	
Miscellaneous Parameters							
% Moisture	32.7		0.10	%	19-DEC-17	20-DEC-17	R3916328
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		22-DEC-17	
Chlordane (Total)	<0.028		0.028	ug/g		29-DEC-17	
Endosulfan (Total)	<0.028		0.028	ug/g		29-DEC-17	
F4G-SG (GHH-Silica)	580		250	ug/g	20-DEC-17	20-DEC-17	R3917800
TOC & FOC-O.Reg 153/04 (July 2011)							
Total Organic Carbon	1.59		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0159		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	1.50		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0150		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	1.43		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0143		0.0010		02-JAN-18	02-JAN-18	R3929771
Average Fraction Organic Carbon	0.0151		0.0010		02-JAN-18	02-JAN-18	R3929771
PAH-O.Reg 153/04 (July 2011)							
1-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
2-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthylene	0.218		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Anthracene	0.063		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-4 PS-G-SED-3							
Sampled By: CR/ZM on 12-DEC-17 @ 15:50							
Matrix: SEDIMENT							
PAH-O.Reg 153/04 (July 2011)							
Benzo(a)anthracene	0.287	R	0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(a)pyrene	0.369		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(b)fluoranthene	0.467		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(g,h,i)perylene	0.275		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(k)fluoranthene	0.148		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Chrysene	0.402		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Dibenzo(ah)anthracene	0.051		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluoranthene	0.852		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluorene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Indeno(1,2,3-cd)pyrene	0.251		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Naphthalene	<0.013		0.013	ug/g	18-DEC-17	22-DEC-17	R3917986
Phenanthrene	0.382		0.046	ug/g	18-DEC-17	22-DEC-17	R3917986
Pyrene	1.09		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Surrogate: 2-Fluorobiphenyl	85.9		50-140	%	18-DEC-17	22-DEC-17	R3917986
Surrogate: p-Terphenyl d14	91.2		50-140	%	18-DEC-17	22-DEC-17	R3917986
DDD, DDE, DDT sums							
Total DDD	<0.028		0.028	ug/g		29-DEC-17	
Total DDE	<0.028		0.028	ug/g		29-DEC-17	
Total DDT	<0.028		0.028	ug/g		29-DEC-17	
OC Pesticides-O.Reg 153/04 (July 2011)							
Aldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
a-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
g-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
o,p-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Dieldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan I	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan II	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor Epoxide	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobenzene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobutadiene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachloroethane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Methoxychlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Surrogate: 2-Fluorobiphenyl	96.5		50-140	%	18-DEC-17	29-DEC-17	R3923851
Surrogate: d14-Terphenyl	76.9		50-140	%	18-DEC-17	29-DEC-17	R3923851
Metals/Inorg-O. Reg 153/04 (July 2011)							
Boron-HWE-O.Reg 153/04 (July 2011)							
Boron (B), Hot Water Ext.	0.52		0.10	ug/g	21-DEC-17	21-DEC-17	R3917998
Conductivity (EC)							
Conductivity	0.222		0.0040	mS/cm		21-DEC-17	R3917497
Cyanide (WAD)-O.Reg 153/04 (July 2011)							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	18-DEC-17	19-DEC-17	R3916360
Hexavalent Chromium in Soil							
Chromium, Hexavalent	<0.20		0.20	ug/g	18-DEC-17	19-DEC-17	R3915747
Mercury in Soil by CVAAS							

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-4 PS-G-SED-3							
Sampled By: CR/ZM on 12-DEC-17 @ 15:50							
Matrix: SEDIMENT							
Mercury in Soil by CVAAS							
Mercury (Hg)	0.0171		0.0050	ug/g	21-DEC-17	21-DEC-17	R3917320
Metals in Soil by CRC ICPMS							
Antimony (Sb)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Arsenic (As)	1.6		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Barium (Ba)	143		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Beryllium (Be)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Boron (B)	<5.0		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cadmium (Cd)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Chromium (Cr)	12.8		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cobalt (Co)	5.4		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Copper (Cu)	10.4		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Lead (Pb)	21.3		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Molybdenum (Mo)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Nickel (Ni)	7.8		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Selenium (Se)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Silver (Ag)	<0.20		0.20	ug/g	21-DEC-17	21-DEC-17	R3917988
Thallium (Tl)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Uranium (U)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Vanadium (V)	29.8		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Zinc (Zn)	77.3		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
SAR-O.Reg 153/04 (July 2011)							
Calcium (Ca)	6.8		1.0	mg/L		21-DEC-17	R3917989
Sodium (Na)	6.2		1.0	mg/L		21-DEC-17	R3917989
Magnesium (Mg)	<1.0		1.0	mg/L		21-DEC-17	R3917989
SAR	0.65	SAR:M	0.10	SAR		21-DEC-17	R3917989
pH							
pH	7.53		0.10	pH units		20-DEC-17	R3916772
L2036241-5 PS-G-SED-6							
Sampled By: CR/ZM on 12-DEC-17 @ 16:40							
Matrix: SEDIMENT							
BTEX, F1-F4-O.Reg 153/04 (July 2011)							
BTEX-O.Reg 153/04 (July 2011)							
Benzene	<0.0068		0.0068	ug/g	18-DEC-17	19-DEC-17	R3915732
Ethylbenzene	<0.018		0.018	ug/g	18-DEC-17	19-DEC-17	R3915732
m+p-Xylenes	<0.030		0.030	ug/g	18-DEC-17	19-DEC-17	R3915732
o-Xylene	<0.020		0.020	ug/g	18-DEC-17	19-DEC-17	R3915732
Toluene	<0.080		0.080	ug/g	18-DEC-17	19-DEC-17	R3915732
Surrogate: 1,4-Difluorobenzene	87.6		50-140	%	18-DEC-17	19-DEC-17	R3915732
Surrogate: 4-Bromofluorobenzene	84.2		50-140	%	18-DEC-17	19-DEC-17	R3915732
F1-F4 Hydrocarbon Calculated Parameters							
F1-BTEX	<5.0		5.0	ug/g		22-DEC-17	
F2-Naphth	<10		10	ug/g		22-DEC-17	
F3-PAH	149		50	ug/g		22-DEC-17	
Total Hydrocarbons (C6-C50)	345		72	ug/g		22-DEC-17	
F1-O.Reg 153/04 (July 2011)							
F1 (C6-C10)	<5.0		5.0	ug/g	18-DEC-17	19-DEC-17	R3915732
Surrogate: 3,4-Dichlorotoluene	79.8		60-140	%	18-DEC-17	19-DEC-17	R3915732
F2-F4-O.Reg 153/04 (July 2011)							
F2 (C10-C16)	<10		10	ug/g	18-DEC-17	21-DEC-17	R3917661
F3 (C16-C34)	175		50	ug/g	18-DEC-17	21-DEC-17	R3917661
F4 (C34-C50)	170		50	ug/g	18-DEC-17	21-DEC-17	R3917661

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-5 PS-G-SED-6							
Sampled By: CR/ZM on 12-DEC-17 @ 16:40							
Matrix: SEDIMENT							
F2-F4-O.Reg 153/04 (July 2011)							
Chrom. to baseline at nC50	NO				18-DEC-17	21-DEC-17	R3917661
Surrogate: 2-Bromobenzotrifluoride	87.2		60-140	%	18-DEC-17	21-DEC-17	R3917661
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.050		0.050	ug/g		20-DEC-17	
Miscellaneous Parameters							
% Moisture	34.0		0.10	%	19-DEC-17	20-DEC-17	R3916328
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		22-DEC-17	
Chlordane (Total)	<0.028		0.028	ug/g		29-DEC-17	
Endosulfan (Total)	<0.063		0.063	ug/g		29-DEC-17	
F4G-SG (GHH-Silica)	720		250	ug/g	20-DEC-17	20-DEC-17	R3917800
TOC & FOC-O.Reg 153/04 (July 2011)							
Total Organic Carbon	2.89		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0289		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	2.48		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0248		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	2.80		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0280		0.0010		02-JAN-18	02-JAN-18	R3929771
Average Fraction Organic Carbon	0.0272		0.0010		02-JAN-18	02-JAN-18	R3929771
PAH-O.Reg 153/04 (July 2011)							
1-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
2-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthene	0.061		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthylene	1.09		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Anthracene	0.379		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(a)anthracene	2.17	R	0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(a)pyrene	2.53		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(b)fluoranthene	3.32		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(g,h,i)perylene	1.74		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(k)fluoranthene	1.02		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Chrysene	2.88		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Dibenzo(ah)anthracene	0.387		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluoranthene	6.18		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluorene	0.249	R	0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Indeno(1,2,3-cd)pyrene	1.83		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Naphthalene	0.015		0.013	ug/g	18-DEC-17	22-DEC-17	R3917986
Phenanthrene	1.81		0.046	ug/g	18-DEC-17	22-DEC-17	R3917986
Pyrene	6.71		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Surrogate: 2-Fluorobiphenyl	86.3		50-140	%	18-DEC-17	22-DEC-17	R3917986
Surrogate: p-Terphenyl d14	90.5		50-140	%	18-DEC-17	22-DEC-17	R3917986
DDD, DDE, DDT sums							
Total DDD	<0.028		0.028	ug/g		29-DEC-17	
Total DDE	<0.028		0.028	ug/g		29-DEC-17	
Total DDT	<0.028		0.028	ug/g		29-DEC-17	
OC Pesticides-O.Reg 153/04 (July 2011)							
Aldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
a-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
g-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
o,p-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-5 PS-G-SED-6							
Sampled By: CR/ZM on 12-DEC-17 @ 16:40							
Matrix: SEDIMENT							
OC Pesticides-O.Reg 153/04 (July 2011)							
op-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Dieldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan I	<0.060	DLQ	0.060	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan II	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor Epoxide	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobenzene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobutadiene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachloroethane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Methoxychlor	<0.10	DLQ	0.10	ug/g	18-DEC-17	29-DEC-17	R3923851
Surrogate: 2-Fluorobiphenyl	95.2		50-140	%	18-DEC-17	29-DEC-17	R3923851
Surrogate: d14-Terphenyl	71.7		50-140	%	18-DEC-17	29-DEC-17	R3923851
Metals/Inorg-O. Reg 153/04 (July 2011)							
Boron-HWE-O.Reg 153/04 (July 2011)							
Boron (B), Hot Water Ext.	0.30		0.10	ug/g	21-DEC-17	21-DEC-17	R3917998
Conductivity (EC)							
Conductivity	0.309		0.0040	mS/cm		21-DEC-17	R3917497
Cyanide (WAD)-O.Reg 153/04 (July 2011)							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	18-DEC-17	19-DEC-17	R3916360
Hexavalent Chromium in Soil							
Chromium, Hexavalent	<0.20		0.20	ug/g	18-DEC-17	19-DEC-17	R3915747
Mercury in Soil by CVAAS							
Mercury (Hg)	0.0267		0.0050	ug/g	21-DEC-17	21-DEC-17	R3917320
Metals in Soil by CRC ICPMS							
Antimony (Sb)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Arsenic (As)	3.6		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Barium (Ba)	55.7		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Beryllium (Be)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Boron (B)	<5.0		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cadmium (Cd)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Chromium (Cr)	12.6		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cobalt (Co)	3.9		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Copper (Cu)	18.4		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Lead (Pb)	182		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Molybdenum (Mo)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Nickel (Ni)	9.2		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Selenium (Se)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Silver (Ag)	<0.20		0.20	ug/g	21-DEC-17	21-DEC-17	R3917988
Thallium (Tl)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Uranium (U)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Vanadium (V)	19.6		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Zinc (Zn)	107		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
SAR-O.Reg 153/04 (July 2011)							
Calcium (Ca)	13.4		1.0	mg/L		21-DEC-17	R3917989
Sodium (Na)	8.3		1.0	mg/L		21-DEC-17	R3917989
Magnesium (Mg)	1.3		1.0	mg/L		21-DEC-17	R3917989
SAR	0.58		0.10	SAR		21-DEC-17	R3917989
pH							
pH	7.43		0.10	pH units		20-DEC-17	R3916772

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-5 PS-G-SED-6							
Sampled By: CR/ZM on 12-DEC-17 @ 16:40							
Matrix: SEDIMENT							
L2036241-6 PS-G-SED-66							
Sampled By: CR/ZM on 12-DEC-17 @ 16:40							
Matrix: SEDIMENT							
BTEX, F1-F4-O.Reg 153/04 (July 2011)							
BTEX-O.Reg 153/04 (July 2011)							
Benzene	<0.0068		0.0068	ug/g	18-DEC-17	19-DEC-17	R3915732
Ethylbenzene	<0.018		0.018	ug/g	18-DEC-17	19-DEC-17	R3915732
m+p-Xylenes	<0.030		0.030	ug/g	18-DEC-17	19-DEC-17	R3915732
o-Xylene	<0.020		0.020	ug/g	18-DEC-17	19-DEC-17	R3915732
Toluene	<0.080		0.080	ug/g	18-DEC-17	19-DEC-17	R3915732
Surrogate: 1,4-Difluorobenzene	96.4		50-140	%	18-DEC-17	19-DEC-17	R3915732
Surrogate: 4-Bromofluorobenzene	94.3		50-140	%	18-DEC-17	19-DEC-17	R3915732
F1-F4 Hydrocarbon Calculated Parameters							
F1-BTEX	<5.0		5.0	ug/g		22-DEC-17	
F2-Naphth	<10		10	ug/g		22-DEC-17	
F3-PAH	150		50	ug/g		22-DEC-17	
Total Hydrocarbons (C6-C50)	332		72	ug/g		22-DEC-17	
F1-O.Reg 153/04 (July 2011)							
F1 (C6-C10)	<5.0		5.0	ug/g	18-DEC-17	19-DEC-17	R3915732
Surrogate: 3,4-Dichlorotoluene	82.9		60-140	%	18-DEC-17	19-DEC-17	R3915732
F2-F4-O.Reg 153/04 (July 2011)							
F2 (C10-C16)	<10		10	ug/g	18-DEC-17	21-DEC-17	R3917661
F3 (C16-C34)	172		50	ug/g	18-DEC-17	21-DEC-17	R3917661
F4 (C34-C50)	161		50	ug/g	18-DEC-17	21-DEC-17	R3917661
Chrom. to baseline at nC50	NO				18-DEC-17	21-DEC-17	R3917661
Surrogate: 2-Bromobenzotrifluoride	69.6		60-140	%	18-DEC-17	21-DEC-17	R3917661
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.050		0.050	ug/g		20-DEC-17	
Miscellaneous Parameters							
% Moisture	35.5		0.10	%	19-DEC-17	20-DEC-17	R3916328
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		22-DEC-17	
Chlordane (Total)	<0.028		0.028	ug/g		29-DEC-17	
Endosulfan (Total)	<0.054		0.054	ug/g		29-DEC-17	
F4G-SG (GHH-Silica)	760		250	ug/g	20-DEC-17	20-DEC-17	R3917800
TOC & FOC-O.Reg 153/04 (July 2011)							
Total Organic Carbon	2.63		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0263		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	3.02		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0302		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	2.78		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0278		0.0010		02-JAN-18	02-JAN-18	R3929771
Average Fraction Organic Carbon	0.0281		0.0010		02-JAN-18	02-JAN-18	R3929771
PAH-O.Reg 153/04 (July 2011)							
1-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
2-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthene	0.061		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthylene	0.886		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Anthracene	0.314		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(a)anthracene	1.48	R	0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(a)pyrene	1.87		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(b)fluoranthene	2.67		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(g,h,i)perylene	1.36		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-6 PS-G-SED-66							
Sampled By: CR/ZM on 12-DEC-17 @ 16:40							
Matrix: SEDIMENT							
PAH-O.Reg 153/04 (July 2011)							
Benzo(k)fluoranthene	0.808		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Chrysene	2.21		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Dibenzo(ah)anthracene	0.276		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluoranthene	5.72		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluorene	0.242		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Indeno(1,2,3-cd)pyrene	1.47		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Naphthalene	0.016		0.013	ug/g	18-DEC-17	22-DEC-17	R3917986
Phenanthrene	1.40		0.046	ug/g	18-DEC-17	22-DEC-17	R3917986
Pyrene	6.16		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Surrogate: 2-Fluorobiphenyl	86.1		50-140	%	18-DEC-17	22-DEC-17	R3917986
Surrogate: p-Terphenyl d14	91.6		50-140	%	18-DEC-17	22-DEC-17	R3917986
DDD, DDE, DDT sums							
Total DDD	<0.028		0.028	ug/g		29-DEC-17	
Total DDE	<0.028		0.028	ug/g		29-DEC-17	
Total DDT	<0.028		0.028	ug/g		29-DEC-17	
OC Pesticides-O.Reg 153/04 (July 2011)							
Aldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
a-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
g-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
o,p-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Dieldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan I	<0.050	DLQ	0.050	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan II	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor Epoxide	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobenzene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobutadiene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachloroethane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Methoxychlor	<0.15	DLQ	0.15	ug/g	18-DEC-17	29-DEC-17	R3923851
Surrogate: 2-Fluorobiphenyl	95.3		50-140	%	18-DEC-17	29-DEC-17	R3923851
Surrogate: d14-Terphenyl	75.5		50-140	%	18-DEC-17	29-DEC-17	R3923851
Metals/Inorg-O. Reg 153/04 (July 2011)							
Boron-HWE-O.Reg 153/04 (July 2011)							
Boron (B), Hot Water Ext.	0.31		0.10	ug/g	21-DEC-17	21-DEC-17	R3917998
Conductivity (EC)							
Conductivity	0.353		0.0040	mS/cm		21-DEC-17	R3917497
Cyanide (WAD)-O.Reg 153/04 (July 2011)							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	19-DEC-17	20-DEC-17	R3917162
Hexavalent Chromium in Soil							
Chromium, Hexavalent	<0.20		0.20	ug/g	18-DEC-17	19-DEC-17	R3915747
Mercury in Soil by CVAAS							
Mercury (Hg)	0.0281		0.0050	ug/g	21-DEC-17	21-DEC-17	R3917320
Metals in Soil by CRC ICPMS							
Antimony (Sb)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Arsenic (As)	3.7		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-6 PS-G-SED-66							
Sampled By: CR/ZM on 12-DEC-17 @ 16:40							
Matrix: SEDIMENT							
Metals in Soil by CRC ICPMS							
Barium (Ba)	59.2		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Beryllium (Be)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Boron (B)	<5.0		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cadmium (Cd)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Chromium (Cr)	11.9		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cobalt (Co)	4.1		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Copper (Cu)	14.8		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Lead (Pb)	191		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Molybdenum (Mo)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Nickel (Ni)	8.9		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Selenium (Se)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Silver (Ag)	<0.20		0.20	ug/g	21-DEC-17	21-DEC-17	R3917988
Thallium (Tl)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Uranium (U)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Vanadium (V)	19.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Zinc (Zn)	115		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
SAR-O.Reg 153/04 (July 2011)							
Calcium (Ca)	18.7		1.0	mg/L		21-DEC-17	R3917989
Sodium (Na)	8.1		1.0	mg/L		21-DEC-17	R3917989
Magnesium (Mg)	1.6		1.0	mg/L		21-DEC-17	R3917989
SAR	0.48		0.10	SAR		21-DEC-17	R3917989
pH							
pH	7.26		0.10	pH units		20-DEC-17	R3916772
L2036241-7 PS-G-SW-2							
Sampled By: CR/ZM on 12-DEC-17 @ 12:40							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	18.8		2.0	mg/L	18-DEC-17	19-DEC-17	R3915659
L2036241-8 PS-G-SW-2D							
Sampled By: CR/ZM on 12-DEC-17 @ 13:35							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	2260	DLHC	4.0	mg/L	18-DEC-17	19-DEC-17	R3915659
L2036241-9 PS-G-SW-3							
Sampled By: CR/ZM on 12-DEC-17 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	18-DEC-17	19-DEC-17	R3916343
L2036241-10 PS-G-SW-3D							
Sampled By: CR/ZM on 12-DEC-17 @ 16:00							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	4300	DLHC	40	mg/L	18-DEC-17	19-DEC-17	R3916343
L2036241-11 PS-G-SW-6							
Sampled By: CR/ZM on 12-DEC-17 @ 16:15							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	18-DEC-17	19-DEC-17	R3916343

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-12 PS-G-SW-6D							
Sampled By: CR/ZM on 12-DEC-17 @ 16:45							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	640	DLHC	4.0	mg/L	18-DEC-17	19-DEC-17	R3916343
L2036241-13 PS-G-SED-5							
Sampled By: CR/ZM on 13-DEC-17 @ 09:30							
Matrix: SEDIMENT							
BTEX, F1-F4-O.Reg 153/04 (July 2011)							
BTEX-O.Reg 153/04 (July 2011)							
Benzene	<0.0068		0.0068	ug/g	18-DEC-17	19-DEC-17	R3915687
Ethylbenzene	<0.018		0.018	ug/g	18-DEC-17	19-DEC-17	R3915687
m+p-Xylenes	<0.030		0.030	ug/g	18-DEC-17	19-DEC-17	R3915687
o-Xylene	<0.020		0.020	ug/g	18-DEC-17	19-DEC-17	R3915687
Toluene	<0.080		0.080	ug/g	18-DEC-17	19-DEC-17	R3915687
Surrogate: 1,4-Difluorobenzene	98.3		50-140	%	18-DEC-17	19-DEC-17	R3915687
Surrogate: 4-Bromofluorobenzene	98.0		50-140	%	18-DEC-17	19-DEC-17	R3915687
F1-F4 Hydrocarbon Calculated Parameters							
F1-BTEX	<5.0		5.0	ug/g		22-DEC-17	
F2-Naphth	<10		10	ug/g		22-DEC-17	
F3-PAH	94		50	ug/g		22-DEC-17	
Total Hydrocarbons (C6-C50)	251		72	ug/g		22-DEC-17	
F1-O.Reg 153/04 (July 2011)							
F1 (C6-C10)	<5.0		5.0	ug/g	18-DEC-17	19-DEC-17	R3915687
Surrogate: 3,4-Dichlorotoluene	90.4		60-140	%	18-DEC-17	19-DEC-17	R3915687
F2-F4-O.Reg 153/04 (July 2011)							
F2 (C10-C16)	<10		10	ug/g	18-DEC-17	21-DEC-17	R3917661
F3 (C16-C34)	98		50	ug/g	18-DEC-17	21-DEC-17	R3917661
F4 (C34-C50)	153		50	ug/g	18-DEC-17	21-DEC-17	R3917661
Chrom. to baseline at nC50	NO				18-DEC-17	21-DEC-17	R3917661
Surrogate: 2-Bromobenzotrifluoride	78.3		60-140	%	18-DEC-17	21-DEC-17	R3917661
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.050		0.050	ug/g		20-DEC-17	
Miscellaneous Parameters							
% Moisture	30.7		0.10	%	19-DEC-17	20-DEC-17	R3916328
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		22-DEC-17	
Chlordane (Total)	<0.028		0.028	ug/g		29-DEC-17	
Endosulfan (Total)	<0.028		0.028	ug/g		29-DEC-17	
F4G-SG (GHH-Silica)	730		250	ug/g	20-DEC-17	20-DEC-17	R3917800
TOC & FOC-O.Reg 153/04 (July 2011)							
Total Organic Carbon	0.87		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0087		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	1.12		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0112		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	1.12		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0112		0.0010		02-JAN-18	02-JAN-18	R3929771
Average Fraction Organic Carbon	0.0104		0.0010		02-JAN-18	02-JAN-18	R3929771
PAH-O.Reg 153/04 (July 2011)							
1-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
2-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthylene	0.259		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Anthracene	0.072		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(a)anthracene	0.308	R	0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(a)pyrene	0.448		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-13 PS-G-SED-5							
Sampled By: CR/ZM on 13-DEC-17 @ 09:30							
Matrix: SEDIMENT							
PAH-O.Reg 153/04 (July 2011)							
Benzo(b)fluoranthene	0.580		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(g,h,i)perylene	0.340		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(k)fluoranthene	0.170		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Chrysene	0.376		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Dibenzo(ah)anthracene	0.071		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluoranthene	0.774		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluorene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Indeno(1,2,3-cd)pyrene	0.341		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Naphthalene	<0.013		0.013	ug/g	18-DEC-17	22-DEC-17	R3917986
Phenanthrene	0.248		0.046	ug/g	18-DEC-17	22-DEC-17	R3917986
Pyrene	0.919		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Surrogate: 2-Fluorobiphenyl	87.8		50-140	%	18-DEC-17	22-DEC-17	R3917986
Surrogate: p-Terphenyl d14	92.9		50-140	%	18-DEC-17	22-DEC-17	R3917986
DDD, DDE, DDT sums							
Total DDD	<0.028		0.028	ug/g		29-DEC-17	
Total DDE	<0.028		0.028	ug/g		29-DEC-17	
Total DDT	<0.028		0.028	ug/g		29-DEC-17	
OC Pesticides-O.Reg 153/04 (July 2011)							
Aldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
a-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
g-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
o,p-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Dieldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan I	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan II	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor Epoxide	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobenzene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobutadiene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachloroethane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Methoxychlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Surrogate: 2-Fluorobiphenyl	100.3		50-140	%	18-DEC-17	29-DEC-17	R3923851
Surrogate: d14-Terphenyl	80.2		50-140	%	18-DEC-17	29-DEC-17	R3923851
Metals/Inorg-O. Reg 153/04 (July 2011)							
Boron-HWE-O.Reg 153/04 (July 2011)							
Boron (B), Hot Water Ext.	0.22		0.10	ug/g	21-DEC-17	21-DEC-17	R3917998
Conductivity (EC)							
Conductivity	0.217		0.0040	mS/cm		21-DEC-17	R3917497
Cyanide (WAD)-O.Reg 153/04 (July 2011)							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	19-DEC-17	20-DEC-17	R3917162
Hexavalent Chromium in Soil							
Chromium, Hexavalent	<0.20		0.20	ug/g	18-DEC-17	19-DEC-17	R3915747
Mercury in Soil by CVAAS							
Mercury (Hg)	0.0167		0.0050	ug/g	21-DEC-17	21-DEC-17	R3917320
Metals in Soil by CRC ICPMS							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-13 PS-G-SED-5							
Sampled By: CR/ZM on 13-DEC-17 @ 09:30							
Matrix: SEDIMENT							
Metals in Soil by CRC ICPMS							
Antimony (Sb)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Arsenic (As)	1.9		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Barium (Ba)	97.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Beryllium (Be)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Boron (B)	<5.0		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cadmium (Cd)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Chromium (Cr)	10.7		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cobalt (Co)	4.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Copper (Cu)	9.9		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Lead (Pb)	11.5		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Molybdenum (Mo)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Nickel (Ni)	6.9		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Selenium (Se)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Silver (Ag)	<0.20		0.20	ug/g	21-DEC-17	21-DEC-17	R3917988
Thallium (Tl)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Uranium (U)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Vanadium (V)	22.2		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Zinc (Zn)	58.8		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
SAR-O.Reg 153/04 (July 2011)							
Calcium (Ca)	6.4		1.0	mg/L		21-DEC-17	R3917989
Sodium (Na)	5.8		1.0	mg/L		21-DEC-17	R3917989
Magnesium (Mg)	<1.0		1.0	mg/L		21-DEC-17	R3917989
SAR	0.63	SAR:M	0.10	SAR		21-DEC-17	R3917989
pH							
pH	7.35		0.10	pH units		20-DEC-17	R3916772
L2036241-14 PS-E-SW-2							
Sampled By: CR/ZM on 13-DEC-17 @ 11:10							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	18-DEC-17	19-DEC-17	R3915640
L2036241-15 PS-E-SW-2D							
Sampled By: CR/ZM on 13-DEC-17 @ 13:00							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	15.4		2.0	mg/L	20-DEC-17	21-DEC-17	R3917128
L2036241-16 PS-E-SW-3							
Sampled By: CR/ZM on 13-DEC-17 @ 12:00							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	4.1		2.0	mg/L	19-DEC-17	20-DEC-17	R3916336
L2036241-17 PS-E-SW-3D							
Sampled By: CR/ZM on 13-DEC-17 @ 13:30							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	20-DEC-17	21-DEC-17	R3917128
L2036241-18 PS-E-SW-5							
Sampled By: CR/ZM on 13-DEC-17 @ 12:30							
Matrix: WATER							
Miscellaneous Parameters							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-18 PS-E-SW-5							
Sampled By: CR/ZM on 13-DEC-17 @ 12:30							
Matrix: WATER							
Total Suspended Solids	10.1		2.0	mg/L	19-DEC-17	20-DEC-17	R3916336
L2036241-19 PS-D-SW-3							
Sampled By: CR/ZM on 14-DEC-17 @ 10:05							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	2.7		2.0	mg/L	19-DEC-17	20-DEC-17	R3916354
L2036241-20 PS-D-SW-3D							
Sampled By: CR/ZM on 14-DEC-17 @ 10:30							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	137		2.0	mg/L	20-DEC-17	21-DEC-17	R3917128
L2036241-21 PS-D-SW-11							
Sampled By: CR/ZM on 14-DEC-17 @ 14:25							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	19-DEC-17	20-DEC-17	R3916354
L2036241-22 PS-D-SW-111							
Sampled By: CR/ZM on 14-DEC-17 @ 14:25							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	19-DEC-17	20-DEC-17	R3916354
L2036241-23 PS-D-SW-11D							
Sampled By: CR/ZM on 14-DEC-17 @ 14:50							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	48.4		2.0	mg/L	20-DEC-17	21-DEC-17	R3917128
L2036241-24 PS-D-SW-19							
Sampled By: CR/ZM on 14-DEC-17 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	3.8		2.0	mg/L	19-DEC-17	20-DEC-17	R3916354
L2036241-25 PS-D-SW-19D							
Sampled By: CR/ZM on 14-DEC-17 @ 15:20							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	250		2.0	mg/L	19-DEC-17	20-DEC-17	R3916354
L2036241-26 PS-D-SED-19 (BULK)							
Sampled By: CR/ZM on 14-DEC-17 @ 15:15							
Matrix: SEDIMENT							
BTEX, F1-F4-O.Reg 153/04 (July 2011)							
BTEX-O.Reg 153/04 (July 2011)							
Benzene	<0.0068		0.0068	ug/g	18-DEC-17	19-DEC-17	R3915687
Ethylbenzene	<0.018		0.018	ug/g	18-DEC-17	19-DEC-17	R3915687
m+p-Xylenes	<0.030		0.030	ug/g	18-DEC-17	19-DEC-17	R3915687
o-Xylene	<0.020		0.020	ug/g	18-DEC-17	19-DEC-17	R3915687
Toluene	<0.080		0.080	ug/g	18-DEC-17	19-DEC-17	R3915687
Surrogate: 1,4-Difluorobenzene	96.2		50-140	%	18-DEC-17	19-DEC-17	R3915687
Surrogate: 4-Bromofluorobenzene	96.8		50-140	%	18-DEC-17	19-DEC-17	R3915687
F1-F4 Hydrocarbon Calculated Parameters							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-26 PS-D-SED-19 (BULK)							
Sampled By: CR/ZM on 14-DEC-17 @ 15:15							
Matrix: SEDIMENT							
F1-F4 Hydrocarbon Calculated Parameters							
F1-BTEX	<5.0		5.0	ug/g		22-DEC-17	
F2-Naphth	<10		10	ug/g		22-DEC-17	
F3-PAH	<50		50	ug/g		22-DEC-17	
Total Hydrocarbons (C6-C50)	<72		72	ug/g		22-DEC-17	
F1-O.Reg 153/04 (July 2011)							
F1 (C6-C10)	<5.0		5.0	ug/g	18-DEC-17	19-DEC-17	R3915687
Surrogate: 3,4-Dichlorotoluene	94.8		60-140	%	18-DEC-17	19-DEC-17	R3915687
F2-F4-O.Reg 153/04 (July 2011)							
F2 (C10-C16)	<10		10	ug/g	18-DEC-17	21-DEC-17	R3917661
F3 (C16-C34)	<50		50	ug/g	18-DEC-17	21-DEC-17	R3917661
F4 (C34-C50)	<50		50	ug/g	18-DEC-17	21-DEC-17	R3917661
Chrom. to baseline at nC50	YES				18-DEC-17	21-DEC-17	R3917661
Surrogate: 2-Bromobenzotrifluoride	75.6		60-140	%	18-DEC-17	21-DEC-17	R3917661
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.050		0.050	ug/g		20-DEC-17	
Miscellaneous Parameters							
% Moisture	26.2		0.10	%	19-DEC-17	20-DEC-17	R3916328
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		22-DEC-17	
Chlordane (Total)	<0.028		0.028	ug/g		29-DEC-17	
Endosulfan (Total)	<0.028		0.028	ug/g		29-DEC-17	
TOC & FOC-O.Reg 153/04 (July 2011)							
Total Organic Carbon	1.36		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0136		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	1.46		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0146		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	1.57		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0157		0.0010		02-JAN-18	02-JAN-18	R3929771
Average Fraction Organic Carbon	0.0146		0.0010		02-JAN-18	02-JAN-18	R3929771
PAH-O.Reg 153/04 (July 2011)							
1-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
2-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthylene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Anthracene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(a)anthracene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(a)pyrene	0.054		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(b)fluoranthene	0.093		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(g,h,i)perylene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(k)fluoranthene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Chrysene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Dibenzo(ah)anthracene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluoranthene	0.068		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluorene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Naphthalene	<0.013		0.013	ug/g	18-DEC-17	22-DEC-17	R3917986
Phenanthrene	<0.046		0.046	ug/g	18-DEC-17	22-DEC-17	R3917986
Pyrene	0.063		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Surrogate: 2-Fluorobiphenyl	87.0		50-140	%	18-DEC-17	22-DEC-17	R3917986
Surrogate: p-Terphenyl d14	91.0		50-140	%	18-DEC-17	22-DEC-17	R3917986
DDD, DDE, DDT sums							
Total DDD	<0.028		0.028	ug/g		29-DEC-17	

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-26 PS-D-SED-19 (BULK)							
Sampled By: CR/ZM on 14-DEC-17 @ 15:15							
Matrix: SEDIMENT							
DDD, DDE, DDT sums							
Total DDE	<0.028		0.028	ug/g		29-DEC-17	
Total DDT	<0.028		0.028	ug/g		29-DEC-17	
OC Pesticides-O.Reg 153/04 (July 2011)							
Aldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
a-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
g-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
o,p-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Dieldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan I	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan II	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor Epoxide	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobenzene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobutadiene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachloroethane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Methoxychlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Surrogate: 2-Fluorobiphenyl	96.8		50-140	%	18-DEC-17	29-DEC-17	R3923851
Surrogate: d14-Terphenyl	80.5		50-140	%	18-DEC-17	29-DEC-17	R3923851
Metals/Inorg-O. Reg 153/04 (July 2011)							
Boron-HWE-O.Reg 153/04 (July 2011)							
Boron (B), Hot Water Ext.	0.12		0.10	ug/g	21-DEC-17	21-DEC-17	R3917998
Conductivity (EC)							
Conductivity	0.297		0.0040	mS/cm		21-DEC-17	R3917497
Cyanide (WAD)-O.Reg 153/04 (July 2011)							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	19-DEC-17	20-DEC-17	R3917162
Hexavalent Chromium in Soil							
Chromium, Hexavalent	<0.20		0.20	ug/g	18-DEC-17	19-DEC-17	R3915747
Mercury in Soil by CVAAS							
Mercury (Hg)	0.0190		0.0050	ug/g	21-DEC-17	21-DEC-17	R3917320
Metals in Soil by CRC ICPMS							
Antimony (Sb)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Arsenic (As)	2.2		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Barium (Ba)	75.7		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Beryllium (Be)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Boron (B)	<5.0		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cadmium (Cd)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Chromium (Cr)	11.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cobalt (Co)	3.7		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Copper (Cu)	16.2		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Lead (Pb)	24.2		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Molybdenum (Mo)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Nickel (Ni)	8.2		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Selenium (Se)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Silver (Ag)	<0.20		0.20	ug/g	21-DEC-17	21-DEC-17	R3917988
Thallium (Tl)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-26 PS-D-SED-19 (BULK)							
Sampled By: CR/ZM on 14-DEC-17 @ 15:15							
Matrix: SEDIMENT							
Metals in Soil by CRC ICPMS							
Uranium (U)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Vanadium (V)	22.8		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Zinc (Zn)	62.1		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
SAR-O.Reg 153/04 (July 2011)							
Calcium (Ca)	13.6		1.0	mg/L		21-DEC-17	R3917989
Sodium (Na)	5.2		1.0	mg/L		21-DEC-17	R3917989
Magnesium (Mg)	1.4		1.0	mg/L		21-DEC-17	R3917989
SAR	0.36		0.10	SAR		21-DEC-17	R3917989
pH							
pH	7.40		0.10	pH units		20-DEC-17	R3916772
L2036241-27 PS-D-SED-19 (TCLP)							
Sampled By: CR/ZM on 14-DEC-17 @ 15:15							
Matrix: SEDIMENT							
O.Reg 347 TCLP Metals and Conventionals							
Cyanide for O. Reg 347							
Cyanide, Weak Acid Diss	<0.10		0.10	mg/L		19-DEC-17	R3916361
Fluoride (F) for O. Reg 347							
Fluoride (F)	<10		10	mg/L		20-DEC-17	R3917490
Leachate Procedure for Reg 347							
Initial pH	9.23		0.10	pH units		19-DEC-17	R3916591
Final pH	6.38		0.10	pH units		19-DEC-17	R3916591
Mercury (CVAA) for O.Reg 347							
Mercury (Hg)	<0.00010		0.00010	mg/L		20-DEC-17	R3916530
Nitrate/Nitrite-N for O. Reg 347							
Nitrate-N	<2.0		2.0	mg/L		20-DEC-17	R3917490
Nitrite-N	<2.0		2.0	mg/L		20-DEC-17	R3917490
Nitrate and Nitrite as N	<4.0		4.0	mg/L		20-DEC-17	R3917490
O.Reg 347 TCLP Leachable Metals							
Silver (Ag)	<0.0050		0.0050	mg/L		19-DEC-17	R3916218
Arsenic (As)	<0.050		0.050	mg/L		19-DEC-17	R3916218
Boron (B)	<2.5		2.5	mg/L		19-DEC-17	R3916218
Barium (Ba)	<0.50		0.50	mg/L		19-DEC-17	R3916218
Cadmium (Cd)	<0.0050		0.0050	mg/L		19-DEC-17	R3916218
Chromium (Cr)	<0.050		0.050	mg/L		19-DEC-17	R3916218
Lead (Pb)	<0.050		0.050	mg/L		19-DEC-17	R3916218
Selenium (Se)	<0.025		0.025	mg/L		19-DEC-17	R3916218
Uranium (U)	<0.25		0.25	mg/L		19-DEC-17	R3916218
BNAs for O. Reg 347							
2,3,4,6-Tetrachlorophenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
2,4,5-Trichlorophenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
2,4,6-Trichlorophenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
2,4-Dichlorophenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
2,4-Dinitrotoluene	<0.0040		0.0040	mg/L	20-DEC-17	21-DEC-17	R3917985
2-Methylphenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
3&4-Methylphenol	<0.010		0.010	mg/L	20-DEC-17	21-DEC-17	R3917985
Benzo(a)pyrene	<0.00020		0.00020	mg/L	20-DEC-17	22-DEC-17	R3917985
Hexachlorobenzene	<0.0040		0.0040	mg/L	20-DEC-17	21-DEC-17	R3917985
Hexachlorobutadiene	<0.0040		0.0040	mg/L	20-DEC-17	21-DEC-17	R3917985
Hexachloroethane	<0.0040		0.0040	mg/L	20-DEC-17	21-DEC-17	R3917985
Nitrobenzene	<0.0040		0.0040	mg/L	20-DEC-17	21-DEC-17	R3917985

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-27 PS-D-SED-19 (TCLP)							
Sampled By: CR/ZM on 14-DEC-17 @ 15:15							
Matrix: SEDIMENT							
BNAs for O. Reg 347							
Pentachlorophenol	<0.0050		0.0050	mg/L	20-DEC-17	21-DEC-17	R3917985
Cresols (total)	<0.015		0.015	mg/L	20-DEC-17	21-DEC-17	R3917985
Surrogate: Nitrobenzene d5	96.6		50-150	%	20-DEC-17	21-DEC-17	R3917985
Surrogate: 2-Fluorobiphenyl	92.3		40-160	%	20-DEC-17	21-DEC-17	R3917985
Surrogate: p-Terphenyl d14	124.8		60-140	%	20-DEC-17	21-DEC-17	R3917985
Surrogate: 2,4,6-Tribromophenol	100.0		50-150	%	20-DEC-17	21-DEC-17	R3917985
O.Reg. 347 TCLP VOCs incl leach							
VOC for O. Reg 347							
1,1-Dichloroethylene	<0.025		0.025	mg/L		20-DEC-17	R3916548
1,2-Dichlorobenzene	<0.025		0.025	mg/L		20-DEC-17	R3916548
1,2-Dichloroethane	<0.025		0.025	mg/L		20-DEC-17	R3916548
1,4-Dichlorobenzene	<0.025		0.025	mg/L		20-DEC-17	R3916548
Benzene	<0.025		0.025	mg/L		20-DEC-17	R3916548
Carbon tetrachloride	<0.025		0.025	mg/L		20-DEC-17	R3916548
Chlorobenzene	<0.025		0.025	mg/L		20-DEC-17	R3916548
Chloroform	<0.10		0.10	mg/L		20-DEC-17	R3916548
Dichloromethane	<0.50		0.50	mg/L		20-DEC-17	R3916548
Methyl Ethyl Ketone	<1.0		1.0	mg/L		20-DEC-17	R3916548
Tetrachloroethylene	<0.025		0.025	mg/L		20-DEC-17	R3916548
Trichloroethylene	<0.025		0.025	mg/L		20-DEC-17	R3916548
Vinyl chloride	<0.050		0.050	mg/L		20-DEC-17	R3916548
Surrogate: 1,4-Difluorobenzene	96.4		70-130	%		20-DEC-17	R3916548
Surrogate: 4-Bromofluorobenzene	92.5		70-130	%		20-DEC-17	R3916548
L2036241-28 PS-D-SED-199							
Sampled By: CR/ZM on 14-DEC-17 @ 15:15							
Matrix: SEDIMENT							
BTEX, F1-F4-O.Reg 153/04 (July 2011)							
BTEX-O.Reg 153/04 (July 2011)							
Benzene	<0.0068		0.0068	ug/g	18-DEC-17	19-DEC-17	R3915687
Ethylbenzene	<0.018		0.018	ug/g	18-DEC-17	19-DEC-17	R3915687
m+p-Xylenes	<0.030		0.030	ug/g	18-DEC-17	19-DEC-17	R3915687
o-Xylene	<0.020		0.020	ug/g	18-DEC-17	19-DEC-17	R3915687
Toluene	<0.080		0.080	ug/g	18-DEC-17	19-DEC-17	R3915687
Surrogate: 1,4-Difluorobenzene	96.1		50-140	%	18-DEC-17	19-DEC-17	R3915687
Surrogate: 4-Bromofluorobenzene	96.7		50-140	%	18-DEC-17	19-DEC-17	R3915687
F1-F4 Hydrocarbon Calculated Parameters							
F1-BTEX	<5.0		5.0	ug/g		22-DEC-17	
F2-Naphth	<10		10	ug/g		22-DEC-17	
F3-PAH	<50		50	ug/g		22-DEC-17	
Total Hydrocarbons (C6-C50)	<72		72	ug/g		22-DEC-17	
F1-O.Reg 153/04 (July 2011)							
F1 (C6-C10)	<5.0		5.0	ug/g	18-DEC-17	19-DEC-17	R3915687
Surrogate: 3,4-Dichlorotoluene	97.7		60-140	%	18-DEC-17	19-DEC-17	R3915687
F2-F4-O.Reg 153/04 (July 2011)							
F2 (C10-C16)	<10		10	ug/g	18-DEC-17	21-DEC-17	R3917661
F3 (C16-C34)	<50		50	ug/g	18-DEC-17	21-DEC-17	R3917661
F4 (C34-C50)	<50		50	ug/g	18-DEC-17	21-DEC-17	R3917661
Chrom. to baseline at nC50	YES				18-DEC-17	21-DEC-17	R3917661
Surrogate: 2-Bromobenzotrifluoride	77.0		60-140	%	18-DEC-17	21-DEC-17	R3917661
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.050		0.050	ug/g		20-DEC-17	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-28 PS-D-SED-199							
Sampled By: CR/ZM on 14-DEC-17 @ 15:15							
Matrix: SEDIMENT							
Miscellaneous Parameters							
% Moisture	21.6		0.10	%	19-DEC-17	20-DEC-17	R3916328
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		22-DEC-17	
Chlordane (Total)	<0.028		0.028	ug/g		29-DEC-17	
Endosulfan (Total)	<0.028		0.028	ug/g		29-DEC-17	
TOC & FOC-O.Reg 153/04 (July 2011)							
Total Organic Carbon	1.48		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0148		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	1.50		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0150		0.0010		02-JAN-18	02-JAN-18	R3929771
Total Organic Carbon	1.52		0.10	%	02-JAN-18	02-JAN-18	R3929771
Fraction Organic Carbon	0.0152		0.0010		02-JAN-18	02-JAN-18	R3929771
Average Fraction Organic Carbon	0.0150		0.0010		02-JAN-18	02-JAN-18	R3929771
PAH-O.Reg 153/04 (July 2011)							
1-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
2-Methylnaphthalene	<0.030		0.030	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Acenaphthylene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Anthracene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(a)anthracene	0.073		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(a)pyrene	0.065		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(b)fluoranthene	0.111		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(g,h,i)perylene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Benzo(k)fluoranthene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Chrysene	0.080		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Dibenzo(ah)anthracene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluoranthene	0.051		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Fluorene	<0.050		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Indeno(1,2,3-cd)pyrene	0.051		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Naphthalene	<0.013		0.013	ug/g	18-DEC-17	22-DEC-17	R3917986
Phenanthrene	<0.046		0.046	ug/g	18-DEC-17	22-DEC-17	R3917986
Pyrene	0.054		0.050	ug/g	18-DEC-17	22-DEC-17	R3917986
Surrogate: 2-Fluorobiphenyl	85.9		50-140	%	18-DEC-17	22-DEC-17	R3917986
Surrogate: p-Terphenyl d14	90.7		50-140	%	18-DEC-17	22-DEC-17	R3917986
DDD, DDE, DDT sums							
Total DDD	<0.028		0.028	ug/g		29-DEC-17	
Total DDE	<0.028		0.028	ug/g		29-DEC-17	
Total DDT	<0.028		0.028	ug/g		29-DEC-17	
OC Pesticides-O.Reg 153/04 (July 2011)							
Aldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
a-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
g-chlordane	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDD	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
o,p-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDE	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
op-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
pp-DDT	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Dieldrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan I	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endosulfan II	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Endrin	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2036241-28 PS-D-SED-199							
Sampled By: CR/ZM on 14-DEC-17 @ 15:15							
Matrix: SEDIMENT							
OC Pesticides-O.Reg 153/04 (July 2011)							
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Heptachlor Epoxide	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobenzene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachlorobutadiene	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Hexachloroethane	<0.010		0.010	ug/g	18-DEC-17	29-DEC-17	R3923851
Methoxychlor	<0.020		0.020	ug/g	18-DEC-17	29-DEC-17	R3923851
Surrogate: 2-Fluorobiphenyl	99.2		50-140	%	18-DEC-17	29-DEC-17	R3923851
Surrogate: d14-Terphenyl	84.7		50-140	%	18-DEC-17	29-DEC-17	R3923851
Metals/Inorg-O. Reg 153/04 (July 2011)							
Boron-HWE-O.Reg 153/04 (July 2011)							
Boron (B), Hot Water Ext.	0.14		0.10	ug/g	21-DEC-17	21-DEC-17	R3917998
Conductivity (EC)							
Conductivity	0.211		0.0040	mS/cm		21-DEC-17	R3917497
Cyanide (WAD)-O.Reg 153/04 (July 2011)							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	19-DEC-17	20-DEC-17	R3917162
Hexavalent Chromium in Soil							
Chromium, Hexavalent	<0.20		0.20	ug/g	18-DEC-17	19-DEC-17	R3915747
Mercury in Soil by CVAAS							
Mercury (Hg)	0.0187		0.0050	ug/g	21-DEC-17	21-DEC-17	R3917320
Metals in Soil by CRC ICPMS							
Antimony (Sb)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Arsenic (As)	2.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Barium (Ba)	59.5		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Beryllium (Be)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Boron (B)	<5.0		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cadmium (Cd)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Chromium (Cr)	11.2		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Cobalt (Co)	3.6		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Copper (Cu)	11.7		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Lead (Pb)	24.1		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Molybdenum (Mo)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Nickel (Ni)	7.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Selenium (Se)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Silver (Ag)	<0.20		0.20	ug/g	21-DEC-17	21-DEC-17	R3917988
Thallium (Tl)	<0.50		0.50	ug/g	21-DEC-17	21-DEC-17	R3917988
Uranium (U)	<1.0		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Vanadium (V)	21.9		1.0	ug/g	21-DEC-17	21-DEC-17	R3917988
Zinc (Zn)	62.3		5.0	ug/g	21-DEC-17	21-DEC-17	R3917988
SAR-O.Reg 153/04 (July 2011)							
Calcium (Ca)	6.4		1.0	mg/L		21-DEC-17	R3917989
Sodium (Na)	4.4		1.0	mg/L		21-DEC-17	R3917989
Magnesium (Mg)	<1.0		1.0	mg/L		21-DEC-17	R3917989
SAR	0.48	SAR:M	0.10	SAR		21-DEC-17	R3917989
pH							
pH	7.36		0.10	pH units		20-DEC-17	R3916772

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLQ	Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
R	The ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
RRQC	Refer to report remarks for information regarding this QC result.
SAR:M	Reported SAR represents a maximum value. Actual SAR may be lower if both Ca and Mg were detectable.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

BNA-TCLP-WT	Waste	BNAs for O. Reg 347	SW846 8270

Samples are leached according to TCLP protocol and then the aqueous leachate is extracted and the resulting extracts are analyzed on GC/MSD

BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CHLORDANE-T-CALC-WT	Soil	Chlordane Total sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

CN-TCLP-WT	Waste	Cyanide for O. Reg 347	APHA 4500CN C E
CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

DDD-DDE-DDT-CALC-WT	Soil	DDD, DDE, DDT sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ENDOSULFAN-T-CALC-WT	Soil	Endosulfan Total sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

F-TCLP-WT	Waste	Fluoride (F) for O. Reg 347	APHA 4110 B-Ion Chromatography
F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F4G-ADD-511-WT	Soil	F4G SG-O.Reg 153/04 (July 2011)	MOE DECPH-E3398/CCME TIER 1

F4G, gravimetric analysis, is determined if the chromatogram does not return to baseline at or before C50. A soil sample is extracted with a solvent mix, the solvent is evaporated and the weight of the residue is determined.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
N2N3-TCLP-WT	Waste	Nitrate/Nitrite-N for O. Reg 347	APHA 4110 B-Ion Chromatography
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking techniqueis used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by GC/MS. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PEST-OC-511-WT	Soil	OC Pesticides-O.Reg 153/04 (July 2011)	SW846 8270 (511)

Soil sample is extracted in a solvent, after extraction a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.

TOC-R511-WT	Soil	TOC & FOC-O.Reg 153/04 (July 2011)	CARTER 21.3.2

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
VOC-TCLP-WT	Waste	VOC for O. Reg 347	SW846 8260
A sample of waste is leached in a zero headspace extractor at 30–2 rpm for 18–2.0 hours with the appropriate leaching solution. After tumbling the leachate is analyzed directly by headspace technology, followed by GC/MS using internal standard quantitation.			
XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION
Total xylenes represents the sum of o-xylene and m&p-xylene.			

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

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

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

1 2 3

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	**Water**							
Batch R3915640								
WG2686040-3 DUP		**L2035721-2**						
Total Suspended Solids		3740	3440		mg/L	8.4	20	19-DEC-17
WG2686040-2 LCS								
Total Suspended Solids			98.4		%		85-115	19-DEC-17
WG2686040-1 MB								
Total Suspended Solids			<2.0		mg/L		2	19-DEC-17
Batch R3915659								
WG2686035-3 DUP		**L2035804-1**						
Total Suspended Solids		6.5	5.9		mg/L	8.7	20	19-DEC-17
WG2686035-2 LCS								
Total Suspended Solids			99.7		%		85-115	19-DEC-17
WG2686035-1 MB								
Total Suspended Solids			<2.0		mg/L		2	19-DEC-17
Batch R3916336								
WG2686789-2 LCS								
Total Suspended Solids			104.4		%		85-115	20-DEC-17
WG2686789-1 MB								
Total Suspended Solids			<2.0		mg/L		2	20-DEC-17
Batch R3916343								
WG2686036-3 DUP		**L2035345-1**						
Total Suspended Solids		1440	1480		mg/L	2.2	20	19-DEC-17
WG2686036-2 LCS								
Total Suspended Solids			100.8		%		85-115	19-DEC-17
WG2686036-1 MB								
Total Suspended Solids			<2.0		mg/L		2	19-DEC-17
Batch R3916354								
WG2686793-3 DUP		**L2035656-7**						
Total Suspended Solids		6060	5980		mg/L	1.3	20	20-DEC-17
WG2686793-2 LCS								
Total Suspended Solids			102.6		%		85-115	20-DEC-17
WG2686793-1 MB								
Total Suspended Solids			<2.0		mg/L		2	20-DEC-17
Batch R3917128								
WG2687663-3 DUP		**L2036139-2**						
Total Suspended Solids		2730	2760		mg/L	1.0	20	21-DEC-17
WG2687663-2 LCS								
Total Suspended Solids			99.3		%		85-115	21-DEC-17
WG2687663-1 MB								

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	**Water**							
Batch R3917128								
WG2687663-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-DEC-17
B-HWS-R511-WT	**Soil**							
Batch R3917998								
WG2688481-4 DUP		**L2036245-6**						
Boron (B), Hot Water Ext.		0.30	0.29		ug/g	3.3	30	21-DEC-17
WG2688481-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			107.9		%		70-130	21-DEC-17
WG2688481-3 LCS								
Boron (B), Hot Water Ext.			97.9		%		70-130	21-DEC-17
WG2688481-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	21-DEC-17
BTX-511-HS-WT	**Soil**							
Batch R3915687								
WG2686092-4 DUP		**WG2686092-3**						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	19-DEC-17
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	19-DEC-17
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-DEC-17
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	19-DEC-17
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	19-DEC-17
WG2686092-2 LCS								
Benzene			107.0		%		70-130	19-DEC-17
Ethylbenzene			99.3		%		70-130	19-DEC-17
m+p-Xylenes			105.6		%		70-130	19-DEC-17
o-Xylene			101.7		%		70-130	19-DEC-17
Toluene			102.2		%		70-130	19-DEC-17
WG2686092-1 MB								
Benzene			<0.0068		ug/g		0.0068	19-DEC-17
Ethylbenzene			<0.018		ug/g		0.018	19-DEC-17
m+p-Xylenes			<0.030		ug/g		0.03	19-DEC-17
o-Xylene			<0.020		ug/g		0.02	19-DEC-17
Toluene			<0.080		ug/g		0.08	19-DEC-17
Surrogate: 1,4-Difluorobenzene			105.3		%		50-140	19-DEC-17
Surrogate: 4-Bromofluorobenzene			104.8		%		50-140	19-DEC-17
WG2686092-5 MS		**WG2686092-3**						

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT	**Soil**							
Batch R3915687								
WG2686092-5 MS		**WG2686092-3**						
Benzene			112.4		%		60-140	19-DEC-17
Ethylbenzene			101.4		%		60-140	19-DEC-17
m+p-Xylenes			107.0		%		60-140	19-DEC-17
o-Xylene			103.7		%		60-140	19-DEC-17
Toluene			104.9		%		60-140	19-DEC-17
Batch R3915732								
WG2686054-4 DUP		**WG2686054-3**						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	19-DEC-17
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	19-DEC-17
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-DEC-17
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	19-DEC-17
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	19-DEC-17
WG2686054-2 LCS								
Benzene			105.5		%		70-130	19-DEC-17
Ethylbenzene			101.2		%		70-130	19-DEC-17
m+p-Xylenes			105.5		%		70-130	19-DEC-17
o-Xylene			103.0		%		70-130	19-DEC-17
Toluene			103.4		%		70-130	19-DEC-17
WG2686054-1 MB								
Benzene			<0.0068		ug/g		0.0068	19-DEC-17
Ethylbenzene			<0.018		ug/g		0.018	19-DEC-17
m+p-Xylenes			<0.030		ug/g		0.03	19-DEC-17
o-Xylene			<0.020		ug/g		0.02	19-DEC-17
Toluene			<0.080		ug/g		0.08	19-DEC-17
Surrogate: 1,4-Difluorobenzene			105.9		%		50-140	19-DEC-17
Surrogate: 4-Bromofluorobenzene			104.7		%		50-140	19-DEC-17
WG2686054-5 MS		**WG2686054-3**						
Benzene			108.8		%		60-140	19-DEC-17
Ethylbenzene			101.9		%		60-140	19-DEC-17
m+p-Xylenes			107.5		%		60-140	19-DEC-17
o-Xylene			104.2		%		60-140	19-DEC-17
Toluene			106.4		%		60-140	19-DEC-17
CN-WAD-R511-WT	**Soil**							

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-WAD-R511-WT	**Soil**							
Batch R3916360								
WG2686140-3 DUP		**L2033203-10**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	19-DEC-17
WG2686140-2 LCS								
Cyanide, Weak Acid Diss			98.6		%		80-120	19-DEC-17
WG2686140-1 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	19-DEC-17
WG2686140-4 MS		**L2033203-10**						
Cyanide, Weak Acid Diss			71.5		%		70-130	19-DEC-17
Batch R3917162								
WG2686781-3 DUP		**L2036241-6**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	20-DEC-17
WG2686781-2 LCS								
Cyanide, Weak Acid Diss			95.6		%		80-120	20-DEC-17
WG2686781-1 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	20-DEC-17
WG2686781-4 MS		**L2036241-6**						
Cyanide, Weak Acid Diss			106.6		%		70-130	20-DEC-17
CR-CR6-IC-WT	**Soil**							
Batch R3915747								
WG2686509-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			91.3		%		70-130	19-DEC-17
WG2686509-3 DUP		**L2035934-4**						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	19-DEC-17
WG2686509-2 LCS								
Chromium, Hexavalent			96.2		%		80-120	19-DEC-17
WG2686509-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	19-DEC-17
EC-WT	**Soil**							
Batch R3917497								
WG2688484-4 DUP		**WG2688484-3**						
Conductivity		0.281	0.279		mS/cm	0.7	20	21-DEC-17
WG2688735-1 LCS								
Conductivity			98.7		%		90-110	21-DEC-17
WG2688484-1 MB								
Conductivity			<0.0040		mS/cm		0.004	21-DEC-17
F1-HS-511-WT	**Soil**							

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Soil**							
Batch R3915687								
WG2686092-4 DUP		**WG2686092-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	19-DEC-17
WG2686092-2 LCS								
F1 (C6-C10)			104.5		%		80-120	19-DEC-17
WG2686092-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	19-DEC-17
Surrogate: 3,4-Dichlorotoluene			104.8		%		60-140	19-DEC-17
WG2686092-7 MS		**WG2686092-6**						
F1 (C6-C10)			100.3		%		60-140	19-DEC-17
Batch R3915732								
WG2686054-4 DUP		**WG2686054-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	19-DEC-17
WG2686054-2 LCS								
F1 (C6-C10)			102.5		%		80-120	19-DEC-17
WG2686054-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	19-DEC-17
Surrogate: 3,4-Dichlorotoluene			110.7		%		60-140	19-DEC-17
WG2686054-7 MS		**WG2686054-6**						
F1 (C6-C10)			103.3		%		60-140	19-DEC-17
F2-F4-511-WT	**Soil**							
Batch R3917482								
WG2688295-4 DUP		**WG2688295-3**						
F2 (C10-C16)		21	21		ug/g	0.1	30	21-DEC-17
F3 (C16-C34)		68	91		ug/g	28	30	21-DEC-17
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	21-DEC-17
WG2688295-2 LCS								
F2 (C10-C16)			97.0		%		80-120	21-DEC-17
F3 (C16-C34)			102.4		%		80-120	21-DEC-17
F4 (C34-C50)			106.3		%		80-120	21-DEC-17
WG2688295-1 MB								
F2 (C10-C16)			<10		ug/g		10	21-DEC-17
F3 (C16-C34)			<50		ug/g		50	21-DEC-17
F4 (C34-C50)			<50		ug/g		50	21-DEC-17
Surrogate: 2-Bromobenzotrifluoride			89.6		%		60-140	21-DEC-17
WG2688295-5 MS		**WG2688295-3**						
F2 (C10-C16)			93.1		%		60-140	21-DEC-17
F3 (C16-C34)			102.1		%		60-140	21-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT	**Soil**							
Batch R3917482								
WG2688295-5 MS		**WG2688295-3**						
F4 (C34-C50)			103.1		%		60-140	21-DEC-17
Batch R3917661								
WG2686472-4 DUP		**WG2686472-3**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	21-DEC-17
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	21-DEC-17
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	21-DEC-17
WG2686472-2 LCS								
F2 (C10-C16)			92.4		%		80-120	21-DEC-17
F3 (C16-C34)			94.4		%		80-120	21-DEC-17
F4 (C34-C50)			99.2		%		80-120	21-DEC-17
WG2686472-1 MB								
F2 (C10-C16)			<10		ug/g		10	21-DEC-17
F3 (C16-C34)			<50		ug/g		50	21-DEC-17
F4 (C34-C50)			<50		ug/g		50	21-DEC-17
Surrogate: 2-Bromobenzotrifluoride			84.9		%		60-140	21-DEC-17
WG2686472-5 MS		**WG2686472-3**						
F2 (C10-C16)			102.3		%		60-140	21-DEC-17
F3 (C16-C34)			102.0		%		60-140	21-DEC-17
F4 (C34-C50)			101.7		%		60-140	21-DEC-17
F4G-ADD-511-WT	**Soil**							
Batch R3917800								
WG2689294-2 LCS								
F4G-SG (GHH-Silica)			84.6		%		60-140	20-DEC-17
WG2689294-1 MB								
F4G-SG (GHH-Silica)			<250		ug/g		250	20-DEC-17
HG-200.2-CVAA-WT	**Soil**							
Batch R3917320								
WG2688458-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			109.3		%		70-130	21-DEC-17
WG2688458-6 DUP		**WG2688458-5**						
Mercury (Hg)		0.0186	0.0172		ug/g	7.9	40	21-DEC-17
WG2688458-3 LCS								
Mercury (Hg)			113.0		%		80-120	21-DEC-17
WG2688458-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	21-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R3917988								
WG2688458-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			95.0		%		70-130	21-DEC-17
Arsenic (As)			98.8		%		70-130	21-DEC-17
Barium (Ba)			100.1		%		70-130	21-DEC-17
Beryllium (Be)			86.9		%		70-130	21-DEC-17
Boron (B)			3.1		mg/kg		0-8.2	21-DEC-17
Cadmium (Cd)			100.7		%		70-130	21-DEC-17
Chromium (Cr)			96.8		%		70-130	21-DEC-17
Cobalt (Co)			96.0		%		70-130	21-DEC-17
Copper (Cu)			95.9		%		70-130	21-DEC-17
Lead (Pb)			91.8		%		70-130	21-DEC-17
Molybdenum (Mo)			99.6		%		70-130	21-DEC-17
Nickel (Ni)			97.9		%		70-130	21-DEC-17
Selenium (Se)			0.29		mg/kg		0.11-0.51	21-DEC-17
Silver (Ag)			0.22		mg/kg		0.13-0.33	21-DEC-17
Thallium (Tl)			0.113		mg/kg		0.077-0.18	21-DEC-17
Uranium (U)			91.6		%		70-130	21-DEC-17
Vanadium (V)			94.4		%		70-130	21-DEC-17
Zinc (Zn)			94.6		%		70-130	21-DEC-17
WG2688458-6 DUP		**WG2688458-5**						
Antimony (Sb)		0.14	0.13		ug/g	5.7	30	21-DEC-17
Arsenic (As)		2.60	2.39		ug/g	8.2	30	21-DEC-17
Barium (Ba)		55.9	53.4		ug/g	4.6	40	21-DEC-17
Beryllium (Be)		0.39	0.35		ug/g	11	30	21-DEC-17
Boron (B)		8.0	7.4		ug/g	8.0	30	21-DEC-17
Cadmium (Cd)		0.090	0.088		ug/g	2.7	30	21-DEC-17
Chromium (Cr)		16.8	15.6		ug/g	7.3	30	21-DEC-17
Cobalt (Co)		5.12	4.68		ug/g	8.9	30	21-DEC-17
Copper (Cu)		11.7	10.9		ug/g	7.0	30	21-DEC-17
Lead (Pb)		7.62	7.15		ug/g	6.3	40	21-DEC-17
Molybdenum (Mo)		0.40	0.38		ug/g	5.4	40	21-DEC-17
Nickel (Ni)		12.5	11.6		ug/g	7.8	30	21-DEC-17
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	21-DEC-17
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	21-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R3917988								
WG2688458-6 DUP		**WG2688458-5**						
Thallium (Tl)		0.079	0.076		ug/g	4.4	30	21-DEC-17
Uranium (U)		0.507	0.483		ug/g	4.9	30	21-DEC-17
Vanadium (V)		28.1	26.9		ug/g	4.4	30	21-DEC-17
Zinc (Zn)		42.4	38.1		ug/g	11	30	21-DEC-17
WG2688458-4 LCS								
Antimony (Sb)			98.1		%		80-120	21-DEC-17
Arsenic (As)			94.6		%		80-120	21-DEC-17
Barium (Ba)			91.5		%		80-120	21-DEC-17
Beryllium (Be)			85.7		%		80-120	21-DEC-17
Boron (B)			83.1		%		80-120	21-DEC-17
Cadmium (Cd)			93.8		%		80-120	21-DEC-17
Chromium (Cr)			95.8		%		80-120	21-DEC-17
Cobalt (Co)			91.0		%		80-120	21-DEC-17
Copper (Cu)			91.1		%		80-120	21-DEC-17
Lead (Pb)			92.3		%		80-120	21-DEC-17
Molybdenum (Mo)			88.8		%		80-120	21-DEC-17
Nickel (Ni)			93.4		%		80-120	21-DEC-17
Selenium (Se)			94.2		%		80-120	21-DEC-17
Silver (Ag)			91.0		%		80-120	21-DEC-17
Thallium (Tl)			90.1		%		80-120	21-DEC-17
Uranium (U)			89.1		%		80-120	21-DEC-17
Vanadium (V)			95.4		%		80-120	21-DEC-17
Zinc (Zn)			87.1		%		80-120	21-DEC-17
WG2688458-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	21-DEC-17
Arsenic (As)			<0.10		mg/kg		0.1	21-DEC-17
Barium (Ba)			<0.50		mg/kg		0.5	21-DEC-17
Beryllium (Be)			<0.10		mg/kg		0.1	21-DEC-17
Boron (B)			<5.0		mg/kg		5	21-DEC-17
Cadmium (Cd)			<0.020		mg/kg		0.02	21-DEC-17
Chromium (Cr)			<0.50		mg/kg		0.5	21-DEC-17
Cobalt (Co)			<0.10		mg/kg		0.1	21-DEC-17
Copper (Cu)			<0.50		mg/kg		0.5	21-DEC-17
Lead (Pb)			<0.50		mg/kg		0.5	21-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R3917988								
WG2688458-1 MB								
Molybdenum (Mo)			<0.10		mg/kg		0.1	21-DEC-17
Nickel (Ni)			<0.50		mg/kg		0.5	21-DEC-17
Selenium (Se)			<0.20		mg/kg		0.2	21-DEC-17
Silver (Ag)			<0.10		mg/kg		0.1	21-DEC-17
Thallium (Tl)			<0.050		mg/kg		0.05	21-DEC-17
Uranium (U)			<0.050		mg/kg		0.05	21-DEC-17
Vanadium (V)			<0.20		mg/kg		0.2	21-DEC-17
Zinc (Zn)			<2.0		mg/kg		2	21-DEC-17
MOISTURE-WT	**Soil**							
Batch R3916328								
WG2687006-3 DUP		**L2036231-2**						
% Moisture		14.4	14.4		%	0.4	20	20-DEC-17
WG2687006-2 LCS								
% Moisture			99.5		%		90-110	20-DEC-17
WG2687006-1 MB								
% Moisture			<0.10		%		0.1	20-DEC-17
PAH-511-WT	**Soil**							
Batch R3917380								
WG2686105-4 DUP		**WG2686105-3**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	21-DEC-17
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	21-DEC-17
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3917380								
WG2686105-4 DUP		**WG2686105-3**						
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	21-DEC-17
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	21-DEC-17
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-DEC-17
WG2686105-2 LCS								
1-Methylnaphthalene			94.3		%		50-140	21-DEC-17
2-Methylnaphthalene			95.3		%		50-140	21-DEC-17
Acenaphthene			94.8		%		50-140	21-DEC-17
Acenaphthylene			89.2		%		50-140	21-DEC-17
Anthracene			97.6		%		50-140	21-DEC-17
Benzo(a)anthracene			95.1		%		50-140	21-DEC-17
Benzo(a)pyrene			88.1		%		50-140	21-DEC-17
Benzo(b)fluoranthene			90.5		%		50-140	21-DEC-17
Benzo(g,h,i)perylene			87.6		%		50-140	21-DEC-17
Benzo(k)fluoranthene			88.5		%		50-140	21-DEC-17
Chrysene			95.7		%		50-140	21-DEC-17
Dibenzo(ah)anthracene			87.1		%		50-140	21-DEC-17
Fluoranthene			95.7		%		50-140	21-DEC-17
Fluorene			89.9		%		50-140	21-DEC-17
Indeno(1,2,3-cd)pyrene			87.5		%		50-140	21-DEC-17
Naphthalene			93.1		%		50-140	21-DEC-17
Phenanthrene			97.8		%		50-140	21-DEC-17
Pyrene			96.3		%		50-140	21-DEC-17
WG2686105-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	21-DEC-17
2-Methylnaphthalene			<0.030		ug/g		0.03	21-DEC-17
Acenaphthene			<0.050		ug/g		0.05	21-DEC-17
Acenaphthylene			<0.050		ug/g		0.05	21-DEC-17
Anthracene			<0.050		ug/g		0.05	21-DEC-17
Benzo(a)anthracene			<0.050		ug/g		0.05	21-DEC-17
Benzo(a)pyrene			<0.050		ug/g		0.05	21-DEC-17
Benzo(b)fluoranthene			<0.050		ug/g		0.05	21-DEC-17
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	21-DEC-17
Benzo(k)fluoranthene			<0.050		ug/g		0.05	21-DEC-17
Chrysene			<0.050		ug/g		0.05	21-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3917380								
WG2686105-1 MB								
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	21-DEC-17
Fluoranthene			<0.050		ug/g		0.05	21-DEC-17
Fluorene			<0.050		ug/g		0.05	21-DEC-17
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	21-DEC-17
Naphthalene			<0.013		ug/g		0.013	21-DEC-17
Phenanthrene			<0.046		ug/g		0.046	21-DEC-17
Pyrene			<0.050		ug/g		0.05	21-DEC-17
Surrogate: 2-Fluorobiphenyl			83.9		%		50-140	21-DEC-17
Surrogate: p-Terphenyl d14			87.4		%		50-140	21-DEC-17
WG2686105-5 MS		**WG2686105-3**						
1-Methylnaphthalene			93.4		%		50-140	21-DEC-17
2-Methylnaphthalene			93.5		%		50-140	21-DEC-17
Acenaphthene			93.5		%		50-140	21-DEC-17
Acenaphthylene			88.0		%		50-140	21-DEC-17
Anthracene			96.7		%		50-140	21-DEC-17
Benzo(a)anthracene			93.8		%		50-140	21-DEC-17
Benzo(a)pyrene			87.7		%		50-140	21-DEC-17
Benzo(b)fluoranthene			88.9		%		50-140	21-DEC-17
Benzo(g,h,i)perylene			85.1		%		50-140	21-DEC-17
Benzo(k)fluoranthene			88.9		%		50-140	21-DEC-17
Chrysene			94.8		%		50-140	21-DEC-17
Dibenzo(ah)anthracene			85.1		%		50-140	21-DEC-17
Fluoranthene			93.0		%		50-140	21-DEC-17
Fluorene			89.0		%		50-140	21-DEC-17
Indeno(1,2,3-cd)pyrene			84.9		%		50-140	21-DEC-17
Naphthalene			92.0		%		50-140	21-DEC-17
Phenanthrene			96.2		%		50-140	21-DEC-17
Pyrene			93.7		%		50-140	21-DEC-17
Batch R3917986								
WG2686380-7 DUP		**WG2686380-6**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	22-DEC-17
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	22-DEC-17
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	22-DEC-17
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	22-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3917986								
WG2686380-7 DUP		**WG2686380-6**						
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	22-DEC-17
Benzo(a)anthracene		0.052	0.053		ug/g	1.1	40	22-DEC-17
Benzo(a)pyrene		<0.050	0.053	RPD-NA	ug/g	N/A	40	22-DEC-17
Benzo(b)fluoranthene		0.066	0.068		ug/g	3.2	40	22-DEC-17
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	22-DEC-17
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	22-DEC-17
Chrysene		<0.050	0.053	RPD-NA	ug/g	N/A	40	22-DEC-17
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	22-DEC-17
Fluoranthene		0.116	0.097		ug/g	17	40	22-DEC-17
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	22-DEC-17
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	22-DEC-17
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	22-DEC-17
Phenanthrene		0.070	0.054		ug/g	26	40	22-DEC-17
Pyrene		0.097	0.086		ug/g	12	40	22-DEC-17
WG2686380-2 LCS								
1-Methylnaphthalene			92.1		%		50-140	22-DEC-17
2-Methylnaphthalene			93.1		%		50-140	22-DEC-17
Acenaphthene			92.5		%		50-140	22-DEC-17
Acenaphthylene			92.7		%		50-140	22-DEC-17
Anthracene			96.7		%		50-140	22-DEC-17
Benzo(a)anthracene			98.2		%		50-140	22-DEC-17
Benzo(a)pyrene			86.3		%		50-140	22-DEC-17
Benzo(b)fluoranthene			87.1		%		50-140	22-DEC-17
Benzo(g,h,i)perylene			87.0		%		50-140	22-DEC-17
Benzo(k)fluoranthene			84.7		%		50-140	22-DEC-17
Chrysene			92.4		%		50-140	22-DEC-17
Dibenzo(ah)anthracene			86.3		%		50-140	22-DEC-17
Fluoranthene			95.2		%		50-140	22-DEC-17
Fluorene			87.5		%		50-140	22-DEC-17
Indeno(1,2,3-cd)pyrene			90.7		%		50-140	22-DEC-17
Naphthalene			93.1		%		50-140	22-DEC-17
Phenanthrene			94.3		%		50-140	22-DEC-17
Pyrene			94.2		%		50-140	22-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3917986								
WG2686380-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	22-DEC-17
2-Methylnaphthalene			<0.030		ug/g		0.03	22-DEC-17
Acenaphthene			<0.050		ug/g		0.05	22-DEC-17
Acenaphthylene			<0.050		ug/g		0.05	22-DEC-17
Anthracene			<0.050		ug/g		0.05	22-DEC-17
Benzo(a)anthracene			<0.050		ug/g		0.05	22-DEC-17
Benzo(a)pyrene			<0.050		ug/g		0.05	22-DEC-17
Benzo(b)fluoranthene			<0.050		ug/g		0.05	22-DEC-17
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	22-DEC-17
Benzo(k)fluoranthene			<0.050		ug/g		0.05	22-DEC-17
Chrysene			<0.050		ug/g		0.05	22-DEC-17
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	22-DEC-17
Fluoranthene			<0.050		ug/g		0.05	22-DEC-17
Fluorene			<0.050		ug/g		0.05	22-DEC-17
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	22-DEC-17
Naphthalene			<0.013		ug/g		0.013	22-DEC-17
Phenanthrene			<0.046		ug/g		0.046	22-DEC-17
Pyrene			<0.050		ug/g		0.05	22-DEC-17
Surrogate: 2-Fluorobiphenyl			86.0		%		50-140	22-DEC-17
Surrogate: p-Terphenyl d14			86.2		%		50-140	22-DEC-17
WG2686380-8 MS		**WG2686380-6**						
1-Methylnaphthalene			96.8		%		50-140	22-DEC-17
2-Methylnaphthalene			99.1		%		50-140	22-DEC-17
Acenaphthene			100.4		%		50-140	22-DEC-17
Acenaphthylene			100.9		%		50-140	22-DEC-17
Anthracene			103.3		%		50-140	22-DEC-17
Benzo(a)anthracene			111.0		%		50-140	22-DEC-17
Benzo(a)pyrene			93.6		%		50-140	22-DEC-17
Benzo(b)fluoranthene			91.4		%		50-140	22-DEC-17
Benzo(g,h,i)perylene			83.1		%		50-140	22-DEC-17
Benzo(k)fluoranthene			98.2		%		50-140	22-DEC-17
Chrysene			97.8		%		50-140	22-DEC-17
Dibenzo(ah)anthracene			86.2		%		50-140	22-DEC-17
Fluoranthene			107.9		%		50-140	22-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3917986								
WG2686380-8 MS		**WG2686380-6**						
Fluorene			96.5		%		50-140	22-DEC-17
Indeno(1,2,3-cd)pyrene			89.5		%		50-140	22-DEC-17
Naphthalene			95.9		%		50-140	22-DEC-17
Phenanthrene			97.7		%		50-140	22-DEC-17
Pyrene			106.8		%		50-140	22-DEC-17
PEST-OC-511-WT	**Soil**							
Batch R3923851								
WG2686370-4 DUP		**WG2686370-3**						
Aldrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
a-chlordane		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
g-chlordane		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
op-DDD		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
pp-DDD		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
o,p-DDE		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
pp-DDE		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
op-DDT		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
pp-DDT		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
Dieldrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
Endosulfan I		<0.060	<0.060	RPD-NA	ug/g	N/A	40	29-DEC-17
Endosulfan II		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
Endrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
gamma-hexachlorocyclohexane		<0.010	0.011	RPD-NA	ug/g	N/A	40	29-DEC-17
Heptachlor		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
Heptachlor Epoxide		<0.020	<0.020	RPD-NA	ug/g	N/A	40	29-DEC-17
Hexachlorobenzene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	29-DEC-17
Hexachlorobutadiene		<0.010	0.130	DUP-H	ug/g	N/A	40	29-DEC-17
Hexachloroethane		<0.010	<0.010	RPD-NA	ug/g	N/A	40	29-DEC-17
Methoxychlor		<0.10	<0.10	RPD-NA	ug/g	N/A	40	29-DEC-17
WG2686370-2 LCS								
Aldrin			124.2		%		50-140	29-DEC-17
a-chlordane			108.1		%		50-140	29-DEC-17
g-chlordane			112.3		%		50-140	29-DEC-17
op-DDD			96.7		%		50-140	29-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PEST-OC-511-WT	**Soil**							
Batch	**R3923851**							
WG2686370-2	**LCS**							
pp-DDD			94.7		%		50-140	29-DEC-17
o,p-DDE			100.8		%		50-140	29-DEC-17
pp-DDE			102.7		%		50-140	29-DEC-17
op-DDT			76.9		%		50-140	29-DEC-17
pp-DDT			68.7		%		50-140	29-DEC-17
Dieldrin			101.8		%		50-140	29-DEC-17
Endosulfan I			100.5		%		50-140	29-DEC-17
Endosulfan II			90.8		%		50-140	29-DEC-17
Endrin			104.2		%		50-140	29-DEC-17
gamma-hexachlorocyclohexane			102.7		%		50-140	29-DEC-17
Heptachlor			107.7		%		50-140	29-DEC-17
Heptachlor Epoxide			113.4		%		50-140	29-DEC-17
Hexachlorobenzene			107.4		%		50-140	29-DEC-17
Hexachlorobutadiene			112.6		%		50-140	29-DEC-17
Hexachloroethane			143.4	MES	%		50-140	29-DEC-17
Methoxychlor			80.5		%		50-140	29-DEC-17
WG2686370-1	**MB**							
Aldrin			<0.020		ug/g		0.02	29-DEC-17
a-chlordane			<0.020		ug/g		0.02	29-DEC-17
g-chlordane			<0.020		ug/g		0.02	29-DEC-17
op-DDD			<0.020		ug/g		0.02	29-DEC-17
pp-DDD			<0.020		ug/g		0.02	29-DEC-17
o,p-DDE			<0.020		ug/g		0.02	29-DEC-17
pp-DDE			<0.020		ug/g		0.02	29-DEC-17
op-DDT			<0.020		ug/g		0.02	29-DEC-17
pp-DDT			<0.020		ug/g		0.02	29-DEC-17
Dieldrin			<0.020		ug/g		0.02	29-DEC-17
Endosulfan I			<0.020		ug/g		0.02	29-DEC-17
Endosulfan II			<0.020		ug/g		0.02	29-DEC-17
Endrin			<0.020		ug/g		0.02	29-DEC-17
gamma-hexachlorocyclohexane			<0.010		ug/g		0.01	29-DEC-17
Heptachlor			<0.020		ug/g		0.02	29-DEC-17
Heptachlor Epoxide			<0.020		ug/g		0.02	29-DEC-17
Hexachlorobenzene			<0.010		ug/g		0.01	29-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PEST-OC-511-WT	**Soil**							
Batch	**R3923851**							
WG2686370-1	**MB**							
Hexachlorobutadiene			<0.010		ug/g		0.01	29-DEC-17
Hexachloroethane			<0.010		ug/g		0.01	29-DEC-17
Methoxychlor			<0.020		ug/g		0.02	29-DEC-17
Surrogate: 2-Fluorobiphenyl			115.6		%		50-140	29-DEC-17
Surrogate: d14-Terphenyl			104.7		%		50-140	29-DEC-17
WG2686370-5	**MS**	**WG2686370-3**						
op-DDT			102.0		%		50-140	29-DEC-17
pp-DDT			144.0	RRQC	%		50-140	29-DEC-17
COMMENTS: RRQC: Matrix spike recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.								
WG2686370-5	**MS**	**WG2686370-3**						
Aldrin			128.5		%		50-140	29-DEC-17
a-chlordane			97.2		%		50-140	29-DEC-17
g-chlordane			106.5		%		50-140	29-DEC-17
op-DDD			85.0		%		50-140	29-DEC-17
pp-DDD			86.9		%		50-140	29-DEC-17
o,p-DDE			87.1		%		50-140	29-DEC-17
pp-DDE			91.2		%		50-140	29-DEC-17
Dieldrin			91.9		%		50-140	29-DEC-17
Endosulfan I			94.8		%		50-140	29-DEC-17
Endosulfan II			89.0		%		50-140	29-DEC-17
Endrin			99.9		%		50-140	29-DEC-17
gamma-hexachlorocyclohexane			96.4		%		50-140	29-DEC-17
Heptachlor			103.9		%		50-140	29-DEC-17
Heptachlor Epoxide			107.8		%		50-140	29-DEC-17
Hexachlorobenzene			105.2		%		50-140	29-DEC-17
Hexachlorobutadiene			104.4		%		50-140	29-DEC-17
Hexachloroethane			126.2		%		50-140	29-DEC-17
Methoxychlor			75.5		%		50-140	29-DEC-17
PH-WT	**Soil**							
Batch	**R3916772**							
WG2686680-1	**DUP**	**L2036028-7**						
pH		7.01	6.87	J	pH units	0.14	0.3	20-DEC-17
WG2686947-1	**LCS**							
pH			6.97		pH units		6.9-7.1	20-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-R511-WT	**Soil**							
Batch R3917989								
WG2688484-4 DUP		**WG2688484-3**						
Calcium (Ca)		1.3	1.4		mg/L	4.0	30	21-DEC-17
Sodium (Na)		35.0	35.9		mg/L	2.6	30	21-DEC-17
Magnesium (Mg)		4.9	5.1		mg/L	3.7	30	21-DEC-17
WG2688484-2 IRM		**WT SAR1**						
Calcium (Ca)			89.1		%		70-130	22-DEC-17
Sodium (Na)			105.3		%		70-130	22-DEC-17
Magnesium (Mg)			90.7		%		70-130	22-DEC-17
WG2688484-1 MB								
Calcium (Ca)			<1.0		mg/L		1	21-DEC-17
Sodium (Na)			<1.0		mg/L		1	21-DEC-17
Magnesium (Mg)			<1.0		mg/L		1	21-DEC-17
TOC-R511-WT	**Soil**							
Batch R3929771								
WG2692571-3 CRM		**WT-TOC-CRM**						
Total Organic Carbon			86.2		%		70-130	02-JAN-18
WG2692571-4 DUP		**L2036241-1**						
Total Organic Carbon		0.23	0.23		%	0.0	35	02-JAN-18
WG2692571-2 LCS								
Total Organic Carbon			97.7		%		80-120	02-JAN-18
Total Organic Carbon			97.7		%		80-120	02-JAN-18
Total Organic Carbon			97.7		%		80-120	02-JAN-18
WG2692571-1 MB								
Total Organic Carbon			<0.10		%		0.1	02-JAN-18
BNA-TCLP-WT	**Waste**							
Batch R3917985								
WG2687660-4 DUP		**WG2687660-3**						
2,3,4,6-Tetrachlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	21-DEC-17
2,4,5-Trichlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	21-DEC-17
2,4,6-Trichlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	21-DEC-17
2,4-Dichlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	21-DEC-17
2,4-Dinitrotoluene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	21-DEC-17
2-Methylphenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	21-DEC-17
3&4-Methylphenol		<0.010	<0.010	RPD-NA	mg/L	N/A	50	21-DEC-17
Benzo(a)pyrene		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	21-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BNA-TCLP-WT	**Waste**							
Batch R3917985								
WG2687660-4 DUP		**WG2687660-3**						
Hexachlorobenzene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	21-DEC-17
Hexachlorobutadiene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	21-DEC-17
Hexachloroethane		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	21-DEC-17
Nitrobenzene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	21-DEC-17
Pentachlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	21-DEC-17
WG2687660-2 LCS								
2,3,4,6-Tetrachlorophenol			122.4		%		60-140	21-DEC-17
2,4,5-Trichlorophenol			118.0		%		60-140	21-DEC-17
2,4,6-Trichlorophenol			109.6		%		60-140	21-DEC-17
2,4-Dichlorophenol			106.4		%		60-140	21-DEC-17
2,4-Dinitrotoluene			113.3		%		50-150	21-DEC-17
2-Methylphenol			84.3		%		60-140	21-DEC-17
3&4-Methylphenol			85.3		%		60-140	21-DEC-17
Benzo(a)pyrene			108.4		%		60-140	21-DEC-17
Hexachlorobenzene			103.0		%		60-140	21-DEC-17
Hexachlorobutadiene			84.6		%		40-130	21-DEC-17
Hexachloroethane			72.2		%		40-130	21-DEC-17
Nitrobenzene			104.0		%		60-140	21-DEC-17
Pentachlorophenol			154.6		%		50-160	21-DEC-17
WG2687660-1 MB								
2,3,4,6-Tetrachlorophenol			<0.0050		mg/L		0.005	21-DEC-17
2,4,5-Trichlorophenol			<0.0050		mg/L		0.005	21-DEC-17
2,4,6-Trichlorophenol			<0.0050		mg/L		0.005	21-DEC-17
2,4-Dichlorophenol			<0.0050		mg/L		0.005	21-DEC-17
2,4-Dinitrotoluene			<0.0040		mg/L		0.004	21-DEC-17
2-Methylphenol			<0.0050		mg/L		0.005	21-DEC-17
3&4-Methylphenol			<0.010		mg/L		0.01	21-DEC-17
Benzo(a)pyrene			<0.00020		mg/L		0.0002	21-DEC-17
Hexachlorobenzene			<0.0040		mg/L		0.004	21-DEC-17
Hexachlorobutadiene			<0.0040		mg/L		0.004	21-DEC-17
Hexachloroethane			<0.0040		mg/L		0.004	21-DEC-17
Nitrobenzene			<0.0040		mg/L		0.004	21-DEC-17
Pentachlorophenol			<0.0050		mg/L		0.005	21-DEC-17
Surrogate: Nitrobenzene d5			99.6		%		50-150	21-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BNA-TCLP-WT	**Waste**							
Batch	**R3917985**							
WG2687660-1	**MB**							
Surrogate: 2-Fluorobiphenyl			98.0		%		40-160	21-DEC-17
Surrogate: p-Terphenyl d14			118.2		%		60-140	21-DEC-17
Surrogate: 2,4,6-Tribromophenol			102.2		%		50-150	21-DEC-17
WG2687660-6	**MB**							
2,3,4,6-Tetrachlorophenol			<0.0050		mg/L		0.005	21-DEC-17
2,4,5-Trichlorophenol			<0.0050		mg/L		0.005	21-DEC-17
2,4,6-Trichlorophenol			<0.0050		mg/L		0.005	21-DEC-17
2,4-Dichlorophenol			<0.0050		mg/L		0.005	21-DEC-17
2,4-Dinitrotoluene			<0.0040		mg/L		0.004	21-DEC-17
2-Methylphenol			<0.0050		mg/L		0.005	21-DEC-17
3&4-Methylphenol			<0.010		mg/L		0.01	21-DEC-17
Benzo(a)pyrene			<0.00020		mg/L		0.0002	21-DEC-17
Hexachlorobenzene			<0.0040		mg/L		0.004	21-DEC-17
Hexachlorobutadiene			<0.0040		mg/L		0.004	21-DEC-17
Hexachloroethane			<0.0040		mg/L		0.004	21-DEC-17
Nitrobenzene			<0.0040		mg/L		0.004	21-DEC-17
Pentachlorophenol			<0.0050		mg/L		0.005	21-DEC-17
Surrogate: Nitrobenzene d5			104.5		%		50-150	21-DEC-17
Surrogate: 2-Fluorobiphenyl			91.4		%		40-160	21-DEC-17
Surrogate: p-Terphenyl d14			128.9		%		60-140	21-DEC-17
Surrogate: 2,4,6-Tribromophenol			97.9		%		50-150	21-DEC-17
WG2687660-5	**MS**	**WG2687660-3**						
2,3,4,6-Tetrachlorophenol			119.7		%		50-150	21-DEC-17
2,4,5-Trichlorophenol			115.6		%		50-150	21-DEC-17
2,4,6-Trichlorophenol			110.1		%		50-150	21-DEC-17
2,4-Dichlorophenol			105.5		%		50-150	21-DEC-17
2,4-Dinitrotoluene			123.0		%		50-150	21-DEC-17
2-Methylphenol			82.2		%		50-150	21-DEC-17
3&4-Methylphenol			85.1		%		50-150	21-DEC-17
Benzo(a)pyrene			105.5		%		50-150	21-DEC-17
Hexachlorobenzene			106.0		%		40-150	21-DEC-17
Hexachlorobutadiene			80.8		%		40-150	21-DEC-17
Hexachloroethane			71.7		%		40-150	21-DEC-17
Nitrobenzene			106.9		%		50-150	21-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BNA-TCLP-WT	**Waste**							
Batch R3917985								
WG2687660-5 MS		**WG2687660-3**						
Pentachlorophenol			146.5		%		50-150	21-DEC-17
CN-TCLP-WT	**Waste**							
Batch R3916361								
WG2687135-3 DUP		**L2036235-1**						
Cyanide, Weak Acid Diss		<0.10	<0.10	RPD-NA	mg/L	N/A	20	19-DEC-17
WG2687135-2 LCS								
Cyanide, Weak Acid Diss			104.0		%		70-130	20-DEC-17
WG2687135-1 MB								
Cyanide, Weak Acid Diss			<0.10		mg/L		0.1	19-DEC-17
WG2687135-4 MS		**L2036235-1**						
Cyanide, Weak Acid Diss			84.9		%		50-150	19-DEC-17
F-TCLP-WT	**Waste**							
Batch R3917490								
WG2688551-3 DUP		**L2036235-1**						
Fluoride (F)		<10	<10	RPD-NA	mg/L	N/A	30	20-DEC-17
WG2688551-2 LCS								
Fluoride (F)			88.0		%		70-130	20-DEC-17
WG2688551-1 MB								
Fluoride (F)			<10		mg/L		10	20-DEC-17
WG2688551-4 MS		**L2036235-1**						
Fluoride (F)			87.4		%		50-150	20-DEC-17
HG-TCLP-WT	**Waste**							
Batch R3916530								
WG2687127-3 DUP		**L2036506-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	20-DEC-17
WG2687127-2 LCS								
Mercury (Hg)			102.0		%		70-130	20-DEC-17
WG2687127-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	20-DEC-17
WG2687127-4 MS		**L2036506-1**						
Mercury (Hg)			96.8		%		50-140	20-DEC-17
MET-TCLP-WT	**Waste**							

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3916218								
WG2687217-4 DUP		**WG2687217-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	19-DEC-17
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	19-DEC-17
Boron (B)		<2.5	<2.5	RPD-NA	mg/L	N/A	40	19-DEC-17
Barium (Ba)		1.35	1.10		mg/L	20	40	19-DEC-17
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	19-DEC-17
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	19-DEC-17
Lead (Pb)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	19-DEC-17
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	19-DEC-17
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	19-DEC-17
WG2687217-2 LCS								
Silver (Ag)			107.7		%		70-130	19-DEC-17
Arsenic (As)			105.2		%		70-130	19-DEC-17
Boron (B)			94.3		%		70-130	19-DEC-17
Barium (Ba)			111.7		%		70-130	19-DEC-17
Cadmium (Cd)			107.6		%		70-130	19-DEC-17
Chromium (Cr)			106.4		%		70-130	19-DEC-17
Lead (Pb)			105.4		%		70-130	19-DEC-17
Selenium (Se)			104.6		%		70-130	19-DEC-17
Uranium (U)			108.4		%		70-130	19-DEC-17
WG2687217-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	19-DEC-17
Arsenic (As)			<0.050		mg/L		0.05	19-DEC-17
Boron (B)			<2.5		mg/L		2.5	19-DEC-17
Barium (Ba)			<0.50		mg/L		0.5	19-DEC-17
Cadmium (Cd)			<0.0050		mg/L		0.005	19-DEC-17
Chromium (Cr)			<0.050		mg/L		0.05	19-DEC-17
Lead (Pb)			<0.050		mg/L		0.05	19-DEC-17
Selenium (Se)			<0.025		mg/L		0.025	19-DEC-17
Uranium (U)			<0.25		mg/L		0.25	19-DEC-17
WG2687217-5 MS		**WG2687217-3**						
Silver (Ag)			112.6		%		50-150	19-DEC-17
Arsenic (As)			95.3		%		50-150	19-DEC-17
Boron (B)			83.8		%		50-150	19-DEC-17
Barium (Ba)			97.5		%		50-150	19-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3916218								
WG2687217-5 MS		**WG2687217-3**						
Cadmium (Cd)			97.4		%		50-150	19-DEC-17
Chromium (Cr)			94.9		%		50-150	19-DEC-17
Lead (Pb)			91.5		%		50-150	19-DEC-17
Selenium (Se)			97.0		%		50-150	19-DEC-17
Uranium (U)			91.9		%		50-150	19-DEC-17
N2N3-TCLP-WT	**Waste**							
Batch R3917490								
WG2688551-3 DUP		**L2036235-1**						
Nitrate-N		7.1	7.2		mg/L	0.4	30	20-DEC-17
Nitrite-N		<2.0	<2.0	RPD-NA	mg/L	N/A	30	20-DEC-17
WG2688551-2 LCS								
Nitrate-N			97.1		%		70-130	20-DEC-17
Nitrite-N			94.5		%		70-130	20-DEC-17
WG2688551-1 MB								
Nitrate-N			<2.0		mg/L		2	20-DEC-17
Nitrite-N			<2.0		mg/L		2	20-DEC-17
WG2688551-4 MS		**L2036235-1**						
Nitrate-N			100.1		%		50-150	20-DEC-17
Nitrite-N			96.9		%		50-150	20-DEC-17
VOC-TCLP-WT	**Waste**							
Batch R3915751								
WG2682359-4 DUP		**WG2682359-3**						
1,1-Dichloroethylene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	19-DEC-17
1,2-Dichlorobenzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	19-DEC-17
1,2-Dichloroethane		<0.025	<0.025	RPD-NA	mg/L	N/A	50	19-DEC-17
1,4-Dichlorobenzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	19-DEC-17
Benzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	19-DEC-17
Carbon tetrachloride		<0.025	<0.025	RPD-NA	mg/L	N/A	50	19-DEC-17
Chlorobenzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	19-DEC-17
Chloroform		<0.10	<0.10	RPD-NA	mg/L	N/A	50	19-DEC-17
Dichloromethane		<0.50	<0.50	RPD-NA	mg/L	N/A	50	19-DEC-17
Methyl Ethyl Ketone		<1.0	<1.0	RPD-NA	mg/L	N/A	50	19-DEC-17
Tetrachloroethylene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	19-DEC-17
Trichloroethylene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	19-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-TCLP-WT	**Waste**							
Batch R3915751								
WG2682359-4 DUP		**WG2682359-3**						
Vinyl chloride		<0.050	<0.050	RPD-NA	mg/L	N/A	50	19-DEC-17
WG2682359-1 LCS								
1,1-Dichloroethylene			92.3		%		70-130	19-DEC-17
1,2-Dichlorobenzene			99.2		%		70-130	19-DEC-17
1,2-Dichloroethane			100.6		%		70-130	19-DEC-17
1,4-Dichlorobenzene			103.4		%		70-130	19-DEC-17
Benzene			98.4		%		70-130	19-DEC-17
Carbon tetrachloride			100.6		%		60-140	19-DEC-17
Chlorobenzene			99.3		%		70-130	19-DEC-17
Chloroform			97.9		%		70-130	19-DEC-17
Dichloromethane			96.3		%		70-130	19-DEC-17
Methyl Ethyl Ketone			112.7		%		50-150	19-DEC-17
Tetrachloroethylene			103.4		%		70-130	19-DEC-17
Trichloroethylene			102.9		%		70-130	19-DEC-17
Vinyl chloride			90.6		%		60-130	19-DEC-17
WG2682359-2 MB								
1,1-Dichloroethylene			<0.025		mg/L		0.025	19-DEC-17
1,2-Dichlorobenzene			<0.025		mg/L		0.025	19-DEC-17
1,2-Dichloroethane			<0.025		mg/L		0.025	19-DEC-17
1,4-Dichlorobenzene			<0.025		mg/L		0.025	19-DEC-17
Benzene			<0.025		mg/L		0.025	19-DEC-17
Carbon tetrachloride			<0.025		mg/L		0.025	19-DEC-17
Chlorobenzene			<0.025		mg/L		0.025	19-DEC-17
Chloroform			<0.10		mg/L		0.1	19-DEC-17
Dichloromethane			<0.50		mg/L		0.5	19-DEC-17
Methyl Ethyl Ketone			<1.0		mg/L		1	19-DEC-17
Tetrachloroethylene			<0.025		mg/L		0.025	19-DEC-17
Trichloroethylene			<0.025		mg/L		0.025	19-DEC-17
Vinyl chloride			<0.050		mg/L		0.05	19-DEC-17
Surrogate: 1,4-Difluorobenzene			97.8		%		70-130	19-DEC-17
Surrogate: 4-Bromofluorobenzene			98.5		%		70-130	19-DEC-17
WG2682359-6 MB								
1,1-Dichloroethylene			<0.025		mg/L		0.025	19-DEC-17
1,2-Dichlorobenzene			<0.025		mg/L		0.025	19-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-TCLP-WT	**Waste**							
Batch R3915751								
WG2682359-6 MB								
1,2-Dichloroethane			<0.025		mg/L		0.025	19-DEC-17
1,4-Dichlorobenzene			<0.025		mg/L		0.025	19-DEC-17
Benzene			<0.025		mg/L		0.025	19-DEC-17
Carbon tetrachloride			<0.025		mg/L		0.025	19-DEC-17
Chlorobenzene			<0.025		mg/L		0.025	19-DEC-17
Chloroform			<0.10		mg/L		0.1	19-DEC-17
Dichloromethane			<0.50		mg/L		0.5	19-DEC-17
Methyl Ethyl Ketone			<1.0		mg/L		1	19-DEC-17
Tetrachloroethylene			<0.025		mg/L		0.025	19-DEC-17
Trichloroethylene			<0.025		mg/L		0.025	19-DEC-17
Vinyl chloride			<0.050		mg/L		0.05	19-DEC-17
Surrogate: 1,4-Difluorobenzene			96.6		%		70-130	19-DEC-17
Surrogate: 4-Bromofluorobenzene			97.5		%		70-130	19-DEC-17
WG2682359-5 MS		**WG2682359-3**						
1,1-Dichloroethylene			90.2		%		50-140	19-DEC-17
1,2-Dichlorobenzene			99.5		%		50-140	19-DEC-17
1,2-Dichloroethane			95.0		%		50-140	19-DEC-17
1,4-Dichlorobenzene			105.1		%		50-140	19-DEC-17
Benzene			98.2		%		50-140	19-DEC-17
Carbon tetrachloride			102.0		%		50-140	19-DEC-17
Chlorobenzene			99.6		%		50-140	19-DEC-17
Chloroform			97.3		%		50-140	19-DEC-17
Dichloromethane			91.6		%		50-140	19-DEC-17
Methyl Ethyl Ketone			98.6		%		50-140	19-DEC-17
Tetrachloroethylene			105.0		%		50-140	19-DEC-17
Trichloroethylene			104.5		%		50-140	19-DEC-17
Vinyl chloride			84.1		%		50-140	19-DEC-17
Batch R3916548								
WG2679606-4 DUP		**L2036241-27**						
1,1-Dichloroethylene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	20-DEC-17
1,2-Dichlorobenzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	20-DEC-17
1,2-Dichloroethane		<0.025	<0.025	RPD-NA	mg/L	N/A	50	20-DEC-17
1,4-Dichlorobenzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	20-DEC-17
Benzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	20-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-TCLP-WT	**Waste**							
Batch R3916548								
WG2679606-4 DUP		**L2036241-27**						
Carbon tetrachloride		<0.025	<0.025	RPD-NA	mg/L	N/A	50	20-DEC-17
Chlorobenzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	20-DEC-17
Chloroform		<0.10	<0.10	RPD-NA	mg/L	N/A	50	20-DEC-17
Dichloromethane		<0.50	<0.50	RPD-NA	mg/L	N/A	50	20-DEC-17
Methyl Ethyl Ketone		<1.0	<1.0	RPD-NA	mg/L	N/A	50	20-DEC-17
Tetrachloroethylene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	20-DEC-17
Trichloroethylene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	20-DEC-17
Vinyl chloride		<0.050	<0.050	RPD-NA	mg/L	N/A	50	20-DEC-17
WG2679606-1 LCS								
1,1-Dichloroethylene			91.4		%		70-130	20-DEC-17
1,2-Dichlorobenzene			101.0		%		70-130	20-DEC-17
1,2-Dichloroethane			105.1		%		70-130	20-DEC-17
1,4-Dichlorobenzene			100.5		%		70-130	20-DEC-17
Benzene			103.9		%		70-130	20-DEC-17
Carbon tetrachloride			102.6		%		60-140	20-DEC-17
Chlorobenzene			99.8		%		70-130	20-DEC-17
Chloroform			104.5		%		70-130	20-DEC-17
Dichloromethane			104.7		%		70-130	20-DEC-17
Methyl Ethyl Ketone			102.8		%		50-150	20-DEC-17
Tetrachloroethylene			96.7		%		70-130	20-DEC-17
Trichloroethylene			104.4		%		70-130	20-DEC-17
Vinyl chloride			85.9		%		60-130	20-DEC-17
WG2679606-2 MB								
1,1-Dichloroethylene			<0.025		mg/L		0.025	20-DEC-17
1,2-Dichlorobenzene			<0.025		mg/L		0.025	20-DEC-17
1,2-Dichloroethane			<0.025		mg/L		0.025	20-DEC-17
1,4-Dichlorobenzene			<0.025		mg/L		0.025	20-DEC-17
Benzene			<0.025		mg/L		0.025	20-DEC-17
Carbon tetrachloride			<0.025		mg/L		0.025	20-DEC-17
Chlorobenzene			<0.025		mg/L		0.025	20-DEC-17
Chloroform			<0.10		mg/L		0.1	20-DEC-17
Dichloromethane			<0.50		mg/L		0.5	20-DEC-17
Methyl Ethyl Ketone			<1.0		mg/L		1	20-DEC-17
Tetrachloroethylene			<0.025		mg/L		0.025	20-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: FABIENNE ETIENNE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-TCLP-WT	**Waste**							
Batch R3916548								
WG2679606-2 MB								
Trichloroethylene			<0.025		mg/L		0.025	20-DEC-17
Vinyl chloride			<0.050		mg/L		0.05	20-DEC-17
Surrogate: 1,4-Difluorobenzene			96.7		%		70-130	20-DEC-17
Surrogate: 4-Bromofluorobenzene			93.5		%		70-130	20-DEC-17
WG2679606-5 MS		**L2036241-27**						
1,1-Dichloroethylene			93.1		%		50-140	20-DEC-17
1,2-Dichlorobenzene			100.7		%		50-140	20-DEC-17
1,2-Dichloroethane			106.8		%		50-140	20-DEC-17
1,4-Dichlorobenzene			100.0		%		50-140	20-DEC-17
Benzene			104.9		%		50-140	20-DEC-17
Carbon tetrachloride			103.8		%		50-140	20-DEC-17
Chlorobenzene			100.8		%		50-140	20-DEC-17
Chloroform			105.5		%		50-140	20-DEC-17
Dichloromethane			106.6		%		50-140	20-DEC-17
Methyl Ethyl Ketone			107.3		%		50-140	20-DEC-17
Tetrachloroethylene			97.7		%		50-140	20-DEC-17
Trichloroethylene			105.1		%		50-140	20-DEC-17
Vinyl chloride			89.7		%		50-140	20-DEC-17

Quality Control Report

Workorder: L2036241 Report Date: 08-JAN-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1
Contact: FABIENNE ETIENNE

Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
RRQC	Refer to report remarks for information regarding this QC result.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

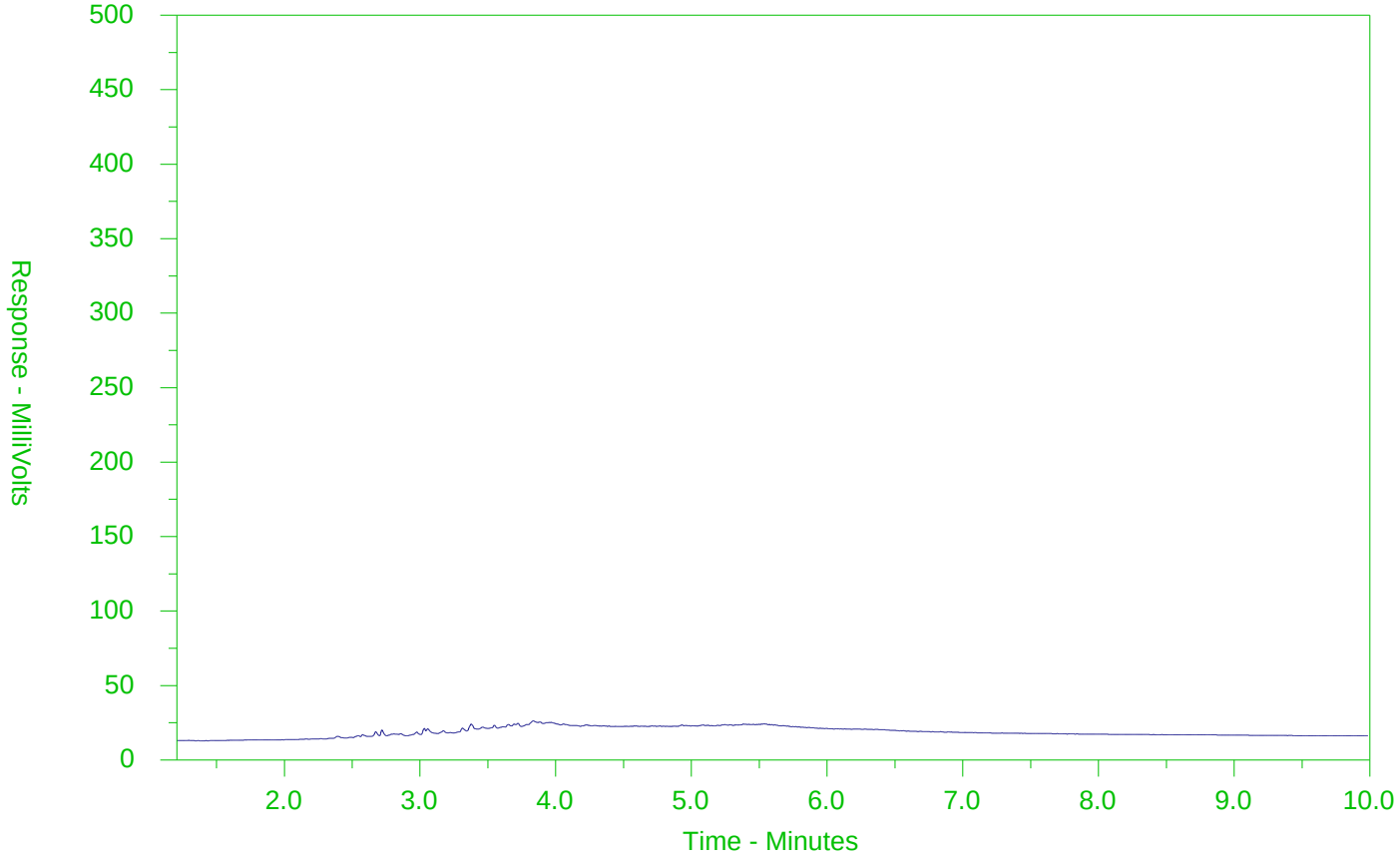
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2036241-1
Client Sample ID: PS-G-SED-1



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

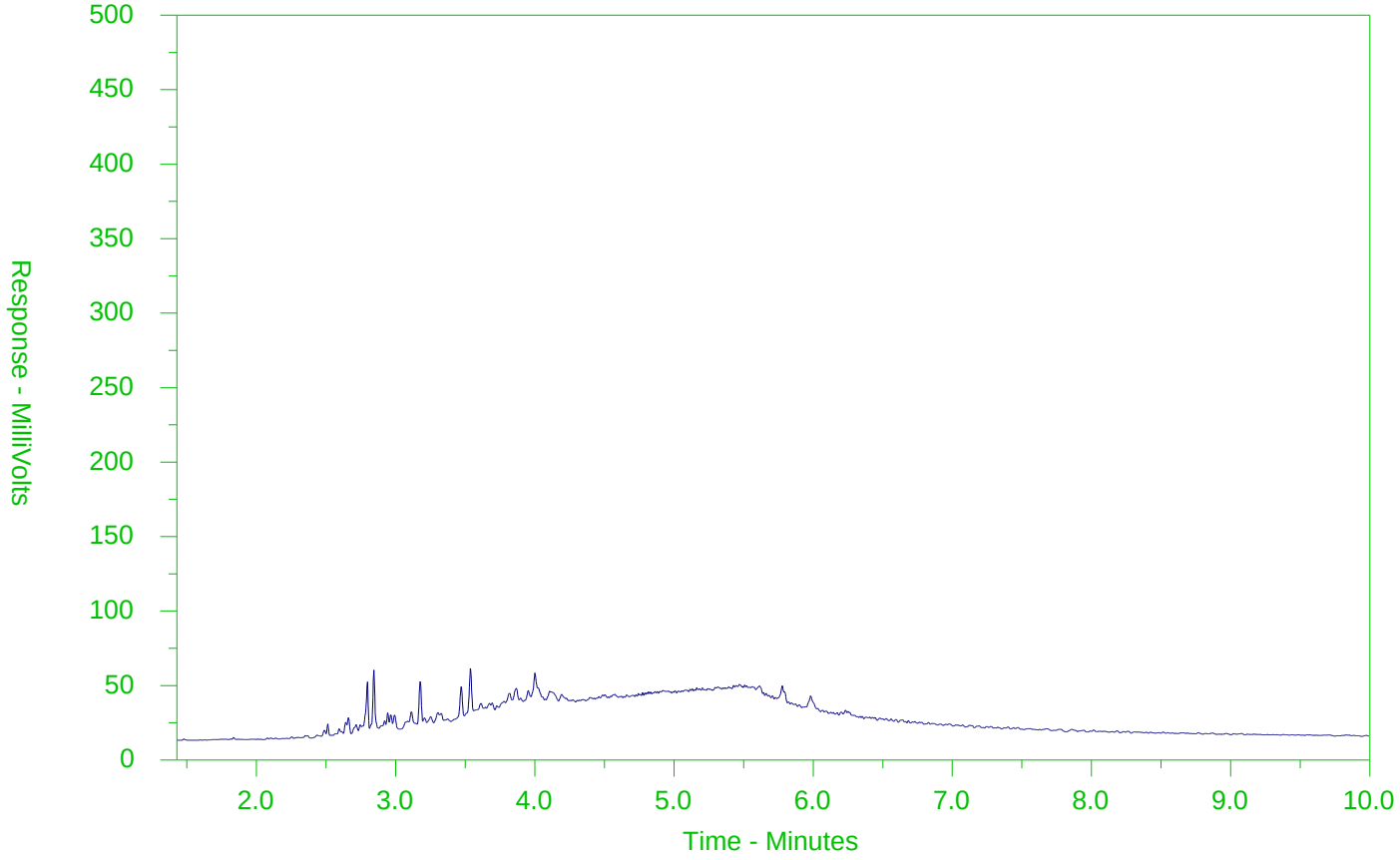
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2036241-2
Client Sample ID: PS-G-SED-2 (BULK)



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

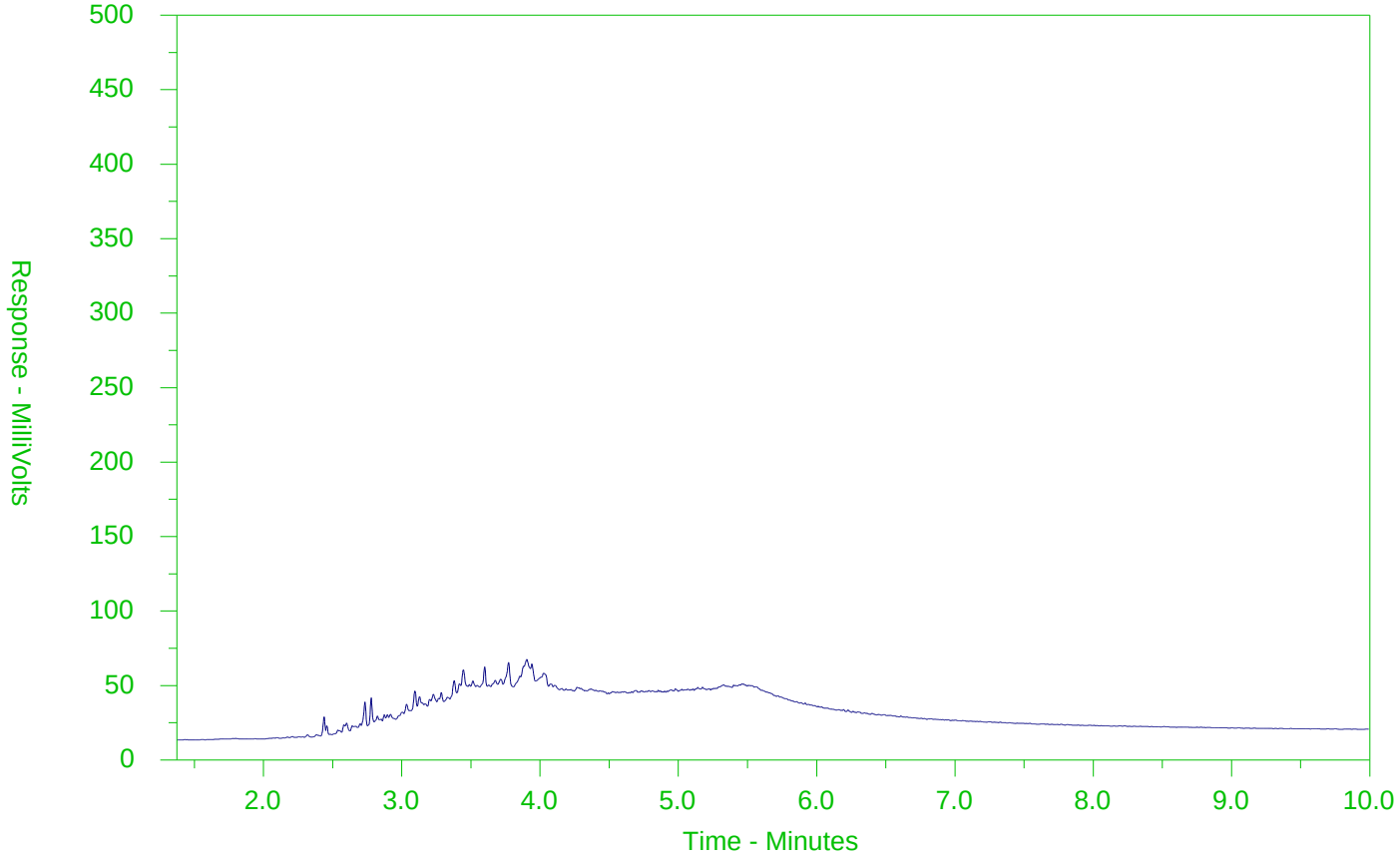
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2036241-4
Client Sample ID: PS-G-SED-3



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

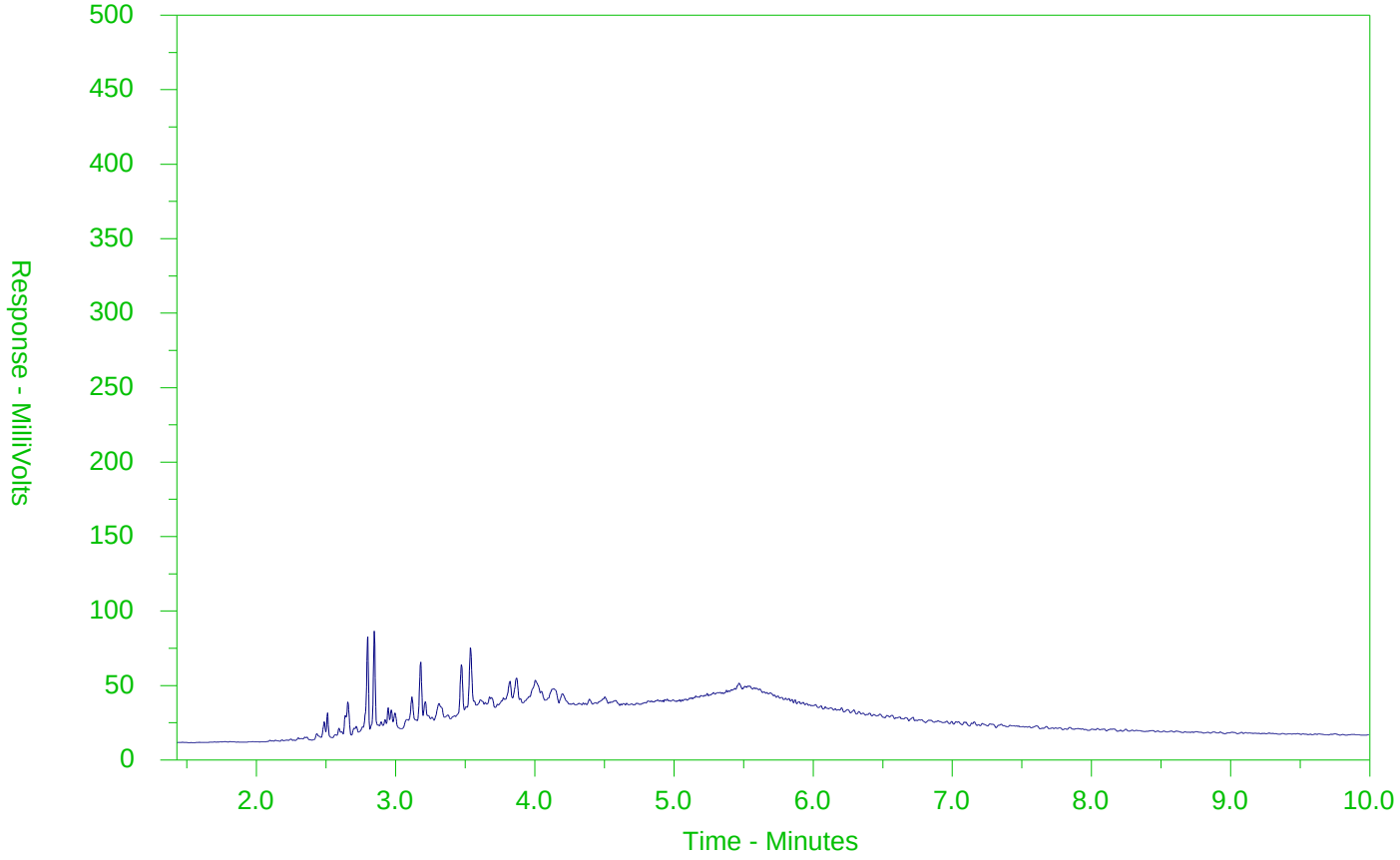
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2036241-5
Client Sample ID: PS-G-SED-6



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

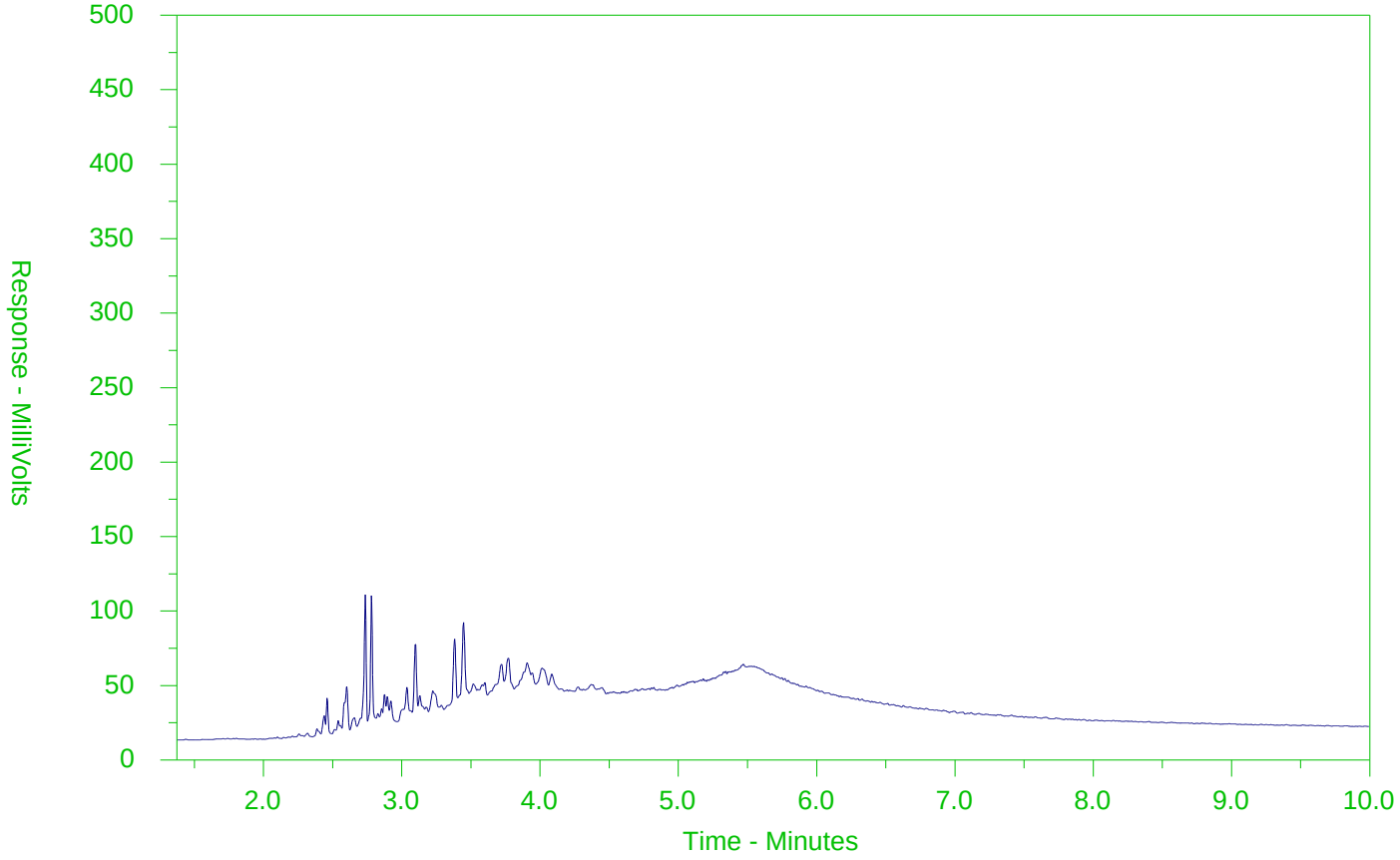
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2036241-6
Client Sample ID: PS-G-SED-66



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

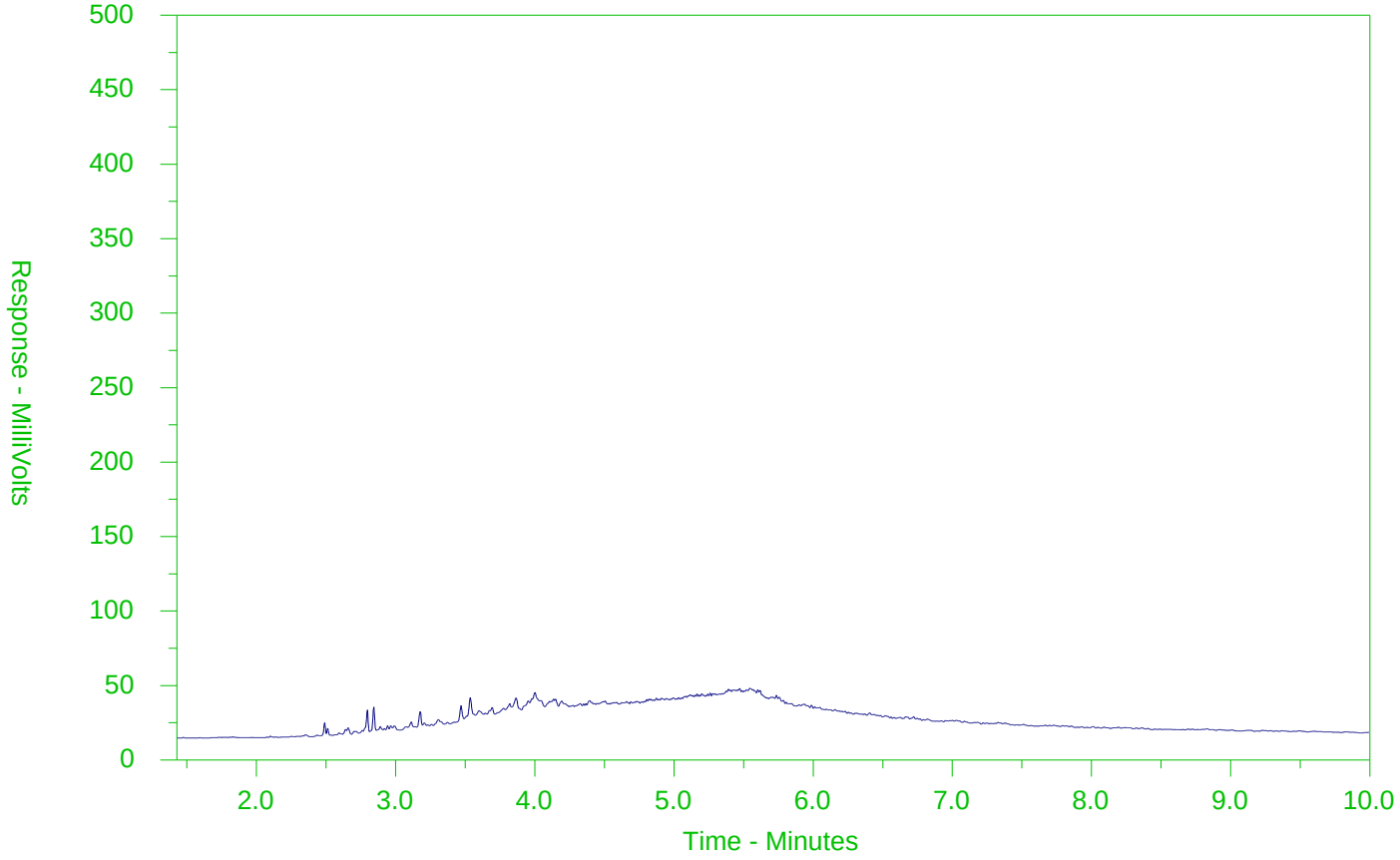
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2036241-13
Client Sample ID: PS-G-SED-5



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

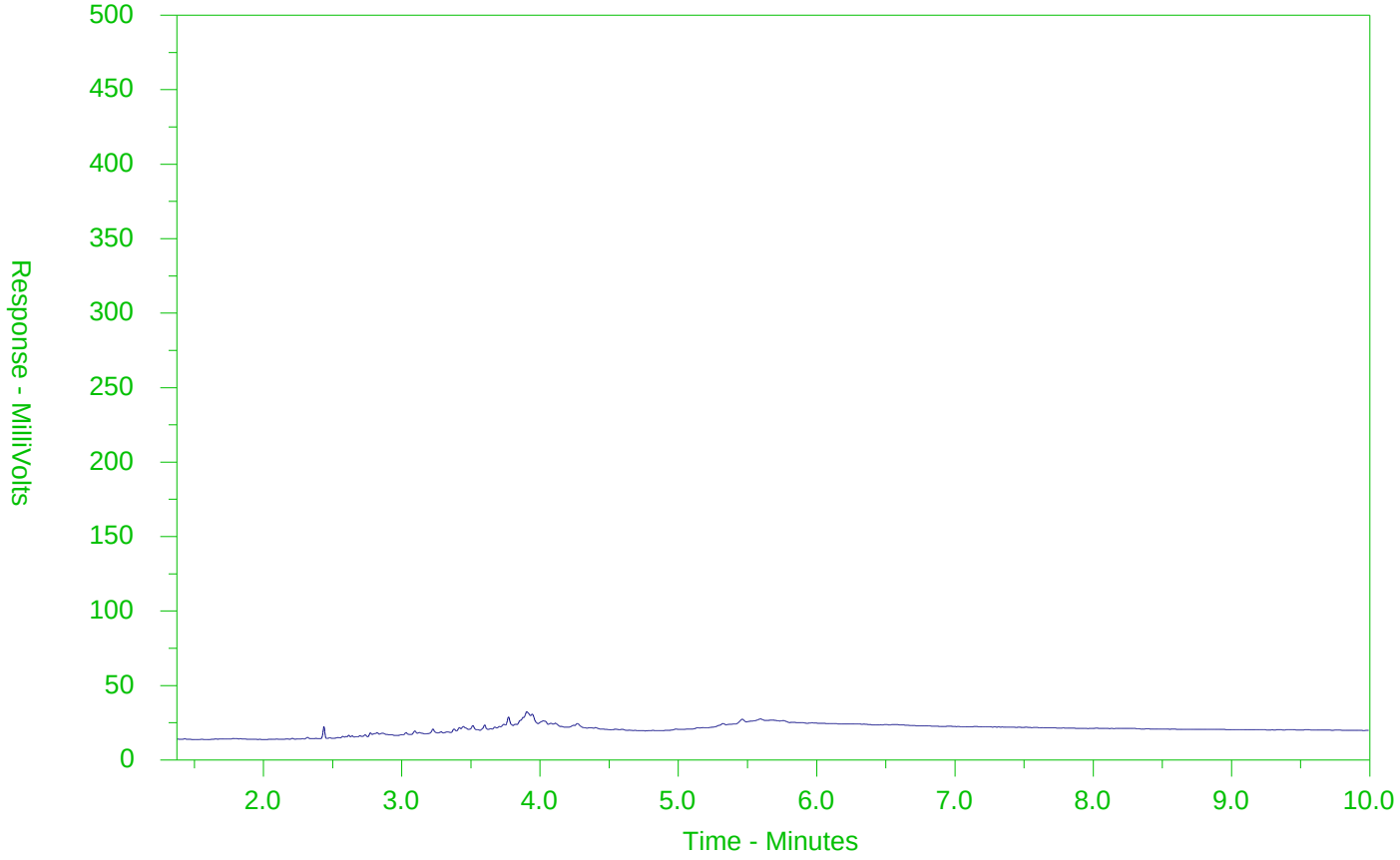
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2036241-26
Client Sample ID: PS-D-SED-19 (BULK)



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

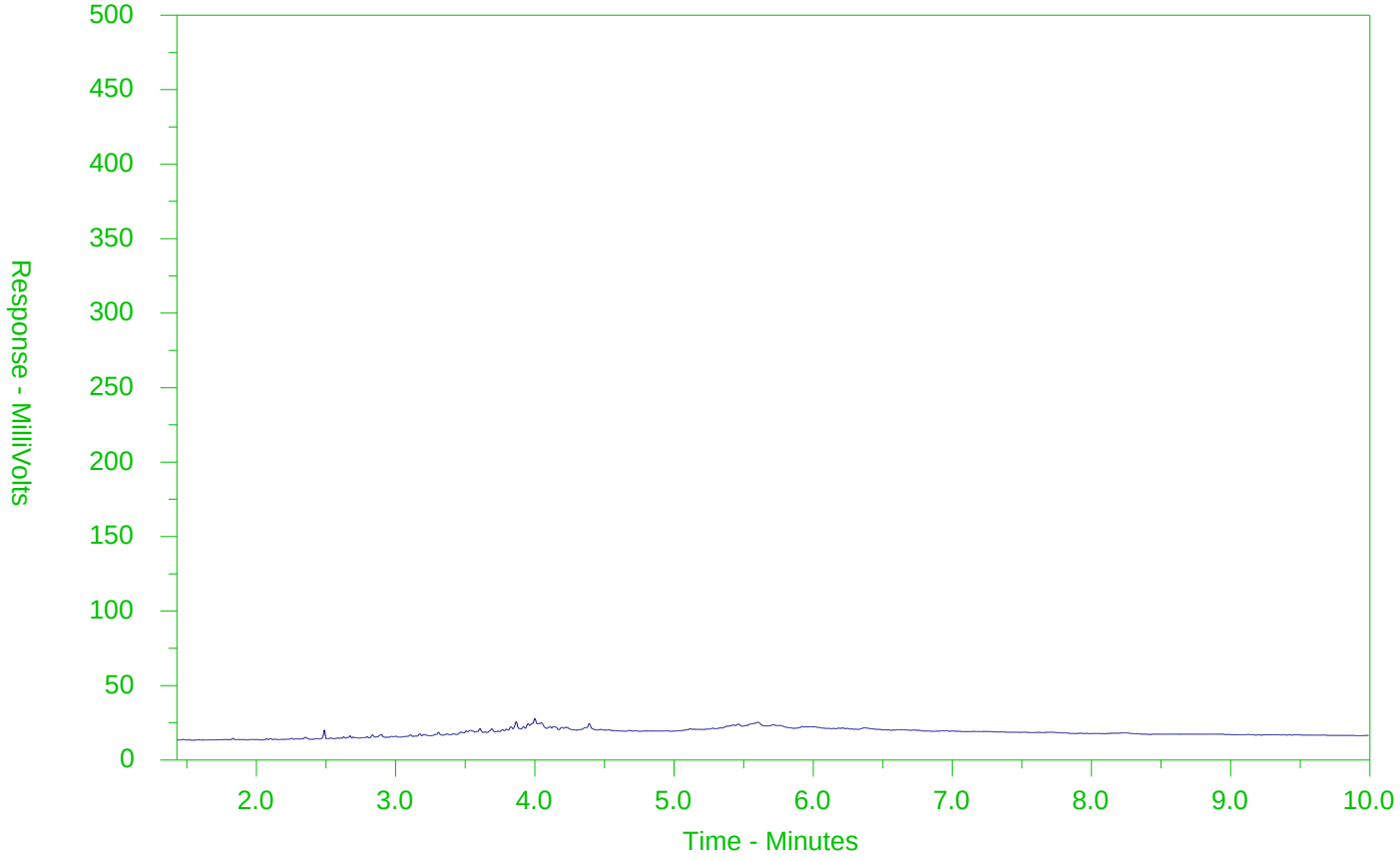
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2036241-28
Client Sample ID: PS-D-SED-199



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2036241-COFC

COC Number: 15 -

Page of

Report To	Contact and company name below will appear on the final report
Company:	SNC Lavalin
Contact:	Fabienne Etienne
Phone:	(416)635-5882 x 56194
	Company address below will appear on the final report
Street:	235 Lesmill Road
City/Province:	Toronto, Ontario
Postal Code:	M3B 2V1
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	SNC Lavalin
Contact:	Accounts Payable

Report Format / Distribution

Select Report Format: ☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☐ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Fabienne.Etienne@snclavalin.com

Email 2

Email 3

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☑ MAIL ☑ FAX

Email 1 or Fax: Accounts Payable

Email 2

Project Information

ALS Account # / Quote #: Q65395

Job #: 651954

PO / AFE:

LSD:

ALS Lab Work Order # (lab use only): L2036241 16A

ALS Contact: Mathy

Sampler: CR/ZM

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#:

Major/Minor Code: Routing Code:

Requisitioner:

Location:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☒ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)			EMERGENCY		
	4 day [P4]	☐		1 Business day [E1]	☐
	3 day [P3]	☐		Same Day, Weekend or Statutory holiday [E0]	☐
	2 day [P2]	☐			

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals & Inorganics	VOC	BTX,F1	F2-F4	PAH	PCB	OC Pesticides	TOC	SOLIDS-TSS-WT (Water)	TCLP BNA	TCLP M&I	TCLP PCB	TCLP VOC	Number of Containers
1	DS-C-SED-1	12DEC17	17:00	SED	X		X	X	X		X	X						6
2 3	DS-C-SED-2	12DEC17	13:30	SED	X		X	X	X		X	X		X	X		X	9
4	DS-C-SED-3	12DEC17	15:30	SED	X		X	X	X		X	X						6
5	DS-C-SED-6	12DEC17	16:40	SED	X		X	X	X		X	X						6
6	DS-C-SED-66	12DEC17	16:40	SED	X		X	X	X		X	X						6
7	DS-C-SW-2	12DEC17	12:40	SW									X					1
8	DS-C-SW-2D	12DEC17	13:35	SW									X					1
9	DS-C-SW-3	12DEC17	15:00	SW									X					1
10	DS-C-SW-3D	12DEC17	16:00	SW									X					1
11	DS-C-SW-6	12DEC17	16:15	SW									X					1
12	DS-C-SW-6D	12DEC17	16:45	SW									X					1
13	DS-C-SED-5	13DEC17	09:30	SED	X		X	X	X		X	X						6

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☒ NO

Are samples for human drinking water use? ☐ YES ☒ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☒ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
0.3	0.1		0.9		

SHIPMENT RELEASE (client use)

Released by: Date: Dec 15/17 Time:

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: Date: 15/12/17 Time: 15:23

FINAL SHIPMENT RECEPTION (lab use only)

Received by: AP Date: 12-15-17 Time: 17:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2036241-COFC

COC Number: 15 -

Page of

Report To	Contact and company name below will appear on the final report
Company:	SNC Lavalin
Contact:	Fabienne Etienne
Phone:	(416)635-5882 x 56194
Company address below will appear on the final report	
Street:	235 Lesmill Road
City/Province:	Toronto, Ontario
Postal Code:	M3B 2V1
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	SNC Lavalin
Contact:	Accounts Payable

Report Format / Distribution

Select Report Format: ☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☐ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax Fabienne.Etienne@snclavalin.com

Email 2

Email 3

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☑ MAIL ☑ FAX

Email 1 or Fax Accounts Payable

Email 2

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☒ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: Q65395

Job #: 651954

PO / AFE:

LSD: 16A

ALS Lab Work Order # (lab use only): L2036241 DA

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Contact: Mathy Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals & Inorganics	VOC ON HOLD	BTX,F1	F2-F4	PAH	PCB	OC Pesticides	TOC	SOLIDS-TSS-WT (Water)	TCLP BNA	TCLP M&I	TCLP PCB	TCLP VOC	Number of Containers
14	D3-E-SW-3	13-Dec-17	11:10	SW									X					1
15	D3-E-SW-2D	13-Dec-17	12:00	SW		X							X					1
16	D5-E-SW-3	13-Dec-17	12:00	SW									X					1
17	D3-F-SW-3D	13-Dec-17	12:30	SW		X							X					1
18	D3-F-SW-3	13-Dec-17	12:30	SW									X					1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?

☐ YES ☒ NO

Are samples for human drinking water use?

☐ YES ☒ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☒ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
0.3	0.1		0.9		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: Dec 15/17	Time:	Received by:	Date: 15/12/17	Time: 15:23	Received by: AP	Date: 12-15-17	Time: 17:00

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Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2036241-COFC

COC Number: 15 -

Page of

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Contact:	Fabienne Etienne
Phone:	(416)635-5882 x 56194
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City/Province:	Toronto, Ontario
Postal Code:	M3B 2V1
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	SNC Lavalin
Contact:	Accounts Payable

Report Format / Distribution

Select Report Format: ☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☐ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Fabienne.Etienne@snclavalin.com

Email 2

Email 3

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☑ MAIL ☑ FAX

Email 1 or Fax: Accounts Payable

Email 2

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	Q65395
Job #:	651954
PO / AFE:	
LSD:	16A
ALS Lab Work Order # (lab use only)	L2036241

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact: Mathy	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals & Inorganics	VOC	BTX,F1	F2-F4	PAH	PCB	OC Pesticides	TOC	SOLIDS-TSS-WT (Water)	TCLP BNA	TCLP M&I	TCLP PCB	TCLP VOC	Number of Containers
19	DS-D-SW-3	14 DEC 17	10:05	SW									X					1
20	DS-D-SW-3D		10:30	SW		On Hold							X					1
21	DS-D-SW-11		14:25	SW									X					1
22	DS-D-SW-111		14:25	SW									X					1
23	DS-D-SW-111D		14:30	SW		On Hold							X					1
24	DS-D-SW-19		15:00	SW									X					1
25	DS-D-SW-19D		15:20	SW									X					1
26,27	DS-D-SED-19		15:15	SED	X		X	X	X		X	X		X	X		X	9
28	DS-D-SED-199	14 DEC 17	15:15	SED	X		X	X	X		X	X						6

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☒ NO

Are samples for human drinking water use? ☐ YES ☒ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☒ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
0.3	0.1		0.9		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: Dec 15/17	Time:	Received by:	Date: 15/12/17	Time: 15:23	Received by: AP	Date: 12-15-17	Time: 17:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

SNC- Lavalin Inc. (Sudbury/Toronto)
ATTN: MELANIE SIEWERT
235 LESMILL ROAD
TORONTO ON M3B 2V1

Date Received: 08-FEB-18
Report Date: 14-FEB-18 14:17 (MT)
Version: FINAL

Client Phone: 416-635-5882

Certificate of Analysis

Lab Work Order #: L2054541
Project P.O. #: 32402
Job Reference: 651954
C of C Numbers:
Legal Site Desc:

Mathy Mahadeva
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054541-1 PS-C-SW-101							
Sampled By: RHH on 06-FEB-18 @ 11:10							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	09-FEB-18	12-FEB-18	R3958971
L2054541-2 PS-C-SW-101D							
Sampled By: RHH on 06-FEB-18 @ 12:00							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	158		2.0	mg/L	09-FEB-18	12-FEB-18	R3958971
L2054541-3 PS-C-SW-102							
Sampled By: RHH on 06-FEB-18 @ 09:30							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	09-FEB-18	12-FEB-18	R3958971
L2054541-4 PS-C-SW-102D							
Sampled By: RHH on 06-FEB-18 @ 10:50							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	282		2.0	mg/L	09-FEB-18	12-FEB-18	R3958971
L2054541-5 PS-C-SW-103							
Sampled By: RHH on 06-FEB-18 @ 13:50							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	09-FEB-18	12-FEB-18	R3958978
L2054541-6 PS-C-SW-103D							
Sampled By: RHH on 06-FEB-18 @ 15:00							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	589	DLHC	4.0	mg/L	09-FEB-18	12-FEB-18	R3958978
L2054541-7 PS-E-SW-103							
Sampled By: RHH on 07-FEB-18 @ 08:45							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	12-FEB-18	13-FEB-18	R3960132
L2054541-8 PS-E-SW-103D							
Sampled By: RHH on 07-FEB-18 @ 11:00							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	24.7		2.0	mg/L	12-FEB-18	13-FEB-18	R3960132
L2054541-9 PS-E-SW-101							
Sampled By: RHH on 07-FEB-18 @ 13:45							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	2.6		2.0	mg/L	12-FEB-18	13-FEB-18	R3960132
L2054541-10 PS-E-SW-102							
Sampled By: RHH on 07-FEB-18 @ 14:30							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	12-FEB-18	13-FEB-18	R3960132

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054541-11 PS-G-SW-101							
Sampled By: RHH on 07-FEB-18 @ 15:30							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	12-FEB-18	13-FEB-18	R3960132
L2054541-12 PS-G-SW-101D							
Sampled By: RHH on 07-FEB-18 @ 16:00							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	140		2.0	mg/L	12-FEB-18	13-FEB-18	R3960132
L2054541-13 PS-G-SW-102							
Sampled By: RHH on 08-FEB-18 @ 08:45							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	3.8		2.0	mg/L	12-FEB-18	13-FEB-18	R3960132
L2054541-14 PS-G-SW-102D							
Sampled By: RHH on 08-FEB-18 @ 10:00							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	129		2.0	mg/L	12-FEB-18	13-FEB-18	R3960132
L2054541-15 PS-E-SW-1033							
Sampled By: RHH on 07-FEB-18 @ 08:45							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	<2.0		2.0	mg/L	13-FEB-18	14-FEB-18	R3960794
L2054541-16 PS-E-SW-1033D							
Sampled By: RHH on 07-FEB-18 @ 11:00							
Matrix: WATER							
Miscellaneous Parameters							
Total Suspended Solids	19.6		2.0	mg/L	13-FEB-18	14-FEB-18	R3960794

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.

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

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

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

Quality Control Report

Workorder: L2054541 Report Date: 14-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	**Water**							
Batch R3958971								
WG2713679-3 DUP		**L2053997-1**						
Total Suspended Solids		182	158		mg/L	14	20	12-FEB-18
WG2713679-2 LCS								
Total Suspended Solids			97.7		%		85-115	12-FEB-18
WG2713679-1 MB								
Total Suspended Solids			<2.0		mg/L		2	12-FEB-18
Batch R3958978								
WG2713680-3 DUP		**L2054248-2**						
Total Suspended Solids		286	301		mg/L	5.3	20	12-FEB-18
WG2713680-2 LCS								
Total Suspended Solids			97.7		%		85-115	12-FEB-18
WG2713680-1 MB								
Total Suspended Solids			<2.0		mg/L		2	12-FEB-18
Batch R3960132								
WG2714777-3 DUP		**L2054286-1**						
Total Suspended Solids		45.7	38.8		mg/L	16	20	13-FEB-18
WG2714777-2 LCS								
Total Suspended Solids			98.3		%		85-115	13-FEB-18
WG2714777-1 MB								
Total Suspended Solids			<2.0		mg/L		2	13-FEB-18
Batch R3960794								
WG2715230-3 DUP		**L2054538-1**						
Total Suspended Solids		1810	1680		mg/L	7.3	20	14-FEB-18
WG2715230-2 LCS								
Total Suspended Solids			99.8		%		85-115	14-FEB-18
WG2715230-1 MB								
Total Suspended Solids			<2.0		mg/L		2	14-FEB-18

Quality Control Report

Workorder: L2054541 Report Date: 14-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1
Contact: MELANIE SIEWERT

Legend:

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

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2054541-COFC

COC Number: 15 -

Page 1 of 2

Report To	Contact and company name below will appear on the final report
Company:	SNC Lavalin
Contact:	Melanie Siewert
Phone:	(416)635-5882 x 56194
	Company address below will appear on the final report
Street:	235 Lesmill Road
City/Province:	Toronto, Ontario
Postal Code:	M3B 2V1
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	SNC Lavalin
Contact:	Accounts Payable

Report Format / Distribution

Select Report Format: ☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☒ YES ☐ NO

☒ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Melanie.Siewert@snclavalin.com

Email 2:

Email 3:

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☒ MAIL ☒ FAX

Email 1 or Fax: Accounts Payable

Email 2: Melanie.Siewert@snclavalin.com

Project Information

ALS Account # / Quote #:	Q85395
Job #:	651954
PO / AFE:	32402
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2054541

ALS Contact: Mathy

Sampler: RHH

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☒ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals & Inorganics	BTX, F1	F2-F4	PAH	OC Pesticides	TOC			SOLIDS-TSS-WT (Water)	TCLP BNA	TCLP M&I	TCLP PCB	TCLP VOC	Number of Containers
	PS-C-SW-101	06-Feb-18	11:10	SW									X					1
	PS-C-SW-101D	↓	12:00	↓									↓					↓
	PS-C-SW-102		9:30															
	PS-C-SW-102D		10:50															
	PS-C-SW-103		13:50															
	PS-C-SW-103D	↓	15:00	↓									↓					↓
	PS-E-SW-103	07-Feb-18	8:45	SW									X					1
	PS-E-SW-103D	↓	11:00	↓									↓					↓
	PS-E-SW-101		13:45															
	PS-E-SW-102		14:30															
	PS-G-SW-101		15:30															
	PS-G-SW-101	↓	16:00	↓									↓					↓

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☒ NO

Are samples for human drinking water use? ☐ YES ☒ NO

Special Instructions: ... report by clicking on the drop-down list below ... OC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☒ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
-3			1.1		

SHIPMENT RELEASE (client use)

Released by: R. Hun-Hsiao Date: ...

SHIPMENT RECEPTION (lab use only)

Received by: ... Date: Feb 8/18 Time: 1:32 pm

FINAL SHIPMENT RECEPTION (lab use only)

Received by: ... Date: 8-Feb-18 Time: 5:10

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may ... and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Re...

OCTOBER 2015 FRONT

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2054541-COFC

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	SNC Lavalin
Contact:	Melanie Siewert
Phone:	(416)635-5882 x 56194
	Company address below will appear on the final report
Street:	235 Lesmill Road
City/Province:	Toronto, Ontario
Postal Code:	M3B 2V1
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	SNC Lavalin
Contact:	Accounts Payable

Report Format / Distribution

Select Report Format: ☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☒ YES ☐ NO

☒ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Melanie.Siewert@snclavalin.com

Email 2:

Email 3:

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☑ MAIL ☑ FAX

Email 1 or Fax: Accounts Payable

Email 2: Melanie.Siewert@snclavalin.com

Project Information

ALS Account # / Quote #: Q65395

Job #: 651954

PO / AFE: 32402

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center:

PO#:

Major/Minor Code:

Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only): L2054541

ALS Contact: Mathy

Sampler: RHH

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☒ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals & Inorganics	BTX, F1	F2-F4	PAH	OC Pesticides	TOC			SOLIDS-TSS-WT (Water)	TCLP BNA	TCLP M&I	TCLP PCB	TCLP VOC	Number of Containers
	PS-G-SW-102	08-Feb-18	8:45	SW									X					1
	PS-G-SW-102D	"	10:00	SW									X					1
	PS-E[redacted]-SW-1033	07-Feb-18	8:45	SW									X					1
	PS-E[redacted]-SW-1033D	07-Feb-18	11:00	SW									X					1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☒ NO

Are samples for human drinking water use? ☐ YES ☒ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
-3.0			1.1		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: K. Hum-Hiao	Date: Feb 8, 2018	Time: 13:30	Received by:	Date: Feb 8/18	Time: 1:32 pm	Received by:	Date: 8-Feb-18	Time: 1:57

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

SNC- Lavalin Inc. (Sudbury/Toronto)
ATTN: MELANIE SIEWERT
235 LESMILL ROAD
TORONTO ON M3B 2V1

Date Received: 08-FEB-18
Report Date: 16-FEB-18 14:23 (MT)
Version: FINAL

Client Phone: 416-635-5882

Certificate of Analysis

Lab Work Order #: L2054623

Project P.O. #: 32402
Job Reference: 651954
C of C Numbers:
Legal Site Desc:

Mathy Mahadeva
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-1 PS-C-SED-101S Sampled By: JC/RHH on 06-FEB-18 @ 12:20 Matrix: SEDIMENT							
Physical Tests							
Conductivity	0.202		0.0040	mS/cm		13-FEB-18	R3960504
% Moisture	28.3		0.10	%	12-FEB-18	12-FEB-18	R3960070
pH	6.34		0.10	pH units		13-FEB-18	R3960519
Cyanides							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	12-FEB-18	13-FEB-18	R3960833
Organic / Inorganic Carbon							
Fraction Organic Carbon	0.0417		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0382		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0387		0.0010		15-FEB-18	15-FEB-18	R3961778
Average Fraction Organic Carbon	0.0395		0.0010		15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	4.17		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	3.82		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	3.87		0.10	%	15-FEB-18	15-FEB-18	R3961778
Saturated Paste Extractables							
SAR	0.80		0.10	SAR		13-FEB-18	R3961081
Calcium (Ca)	8.8		1.0	mg/L		13-FEB-18	R3961081
Magnesium (Mg)	1.5		1.0	mg/L		13-FEB-18	R3961081
Sodium (Na)	9.7		1.0	mg/L		13-FEB-18	R3961081
Metals							
Antimony (Sb)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Arsenic (As)	1.6		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Barium (Ba)	70.4		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Beryllium (Be)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B)	<5.0		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B), Hot Water Ext.	0.35		0.10	ug/g	13-FEB-18	13-FEB-18	R3961029
Cadmium (Cd)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Chromium (Cr)	12.9		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Cobalt (Co)	3.8		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Copper (Cu)	11.1		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Lead (Pb)	42.1		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Mercury (Hg)	0.0593		0.0050	ug/g	13-FEB-18	13-FEB-18	R3960180
Molybdenum (Mo)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Nickel (Ni)	8.1		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Selenium (Se)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Silver (Ag)	<0.20		0.20	ug/g	13-FEB-18	13-FEB-18	R3960869
Thallium (Tl)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Uranium (U)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Vanadium (V)	20.8		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Zinc (Zn)	71.6		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Speciated Metals							
Chromium, Hexavalent	<0.20		0.20	ug/g	12-FEB-18	13-FEB-18	R3960809
Volatile Organic Compounds							
Benzene	<0.0068		0.0068	ug/g	09-FEB-18	11-FEB-18	R3958282

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-1 PS-C-SED-101S Sampled By: JC/RHH on 06-FEB-18 @ 12:20 Matrix: SEDIMENT							
Volatile Organic Compounds							
Ethylbenzene	<0.018		0.018	ug/g	09-FEB-18	11-FEB-18	R3958282
Toluene	<0.080		0.080	ug/g	09-FEB-18	11-FEB-18	R3958282
o-Xylene	<0.020		0.020	ug/g	09-FEB-18	11-FEB-18	R3958282
m+p-Xylenes	<0.030		0.030	ug/g	09-FEB-18	11-FEB-18	R3958282
Xylenes (Total)	<0.050		0.050	ug/g		13-FEB-18	
Surrogate: 4-Bromofluorobenzene	86.8		50-140	%	09-FEB-18	11-FEB-18	R3958282
Surrogate: 1,4-Difluorobenzene	82.1		50-140	%	09-FEB-18	11-FEB-18	R3958282
Hydrocarbons							
F1 (C6-C10)	<5.0		5.0	ug/g	09-FEB-18	13-FEB-18	R3958282
F1-BTEX	<5.0		5.0	ug/g		15-FEB-18	
F2 (C10-C16)	<10		10	ug/g	13-FEB-18	14-FEB-18	R3960953
F2-Naphth	<10		10	ug/g		15-FEB-18	
F3 (C16-C34)	62		50	ug/g	13-FEB-18	14-FEB-18	R3960953
F3-PAH	62		50	ug/g		15-FEB-18	
F4 (C34-C50)	<50		50	ug/g	13-FEB-18	14-FEB-18	R3960953
Total Hydrocarbons (C6-C50)	<72		72	ug/g		15-FEB-18	
Chrom. to baseline at nC50	YES				13-FEB-18	14-FEB-18	R3960953
Surrogate: 2-Bromobenzotrifluoride	94.0		60-140	%	13-FEB-18	14-FEB-18	R3960953
Surrogate: 3,4-Dichlorotoluene	80.7		60-140	%	09-FEB-18	13-FEB-18	R3958282
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Acenaphthylene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Anthracene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(a)anthracene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(a)pyrene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(b)fluoranthene	0.077		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(g,h,i)perylene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(k)fluoranthene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Chrysene	0.055		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Dibenzo(ah)anthracene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Fluoranthene	0.064		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Fluorene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		15-FEB-18	
1-Methylnaphthalene	<0.030		0.030	ug/g	09-FEB-18	15-FEB-18	R3960867
2-Methylnaphthalene	<0.030		0.030	ug/g	09-FEB-18	15-FEB-18	R3960867
Naphthalene	<0.013		0.013	ug/g	09-FEB-18	15-FEB-18	R3960867
Phenanthrene	<0.046		0.046	ug/g	09-FEB-18	15-FEB-18	R3960867
Pyrene	0.064		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Surrogate: 2-Fluorobiphenyl	86.8		50-140	%	09-FEB-18	15-FEB-18	R3960867
Surrogate: p-Terphenyl d14	83.0		50-140	%	09-FEB-18	15-FEB-18	R3960867

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-2 PS-C-SED-102S Sampled By: JC/RHH on 06-FEB-18 @ 11:00 Matrix: SEDIMENT							
Physical Tests							
Conductivity	0.177		0.0040	mS/cm		13-FEB-18	R3960504
% Moisture	31.7		0.10	%	12-FEB-18	12-FEB-18	R3960070
pH	6.51		0.10	pH units		13-FEB-18	R3960519
Cyanides							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	12-FEB-18	13-FEB-18	R3960833
Organic / Inorganic Carbon							
Fraction Organic Carbon	0.0287		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0316		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0324		0.0010		15-FEB-18	15-FEB-18	R3961778
Average Fraction Organic Carbon	0.0309		0.0010		15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	2.87		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	3.16		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	3.24		0.10	%	15-FEB-18	15-FEB-18	R3961778
Saturated Paste Extractables							
SAR	0.67	SAR:M	0.10	SAR		13-FEB-18	R3961081
Calcium (Ca)	6.5		1.0	mg/L		13-FEB-18	R3961081
Magnesium (Mg)	<1.0		1.0	mg/L		13-FEB-18	R3961081
Sodium (Na)	6.2		1.0	mg/L		13-FEB-18	R3961081
Metals							
Antimony (Sb)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Arsenic (As)	2.5		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Barium (Ba)	72.7		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Beryllium (Be)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B)	<5.0		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B), Hot Water Ext.	0.23		0.10	ug/g	13-FEB-18	13-FEB-18	R3961029
Cadmium (Cd)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Chromium (Cr)	13.1		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Cobalt (Co)	5.1		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Copper (Cu)	15.2		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Lead (Pb)	75.2		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Mercury (Hg)	0.0375		0.0050	ug/g	13-FEB-18	13-FEB-18	R3960180
Molybdenum (Mo)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Nickel (Ni)	8.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Selenium (Se)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Silver (Ag)	<0.20		0.20	ug/g	13-FEB-18	13-FEB-18	R3960869
Thallium (Tl)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Uranium (U)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Vanadium (V)	25.2		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Zinc (Zn)	85.8		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Speciated Metals							
Chromium, Hexavalent	<0.20		0.20	ug/g	12-FEB-18	13-FEB-18	R3960809
Volatile Organic Compounds							
Benzene	<0.0068		0.0068	ug/g	09-FEB-18	11-FEB-18	R3958282

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-2 PS-C-SED-102S Sampled By: JC/RHH on 06-FEB-18 @ 11:00 Matrix: SEDIMENT							
Volatile Organic Compounds							
Ethylbenzene	<0.018		0.018	ug/g	09-FEB-18	11-FEB-18	R3958282
Toluene	<0.080		0.080	ug/g	09-FEB-18	11-FEB-18	R3958282
o-Xylene	<0.020		0.020	ug/g	09-FEB-18	11-FEB-18	R3958282
m+p-Xylenes	<0.030		0.030	ug/g	09-FEB-18	11-FEB-18	R3958282
Xylenes (Total)	<0.050		0.050	ug/g		13-FEB-18	
Surrogate: 4-Bromofluorobenzene	87.4		50-140	%	09-FEB-18	11-FEB-18	R3958282
Surrogate: 1,4-Difluorobenzene	83.2		50-140	%	09-FEB-18	11-FEB-18	R3958282
Hydrocarbons							
F1 (C6-C10)	<5.0		5.0	ug/g	09-FEB-18	13-FEB-18	R3958282
F1-BTEX	<5.0		5.0	ug/g		15-FEB-18	
F2 (C10-C16)	<10		10	ug/g	09-FEB-18	12-FEB-18	R3960100
F2-Naphth	<10		10	ug/g		15-FEB-18	
F3 (C16-C34)	93		50	ug/g	09-FEB-18	12-FEB-18	R3960100
F3-PAH	93		50	ug/g		15-FEB-18	
F4 (C34-C50)	<50		50	ug/g	09-FEB-18	12-FEB-18	R3960100
Total Hydrocarbons (C6-C50)	93		72	ug/g		15-FEB-18	
Chrom. to baseline at nC50	YES				09-FEB-18	12-FEB-18	R3960100
Surrogate: 2-Bromobenzotrifluoride	83.7		60-140	%	09-FEB-18	12-FEB-18	R3960100
Surrogate: 3,4-Dichlorotoluene	86.2		60-140	%	09-FEB-18	13-FEB-18	R3958282
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Acenaphthylene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Anthracene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(a)anthracene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(a)pyrene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(b)fluoranthene	0.060		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(g,h,i)perylene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(k)fluoranthene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Chrysene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Dibenzo(ah)anthracene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Fluoranthene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Fluorene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		15-FEB-18	
1-Methylnaphthalene	<0.030		0.030	ug/g	09-FEB-18	15-FEB-18	R3960867
2-Methylnaphthalene	<0.030		0.030	ug/g	09-FEB-18	15-FEB-18	R3960867
Naphthalene	<0.013		0.013	ug/g	09-FEB-18	15-FEB-18	R3960867
Phenanthrene	<0.046		0.046	ug/g	09-FEB-18	15-FEB-18	R3960867
Pyrene	<0.050		0.050	ug/g	09-FEB-18	15-FEB-18	R3960867
Surrogate: 2-Fluorobiphenyl	91.8		50-140	%	09-FEB-18	15-FEB-18	R3960867
Surrogate: p-Terphenyl d14	86.9		50-140	%	09-FEB-18	15-FEB-18	R3960867
Organochlorine Pesticides							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-2 PS-C-SED-102S Sampled By: JC/RHH on 06-FEB-18 @ 11:00 Matrix: SEDIMENT							
Organochlorine Pesticides							
Aldrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
a-chlordane	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Chlordane (Total)	<0.028		0.028	ug/g		15-FEB-18	
g-chlordane	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
op-DDD	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDD	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDD	<0.028		0.028	ug/g		15-FEB-18	
o,p-DDE	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDE	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDE	<0.028		0.028	ug/g		15-FEB-18	
op-DDT	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDT	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDT	<0.028		0.028	ug/g		15-FEB-18	
Dieldrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Endosulfan I	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Endosulfan II	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Endosulfan (Total)	<0.028		0.028	ug/g		15-FEB-18	
Endrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Heptachlor	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Heptachlor Epoxide	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachlorobenzene	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachlorobutadiene	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachloroethane	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Methoxychlor	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Surrogate: 2-Fluorobiphenyl	93.6		50-140	%	09-FEB-18	15-FEB-18	R3961401
Surrogate: d14-Terphenyl	72.3		50-140	%	09-FEB-18	15-FEB-18	R3961401
L2054623-3 PS-C-SED-103S Sampled By: JC/RHH on 06-FEB-18 @ 15:45 Matrix: SEDIMENT							
Physical Tests							
Conductivity	0.293		0.0040	mS/cm		13-FEB-18	R3960504
% Moisture	70.2		0.10	%	12-FEB-18	12-FEB-18	R3960070
pH	6.33		0.10	pH units		13-FEB-18	R3960519
Cyanides							
Cyanide, Weak Acid Diss	0.12	DLHM	0.15	ug/g	12-FEB-18	13-FEB-18	R3960833
Organic / Inorganic Carbon							
Fraction Organic Carbon	0.130		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.140		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.127		0.0010		15-FEB-18	15-FEB-18	R3961778
Average Fraction Organic Carbon	0.132		0.0010		15-FEB-18	15-FEB-18	R3961778

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-3 PS-C-SED-103S Sampled By: JC/RHH on 06-FEB-18 @ 15:45 Matrix: SEDIMENT							
Organic / Inorganic Carbon							
Total Organic Carbon	13.0		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	14.0		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	12.7		0.10	%	15-FEB-18	15-FEB-18	R3961778
Saturated Paste Extractables							
SAR	0.72		0.10	SAR		13-FEB-18	R3961081
Calcium (Ca)	24.6		1.0	mg/L		13-FEB-18	R3961081
Magnesium (Mg)	4.7		1.0	mg/L		13-FEB-18	R3961081
Sodium (Na)	14.9		1.0	mg/L		13-FEB-18	R3961081
Metals							
Antimony (Sb)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Arsenic (As)	3.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Barium (Ba)	102		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Beryllium (Be)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B)	5.7		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B), Hot Water Ext.	1.12		0.10	ug/g	13-FEB-18	13-FEB-18	R3961029
Cadmium (Cd)	0.52		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Chromium (Cr)	16.3		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Cobalt (Co)	5.7		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Copper (Cu)	14.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Lead (Pb)	35.6		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Mercury (Hg)	0.0529		0.0050	ug/g	13-FEB-18	13-FEB-18	R3960180
Molybdenum (Mo)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Nickel (Ni)	9.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Selenium (Se)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Silver (Ag)	<0.20		0.20	ug/g	13-FEB-18	13-FEB-18	R3960869
Thallium (Tl)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Uranium (U)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Vanadium (V)	28.3		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Zinc (Zn)	105		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Speciated Metals							
Chromium, Hexavalent	<0.40	DLHM	0.40	ug/g	12-FEB-18	13-FEB-18	R3960809
Volatile Organic Compounds							
Benzene	<0.020	DLHM	0.020	ug/g	09-FEB-18	11-FEB-18	R3958282
Ethylbenzene	<0.054	DLHM	0.054	ug/g	09-FEB-18	11-FEB-18	R3958282
Toluene	<0.24	DLHM	0.24	ug/g	09-FEB-18	11-FEB-18	R3958282
o-Xylene	<0.060	DLHM	0.060	ug/g	09-FEB-18	11-FEB-18	R3958282
m+p-Xylenes	<0.090	DLHM	0.090	ug/g	09-FEB-18	11-FEB-18	R3958282
Xylenes (Total)	<0.11		0.11	ug/g		13-FEB-18	
Surrogate: 4-Bromofluorobenzene	81.4		50-140	%	09-FEB-18	11-FEB-18	R3958282
Surrogate: 1,4-Difluorobenzene	78.5		50-140	%	09-FEB-18	11-FEB-18	R3958282
Hydrocarbons							
F1 (C6-C10)	<15	DLHM	15	ug/g	09-FEB-18	13-FEB-18	R3958282

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-3 PS-C-SED-103S Sampled By: JC/RHH on 06-FEB-18 @ 15:45 Matrix: SEDIMENT							
Hydrocarbons							
F1-BTEX	<15		15	ug/g		15-FEB-18	
F2 (C10-C16)	<30	DLHM	30	ug/g	13-FEB-18	14-FEB-18	R3960953
F2-Naphth	<30		30	ug/g		15-FEB-18	
F3 (C16-C34)	340	DLHM	150	ug/g	13-FEB-18	14-FEB-18	R3960953
F3-PAH	340		150	ug/g		15-FEB-18	
F4 (C34-C50)	230	DLHM	150	ug/g	13-FEB-18	14-FEB-18	R3960953
Total Hydrocarbons (C6-C50)	580		210	ug/g		15-FEB-18	
Chrom. to baseline at nC50	YES				13-FEB-18	14-FEB-18	R3960953
Surrogate: 2-Bromobenzotrifluoride	91.1		60-140	%	13-FEB-18	14-FEB-18	R3960953
Surrogate: 3,4-Dichlorotoluene	72.8		60-140	%	09-FEB-18	13-FEB-18	R3958282
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.075	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Acenaphthylene	<0.075	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Anthracene	<0.075	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(a)anthracene	0.081	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(a)pyrene	<0.075	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(b)fluoranthene	0.150	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(g,h,i)perylene	<0.075	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Benzo(k)fluoranthene	<0.075	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Chrysene	0.103	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Dibenzo(ah)anthracene	<0.075	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Fluoranthene	0.111	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Fluorene	<0.075	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Indeno(1,2,3-cd)pyrene	<0.075	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
1+2-Methylnaphthalenes	<0.064		0.064	ug/g		15-FEB-18	
1-Methylnaphthalene	<0.045	DLHM	0.045	ug/g	09-FEB-18	15-FEB-18	R3960867
2-Methylnaphthalene	<0.045	DLHM	0.045	ug/g	09-FEB-18	15-FEB-18	R3960867
Naphthalene	<0.020	DLHM	0.020	ug/g	09-FEB-18	15-FEB-18	R3960867
Phenanthrene	<0.069	DLHM	0.069	ug/g	09-FEB-18	15-FEB-18	R3960867
Pyrene	0.105	DLHM	0.075	ug/g	09-FEB-18	15-FEB-18	R3960867
Surrogate: 2-Fluorobiphenyl	92.2		50-140	%	09-FEB-18	15-FEB-18	R3960867
Surrogate: p-Terphenyl d14	90.9		50-140	%	09-FEB-18	15-FEB-18	R3960867
L2054623-4 PS-E-SED-103S Sampled By: JC/RHH on 07-FEB-18 @ 11:15 Matrix: SEDIMENT							
Physical Tests							
Conductivity	0.167		0.0040	mS/cm		13-FEB-18	R3960504
% Moisture	19.6		0.10	%	12-FEB-18	12-FEB-18	R3960070
pH	7.16		0.10	pH units		13-FEB-18	R3960519
Cyanides							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	12-FEB-18	13-FEB-18	R3960833
Organic / Inorganic Carbon							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-4 PS-E-SED-103S Sampled By: JC/RHH on 07-FEB-18 @ 11:15 Matrix: SEDIMENT							
Organic / Inorganic Carbon							
Fraction Organic Carbon	0.0068		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0072		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0081		0.0010		15-FEB-18	15-FEB-18	R3961778
Average Fraction Organic Carbon	0.0074		0.0010		15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.68		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.72		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.81		0.10	%	15-FEB-18	15-FEB-18	R3961778
Saturated Paste Extractables							
SAR	0.64	SAR:M	0.10	SAR		13-FEB-18	R3961081
Calcium (Ca)	6.3		1.0	mg/L		13-FEB-18	R3961081
Magnesium (Mg)	<1.0		1.0	mg/L		13-FEB-18	R3961081
Sodium (Na)	5.8		1.0	mg/L		13-FEB-18	R3961081
Metals							
Antimony (Sb)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Arsenic (As)	1.8		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Barium (Ba)	97.3		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Beryllium (Be)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B)	<5.0		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B), Hot Water Ext.	<0.10		0.10	ug/g	13-FEB-18	13-FEB-18	R3961029
Cadmium (Cd)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Chromium (Cr)	22.1		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Cobalt (Co)	6.9		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Copper (Cu)	15.6		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Lead (Pb)	8.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Mercury (Hg)	0.0082		0.0050	ug/g	13-FEB-18	13-FEB-18	R3960180
Molybdenum (Mo)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Nickel (Ni)	14.4		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Selenium (Se)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Silver (Ag)	<0.20		0.20	ug/g	13-FEB-18	13-FEB-18	R3960869
Thallium (Tl)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Uranium (U)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Vanadium (V)	39.7		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Zinc (Zn)	49.4		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Speciated Metals							
Chromium, Hexavalent	<0.20		0.20	ug/g	12-FEB-18	13-FEB-18	R3960809
Volatile Organic Compounds							
Benzene	<0.0068		0.0068	ug/g	09-FEB-18	11-FEB-18	R3958282
Ethylbenzene	<0.018		0.018	ug/g	09-FEB-18	11-FEB-18	R3958282
Toluene	<0.080		0.080	ug/g	09-FEB-18	11-FEB-18	R3958282
o-Xylene	<0.020		0.020	ug/g	09-FEB-18	11-FEB-18	R3958282
m+p-Xylenes	<0.030		0.030	ug/g	09-FEB-18	11-FEB-18	R3958282
Xylenes (Total)	<0.050		0.050	ug/g		13-FEB-18	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-4 PS-E-SED-103S Sampled By: JC/RHH on 07-FEB-18 @ 11:15 Matrix: SEDIMENT							
Volatile Organic Compounds							
Surrogate: 4-Bromofluorobenzene	92.6		50-140	%	09-FEB-18	11-FEB-18	R3958282
Surrogate: 1,4-Difluorobenzene	88.2		50-140	%	09-FEB-18	11-FEB-18	R3958282
Hydrocarbons							
F1 (C6-C10)	<5.0		5.0	ug/g	09-FEB-18	13-FEB-18	R3958282
F1-BTEX	<5.0		5.0	ug/g		15-FEB-18	
F2 (C10-C16)	<10		10	ug/g	09-FEB-18	12-FEB-18	R3960100
F2-Naphth	<10		10	ug/g		15-FEB-18	
F3 (C16-C34)	<50		50	ug/g	09-FEB-18	12-FEB-18	R3960100
F3-PAH	<50		50	ug/g		15-FEB-18	
F4 (C34-C50)	<50		50	ug/g	09-FEB-18	12-FEB-18	R3960100
Total Hydrocarbons (C6-C50)	<72		72	ug/g		15-FEB-18	
Chrom. to baseline at nC50	YES				09-FEB-18	12-FEB-18	R3960100
Surrogate: 2-Bromobenzotrifluoride	88.8		60-140	%	09-FEB-18	12-FEB-18	R3960100
Surrogate: 3,4-Dichlorotoluene	85.2		60-140	%	09-FEB-18	13-FEB-18	R3958282
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Acenaphthylene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(a)anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(a)pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(b)fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(g,h,i)perylene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(k)fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Chrysene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Dibenzo(ah)anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Fluorene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		15-FEB-18	
1-Methylnaphthalene	<0.030		0.030	ug/g	12-FEB-18	15-FEB-18	R3961530
2-Methylnaphthalene	<0.030		0.030	ug/g	12-FEB-18	15-FEB-18	R3961530
Naphthalene	<0.013		0.013	ug/g	12-FEB-18	15-FEB-18	R3961530
Phenanthrene	<0.046		0.046	ug/g	12-FEB-18	15-FEB-18	R3961530
Pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Surrogate: 2-Fluorobiphenyl	79.8		50-140	%	12-FEB-18	15-FEB-18	R3961530
Surrogate: p-Terphenyl d14	74.3		50-140	%	12-FEB-18	15-FEB-18	R3961530
Organochlorine Pesticides							
Aldrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
a-chlordane	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Chlordane (Total)	<0.028		0.028	ug/g		15-FEB-18	
g-chlordane	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-4 PS-E-SED-103S Sampled By: JC/RHH on 07-FEB-18 @ 11:15 Matrix: SEDIMENT							
Organochlorine Pesticides							
op-DDD	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDD	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDD	<0.028		0.028	ug/g		15-FEB-18	
o,p-DDE	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDE	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDE	<0.028		0.028	ug/g		15-FEB-18	
op-DDT	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDT	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDT	<0.028		0.028	ug/g		15-FEB-18	
Dieldrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Endosulfan I	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Endosulfan II	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Endosulfan (Total)	<0.028		0.028	ug/g		15-FEB-18	
Endrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Heptachlor	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Heptachlor Epoxide	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachlorobenzene	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachlorobutadiene	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachloroethane	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Methoxychlor	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Surrogate: 2-Fluorobiphenyl	93.1		50-140	%	09-FEB-18	15-FEB-18	R3961401
Surrogate: d14-Terphenyl	87.4		50-140	%	09-FEB-18	15-FEB-18	R3961401
L2054623-5 PS-E-SED-1033S Sampled By: JC/RHH on 07-FEB-18 @ 11:15 Matrix: SEDIMENT							
Physical Tests							
Conductivity	0.194		0.0040	mS/cm		13-FEB-18	R3960504
% Moisture	20.1		0.10	%	12-FEB-18	12-FEB-18	R3960070
pH	7.29		0.10	pH units		13-FEB-18	R3960519
Cyanides							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	12-FEB-18	13-FEB-18	R3960833
Organic / Inorganic Carbon							
Fraction Organic Carbon	0.0073		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0064		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0077		0.0010		15-FEB-18	15-FEB-18	R3961778
Average Fraction Organic Carbon	0.0071		0.0010		15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.73		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.64		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.77		0.10	%	15-FEB-18	15-FEB-18	R3961778
Saturated Paste Extractables							
SAR	0.69	SAR:M	0.10	SAR		13-FEB-18	R3961081
Calcium (Ca)	8.1		1.0	mg/L		13-FEB-18	R3961081
Magnesium (Mg)	<1.0		1.0	mg/L		13-FEB-18	R3961081

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-5 PS-E-SED-1033S Sampled By: JC/RHH on 07-FEB-18 @ 11:15 Matrix: SEDIMENT							
Saturated Paste Extractables							
Sodium (Na)	7.2		1.0	mg/L		13-FEB-18	R3961081
Metals							
Antimony (Sb)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Arsenic (As)	1.9		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Barium (Ba)	108		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Beryllium (Be)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B)	<5.0		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B), Hot Water Ext.	<0.10		0.10	ug/g	13-FEB-18	13-FEB-18	R3961029
Cadmium (Cd)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Chromium (Cr)	24.5		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Cobalt (Co)	7.4		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Copper (Cu)	17.2		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Lead (Pb)	9.1		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Mercury (Hg)	0.0116		0.0050	ug/g	13-FEB-18	13-FEB-18	R3960180
Molybdenum (Mo)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Nickel (Ni)	13.8		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Selenium (Se)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Silver (Ag)	<0.20		0.20	ug/g	13-FEB-18	13-FEB-18	R3960869
Thallium (Tl)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Uranium (U)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Vanadium (V)	44.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Zinc (Zn)	49.7		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Speciated Metals							
Chromium, Hexavalent	<0.20		0.20	ug/g	13-FEB-18	14-FEB-18	R3960985
Volatile Organic Compounds							
Benzene	<0.0068		0.0068	ug/g	09-FEB-18	11-FEB-18	R3958282
Ethylbenzene	<0.018		0.018	ug/g	09-FEB-18	11-FEB-18	R3958282
Toluene	<0.080		0.080	ug/g	09-FEB-18	11-FEB-18	R3958282
o-Xylene	<0.020		0.020	ug/g	09-FEB-18	11-FEB-18	R3958282
m+p-Xylenes	<0.030		0.030	ug/g	09-FEB-18	11-FEB-18	R3958282
Xylenes (Total)	<0.050		0.050	ug/g		13-FEB-18	
Surrogate: 4-Bromofluorobenzene	91.7		50-140	%	09-FEB-18	11-FEB-18	R3958282
Surrogate: 1,4-Difluorobenzene	86.4		50-140	%	09-FEB-18	11-FEB-18	R3958282
Hydrocarbons							
F1 (C6-C10)	<5.0		5.0	ug/g	09-FEB-18	13-FEB-18	R3958282
F1-BTEX	<5.0		5.0	ug/g		15-FEB-18	
F2 (C10-C16)	<10		10	ug/g	09-FEB-18	12-FEB-18	R3960100
F2-Naphth	<10		10	ug/g		15-FEB-18	
F3 (C16-C34)	<50		50	ug/g	09-FEB-18	12-FEB-18	R3960100
F3-PAH	<50		50	ug/g		15-FEB-18	
F4 (C34-C50)	<50		50	ug/g	09-FEB-18	12-FEB-18	R3960100
Total Hydrocarbons (C6-C50)	<72		72	ug/g		15-FEB-18	

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-5 PS-E-SED-1033S Sampled By: JC/RHH on 07-FEB-18 @ 11:15 Matrix: SEDIMENT							
Hydrocarbons							
Chrom. to baseline at nC50	YES				09-FEB-18	12-FEB-18	R3960100
Surrogate: 2-Bromobenzotrifluoride	83.6		60-140	%	09-FEB-18	12-FEB-18	R3960100
Surrogate: 3,4-Dichlorotoluene	85.5		60-140	%	09-FEB-18	13-FEB-18	R3958282
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Acenaphthylene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Benzo(a)anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Benzo(a)pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Benzo(b)fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Benzo(g,h,i)perylene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Benzo(k)fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Chrysene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Dibenzo(ah)anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Fluorene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		15-FEB-18	
1-Methylnaphthalene	<0.030		0.030	ug/g	12-FEB-18	15-FEB-18	R3961706
2-Methylnaphthalene	<0.030		0.030	ug/g	12-FEB-18	15-FEB-18	R3961706
Naphthalene	<0.013		0.013	ug/g	12-FEB-18	15-FEB-18	R3961706
Phenanthrene	<0.046		0.046	ug/g	12-FEB-18	15-FEB-18	R3961706
Pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961706
Surrogate: 2-Fluorobiphenyl	94.3		50-140	%	12-FEB-18	15-FEB-18	R3961706
Surrogate: p-Terphenyl d14	88.0		50-140	%	12-FEB-18	15-FEB-18	R3961706
Organochlorine Pesticides							
Aldrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
a-chlordane	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Chlordane (Total)	<0.028		0.028	ug/g		15-FEB-18	
g-chlordane	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
op-DDD	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDD	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDD	<0.028		0.028	ug/g		15-FEB-18	
o,p-DDE	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDE	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDE	<0.028		0.028	ug/g		15-FEB-18	
op-DDT	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDT	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDT	<0.028		0.028	ug/g		15-FEB-18	
Dieldrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-5 PS-E-SED-1033S Sampled By: JC/RHH on 07-FEB-18 @ 11:15 Matrix: SEDIMENT							
Organochlorine Pesticides							
Endosulfan I	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Endosulfan II	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Endosulfan (Total)	<0.028		0.028	ug/g		15-FEB-18	
Endrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Heptachlor	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Heptachlor Epoxide	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachlorobenzene	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachlorobutadiene	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachloroethane	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Methoxychlor	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Surrogate: 2-Fluorobiphenyl	93.2		50-140	%	09-FEB-18	15-FEB-18	R3961401
Surrogate: d14-Terphenyl	73.4		50-140	%	09-FEB-18	15-FEB-18	R3961401
L2054623-6 PS-G-SED-101S Sampled By: JC/RHH on 07-FEB-18 @ 16:15 Matrix: SEDIMENT							
Physical Tests							
Conductivity	0.202		0.0040	mS/cm		13-FEB-18	R3960504
% Moisture	22.7		0.10	%	12-FEB-18	12-FEB-18	R3960070
pH	7.51		0.10	pH units		13-FEB-18	R3960519
Cyanides							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	12-FEB-18	13-FEB-18	R3960833
Organic / Inorganic Carbon							
Fraction Organic Carbon	0.0023		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0020		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0021		0.0010		15-FEB-18	15-FEB-18	R3961778
Average Fraction Organic Carbon	0.0021		0.0010		15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.23		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.20		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.21		0.10	%	15-FEB-18	15-FEB-18	R3961778
Saturated Paste Extractables							
SAR	1.63	SAR:M	0.10	SAR		13-FEB-18	R3961081
Calcium (Ca)	4.9		1.0	mg/L		13-FEB-18	R3961081
Magnesium (Mg)	<1.0		1.0	mg/L		13-FEB-18	R3961081
Sodium (Na)	13.2		1.0	mg/L		13-FEB-18	R3961081
Metals							
Antimony (Sb)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Arsenic (As)	1.2		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Barium (Ba)	80.2		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Beryllium (Be)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B)	5.4		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B), Hot Water Ext.	<0.10		0.10	ug/g	13-FEB-18	13-FEB-18	R3961029
Cadmium (Cd)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Chromium (Cr)	18.4		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-6 PS-G-SED-101S Sampled By: JC/RHH on 07-FEB-18 @ 16:15 Matrix: SEDIMENT							
Metals							
Cobalt (Co)	5.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Copper (Cu)	11.4		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Lead (Pb)	23.5		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Mercury (Hg)	0.0052		0.0050	ug/g	13-FEB-18	13-FEB-18	R3960180
Molybdenum (Mo)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Nickel (Ni)	9.1		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Selenium (Se)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Silver (Ag)	<0.20		0.20	ug/g	13-FEB-18	13-FEB-18	R3960869
Thallium (Tl)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Uranium (U)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Vanadium (V)	38.8		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Zinc (Zn)	26.4		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Speciated Metals							
Chromium, Hexavalent	0.41		0.20	ug/g	13-FEB-18	14-FEB-18	R3960985
Volatile Organic Compounds							
Benzene	<0.0068		0.0068	ug/g	09-FEB-18	11-FEB-18	R3958282
Ethylbenzene	<0.018		0.018	ug/g	09-FEB-18	11-FEB-18	R3958282
Toluene	<0.080		0.080	ug/g	09-FEB-18	11-FEB-18	R3958282
o-Xylene	<0.020		0.020	ug/g	09-FEB-18	11-FEB-18	R3958282
m+p-Xylenes	<0.030		0.030	ug/g	09-FEB-18	11-FEB-18	R3958282
Xylenes (Total)	<0.050		0.050	ug/g		13-FEB-18	
Surrogate: 4-Bromofluorobenzene	92.4		50-140	%	09-FEB-18	11-FEB-18	R3958282
Surrogate: 1,4-Difluorobenzene	87.6		50-140	%	09-FEB-18	11-FEB-18	R3958282
Hydrocarbons							
F1 (C6-C10)	<5.0		5.0	ug/g	09-FEB-18	13-FEB-18	R3958282
F1-BTEX	<5.0		5.0	ug/g		15-FEB-18	
F2 (C10-C16)	<10		10	ug/g	09-FEB-18	12-FEB-18	R3960100
F2-Naphth	<10		10	ug/g		15-FEB-18	
F3 (C16-C34)	<50		50	ug/g	09-FEB-18	12-FEB-18	R3960100
F3-PAH	<50		50	ug/g		15-FEB-18	
F4 (C34-C50)	<50		50	ug/g	09-FEB-18	12-FEB-18	R3960100
Total Hydrocarbons (C6-C50)	<72		72	ug/g		15-FEB-18	
Chrom. to baseline at nC50	YES				09-FEB-18	12-FEB-18	R3960100
Surrogate: 2-Bromobenzotrifluoride	85.5		60-140	%	09-FEB-18	12-FEB-18	R3960100
Surrogate: 3,4-Dichlorotoluene	76.4		60-140	%	09-FEB-18	13-FEB-18	R3958282
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Acenaphthylene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(a)anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(a)pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(b)fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-6 PS-G-SED-101S Sampled By: JC/RHH on 07-FEB-18 @ 16:15 Matrix: SEDIMENT							
Polycyclic Aromatic Hydrocarbons							
Benzo(g,h,i)perylene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(k)fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Chrysene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Dibenzo(ah)anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Fluorene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		15-FEB-18	
1-Methylnaphthalene	<0.030		0.030	ug/g	12-FEB-18	15-FEB-18	R3961530
2-Methylnaphthalene	<0.030		0.030	ug/g	12-FEB-18	15-FEB-18	R3961530
Naphthalene	<0.013		0.013	ug/g	12-FEB-18	15-FEB-18	R3961530
Phenanthrene	<0.046		0.046	ug/g	12-FEB-18	15-FEB-18	R3961530
Pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Surrogate: 2-Fluorobiphenyl	92.3		50-140	%	12-FEB-18	15-FEB-18	R3961530
Surrogate: p-Terphenyl d14	84.6		50-140	%	12-FEB-18	15-FEB-18	R3961530
Organochlorine Pesticides							
Aldrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
gamma-hexachlorocyclohexane	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
a-chlordane	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Chlordane (Total)	<0.028		0.028	ug/g		15-FEB-18	
g-chlordane	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
op-DDD	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDD	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDD	<0.028		0.028	ug/g		15-FEB-18	
o,p-DDE	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDE	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDE	<0.028		0.028	ug/g		15-FEB-18	
op-DDT	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
pp-DDT	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Total DDT	<0.028		0.028	ug/g		15-FEB-18	
Dieldrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Endosulfan I	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Endosulfan II	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Endosulfan (Total)	<0.028		0.028	ug/g		15-FEB-18	
Endrin	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Heptachlor	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Heptachlor Epoxide	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachlorobenzene	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachlorobutadiene	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Hexachloroethane	<0.010		0.010	ug/g	09-FEB-18	15-FEB-18	R3961401
Methoxychlor	<0.020		0.020	ug/g	09-FEB-18	15-FEB-18	R3961401

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-6 PS-G-SED-101S Sampled By: JC/RHH on 07-FEB-18 @ 16:15 Matrix: SEDIMENT							
Organochlorine Pesticides							
Surrogate: 2-Fluorobiphenyl	99.0		50-140	%	09-FEB-18	15-FEB-18	R3961401
Surrogate: d14-Terphenyl	91.9		50-140	%	09-FEB-18	15-FEB-18	R3961401
L2054623-7 PS-G-SED-102S Sampled By: JC/RHH on 08-FEB-18 @ 09:30 Matrix: SEDIMENT							
Physical Tests							
Conductivity	0.0951		0.0040	mS/cm		13-FEB-18	R3960504
% Moisture	26.0		0.10	%	12-FEB-18	12-FEB-18	R3960070
pH	5.75		0.10	pH units		13-FEB-18	R3960519
Cyanides							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	12-FEB-18	13-FEB-18	R3960833
Organic / Inorganic Carbon							
Fraction Organic Carbon	0.0027		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0031		0.0010		15-FEB-18	15-FEB-18	R3961778
Fraction Organic Carbon	0.0027		0.0010		15-FEB-18	15-FEB-18	R3961778
Average Fraction Organic Carbon	0.0028		0.0010		15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.27		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.31		0.10	%	15-FEB-18	15-FEB-18	R3961778
Total Organic Carbon	0.27		0.10	%	15-FEB-18	15-FEB-18	R3961778
Saturated Paste Extractables							
SAR	0.45		0.10	SAR		13-FEB-18	R3961081
Calcium (Ca)	6.5		1.0	mg/L		13-FEB-18	R3961081
Magnesium (Mg)	10.2		1.0	mg/L		13-FEB-18	R3961081
Sodium (Na)	7.9		1.0	mg/L		13-FEB-18	R3961081
Metals							
Antimony (Sb)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Arsenic (As)	1.7		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Barium (Ba)	196		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Beryllium (Be)	0.67		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B)	5.2		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Boron (B), Hot Water Ext.	<0.10		0.10	ug/g	13-FEB-18	13-FEB-18	R3961029
Cadmium (Cd)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Chromium (Cr)	32.7		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Cobalt (Co)	9.4		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Copper (Cu)	22.9		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Lead (Pb)	5.6		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Mercury (Hg)	0.0098		0.0050	ug/g	13-FEB-18	13-FEB-18	R3960180
Molybdenum (Mo)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Nickel (Ni)	19.1		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Selenium (Se)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Silver (Ag)	<0.20		0.20	ug/g	13-FEB-18	13-FEB-18	R3960869
Thallium (Tl)	<0.50		0.50	ug/g	13-FEB-18	13-FEB-18	R3960869
Uranium (U)	<1.0		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-7 PS-G-SED-102S Sampled By: JC/RHH on 08-FEB-18 @ 09:30 Matrix: SEDIMENT							
Metals							
Vanadium (V)	49.2		1.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Zinc (Zn)	55.2		5.0	ug/g	13-FEB-18	13-FEB-18	R3960869
Speciated Metals							
Chromium, Hexavalent	0.68		0.20	ug/g	13-FEB-18	14-FEB-18	R3960985
Volatile Organic Compounds							
Benzene	<0.0068		0.0068	ug/g	09-FEB-18	11-FEB-18	R3958282
Ethylbenzene	<0.018		0.018	ug/g	09-FEB-18	11-FEB-18	R3958282
Toluene	<0.080		0.080	ug/g	09-FEB-18	11-FEB-18	R3958282
o-Xylene	<0.020		0.020	ug/g	09-FEB-18	11-FEB-18	R3958282
m+p-Xylenes	<0.030		0.030	ug/g	09-FEB-18	11-FEB-18	R3958282
Xylenes (Total)	<0.050		0.050	ug/g		13-FEB-18	
Surrogate: 4-Bromofluorobenzene	90.8		50-140	%	09-FEB-18	11-FEB-18	R3958282
Surrogate: 1,4-Difluorobenzene	85.8		50-140	%	09-FEB-18	11-FEB-18	R3958282
Hydrocarbons							
F1 (C6-C10)	<5.0		5.0	ug/g	09-FEB-18	13-FEB-18	R3958282
F1-BTEX	<5.0		5.0	ug/g		15-FEB-18	
F2 (C10-C16)	<10		10	ug/g	09-FEB-18	12-FEB-18	R3960100
F2-Naphth	<10		10	ug/g		15-FEB-18	
F3 (C16-C34)	<50		50	ug/g	09-FEB-18	12-FEB-18	R3960100
F3-PAH	<50		50	ug/g		15-FEB-18	
F4 (C34-C50)	<50		50	ug/g	09-FEB-18	12-FEB-18	R3960100
Total Hydrocarbons (C6-C50)	<72		72	ug/g		15-FEB-18	
Chrom. to baseline at nC50	YES				09-FEB-18	12-FEB-18	R3960100
Surrogate: 2-Bromobenzotrifluoride	82.7		60-140	%	09-FEB-18	12-FEB-18	R3960100
Surrogate: 3,4-Dichlorotoluene	89.9		60-140	%	09-FEB-18	13-FEB-18	R3958282
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Acenaphthylene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(a)anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(a)pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(b)fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(g,h,i)perylene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Benzo(k)fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Chrysene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Dibenzo(ah)anthracene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Fluoranthene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Fluorene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
1+2-Methylnaphthalenes	<0.042		0.042	ug/g		15-FEB-18	
1-Methylnaphthalene	<0.030		0.030	ug/g	12-FEB-18	15-FEB-18	R3961530
2-Methylnaphthalene	<0.030		0.030	ug/g	12-FEB-18	15-FEB-18	R3961530

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-7 PS-G-SED-102S Sampled By: JC/RHH on 08-FEB-18 @ 09:30 Matrix: SEDIMENT							
Polycyclic Aromatic Hydrocarbons							
Naphthalene	<0.013		0.013	ug/g	12-FEB-18	15-FEB-18	R3961530
Phenanthrene	<0.046		0.046	ug/g	12-FEB-18	15-FEB-18	R3961530
Pyrene	<0.050		0.050	ug/g	12-FEB-18	15-FEB-18	R3961530
Surrogate: 2-Fluorobiphenyl	86.3		50-140	%	12-FEB-18	15-FEB-18	R3961530
Surrogate: p-Terphenyl d14	79.5		50-140	%	12-FEB-18	15-FEB-18	R3961530
L2054623-8 PS-C-SED-101S TCLP Sampled By: JC/RHH on 06-FEB-18 @ 12:20 Matrix: SEDIMENT							
Sample Preparation							
Initial pH	7.42		0.10	pH units		13-FEB-18	R3960398
Final pH	4.91		0.10	pH units		13-FEB-18	R3960398
TCLP Extractables							
Aroclor 1242	<0.00020		0.00020	mg/L	14-FEB-18	15-FEB-18	R3960479
Aroclor 1248	<0.00020		0.00020	mg/L	14-FEB-18	15-FEB-18	R3960479
Aroclor 1254	<0.00020		0.00020	mg/L	14-FEB-18	15-FEB-18	R3960479
Aroclor 1260	<0.00020		0.00020	mg/L	14-FEB-18	15-FEB-18	R3960479
Benzo(a)pyrene	<0.00020		0.00020	mg/L	14-FEB-18	15-FEB-18	R3961467
3&4-Methylphenol	<0.010		0.010	mg/L	14-FEB-18	15-FEB-18	R3961467
Cresols (total)	<0.015		0.015	mg/L	14-FEB-18	15-FEB-18	R3961467
Cyanide, Weak Acid Diss	<0.10		0.10	mg/L		14-FEB-18	R3961510
2,4-Dichlorophenol	<0.0050		0.0050	mg/L	14-FEB-18	15-FEB-18	R3961467
2,4-Dinitrotoluene	<0.0040		0.0040	mg/L	14-FEB-18	15-FEB-18	R3961467
Fluoride (F)	<10		10	mg/L		14-FEB-18	R3961620
Hexachlorobenzene	<0.0040		0.0040	mg/L	14-FEB-18	15-FEB-18	R3961467
Hexachlorobutadiene	<0.0040		0.0040	mg/L	14-FEB-18	15-FEB-18	R3961467
Hexachloroethane	<0.0040		0.0040	mg/L	14-FEB-18	15-FEB-18	R3961467
2-Methylphenol	<0.0050		0.0050	mg/L	14-FEB-18	15-FEB-18	R3961467
Nitrate and Nitrite as N	<4.0		4.0	mg/L		14-FEB-18	R3961620
Nitrate-N	<2.0		2.0	mg/L		14-FEB-18	R3961620
Nitrite-N	<2.0		2.0	mg/L		14-FEB-18	R3961620
Nitrobenzene	<0.0040		0.0040	mg/L	14-FEB-18	15-FEB-18	R3961467
Total PCBs	<0.00040		0.00040	mg/L	14-FEB-18	15-FEB-18	R3960479
Pentachlorophenol	<0.0050		0.0050	mg/L	14-FEB-18	15-FEB-18	R3961467
2,3,4,6-Tetrachlorophenol	<0.0050		0.0050	mg/L	14-FEB-18	15-FEB-18	R3961467
2,4,5-Trichlorophenol	<0.0050		0.0050	mg/L	14-FEB-18	15-FEB-18	R3961467
2,4,6-Trichlorophenol	<0.0050		0.0050	mg/L	14-FEB-18	15-FEB-18	R3961467
Surrogate: 2,4,6-Tribromophenol	95.5		50-150	%	14-FEB-18	15-FEB-18	R3961467
Surrogate: 2-Fluorobiphenyl	90.7		40-160	%	14-FEB-18	15-FEB-18	R3961467
Surrogate: 2-Fluorobiphenyl	62.6		40-160	%	14-FEB-18	15-FEB-18	R3960479
Surrogate: Nitrobenzene d5	96.9		50-150	%	14-FEB-18	15-FEB-18	R3961467
Surrogate: p-Terphenyl d14	147.8	SURR-ND	60-140	%	14-FEB-18	15-FEB-18	R3961467
TCLP Metals							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2054623-8 PS-C-SED-101S TCLP Sampled By: JC/RHH on 06-FEB-18 @ 12:20 Matrix: SEDIMENT							
TCLP Metals							
Arsenic (As)	<0.050		0.050	mg/L		13-FEB-18	R3960634
Barium (Ba)	<0.50		0.50	mg/L		13-FEB-18	R3960634
Boron (B)	<2.5		2.5	mg/L		13-FEB-18	R3960634
Cadmium (Cd)	<0.0050		0.0050	mg/L		13-FEB-18	R3960634
Chromium (Cr)	<0.050		0.050	mg/L		13-FEB-18	R3960634
Lead (Pb)	<0.050		0.050	mg/L		13-FEB-18	R3960634
Mercury (Hg)	<0.00010		0.00010	mg/L		14-FEB-18	R3960937
Selenium (Se)	<0.025		0.025	mg/L		13-FEB-18	R3960634
Silver (Ag)	<0.0050		0.0050	mg/L		13-FEB-18	R3960634
Uranium (U)	<0.25		0.25	mg/L		13-FEB-18	R3960634
TCLP VOCs							
1,1-Dichloroethylene	<0.025		0.025	mg/L		14-FEB-18	R3960757
1,2-Dichlorobenzene	<0.025		0.025	mg/L		14-FEB-18	R3960757
1,2-Dichloroethane	<0.025		0.025	mg/L		14-FEB-18	R3960757
1,4-Dichlorobenzene	<0.025		0.025	mg/L		14-FEB-18	R3960757
Benzene	<0.025		0.025	mg/L		14-FEB-18	R3960757
Carbon tetrachloride	<0.025		0.025	mg/L		14-FEB-18	R3960757
Chlorobenzene	<0.025		0.025	mg/L		14-FEB-18	R3960757
Chloroform	<0.10		0.10	mg/L		14-FEB-18	R3960757
Dichloromethane	<0.50		0.50	mg/L		14-FEB-18	R3960757
Methyl Ethyl Ketone	<1.0		1.0	mg/L		14-FEB-18	R3960757
Tetrachloroethylene	<0.025		0.025	mg/L		14-FEB-18	R3960757
Trichloroethylene	<0.025		0.025	mg/L		14-FEB-18	R3960757
Vinyl chloride	<0.050		0.050	mg/L		14-FEB-18	R3960757
Surrogate: 4-Bromofluorobenzene	97.0		70-130	%		14-FEB-18	R3960757
Volatile Organic Compounds							
Surrogate: 1,4-Difluorobenzene	94.4		70-130	%		14-FEB-18	R3960757

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Laboratory Control Sample	Aroclor 1260	LCS-H	L2054623-8

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHM	Detection Limit Adjusted: Sample has High Moisture Content
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
SAR:M	Reported SAR represents a maximum value. Actual SAR may be lower if both Ca and Mg were detectable.
SURR-ND	Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

BNA-TCLP-WT	Waste	BNAs for O. Reg 347	SW846 8270

Samples are leached according to TCLP protocol and then the aqueous leachate is extracted and the resulting extracts are analyzed on GC/MSD

BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CHLORDANE-T-CALC-WT	Soil	Chlordane Total sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

CN-TCLP-WT	Waste	Cyanide for O. Reg 347	APHA 4500CN C E
CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

DDD-DDE-DDT-CALC-WT	Soil	DDD, DDE, DDT sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

ENDOSULFAN-T-CALC-WT	Soil	Endosulfan Total sums	CALCULATION

Aqueous sample is extracted by liquid/liquid extraction with a solvent mix. After extraction, a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

Reference Information

F-TCLP-WT	Waste	Fluoride (F) for O. Reg 347	APHA 4110 B-Ion Chromatography
F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate

Reference Information

minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8
METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
N2N3-TCLP-WT	Waste	Nitrate/Nitrite-N for O. Reg 347	APHA 4110 B-Ion Chromatography
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking techniqueis used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PCB-TCLP-WT	Waste	PCBs for O. Reg 347	SW846 8270
PEST-OC-511-WT	Soil	OC Pesticides-O.Reg 153/04 (July 2011)	SW846 8270 (511)

Soil sample is extracted in a solvent, after extraction a number of clean up techniques may be applied, depending on the sample matrix and analyzed by GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

TOC-R511-WT	Soil	TOC & FOC-O.Reg 153/04 (July 2011)	CARTER 21.3.2

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

VOC-TCLP-WT	Waste	VOC for O. Reg 347	SW846 8260

A sample of waste is leached in a zero headspace extractor at 30–2 rpm for 18–2.0 hours with the appropriate leaching solution. After tumbling the leachate is analyzed directly by headspace technology, followed by GC/MS using internal standard quantitation.

XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

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

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

Laboratory Definition Code	Laboratory Location

Reference Information

WT ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT	**Soil**							
Batch R3961029								
WG2715189-4 DUP		**L2054166-38**						
Boron (B), Hot Water Ext.		0.35	0.33		ug/g	6.7	30	13-FEB-18
WG2715189-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			107.0		%		70-130	13-FEB-18
WG2715189-3 LCS								
Boron (B), Hot Water Ext.			106.4		%		70-130	13-FEB-18
WG2715189-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	13-FEB-18
BTX-511-HS-WT	**Soil**							
Batch R3958282								
WG2713790-4 DUP		**WG2713790-3**						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	09-FEB-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	09-FEB-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	09-FEB-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	09-FEB-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	09-FEB-18
WG2713790-2 LCS								
Benzene			96.7		%		70-130	09-FEB-18
Ethylbenzene			94.6		%		70-130	09-FEB-18
m+p-Xylenes			97.4		%		70-130	09-FEB-18
o-Xylene			95.3		%		70-130	09-FEB-18
Toluene			95.0		%		70-130	09-FEB-18
WG2713790-1 MB								
Benzene			<0.0068		ug/g		0.0068	09-FEB-18
Ethylbenzene			<0.018		ug/g		0.018	09-FEB-18
m+p-Xylenes			<0.030		ug/g		0.03	09-FEB-18
o-Xylene			<0.020		ug/g		0.02	09-FEB-18
Toluene			<0.080		ug/g		0.08	09-FEB-18
Surrogate: 1,4-Difluorobenzene			103.2		%		50-140	09-FEB-18
Surrogate: 4-Bromofluorobenzene			108.8		%		50-140	09-FEB-18
WG2713790-5 MS		**WG2713790-3**						
Benzene			99.4		%		60-140	09-FEB-18
Ethylbenzene			99.4		%		60-140	09-FEB-18
m+p-Xylenes			99.5		%		60-140	09-FEB-18
o-Xylene			100.6		%		60-140	09-FEB-18
Toluene			98.3		%		60-140	09-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-WAD-R511-WT	**Soil**							
Batch R3960833								
WG2715077-3 DUP		**L2054171-5**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	13-FEB-18
WG2715077-2 LCS								
Cyanide, Weak Acid Diss			93.8		%		80-120	13-FEB-18
WG2715077-1 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	13-FEB-18
WG2715077-4 MS		**L2054171-5**						
Cyanide, Weak Acid Diss			95.0		%		70-130	13-FEB-18
CR-CR6-IC-WT	**Soil**							
Batch R3960809								
WG2714965-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			104.5		%		70-130	13-FEB-18
WG2714965-3 DUP		**L2054166-28**						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	13-FEB-18
WG2714965-2 LCS								
Chromium, Hexavalent			85.2		%		80-120	13-FEB-18
WG2714965-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	13-FEB-18
Batch R3960985								
WG2715257-12 CRM		**WT-SQC012**						
Chromium, Hexavalent			98.0		%		70-130	14-FEB-18
WG2715257-11 DUP		**L2052970-3**						
Chromium, Hexavalent		0.37	0.37		ug/g	0.7	35	14-FEB-18
WG2715257-10 LCS								
Chromium, Hexavalent			118.0		%		80-120	14-FEB-18
WG2715257-9 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	14-FEB-18
EC-WT	**Soil**							
Batch R3960504								
WG2715190-4 DUP		**WG2715190-3**						
Conductivity		1.20	1.15		mS/cm	4.5	20	13-FEB-18
WG2715359-1 LCS								
Conductivity			98.6		%		90-110	13-FEB-18
WG2715190-1 MB								
Conductivity			<0.0040		mS/cm		0.004	13-FEB-18
F1-HS-511-WT	**Soil**							

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Soil**							
Batch	**R3958282**							
WG2713790-4	**DUP**	**WG2713790-3**						
F1 (C6-C10)		6.3	7.0		ug/g	10	30	11-FEB-18
WG2713790-2	**LCS**							
F1 (C6-C10)			82.7		%		80-120	11-FEB-18
WG2713790-1	**MB**							
F1 (C6-C10)			<5.0		ug/g		5	11-FEB-18
Surrogate: 3,4-Dichlorotoluene			118.0		%		60-140	11-FEB-18
WG2713790-7	**MS**	**WG2713790-6**						
F1 (C6-C10)			71.7		%		60-140	11-FEB-18
F2-F4-511-WT	**Soil**							
Batch	**R3960100**							
WG2714292-4	**DUP**	**WG2714292-3**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	12-FEB-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	12-FEB-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	12-FEB-18
WG2714292-2	**LCS**							
F2 (C10-C16)			94.6		%		80-120	12-FEB-18
F3 (C16-C34)			94.6		%		80-120	12-FEB-18
F4 (C34-C50)			86.2		%		80-120	12-FEB-18
WG2714292-1	**MB**							
F2 (C10-C16)			<10		ug/g		10	12-FEB-18
F3 (C16-C34)			<50		ug/g		50	12-FEB-18
F4 (C34-C50)			<50		ug/g		50	12-FEB-18
Surrogate: 2-Bromobenzotrifluoride			81.7		%		60-140	12-FEB-18
WG2714292-5	**MS**	**WG2714292-3**						
F2 (C10-C16)			93.9		%		60-140	12-FEB-18
F3 (C16-C34)			98.4		%		60-140	12-FEB-18
F4 (C34-C50)			89.5		%		60-140	12-FEB-18
Batch	**R3960953**							
WG2715222-3	**DUP**	**WG2715222-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	14-FEB-18
F3 (C16-C34)		<50	52	RPD-NA	ug/g	N/A	30	14-FEB-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	14-FEB-18
WG2715222-2	**LCS**							
F2 (C10-C16)			105.9		%		80-120	14-FEB-18
F3 (C16-C34)			104.5		%		80-120	14-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT	**Soil**							
Batch R3960953								
WG2715222-2 LCS								
F4 (C34-C50)			102.9		%		80-120	14-FEB-18
WG2715222-1 MB								
F2 (C10-C16)			<10		ug/g		10	14-FEB-18
F3 (C16-C34)			<50		ug/g		50	14-FEB-18
F4 (C34-C50)			<50		ug/g		50	14-FEB-18
Surrogate: 2-Bromobenzotrifluoride			92.6		%		60-140	14-FEB-18
WG2715222-4 MS		**WG2715222-5**						
F2 (C10-C16)			104.2		%		60-140	14-FEB-18
F3 (C16-C34)			102.1		%		60-140	14-FEB-18
F4 (C34-C50)			103.9		%		60-140	14-FEB-18
HG-200.2-CVAA-WT	**Soil**							
Batch R3960180								
WG2715184-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			111.4		%		70-130	13-FEB-18
WG2715184-6 DUP		**WG2715184-5**						
Mercury (Hg)		0.0170	0.0174		ug/g	2.4	40	13-FEB-18
WG2715184-3 LCS								
Mercury (Hg)			107.5		%		80-120	13-FEB-18
WG2715184-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	13-FEB-18
MET-200.2-CCMS-WT	**Soil**							
Batch R3960869								
WG2715184-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			90.0		%		70-130	13-FEB-18
Arsenic (As)			96.3		%		70-130	13-FEB-18
Barium (Ba)			98.2		%		70-130	13-FEB-18
Beryllium (Be)			105.9		%		70-130	13-FEB-18
Boron (B)			3.2		mg/kg		0-8.2	13-FEB-18
Cadmium (Cd)			95.7		%		70-130	13-FEB-18
Chromium (Cr)			100.2		%		70-130	13-FEB-18
Cobalt (Co)			95.5		%		70-130	13-FEB-18
Copper (Cu)			99.2		%		70-130	13-FEB-18
Lead (Pb)			96.4		%		70-130	13-FEB-18
Molybdenum (Mo)			92.5		%		70-130	13-FEB-18
Nickel (Ni)			98.0		%		70-130	13-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R3960869								
WG2715184-2 CRM		**WT-CANMET-TILL1**						
Selenium (Se)			0.30		mg/kg		0.11-0.51	13-FEB-18
Silver (Ag)			0.21		mg/kg		0.13-0.33	13-FEB-18
Thallium (Tl)			0.113		mg/kg		0.077-0.18	13-FEB-18
Uranium (U)			100.4		%		70-130	13-FEB-18
Vanadium (V)			97.6		%		70-130	13-FEB-18
Zinc (Zn)			96.0		%		70-130	13-FEB-18
WG2715184-6 DUP		**WG2715184-5**						
Antimony (Sb)		0.13	0.13		ug/g	3.9	30	13-FEB-18
Arsenic (As)		3.76	3.59		ug/g	4.5	30	13-FEB-18
Barium (Ba)		83.5	78.6		ug/g	6.0	40	13-FEB-18
Beryllium (Be)		0.64	0.60		ug/g	7.1	30	13-FEB-18
Boron (B)		10.5	10.1		ug/g	3.8	30	13-FEB-18
Cadmium (Cd)		0.124	0.110		ug/g	11	30	13-FEB-18
Chromium (Cr)		19.8	18.8		ug/g	5.3	30	13-FEB-18
Cobalt (Co)		8.50	7.97		ug/g	6.4	30	13-FEB-18
Copper (Cu)		17.8	16.9		ug/g	5.2	30	13-FEB-18
Lead (Pb)		12.5	12.9		ug/g	3.2	40	13-FEB-18
Molybdenum (Mo)		0.26	0.24		ug/g	10	40	13-FEB-18
Nickel (Ni)		18.1	17.1		ug/g	5.7	30	13-FEB-18
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	13-FEB-18
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	13-FEB-18
Thallium (Tl)		0.119	0.114		ug/g	4.3	30	13-FEB-18
Uranium (U)		0.427	0.425		ug/g	0.5	30	13-FEB-18
Vanadium (V)		31.4	28.8		ug/g	8.8	30	13-FEB-18
Zinc (Zn)		60.9	57.3		ug/g	6.0	30	13-FEB-18
WG2715184-4 LCS								
Antimony (Sb)			101.4		%		80-120	13-FEB-18
Arsenic (As)			94.8		%		80-120	13-FEB-18
Barium (Ba)			104.2		%		80-120	13-FEB-18
Beryllium (Be)			88.5		%		80-120	13-FEB-18
Boron (B)			89.5		%		80-120	13-FEB-18
Cadmium (Cd)			90.7		%		80-120	13-FEB-18
Chromium (Cr)			97.5		%		80-120	13-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R3960869								
WG2715184-4 LCS								
Cobalt (Co)			92.7		%		80-120	13-FEB-18
Copper (Cu)			92.9		%		80-120	13-FEB-18
Lead (Pb)			96.1		%		80-120	13-FEB-18
Molybdenum (Mo)			93.3		%		80-120	13-FEB-18
Nickel (Ni)			94.6		%		80-120	13-FEB-18
Selenium (Se)			95.0		%		80-120	13-FEB-18
Silver (Ag)			98.8		%		80-120	13-FEB-18
Thallium (Tl)			102.8		%		80-120	13-FEB-18
Uranium (U)			89.7		%		80-120	13-FEB-18
Vanadium (V)			98.6		%		80-120	13-FEB-18
Zinc (Zn)			88.9		%		80-120	13-FEB-18
WG2715184-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	13-FEB-18
Arsenic (As)			<0.10		mg/kg		0.1	13-FEB-18
Barium (Ba)			<0.50		mg/kg		0.5	13-FEB-18
Beryllium (Be)			<0.10		mg/kg		0.1	13-FEB-18
Boron (B)			<5.0		mg/kg		5	13-FEB-18
Cadmium (Cd)			<0.020		mg/kg		0.02	13-FEB-18
Chromium (Cr)			<0.50		mg/kg		0.5	13-FEB-18
Cobalt (Co)			<0.10		mg/kg		0.1	13-FEB-18
Copper (Cu)			<0.50		mg/kg		0.5	13-FEB-18
Lead (Pb)			<0.50		mg/kg		0.5	13-FEB-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	13-FEB-18
Nickel (Ni)			<0.50		mg/kg		0.5	13-FEB-18
Selenium (Se)			<0.20		mg/kg		0.2	13-FEB-18
Silver (Ag)			<0.10		mg/kg		0.1	13-FEB-18
Thallium (Tl)			<0.050		mg/kg		0.05	13-FEB-18
Uranium (U)			<0.050		mg/kg		0.05	13-FEB-18
Vanadium (V)			<0.20		mg/kg		0.2	13-FEB-18
Zinc (Zn)			<2.0		mg/kg		2	13-FEB-18
MOISTURE-WT	**Soil**							

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R3960070								
WG2714769-3 DUP		**L2054392-1**						
% Moisture		15.0	15.5		%	3.4	20	12-FEB-18
WG2714769-2 LCS								
% Moisture			100.6		%		90-110	12-FEB-18
WG2714769-1 MB								
% Moisture			<0.10		%		0.1	12-FEB-18
PAH-511-WT	**Soil**							
Batch R3960867								
WG2713957-4 DUP		**WG2713957-3**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	14-FEB-18
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	14-FEB-18
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	14-FEB-18
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	14-FEB-18
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	14-FEB-18
WG2713957-2 LCS								
1-Methylnaphthalene			103.4		%		50-140	14-FEB-18
2-Methylnaphthalene			104.1		%		50-140	14-FEB-18
Acenaphthene			103.4		%		50-140	14-FEB-18
Acenaphthylene			103.1		%		50-140	14-FEB-18
Anthracene			89.9		%		50-140	14-FEB-18
Benzo(a)anthracene			101.2		%		50-140	14-FEB-18
Benzo(a)pyrene			82.8		%		50-140	14-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3960867								
WG2713957-2 LCS								
Benzo(b)fluoranthene			92.8		%		50-140	14-FEB-18
Benzo(g,h,i)perylene			81.6		%		50-140	14-FEB-18
Benzo(k)fluoranthene			85.5		%		50-140	14-FEB-18
Chrysene			102.6		%		50-140	14-FEB-18
Dibenzo(ah)anthracene			84.1		%		50-140	14-FEB-18
Fluoranthene			87.8		%		50-140	14-FEB-18
Fluorene			97.6		%		50-140	14-FEB-18
Indeno(1,2,3-cd)pyrene			87.9		%		50-140	14-FEB-18
Naphthalene			106.9		%		50-140	14-FEB-18
Phenanthrene			94.8		%		50-140	14-FEB-18
Pyrene			88.4		%		50-140	14-FEB-18
WG2713957-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	14-FEB-18
2-Methylnaphthalene			<0.030		ug/g		0.03	14-FEB-18
Acenaphthene			<0.050		ug/g		0.05	14-FEB-18
Acenaphthylene			<0.050		ug/g		0.05	14-FEB-18
Anthracene			<0.050		ug/g		0.05	14-FEB-18
Benzo(a)anthracene			<0.050		ug/g		0.05	14-FEB-18
Benzo(a)pyrene			<0.050		ug/g		0.05	14-FEB-18
Benzo(b)fluoranthene			<0.050		ug/g		0.05	14-FEB-18
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	14-FEB-18
Benzo(k)fluoranthene			<0.050		ug/g		0.05	14-FEB-18
Chrysene			<0.050		ug/g		0.05	14-FEB-18
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	14-FEB-18
Fluoranthene			<0.050		ug/g		0.05	14-FEB-18
Fluorene			<0.050		ug/g		0.05	14-FEB-18
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	14-FEB-18
Naphthalene			<0.013		ug/g		0.013	14-FEB-18
Phenanthrene			<0.046		ug/g		0.046	14-FEB-18
Pyrene			<0.050		ug/g		0.05	14-FEB-18
Surrogate: 2-Fluorobiphenyl			91.3		%		50-140	14-FEB-18
Surrogate: p-Terphenyl d14			82.7		%		50-140	14-FEB-18
WG2713957-5 MS		**WG2713957-3**						
1-Methylnaphthalene			107.3		%		50-140	14-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3960867								
WG2713957-5 MS		**WG2713957-3**						
2-Methylnaphthalene			107.6		%		50-140	14-FEB-18
Acenaphthene			108.4		%		50-140	14-FEB-18
Acenaphthylene			106.4		%		50-140	14-FEB-18
Anthracene			94.2		%		50-140	14-FEB-18
Benzo(a)anthracene			107.3		%		50-140	14-FEB-18
Benzo(a)pyrene			86.2		%		50-140	14-FEB-18
Benzo(b)fluoranthene			96.4		%		50-140	14-FEB-18
Benzo(g,h,i)perylene			80.7		%		50-140	14-FEB-18
Benzo(k)fluoranthene			89.9		%		50-140	14-FEB-18
Chrysene			106.1		%		50-140	14-FEB-18
Dibenzo(ah)anthracene			84.0		%		50-140	14-FEB-18
Fluoranthene			92.5		%		50-140	14-FEB-18
Fluorene			103.0		%		50-140	14-FEB-18
Indeno(1,2,3-cd)pyrene			87.7		%		50-140	14-FEB-18
Naphthalene			109.1		%		50-140	14-FEB-18
Phenanthrene			97.5		%		50-140	14-FEB-18
Pyrene			92.4		%		50-140	14-FEB-18
Batch R3961530								
WG2714799-3 DUP		**WG2714799-5**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	15-FEB-18
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	15-FEB-18
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3961530								
WG2714799-3 DUP		**WG2714799-5**						
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	15-FEB-18
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	15-FEB-18
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
WG2714799-2 LCS								
1-Methylnaphthalene			104.9		%		50-140	15-FEB-18
2-Methylnaphthalene			105.9		%		50-140	15-FEB-18
Acenaphthene			105.6		%		50-140	15-FEB-18
Acenaphthylene			107.8		%		50-140	15-FEB-18
Anthracene			93.2		%		50-140	15-FEB-18
Benzo(a)anthracene			104.3		%		50-140	15-FEB-18
Benzo(a)pyrene			83.8		%		50-140	15-FEB-18
Benzo(b)fluoranthene			90.1		%		50-140	15-FEB-18
Benzo(g,h,i)perylene			80.3		%		50-140	15-FEB-18
Benzo(k)fluoranthene			88.7		%		50-140	15-FEB-18
Chrysene			102.3		%		50-140	15-FEB-18
Dibenzo(ah)anthracene			83.6		%		50-140	15-FEB-18
Fluoranthene			88.6		%		50-140	15-FEB-18
Fluorene			99.5		%		50-140	15-FEB-18
Indeno(1,2,3-cd)pyrene			86.1		%		50-140	15-FEB-18
Naphthalene			108.1		%		50-140	15-FEB-18
Phenanthrene			94.9		%		50-140	15-FEB-18
Pyrene			88.9		%		50-140	15-FEB-18
WG2714799-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	15-FEB-18
2-Methylnaphthalene			<0.030		ug/g		0.03	15-FEB-18
Acenaphthene			<0.050		ug/g		0.05	15-FEB-18
Acenaphthylene			<0.050		ug/g		0.05	15-FEB-18
Anthracene			<0.050		ug/g		0.05	15-FEB-18
Benzo(a)anthracene			<0.050		ug/g		0.05	15-FEB-18
Benzo(a)pyrene			<0.050		ug/g		0.05	15-FEB-18
Benzo(b)fluoranthene			<0.050		ug/g		0.05	15-FEB-18
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	15-FEB-18
Benzo(k)fluoranthene			<0.050		ug/g		0.05	15-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3961530								
WG2714799-1 MB								
Chrysene			<0.050		ug/g		0.05	15-FEB-18
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	15-FEB-18
Fluoranthene			<0.050		ug/g		0.05	15-FEB-18
Fluorene			<0.050		ug/g		0.05	15-FEB-18
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	15-FEB-18
Naphthalene			<0.013		ug/g		0.013	15-FEB-18
Phenanthrene			<0.046		ug/g		0.046	15-FEB-18
Pyrene			<0.050		ug/g		0.05	15-FEB-18
Surrogate: 2-Fluorobiphenyl			90.5		%		50-140	15-FEB-18
Surrogate: p-Terphenyl d14			86.0		%		50-140	15-FEB-18
WG2714799-4 MS		**WG2714799-5**						
1-Methylnaphthalene			104.7		%		50-140	15-FEB-18
2-Methylnaphthalene			104.4		%		50-140	15-FEB-18
Acenaphthene			104.3		%		50-140	15-FEB-18
Acenaphthylene			103.2		%		50-140	15-FEB-18
Anthracene			90.7		%		50-140	15-FEB-18
Benzo(a)anthracene			100.6		%		50-140	15-FEB-18
Benzo(a)pyrene			81.3		%		50-140	15-FEB-18
Benzo(b)fluoranthene			88.2		%		50-140	15-FEB-18
Benzo(g,h,i)perylene			79.6		%		50-140	15-FEB-18
Benzo(k)fluoranthene			87.3		%		50-140	15-FEB-18
Chrysene			102.5		%		50-140	15-FEB-18
Dibenzo(ah)anthracene			82.3		%		50-140	15-FEB-18
Fluoranthene			87.7		%		50-140	15-FEB-18
Fluorene			98.2		%		50-140	15-FEB-18
Indeno(1,2,3-cd)pyrene			77.7		%		50-140	15-FEB-18
Naphthalene			107.2		%		50-140	15-FEB-18
Phenanthrene			95.2		%		50-140	15-FEB-18
Pyrene			87.3		%		50-140	15-FEB-18
Batch R3961706								
WG2714999-4 DUP		**WG2714999-3**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	15-FEB-18
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	15-FEB-18
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3961706								
WG2714999-4 DUP		**WG2714999-3**						
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	15-FEB-18
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	15-FEB-18
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	15-FEB-18
WG2714999-2 LCS								
1-Methylnaphthalene			104.1		%		50-140	15-FEB-18
2-Methylnaphthalene			105.2		%		50-140	15-FEB-18
Acenaphthene			105.5		%		50-140	15-FEB-18
Acenaphthylene			98.5		%		50-140	15-FEB-18
Anthracene			91.5		%		50-140	15-FEB-18
Benzo(a)anthracene			100.0		%		50-140	15-FEB-18
Benzo(a)pyrene			90.2		%		50-140	15-FEB-18
Benzo(b)fluoranthene			93.7		%		50-140	15-FEB-18
Benzo(g,h,i)perylene			88.7		%		50-140	15-FEB-18
Benzo(k)fluoranthene			93.2		%		50-140	15-FEB-18
Chrysene			104.7		%		50-140	15-FEB-18
Dibenzo(ah)anthracene			88.9		%		50-140	15-FEB-18
Fluoranthene			88.9		%		50-140	15-FEB-18
Fluorene			98.7		%		50-140	15-FEB-18
Indeno(1,2,3-cd)pyrene			88.2		%		50-140	15-FEB-18
Naphthalene			106.7		%		50-140	15-FEB-18
Phenanthrene			97.9		%		50-140	15-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3961706								
WG2714999-2 LCS								
Pyrene			90.3		%		50-140	15-FEB-18
WG2714999-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	15-FEB-18
2-Methylnaphthalene			<0.030		ug/g		0.03	15-FEB-18
Acenaphthene			<0.050		ug/g		0.05	15-FEB-18
Acenaphthylene			<0.050		ug/g		0.05	15-FEB-18
Anthracene			<0.050		ug/g		0.05	15-FEB-18
Benzo(a)anthracene			<0.050		ug/g		0.05	15-FEB-18
Benzo(a)pyrene			<0.050		ug/g		0.05	15-FEB-18
Benzo(b)fluoranthene			<0.050		ug/g		0.05	15-FEB-18
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	15-FEB-18
Benzo(k)fluoranthene			<0.050		ug/g		0.05	15-FEB-18
Chrysene			<0.050		ug/g		0.05	15-FEB-18
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	15-FEB-18
Fluoranthene			<0.050		ug/g		0.05	15-FEB-18
Fluorene			<0.050		ug/g		0.05	15-FEB-18
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	15-FEB-18
Naphthalene			<0.013		ug/g		0.013	15-FEB-18
Phenanthrene			<0.046		ug/g		0.046	15-FEB-18
Pyrene			<0.050		ug/g		0.05	15-FEB-18
Surrogate: 2-Fluorobiphenyl			87.2		%		50-140	15-FEB-18
Surrogate: p-Terphenyl d14			78.8		%		50-140	15-FEB-18
WG2714999-5 MS		**WG2714999-3**						
1-Methylnaphthalene			103.8		%		50-140	15-FEB-18
2-Methylnaphthalene			103.7		%		50-140	15-FEB-18
Acenaphthene			104.8		%		50-140	15-FEB-18
Acenaphthylene			96.6		%		50-140	15-FEB-18
Anthracene			91.3		%		50-140	15-FEB-18
Benzo(a)anthracene			97.6		%		50-140	15-FEB-18
Benzo(a)pyrene			87.6		%		50-140	15-FEB-18
Benzo(b)fluoranthene			91.2		%		50-140	15-FEB-18
Benzo(g,h,i)perylene			86.3		%		50-140	15-FEB-18
Benzo(k)fluoranthene			93.7		%		50-140	15-FEB-18
Chrysene			105.6		%		50-140	15-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R3961706								
WG2714999-5 MS		**WG2714999-3**						
Dibenzo(ah)anthracene			86.0		%		50-140	15-FEB-18
Fluoranthene			89.5		%		50-140	15-FEB-18
Fluorene			98.1		%		50-140	15-FEB-18
Indeno(1,2,3-cd)pyrene			78.2		%		50-140	15-FEB-18
Naphthalene			105.2		%		50-140	15-FEB-18
Phenanthrene			97.3		%		50-140	15-FEB-18
Pyrene			90.9		%		50-140	15-FEB-18
PEST-OC-511-WT	**Soil**							
Batch R3961401								
WG2714154-4 DUP		**WG2714154-3**						
Aldrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
a-chlordane		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
g-chlordane		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
op-DDD		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
pp-DDD		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
o,p-DDE		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
pp-DDE		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
op-DDT		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
pp-DDT		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
Dieldrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
Endosulfan I		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
Endosulfan II		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
Endrin		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
gamma-hexachlorocyclohexane		<0.010	<0.010	RPD-NA	ug/g	N/A	40	15-FEB-18
Heptachlor		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
Heptachlor Epoxide		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
Hexachlorobenzene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	15-FEB-18
Hexachlorobutadiene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	15-FEB-18
Hexachloroethane		<0.010	<0.010	RPD-NA	ug/g	N/A	40	15-FEB-18
Methoxychlor		<0.020	<0.020	RPD-NA	ug/g	N/A	40	15-FEB-18
WG2714154-2 LCS								
Aldrin			87.7		%		50-140	15-FEB-18
a-chlordane			88.6		%		50-140	15-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PEST-OC-511-WT	**Soil**							
Batch	**R3961401**							
WG2714154-2	**LCS**							
g-chlordane			96.6		%		50-140	15-FEB-18
op-DDD			94.8		%		50-140	15-FEB-18
pp-DDD			88.1		%		50-140	15-FEB-18
o,p-DDE			91.7		%		50-140	15-FEB-18
pp-DDE			92.8		%		50-140	15-FEB-18
op-DDT			98.5		%		50-140	15-FEB-18
pp-DDT			87.8		%		50-140	15-FEB-18
Dieldrin			96.2		%		50-140	15-FEB-18
Endosulfan I			98.0		%		50-140	15-FEB-18
Endosulfan II			90.4		%		50-140	15-FEB-18
Endrin			104.1		%		50-140	15-FEB-18
gamma-hexachlorocyclohexane			88.3		%		50-140	15-FEB-18
Heptachlor			83.0		%		50-140	15-FEB-18
Heptachlor Epoxide			101.5		%		50-140	15-FEB-18
Hexachlorobenzene			96.2		%		50-140	15-FEB-18
Hexachlorobutadiene			99.1		%		50-140	15-FEB-18
Hexachloroethane			106.6		%		50-140	15-FEB-18
Methoxychlor			81.6		%		50-140	15-FEB-18
WG2714154-1	**MB**							
Aldrin			<0.020		ug/g		0.02	15-FEB-18
a-chlordane			<0.020		ug/g		0.02	15-FEB-18
g-chlordane			<0.020		ug/g		0.02	15-FEB-18
op-DDD			<0.020		ug/g		0.02	15-FEB-18
pp-DDD			<0.020		ug/g		0.02	15-FEB-18
o,p-DDE			<0.020		ug/g		0.02	15-FEB-18
pp-DDE			<0.020		ug/g		0.02	15-FEB-18
op-DDT			<0.020		ug/g		0.02	15-FEB-18
pp-DDT			<0.020		ug/g		0.02	15-FEB-18
Dieldrin			<0.020		ug/g		0.02	15-FEB-18
Endosulfan I			<0.020		ug/g		0.02	15-FEB-18
Endosulfan II			<0.020		ug/g		0.02	15-FEB-18
Endrin			<0.020		ug/g		0.02	15-FEB-18
gamma-hexachlorocyclohexane			<0.010		ug/g		0.01	15-FEB-18
Heptachlor			<0.020		ug/g		0.02	15-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PEST-OC-511-WT	**Soil**							
Batch R3961401								
WG2714154-1 MB								
Heptachlor Epoxide			<0.020		ug/g		0.02	15-FEB-18
Hexachlorobenzene			<0.010		ug/g		0.01	15-FEB-18
Hexachlorobutadiene			<0.010		ug/g		0.01	15-FEB-18
Hexachloroethane			<0.010		ug/g		0.01	15-FEB-18
Methoxychlor			<0.020		ug/g		0.02	15-FEB-18
Surrogate: 2-Fluorobiphenyl			103.3		%		50-140	15-FEB-18
Surrogate: d14-Terphenyl			97.7		%		50-140	15-FEB-18
WG2714154-5 MS		**WG2714154-3**						
Aldrin			99.3		%		50-140	15-FEB-18
a-chlordane			84.8		%		50-140	15-FEB-18
g-chlordane			95.2		%		50-140	15-FEB-18
op-DDD			87.5		%		50-140	15-FEB-18
pp-DDD			82.3		%		50-140	15-FEB-18
o,p-DDE			87.9		%		50-140	15-FEB-18
pp-DDE			87.3		%		50-140	15-FEB-18
op-DDT			97.6		%		50-140	15-FEB-18
pp-DDT			91.1		%		50-140	15-FEB-18
Dieldrin			89.6		%		50-140	15-FEB-18
Endosulfan I			91.0		%		50-140	15-FEB-18
Endosulfan II			85.6		%		50-140	15-FEB-18
Endrin			102.6		%		50-140	15-FEB-18
gamma-hexachlorocyclohexane			89.2		%		50-140	15-FEB-18
Heptachlor			95.5		%		50-140	15-FEB-18
Heptachlor Epoxide			107.0		%		50-140	15-FEB-18
Hexachlorobenzene			93.5		%		50-140	15-FEB-18
Hexachlorobutadiene			95.3		%		50-140	15-FEB-18
Hexachloroethane			106.2		%		50-140	15-FEB-18
Methoxychlor			95.0		%		50-140	15-FEB-18
PH-WT	**Soil**							
Batch R3960519								
WG2714848-3 DUP		**L2054169-1**						
pH		7.78	7.72	J	pH units	0.06	0.3	13-FEB-18
WG2715361-1 LCS								
pH			6.98		pH units		6.9-7.1	13-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-R511-WT	**Soil**							
Batch R3961081								
WG2715190-4 DUP		**WG2715190-3**						
Calcium (Ca)		2.1	1.9		mg/L	6.4	30	13-FEB-18
Sodium (Na)		247	248		mg/L	0.4	30	13-FEB-18
Magnesium (Mg)		1.3	1.1		mg/L	12	30	13-FEB-18
WG2715190-2 IRM		**WT SAR1**						
Calcium (Ca)			117.8		%		70-130	13-FEB-18
Sodium (Na)			122.1		%		70-130	13-FEB-18
Magnesium (Mg)			113.3		%		70-130	13-FEB-18
WG2715190-1 MB								
Calcium (Ca)			<1.0		mg/L		1	13-FEB-18
Sodium (Na)			<1.0		mg/L		1	13-FEB-18
Magnesium (Mg)			<1.0		mg/L		1	13-FEB-18
TOC-R511-WT	**Soil**							
Batch R3961778								
WG2716682-3 CRM		**WT-TOC-CRM**						
Total Organic Carbon			94.3		%		70-130	15-FEB-18
WG2716682-4 DUP		**L2053595-1**						
Total Organic Carbon		0.18	0.17		%	6.6	35	15-FEB-18
WG2716682-2 LCS								
Total Organic Carbon			102.3		%		80-120	15-FEB-18
Total Organic Carbon			102.3		%		80-120	15-FEB-18
Total Organic Carbon			102.3		%		80-120	15-FEB-18
WG2716682-1 MB								
Total Organic Carbon			<0.10		%		0.1	15-FEB-18
BNA-TCLP-WT	**Waste**							
Batch R3961467								
WG2715620-4 DUP		**WG2715620-3**						
2,3,4,6-Tetrachlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	15-FEB-18
2,4,5-Trichlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	15-FEB-18
2,4,6-Trichlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	15-FEB-18
2,4-Dichlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	15-FEB-18
2,4-Dinitrotoluene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	15-FEB-18
2-Methylphenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	15-FEB-18
3&4-Methylphenol		<0.010	<0.010	RPD-NA	mg/L	N/A	50	15-FEB-18
Benzo(a)pyrene		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	15-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BNA-TCLP-WT	**Waste**							
Batch R3961467								
WG2715620-4 DUP		**WG2715620-3**						
Hexachlorobenzene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	15-FEB-18
Hexachlorobutadiene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	15-FEB-18
Hexachloroethane		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	15-FEB-18
Nitrobenzene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	15-FEB-18
Pentachlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	15-FEB-18
WG2715620-2 LCS								
2,3,4,6-Tetrachlorophenol			129.1		%		60-140	15-FEB-18
2,4,5-Trichlorophenol			128.4		%		60-140	15-FEB-18
2,4,6-Trichlorophenol			123.3		%		60-140	15-FEB-18
2,4-Dichlorophenol			115.1		%		60-140	15-FEB-18
2,4-Dinitrotoluene			109.3		%		50-150	15-FEB-18
2-Methylphenol			87.8		%		60-140	15-FEB-18
3&4-Methylphenol			86.5		%		60-140	15-FEB-18
Benzo(a)pyrene			120.2		%		60-140	15-FEB-18
Hexachlorobenzene			102.3		%		60-140	15-FEB-18
Hexachlorobutadiene			81.2		%		40-130	15-FEB-18
Hexachloroethane			65.3		%		40-130	15-FEB-18
Nitrobenzene			100.7		%		60-140	15-FEB-18
Pentachlorophenol			132.9		%		50-160	15-FEB-18
WG2715620-1 MB								
2,3,4,6-Tetrachlorophenol			<0.0050		mg/L		0.005	15-FEB-18
2,4,5-Trichlorophenol			<0.0050		mg/L		0.005	15-FEB-18
2,4,6-Trichlorophenol			<0.0050		mg/L		0.005	15-FEB-18
2,4-Dichlorophenol			<0.0050		mg/L		0.005	15-FEB-18
2,4-Dinitrotoluene			<0.0040		mg/L		0.004	15-FEB-18
2-Methylphenol			<0.0050		mg/L		0.005	15-FEB-18
3&4-Methylphenol			<0.010		mg/L		0.01	15-FEB-18
Benzo(a)pyrene			<0.00020		mg/L		0.0002	15-FEB-18
Hexachlorobenzene			<0.0040		mg/L		0.004	15-FEB-18
Hexachlorobutadiene			<0.0040		mg/L		0.004	15-FEB-18
Hexachloroethane			<0.0040		mg/L		0.004	15-FEB-18
Nitrobenzene			<0.0040		mg/L		0.004	15-FEB-18
Pentachlorophenol			<0.0050		mg/L		0.005	15-FEB-18
Surrogate: Nitrobenzene d5			92.4		%		50-150	15-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BNA-TCLP-WT	**Waste**							
Batch R3961467								
WG2715620-1 MB								
Surrogate: 2-Fluorobiphenyl			90.9		%		40-160	15-FEB-18
Surrogate: p-Terphenyl d14			133.5		%		60-140	15-FEB-18
Surrogate: 2,4,6-Tribromophenol			92.4		%		50-150	15-FEB-18
WG2715620-6 MB								
2,3,4,6-Tetrachlorophenol			<0.0050		mg/L		0.005	15-FEB-18
2,4,5-Trichlorophenol			<0.0050		mg/L		0.005	15-FEB-18
2,4,6-Trichlorophenol			<0.0050		mg/L		0.005	15-FEB-18
2,4-Dichlorophenol			<0.0050		mg/L		0.005	15-FEB-18
2,4-Dinitrotoluene			<0.0040		mg/L		0.004	15-FEB-18
2-Methylphenol			<0.0050		mg/L		0.005	15-FEB-18
3&4-Methylphenol			<0.010		mg/L		0.01	15-FEB-18
Benzo(a)pyrene			<0.00020		mg/L		0.0002	15-FEB-18
Hexachlorobenzene			<0.0040		mg/L		0.004	15-FEB-18
Hexachlorobutadiene			<0.0040		mg/L		0.004	15-FEB-18
Hexachloroethane			<0.0040		mg/L		0.004	15-FEB-18
Nitrobenzene			<0.0040		mg/L		0.004	15-FEB-18
Pentachlorophenol			<0.0050		mg/L		0.005	15-FEB-18
Surrogate: Nitrobenzene d5			90.4		%		50-150	15-FEB-18
Surrogate: 2-Fluorobiphenyl			86.5		%		40-160	15-FEB-18
Surrogate: p-Terphenyl d14			128.5		%		60-140	15-FEB-18
Surrogate: 2,4,6-Tribromophenol			98.6		%		50-150	15-FEB-18
WG2715620-5 MS		**WG2715620-3**						
2,3,4,6-Tetrachlorophenol			131.9		%		50-150	15-FEB-18
2,4,5-Trichlorophenol			126.4		%		50-150	15-FEB-18
2,4,6-Trichlorophenol			122.1		%		50-150	15-FEB-18
2,4-Dichlorophenol			115.7		%		50-150	15-FEB-18
2,4-Dinitrotoluene			113.5		%		50-150	15-FEB-18
2-Methylphenol			86.8		%		50-150	15-FEB-18
3&4-Methylphenol			85.2		%		50-150	15-FEB-18
Benzo(a)pyrene			121.7		%		50-150	15-FEB-18
Hexachlorobenzene			103.6		%		40-150	15-FEB-18
Hexachlorobutadiene			78.8		%		40-150	15-FEB-18
Hexachloroethane			66.5		%		40-150	15-FEB-18
Nitrobenzene			101.8		%		50-150	15-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BNA-TCLP-WT	**Waste**							
Batch R3961467								
WG2715620-5 MS		**WG2715620-3**						
Pentachlorophenol			136.9		%		50-150	15-FEB-18
CN-TCLP-WT	**Waste**							
Batch R3961510								
WG2715511-3 DUP		**L2052065-1**						
Cyanide, Weak Acid Diss		<0.10	<0.10	RPD-NA	mg/L	N/A	20	14-FEB-18
WG2715511-2 LCS								
Cyanide, Weak Acid Diss			99.5		%		70-130	14-FEB-18
WG2715511-1 MB								
Cyanide, Weak Acid Diss			<0.10		mg/L		0.1	14-FEB-18
WG2715511-4 MS		**L2052065-1**						
Cyanide, Weak Acid Diss			94.2		%		50-150	14-FEB-18
F-TCLP-WT	**Waste**							
Batch R3961620								
WG2716135-3 DUP		**L2052065-1**						
Fluoride (F)		<10	<10	RPD-NA	mg/L	N/A	30	14-FEB-18
WG2716135-2 LCS								
Fluoride (F)			89.8		%		70-130	14-FEB-18
WG2716135-1 MB								
Fluoride (F)			<10		mg/L		10	14-FEB-18
WG2716135-4 MS		**L2052065-1**						
Fluoride (F)			84.4		%		50-150	14-FEB-18
HG-TCLP-WT	**Waste**							
Batch R3960937								
WG2716098-3 DUP		**L2052065-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	14-FEB-18
WG2716098-2 LCS								
Mercury (Hg)			94.1		%		70-130	14-FEB-18
WG2716098-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	14-FEB-18
WG2716098-4 MS		**L2052065-1**						
Mercury (Hg)			94.1		%		50-140	14-FEB-18
MET-TCLP-WT	**Waste**							

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3960634								
WG2715482-4 DUP		**WG2715482-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	13-FEB-18
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	13-FEB-18
Boron (B)		<2.5	<2.5	RPD-NA	mg/L	N/A	40	13-FEB-18
Barium (Ba)		0.66	0.66		mg/L	0.6	40	13-FEB-18
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	13-FEB-18
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	40	13-FEB-18
Lead (Pb)		0.064	0.063		mg/L	1.5	40	13-FEB-18
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	40	13-FEB-18
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	40	13-FEB-18
WG2715482-2 LCS								
Silver (Ag)			103.9		%		70-130	13-FEB-18
Arsenic (As)			100.1		%		70-130	13-FEB-18
Boron (B)			100.7		%		70-130	13-FEB-18
Barium (Ba)			105.8		%		70-130	13-FEB-18
Cadmium (Cd)			98.3		%		70-130	13-FEB-18
Chromium (Cr)			102.7		%		70-130	13-FEB-18
Lead (Pb)			99.98		%		70-130	13-FEB-18
Selenium (Se)			99.7		%		70-130	13-FEB-18
Uranium (U)			101.6		%		70-130	13-FEB-18
WG2715482-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	13-FEB-18
Arsenic (As)			<0.050		mg/L		0.05	13-FEB-18
Boron (B)			<2.5		mg/L		2.5	13-FEB-18
Barium (Ba)			<0.50		mg/L		0.5	13-FEB-18
Cadmium (Cd)			<0.0050		mg/L		0.005	13-FEB-18
Chromium (Cr)			<0.050		mg/L		0.05	13-FEB-18
Lead (Pb)			<0.050		mg/L		0.05	13-FEB-18
Selenium (Se)			<0.025		mg/L		0.025	13-FEB-18
Uranium (U)			<0.25		mg/L		0.25	13-FEB-18
WG2715482-5 MS		**WG2715482-3**						
Silver (Ag)			121.3		%		50-150	13-FEB-18
Arsenic (As)			99.5		%		50-150	13-FEB-18
Boron (B)			93.7		%		50-150	13-FEB-18
Barium (Ba)			99.3		%		50-150	13-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R3960634								
WG2715482-5 MS		**WG2715482-3**						
Cadmium (Cd)			99.5		%		50-150	13-FEB-18
Chromium (Cr)			99.97		%		50-150	13-FEB-18
Lead (Pb)			96.3		%		50-150	13-FEB-18
Selenium (Se)			99.5		%		50-150	13-FEB-18
Uranium (U)			98.3		%		50-150	13-FEB-18
N2N3-TCLP-WT	**Waste**							
Batch R3961620								
WG2716135-3 DUP		**L2052065-1**						
Nitrate-N		<2.0	<2.0	RPD-NA	mg/L	N/A	30	14-FEB-18
Nitrite-N		<2.0	<2.0	RPD-NA	mg/L	N/A	30	14-FEB-18
WG2716135-2 LCS								
Nitrate-N			101.8		%		70-130	14-FEB-18
Nitrite-N			100.6		%		70-130	14-FEB-18
WG2716135-1 MB								
Nitrate-N			<2.0		mg/L		2	14-FEB-18
Nitrite-N			<2.0		mg/L		2	14-FEB-18
WG2716135-4 MS		**L2052065-1**						
Nitrate-N			98.7		%		50-150	14-FEB-18
Nitrite-N			96.1		%		50-150	14-FEB-18
PCB-TCLP-WT	**Waste**							
Batch R3960479								
WG2715113-4 DUP		**WG2715113-3**						
Aroclor 1242		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	13-FEB-18
Aroclor 1248		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	13-FEB-18
Aroclor 1254		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	13-FEB-18
Aroclor 1260		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	13-FEB-18
WG2715113-2 LCS								
Aroclor 1242			96.5		%		65-130	13-FEB-18
Aroclor 1248			93.0		%		65-130	13-FEB-18
Aroclor 1254			110.0		%		65-130	13-FEB-18
Aroclor 1260			146.5	LCS-H	%		65-130	13-FEB-18
WG2715113-1 MB								
Aroclor 1242			<0.00020		mg/L		0.0002	13-FEB-18
Aroclor 1248			<0.00020		mg/L		0.0002	13-FEB-18
Aroclor 1254			<0.00020		mg/L		0.0002	13-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PCB-TCLP-WT	**Waste**							
Batch R3960479								
WG2715113-1 MB								
Aroclor 1260			<0.00020		mg/L		0.0002	13-FEB-18
Surrogate: 2-Fluorobiphenyl			73.9		%		40-160	13-FEB-18
WG2715113-6 MB								
Aroclor 1242			<0.00020		mg/L		0.0002	13-FEB-18
Aroclor 1248			<0.00020		mg/L		0.0002	13-FEB-18
Aroclor 1254			<0.00020		mg/L		0.0002	13-FEB-18
Aroclor 1260			<0.00020		mg/L		0.0002	13-FEB-18
Surrogate: 2-Fluorobiphenyl			63.1		%		40-160	13-FEB-18
WG2715113-5 MS		**WG2715113-3**						
Aroclor 1242			86.5		%		50-150	13-FEB-18
Aroclor 1254			95.1		%		50-150	13-FEB-18
Aroclor 1260			116.4		%		50-150	13-FEB-18
VOC-TCLP-WT	**Waste**							
Batch R3960757								
WG2715368-4 DUP		**WG2715368-3**						
1,1-Dichloroethylene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	14-FEB-18
1,2-Dichlorobenzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	14-FEB-18
1,2-Dichloroethane		<0.025	<0.025	RPD-NA	mg/L	N/A	50	14-FEB-18
1,4-Dichlorobenzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	14-FEB-18
Benzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	14-FEB-18
Carbon tetrachloride		<0.025	<0.025	RPD-NA	mg/L	N/A	50	14-FEB-18
Chlorobenzene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	14-FEB-18
Chloroform		<0.10	<0.10	RPD-NA	mg/L	N/A	50	14-FEB-18
Dichloromethane		<0.50	<0.50	RPD-NA	mg/L	N/A	50	14-FEB-18
Methyl Ethyl Ketone		<1.0	<1.0	RPD-NA	mg/L	N/A	50	14-FEB-18
Tetrachloroethylene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	14-FEB-18
Trichloroethylene		<0.025	<0.025	RPD-NA	mg/L	N/A	50	14-FEB-18
Vinyl chloride		<0.050	<0.050	RPD-NA	mg/L	N/A	50	14-FEB-18
WG2715368-1 LCS								
1,1-Dichloroethylene			91.1		%		70-130	14-FEB-18
1,2-Dichlorobenzene			102.2		%		70-130	14-FEB-18
1,2-Dichloroethane			111.6		%		70-130	14-FEB-18
1,4-Dichlorobenzene			97.5		%		70-130	14-FEB-18
Benzene			104.9		%		70-130	14-FEB-18

Quality Control Report

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235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-TCLP-WT	**Waste**							
Batch R3960757								
WG2715368-1 LCS								
Carbon tetrachloride			98.3		%		60-140	14-FEB-18
Chlorobenzene			102.6		%		70-130	14-FEB-18
Chloroform			106.4		%		70-130	14-FEB-18
Dichloromethane			109.2		%		70-130	14-FEB-18
Methyl Ethyl Ketone			110.1		%		50-150	14-FEB-18
Tetrachloroethylene			95.0		%		70-130	14-FEB-18
Trichloroethylene			101.9		%		70-130	14-FEB-18
Vinyl chloride			80.2		%		60-130	14-FEB-18
WG2715368-2 MB								
1,1-Dichloroethylene			<0.025		mg/L		0.025	14-FEB-18
1,2-Dichlorobenzene			<0.025		mg/L		0.025	14-FEB-18
1,2-Dichloroethane			<0.025		mg/L		0.025	14-FEB-18
1,4-Dichlorobenzene			<0.025		mg/L		0.025	14-FEB-18
Benzene			<0.025		mg/L		0.025	14-FEB-18
Carbon tetrachloride			<0.025		mg/L		0.025	14-FEB-18
Chlorobenzene			<0.025		mg/L		0.025	14-FEB-18
Chloroform			<0.10		mg/L		0.1	14-FEB-18
Dichloromethane			<0.50		mg/L		0.5	14-FEB-18
Methyl Ethyl Ketone			<1.0		mg/L		1	14-FEB-18
Tetrachloroethylene			<0.025		mg/L		0.025	14-FEB-18
Trichloroethylene			<0.025		mg/L		0.025	14-FEB-18
Vinyl chloride			<0.050		mg/L		0.05	14-FEB-18
Surrogate: 1,4-Difluorobenzene			94.0		%		70-130	14-FEB-18
Surrogate: 4-Bromofluorobenzene			97.1		%		70-130	14-FEB-18
WG2715368-5 MS		**WG2715368-3**						
1,1-Dichloroethylene			92.5		%		50-140	14-FEB-18
1,2-Dichlorobenzene			103.3		%		50-140	14-FEB-18
1,2-Dichloroethane			105.2		%		50-140	14-FEB-18
1,4-Dichlorobenzene			100.9		%		50-140	14-FEB-18
Benzene			104.2		%		50-140	14-FEB-18
Carbon tetrachloride			100.4		%		50-140	14-FEB-18
Chlorobenzene			103.1		%		50-140	14-FEB-18
Chloroform			104.9		%		50-140	14-FEB-18
Dichloromethane			104.1		%		50-140	14-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-TCLP-WT	**Waste**							
Batch R3960757								
WG2715368-5 MS		**WG2715368-3**						
Methyl Ethyl Ketone			97.9		%		50-140	14-FEB-18
Tetrachloroethylene			99.2		%		50-140	14-FEB-18
Trichloroethylene			103.2		%		50-140	14-FEB-18
Vinyl chloride			80.9		%		50-140	14-FEB-18

Quality Control Report

Workorder: L2054623 Report Date: 16-FEB-18

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235 LESMILL ROAD
TORONTO ON M3B 2V1

Contact: MELANIE SIEWERT

Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

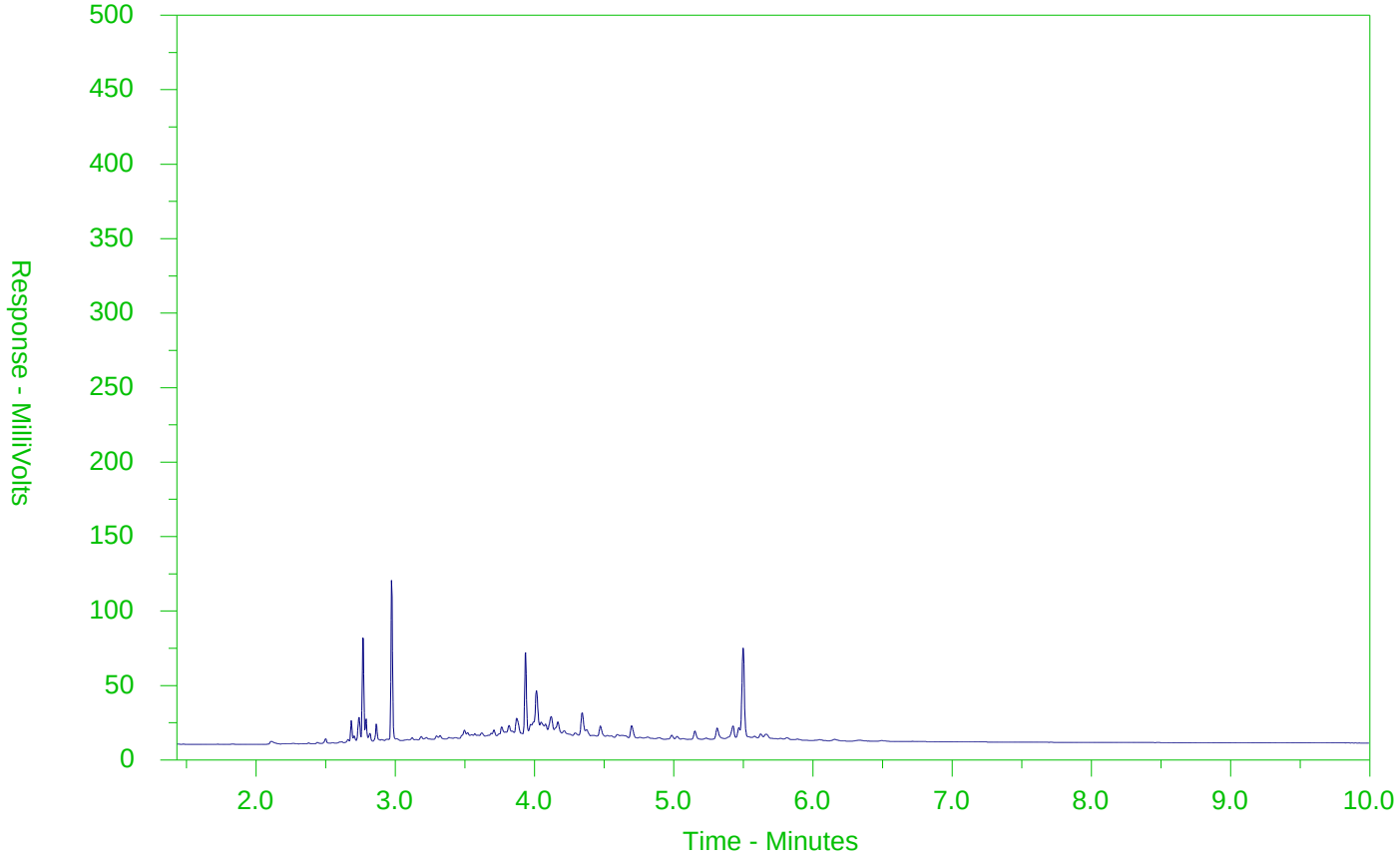
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2054623-1
Client Sample ID: PS-C-SED-101S



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

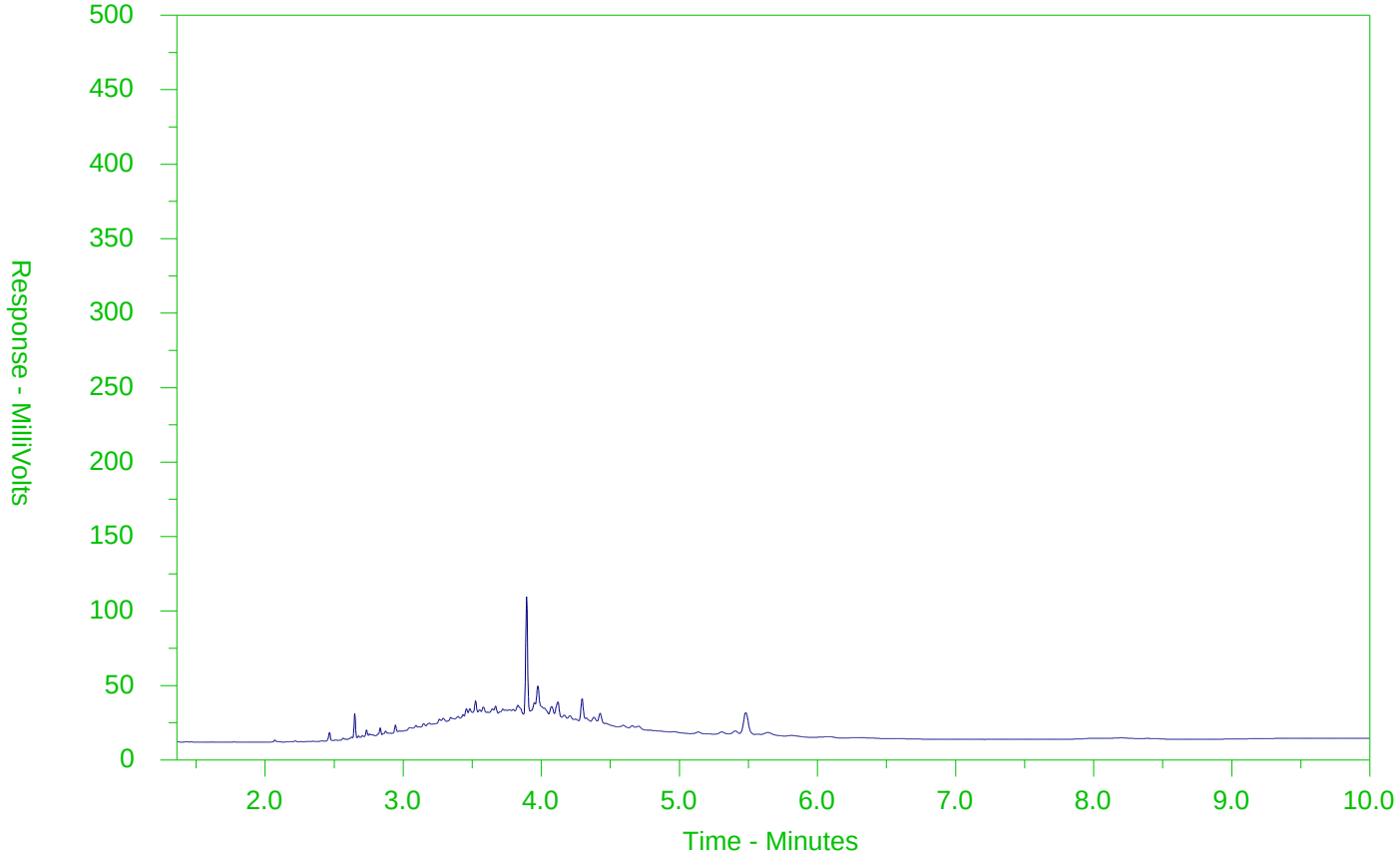
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2054623-2
Client Sample ID: PS-C-SED-102S



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

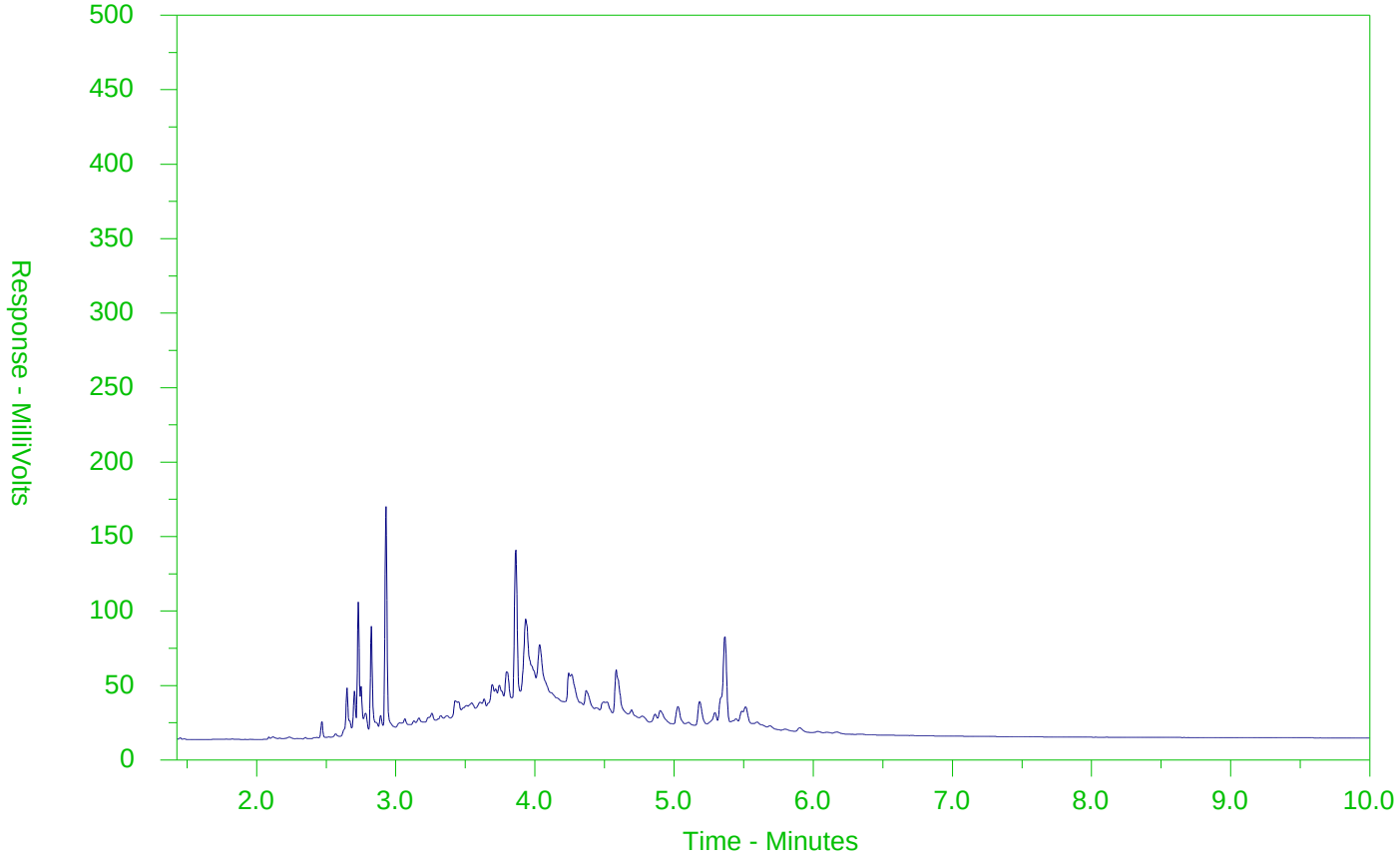
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2054623-3
Client Sample ID: PS-C-SED-103S



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

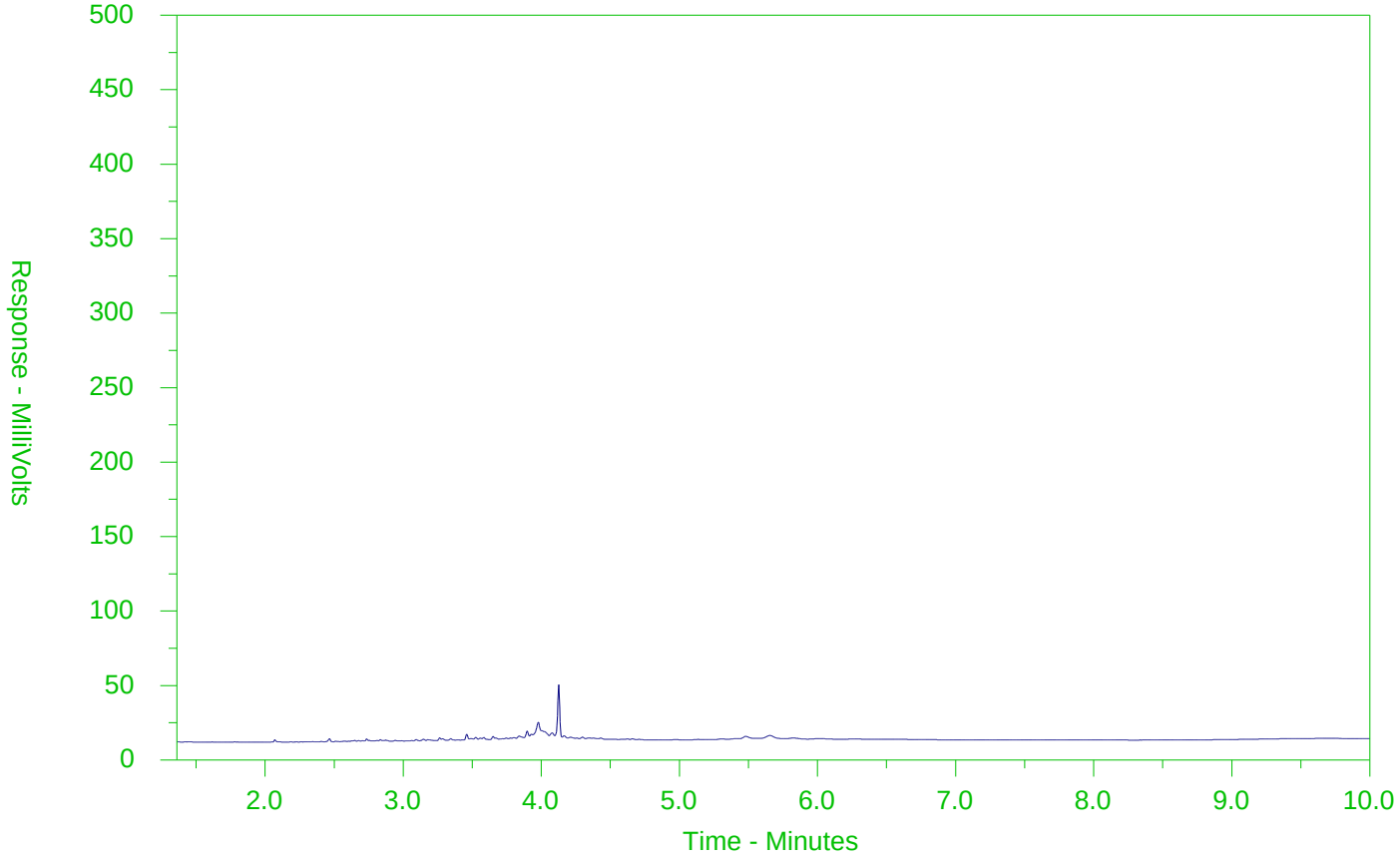
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2054623-4
Client Sample ID: PS-E-SED-103S



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

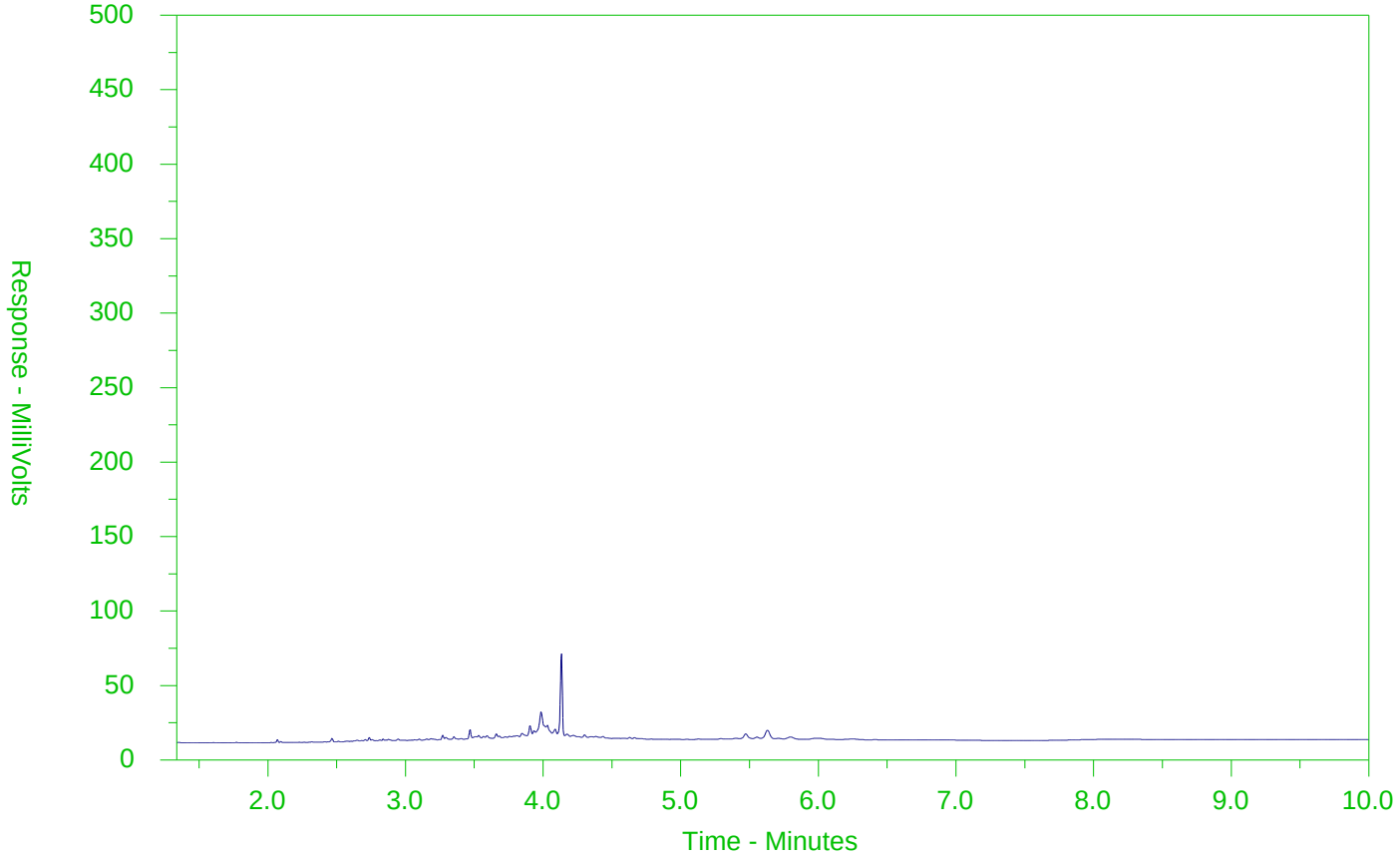
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2054623-5
Client Sample ID: PS-E-SED-1033S



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

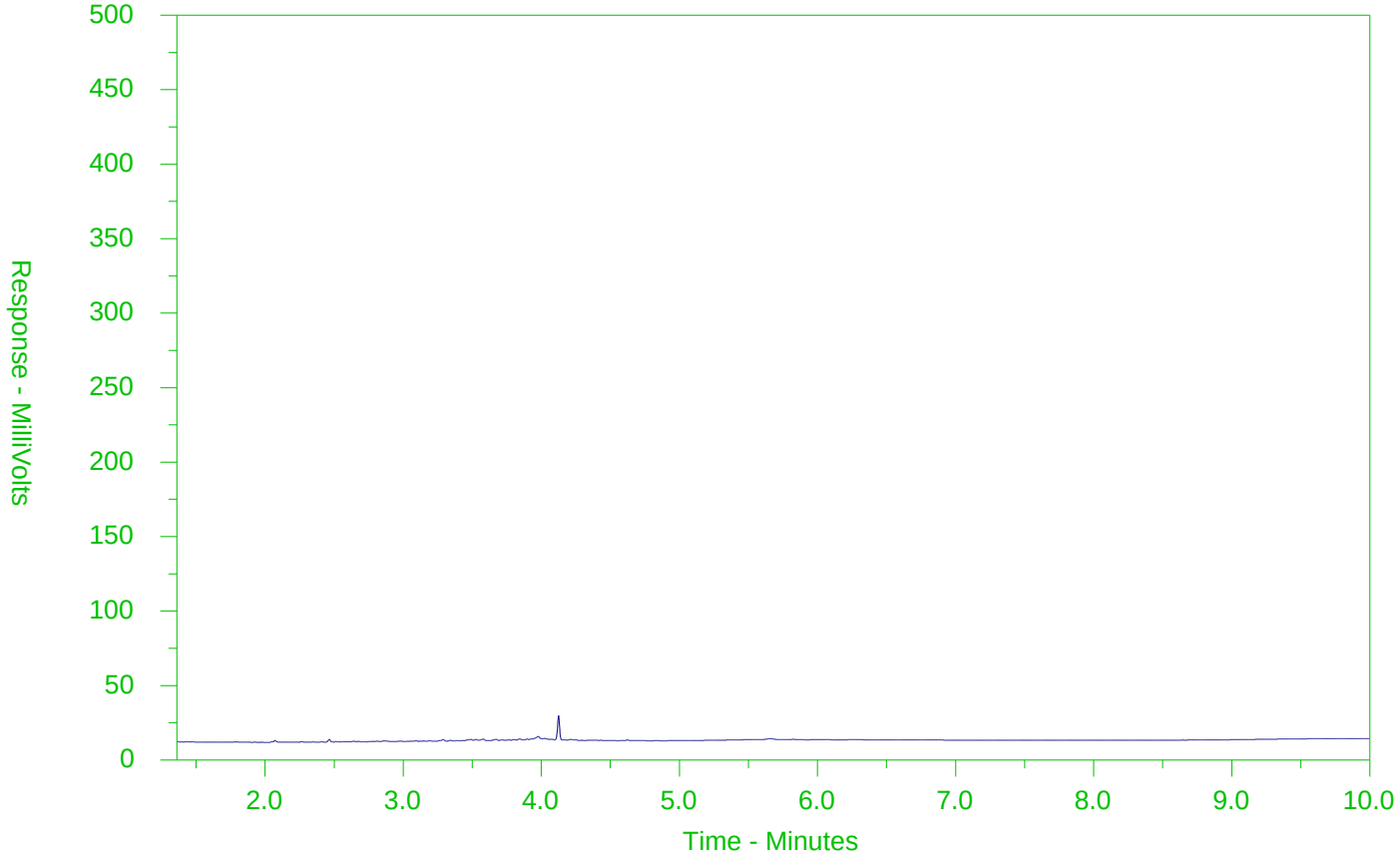
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2054623-6
Client Sample ID: PS-G-SED-101S



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

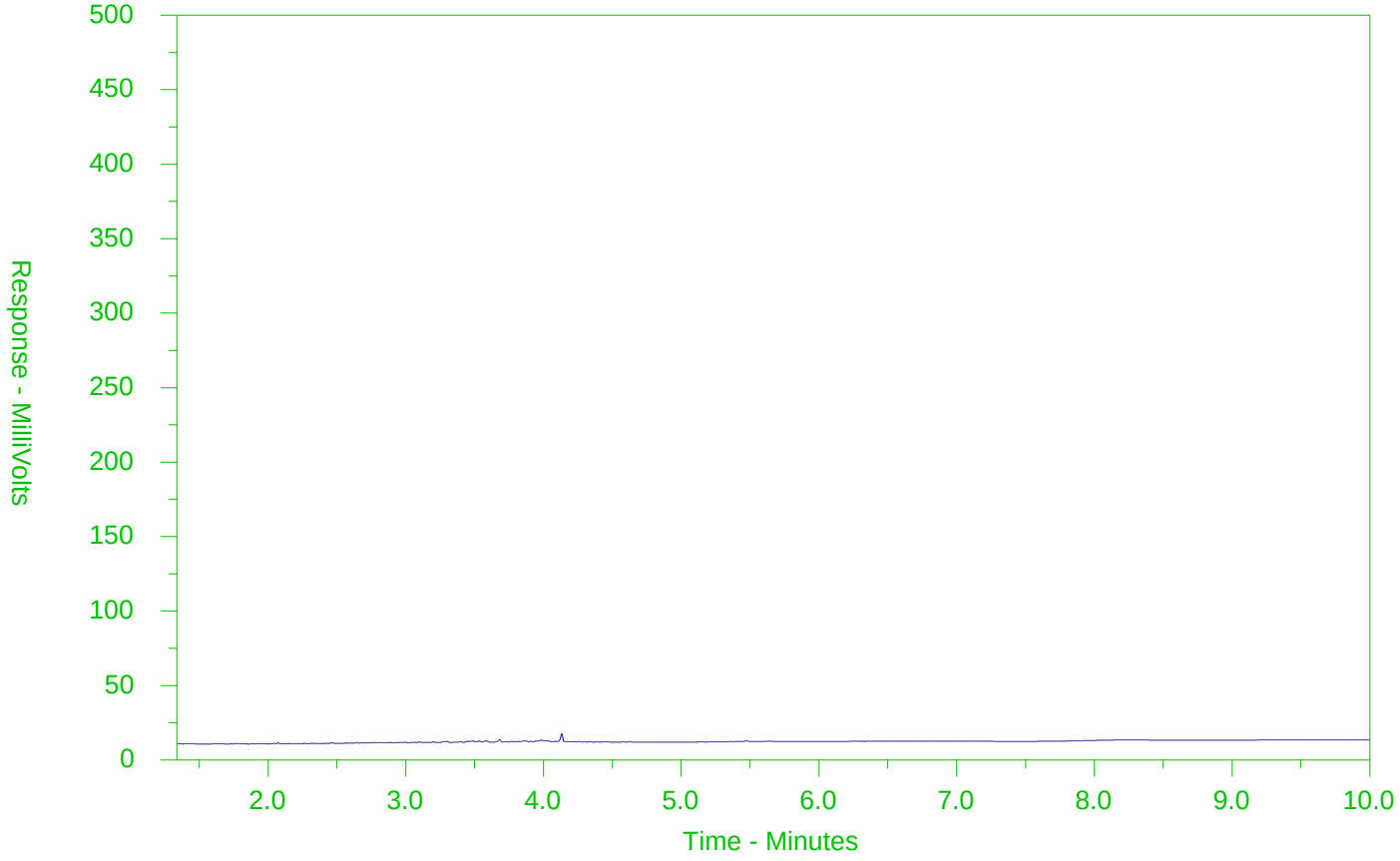
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2054623-7
Client Sample ID: PS-G-SED-102S



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2054623-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	SNC Lavalin
Contact:	Melanie Siewert
Phone:	(416)635-5882 x 56194
	Company address below will appear on the final report
Street:	235 Lesmill Road
City/Province:	Toronto, Ontario
Postal Code:	M3B 2V1
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	SNC Lavalin
Contact:	Accounts Payable

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Melanie.Siewert@snclavalin.com

Email 2:

Email 3:

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☑ MAIL ☑ FAX

Email 1 or Fax: Accounts Payable

Email 2: Melanie.Siewert@snclavalin.com

Project Information

ALS Account # / Quote #: Q65395

Job #: 651954

PO / AFE: 32402

LSD: 0SE

Oil and Gas Required Fields (client use)

AFE/Cost Center:

PO#:

Major/Minor Code:

Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only): L2054623

ALS Contact: Mathy

Sampler: JC / RHH

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals & Inorganics	BTX, F1	F2-F4	PAH	OC Pesticides	TOC	LIMITED SAMPLE REVIEW		SOLIDS-TSS-WT (Water)	TCLP BNA	TCLP M&I	TCLP PCB	TCLP VOC	Number of Containers
1,8	PS-C-SED-101S	Feb 6/18	12:20pm	Sediment	X	X	X	X		X	X			X	X	X	X	9
2	PS-C-SED-102S	↓	11:00am	↓	X	X	X	X	X	X	X							7
3	PS-C-SED-103S	↓	3:45pm	↓	X	X	X	X		X	X							6
4	PS-E-SED-103S	Feb 7/18	11:15am	↓	X	X	X	X	X	X	X							6
5	PS-E-SED-1033S	↓	11:15am	↓	X	X	X	X	X	X	X							6
6	PS-G-SED-101S	↓	4:15pm	↓	X	X	X	X	X	X	X							7
7	PS-G-SED-102S	Feb 8/18	9:30am	↓	X	X	X	X		X	X							5

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☒ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
-2.8			0.4		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: J. Cahill	Date: Feb 8/18	Time: 10:30am	Received by:	Date: Feb 8/18	Time: 1:32pm	Received by: AP	Date: 8/2/18	Time: 10:15

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Appendix E

Quality Assurance & Quality Control

Quality Assurance and Quality Control Program

A quality assurance and quality control (QA/QC) program was implemented to minimize and quantify data variability introduced during sample collection, handling, shipping and analysis. As part of the QA/QC program, sampling protocols included minimizing sample handling, submitting field QA/QC samples, using dedicated non contaminating sampling equipment, wearing new disposable vinyl gloves for each sample handled, using sample specific identification and labeling procedures and using chain of custody records.

Field Quality Assurance and Quality Control

The field QA/QC program included the analysis of field duplicate samples. Duplicate samples were analysed for each analytical parameter (with the exception of TCLP analyses) at a frequency of approximately 10% or a minimum of one (1) duplicate. The field duplicates were blind duplicates in that duplicate pairs were not identified to the laboratory. The field duplicate samples analysed as part of the QA/QC program are summarized below:

Sample ID	Duplicate ID	Analyses
PS-D-SW-11	PS-D-SW-111	Total Suspended Solids
PS-E-SW-103	PS-E-SW-1033	Total Suspended Solids
PS-E-SW-103D	PS-E-SW-1033D	Total Suspended Solids
PS-D-SED-19	PS-D-SED-199	BTEX, metals, inorganics, PHC fractions, PAH, organochlorine pesticides and TOC
PS-G-SED-6	PS-G-SED-66	BTEX, metals, inorganics, PHC fractions, PAH, organochlorine pesticides and TOC
PS-E-SED-103S	PS-E-SED-1033S	BTEX, metals, inorganics, PHC fractions, PAH, organochlorine pesticides and TOC

A duplicate sample was not analysed for TCLP analyses as part of this program as only three (3) samples were analysed for waste characterization.

Laboratory Quality Assurance and Quality Control

Chemical analyses were performed by a laboratory accredited by the Standards Council of Canada (SCC). Laboratory analyses for Ontario Regulation 153/04 parameters were completed in accordance with Standard Methods (MOECC, CCME, US EPA or ASTM) and generally accepted industry practices. Laboratory QA/QC measures included analysis of laboratory blank, duplicate and spike samples. Laboratory acceptance criteria reported on laboratory certificates of analyses were used to assess the quality of laboratory QA/QC measures.

Results of the QA/QC Program

Field Duplicate Results

Field duplicates were evaluated by estimating the potential uncertainty, expressed as a relative percent difference (RPD), in the analytical determinations calculated from the blind field duplicate and sample pairs. RPD was determined as follows:

$$RPD=ABS((S_x-D_x)/avg(S_xD_x))*100$$

Where: the RPD is a measure of the potential uncertainty (combined field and laboratory variance) in percent between the duplicate and sample; $ABS((S_x-D_x)$ represents the absolute value of the difference in reported concentrations of sample x (S_x) and the duplicate sample (D_x) of sample x; and $avg(S_x-D_x)$ is the average concentration of the parameter of interest in the sample and duplicate sample.

Field precision data quality was assessed relative to regulatory guidance provided by the Canadian Council of Ministers of the Environment (CCME, 2016). Following CCME guidance, calculated RPD values for field duplicates can be compared to acceptance criteria derived as twice the laboratory acceptance criteria for laboratory duplicates. For example, as the laboratory acceptance criterion is ≤30% for RPDs calculated for laboratory duplicates for most metals in sediments, RPDs for field duplicates should be ≤60% for similar analyses. As the uncertainty in concentrations increases near detection limits, RPD values were calculated only where detected concentrations in both duplicate pair samples were greater than five (5) times the laboratory detection limit.

Calculated RPD values for duplicate sediment and surface water samples are presented in Tables E.1 and E.2, respectively. The calculated RPD value for pH marginally exceeded the CCME (2016) acceptance criteria for sediment samples PS-G-SED-6, PS-E-SED-103S, PS-D-SED-19 and their duplicate pairs. In this report, pH concentrations were not compared to regulatory criteria; therefore, any potential variability these results may represent should not materially affect the findings of this report. All other calculated RPD values for sediment and surface water field duplicate pairs satisfied CCME (2016) acceptance criteria and therefore considered acceptable.

Laboratory QA/QC

Results of laboratory QA/QC measures associated with sediment analyses are presented in the laboratory certificates of analysis in Appendix D. Laboratory certificates of analysis were reviewed for any potential QA/QC issues identified by the laboratory. The following laboratory QA/QC issues, with the potential to materially affect the conclusions based on the reported data, were identified by the laboratory:

- In laboratory report L2036241
    - Benzo(a)anthracene and/or fluorene concentrations for sediment samples PS-G-SED-1, PS-G-SED-2, PS-G-SED-3, PS-G-SED-5, PS-G-SED-6 may be biased high as the ion abundance ratios did not meet the laboratory acceptance criteria and the laboratory presented an estimated maximum. Although this potential high bias may represent additional conservativeness in sediment concentration evaluations, as other PAH parameters in these samples also exceeded regulatory criteria and were also evaluated separately, the potential high bias is not anticipated to materially affect the findings of this report.
    - The matrix spike recovery in laboratory matrix sample WG2686370-5 for p,p-DDT exceeded the laboratory data quality objective (DQO). Since the concentrations of

p,p-DDT in site sediment samples were all less than the laboratory reportable detection limit (RDL), any potential high bias represented by these results should not materially affect the findings in this report.

- Hexachloroethane recovery in laboratory control sample (LCS) WG2686370-2 marginally exceeded the laboratory DQO. The lab has indicated that although the recovery for hexachloroethane in the LCS exceeds the DQO, this deviation is considered acceptable as per MOECC and CCME guidance as the DQO was exceeded less than 10%. Further, as hexachloroethane is not identified as a COPC, any potential high bias should not materially affect the findings in this report.

- In laboratory report L2054623, aroclor 1260 recovery in the LCS was above the laboratory DQO for the TCLP sample PS-C-SED-101S. Since the concentration of aroclor 1260 in this sediment sample are less than the laboratory RDL, the lab considers the results reliable. As such, any potential high bias for these results should not materially affect the findings of this report.
- For all sediment samples, the laboratory noted a potential high bias in reported SAR results since maximum SAR concentrations are reported. As SAR was not identified as a COPC, any potential high bias should not materially affect the findings in this report.

No other laboratory QA/QC issues were identified by the laboratory

Overall Data Quality

Based on the above discussions, the results of field and laboratory QA/QC measures associated with analysed sediment samples were generally acceptable. Where deviations were identified, the effects were determined to be negligible and are not believed to have materially affected the conclusions based on these results.

References

Council of Ministers of the Environment (CCME), 2016. Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment – Volume 1 (Guidance Manual) and Volume 4 (Analytical Methods). 2016.

TABLE E.1: **Sediment RPD Calculations**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

Sample Location		RPD Limit	PS-G-SED-6	PS-G-SED-6	RPD	PS-E-SED-103S	PS-E-SED-103S	RPD	PS-D-SED-19	PS-D-SED-19	RPD
Laboratory Sample ID			L2036241-5	L2036241-6		L2054623-4	L2054623-5		L2036241-26	L2036241-28	
SNC-Lavalin Sample ID			PS-G-SED-6	PS-G-SED-66		PS-E-SED-103S	PS-E-SED-		PS-D-SED-19	PS-D-SED-199	
Sampling Date (yyyy/mm/dd)			2017/12/12	2017/12/12		2018/02/07	2018/02/07		2017/12/14	2017/12/14	
Depth Interval (mbm)			0.0 - 0.25	0.0 - 0.25		0.0 - 0.20	0.0 - 0.20		0.0 - 0.25	0.0 - 0.25	
Parameter	Units			Duplicate of PS-G-SED-6			Duplicate of PS-E-SED-103S			Duplicate of PS-D-SED-19	
General Chemistry											
Cyanide (WAD)	µg/g	70%	< 0.050	< 0.050	*	< 0.050	< 0.050	*	< 0.050	< 0.050	*
Electrical Conductivity	mS/cm	40%	0.309	0.353	13%	0.167	0.194	15%	0.297	0.211	34%
Moisture	%	40%	34	35.5	4%	19.6	20.1	3%	26.2	21.6	19%
pH	pH	0.6%	7.43	7.26	**2%**	7.16	7.29	**2%**	7.4	7.36	**1%**
Sodium Adsorption Ratio	None	40%	0.58	0.48	*	0.64	0.69	8%	0.36	0.48	*
			2.48	2.63		0.68	0.64		1.36	1.48	
Total Organic Carbon	%	70%	2.80	2.78	*	0.72	0.73	*	1.46	1.50	*
			2.89	3.02		0.81	0.77		1.57	1.52	
Fraction of Organic Carbon (Average)	None	60%	0.0272	0.0281	3%	0.0074	0.0071	4%	0.0146	0.015	3%
			0.0248	0.0263		0.0068	0.0064		0.0136	0.0148	
Fraction of Organic Carbon	None	60%	0.0280	0.0278	*	0.0072	0.0073	*	0.0146	0.0150	*
			0.0289	0.0302		0.0081	0.0077		0.0157	0.0152	
Total Metals											
Antimony	µg/g	60%	< 1.0	< 1.0	*	< 1.0	< 1.0	*	< 1.0	< 1.0	*
Arsenic	µg/g	60%	3.6	3.7	*	1.8	1.9	*	2.2	2	*
Barium	µg/g	80%	55.7	59.2	6%	97.3	108	10%	75.7	59.5	24%
Beryllium	µg/g	60%	< 0.50	< 0.50	*	< 0.50	< 0.50	*	< 0.50	< 0.50	*
Boron	µg/g	60%	< 5.0	< 5.0	*	< 5.0	< 5.0	*	< 5.0	< 5.0	*
Boron (Hot Water Soluble)	µg/g	60%	0.3	0.31	*	< 0.10	< 0.10	*	0.12	0.14	*
Cadmium	µg/g	60%	< 0.50	< 0.50	*	< 0.50	< 0.50	*	< 0.50	< 0.50	*
Chromium (total)	µg/g	60%	12.6	11.9	6%	22.1	24.5	10%	11	11.2	2%
Chromium (VI)	µg/g	70%	< 0.20	< 0.20	*	< 0.20	< 0.20	*	< 0.20	< 0.20	*
Cobalt	µg/g	60%	3.9	4.1	*	6.9	7.4	7%	3.7	3.6	*
Copper	µg/g	60%	18.4	14.8	22%	15.6	17.2	10%	16.2	11.7	32%
Lead	µg/g	80%	182	191	5%	8	9.1	13%	24.2	24.1	0%
Mercury	µg/g	80%	0.0267	0.0281	5%	0.0082	0.0116	*	0.019	0.0187	*
Molybdenum	µg/g	80%	< 1.0	< 1.0	*	< 1.0	< 1.0	*	< 1.0	< 1.0	*
Nickel	µg/g	60%	9.2	8.9	3%	14.4	13.8	4%	8.2	7	16%
Selenium	µg/g	60%	< 1.0	< 1.0	*	< 1.0	< 1.0	*	< 1.0	< 1.0	*
Silver	µg/g	80%	< 0.20	< 0.20	*	< 0.20	< 0.20	*	< 0.20	< 0.20	*
Thallium	µg/g	60%	< 0.50	< 0.50	*	< 0.50	< 0.50	*	< 0.50	< 0.50	*
Uranium	µg/g	60%	< 1.0	< 1.0	*	< 1.0	< 1.0	*	< 1.0	< 1.0	*
Vanadium	µg/g	60%	19.6	19	3%	39.7	44	10%	22.8	21.9	4%
Zinc	µg/g	60%	107	115	7%	49.4	49.7	1%	62.1	62.3	0%
Petroleum Hydrocarbon (PHC) Fractions											
PHC F1	µg/g	60%	< 5.0	< 5.0	*	< 5.0	< 5.0	*	< 5.0	< 5.0	*
PHC F2	µg/g	60%	< 10	< 10	*	< 10	< 10	*	< 10	< 10	*
PHC F3	µg/g	60%	175	172	*	< 50	< 50	*	< 50	< 50	*
PHC F4	µg/g	60%	170	161	*	< 50	< 50	*	< 50	< 50	*
PHC F4 (gravimetric)	µg/g	60%	720	760	*	-	-	-	-	-	-
Total PHC C6-C50	µg/g	60%	345	332	*	< 72	< 72	*	< 72	< 72	*
Total PHC (F1-F4)	µg/g	60%	895	932	4%	< 72	< 72	*	< 72	< 72	*
Volatile Organic Compounds											
Benzene	µg/g	80%	< 0.0068	< 0.0068	*	< 0.0068	< 0.0068	*	< 0.0068	< 0.0068	*
Ethylbenzene	µg/g	60%	< 0.018	< 0.018	*	< 0.018	< 0.018	*	< 0.018	< 0.018	*
Toluene	µg/g	80%	< 0.080	< 0.080	*	< 0.080	< 0.080	*	< 0.080	< 0.080	*
Xylenes, m+p-	µg/g	80%	< 0.030	< 0.030	*	< 0.030	< 0.030	*	< 0.030	< 0.030	*
Xylenes, o-	µg/g	40%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
Xylenes	µg/g	80%	< 0.050	< 0.050	*	< 0.050	< 0.050	*	< 0.050	< 0.050	*
PAHs											
Acenaphthene	µg/g	80%	0.061	0.061	*	< 0.050	< 0.050	*	< 0.050	< 0.050	*
Acenaphthylene	µg/g	80%	1.09	0.886	21%	< 0.050	< 0.050	*	< 0.050	< 0.050	*
Anthracene	µg/g	80%	0.379	0.314	19%	< 0.050	< 0.050	*	< 0.050	< 0.050	*
Benzo(a)anthracene	µg/g	80%	2.17	1.48	38%	< 0.050	< 0.050	*	< 0.050	0.073	*
Benzo(a)pyrene	µg/g	100%	2.53	1.87	30%	< 0.050	< 0.050	*	0.054	0.065	*
Benzo(b)fluoranthene	µg/g	80%	3.32	2.67	22%	< 0.050	< 0.050	*	0.093	0.111	*
Benzo(g,h,i)perylene	µg/g	80%	1.74	1.36	25%	< 0.050	< 0.050	*	< 0.050	< 0.050	*
Benzo(k)fluoranthene	µg/g	80%	1.02	0.808	23%	< 0.050	< 0.050	*	< 0.050	< 0.050	*
Chrysene	µg/g	80%	2.88	2.21	26%	< 0.050	< 0.050	*	< 0.050	0.08	*
Dibenzo(a,h)anthracene	µg/g	80%	0.387	0.276	33%	< 0.050	< 0.050	*	< 0.050	< 0.050	*
Fluoranthene	µg/g	80%	6.18	5.72	8%	< 0.050	< 0.050	*	0.068	0.051	*
Fluorene	µg/g	80%	0.249	0.242	*	< 0.050	< 0.050	*	< 0.050	< 0.050	*
Indeno(1,2,3-cd)pyrene	µg/g	80%	1.83	1.47	22%	< 0.050	< 0.050	*	< 0.050	0.051	*
Methylnaphthalene, 1-	µg/g	80%	< 0.030	< 0.030	*	< 0.030	< 0.030	*	< 0.030	< 0.030	*
Methylnaphthalene, 2-	µg/g	80%	< 0.030	< 0.030	*	< 0.030	< 0.030	*	< 0.030	< 0.030	*
Methylnaphthalene, 1- & 2-	µg/g	80%	< 0.042	< 0.042	*	< 0.042	< 0.042	*	< 0.042	< 0.042	*
Naphthalene	µg/g	80%	0.015	0.016	*	< 0.013	< 0.013	*	< 0.013	< 0.013	*
Phenanthrene	µg/g	80%	1.81	1.4	26%	< 0.046	< 0.046	*	< 0.046	< 0.046	*
Pyrene	µg/g	80%	6.71	6.16	9%	< 0.050	< 0.050	*	0.063	0.054	*
Organochlorine Pesticides											
Aldrin	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
Chlordane, alpha-	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
Chlordane, gamma-	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
Chlordane (Total)	µg/g	80%	< 0.028	< 0.028	*	< 0.028	< 0.028	*	< 0.028	< 0.028	*
DDD, o,p-	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
DDD, p,p-	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
DDD (Total)	µg/g	80%	< 0.028	< 0.028	*	< 0.028	< 0.028	*	< 0.028	< 0.028	*
DDE, o,p-	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
DDE, p,p-	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
DDE (Total)	µg/g	80%	< 0.028	< 0.028	*	< 0.028	< 0.028	*	< 0.028	< 0.028	*
DDT, o,p-	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
DDT, p,p-	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
DDT (Total)	µg/g	80%	< 0.028	< 0.028	*	< 0.028	< 0.028	*	< 0.028	< 0.028	*
Dieldrin	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
Endosulfan I	µg/g	80%	< 0.060	< 0.050	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
Endosulfan II	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
Endosulfan (Total)	µg/g	80%	< 0.063	< 0.054	*	< 0.028	< 0.028	*	< 0.028	< 0.028	*
Endrin	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
Heptachlor	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
Heptachlor Epoxide	µg/g	80%	< 0.020	< 0.020	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*
Hexachlorobenzene	µg/g	80%	< 0.010	< 0.010	*	< 0.010	< 0.010	*	< 0.010	< 0.010	*
Hexachlorobutadiene	µg/g	80%	< 0.010	< 0.010	*	< 0.010	< 0.010	*	< 0.010	< 0.010	*
Hexachlorocyclohexane, gamma- (Lindane)	µg/g	80%	< 0.010	< 0.010	*	< 0.010	< 0.010	*	< 0.010	< 0.010	*
Hexachloroethane	µg/g	80%	< 0.010	< 0.010	*	< 0.010	< 0.010	*	< 0.010	< 0.010	*
Methoxychlor	µg/g	80%	< 0.10	< 0.15	*	< 0.020	< 0.020	*	< 0.020	< 0.020	*

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mbm - metres below mudline
% - percent
µg/g - micrograms per gram, dry weight basis
mS/cm - milliSiemens per centimetre
RPD - Relative Percent Difference (not calculated when one or both results are less than or equal to 5X RDL)
* - RPD not calculable

UNDERLINE RPD exceeds limit

TABLE E.2: **Surface Water RPD Calculations**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

Sample Location **Laboratory Sample ID** **SNC-Lavalin Sample ID** **Sampling Date (yyyy/mm/dd)** **Parameter**	**Units**	**RPD Limit**	**PS-E-SW-103** L2054541-7 PS-E-SW-103 2018/02/07	**PS-E-SW-103** L2054541-15 PS-E-SW-1033 2018/02/07 Duplicate of PS-E-SW-103	**RPD**	**PS-E-SW-103D** L2054541-8 PS-E-SW-103D 2018/02/07	**PS-E-SW-103D** L2054541-16 PS-E-SW-1033D 2018/02/07 Duplicate of PS-E-SW-103D	**RPD**	**PS-D-SW-11** L2036241-21 PS-D-SW-11 2017/12/14	**PS-D-SW-11** L2036241-22 PS-D-SW-111 2017/12/14 Duplicate of PS-D-SW-11	**RPD**
General Chemistry											
Total Suspended Solids	mg/L	40%	< 2.0	< 2.0	*	24.7	19.6	23%	< 2.0	< 2.0	*

All terms defined within the body of SNC-Lavalin's report.
Laboratory analysis by ALS, Mississauga, ON
RDL - Reportable Detection Limit, unless otherwise noted
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable
mg/L - milligrams per litre
RPD - Relative Percent Difference (not calculated when one or both results are less than or equal to 5X RDL)
* - RPD not calculable

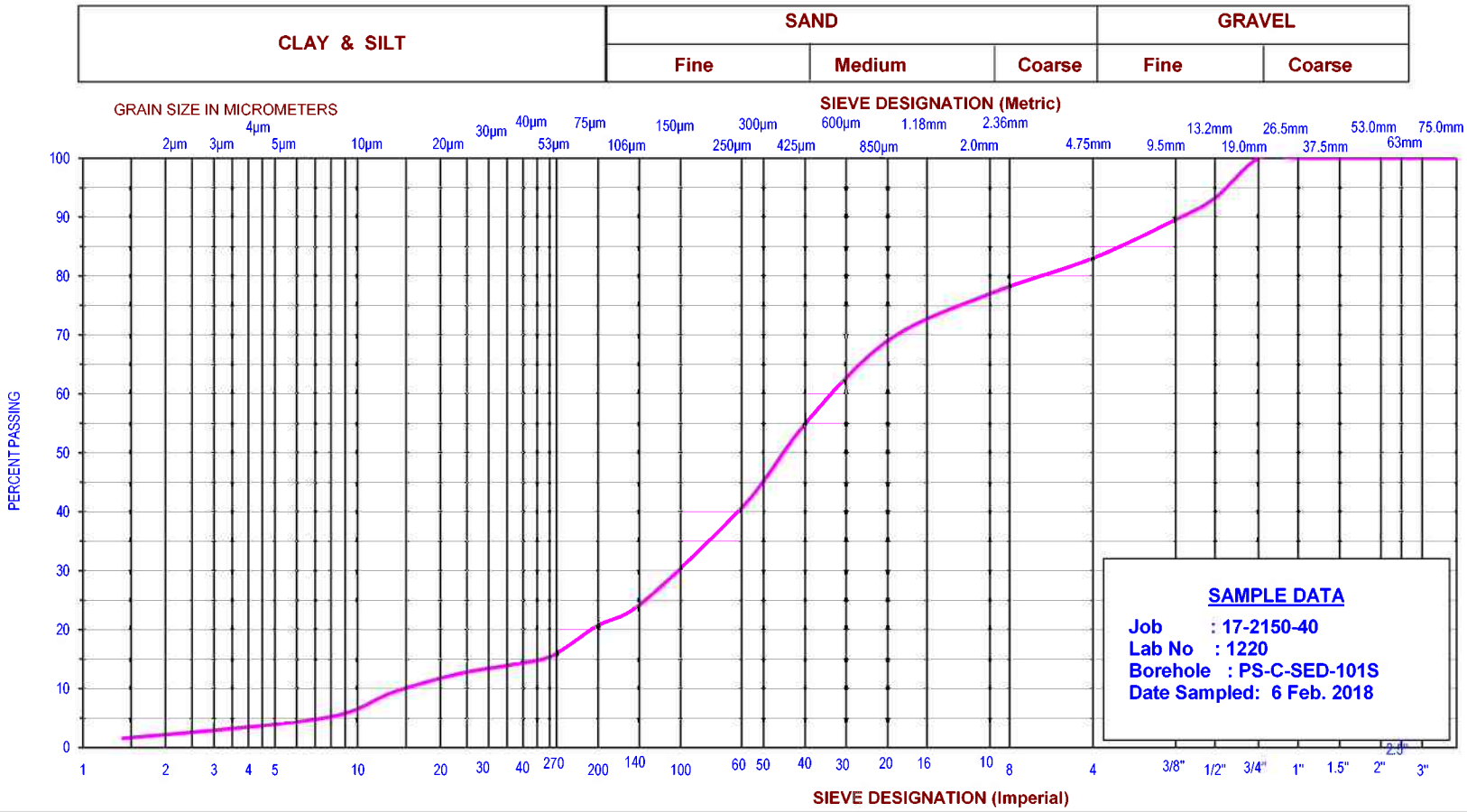
UNDERLINE RPD exceeds limit

Appendix F

Grain Size Analyses

SNC·LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0	17	6	22	34	19	2

SNC-Lavalin GEM Ontario Inc.
401 Hanlan Road
Vaughan, Ontario, Canada, L4L 3T1
905.851.0090 905.851.0091

GRAIN SIZE DISTRIBUTION

SAND

some silt, some gravel, trace clay

Client: SNC-Lavalin Inc.

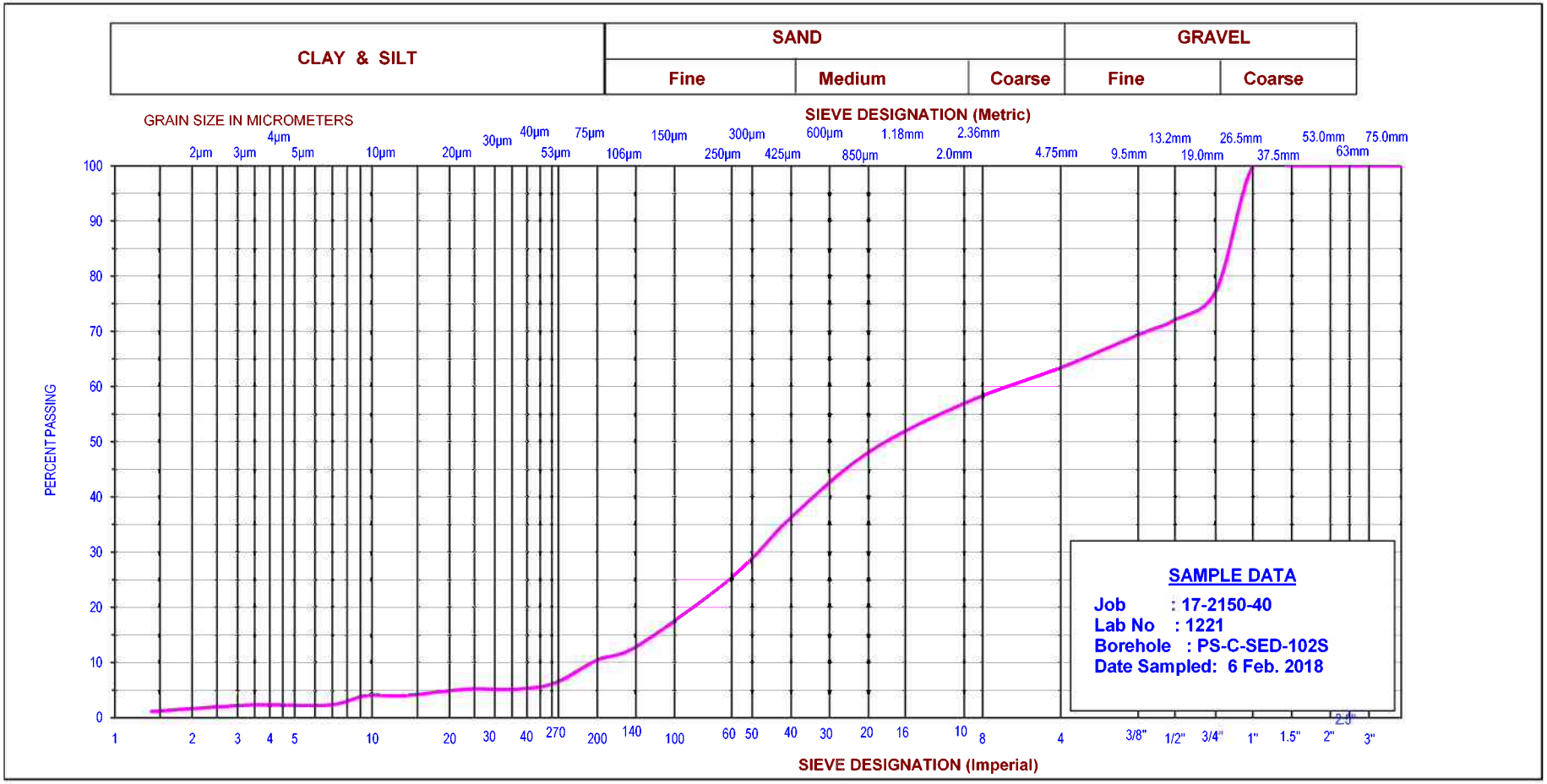
Project Number Reference: 651954

Project Name: Port Severn

Date: February 2018

SNC·LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	23	14	6	21	26	8	2

SNC-Lavalin GEM Ontario Inc.
401 Hanlan Road
Vaughan, Ontario, Canada, L4L 3T1
905.851.0090 905.851.0091

GRAIN SIZE DISTRIBUTION

SAND AND GRAVEL

trace silt, trace clay

Client: SNC-Lavalin Inc.

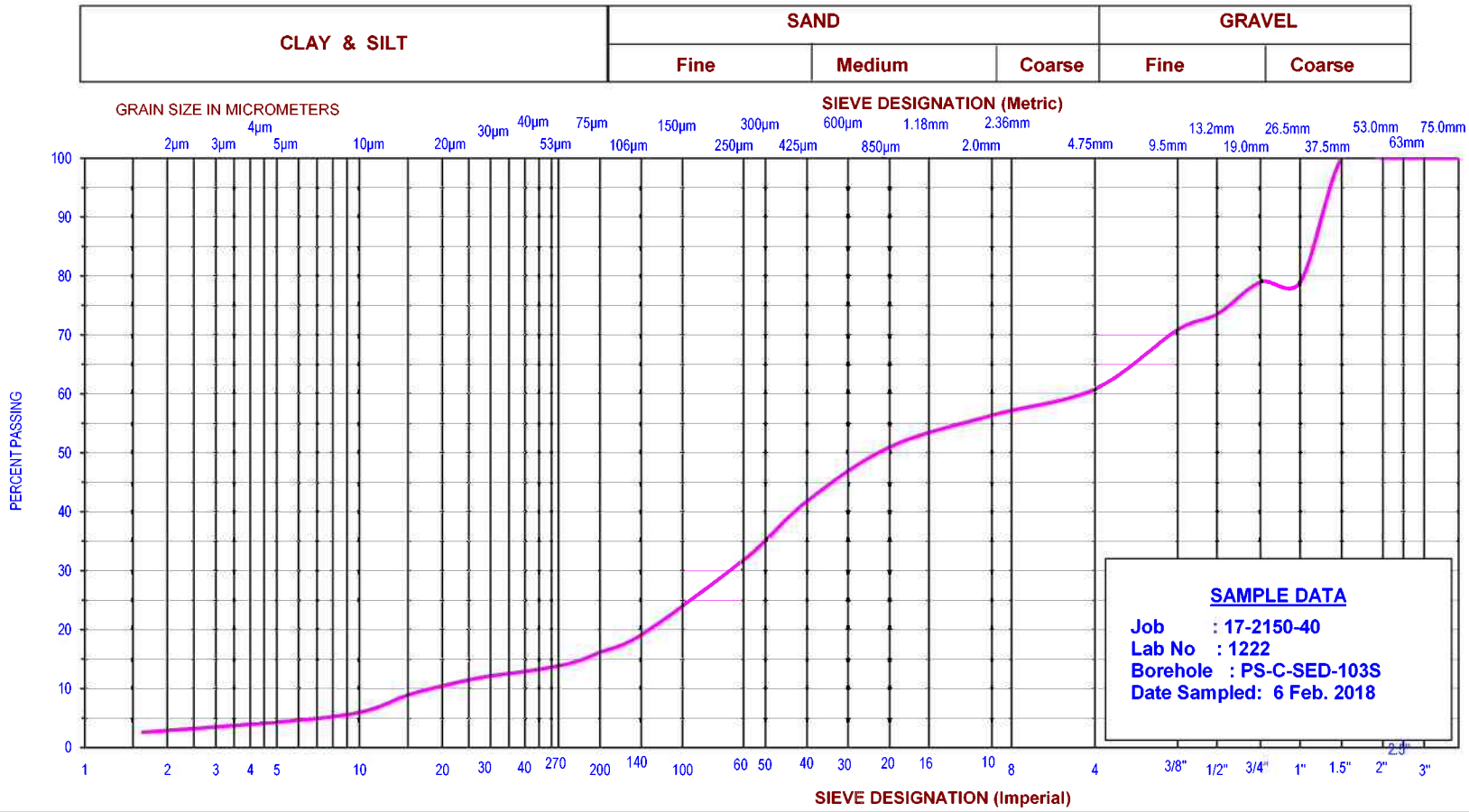
Project Number Reference: 651954

Project Name: Port Severn

Date: February 2018

SNC·LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	21	18	4	15	26	13	3

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401 Hanlan Road
Vaughan, Ontario, Canada, L4L 3T1
905.851.0090 905.851.0091

GRAIN SIZE DISTRIBUTION

SAND AND GRAVEL

some silt, trace clay

Client: SNC-Lavalin Inc.

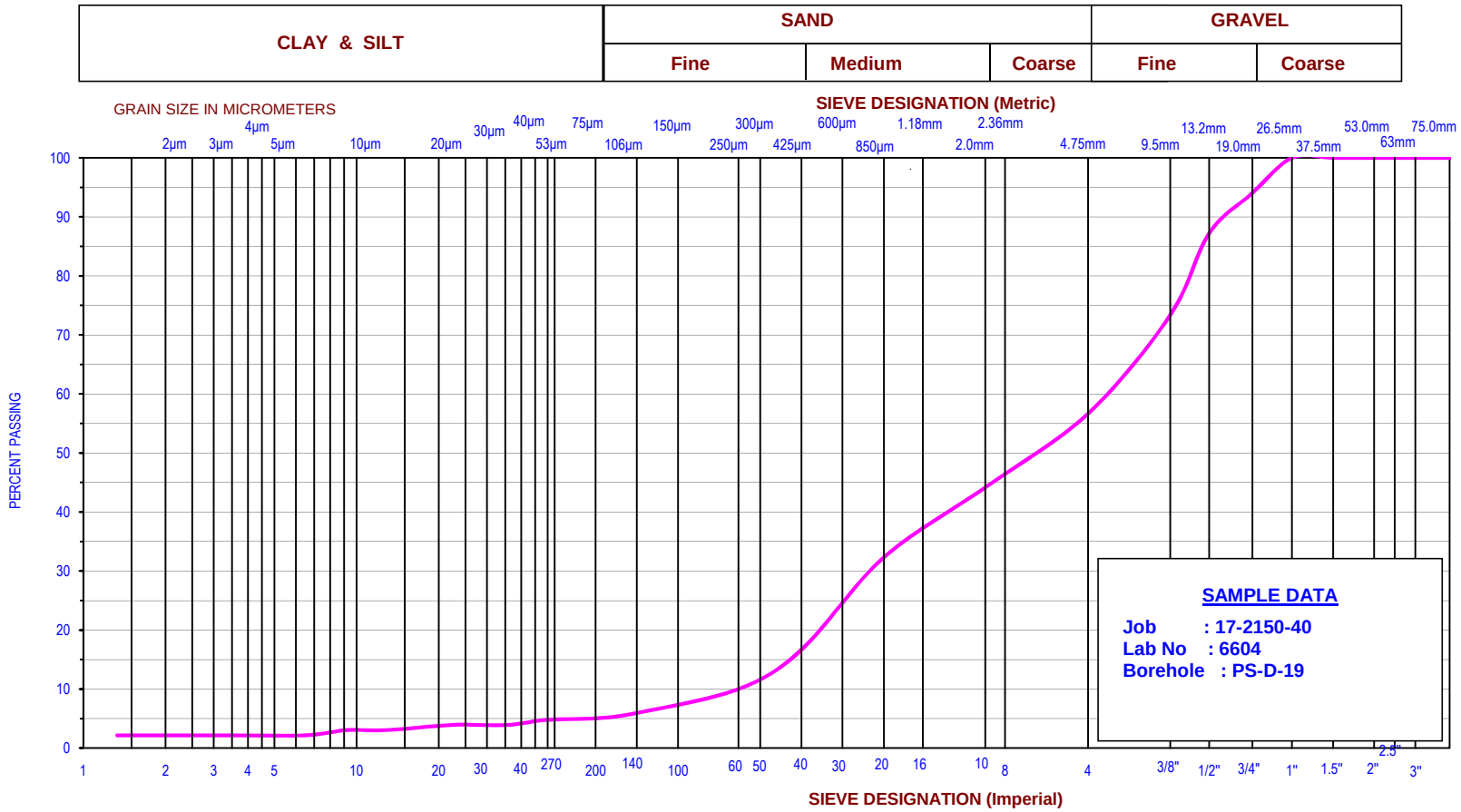
Project Number Reference: 651954

Project Name: Port Severn

Date: February 2018

SNC·LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Course	Medium	Fine	Silt	Clay
	6	37	12	28	12	3	2

SNC-Lavalin GEM Ontario Inc.
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GRAIN SIZE DISTRIBUTION

SAND AND GRAVEL

trace silt, trace clay

Client: SNC-Lavalin Inc.

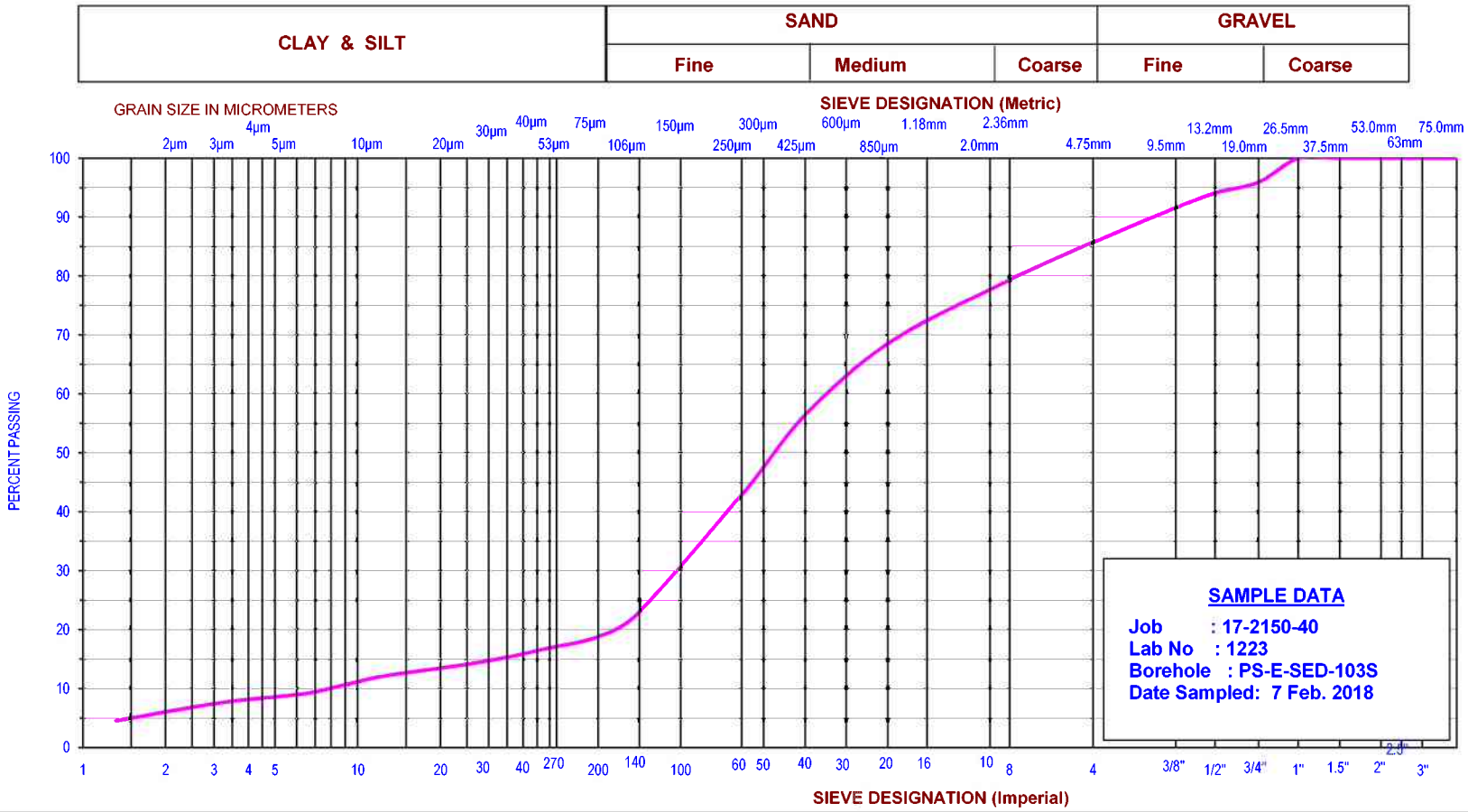
Project Number Reference: 651954

Project Name: Port Severn

Date: January 2018

SNC·LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	4	10	8	21	38	13	6

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GRAIN SIZE DISTRIBUTION

SAND

some gravel, some silt, trace clay

Client: SNC-Lavalin Inc.

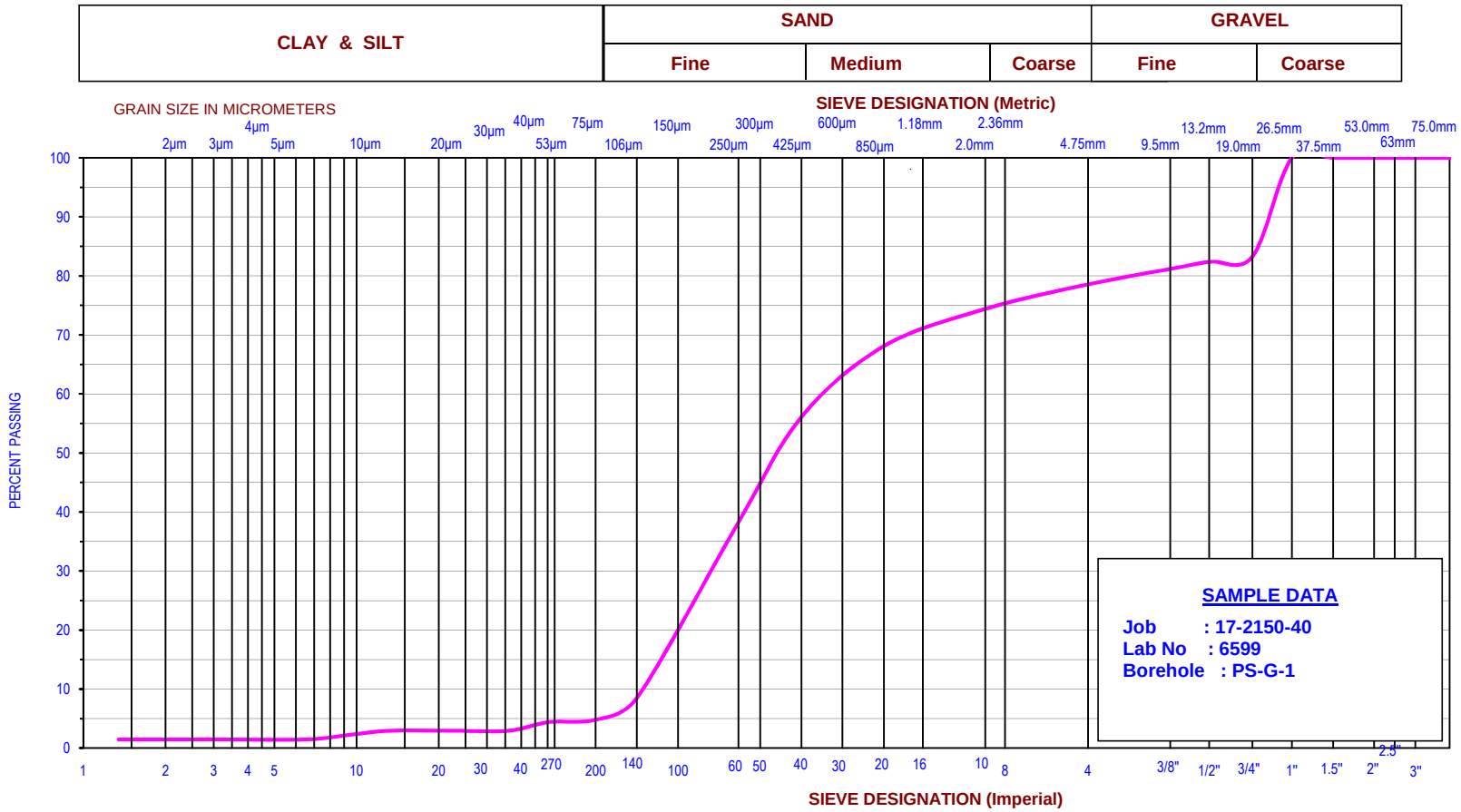
Project Number Reference: 651954

Project Name: Port Severn

Date: February 2018

SNC·LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Course	Medium	Fine	Silt	Clay
	17	5	4	18	51	3	2

SNC-Lavalin GEM Ontario Inc.
401 Hanlan Road
Vaughan, Ontario, Canada, L4L 3T1
905.851.0090 905.851.0091

GRAIN SIZE DISTRIBUTION

SAND

with gravel, trace silt, trace clay

Client: SNC-Lavalin Inc.

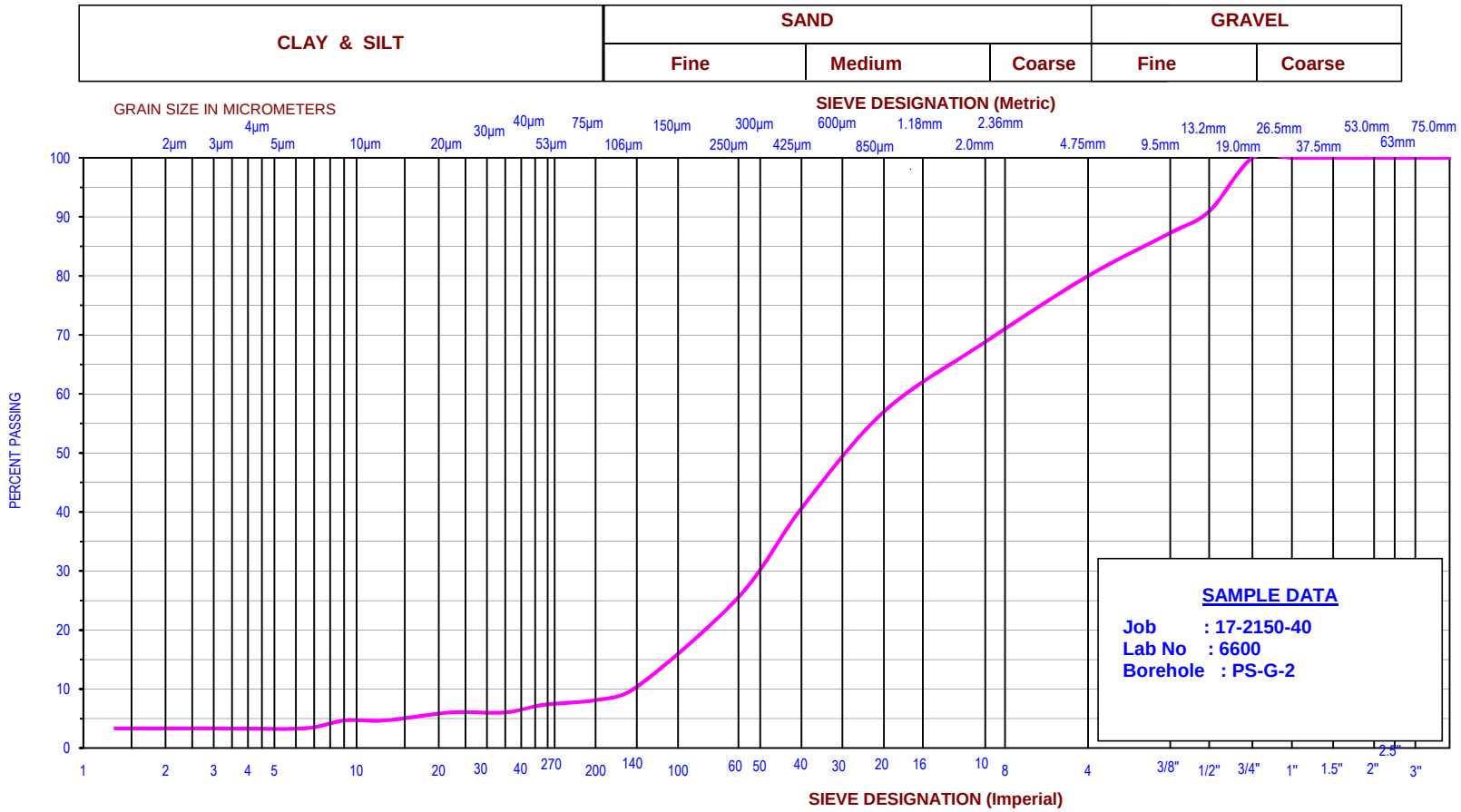
Project Number Reference: 651954

Project Name: Port Severn

Date: January 2018

SNC·LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Course	Medium	Fine	Silt	Clay
	0	20	11	28	33	5	3

SNC-Lavalin GEM Ontario Inc.
401 Hanlan Road
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905.851.0090 905.851.0091

GRAIN SIZE DISTRIBUTION

SAND

with gravel, trace silt, trace clay

Client: SNC-Lavalin Inc.

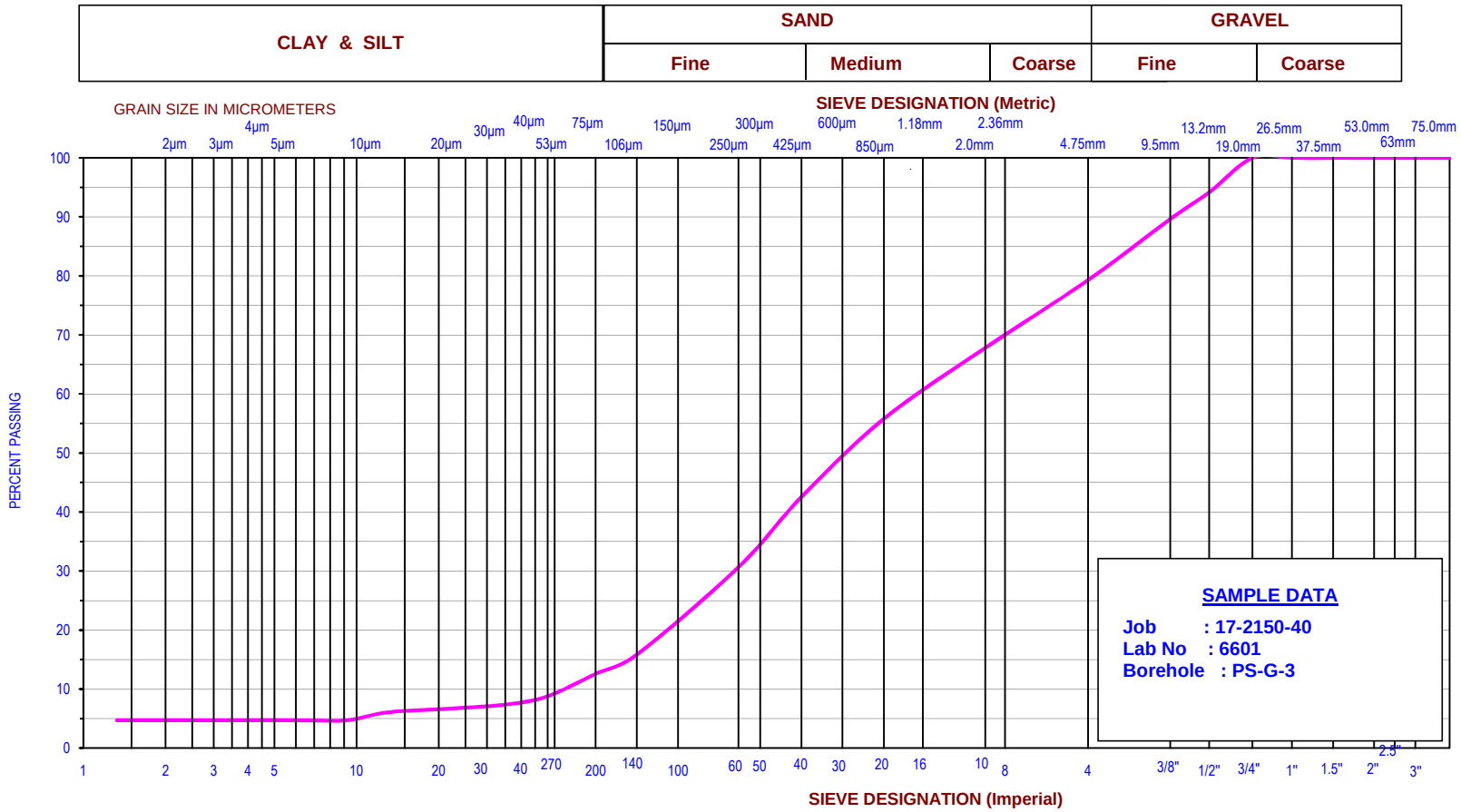
Project Number Reference: 651954

Project Name: Port Severn

Date: January 2018

SNC·LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Course	Medium	Fine	Silt	Clay
	0	21	11	25	30	8	5

SNC-Lavalin GEM Ontario Inc.
401 Hanlan Road
Vaughan, Ontario, Canada, L4L 3T1
905.851.0090 905.851.0091

GRAIN SIZE DISTRIBUTION

SAND

with gravel, trace silt, trace clay

Client: SNC-Lavalin Inc.

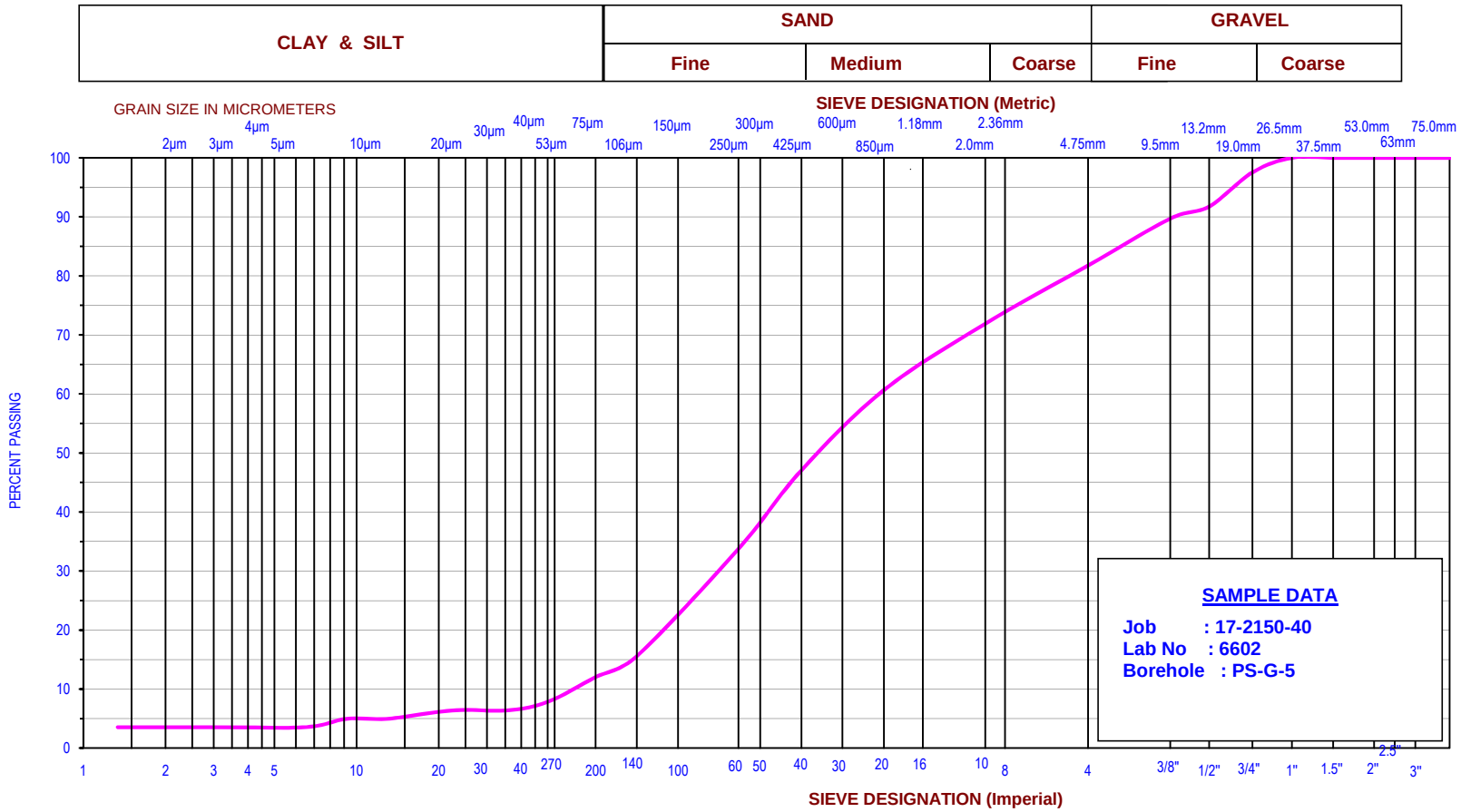
Project Number Reference: 651954

Project Name: Port Severn

Date: January 2018

SNC·LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Course	Medium	Fine	Silt	Clay
	2	16	10	25	35	8	4

SNC-Lavalin GEM Ontario Inc.
401 Hanlan Road
Vaughan, Ontario, Canada, L4L 3T1
905.851.0090 905.851.0091

GRAIN SIZE DISTRIBUTION

SAND

some gravel, trace silt, trace clay

Client: SNC-Lavalin Inc.

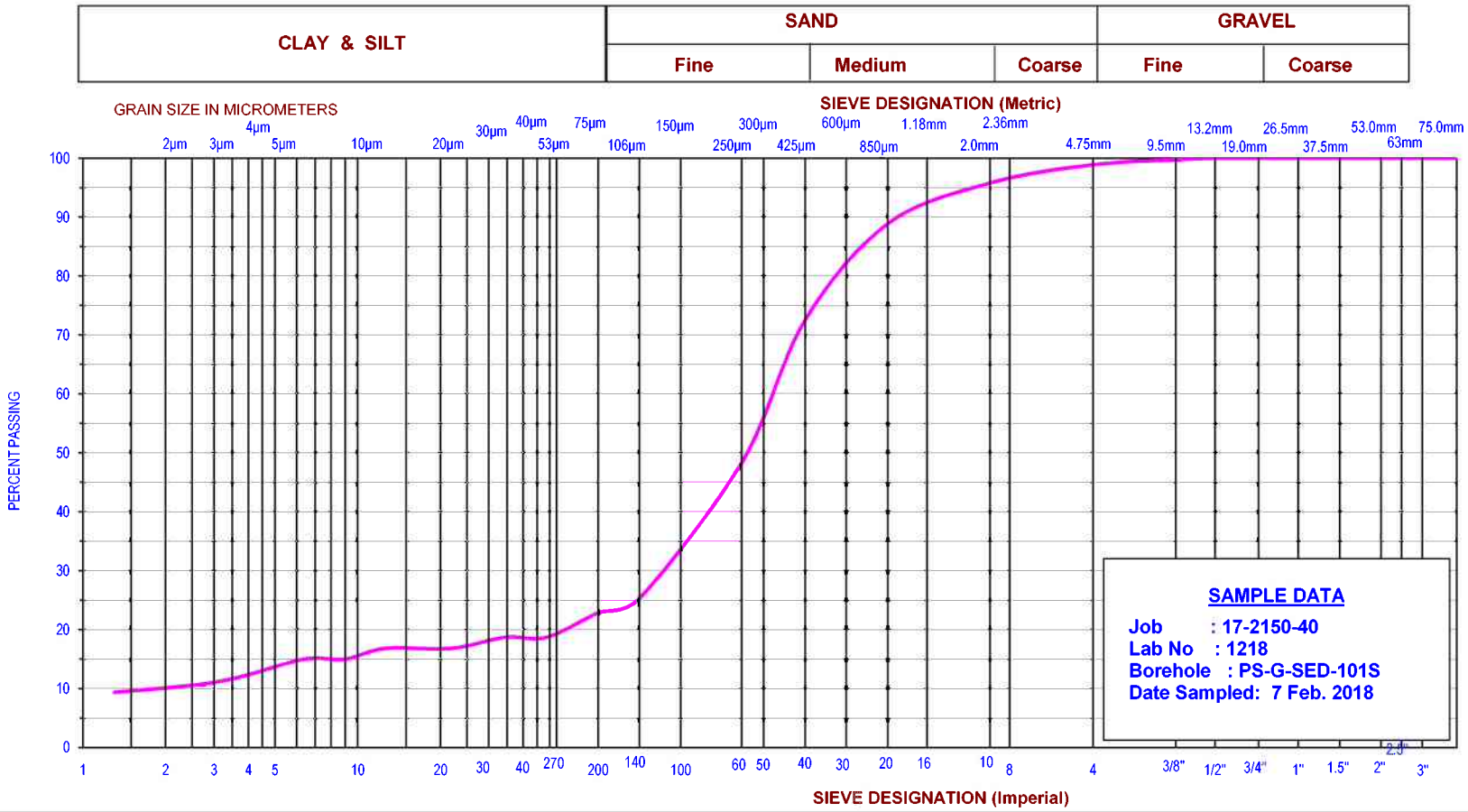
Project Number Reference: 651954

Project Name: Port Severn

Date: January 2018

SNC·LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0	1	3	23	50	13	10

SNC-Lavalin GEM Ontario Inc.
401 Hanlan Road
Vaughan, Ontario, Canada, L4L 3T1
905.851.0090 905.851.0091

GRAIN SIZE DISTRIBUTION

SAND

some silt, some clay, trace gravel

Client: SNC-Lavalin Inc.

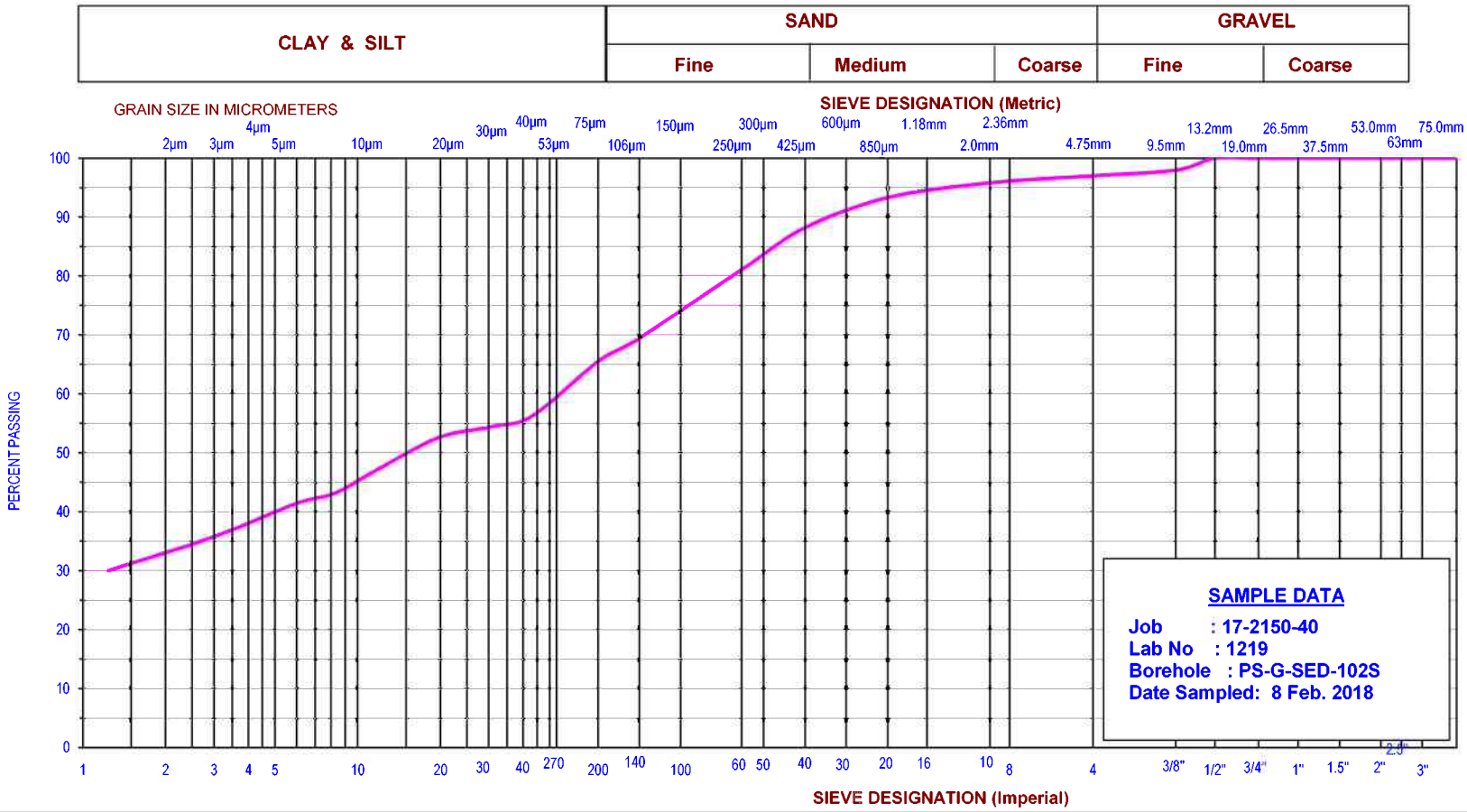
Project Number Reference: 651954

Project Name: Port Severn

Date: February 2018

SNC·LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0	3	1	7	23	33	33

SNC-Lavalin GEM Ontario Inc.
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Vaughan, Ontario, Canada, L4L 3T1
905.851.0090 905.851.0091

GRAIN SIZE DISTRIBUTION

CLAY, SILT AND SAND

trace gravel

Client: SNC-Lavalin Inc.

Project Number Reference: 651954

Project Name: Port Severn

Date: February 2018

Appendix G

Sediment Results Statistical Summary

TABLE G1: **Statistical Summary of Sediment Results**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			Sediment Quality Guidelines					Dam G					Dam E	
	Sample Location Laboratory Sample ID SNC-Lavalin Sample ID Sampling Date (yyyy/mm/dd) Depth Interval (mbm)		CCME CEQG Interim Sediment Quality (ISQG)[a]	CCME CEQG Probable Effect Level (PEL)[b]	MOE Sediment Standards[c]	Atlantic RBCA[d]	CCME CEQG Residential Surface (RL Surface)[e]	No Samples	Minimum Concentration	Maximum Concentration	Mean Concentration	90th Percentile Concentration	No Samples	Result
Parameter	**RDL**	**Units**												
General Chemistry														
Fraction of Organic Carbon	0.0010	None	na	na	na	na	na	7	0.0021	0.0272	0.0102	0.0199	-	-
Moisture	0.10	%	na	na	na	na	na	7	22.3	34.0	27.4	33.2	1	19.6
Total Organic Carbon	0.10	%	na	na	na	na	na	7	0.21	2.72	1.02	1.99	-	-
Electrical Conductivity	0.0040	mS/cm	na	na	na	na	na	7	0.10	0.309	0.200	0.259	1	0.167
Fraction of Organic Carbon (Average)	0.0010	None	na	na	na	na	na	7	0.0021	0.027	0.010	0.020	1	0.0074
Sodium Adsorption Ratio	0.10	None	na	na	na	na	na	7	0.44	1.63	0.71	1.04	1	0.64
Cyanide (WAD)	0.050	µg/g	na	na	0.1	na	na	7	<	**1.76**	**0.29**	**0.73**	1	<
pH	0.10	pH	na	na	na	na	na	7	5.75	7.69	7.26	7.61	1	7.16
Total Metals														
Boron (Hot Water Soluble)	0.10	µg/g	na	na	na	na	na	7	0.22	0.52	0.35	0.48	1	<
Antimony	1.0	µg/g	na	na	na	na	na	7	<	<	<	<	1	<
Arsenic	1.0	µg/g	5.9	17	6	na	12	7	1.2	3.6	2.0	2.9	1	1.8
Barium	1.0	µg/g	na	na	na	na	6,800	7	16.9	196.0	90.9	164.2	1	97.3
Beryllium	0.50	µg/g	na	na	na	na	75	7	0.7	0.7	0.7	0.7	1	<
Boron	5.0	µg/g	na	na	na	na	na	7	5.2	5.4	5.3	5.4	1	<
Cadmium	0.50	µg/g	0.6	3.5	0.6	na	14	7	<	<	<	<	1	<
Chromium (total)	1.0	µg/g	37.3	90	26	na	220	7	5.0	**32.7**	14.0	24.1	1	22.1
Chromium (VI)	0.20	µg/g	na	na	na	na	na	7	0.41	0.68	0.55	0.65	1	<
Cobalt	1.0	µg/g	na	na	50	na	na	7	1.7	9.4	4.6	7.0	1	6.9
Copper	1.0	µg/g	35.7	197	16	na	1,100	7	3.9	**22.9**	11.7	**20.2**	1	15.6
Lead	1.0	µg/g	35	91.3	31	na	140	7	2.9	**182**	**38.0**	**86.9**	1	8
Mercury	0.0050	µg/g	0.17	0.486	0.2	na	6.6	7	0.01	0.03	0.01	0.02	1	0.0082
Molybdenum	1.0	µg/g	na	na	na	na	na	7	<	<	<	<	1	<
Nickel	1.0	µg/g	na	na	16	na	200	7	3.0	**19.1**	8.4	13.2	1	14.4
Selenium	1.0	µg/g	na	na	na	na	80	7	<	<	<	<	1	<
Silver	0.20	µg/g	na	na	0.5	na	na	7	<	<	<	<	1	<
Thallium	0.50	µg/g	na	na	na	na	1	7	<	<	<	<	1	<
Uranium	1.0	µg/g	na	na	na	na	23	7	<	<	<	<	1	<
Vanadium	1.0	µg/g	na	na	na	na	na	7	13.6	49.2	27.2	43.0	1	39.7
Zinc	5.0	µg/g	123	315	120	na	na	7	12.9	107.0	52.4	89.2	1	49.4
Volatiles														
Benzene	0.00020	µg/g	na	na	na	1.2	110	7	<	<	<	<	1	<
Toluene	0.080	µg/g	na	na	na	1.4	22,000	7	<	<	<	<	1	<
Ethylbenzene	0.018	µg/g	na	na	na	1.2	10,000	7	<	<	<	<	1	<
Xylenes	0.050	µg/g	na	na	na	1.3	150,000	7	<	<	<	<	1	<
Petroleum Hydrocarbon (PHC) Fractions														
PHC F1	5.0	µg/g	na	na	na	15	12,000	7	<	<	<	<	1	<
PHC F2	10	µg/g	na	na	na	25	6,800	7	<	<	<	<	1	<
PHC F3	50	µg/g	na	na	na	25	15,000	7	98	175	138	169	1	<
PHC F4	50	µg/g	na	na	na	500	21,000	7	153	170	159	167	1	<
PHC F4 (gravimetric)	250	µg/g	na	na	na	500	21,000	5	580	730	680	727	1	-
Total PHC (F1 - F4)	72	µg/g	na	na	na	500	na	7	<	895	498	855	1	<
PAHs														
Acenaphthene	0.050	µg/g	0.00671	0.0889	na	na	na	7	<	**0.061**	0.05	0.05	1	<
Acenaphthylene	0.050	µg/g	0.00587	0.128	na	na	na	7	<	**1.09**	**0.286**	**0.593**	1	<
Anthracene	0.050	µg/g	0.0469	0.245	0.22	na	na	7	<	**0.379**	**0.108**	**0.209**	1	<
Benzo(a)anthracene	0.050	µg/g	0.0317	0.385	0.32	na	na	7	<	**2.17**	**0.48**	**1.11**	1	<
Benzo(a)pyrene	0.050	µg/g	0.0319	0.782	0.37	na	na	7	<	**2.53**	**0.582**	**1.315**	1	<
Benzo(b)fluoranthene	0.050	µg/g	na	na	na	na	na	7	<	3.32	0.74	1.69	1	<
Benzo(g,h,i)perylene	0.050	µg/g	na	na	0.17	na	na	7	<	**1.74**	**0.42**	**0.91**	1	<
Chrysene	0.050	µg/g	0.0571	0.862	0.34	na	na	7	<	**2.88**	**0.64**	**1.51**	1	<
Dibenzo(a,h)anthracene	0.050	µg/g	0.00622	0.135	0.06	na	na	7	<	**0.387**	**0.10**	**0.20**	1	<
Fluoranthene	0.050	µg/g	0.111	2.355	0.75	na	na	7	<	**6.18**	**1.30**	**3.11**	1	<
Fluorene	0.050	µg/g	0.0212	0.144	0.19	na	na	7	<	**0.249**	**0.08**	**0.13**	1	<
Indeno(1,2,3-cd)pyrene	0.050	µg/g	na	na	0.2	na	na	7	<	**1.83**	**0.42**	**0.94**	1	<
Methylnaphthalene, 1-	0.030	µg/g	na	na	na	na	na	7	<	<	<	<	1	<
Methylnaphthalene, 2-	0.030	µg/g	0.0202	0.201	na	na	na	7	<	<	<	<	1	<
Methylnaphthalene, 1- & 2-	0.042	µg/g	na	na	na	na	na	7	<	<	<	<	1	<
Naphthalene	0.013	µg/g	0.0346	0.391	na	na	na	7	<	0.015	0.013	0.014	1	<
Phenanthrene	0.046	µg/g	0.0419	0.515	0.56	na	na	7	<	**1.81**	**0.430**	**0.983**	1	<
Pyrene	0.050	µg/g	0.053	0.875	0.49	na	na	7	<	**6.71**	**1.50**	**3.54**	1	<
Benzo(k)fluoranthene	0.050	µg/g	na	na	0.24	na	na	7	<	**1.02**	0.24	**0.51**	1	<
Total PAH	0.050	µg/g	na	na	4	na	na	7	0.759	**32.31**	**7.36**	**16.79**	1	<
B(a)P TPE	0.050	µg/g	5.3	na	na	na	na	7	0.0	3.8	0.8	2.0	1	<
Organochlorine Pesticides														
DDT (Total)	0.028	µg/g	0.00119	0.00477	0.007	na	na	6	<	<	<	<	1	<
Aldrin	0.020	µg/g	na	na	0.002	na	na	6	<	<	<	<	1	<
Chlordane (Total)	0.028	µg/g	0.0045	0.00887	0.007	na	na	6	<	<	<	<	1	<
Chlordane, alpha-	0.020	µg/g	na	na	na	na	na	6	<	<	<	<	1	<
DDD (Total)	0.028	µg/g	0.00354	0.00851	0.008	na	na	6	<	<	<	<	1	<
DDE (Total)	0.028	µg/g	0.00142	0.00675	0.005	na	na	6	<	<	<	<	1	<
DDE, o,p-	0.020	µg/g	0.00142	0.00675	0.005	na	na	6	<	<	<	<	1	<
DDE, p,p-	0.020	µg/g	0.00142	0.00675	0.005	na	na	6	<	<	<	<	1	<
DDT, o,p-	0.020	µg/g	0.00119	0.00477	0.007	na	na	6	<	<	<	<	1	<
DDD, o,p-	0.020	µg/g	0.00354	0.00851	0.008	na	na	6	<	<	<	<	1	<
DDD, p,p-	0.020	µg/g	0.00354	0.00851	0.008	na	na	6	<	<	<	<	1	<
DDT, p,p-	0.020	µg/g	0.00119	0.00477	0.007	na	na	6	<	<	<	<	1	<
Dieldrin	0.020	µg/g	0.00285	0.00667	0.002	na	na	6	<	<	<	<	1	<
Endosulfan (Total)	0.028	µg/g	na	na	na	na	na	6	<	<	<	<	1	<
Endosulfan I	0.020	µg/g	na	na	na	na	na	6	<	<	<	<	1	<
Endosulfan II	0.020	µg/g	na	na	na	na	na	6	<	<	<	<	1	<
Endrin	0.020	µg/g	0.00267	0.0624	0.003	na	na	6	<	<	<	<	1	<
Heptachlor	0.020	µg/g	na	na	na	na	na	6	<	<	<	<	1	<
Heptachlor Epoxide	0.020	µg/g	0.0006	0.00274	0.005	na	na	6	<	<	<	<	1	<
Hexachlorobenzene	0.010	µg/g	na	na	0.02	na	na	6	<	<	<	<	1	<
Hexachlorobutadiene	0.010	µg/g	na	na	na	na	na	6	<	<	<	<	1	<
Hexachlorocyclohexane, gamma- (Lindane)	0.010	µg/g	0.00094	0.00138	0.003	na	na	6	<	<	<	<	1	<
Hexachloroethane	0.010	µg/g	na	na	na	na	na	6	<	<	<	<	1	<
Methoxychlor	0.020	µg/g	na	na	na	na	na	6	<	<	<	<	1	<
Chlordane, gamma-	0.020	µg/g	na	na	na	na	na	6	<	<	<	<	1	<

All terms defined within the body of SNC-Lavalin's report.
RDL - Reportable Detection Limit
< - Denotes concentration less than indicated detection limit
"-" - Not analyzed
na - Not applicable

UNDERLINE	Concentration greater than CCME CEQG Interim Sediment Quality (ISQG) Guideline
SHADED	Concentration greater than CCME CEQG Probable Effect Level (PEL) Guideline
RED	Concentration greater than MOE Sediment Standards
SHADOW	Concentration greater than Atlantic RBCA
PATTERN	Concentration greater than CCME CEQG Soil Quality Guideline

[a] Guideline to protect freshwater aquatic life.
[b] Guideline to protect freshwater aquatic life.
[c] Ontario Ministry of Environment Lowest Effect Level (LEL) Sediment Standard (MOE, 2008 and 2011)
[d] Atlantic Risk-Based Corrective Action (RBCA) Tier 1 Sediment Ecological Screening Levels for the Protection of Aquatic Life. Based on fraction of organic carbon of 1%.
[e] CCME CEQG Soil Quality Guideline for direct contact (soil ingestion and dermal contact) for residential land use.

TABLE G1: **Statistical Summary of Sediment Results**
Trent Severn Waterway Sediment Sampling Program
Dams G, E, D and C, Port Severn, ON

			Sediment Quality Guid			Dam D		Dam C				
	Sample Location Laboratory Sample ID SNC-Lavalin Sample ID Sampling Date (yyyy/mm/dd) Depth Interval (mbm)		CCME CEQG Interim Sediment Quality (ISQG)[a]	CCME CEQG Probable Effect Level (PEL)[b]	MOE Sediment Standards[c]	No Samples	Result	No Samples	Minimum Concentration	Maximum Concentration	Mean Concentration	90th Percentile Concentration
Parameter	**RDL**	**Units**										
General Chemistry												
Fraction of Organic Carbon	0.0010	None	na	na	na	-		-	-	-	-	-
Moisture	0.10	%	na	na	na	1	26.2	3	28.3	70.2	43.4	62.5
Total Organic Carbon	0.10	%	na	na	na	-		-	-	-	-	-
Electrical Conductivity	0.0040	mS/cm	na	na	na	1	0.297	3	0.177	0.293	0.224	0.275
Fraction of Organic Carbon (Average)	0.0010	None	na	na	na	1	0.0146	3	0.031	0.132	0.067	0.114
Sodium Adsorption Ratio	0.10	None	na	na	na	1	0.36	3	0.67	0.8	0.73	0.784
Cyanide (WAD)	0.050	µg/g	na	na	0.1	1	<	3	<	**0.12**	0.07	**0.11**
pH	0.10	pH	na	na	na	1	7.4	3	6.33	6.51	6.39	6.48
Total Metals												
Boron (Hot Water Soluble)	0.10	µg/g	na	na	na	1	0.12	3	0.23	1.12	0.57	0.97
Antimony	1.0	µg/g	na	na	na	1	<	3	<	<	<	<
Arsenic	1.0	µg/g	5.9	17	6	1	2.2	3	1.6	3	2.4	2.9
Barium	1.0	µg/g	na	na	na	1	75.7	3	70.4	102	82	96
Beryllium	0.50	µg/g	na	na	na	1	<	3	<	<	<	<
Boron	5.0	µg/g	na	na	na	1	<	3	<	5.7	5.2	5.6
Cadmium	0.50	µg/g	0.6	3.5	0.6	1	<	3	<	0.52	0.51	0.52
Chromium (total)	1.0	µg/g	37.3	90	26	1	11	3	12.9	16.3	14.1	15.66
Chromium (VI)	0.20	µg/g	na	na	na	1	<	3	<	<	<	<
Cobalt	1.0	µg/g	na	na	50	1	3.7	3	3.8	5.7	4.9	5.6
Copper	1.0	µg/g	35.7	197	16	1	**16.2**	3	11.1	15.2	13.4	15.0
Lead	1.0	µg/g	35	91.3	31	1	24.2	3	**35.6**	**75.2**	**51.0**	**68.6**
Mercury	0.0050	µg/g	0.17	0.486	0.2	1	0.019	3	0.0375	0.0593	0.050	0.058
Molybdenum	1.0	µg/g	na	na	na	1	<	3	<	<	<	<
Nickel	1.0	µg/g	na	na	16	1	8.2	3	8	9	8.4	8.8
Selenium	1.0	µg/g	na	na	na	1	<	3	<	<	<	<
Silver	0.20	µg/g	na	na	0.5	1	<	3	<	<	<	<
Thallium	0.50	µg/g	na	na	na	1	<	3	<	<	<	<
Uranium	1.0	µg/g	na	na	na	1	<	3	<	<	<	<
Vanadium	1.0	µg/g	na	na	na	1	22.8	3	20.8	28.3	24.8	27.7
Zinc	5.0	µg/g	123	315	120	1	62.1	3	71.6	105	87.5	101.2
Volatiles												
Benzene	0.00020	µg/g	na	na	na	1	<	3	<	<	<	<
Toluene	0.080	µg/g	na	na	na	1	<	3	<	<	<	<
Ethylbenzene	0.018	µg/g	na	na	na	1	<	3	<	<	<	<
Xylenes	0.050	µg/g	na	na	na	1	<	3	<	<	<	<
Petroleum Hydrocarbon (PHC) Fractions												
PHC F1	5.0	µg/g	na	na	na	1	<	3	<	<	<	<
PHC F2	10	µg/g	na	na	na	1	<	3	<	<	<	<
PHC F3	50	µg/g	na	na	na	1	<	3	62	340	165	291
PHC F4	50	µg/g	na	na	na	1	<	3	<	230	110	194
PHC F4 (gravimetric)	250	µg/g	na	na	na	1	-	-	<	<	<	<
Total PHC (F1 - F4)	72	µg/g	na	na	na	1	<	3	62	570	242	475
PAHs												
Acenaphthene	0.050	µg/g	0.00671	0.0889	na	1	<	3	<	<	<	<
Acenaphthylene	0.050	µg/g	0.00587	0.128	na	1	<	3	<	<	<	<
Anthracene	0.050	µg/g	0.0469	0.245	0.22	1	<	3	<	<	<	<
Benzo(a)anthracene	0.050	µg/g	0.0317	0.385	0.32	1	<	3	<	**0.081**	**0.060**	**0.075**
Benzo(a)pyrene	0.050	µg/g	0.0319	0.782	0.37	1	**0.054**	3	<	<	<	<
Benzo(b)fluoranthene	0.050	µg/g	na	na	na	1	0.093	3	0.06	0.15	0.10	0.14
Benzo(g,h,i)perylene	0.050	µg/g	na	na	0.17	1	<	3	<	<	<	<
Chrysene	0.050	µg/g	0.0571	0.862	0.34	1	<	3	0.055	**0.103**	**0.069**	**0.093**
Dibenzo(a,h)anthracene	0.050	µg/g	0.00622	0.135	0.06	1	<	3	<	<	<	<
Fluoranthene	0.050	µg/g	0.111	2.355	0.75	1	0.068	3	<	0.111	0.075	0.1016
Fluorene	0.050	µg/g	0.0212	0.144	0.19	1	<	3	<	<	<	<
Indeno(1,2,3-cd)pyrene	0.050	µg/g	na	na	0.2	1	<	3	<	<	<	<
Methylnaphthalene, 1-	0.030	µg/g	na	na	na	1	<	3	<	<	<	<
Methylnaphthalene, 2-	0.030	µg/g	0.0202	0.201	na	1	<	3	<	<	<	<
Methylnaphthalene, 1- & 2-	0.042	µg/g	na	na	na	1	<	3	<	<	<	<
Naphthalene	0.013	µg/g	0.0346	0.391	na	1	<	3	<	<	<	<
Phenanthrene	0.046	µg/g	0.0419	0.515	0.56	1	<	3	<	<	<	<
Pyrene	0.050	µg/g	0.053	0.875	0.49	1	**0.063**	3	<	**0.105**	**0.073**	**0.0968**
Benzo(k)fluoranthene	0.050	µg/g	na	na	0.24	1	<	3	<	<	<	<
Total PAH	0.050	µg/g	na	na	4	1	0.837	3	0.77	1.31	0.97	1.22
B(a)P TPE	0.050	µg/g	5.3	na	na	1	0.06	3	0.01	0.02	0.01	0.02
Organochlorine Pesticides												
DDT (Total)	0.028	µg/g	0.00119	0.00477	0.007	1	<	1	<	<	<	<
Aldrin	0.020	µg/g	na	na	0.002	1	<	1	<	<	<	<
Chlordane (Total)	0.028	µg/g	0.0045	0.00887	0.007	1	<	1	<	<	<	<
Chlordane, alpha-	0.020	µg/g	na	na	na	1	<	1	<	<	<	<
DDD (Total)	0.028	µg/g	0.00354	0.00851	0.008	1	<	1	<	<	<	<
DDE (Total)	0.028	µg/g	0.00142	0.00675	0.005	1	<	1	<	<	<	<
DDE, o,p-	0.020	µg/g	0.00142	0.00675	0.005	1	<	1	<	<	<	<
DDE, p,p-	0.020	µg/g	0.00142	0.00675	0.005	1	<	1	<	<	<	<
DDT, o,p-	0.020	µg/g	0.00119	0.00477	0.007	1	<	1	<	<	<	<
DDD, o,p-	0.020	µg/g	0.00354	0.00851	0.008	1	<	1	<	<	<	<
DDD, p,p-	0.020	µg/g	0.00354	0.00851	0.008	1	<	1	<	<	<	<
DDT, p,p-	0.020	µg/g	0.00119	0.00477	0.007	1	<	1	<	<	<	<
Dieldrin	0.020	µg/g	0.00285	0.00667	0.002	1	<	1	<	<	<	<
Endosulfan (Total)	0.028	µg/g	na	na	na	1	<	1	<	<	<	<
Endosulfan I	0.020	µg/g	na	na	na	1	<	1	<	<	<	<
Endosulfan II	0.020	µg/g	na	na	na	1	<	1	<	<	<	<
Endrin	0.020	µg/g	0.00267	0.0624	0.003	1	<	1	<	<	<	<
Heptachlor	0.020	µg/g	na	na	na	1	<	1	<	<	<	<
Heptachlor Epoxide	0.020	µg/g	0.0006	0.00274	0.005	1	<	1	<	<	<	<
Hexachlorobenzene	0.010	µg/g	na	na	0.02	1	<	1	<	<	<	<
Hexachlorobutadiene	0.010	µg/g	na	na	na	1	<	1	<	<	<	<
Hexachlorocyclohexane, gamma- (Lindane)	0.010	µg/g	0.00094	0.00138	0.003	1	<	1	<	<	<	<
Hexachloroethane	0.010	µg/g	na	na	na	1	<	1	<	<	<	<
Methoxychlor	0.020	µg/g	na	na	na	1	<	1	<	<	<	<
Chlordane, gamma-	0.020	µg/g	na	na	na	1	<	1	<	<	<	<

All terms defined within the body of SNC-Lavalin's report.
RDL - Reportable Detection Limit
< - Denotes concentration less than indicated detection limit
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[a] Guideline to protect freshwater aquatic life.
[b] Guideline to protect freshwater aquatic life.
[c] Ontario Ministry of Environment Lowest Effect Level (LEL) Sediment Standard (MOE, 2008 and 2011)
[d] Atlantic Risk-Based Corrective Action (RBCA) Tier 1 Sediment Ecological Screening Levels for the Protection of Aquatic Life. Based
[e] CCME CEQG Soil Quality Guideline for direct contact (soil ingestion and dermal contact) for residential land use.

Table G2: **Summay of Water Quality Guidelines and Screening Benchmarks for Aquatic Life, Recreational Use, and Drinking Water**

		Water Qualtiy Guidelines and Screening Benchmarks for the Protection of:		
		Aquatic Life[a]	Recreational Use[b]	Drinking Water[c]
Parameter	**Units**			
General Chemistry				
Total suspended solids	mg/L	25 above background (max) 5 above background (avg)	n/a	n/a
Turbidity	NTU	8 above background	50[f]	n/a
Cyanide (WAD)	mg/L	0.005	2	0.2
Total Metals				
Lead	mg/L	0.007[d]	0.1	0.01
Nickel	mg/L	0.15[d]	n/a	n/a
Petroleum Hydrocarbon (PHC) Fractions				
PHC F1	mg/L	1.5[e]	n/a	n/a
PHC F2	mg/L	0.1[e]	n/a	n/a
PHC F3	mg/L	0.1[e]	n/a	n/a
PHC F4 (gravimetric)	mg/L	n/a	n/a	n/a
PAHs				
Acenaphthene	mg/L	0.0058	26.5	2.65
Acenaphthylene	mg/L	n/a	n/a	n/a
Anthracene	mg/L	1.2E-05	90	9
Benzo(a)anthracene	mg/L	1.8E-05	3.0E-03	3.0E-04
Benzo(a)pyrene	mg/L	1.5E-05	4.0E-04	4.0E-05
Benzo(b)fluoranthene	mg/L	n/a	2.5E-02	2.5E-03
Benzo(k)fluoranthene	mg/L	n/a	0.25	0.025
Benzo(g,h,i)perylene	mg/L	n/a	n/a	n/a
Chrysene	mg/L	n/a	2.5	0.25
Dibenzo(a,h)anthracene	mg/L	n/a	2.5E-03	2.5E-04
Fluoranthene	mg/L	4.0E-05	40	4
Fluorene	mg/L	0.003	14.5	1.45
Indeno(1,2,3-cd)pyrene	mg/L	n/a	2.5E-02	2.5E-03
Methylnaphthalene, 1-	mg/L	n/a	5.5E-02	5.5E-03
Methylnaphthalene, 2-	mg/L	n/a	1.8	0.18
Naphthalene	mg/L	1.1E-03	8.50E-03	8.50E-04
Phenanthrene	mg/L	4.0E-04	n/a	n/a
Pyrene	mg/L	2.5E-05	6.0	0.6
Total PAH	mg/L	n/a	n/a	n/a

na - Not applicable; AO - aesthetic objective

[a] CCME Water Quality Guidelines (WQG) for freshwater aquatic life.

[b] Based on aesthetic objectives. Where aesthetic objectives were not avialable, drinking water quality guidelines were adjusted by a factor of 10 to reflect incidental ingestion rate that is 10 times lower than the intake of potable water (WHO, 2003).

[c] Based on Health Canada (2017b) drinking water qualtiy guidelines. Where Health Canada guidelines were not available, US EPA (2017) tap-water screening values were used. Where applicable, US EPA (2017) values were adjusted for an acceptable Hazard Quotient of 0.2, and an acceptable incremental lifetime cancer risk of 1×10^{-5}, which are the acceptable risk levels adopted by Health Canada.

[d] CCME WQG based on a water hardness > 180 mg/L.

[e] Atlantic Risk-Based Corrective Action (RBCA) 2012 Tier 1 Surface Water Ecological Screening Levels for the Protection of Freshwater and Marine Life

[f] Health Canada (2012) Guidelines for Canadian Recreational Water Quality.

Table G3: **Summay of Water Quality Guidelines for Protection of Freshwater Aquatic Life and Fish Acute Toxicity Benchmarks**

Parameter	Units	Fish Acute Toxicity Benchmark			Water Qualtiy Guidelines for the Protection of Aquatic Life		
		Value	Rationale	Reference	Value	Derivation	Reference
General Chemistry							
Cyanide (WAD)	mg/L	0.027	Lowest available toxicity data point (96-h LC_{50} for juvenile rainbow trout at 6° C)	BC MOE, 1986	0.005	Value is from CCREM, 1987.	CCREM, 1987
Total Metals							
Lead	mg/L	2.45	Species mean acute toxicity value for rainbow trout	US EPA 1985b	0.007	Based on H > 180 mg/L	US EPA, 1985b
Nickel	mg/L	15.3	96-h LC50 for juvenile rainbow trout	Pane et al, 2003	0.15	Based on H > 180 mg/L	Taylor et al 1979 US EPA 1980
Petroleum Hydrocarbons							
F1	mg/L	12.5	Acute 96-h LC50 for rainbow trout (Oncorhynchus mykiss)	APIRI, 2012b	1.5	Chronic HC_5 for algae, *Chlamydomonas reinhardtii*	APIRI, 2012b
F2	mg/L	0.84	Acute 96-h LC50 for rainbow trout (Oncorhynchus mykiss)	APIRI, 2012b	0.1	Chronic HC_5 for algae, *Chlamydomonas reinhardtii*	APIRI, 2012b
F3	mg/L	0.48	Acute 96-h LC50 for rainbow trout (Oncorhynchus mykiss)	APIRI, 2012b	0.1	Chronic HC_5 for algae, *Chlamydomonas reinhardtii*	APIRI, 2012b
F4	mg/L	n/a	n/a	n/a	n/a	n/a	n/a
PAHs							
Acenaphthene	mg/L	0.51	Lower 95% confidence limit of the lowest available data point (96-h LC50 for juvenile brown trout, *Salmo trutta*)	Holcombe et al, 1983	0.0058	0.01 safety factor applied to 96-h LC_{50} of 0.580 mg/L for brown trout (*Salmo trutta*)	CCME, 1999c
Acenaphthylene	mg/L	1.77	Based on QSAR	DiToro et al, 2000	n/a	n/a	n/a
Anthracene	mg/L	0.005	Lowest available toxicity data point (96-hr LC_{50}) for fathead minnow fry (*Pimephales promelas*)	Oris and Giesy, 1987	1.20E-05	0.01 safety factor applied to a 15 min LT_{50} of 0.0012 mg/L for *Daphnia pulex*	CCME, 1999c
Benzo(a)anthracene	mg/L	0.0018	Lowest available toxicity data point (96-hr LC_{50}) for fathead minnow fry (*Pimephales promelas*)	Oris and Giesy, 1987	1.80E-05	0.01 safety factor applied to a 48-h L_{50} of 0.0018 mg/L for *Daphnia magna*	CCME, 1999c
Benzo(a)pyrene	mg/L	0.0056	Lowest available toxicity data point (96-hr LC_{50}) for fathead minnow fry (*Pimephales promelas*)	Oris and Giesy, 1987	1.50E-05	0.01 safety factor applied to a 48-h L_{50} of 0.0015 mg/L for *Daphnia magna*	CCME, 1999c
Benzo(b)fluoranthene	mg/L	0.0086	Based on QSAR	DiToro et al, 2000	n/a	n/a	n/a
Benzo(k)fluoranthene	mg/L	0.0086	Based on QSAR	DiToro et al, 2000	n/a	n/a	n/a
Benzo(g,h,i)perylene	mg/L	n/a	n/a	n/a	n/a	n/a	n/a
Chrysene	mg/L	0.0086	Based on QSAR	DiToro et al, 2000	n/a	n/a	n/a
Dibenzo(a,h)anthracene	mg/L	0.001	Based on QSAR	DiToro et al, 2000	n/a	n/a	n/a
Fluoranthene	mg/L	0.091	Lowest available toxicity data point (96-hr LC_{50}) for rainbow trout (*Oncorhynchus mykiss*)	Spehar et al, 1999	4.00E-05	0.01 safety factor applied to 1-h LC_{50} of 0.004 mg/L for *Daphnia magna* exposed to UV light	CCME, 1999c
Fluorene	mg/L	0.55	Lower 95% confidence limit of the lowest available data point (96-h LC_{50} for rainbow trout embryos)	Finger et al, 1985	0.003	0.1 safety factor applied to 14-d LOEC of 0.125 mg/L, with a 0.24 correction factor, for *Daphnia magna*	CCME, 1999c
Indeno(1,2,3-cd)pyrene	mg/L	n/a	n/a	n/a	n/a	n/a	n/a
Methylnaphthalene, 1-	mg/L	n/a	n/a	n/a	n/a	n/a	n/a
Methylnaphthalene, 2-	mg/L	n/a	n/a	n/a	n/a	n/a	n/a
Naphthalene	mg/L	0.1	Lower 95% confidence limit of the lowest available data point (96-h LC_{50} for rainbow trout embryos)	Black et al, 1983	0.0011	0.1 safety factor applied to chronic LOEL of 0.004 mg/L for rainbow trout embryo-larval stage	CCME, 1999c
Phenanthrene	mg/L	0.0234	Lowest available toxicity data point (96-hr LC_{50}) for bluegill (*Lepomis macrochirus*)	Call et al, 1986	4.00E-04	0.1 safety factor applied to chronic LOEL of 0.004 mg/L for rainbow trout embryo-larval stage	CCME, 1999c
Pyrene	mg/L	0.0256	Lowest available toxicity data point (96-hr LC_{50}) for fathead minnow fry (*Pimephales promelas*)	Oris and Giesy, 1987	2.50E-05	0.01 safety factor applied to LC_{50} of 0.0025 mg/L for mosquito larvae (*Aedes aegypti*)	CCME, 1999c

na - Not applicable; H - hardness (as mg/L $CaCO_3$); LC_{50} - concentration at which 50% mortality occurs; LT_{50} - time at which 50% mortality occurs; QSAR - quantitative structure-activitiy relationship; UV -ultraviolet; LOEL - lowest observed effects level; LOEC - lowest observed effects concentration; HC_5 - concentration considere to have no deleterious effects to less than 5% aquatic species

Table G4: **Water Quality Predictions for Dam G**

		90 percentile Concentration Dam G	Predicted Water Concentrations (mg/L)							Water Qualtiy Guidelines and Screening Benchmarks for the Protection of:			
	TSS (mg/L)		5	10	15	25	50	75	100	Aquatic Life[a]	Recreational Use[b]	Drinking Water[c]	Qualifier
Parameter	**Units**												
Cyanide (WAD)	µg/g	0.05	2.50E-07	5.00E-07	7.50E-07	1.25E-06	2.50E-06	3.75E-06	5.00E-06	0.005	2	0.2	
Total Metals													
Lead	µg/g	22.4	1.12E-04	2.24E-04	3.36E-04	5.60E-04	1.12E-03	1.68E-03	2.24E-03	0.007[d]	0.1	0.01	based on water hardness > 180 mg/L
Nickel	µg/g	9.15	4.58E-05	9.15E-05	1.37E-04	2.29E-04	4.58E-04	6.86E-04	9.15E-04	0.15[d]	n/a	n/a	based on water hardness > 180 mg/L
Petroleum Hydrocarbon (PHC) Fractions													
PHC F1	µg/g	<	-	-	-	-	-	-	-	1.5[e]	n/a	n/a	
PHC F2	µg/g	<	-	-	-	-	-	-	-	0.1[e]	n/a	n/a	
PHC F3	µg/g	159.25	8.0E-04	1.6E-03	2.4E-03	4.0E-03	8.0E-03	1.2E-02	1.6E-02	0.1[e]	n/a	n/a	
PHC F4 (gravimetric)	µg/g	722.5	3.6E-03	7.2E-03	1.1E-02	1.8E-02	3.6E-02	5.4E-02	7.2E-02	n/a	n/a	n/a	
PAHs													
Acenaphthene	µg/g	0.061	3.1E-07	6.1E-07	9.2E-07	1.5E-06	3.1E-06	4.6E-06	6.1E-06	0.0058	26.5	2.65	
Acenaphthylene	µg/g	0.262	1.3E-06	2.6E-06	3.9E-06	6.6E-06	1.3E-05	2.0E-05	2.6E-05	n/a	n/a	n/a	
Anthracene	µg/g	0.166	8.3E-07	1.7E-06	2.5E-06	4.2E-06	8.3E-06	1.2E-05	**1.7E-05**	1.2E-05	90	9	Within Safety Factor for Aquatic Life
Benzo(a)anthracene	µg/g	0.407	2.0E-06	4.1E-06	6.1E-06	1.0E-05	**2.0E-05**	**3.1E-05**	**4.1E-05**	1.8E-05	3.0E-03	3.0E-04	Within Safety Factor for Aquatic Life
Benzo(a)pyrene	µg/g	1.315	6.6E-06	1.3E-05	**2.0E-05**	**3.3E-05**	**6.6E-05**	**9.9E-05**	**1.3E-04**	1.5E-05	4.0E-04	4.0E-05	Within Safety Factor for Aquatic Life
Benzo(b)fluoranthene	µg/g	0.597	3.0E-06	6.0E-06	9.0E-06	1.5E-05	3.0E-05	4.5E-05	6.0E-05	n/a	2.5E-02	2.5E-03	
Benzo(k)fluoranthene	µg/g	0.38325	1.9E-06	3.8E-06	5.7E-06	9.6E-06	1.9E-05	2.9E-05	3.8E-05	n/a	0.25	0.025	
Benzo(g,h,i)perylene	µg/g	0.364	1.8E-06	3.6E-06	5.5E-06	9.1E-06	1.8E-05	2.7E-05	3.6E-05	n/a	n/a	n/a	
Chrysene	µg/g	0.6	3.0E-06	6.0E-06	9.0E-06	1.5E-05	3.0E-05	4.5E-05	6.0E-05	n/a	2.5	0.25	
Dibenzo(a,h)anthracene	µg/g	0.15075	7.5E-07	1.5E-06	2.3E-06	3.8E-06	7.5E-06	1.1E-05	1.5E-05	n/a	2.5E-03	2.5E-04	
Fluoranthene	µg/g	1.07	5.4E-06	1.1E-05	1.6E-05	2.7E-05	**5.4E-05**	**8.0E-05**	**1.1E-04**	4.0E-05	40	4	Within Safety Factor for Aquatic Life
Fluorene	µg/g	0.249	1.2E-06	2.5E-06	3.7E-06	6.2E-06	1.2E-05	1.9E-05	2.5E-05	0.003	14.5	1.45	
Indeno(1,2,3-cd)pyrene	µg/g	0.341	1.7E-06	3.4E-06	5.1E-06	8.5E-06	1.7E-05	2.6E-05	3.4E-05	n/a	2.5E-02	2.5E-03	
Methylnaphthalene, 1-	µg/g	<	-	-	-	-	-	-	-	n/a	5.5E-02	5.5E-03	
Methylnaphthalene, 2-	µg/g	<	-	-	-	-	-	-	-	n/a	1.8	0.18	
Naphthalene	µg/g	0.015	7.5E-08	1.5E-07	2.3E-07	3.8E-07	7.5E-07	1.1E-06	1.5E-06	1.1E-03	8.50E-03	8.50E-04	
Phenanthrene	µg/g	0.7765	3.9E-06	7.8E-06	1.2E-05	1.9E-05	3.9E-05	5.8E-05	7.8E-05	4.0E-04	n/a	n/a	
Pyrene	µg/g	1.43	7.2E-06	1.4E-05	2.1E-05	**3.6E-05**	**7.2E-05**	**1.1E-04**	**1.4E-04**	2.5E-05	6.0	0.6	Within Safety Factor for Aquatic Life
Total PAH	µg/g	5.705	2.9E-05	5.7E-05	8.6E-05	1.4E-04	2.9E-04	4.3E-04	5.7E-04	n/a	n/a	n/a	

na - Not applicable
µg/g - micrograms per gram, dry weight basis

SHADED	Predicted water concentrations greater than CCME WQG for aquatic life.
RED	Predicted water concentrations greater than drinking water quality guideline.

[a] CCME Water Quality Guidelines (WQG) for freshwater aquatic life.
[b] Based on aesthetic objectives. Where aesthetic objectives were not avialable, drinking water quality guidelines were adjusted by a factor of 10 to reflect incidental ingestion rate that is 10 times lower than the intake of potable water (WHO, 2003).
[c] Based on Health Canada (2017) drinking water qualtiy guidelines. Where Health Canada guidelines were not available, US EPA (2017) tap-water screening values were used.
[d] CCME WQG based on a water hardness > 180 mg/L.
[e] Atlantic Risk-Based Corrective Action (RBCA) 2012 Tier 1 Surface Water Ecological Screening Levels for the Protection of Freshwater and Marine Life

Table G5: **Water Quality Predictions for Dams C, D, and E**

		90 percentile Concentration Entire Site	Predicted Water Concentrations (mg/L)							Water Qualtiy Guidelines and Screening Benchmarks for the Protection of:			
	TSS (mg/L)		5	10	15	25	50	75	100	Aquatic Life[a] (mg/L)	Recreational Use[b] (mg/L)	Drinking Water[c] (mg/L)	Qualifier
Parameter	**Units**												
Cyanide (WAD)	µg/g	0.94	4.70E-06	9.40E-06	1.41E-05	2.35E-05	4.70E-05	7.05E-05	9.40E-05	0.005	2	0.2	
Total Metals													
Lead	µg/g	71.89	3.59E-04	7.19E-04	1.08E-03	1.80E-03	3.59E-03	5.39E-03	**7.19E-03**	0.007[d]	0.1	0.01	
Nickel	µg/g	13.88	6.94E-05	1.39E-04	2.08E-04	3.47E-04	6.94E-04	1.04E-03	1.39E-03	0.15[d]	n/a	n/a	
Petroleum Hydrocarbon (PHC) Fractions													
PHC F1	µg/g	<	-	-	-	-	-	-	-	1.5[e]	n/a	n/a	
PHC F2	µg/g	<	-	-	-	-	-	-	-	0.1[e]	n/a	n/a	
PHC F3	µg/g	241.00	1.2E-03	2.4E-03	3.6E-03	6.0E-03	1.2E-02	1.8E-02	2.4E-02	0.1[e]	n/a	n/a	
PHC F4 (gravimetric)	µg/g	727.00	3.6E-03	7.3E-03	1.1E-02	1.8E-02	3.6E-02	5.5E-02	7.3E-02	n/a	n/a	n/a	
PAHs													
Acenaphthene	µg/g	0.06	3.1E-07	6.1E-07	9.2E-07	1.5E-06	3.1E-06	4.6E-06	6.1E-06	0.0058	26.5	2.65	
Acenaphthylene	µg/g	0.26	1.3E-06	2.6E-06	3.9E-06	6.5E-06	1.3E-05	2.0E-05	2.6E-05	n/a	n/a	n/a	
Anthracene	µg/g	0.10	4.8E-07	9.5E-07	1.4E-06	2.4E-06	4.8E-06	7.1E-06	9.5E-06	1.20E-05	90	9	Within Safety Factor for Aquatic Life
Benzo(a)anthracene	µg/g	0.40	2.0E-06	4.0E-06	6.0E-06	9.9E-06	**2.0E-05**	**3.0E-05**	**4.0E-05**	1.80E-05	3.0E-03	3.0E-04	Within Safety Factor for Aquatic Life
Benzo(a)pyrene	µg/g	0.50	2.5E-06	5.0E-06	7.5E-06	1.2E-05	**2.5E-05**	**3.7E-05**	**5.0E-05**	1.50E-05	4.0E-04	4.0E-05	Within Safety Factor for Aquatic Life
Benzo(b)fluoranthene	µg/g	1.14	5.7E-06	1.1E-05	1.7E-05	2.9E-05	5.7E-05	8.6E-05	1.1E-04	n/a	2.5E-02	2.5E-03	
Benzo(k)fluoranthene	µg/g	0.17	8.6E-07	1.7E-06	2.6E-06	4.3E-06	8.6E-06	1.3E-05	1.7E-05	n/a	0.25	0.025	
Benzo(g,h,i)perylene	µg/g	0.36	1.8E-06	3.6E-06	5.4E-06	9.0E-06	1.8E-05	2.7E-05	3.6E-05	n/a	n/a	n/a	
Chrysene	µg/g	0.58	2.9E-06	5.8E-06	8.7E-06	1.5E-05	2.9E-05	4.4E-05	5.8E-05	n/a	2.5	0.25	
Dibenzo(a,h)anthracene	µg/g	0.08	3.8E-07	7.5E-07	1.1E-06	1.9E-06	3.8E-06	5.6E-06	7.5E-06	n/a	2.5E-03	2.5E-04	
Fluoranthene	µg/g	1.05	5.2E-06	1.0E-05	1.6E-05	2.6E-05	**5.2E-05**	**7.9E-05**	**1.0E-04**	4.00E-05	40	4	Within Safety Factor for Aquatic Life
Fluorene	µg/g	0.13	6.4E-07	1.3E-06	1.9E-06	3.2E-06	6.4E-06	9.5E-06	1.3E-05	0.003	14.5	1.45	
Indeno(1,2,3-cd)pyrene	µg/g	0.34	1.7E-06	3.4E-06	5.1E-06	8.5E-06	1.7E-05	2.5E-05	3.4E-05	n/a	2.5E-02	2.5E-03	
Methylnaphthalene, 1-	µg/g	<	-	-	-	-	-	-	-	n/a	5.5E-02	5.5E-03	
Methylnaphthalene, 2-	µg/g	<	-	-	-	-	-	-	-	n/a	1.8	0.18	
Naphthalene	µg/g	0.02	7.5E-08	1.5E-07	2.3E-07	3.8E-07	7.5E-07	1.1E-06	1.5E-06	0.0011	8.50E-03	8.50E-04	
Phenanthrene	µg/g	0.43	2.2E-06	4.3E-06	6.5E-06	1.1E-05	2.2E-05	3.2E-05	4.3E-05	4.00E-04	n/a	n/a	
Pyrene	µg/g	1.40	7.0E-06	1.4E-05	2.1E-05	**3.5E-05**	**7.0E-05**	**1.0E-04**	**1.4E-04**	2.50E-05	6.0	0.6	Within Safety Factor for Aquatic Life
Total PAH	µg/g	6.29	3.1E-05	6.3E-05	9.4E-05	1.6E-04	3.1E-04	4.7E-04	6.3E-04	n/a	n/a	n/a	

na - Not applicable
µg/g - micrograms per gram, dry weight basis

SHADED	Predicted water concentrations greater than CCME WQG for aquatic life.
RED	Predicted water concentrations greater than drinking water quality guideline.

[a] CCME Water Quality Guidelines (WQG) for freshwater aquatic life.
[b] Based on aesthetic objectives. Where aesthetic objectives were not avialable, drinking water quality guidelines were adjusted by a factor of 10 to reflect incidental ingestion rate that is 10 times lower than the intake of potable water (WHO, 2003).
[c] Based on Health Canada (2017) drinking water qualtiy guidelines. Where Health Canada guidelines were not available, US EPA (2017) tap-water screening values were used.
[d] CCME WQG based on a water hardness > 180 mg/L.
[e] Atlantic Risk-Based Corrective Action (RBCA) 2012 Tier 1 Surface Water Ecological Screening Levels for the Protection of Freshwater and Marine Life

Table G6: **Sum of Toxic Units for Dam G**

Parameter	Predicted Water Concentrations at 100 mg/L TSS and 90th Percentile Sediment Concentrations at Dam G	Acute Endpoint[a]	Toxic Unit
	mg/L	mg/L	
Repiratory Toxicants			
Cyanide (WAD)	5.00E-06	0.027	1.85E-04
Nickel	9.15E-04	15.3	5.98E-05
Ionoregulatory Toxicants			
Lead	2.24E-03	2.45	9.14E-04
NarcoticToxicants			
F1	<	12.5	-
F2	<	0.84	-
F3	1.6E-02	0.48	3.32E-02
F4	7.2E-02	n/a	n/a
Acenaphthene	6.1E-06	0.51	1.20E-05
Acenaphthylene	2.6E-05	1.77	1.48E-05
Anthracene	1.66E-05	0.005	3.32E-03
Benzo(a)anthracene	4.07E-05	0.0018	2.26E-02
Benzo(k)fluoranthene	3.8E-05	0.0086	4.46E-03
Benzo(a)pyrene	1.32E-04	0.0056	2.35E-02
Benzo(b)fluoranthene	5.97E-05	0.0086	6.94E-03
Benzo(g,h,i)perylene	3.64E-05	n/a	n/a
Chrysene	6.00E-05	0.0086	6.98E-03
Dibenzo(a,h)anthracene	1.51E-05	0.001	1.51E-02
Fluoranthene	1.07E-04	0.091	1.18E-03
Fluorene	2.49E-05	0.55	4.53E-05
Indeno(1,2,3-cd)pyrene	3.41E-05	n/a	n/a
Methylnaphthalene, 1-	<	n/a	n/a
Methylnaphthalene, 2-	<	n/a	n/a
Naphthalene	1.50E-06	0.1	1.50E-05
Phenanthrene	7.77E-05	0.0234	3.32E-03
Pyrene	1.43E-04	0.0256	5.59E-03
			Sum of Toxic Units
		Respiratory Toxicants	0.0002
		Ionoregulatory Toxicants	0.0009
		Narcotic Toxicants	0.1

na - Not applicable; TSS - total suspended solids
[a] Based on data for acute lethality to fish (Table G2)

Table G7: **Sum of Toxic Units for Dams C, D, and E**

Parameter	Predicted Water Concentrations at 100 mg/L TSS and 90th Percentile Sediment Concentrations at Entire Site	Acute Endpoint[a]	Toxic Unit
	mg/L	mg/L	
Repiratory Toxicants			
Cyanide (WAD)	9.40E-05	0.027	3.48E-03
Nickel	1.39E-03	15.3	9.07E-05
Ionoregulatory Toxicants			
Lead	7.19E-03	2.45	2.93E-03
NarcoticToxicants			
F1	<	12.5	-
F2	<	0.84	-
F3	2.4E-02	0.48	5.02E-02
F4	7.3E-02	n/a	n/a
Acenaphthene	6.1E-06	0.51	1.20E-05
Acenaphthylene	2.6E-05	1.77	1.48E-05
Anthracene	9.5E-06	0.005	1.90E-03
Benzo(a)anthracene	4.0E-05	0.0018	2.21E-02
Benzo(k)fluoranthene	1.7E-05	0.0086	1.99E-03
Benzo(a)pyrene	5.0E-05	0.0056	8.92E-03
Benzo(b)fluoranthene	1.1E-04	0.0086	1.33E-02
Benzo(g,h,i)perylene	3.6E-05	n/a	n/a
Chrysene	5.8E-05	0.0086	6.75E-03
Dibenzo(a,h)anthracene	7.5E-06	0.001	7.50E-03
Fluoranthene	1.0E-04	0.091	1.15E-03
Fluorene	1.3E-05	0.55	2.31E-05
Indeno(1,2,3-cd)pyrene	3.4E-05	n/a	n/a
Methylnaphthalene, 1-	<	n/a	n/a
Methylnaphthalene, 2-	<	n/a	n/a
Naphthalene	1.5E-06	0.1	1.50E-05
Phenanthrene	4.3E-05	0.0234	1.85E-03
Pyrene	1.4E-04	0.0256	5.45E-03
			Sum of Toxic Units
		Respiratory Toxicants	0.004
		Ionoregulatory Toxicants	0.003
		Narcotic Toxicants	0.1

na - Not applicable; TSS - total suspended solids
[a] Based on data for acute lethality to fish (Table G2)

Appendix H

Standard Mitigation Measures and Monitoring Requirements

Appendix H - Standard Mitigation Measures and Monitoring Requirements

This appendix outlines general mitigation measures and monitoring requirements which may apply to the construction activities related to the structural upgrades of various dam and lock structures on the Trent-Severn Waterway. It was deemed appropriate that the different contractors hired to complete these upgrades would follow consistent procedures in selecting and implementing mitigation measures to deal with potentially contaminated sediments which might be encountered at the different sites and for monitoring during construction activities. These mitigation measures and monitoring requirements were derived from Golder Associates "Environmental Management Planning Considerations – Ottawa Wall Repairs Rideau Canal, Ottawa, Ontario" prepared for Public Works and Government Services Canada (PWGSC) in September 2017, and augmented with other construction best management practices (BMPs) from other reference sources. It is our understanding that Golder Associates has recently been contracted to develop a generic document of appropriate mitigation measures and monitoring requirements which will apply to all of the sediment assessments which have been undertaken at the Trent-Severn Waterway sites to support structural upgrade activities. This new document will replace this appendix. In the interim this appendix will provide guidance to potential contractors hired to undertake the structural upgrades.

Table H.1 outlines the different construction activities with the potential to disturb sediments in the work areas and includes an indication of the potential level of concern. The potential for effects to occur from construction activities varies during the various phases of the project. Dewatering of the work area (to work in the dry) has the greatest potential to disturb bottom sediments and result in unintended release of sediments to the Waterway.

Table H.1. Overview of Construction Activities

Construction Phase	Construction Activity	Relative Level of Concern
Mobilization	Installation of mitigation measures (i.e., turbidity curtain and cofferdam)	Moderate
Execution	Dewatering of work area Physical disturbance of bottom sediments	Highest
Demobilization	Re-watering the work area Removal and decontamination of mitigation measures	Moderate

Mitigation Measures

To reduce the potential for remobilization of work-site contaminated sediment due to construction activities in the Trent-Severn Waterway and to protect aquatic life within the Waterway, the following mitigation measures are recommended. These mitigation measures are not intended to be tender specifications. Rather, they are intended to be general considerations to reduce the disturbance of bottom sediment, as well as to mitigate exposure to sediments within and downstream of the work area. These mitigation measures may be subject to change based on the Contractor's experience and

approach. Furthermore, a Sediment Assessment report has been completed in support of construction activities specific to each work area. Each Sediment Assessment report details the verification process followed to confirm that the environmental performance objectives (EPOs) used to assess water quality during construction activities along the Trent-Severn Waterway will provide adequate protection of human health and the aquatic environment at the point of discharge and in the receiving environment. As the Sediment Assessment report outlines any assumptions applied in evaluating EPOs and recommends specific mitigation measures for implementation during construction, the recommended mitigation measures outlined herein should be read in conjunction with the Sediment Assessment report.

The recommended mitigation measures to be implemented during construction activities at the site are as follows:

Environmental Management Plan

- Prior to the start of construction, the Contractor is to develop an Environmental Management Plan (EMP) for review and acceptance by Parks Canada Agency (PCA). The EMP is to address the water and sediment quality issues identified in this report plus other relevant environmental issues.

Health and Safety Plan

- The Contractor is to develop a Health and Safety Plan (HASP) which deals with safety issues related to work in or near water, specific work activities, as well as the potential for workers to encounter contaminated sediments, including volatile contaminants (if present). Identifying all Health and Safety concerns associated with the project is beyond the scope of the current assessment; the Contractor will need to evaluate Health and Safety protocols, including worker exposure to contaminants and vapours, in accordance with applicable health and safety regulations.
- The work area will be delineated and controls put in place such that the general public will be prevented from entering the work area.
- Appropriate personal protective equipment (PPE) to minimize exposure to contaminated sediment will be worn at all times while onsite and will include gloves, long-sleeved shirts, long pants, water-proof/chemical resistant footwear, and safety glasses, as well as respirators in the event that vapours are identified as a concern. Bare skin exposure to contaminated sediment should be minimized particularly if divers are used; wetsuits, face masks, etc. should be utilized.
- The Contractor will provide appropriate wash stations to remove adhered sediment from PPE, as well as hand-wash stations. Wash water will be collected and properly disposed of offsite. Wash water will not be allowed to enter the waterway either directly or indirectly via a storm drain.

Sediment Isolation

- In-water protection will be achieved by restricting the work area to as small a footprint as possible and by employing controls to isolate the work area from the rest of the water body.
- Methods of isolating suspended sediments within the work area include turbidity curtains, cofferdams, or other suitable methods that may be identified by the Contractor.
- Should point of discharge EPOs specified in the Sediment Assessment report be exceeded, the relevant mitigation measures and corrective actions detailed in the Sediment Assessment report should be implemented.

- Where the Contractor has elected to use flocculants for the control of suspended sediments, the Contractor will provide a toxicity evaluation of the specific flocculant formulation to verify that no toxic effect on the aquatic environment will occur.
- A qualified, independent Environment Monitor is to be hired by the Contractor to inspect the project site, collect field measurements and samples, and notify the Contractor where modifications to the work, including temporary stoppage of work, may be necessary to meet the EPO for the project as specified in the Sediment Assessment report.

Spills Management and Emergency Response Plan

- A Spills Management and Emergency Response Plan will be developed and implemented by the Contractor, including posting the plan in an accessible location onsite. All workers should be fully aware of the spill prevention and response procedures including notification of applicable authorities including the MOECC Spills Action Centre.
    - The Spills Management and Emergency Response Plans will include stop work and reporting requirements should the reporting threshold value for suspended sediment identified in the Sediment Assessment report be exceeded. .
    - Where sheens occur, they will be addressed in a similar manner as a spill of fuel. The Contractor's Spills Management and Emergency Response Plan will include provisions for addressing possible sheens including notifying the municipal authorities and the public following incidents above a pre-determined threshold, such as if a sheen is observed in the receiving environment and the sheen can be linked to the work areas (i.e. via dewatering effluent discharge or leakage outside containment structures). An appropriate spill kit will be maintained onsite during all project phases and the Contractor's staff will be trained in the use of the kit. Should a spill within the work area occur, the Spills Management and Emergency Response Plan will be implemented for clean-up of all contaminated media. Disposal of waste generated by a spill will be done in compliance with Ontario Waste Regulations and at an MOECC-approved disposal facility.
    - Designated fuelling area(s) will be established more than 30 m from watercourses, wetlands and seasonally wet areas (i.e. not within 30 m of the high water mark).

Erosion and Sediment Control Plan

- The Contractor will develop and implement an Erosion and Sediment Control Plan outlining the techniques to be implemented and where such techniques will be required. The Erosion and Sediment Control Plan will include provisions to implement and maintain temporary erosion and sediment control measures and runoff conveyance structures as appropriate (e.g. silt fences, straw bale and rock check dams, etc.). Soil type, slope of land, drainage area, predicted sediment load and deposition will be considered when selecting sediment control methods. Sediment and erosion control measures will be in place prior to commencement of any excavation or construction works. Further, the Erosion and Sediment Control Plan will specify procedures for minimizing sediment or soil originating from the project site entering into the waterway such as dust control measures, minimizing soil erosion by re-seeding or otherwise stabilizing disturbed erosion-prone areas as soon as possible, the use of silt fences and other measures to minimize off-site sediment transport, and stabilizing stockpiled materials away from waterways.
- Construction and operation methods will be designed and implemented to protect and minimize disturbance of aquatic and nearshore vegetation such as minimizing clearing of vegetation to only those areas necessary for construction and operations, the use of delineation fencing to protect

vegetation and roots to be maintained, avoiding storage, dumping or traffic over root zones, timely stabilizing re-seeding and/or landscaping of erosion-prone areas, and use of native species.

Turbidity Curtains

- Turbidity curtains are comprised of geotextile material vertically suspended in water to enclose an in-water work area. They serve to contain sediment transport to a limited area and allow sediment to settle out of suspension. They act as a filter baffle and isolate sensitive features. Turbidity curtains are suspended with floatation/buoy devices and are affixed to the bottom of the water body with anchors and secured in location with cable or rope mooring. Refer to OPSD 219.260 and 219.261 for details.
- Turbidity curtains should be positioned at least five (5) metres outside of the area of disturbance.
- Turbidity curtains should be left in place until suspended sediments have settled and the EPO specified in the Sediment Assessment report is met.
- Following the completion of construction activities, turbidity curtains need to be properly removed as physical disruption of the curtain may result in the resuspension of sediment in the water column. Refer to manufacturer's instructions for proper removal procedures.

Cofferdams

- A cofferdam is a temporary, sealed structural barrier surrounding the work area adjacent to or within a water body. It constricts the flow to the remainder of the channel (maximum 50% reduction in channel width). They can be constructed with pre-cast concrete jersey barriers, stone and impermeable sheeting (e.g. sheet piling), aqua dams and pea gravel bags. Dewatering operations are required to allow construction to be conducted in dry conditions.
- If more than 1/3 of a watercourse is isolated, the impact to the local channel section (e.g. potential increased erosion) needs to be assessed by a qualified personnel.
- All sediment laden water pumped from behind the cofferdam must be managed during dewatering activities (see Dewatering Operations).
- Stranded aquatic life needs to be salvaged (see Fish and Wildlife Salvage) as dewatering occurs.
- At the end of construction, cofferdams must be carefully removed to minimize disturbance of bottom sediment.
- Where a cofferdam is installed or removed, an impermeable turbidity curtain (or other method identified by the Contractor to control sediment) will be in place around the structure to contain disturbed sediment. Disturbed areas must be stabilized and restored immediately.
- Fuel or other hazardous materials are not to be stored behind a cofferdam. All equipment must be removed from behind the cofferdam if high flows (e.g. major rain storms) are expected.

Dewatering Operations

- In all cases, water pumped from behind any cofferdams will be discharged so that it passes through a sediment control device prior to re-release to receiving waters. These devices may include geotextile filter bags, sediment basins, straw bale/silt fence pits or traps, or vegetative Filter Strips or other means identified by the Contractor.
- A silt fence barrier, if necessary, can be considered as a secondary treatment of dewatering effluent.
- Some form of energy dissipation (e.g. haybales, riprap, sheet of plywood, etc.) needs to be provided at the pump discharge and at the outlet to the watercourse. Scouring of the bottom of

the watercourse within or outside of the work area needs to be prevented to avoid damage to the work site or adjacent lands.

- To minimize disruption of the sediment after the work area is dewatered, a barrier will be placed on the sediment surface to minimize disruption of the sediment, especially during construction activities in areas where elevated contaminant levels were identified in the Sediment Assessment report.
- In the EMP prior to commencement of the work, an alternate procedure for storing, treating (i.e. active water treatment) or disposing of dewatering effluent from the work area will be identified. Alternate methods will be available in the event that the EPO specified in the Sediment Assessment report cannot be met or water in the enclosed work area is found to be acutely lethal to fish.
- Any filtering devices used must be inspected frequently during pumping operations and repaired or replaced once the sediment build-up prevents the device from functioning as designed.
- Accumulated sediment removed from a dewatering device must be tested and if necessary disposed of at an approved disposal site.
- Dewatering pumps must not entrain fish or other aquatic species.

Material Management

- Water and sediment removed from the waterway during construction activities will be separately managed to isolate potentially contaminated material. Prior to removal from the project site, soil and water testing will be completed for any materials or water to be removed. Results of these analyses would govern the acceptance of these materials for re-use within the project site and/or its ultimate disposal at an offsite facility. Imported material used to restore the grade of the site to pre-construction elevations will be tested for contaminants of potential concern (COPCs) and confirmed to be acceptable following guidance provided in the Sediment Assessment report.
  - All vehicles and equipment used for site preparation and project completion will arrive at the site free of deleterious substances and fluid leaks. Such will be cleaned prior to leaving the work area to ensure no material leaves the work site. Equipment and material rinsing will be conducted in a manner that does not permit the release of wash water into the waterway either directly or through a storm drain. Wash material will be collected and disposed of off-site.
  - Treated wood products are not to be used in any construction areas near the stream channel, to prevent the release of preservatives that are toxic to fish.
  - Remove excavated material and debris from the site in a timely manner.
  - If stored on-site, place material in a stable area above the high water mark or active floodplain and as far as possible from the watercourse.
  - When material is moved off-site, dispose of it in a manner that prevents its entry into any watercourse, floodplain, ravine, or storm sewer system.
  - Protect excavated material from being eroded and reintroduced into the watercourse by covering material with erosion control blankets, seeding and planting with native vegetation, or other measures.

Timing Restrictions and Species at Risk

- Additional restrictions may apply if protected species or their habitat are identified in proximity to planned construction work. Should Species at Risk be suspected, the Contractor should implement measures to avoid destruction, injury or interference with the species, its residence and/or its habitat (e.g., through sighting, timing or design changes) and contact the Canadian Wildlife Service (Environment Canada) for advice regarding mitigation measures.

- Additional mitigation measures may be required relating to permitting or approvals for the construction work and may include in water timing restrictions for the protection of fish or restrictions on cutting of trees and other vegetation with the potential to disrupt nesting birds. A comprehensive assessment of all permitting and approval requirements is beyond the scope of the current assessment.

Salvage of Fish and/or Wildlife

- If required, complete a fish and amphibian salvage operation before and during dewatering activities if any portion of the wetted watercourse will be isolated or dewatered. The salvage must be completed by an appropriately qualified biologist.
- Where salvage is necessary, recover and relocate fish and/or wildlife to a safe area outside of the influence of the construction activities.
- Low impact salvage methods such as trapping and seining should be selected before opting for higher impact methods such as electrofishing.
- Special techniques and extra caution should be used when completing salvages that involve species at risk. Contact the regulatory agencies for information regarding assessment and salvage requirements for species at risk.

Contingency Plan

- The Contractor will develop a contingency plan for in the event that the EPO specified in the Sediment Assessment report cannot be met or water in the enclosed work area is found to be acutely lethal to fish. This may include alternate means for temporary storage (e.g. holding tank) and pre-treatment of discharge water using a mobile treatment unit with an Environmental Compliance Approval (ECA) prior to discharging water to the environment.
- Contingency plans must be designed and in place to address schedule disruptions and unforeseen storm events with associated potential high water flows.

Monitoring Requirements

Proposed minimum monitoring requirements are outlined below. These represent expected outcomes and general considerations for the development of a work-specific monitoring program. These requirements are not intended to be tender specifications. The specifics of the monitoring program are to be discussed and reviewed with PCA prior to implementation. It is expected that the Contractor will retain a qualified professional to design and implement the water quality monitoring program to ensure that the EPOs specified in the Sediment Assessment report are complied with during construction activities. Depending on the nature of the in-water works and the sensitivity of the site, the environmental monitor may be on-site continually or may make periodic site visits. A pre-construction meeting between the environmental monitor and the Contractor undertaking the work at the site should be held to ensure a common understanding of the best management practices for the project, project safety, monitoring requirements and responsibilities.

Listed below are the expected outcomes of the monitoring program:

- Verify that the EPOs specified in the Sediment Assessment report are being met at the point of discharge and receiving environment;
- Verify that the EPOs specified in the Sediment Assessment report are protective of water quality in the Trent-Severn Waterway;
- Verify the water quality predictions made in the Sediment Assessment report; and

- Provide the basis to support the assessment of potential impact of an inadvertent release of sediment-laden water into the Trent-Severn Waterway during construction.

In situ turbidity measurements are anticipated to be conducted for day-to-day assessment of water quality. This information will help inform the Contractor of the possible need to initiate corrective actions. The following monitoring requirements are recommended for construction activities in the Trent-Severn Waterway:

- At a sampling location deemed to be representative of discharge water, turbidity or TSS will be measured on an hourly basis during periods of active discharge using a hand held turbidity meter. Should point of discharge EPOs specified in the Sediment Assessment report be exceeded, mitigation measures and corrective actions should be implemented as specified in the Sediment Assessment report.
- For the receiving environment, turbidity or TSS will be measured on a regular basis (at least daily) during dewatering at a minimum of one sampling location upstream of the work area and one sampling location downstream of the discharge point. Sampling frequency should increase if a sediment plume is noted. Turbidity and/or TSS may be recorded either using a hand held turbidity meter or with a continuous recorder with data logger. If a continuous recorder is used, the data logger will be downloaded weekly and turbidity measurements supplemented with daily manual spot measurements. Should receiving environment EPOs specified in the Sediment Assessment report be exceeded, mitigation measures and corrective actions should be implemented as specified in the Sediment Assessment report. Additional mitigation measures may be required if the work in a given area lasts longer than 30 days.
- A minimum of one set of surface water samples will be collected during each active dewatering event and following each re-watering event prior to removal of cofferdams. The surface water sample set will consist of a point of discharge sample, an upstream sample and a downstream sample collected concurrently. To verify the water quality predictions, surface water samples will be analyzed and assessed as specified in the Sediment Assessment report.
- The Contractor will take extra precautions during storm events to ensure EPOs specified in the Sediment Assessment report are not exceeded which may include increasing the sampling frequency and/or activating the contingency plan should EPOs specified in the Sediment Assessment report not be met.
- Monitoring should include visual inspections of plumes downstream of the work sites to inform frequency of turbidity monitoring. Also the presence of contaminants in impounded waters should be determined by checking for odors, discoloration, or an oily sheen.
- Inspect turbidity curtains and other sediment control measures (when used) at least daily during in-water work and immediately repair or replace measures.
- Monitor weather conditions to anticipate when less-favourable weather and/or high water conditions may occur leading to potential impacts to the watercourse and the release of deleterious substances.
- Imported material used to restore the grade of the site to pre-construction elevations should be tested for contaminants of potential concern (COPCs)and confirmed to be acceptable following guidance provided in the Sediment Assessment report.

In the event of an accidental release of water exceeding the threshold for reporting of a release of sediment-laden water as specified in the Sediment Assessment report , a comprehensive spill response must be initiated. The spill response will include measures to stop work, contain sediment-laden water and other deleterious substances and notify all applicable authorities. Additional corrective actions may

be required by the regulatory authorities notified. To assess the potential impact of such a release, samples of the discharge water as well as upstream and downstream water samples should be collected and analyzed as specified in the Sediment Assessment report.

In the event that a sheen or other visual evidence of contamination is observed during construction, this will be considered a spill and a comprehensive spill response must be initiated. The spill response will include measures to stop work, contain the sheen or other deleterious substances and notify all applicable authorities. Additional corrective actions may be required by the regulatory authorities notified. To assess the potential impact of a sheen or other observed contamination, sediment samples will be collected, analyzed and assessed following the guidance provided in the Sediment Assessment report.

REFERENCES

Golder Associates 2017. Environmental Management Planning Considerations – Ottawa Wall Repairs Rideau Canal, Ottawa, Ontario, September 2017.

B.C. Ministry of Water, Land and Air Protection 2004. Standards and Best Practices for Instream Works, B.C. Ministry of Water, Land and Air Protection, Ecosystem Standards and Planning, Biodiversity Branch, March 2004.

West Virginia Department of Environmental Protection 2016. Erosion and Sediment Control Best Management Practice Manual, West Virginia Department of Environmental Protection, Division of Water and Waste Management, 2006 (Revised August 29, 2016).

Greater Golden Horseshoe Area Conservation Authorities 2006. Erosion & Sediment Control Guidelines for Urban Construction, Greater Golden Horseshoe Area Conservation Authorities, December, 2006.

State of California Department of Transportation 2003. Construction Site Best Management Practice (BMP) Field Manual and Troubleshooting Guide CTSW-RT-02-007, January 2003.

City of Portland Oregon, 2008. Erosion and Sediment Control Manual, City of Portland Oregon, Bureau of Development Services, Bureau of Environmental Services, Portland Office of Transportation, and Portland Water Bureau, March 2008.

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