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# ANNEX C: ENVIRONMENTAL REQUIREMENTS

**CFB Comox FFTA Source Control Project**

PSPC

CFB Comox, Lazo, BC

Requisition No.: R.111173.004

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# ENVIRONMENTAL MANAGEMENT PLAN

## **CFB Comox FFTA Source Control Project**

PSPC

CFB Comox, Lazo, BC

Requisition No.: R.111173.004



 **Environmental Management Plan**  
**CFB Comox FFTA Source Control Project**

**Public Services and Procurement Canada**

SLR Project No: 219.05444.00000

November 2020

**SLR** 

ENVIRONMENTAL MANAGEMENT PLAN  
CFB COMOX FFTA SOURCE CONTROL PROJECT  
LAZO, BC  
SLR Project No: 219.05444.00000

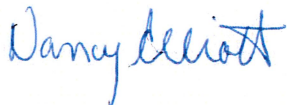
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# CONTENTS

ACRONYMS.....	iii
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
1.1 Background Description .....	1
1.2 Scope of Work.....	1
1.3 Objective of the EMP.....	2
<b>2.0 ENVIRONMENTAL SETTING.....</b>	<b>3</b>
2.1 Physical Environment .....	3
2.2 Biological Environment.....	3
2.3 Social and Cultural Environment .....	4
<b>3.0 REGULATORY SETTING .....</b>	<b>5</b>
<b>4.0 ENVIRONMENTAL RESPONSIBILITIES.....</b>	<b>6</b>
<b>5.0 ENVIRONMENTAL MONITORING .....</b>	<b>6</b>
<b>6.0 MEETINGS.....</b>	<b>7</b>
6.1 Pre-construction Meeting(s) .....	7
6.2 Tailgate Meetings.....	7
<b>7.0 ENVIRONMENTAL REPORTING.....</b>	<b>8</b>
7.1 Environmental Monitoring Reports.....	8
7.2 Environmental Incident Reporting .....	8
<b>8.0 ENVIRONMENTAL PROTECTION PLAN.....</b>	<b>9</b>
8.1 Spill Prevention and Emergency Response.....	10
8.1.1 Mitigation.....	11
8.2 Soil and Water Management .....	12
8.2.1 Mitigation.....	12
8.3 Erosion and Sediment Control.....	14
8.3.1 Mitigation.....	14
8.4 Concrete and Asphalt Work .....	15
8.4.1 Mitigation.....	15
8.5 General Housekeeping and Waste .....	15
8.5.1 Mitigation.....	16
8.6 Hazardous Materials Management .....	16
8.6.1 Mitigation.....	17

8.7	Aquatic Environment.....	17
8.7.1	Mitigation .....	18
8.8	Wildlife Protection .....	18
8.8.1	Mitigation .....	18
8.9	Vegetation Protection .....	19
8.9.1	Mitigation .....	19
8.10	Archaeology and Heritage Resources.....	20
8.10.1	Mitigation .....	20
8.11	Air Quality, Dust and Noise Control.....	20
8.11.1	Mitigation .....	20
8.12	Site Restoration .....	21
8.13	Traffic Management Plan .....	22
8.13.1	Mitigation .....	22
<b>9.0</b>	<b>STATEMENT OF LIMITATIONS .....</b>	<b>23</b>
<b>10.0</b>	<b>REFERENCES.....</b>	<b>24</b>

## DRAWINGS

- Drawing 001: Site Location
- Drawing 002: Site Plan

## APPENDICES

- APPENDIX A: Select Drawings

## ACRONYMS

BC CDC	BC Conservation Data Centre
BMP	Best Management Practices
CCME	Canadian Council of Ministers of the Environment
CDF	Coastal Douglas fir
CFB	Canadian Forces Base
COC	Contaminants of Concern
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSR	Contaminated Sites Regulation
CVRD	Comox Valley Regional District
DFO	Fisheries and Oceans Canada
DND	Department of National Defence
DR	Departmental Representative
EED	Environmental Effects Determination
EIR	Environmental Incident Report
EM	Environmental Monitor
EMA	Environmental Management Act
EMP	Environmental Management Plan
ENV	BC Ministry of the Environment and Climate Change Strategy
EPP	Environmental Protection Plan
ESA	Environmental Site Assessment
FFTA	Fire Fighting Training Area
FOD	Foreign object debris
HWR	Hazardous Waste Regulation

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MBCA	Migratory Birds Convention Act
MFLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
PCB	Polychlorinated biphenyl
PEP	Provincial Emergency Program
PFAS	Polyfluoroalkyl Substances
PHR	Provincial Heritage Register
PPE	Personal Protective Equipment
PSPC	Public Services and Procurement Canada
QEP	Qualified Environmental Professional
QP	Qualified Professional
RAP	Remedial Action Plan
SAR	Species at Risk
SARA	Species at Risk Act
SDS	Safety Data Sheets
SLR	SLR Consulting (Canada) Ltd.
TOP	Total Oxidizable Precursor



## 1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Services and Procurement Canada (PSPC) to complete an Environmental Management Plan (EMP) in support of the Fire Fighting Training Area (FFTA) Source Control project at the Canadian Forces Base (CFB) Comox FFTA (the “Site”), located in Lazo, BC. The EMP was completed under PSPC Contract No. EZ897-192499/001/VAN (Task Authorization Order No. 700510131).

### 1.1 BACKGROUND DESCRIPTION

CFB Comox is situated in the town of Comox, BC on the east-central coast of Vancouver Island, within the community of Lazo, BC. The majority of the CFB property is located within the Town of Comox boundaries at the northwest of the town; the areas to the north and west of the site are located within the Comox Valley Regional District (CVRD) boundaries. The nearby City of Courtenay lies further of the Town of Comox. The Town of Comox and City of Courtenay purchase drinking water from the CVRD. CVRD draws their potable water from Comox Lake, located approximately 14 km to the southwest of CFB Comox. However, multiple properties in the vicinity of the site rely on personal wells as a supply potable water.

The Department of National Defence (DND), which administers CFB Comox, is implementing a source control program at the FFTA of CFB Comox to manage soil and groundwater contamination from historical fire fighter training activities at the FFTA.

The location of the site is shown on Drawing 001 and a site plan is provided on Drawing 002. Additional selected drawings from the CFB Comox FFTA Source Control Project Specifications are included in Appendix A.

As a result of these historical FFTA activities at CFB Comox, contamination exceeds the federal industrial land use guidelines in soil within the Site. The primary contaminants of concern (COCs) in soil at the FFTA are per- and polyfluoroalkyl substances and their precursors (PFAS), but the site soil also includes limited petroleum hydrocarbon contamination. Data for other parameters including metals, volatile organic compounds, phenols, glycols, polychlorinated biphenyls, herbicides, and explosives are less than the referenced Canadian federal guidelines and provincial standards.

PFAS, the main COC at the FFTA, are a complex family of more than 3,000 manmade fluorinated organic chemicals. PFAS compounds in the FFTA soil are an environmental concern because of their global distribution, persistence, toxicity and tendency to bioaccumulate. Many PFAS parameters have been identified in historical firefighting foam formulations and related contaminated media; however, at the present time, commercial laboratories in Canada provide analysis for only a limited number of the individual chemicals related to firefighting foams. Up to 30 PFAS parameters have been analyzed in soil at the site. For the applicable parameters, the FFTA Site concentrations in soil are less than the Stockholm Convention limits. Additionally, Total Oxidizable Precursor (TOP) Assay results collectively suggest PFAS precursors are present in soil in the proposed excavation areas.

### 1.2 SCOPE OF WORK

The focus of this project is the source zone management (i.e., source control) of contaminated soil at the FFTA in CFB Comox. Up to 30,000 cubic metres of contaminated soil is proposed to be excavated. Once excavated the soil will be managed as follows:

1. Transported off site for treatment or destruction and later disposal; or
2. Stabilized on site through the addition of amendments and then reused/replaced as backfill in select portions of the excavation.

Material with PFAS concentrations greater than 0.14 mg/kg and less than 0.54 kg/mg will be stabilized (i.e., 2 above). The remainder of PFAS contaminated material (i.e., PFAS concentration exceeding 0.54 mg/kg) will be transported off-site for treatment/destruction and ultimately disposed at a permitted facility. Following excavation, the new FFTA area will be returned to grade with imported clean geotechnical fill and the FFTA will be restored for operational use.

Excavated soil that has PFAS concentrations greater than 0.54 mg/kg (i.e., 1 above) will be transported to off-site permitted facilities along allocated trucking routes between CFB Comox and a barge loading facility, likely, in Nanaimo or Campbell River, depending on the remediation contractor's preferred means and methods. Soil is expected to then be transported on water via barge, followed by rail and/or road to its destination in Canada or the United States, depending on the remediation contractor's means and methods.

Surface water and excavation water will be managed throughout this project to mitigate environmental impacts of both contamination and sediment. The scope of work specifies collection, storage, turbidity reduction, and transfer of captured water to the existing DND on-site water treatment plant (see Appendix A).

Consequential to the work is removal of an existing shed, hydrant, water line, and retention pond at the Site. A bioswale will be designed and constructed to manage FFTA stormwater discharge and to replace the existing retention pond that will be removed during construction (SLR, 2020a). The bioswale will be lined with topsoil around the edges and will be revegetated. No tree removal is anticipated as part of the Project.

### 1.3 OBJECTIVE OF THE EMP

The EMP is provided to guide the development of each component of the Environmental Protection Plan (EPP) and identifies expectations for the delivery of mitigation during construction to avoid adverse effects to the environment. The EMP will identify the following:

- environmental responsibilities;
- regulatory obligations;
- environmental protection requirements, including environmental mitigation and monitoring; and
- environmental reporting requirements, including incident reporting.

The EMP allows for a process of continuous improvement and adaptive management if additional risks or changes to legislation, best practices, changes in project scope or design elements are identified as the project progresses.

If there is a discrepancy or conflict between the EMP and the contract or provisions of any legislation, regulations, or municipal bylaws, the more stringent requirement shall apply resulting in the greater protection of the environment and greater environmental protection and safety.

## 2.0 ENVIRONMENTAL SETTING

### 2.1 PHYSICAL ENVIRONMENT

There are two anthropogenic surface water drainage ditches that flow generally in a north-northwest direction within the Site referred to as the Northwest Swale (see Drawing 002) and the Northeast swale. The ditches are ephemeral, with higher flows in the wetter portions of the year. The ditches discharge into a ditch running parallel to the south side of Kilmorley Road. Fish are not expected to occur in these ditches due to their ephemeral nature, but they do contribute water to fish bearing watercourses such as Scales Creek. There is an existing retention pond near the centre of the proposed FFTA excavation area. The retention pond receives runoff from the FFTA that is seasonally dependent, ranging from a shallow pond in the summer to a depth of 0.7 m during the winter.

Scales Creek is located along the western boundary of CFB Comox and is approximately 190 m west of the FFTA. Immediately west of the FFTA a short swale (unnamed) flows north to the existing retention pond.

### 2.2 BIOLOGICAL ENVIRONMENT

The Site is located within the Coastal Western Hemlock Biogeoclimatic Zone which experiences cool summers and mild winters (Pojar et al. 1991). Vegetation within the Site consists mostly of manicured grass, sedges and various herbs with no shrubs or trees visible (Golder 2020). Vegetation north and west of the Site is mainly mature coniferous forest (Golder 2020).

The Site generally contains limited wildlife habitat value as the area is regularly manicured. The retention pond may be utilized by wildlife (e.g., amphibian breeding). Wildlife habitat along Scales Creek riparian area includes mixed forest habitat and wetlands that may be used by many different species.

There is no suitable breeding habitat within the Site for waterfowl or water-associated birds due to the disturbed nature of the Site (Golder 2020). Small mammals, such as rodents, may forage and live in vegetated habitat within the Site. Trees adjacent to the Site may provide suitable bat-roosting sites (Golder 2020).

Scales Creek (Watershed Atlas code 920-576800-21000) is a low gradient, channelized and fish-bearing stream. Coho salmon (*Oncorhynchus kisutch*), Coastal Cutthroat Trout (*O. clarkii clarkii*) and Stickleback spp. (*Gasterosteus* spp.) have been recorded in Scales Creek (Golder 2020). Coho spawning and fry have also been observed within Scales Creek (Stantec 2017). Riparian habitat adjacent to Scales Creek likely provides habitat for a variety of nesting birds.

Based on previous assessment reviews it was determined that the following SAR could be present within the area of FFTA:

- nine federally listed species at risk within the area of CFB Comox (Aldous et. al 2012):
  - Sand-verbena moth (*Copablepharon fuscum*);
  - Northern red-legged frog (*Rana aurora*);
  - Great-blue heron (*Ardea herodias fannini*);
  - Peregrine falcon (*Falco peregrinus pealei*);
  - Barn owl (*Tyto alba*);

- Western screech owl (*Megascops kennicottii*);
- Common nighthawk (*Chordeiles minor*);
- Band-tailed pigeon (*Patagioenas fasciata*); and
- Barn swallow (*Hirundo rustica*).
- an additional four species were inventoried for based on potential to be present but were not identified including (Aldous et. al 2012):
  - Vancouver Island beggarticks (*Bidens amplissima*);
  - Northern goshawk (*Accipiter gentilis laingi*);
  - Olive-sided flycatcher (*Contopus cooperi*); and
  - Painted turtle (*Chrysemys picta*).
- in 2017, the following potential occurrences including the additional SAR were identified (Stantec 2017):
  - Short-eared owl (*Asio flammeus*) – observed foraging; however, not known to breed on Vancouver Island;
  - Western meadowlark (*Sturnella neglecta*) – breeding pair observed historically;
  - Island tiger moth (*Grammia complicata*);
  - Cutthroat trout (*Oncorhynchus clarkii*); and
  - Western toad (*Anaxyrus boreas*).

Several other species were identified within the Comox Valley area and through previous assessments; however, these species are more specific to other areas of the base and suitable habitat for these species was not expected in the FFTA (i.e., marine foreshore species).

## 2.3 SOCIAL AND CULTURAL ENVIRONMENT

The Site is located within the Town of Comox on CFB Comox property and also located within the CVRD. The CVRD jurisdiction is north of Kilmorely Road and west of Little River Road.

The Site is within the traditional territories of the K'òmoks, Qualicum, Tla'amin, Xwemalhkwa (Homalco), We Wai Kai, and Wei Wai Kum First Nations.

A review of the Provincial Heritage Register (PHR), Canadian Register of Historic Places, and the Directory of Federal Heritage Designations, indicates that no registered or formally recognized heritage sites are located within the Site (Golder, 2020). There are two registered archaeological sites located approximately 160 m northeast from the Site (DkSf-7) and approximately 100 m southeast of the Site (DkSf-47) (Golder 2020). Based on a review by Golder (2020), the Site is considered to have potential for the presence of archaeological sites due to the presence of nearby watercourses, the presence of modelled archaeological potential within the Site, the close proximity of the Project site to the Strait of Georgia shoreline, and the presence of two archaeological sites within 200 m. Despite the highly disturbed site, there is the potential for archaeological materials to remain on site (Golder 2020).

### 3.0 REGULATORY SETTING

Although CFB Comox is a federal site and under federal regulatory regime, the Contractor will respect all provincial laws and municipal by-laws that generally do not apply on federal lands. It is the Contractor's responsibility to understand the regulatory context governing their activities. If the Contractor should need clarification of any environmental issue, they should consult the original regulations or legislative documents and seek clarification with the PSPC DR. All components of the work shall be carried out in accordance with the principles listed below:

- avoid causing environmental impacts;
- restore or repair habitat if environmental impacts have been created; and
- meet or exceed applicable environmental laws, regulations and other requirements, which may include, but not be limited to:
  - local municipal bylaws;
  - *British Columbia Riparian Areas Protection Act* [SBC 1997] c.21;
  - *British Columbia Water Sustainability Act* [SBC 2014] c.15;
  - *British Columbia Environmental Management Act* [SBC 2003] c.53:
    - › Spill Reporting Regulation (Reg.221/2017);
    - › Contaminated Sites Regulation (Reg.13/2019);
    - › Hazardous Waste Regulation (Reg.243/2016); and
    - › Waste Discharge Regulation (Reg.154/2019).
  - *British Columbia Weed Control Act* [RSBC 1996, c.487];
  - *British Columbia Wildlife Act* [RSBC 1996] c.488;
  - *British Columbia Heritage Conservation Act* [RSBC 1996] c.187;
  - *Fisheries Act* [1985];
  - *Transportation of Dangerous Goods Act* [1992, c.34];
  - *Canadian Environmental Protection Act* [1999, c.33];
  - *Species at Risk Act* [2002, c.29]; and
  - *Migratory Birds Convention Act* [1994, c.22].

The Contractor shall complete project activities according to the work specifications, environmental requirements and best management practices. Industry standard Environmental Best Management Practices (BMPs), where available, shall apply to all unspecified routine work.

A general Wildlife permit may be required if amphibians are observed breeding within the Site and a salvage must be conducted from the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (Golder 2020). Other federal and provincial permits are not anticipated for the excavation and construction of the bioswale.

## 4.0 ENVIRONMENTAL RESPONSIBILITIES

The Contractor will be responsible for all agents, employees, and subcontractors retained throughout the Project and will ensure environmental protection measures are in place and working effectively. The Contractor will retain an appropriately skilled environmental professional or Qualified Environmental Professional (QEP) to prepare an EPP. A QEP is an individual that is registered and in good standing in BC with the appropriate professional association constituted under an Act for the individual's profession (e.g., RPBio., P.Ag.) and can be reasonably relied on to provide advice within their area of expertise, within the scope of professional practice for the individual's profession, and under the code of ethics of the appropriate professional association and is subject to disciplinary action by that professional association. The EPP will be prepared prior to start of construction for the Contractor's component of the work for submission to and approval by the PSPC Departmental Representative (DR).

The Contractor shall take all reasonable and necessary measures to ensure that any activities undertaken in the performance of the work are conducted in such a way as to minimize disturbance or damage to the environment. This includes protecting ground surfaces, waterbodies, marine environment, wildlife, fish and heritage and archaeological resources. It also includes minimizing disturbance to the general public and CFB Comox workers. Any condition which has resulted from the Contractor's work and which constitutes, or which could result in, unnecessary damage or disturbance to property and the environment must be corrected to the satisfaction of and within the time period specified by the PSPC DR.

The Contractor will communicate effectively with all work crews and subcontractors to ensure that environmental responsibilities and requirements are understood prior to the commencement of work and are carried forward for the duration of their work. The Contractor will ensure that their employees are familiar with, and comply with, the contents of this EMP and the Contractor's EPP. A copy of this EMP and the Contractor's EPP will be kept at the Project construction office/trailer for review by all new contractors, employees, and site visitors. The Contractor shall complete project activities according to the work specifications, environmental requirements and BMPs.

Liaison between PSPC, the Contractor and the Contractor's EM, as well as between PSPC and the site users, will be necessary because the site is actively used. It is expected that the Project construction activities will impact facilities and personnel in the immediate vicinity of the site. In addition, the construction activities are likely to increase traffic along the site access routes. Traffic management, site access, parking, and Contractor facilities are as specified on the CFB Comox FFTA Source Control Specifications drawings (see Appendix A).

The Contractor will retain an Environmental Monitor (EM) to confirm that environmental management measures and controls are implemented in accordance with regulatory documents, environmental components of the contract requirements, including this EMP as well as the Contractor's EPP. Environmental monitoring is to be conducted by, or under the supervision of a QEP.

## 5.0 ENVIRONMENTAL MONITORING

The Contractor's EM will inspect the work site to ensure compliance with the Contractor's EPP, this EMP, and relevant BMPs. An EM will complete inspections of construction activities including environmental support in the event of an environmental incident during all project activities at an appropriate frequency to facilitate environmental protection and compliance. The Contractor will ensure that emergency contact numbers for all key project representatives are available and any subsequent changes are

updated as required within their site-specific EPP. The EM has written authority to modify and/or halt any construction activity if deemed necessary for the protection of the environment or to meet conditions of the Contractor's EPP or this EMP.

Inspections of all work areas will be conducted by the EM during all phases of the Project to identify any potential sources of environmental impairment that are to be addressed and rectified by the Contractor. Inspections will include, but may not be limited to, all waste (e.g., hazardous, construction materials, and domestic refuse) storage areas, all hazardous materials storage areas, vehicle refuelling, maintenance, storage areas, general equipment inspections, and inspections of all active work areas. Inspections should also include inspections of sediment and erosion control measures, water management and areas of exposed soil.

All workers are required to report all incidents that involve a potential for environmental impacts to the EM, PSPC DR or other appropriate representative. Records of all inspections will be filed on site, and any potential sources of environmental impairment, and appropriate actions taken will be immediately reported to the Contractor's Site Supervisor.

If the Contractor encounters any additional or unforeseen activities during the execution of the project that may pose an environmental risk, the Contractor shall contact the PSPC DR and/or the EM for assistance prior to commencing or continuing work.

## 6.0 MEETINGS

As specified in the Contract, regular meetings will occur to provide the Contractor and their crews with information to fulfil the obligations of regulatory approvals and permits and the environmental requirements of the contract, including this EMP.

### 6.1 PRE-CONSTRUCTION MEETING(S)

A pre-construction meeting will be held between PSPC, the Contractor, and EM to review environmental requirements of the contract as well as discuss items including, but not limited to the following:

- relevant information not previously communicated that pertains to the contract;
- consequences of non-compliance with environmental law, authorizations, approvals, permits, and contract specific environmental requirements;
- review of communication protocols; and
- reporting of environmental incidents and emergencies.

### 6.2 TAILGATE MEETINGS

Daily tailgate meetings are required to address environmental requirements based on the nature of the work being conducted. The tailgate meetings will be used to document potential hazards, processes, equipment, tools, environment and materials and to inform all workers of the risks in their surroundings. The Contractor will keep a record of all environmental requirements addressed in daily tailgate meetings and provide to the PSPC DR upon request.

## 7.0 ENVIRONMENTAL REPORTING

### 7.1 ENVIRONMENTAL MONITORING REPORTS

Environmental monitoring reports will be compiled by the Contractor after each site visit and submitted to the Departmental Representative within 48-hours of the completion of the EM inspection. These reports will include, at a minimum, the following:

- monitoring results;
- a description of site works in progress including photos;
- summary of visit and rationale for site visit;
- any environmental issues that arose during the inspection and mitigation measures implemented, including photos; and
- communications with project personnel.

Additional reporting elements that will be included as needed include:

- results from any water or soil chemical analyses;
- environmental Incident Reports; and
- communications required with any regulatory agencies.

During inspections, the EM may recommend improvements or changes to the Contractor's Site Supervisor. These recommendations will be included on the monitoring forms.

Upon completion of the Project, the Contractor will prepare an environmental completion report. The report will include a summary of monitoring data collected, a summary of construction activities, representative site photographs, environmental management and issues during construction, how these issues were managed, and mitigation implemented.

### 7.2 ENVIRONMENTAL INCIDENT REPORTING

An environmental incident refers to an event that has caused or has the potential to cause one or more of the following:

- adverse impact on the quality of air, land or water, wildlife, aquatic species or species at risk;
- exceedance of compliance requirement limits as documented in a regulatory instrument (i.e., permit, order, license, authorization, agreements, etc.);
- violation of legislation, related policies or regulations;
- notification to external agencies due to an emergency beyond normal circumstances;
- adverse publicity with respect to the environment;
- alteration of, or damage to, heritage or archaeological resources; and
- legal or regulatory action with respect to any of the above.

Examples of environmental incidents include spills of any quantity of oil, fuel, hydraulic fluid or other hazardous substances (regardless of their size), discharge of deleterious substances to an aquatic environment, or harm to wildlife.



In the event an environmental incident, the Contractor and any subcontractors will immediately take action to protect persons from injury and mitigate damage to property and the environment. The Contractor will notify the PSPC DR (or delegate) of the incident as soon as is safe to do so and submit a complete Environmental Incident Report (EIR) within 24-hours of the incident. EIRs must be submitted to the PSPC DR (or delegate) prior to submission to the regulatory agency, unless the PSPC DR (or delegate) is not available in a timely manner (within 24-hours of the incident).

The Contractor's EIR will include the following:

- cause and nature of the incident;
- approximate volume of release, area of habitat affected;
- aquatic, terrestrial and/or cultural resources affected;
- mitigation measures taken to control or limit the activity causing the incident;
- additional proposed remedial or corrective actions recommended;
- communications held with project personnel; and
- communications with regulatory agencies.

## 8.0 ENVIRONMENTAL PROTECTION PLAN

The Contractor is required to prepare a site-specific EPP that identifies the Contractor's means and methods for complying with the environmental protection requirements of the standards and other requirements of the EMP, and any other environmental requirements under federal, provincial, municipal, local, or other legislation, regulations, codes, or by-laws. The EPP also identifies the procedures by which the Contractor will establish and maintain quality control for environmental protection of all components of the work. The Contractor will need to submit a site-specific EPP for approval by the PSPC DR prior to construction.

The EPP will include, but may not be limited to, the following information:

- roles and responsibilities of PSPC, the EM, and the Contractor(s) for implementing, inspecting, and reporting on the effectiveness of the environmental protection and mitigation measures;
- policies, plans and procedures for communicating environmental protection matters;
- environmental awareness training procedures for all personnel to verify that personnel in environmentally critical roles are qualified and competent;
- site and activity-specific measures to determine the environmental hazards associated with all aspects of the planned work or activity, to evaluate the risk potential of such hazards, and to identify and implement appropriate mitigation strategies for the proposed work or activity;
- list of all structures, facilities, equipment and systems critical to environmental protection, and a summary of the system in place for their inspection, testing and maintenance;
- identify potential environmental emergencies and hazards and provide the appropriate emergency plans and procedures and/or spill response plan(s) that would be implemented;
- summarize and reference the procedures for the reporting of all environmental incidents; and
- contingency procedures to identify and deal with nonconformities or problems related to procedures and equipment that have caused or could cause poor environmental performance, spills or pollution.

The Contractor's EPP will include, but not be limited to, procedures for the following:

- spill prevention and emergency response;
- soil and water management;
- erosion and sediment control;
- turbidity reduction plan;
- concrete and asphalt work;
- general housekeeping and waste;
- hazardous materials management;
- aquatic environment;
- wildlife protection;
- vegetation protection;
- archaeology and heritage resources;
- air quality, dust and noise control;
- site restoration; and
- traffic management plan.

The following sections outline various protection measures and mitigation plans that may apply to construction activities based on the scope of the Project. Mitigation measures have been identified for the Project from site mobilization to demobilization.

In the event of a discrepancy between this EMP and the Contract, the Contract will stand.

## 8.1 SPILL PREVENTION AND EMERGENCY RESPONSE

A spill is an unauthorized discharge or release of a material or substance into the environment that is equal to or exceeds the regulated amount for that deleterious substance. Spill management is designed to reduce the risk of a harmful exposure to individuals and the surrounding environment. Requirements for reporting spills are defined in the Federal Transportation of Dangerous Goods Act (2011) and Canadian Environmental Protection Act (1999).

All users operating at the Site must have the capability to effectively manage spills resulting from their activities and operations. Information on preparing a spill prevention and emergency response plan can be found at: [www.env.gov.bc.ca/eemp/resources/guidelines/bc.htm](http://www.env.gov.bc.ca/eemp/resources/guidelines/bc.htm). At a minimum, the plan will include:

- a general measure of the probability and severity of an adverse effect to health, property, or the environment, based on fuel, oil, and other hazardous materials consumed, handled, and stored;
- spill/release notification and alerting procedures;
- the DND Spill policy, including the Spill Response Flowchart and Spill and Release Incident form;
- adequate training procedures for staff in spill response;
- established procedures for addressing spills and releases of deleterious substances;
- provision and access to spill response equipment and materials appropriate to the work that is performed;
- spill incident report forms; and

- names and telephone numbers of persons and organizations that may be contacted in the event of a potential environmental incident, including PSPC representatives, the EM, Contractor(s) representative, and local emergency response organizations.

The Plan will be available for inspection by PSPC and regulatory agency personnel and will be posted at visible locations in the Work Site and in relevant machinery.

### 8.1.1 MITIGATION

To reduce the risk of leaks and fluid spills reaching watercourses or waterbodies, at a minimum, the following measures should be incorporated into the Contractor's EPP and followed:

- fuel storage and handling equipment shall comply with A Field Guide to Fuel Handling, Transportation and Storage (BC Ministry of Water, Land and Air Protection 2002);
- vehicles and equipment, including their hydraulic fittings, shall be inspected daily to ensure that they are in good condition and free of leaks;
- operate storage areas so that containment systems are effective during wet weather;
- all fuel supply trucks, and vehicle tidy tanks shall always be clean and well maintained. All fuel or grease spills occurring from their use or operation are to be cleaned immediately. Poorly maintained fuel storage tanks will be taken off-site immediately and replaced with a new clean tank at the Contractor's expense;
- a Spill Contingency Plan will be prepared by the Contractor and shall be kept on site and will include the names of those to be contacted;
- all containment basins shall be inspected daily for leaks and wear points;
- containment basins shall be cleaned regularly, and any accumulated waters removed;
- where leaks or wear points are found, they shall be repaired promptly to restore full containment; and
- additional major spill kits are to be located at the Site.

#### 8.1.1.1 Emergency Spill Response

In the event an environmental incident, the Contractor and any subcontractors will immediately take action to protect persons from injury and mitigate damage to property and the environment. The Contractor will notify the PSPC Representative (or delegate) of the incident as soon as is safe to do so and submit a complete EIR within 24-hours of the incident. Copies of emergency response procedures will be maintained by the Contractor and stored in an accessible location on site.

The Contractor's EIR will include the following:

- cause and nature of the incident;
- approximate volume of release and identification of spill location/feature;
- aquatic, terrestrial and/or cultural resources affected;
- mitigation measures taken to control or limit the activity causing the incident;
- additional proposed remedial or corrective actions recommended;
- communications held with project personnel; and
- communications with regulatory agencies.

All emergency spill response plans and activities on the site will follow the BC Guidelines for Industry Emergency Response Plans (BC MOE 2002).

## 8.2 SOIL AND WATER MANAGEMENT

The Contractor shall perform Project activities in a manner that prevents the release of oil, fuel, waste, and other pollutants into soil, groundwater, rivers, streams, lakes, or marine environment. Waste and other pollutants include, but are not limited to, refuse, garbage, sewage effluent, contaminated soil, sediment, construction waste, and chemicals.

The Contractor is also required to prepare and adhere to a Soil and Water Management Plan for the project. Contaminated soil will be handled, stored, sampled and tested as needed, transported and disposed in accordance with the Contractor's EPP and applicable regulations and requirements. Ground disturbance from the work has the potential to create turbid or sediment laden water that may enter Scales Creek or other waterbodies and negatively affect groundwater quality in and adjacent to the Project site. Surface waters must be directed away from the excavation and work areas, and into pre-existing surface drainage patterns.

Contaminated water (including excavation water) will be collected, stored, turbidity reduced and transferred to the existing DND on-site water treatment plant (see Appendix A). The contractor will prepare a Contaminated Water Management (Turbidity Reduction) Plan. As per the Contract, a Contaminated Water Management (Turbidity Reduction) Plan is required as a component of the Construction Work Plan (see 01 35 13.43) within 10 working days after Contract award and prior to mobilization to Site. The Contaminated Water Management Plan will include methods, means, and sequences for Contaminated Water Management (Turbidity Reduction). A supply of equipment, including but not limited to Turbidity Reduction Equipment to treat sediment load as per Specifications and onsite infrastructure is required. The contaminated Water Management (Turbidity Reduction) Plan must be signed by Contractor's Qualified Professional. Contaminant management and final discharge are excluded from this project. The contractor will be responsible to test water per the contract prior to delivery to the DND water treatment unit.

### 8.2.1 MITIGATION

To reduce the risk of transport of contamination to surface waterbodies, control measures should be implemented by the Contractor within the area of the ground disturbance and equipment operation to prevent transport of contamination, at a minimum, the following measures should be incorporated into the Contractor's EPP and followed:

- Schedule
  - the removal of the northwest swale and retention pond should be completed during the dry season to minimize the need for dewatering of standing water; and
  - ground disturbance, soil handling activities (including soil stabilization), and backfilling by the contractor should be scheduled for the dry season.
- Water (Surface water and excavation water)
  - Contractor to regularly monitor surface water quality in downstream surface watercourses leading to Scales Creek and its tributaries to confirm that water quality complies with

- performance objectives and the Canadian water quality guidelines for the protection of aquatic life and BC water quality guidelines for aquatic life;
- stormwater runoff into the excavation area is to be prevented by the Contractor;
  - groundwater that collects in the excavation and disturbed area will be considered contaminated and shall be managed and contained by the Contractor in accordance with the contract;
  - during the work, surface water runoff shall be directed away from the excavation by the Contractor to minimize potential contact with contamination;
  - all excavation water will be considered contaminated and must be captured, stored, and treated during the work in accordance with the contract. Excavation water and retention pond water shall not be discharged to ground; and
  - wastewater (including water generated from the truck wash station), construction water and water containing liquids from construction (e.g., concrete) must also be contained and demonstrated to comply with performance objectives prior to being discharged.
- Soil
    - imported backfill material should be stockpiled separately from removed contaminated soils;
    - soil shall not be stockpiled on roadways or driveways;
    - excavated soils must be in locations identified in the Contract and stockpiled 15 m away from any drainage features, drains, ditches and 30 m away from any watercourse;
    - excavated soil must be staged on 10 mil polyethylene liner (poly) and when inactive, covered with 10 mil poly, weighted down to secure the cover;
    - excavated soil must be segregated and contained based on source site and contaminant classification. Blending or mixing of soils of varying classifications or quality is not permitted unless otherwise directed by the PSPC Representative;
    - use of smaller track equipment during excavation where possible;
    - restore areas of compaction or rutting;
    - use established construction routes and equipment storage areas;
    - clean equipment in designated areas only; and
    - washing, refueling and servicing equipment will be conducted at least 30 m from any watercourse, storm drain, or drainage ditch.
  - Barging
    - marine transportation of excavated material will be undertaken using sealed (watertight) barges with sidewalls to fully contain material;
    - discharge of water from the barge must also not occur during in-water transportation;

- provide certification of seaworthiness from an independent Marine Surveyor for each haul barge that will be used for the Project. If a barge is damaged during Project activities and requires repair, a new certification of seaworthiness will be required.
- conduct its vessel operations in a manner to limit the risk of contamination resulting from the suspension of sediment by operating at reduced power during vessel movement activities to the maximum extent practicable.

Imported fill quality documentation must be submitted to, and approved by, the PSPC DR in accordance with Contract and prior to being imported to site. The fill material is required to have been characterized by a QEP in accordance with the contract. Imported backfill must be shown to meet Canadian Council of Ministers of the Environment (CCME) Residential I and use (RL) guidelines prior to importation onto the site.

Backfill will meet the contract requirement regarding gradation and quality and will be compacted to a geotechnical engineer-specified density based on the future site use as defined by PSPC. A geotechnical engineering firm commissioned by the Contractor shall provide in-situ density testing of backfill soil as required.

## 8.3 EROSION AND SEDIMENT CONTROL

The Contractor shall perform Project activities in a manner that prevents the release of oil, fuel, waste, and other pollutants into soil, groundwater, rivers, streams, lakes, or marine environment. Waste and other pollutants include, but are not limited to, refuse, garbage, sewage effluent, contaminated soil, sediment, contaminated surface water, construction waste, and chemicals.

Ground disturbance from the work has the potential to create turbid or sediment laden water that may enter Scales Creek or other waterbodies on Site. Erosion and sediment control measures will be implemented as necessary to reduce erosion and sediment generation at the site.

### 8.3.1 MITIGATION

To reduce the risk of turbid or sediment laden water reaching the aquatic environment, at a minimum, the following measures should be incorporated into the Contractor's EPP and followed:

- the Contractor shall not divert, block or restrict watercourses except as specified in the Contract;
- restrict vehicle access to certain areas of the site;
- directing runoff and wastewater from excavations as per the contract and Section 8.2 above;
- installing sediment fencing between all work areas and water courses to ensure no sediment laden runoff enters any adjacent areas;
- excavated and exposed ground that will be left unattended for more than 12 hours or during rain events shall require surface protection using weighted plastic sheeting or waterproof tarps;
- surplus water shall be captured and managed in accordance with the contract in a method and location as accepted by the EM and the PSPC DR (or delegate);
- the Contractor is not permitted to discharge or divert water from excavations or any other source into waterbodies or watercourses within or adjacent to the Site;
- the Contractor shall minimize soil disturbance;
- the Contractor shall take reasonable care to avoid damage to graded and seeded areas;

- the Contractor must restore to original or better condition, any soil or ground that has eroded or become unstable as a result of project activities;
- surface water runoff at the Site and water in downstream surface watercourses should be regularly monitored by a qualified EM to confirm that water quality complies with performance objectives, Canadian water quality guidelines for the protection of aquatic life;
- work sites are to be cleaned and restored upon completion to the satisfaction of the EM; and
- work may be suspended by PSPC DR (or delegate) or the EM during heavy rain to minimize sediment mobilization by construction machinery.

Sediment fencing should be removed at project completion only if the risk of erosion and/or sediment release has been eliminated through site reinstating activities.

## 8.4 CONCRETE AND ASPHALT WORK

Wet concrete, a mixture of cement and water, creates a very high pH solution often with high metals concentrations that is highly toxic to fish and other aquatic life. Additionally, elevated pH has the potential to impact PFAS contaminants in the environment potentially increasing contamination mobilization. All uncured concrete and concrete leachate must be prevented from entering the aquatic environment.

### 8.4.1 MITIGATION

At a minimum the following should be considered when preparing the site-specific EPP:

- protect the surrounding environment and establish a protocol for discarding of unused concrete;
- concrete or asphalt laden equipment must be washed off-site, or at a designated location that poses no risk of the wash-water entering the aquatic environment;
- contain dust emissions from concrete cutting and drilling;
- prevent debris from mixing concrete from entering storm drains or the aquatic environment;
- concrete will be poured into leak-free forms and poured in isolation of water;
- if a hose is used to pump concrete, the hose must be sealed and leak-free;
- the poured concrete will be covered with material until fully cured;
- any spill (concrete, asphalt, or their components) should be contained immediately and removed as quickly as possible; and
- during project construction minimize asphalt smoke impact on surrounding air quality.

The Contractor is responsible for disposing off-site any demolished concrete or asphalt including reinforcing steel or embedded timber in accordance with the contract.

## 8.5 GENERAL HOUSEKEEPING AND WASTE

The Contractor must adhere to all applicable legislation with respect to the handling, transportation, and/or disposal of all materials related to this Project.

All non-hazardous waste, debris, and other construction related materials will be removed from the sites and disposed of in an appropriate manner. The Contractor will contact the appropriate municipal, regional, provincial or federal authorities prior to waste disposal to confirm their ability to accept the

waste materials. As required, the Contractor will provide the PSPC Representative (or delegate) with a copy of the landfill permit or acceptance demonstrating their authorization to accept the material.

### 8.5.1 MITIGATION

At a minimum the following should be considered when preparing the site-specific EPP:

Equipment laydown and material storage areas are designated in the contract. The lay down area will include the following environmental considerations:

- spill kits in all equipment;
- larger spill kits are to be located at the project site and hazardous materials storage locations;
- solid waste bin storage;
- sweep and/or clean active work areas on a regular basis; and
- recycle all construction and industrial materials to the extent possible.

General waste accumulated throughout the site will be segregated and stored at a designated location prior to removal. Measures to ensure that appropriate care is given to general waste are as follows:

- care to prevent the generation garbage which can become Foreign Object Damage (FOD) which may be hazardous to the airport will be taken. All waste shall be collected and placed within appropriate waste containers;
- all waste bins will have tightly sealed lids to minimize the potential of the wind catching and discharging debris and FOD;
- remove surplus construction material and waste from work sites, and dispose of at an appropriately authorized facility;
- recyclable and non-recyclable waste should be separated and stored in appropriately labelled, covered, waterproof containers for storage and transport;
- all waste material should be removed from site in a timely manner on an as needed basis and at a minimum at the completion of the project;
- recyclable materials should be removed from site by an approved waste management company and taken to the appropriate facilities;
- decommission erosion and sediment control materials and features following project completion (if no longer required); and
- all waste material (i.e. wood, cardboard, steel, concrete) shall be separated into individual bins and taken off-site to a certified disposal facility or recycling facility.

## 8.6 HAZARDOUS MATERIALS MANAGEMENT

Hazardous waste will be managed to prevent contamination of soils or the aquatic environment from accidental spills and to prevent uncontrolled or accidental fires. Hazardous materials include “dangerous goods” and “controlled products”. These include, but are not limited to fuels, oils, solvents, paints, greases, asbestos and asbestos containing materials, polychlorinated biphenyl (PCB) oils, and batteries.

Hazardous materials used during construction activities will be stored and handled in accordance with all applicable legislation and BMPs, for example, the *Transportation of Dangerous Goods Act*, and product-specific Safety Data Sheets (SDS).



### 8.6.1 MITIGATION

Hazardous materials will be disposed of in accordance with law and the requirements of all authorities having jurisdiction. General storage, handling and disposal requirements for hazardous materials should be considered when preparing the site-specific EPP:

- copies of SDS for any hazardous materials used during the project will be maintained by the Contractor and stored in an accessible location on site;
- the Contractor will ensure that all staff and subcontractors are adequately trained (and certified where required) in handling and transporting any hazardous materials they encounter during their job activities;
- storage and handling of hazardous materials will be conducted to avoid loss and provide containment in the event of a spill;
- transfer and temporary storage of hazardous materials and wastes will occur only in an area designated for this purpose. The designated area will be clearly labelled and controlled using barriers, anchored tarps, and/or separate storage containers;
- all containers used for storage or transfer will be labelled, handled and transported in accordance with the *Transportation of Dangerous Goods Act*;
- disposal of hazardous wastes generated during the project will be in compliance with the *Environmental Management Act*, the *Transportation of Dangerous Goods Act* and the Hazardous Waste Regulation; and
- the Contractor will maintain records for all hazardous waste/materials including:
  - inventories of types and quantities of materials or waste generated, stored or removed;
  - Hazardous Waste Manifests identifying licensed waste haulers and disposal destinations; and
  - disposal certification documents.

## 8.7 AQUATIC ENVIRONMENT

The Project has the potential to interact with freshwater aquatic environment via nearby surface water courses (i.e., Scales Creek) and via the marine aquatic environment during marine barge transportation activities. The Project may cause damage and/or loss of downstream aquatic habitat from the potential release of deleterious substances towards Scales Creek and its tributaries. In addition, the Project may cause damage and/or loss of marine habitat from the potential release of deleterious substances from barges during marine transportation. Site activities may involve the introduction of sediment and other deleterious substances into the aquatic environment, and/or vegetation disturbance.

The clearing of vegetation along waterways is not anticipated during the work and requires prior notice if needed. Clearing of vegetation reduces riparian function, which affects instream habitat quality. Riparian areas contribute food to the aquatic system in the form of organic detritus and insects shed from vegetation, improve habitat quality by creating cover from predators and moderate temperatures along streambanks and within waterways.

Although it is assumed that some work activities will occur within 30 m of a watercourse, storm drain, or drainage ditch (e.g., stockpile), the risks will be mitigated by the Contractor by installing measures such as silt fencing, redirecting surface water, and/ or well-constructed stockpile areas.

### 8.7.1 MITIGATION

To minimize the risk of sediment or deleterious substances entering downstream watercourses (e.g., Scales Creek) and the marine environment, the following mitigation measures will be followed to reduce effects of the Project on the surrounding aquatic habitat:

- sediment and erosion controls shall be implemented by the Contractor;
- implement control measures within the area of the ground disturbance and equipment operation to prevent transport of contamination to downstream watercourses (e.g., Scales Creek and its tributaries);
- surface water runoff at the Project site and water in downstream surface watercourses should be regularly monitored by the EM;
- the Contractor's EPP shall specifically dictate measures required during marine barge transport activities to mitigate marine aquatic environment impacts;
- appropriate emergency preparedness and spill control equipment (spill kits) should be maintained on-site during the construction; and
- servicing or fueling will be completed within a pre-approved area that is at least 30 m from any watercourse, storm drain, or drainage ditch.

## 8.8 WILDLIFE PROTECTION

The Project will adhere to wildlife and wildlife habitat protection provisions presented in a variety of applicable legislation, guidelines and protocols under the authority of various levels of government. The regulatory and policy related documents provided below outline wildlife protection provisions relevant to the Project.

- The *Species at Risk Act* protects federally listed species at risk, requires Recovery Strategies and Recovery Action Plans to be developed for federal species at risk and provides measures for the protection of applicable critical habitat; and
- The *Migratory Birds Convention Act* prohibits the possession of migratory birds or their nests.

### 8.8.1 MITIGATION

The following general measures to mitigate wildlife impacts should be considered when preparing the site-specific EPP:

- do not feed, attract or harass wildlife;
- all wildlife must be left alone. Do not approach or handle newborn or juvenile wildlife;
- injured or orphaned wildlife must not be handled without proper experience and equipment;
- report all incidents, observations of injured or deceased animals to the PSPC DR;
- food waste and garbage will be disposed of in animal-proof containers and removed from site daily;
- all staff and subcontractors will adhere to maximum speed limits and be alert while driving to avoid potential wildlife-vehicle collisions;
- conduct works outside of the general nesting period and within the reduced risk timing window (i.e., reduced risk between September 1 to February 28) for migratory birds that are protected under the *Migratory Birds Convention Act*. If this is not possible, pre-disturbance nest surveys

should be undertaken by a qualified professional to identify nests in and adjacent to the Project site. If a bird nest is identified, the EM will be notified, and all protection will be afforded to the nest. Raptor nests are protected year-round and therefore are not to be disturbed. If a bird nest is identified, additional strategies for nest management may also be required at the direction of the EM;

- to avoid potential Project-related amphibian mortality, work should ideally be completed outside of the amphibian breeding season (i.e., conduct work preferentially between November 1 to January 31);
- recommend installing silt fencing around known breeding locations within the Site prior to amphibian breeding season to exclude adult amphibians from breeding. Prior to construction activities, an amphibian breeding survey should be completed in potential habitat. If amphibians are observed during site preparation or construction, notify the EM and PSPC DR. An amphibian salvage must be conducted by a qualified professional and a general wildlife permit under the *BC Wildlife Act* be obtained prior to salvage activities at least 90 days before the proposed work;
- if SAR or provincially rare species are observed on the site, the EM will be notified immediately. No interaction with the animal shall occur unless required and under appropriate Provincial or Federal permit;
- QEP will oversee removal of vegetation to monitor for small mammals and amphibians; and
- lighting will be limited to only essential work areas and night work will be avoided whenever possible.

## 8.9 VEGETATION PROTECTION

The clearing limits will be strictly held to the minimum area required to safely complete the work. The limits will be flagged in the field. Should vegetation removal be required, the Contractor shall segregate invasive plant species from native plant species. Removal of invasive plant species shall require the Contractor to remove the entire adult plant, including all root structures.

All plant material to be removed as part of the Contract (invasive or otherwise) will be treated as PFAS contaminated in accordance with the Contract.

### 8.9.1 MITIGATION

The following general measures to mitigate vegetation impacts should be considered when preparing the site-specific EPP:

- trees shall be retained;
- do not work within root or drip zones of trees;
- replace vegetation with native species approved by the PSPC DR and the Contract;
- remove invasive plants and dispose in accordance with the Contract;
- delineate vegetation clearing boundaries in a highly visible manner prior to clearing;
- revegetate disturbed soils to prevent invasive plant colonization;
- clean equipment between areas to limit spread of invasive plant species;
- tire wash stations should be established at entrance and exit to reduce tracking of soil and to reduce the potential for movement of invasive weed seeds;

- use of small track equipment and protective matting where possible;
- limited remedial access locations in order to reduce vegetation removal; and
- follow approved construction routes.

Where applicable, for moderate and above forest fire ratings, all vehicles and construction machinery will carry firefighting equipment in accordance with the *Parks Canada Act* and Fire Management Team. This should include, but not be limited to shovels; pulaskis or mattocks; hand-tank pumps and fire extinguishers. Any fires must be reported immediately to local emergency responders.

## 8.10 ARCHAEOLOGY AND HERITAGE RESOURCES

No impacts are to occur to known cultural heritage artifacts. The Contractor shall protect and preserve the remains or items of geological or archaeological interest or value encountered on-site and must take all reasonable precautions to prevent damage or unauthorized removal of items by any personnel except the applicable PSPC archaeological representative. The Contractor will implement the Chance Find Procedure (component of the EED included in the Contract) if potential cultural heritage artifacts are identified.

### 8.10.1 MITIGATION

If sites or artifacts of heritage or archaeological importance are discovered, stop work immediately and contact the PSPC DR. If evidence of cultural artifacts is found (i.e., human bones, stone tools, shell deposits and rock paintings) the following procedures are to be followed:

- immediately stop work in the vicinity of the suspected archaeological find and immediately notify the PSPC DR;
- do not undertake any further work that could disturb the site;
- do not move soil from the vicinity of the site;
- do not move or collect the artifacts;
- do not take pictures of the artifacts;
- secure the area by staking or flagging off the affected location to prevent additional disturbances; and
- do not backfill the area.

## 8.11 AIR QUALITY, DUST AND NOISE CONTROL

Air quality may be affected by Project activities. Construction equipment and vehicles may temporarily emit greenhouse gases and deleterious substances and will emit particulate matter. The movement of equipment, vehicles, and wind over soil and unpaved roads may cause temporary fugitive dust emissions. All work should comply with local noise bylaws unless exemptions have been obtained prior to commencing any site works.

Dust to be kept at a minimum in accordance with the Contract.

### 8.11.1 MITIGATION

The following air quality, dust and noise control measures should be considered when preparing the site-specific EPP:

- equipment should be maintained in good working condition. Fleet vehicles should be maintained according to manufacturer's guidelines. Vehicles and equipment should be inspected on a regular basis and maintained as required;
- standard practices and use of best available control technologies should be implemented to control equipment, including hand-held, and vehicle noise. Noise levels will be managed using standard noise reduction mufflers. Mufflers are to be maintained in good working condition to meet their warranted operating efficiency;
- schedule noisy activities for daytime hours on weekdays;
- the Contractor will consider the requirements of the municipal bylaws;
- spotlights will be directed away from residential areas or lights will be fitted with shrouds to direct light to the immediate work area;
- the movement of equipment, vehicles, and wind over bare soil and/or unpaved roads may cause temporary fugitive dust emissions;
- minimize the time unpaved surfaces are exposed or cover potential dust sources. Paved surfaces shall be swept regularly to reduce issues related to fugitive dust;
- during dry weather conditions, minimize and control dust from exposed soils both in excavations and soil stockpiles, and from equipment;
- stockpiles should be managed as specified previously (e.g., weighted covers);
- apply water to dry soils, lay down areas, and work areas during periods of high wind and/or dry weather if there is evidence that wind erosion is a problem (e.g., drifting of stockpiles) or if dust control is required. When using water, caution shall be used to prevent run-off into adjacent watercourses or waterbodies;
- to minimize exposure of Project personnel to dust and contaminants of concern including PFAS, include Health & Safety requirements and outline required personnel protective equipment (PPE);
- equipment and vehicles shall be decontaminated prior to leaving the site; and
- do not use oils or other similar products as dust suppressants.

In order to minimize greenhouse gas emissions during construction activities, the following practices shall be implemented by the Contractor:

- ensure that all equipment is maintained in good working order and has properly functioning emission controls;
- locate operating vehicles away from sensitive receptors such as fresh air intakes, air conditioners and windows;
- do not idle vehicles near building doorways or air intakes;
- vehicles must be turned off if idling for more than 3 minutes in a 60-minute period; and
- establish a staging zone for trucks that are waiting to load or unload material at the site, away from sensitive receptors.

## 8.12 SITE RESTORATION

The Site must be fully restored in accordance with the Contract including construction of the new FFTA, and related appurtenances (e.g. surface water runoff piping and tanks); installation of the new bioswale,

restoration of excavated areas to specified grades; and surface and bioswale vegetation planting in accordance with the contract and CFB Comox requirements. The backfilled areas will be graded and the FFTA with associated facilities for training will be reinstated.

The Contractor will:

- clean all work areas to pre-remediation condition and to the satisfaction of the PSPC Representative (or delegate);
- exposed soil (not including areas to be capped with concrete, asphalt or coarse fill material) should be covered in topsoil and reseeded by the contractor to re-establish a vegetative cover and prevent erosion and dust generation;
- reseeded activities shall comply with CFB Comox requirements (including native seed mixes and hydroseeding);
- repair or replace as necessary any damage to public and CFB Comox roadways that has occurred as a result of the Contractor's usage of the site; and
- remove all environmental controls.

### 8.13 TRAFFIC MANAGEMENT PLAN

The Contractor is responsible for traffic management in and around the work areas, including public roads (e.g., Little River Road), CFB Comox roads (including but not limited to Route 66), shared access routes, and any other traffic routes that may be impacted by the work. The Traffic Management Plan must comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out work or haul materials or equipment. The Contractor will supply and install signs and markings to clearly identify the access routes to be used to the satisfaction of the PSPC DR. Priority must be given to DND vehicles, including (but not limited to) refueling trucks, armament trucks and fire trucks.

#### 8.13.1 MITIGATION

At a minimum the following should be considered when preparing the site-specific EPP:

- manage both vehicles and pedestrians, including signage and traffic control personnel for Site ingress and egress;
- ensure pedestrians have safe and unencumbered access in public areas;
- provide measures for protection and diversion of traffic, including provision of watchpersons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs;
- prevent tracking or spilling of debris or material onto private and public roads;
- clean public and DND roads within a minimum 200 m radius of the Site entrance or as required at least once per shift, or as directed by the PSPC DR;
- place equipment in position to present minimum of interference and hazard to travelling public;
- keep equipment units as close together as working conditions permit and preferably on same side of travelled way;
- do not leave equipment on travelled way overnight;
- do not close any lanes of road without approval of PSPC DR;

- before re-routing traffic erect suitable signs and devices in accordance with the Contract and permits or approvals;
- keep travelled way graded, free of potholes and of sufficient width for required number of lanes of traffic;
- provide minimum 6 m wide temporary roadway for traffic in two-way sections through Work and on detours;
- provide minimum 3.5 m wide temporary roadway for traffic in one-way sections through Work and on detours;
- provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response;
- prior to commencement of work submit a list of signs and other devices required for project and if situation on site changes, a revised list is to be submitted for approval of PSPC DR;
- continually maintain traffic control devices in use;
- provide competent flag persons, trained in accordance with, and properly equipped; and
- all vehicles must follow the designated access routes and all personnel are familiar with the routes prior to use.

## 9.0 STATEMENT OF LIMITATIONS

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

Any conclusions or recommendations made in this plan reflect SLR's judgment based on an understanding of Project activities. While efforts have been made to substantiate information provided by third parties, SLR makes no representation or warranty as to its completeness or accuracy.

If site conditions change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this plan may be necessary.

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

Other than by PSPC and as set out herein, copying or distribution of this plan or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of SLR.

Notwithstanding the stated limitations, PSPC may submit this plan to Environmental Regulatory Authorities (Municipal, Provincial, and Federal) and/or other designated persons of authority (collectively called "Authorities"). Furthermore, those Authorities may rely on this plan for review and comment purposes on matters pertaining directly to this plan or to the subject Project.

## 10.0 REFERENCES

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- Stantec Consulting Ltd. 2017. Natural Resource Inventory at CFB Comox, British Columbia: Background Information Review. DCC Project Number: CXA46092. March 30, 2017.

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N:\Kelowna\Projects\PWGSC\219.05444. CFB Comox FFTA Rem Specs\Deliverables\FY 2020 2021\Specifications\  
4. Annexes\C\_Environmental Requirements\4\_EMP\Final EMP\1. 219.054444 EMP 2020-11-24.docx



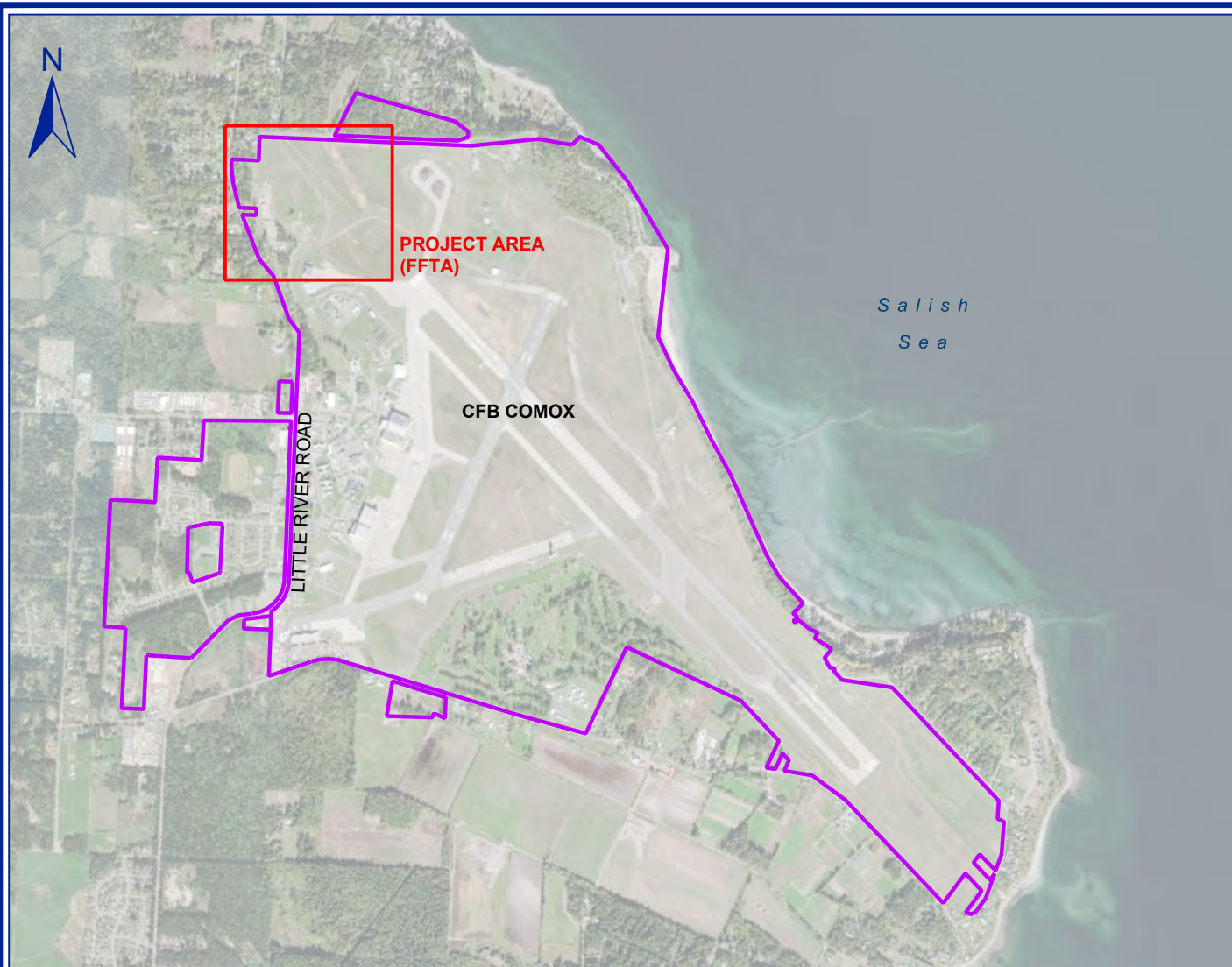


**Environmental Management Plan  
CFB Comox FFTA Source Control Project**

Public Services and Procurement Canada

CFB Comox, Lazo, BC

SLR Project No: 219.05444.00000



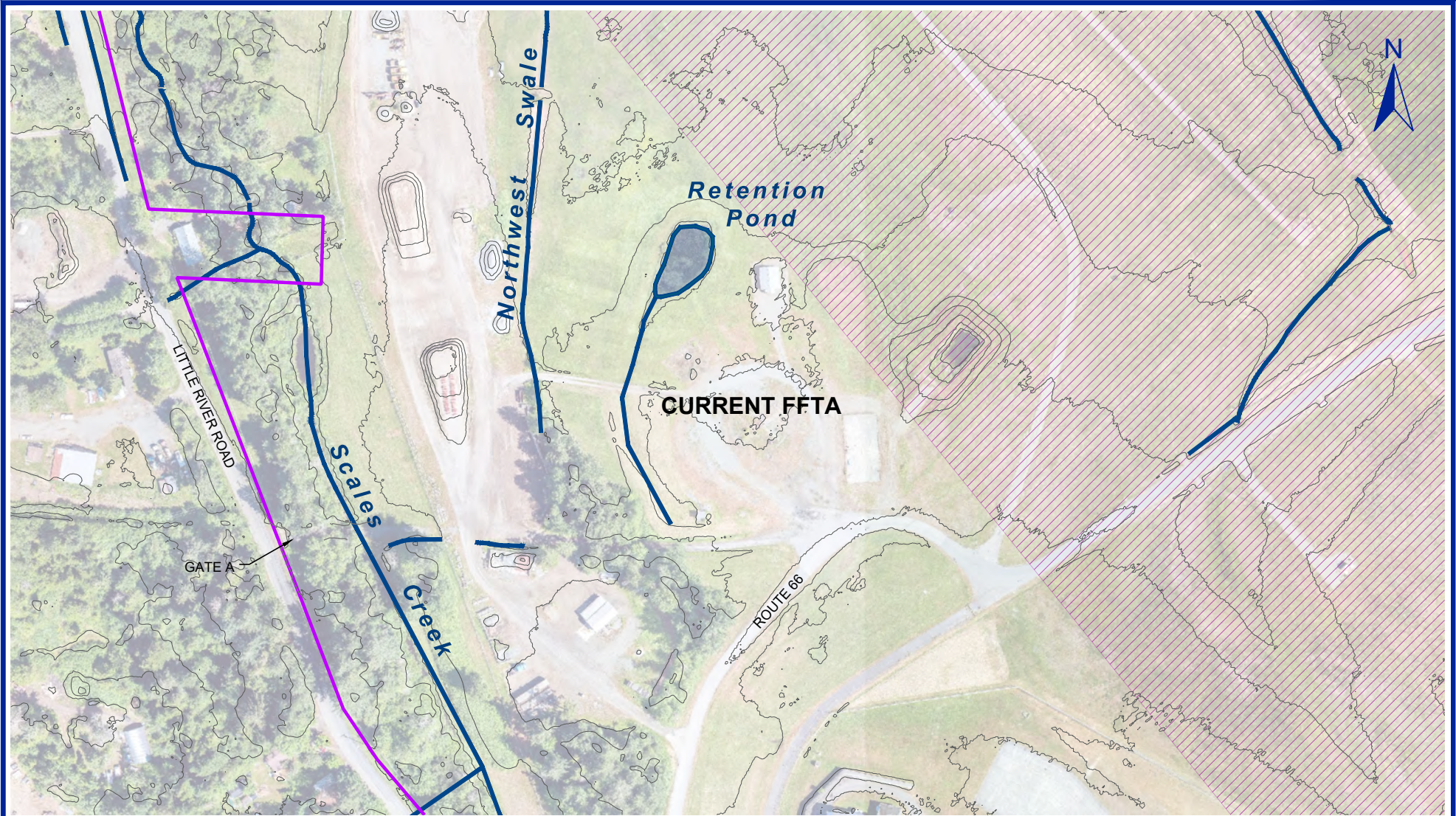
LEGEND:  
 CFB COMOX BOUNDARY

0 0.25 0.5 1.0 1.5 km  
 SCALE 1:30,000  
 WHEN PLOTTED CORRECTLY ON A 8.5 x 11 PAGE LAYOUT  
 NAD 1983 UTM Zone 10 U











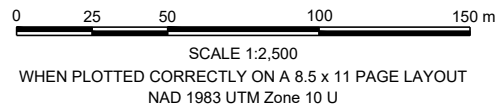
<b>CFB COMOX LAZO, BC</b>	
<b>CFB COMOX SOURCE CONTROL PROJECT ENVIRONMENTAL MANAGEMENT PLAN</b>	
<b>SITE LOCATION</b>	
Date: October 2, 2020	Drawing No. 001
Project No. 219.05444.00000	

Cadfile name: S\_219-05444-00000-A6.dwg



**LEGEND:**

-  CFB COMOX BOUNDARY
-  DR/ATC COORDINATION ZONE
-  WATERCOURSE
-  ELEVATION CONTOUR (1m INTERVAL)
- UTILITIES**
-  U/G ELECTRICAL
-  U/G SANITARY
-  U/G STORM
-  U/G WATER



**CFB COMOX  
LAZO, BC**

**CFB COMOX SOURCE CONTROL PROJECT  
ENVIRONMENTAL MANAGEMENT PLAN**

**SITE PLAN**

Date: October 2, 2020

Project No. 219.05444.00000

Drawing No.

**002**



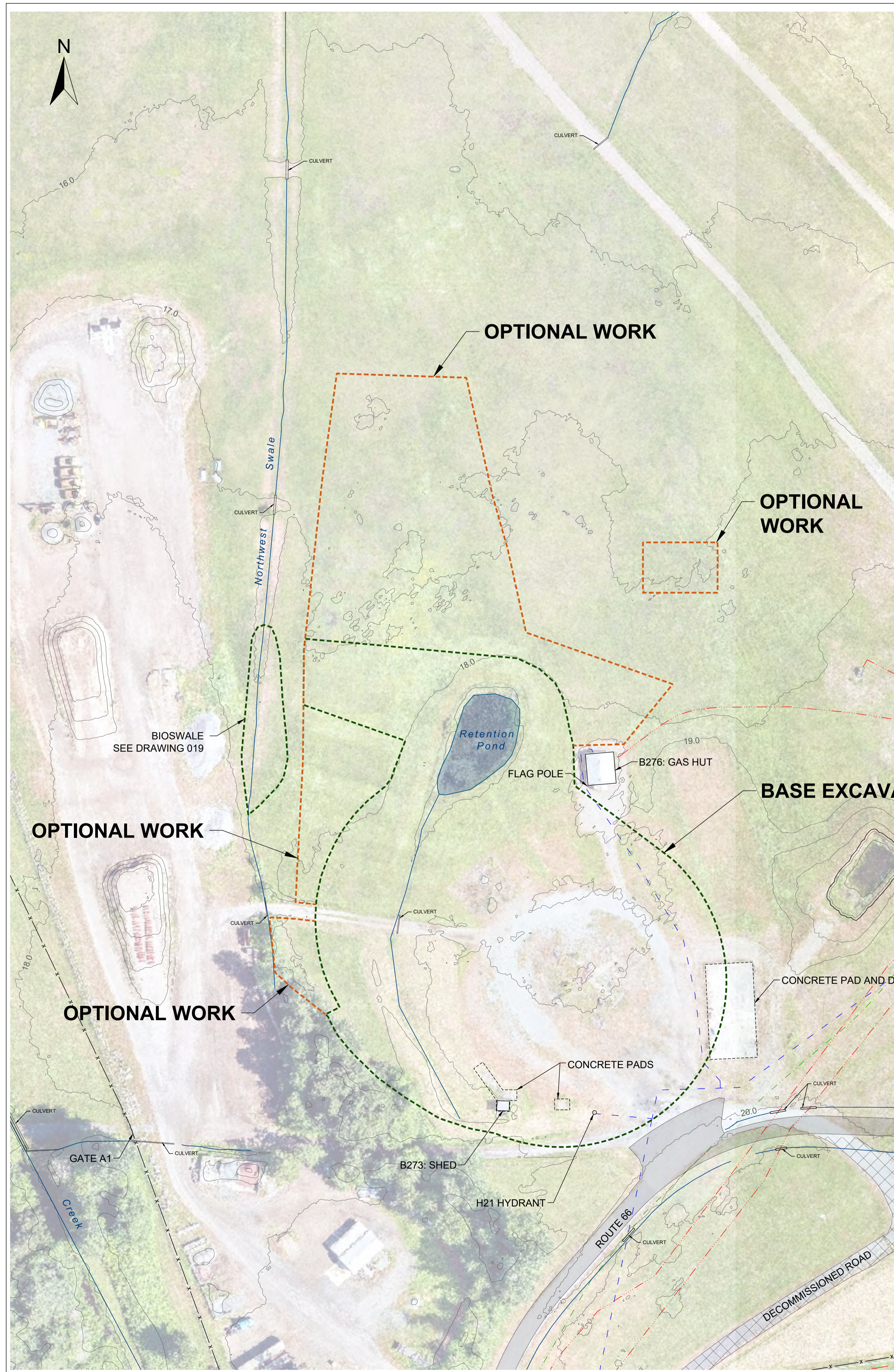
# APPENDIX A: Select Drawings

## **Environmental Management Plan CFB Comox FFTA Source Control Project**

Public Services and Procurement Canada

CFB Comox, Lazo, BC

SLR Project No: 219.05444.00000



**NEW FFTA AND SITE RESTORATION**  
SCALE 1:600

NIVEAU DE SÉCURITÉ | LEVEL OF SECURITY

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- LEGEND:**
- CFB COMOX BOUNDARY
  - ROAD (PAVED)
  - ROAD (DECOMMISSIONED)
  - BASE EXCAVATION
  - OPTIONAL WORK
  - FENCE
  - WATERCOURSE
  - ELEVATION CONTOUR (1m INTERVAL)
  - UTILITIES
  - U/G ELECTRICAL
  - U/G SANITARY
  - U/G STORM
  - U/G WATER

NOTES: ELEVATION REFERENCED FROM 2018 DND LIDAR DATA (50cm RESOLUTION).

ÉCHELLE | SCALE  
1:750

EMPLACEMENT | LOCATION  
**CFB COMOX LAZO BRITISH COLUMBIA**

PROJET | PROJECT  
**CFB COMOX FFTA SOURCE CONTROL PROJECT**

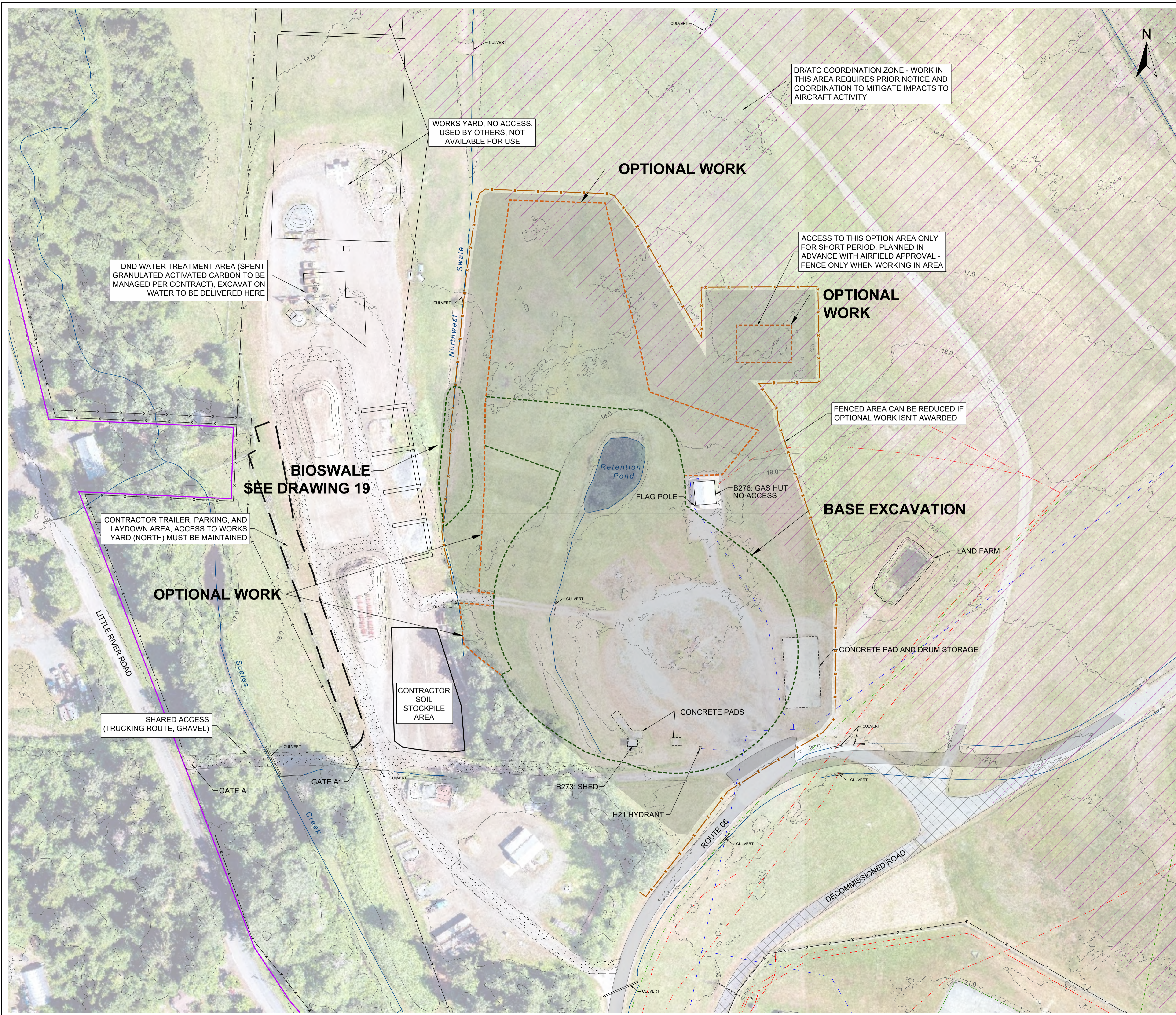
MÉTIER | TRADE: -  
DATE: 2020/07/09

**REMEDIAL PLAN OVERVIEW**

PRODUCTION	REVISÉ   REVIEWED	AGENT CONC   DES O
ÉTUDE   DESIGNED	COMMS   COMMS	GEST PROJ   PROJ MGR
DESSINÉ   DRAWN		GEST CONC   DES MGR
VÉRIFIÉ   CHECKED		INCENDIE   FIRE
COORDINATION		

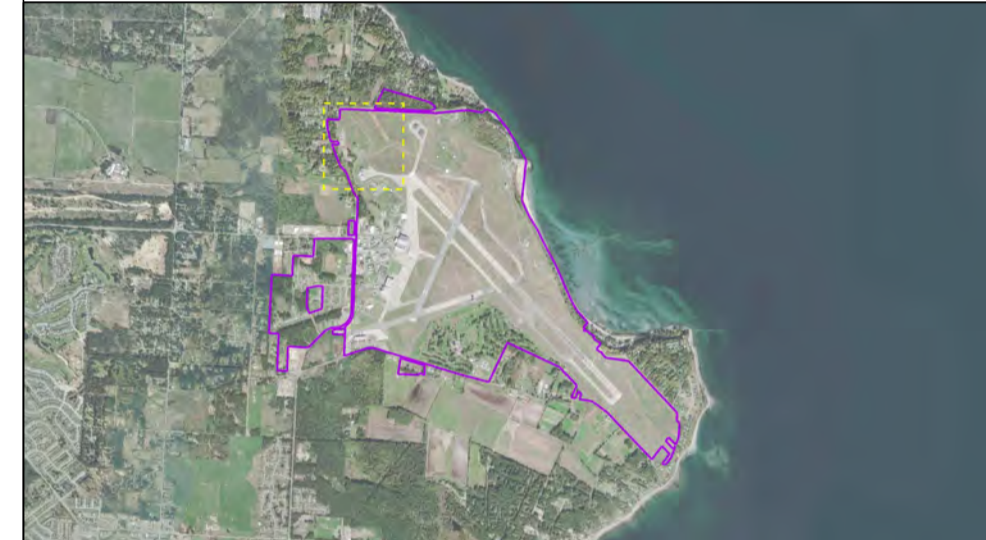
NO. SRT | WBS NO. - NO. DP | PF NO. -  
NO. DESSIN | DWG. NO. 003

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- LEGEND:**
- CFB COMOX BOUNDARY
  - ROAD (PAVED)
  - ROAD (GRAVEL)
  - ROAD (DECOMMISSIONED)
  - BASE EXCAVATION
  - OPTIONAL WORK
  - CONTRACTOR WORK AREA
  - DR/ATC COORDINATION ZONE
  - FENCE
  - CONTRACTOR TRAILER, PARKING AND LAYDOWN AREA
  - FENCING REQUIRED (6 FT. TALL, ENSURE WEIGHTED AND NO FOD)
  - WATERCOURSE
  - ELEVATION CONTOUR (1m INTERVAL)
  - UTILITIES
  - U/G ELECTRICAL
  - U/G SANITARY
  - U/G STORM
  - U/G WATER

NOTES: ELEVATION REFERENCED FROM 2018 DND LIDAR DATA (50cm RESOLUTION).

ÉCHELLE | SCALE: 1:750

EMPLACEMENT | LOCATION: CFB COMOX LAZO BRITISH COLUMBIA

PROJET | PROJECT: CFB COMOX FFTA SOURCE CONTROL PROJECT

MÉTIER | TRADE: - DATE: 2020/07/09

SUJET | SUBJECT: CONTRACTOR WORK ZONE AND ACCESS

PRODUCTION: - REVU | REVIEWED: -

ÉTUDE | DESIGNED: - COMMS | COMMS: - AGENT CONC | DES O: -

DESSINÉ | DRAWN: - GEST PROJ | PROJ MGR: -

VÉRIFIÉ | CHECKED: - GEST CONC | DES MGR: -

COORDINATION: - INCENDIE | FIRE: -

NO. SRT | WBS NO.: - NO. DP | PF NO.: -

NO. DESSIN | DWG. NO.: 004

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LEGEND:

	CFB COMOX BOUNDARY
	BASE EXCAVATION
	ROAD (PAVED)
	BASE EXCAVATION
	OPTIONAL WORK
	DR/ATC COORDINATION ZONE
	FENCE
	WATERCOURSE
	ELEVATION CONTOUR - PROPOSED NEW FFTA SURFACE (0.1m INTERVAL)
	UTILITIES
	U/G ELECTRICAL
	U/G SANITARY
	U/G STORM
	U/G WATER

NOTES: ELEVATION REFERENCED FROM 2018 DND LIDAR DATA (50m RESOLUTION). MONITORING WELLS WITHIN EXCAVATION TO BE DECOMMISSIONED BY OTHERS PRIOR TO WORK. PROTECT REMAINING WELLS.

ÉCHELLE | SCALE 1:750

EMPLACEMENT | LOCATION  
**CFB COMOX LAZO BRITISH COLUMBIA**

PROJET | PROJECT  
**CFB COMOX FFTA SOURCE CONTROL PROJECT**

MÉTIER | TRADE - DATE 2020/07/09

SUJET | SUBJECT  
**FINAL GRADING CONCEPT**

PRODUCTION	REVISÉ   REVIEWED	AGENT CONC   DES O
ÉTUDE   DESIGNED	COMMS   COMMS	-
DESSINÉ   DRAWN		GEST PROJ   PROJ MGR
VÉRIFIÉ   CHECKED		GEST CONC   DES MGR
COORDINATION		INCENDIE   FIRE

NO. SRT | WBS NO. - NO. DP | PF NO. -  
 NO. DESSIN | DWG. NO. 015

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LEGEND:

	CFB COMOX BOUNDARY
	BASE EXCAVATION
	OPTIONAL WORK
	PROPOSED BIOSWALE / RETENTION POND
	WATERCOURSE
	ELEVATION CONTOUR (1m INTERVAL)
	SLOPE DIRECTION
	CROSS SECTION LINE

ÉCHELLE | SCALE AS NOTED

EMPLACEMENT | LOCATION  
**CFB COMOX LAZO BRITISH COLUMBIA**

PROJET | PROJECT  
**CFB COMOX FFTA SOURCE CONTROL PROJECT**

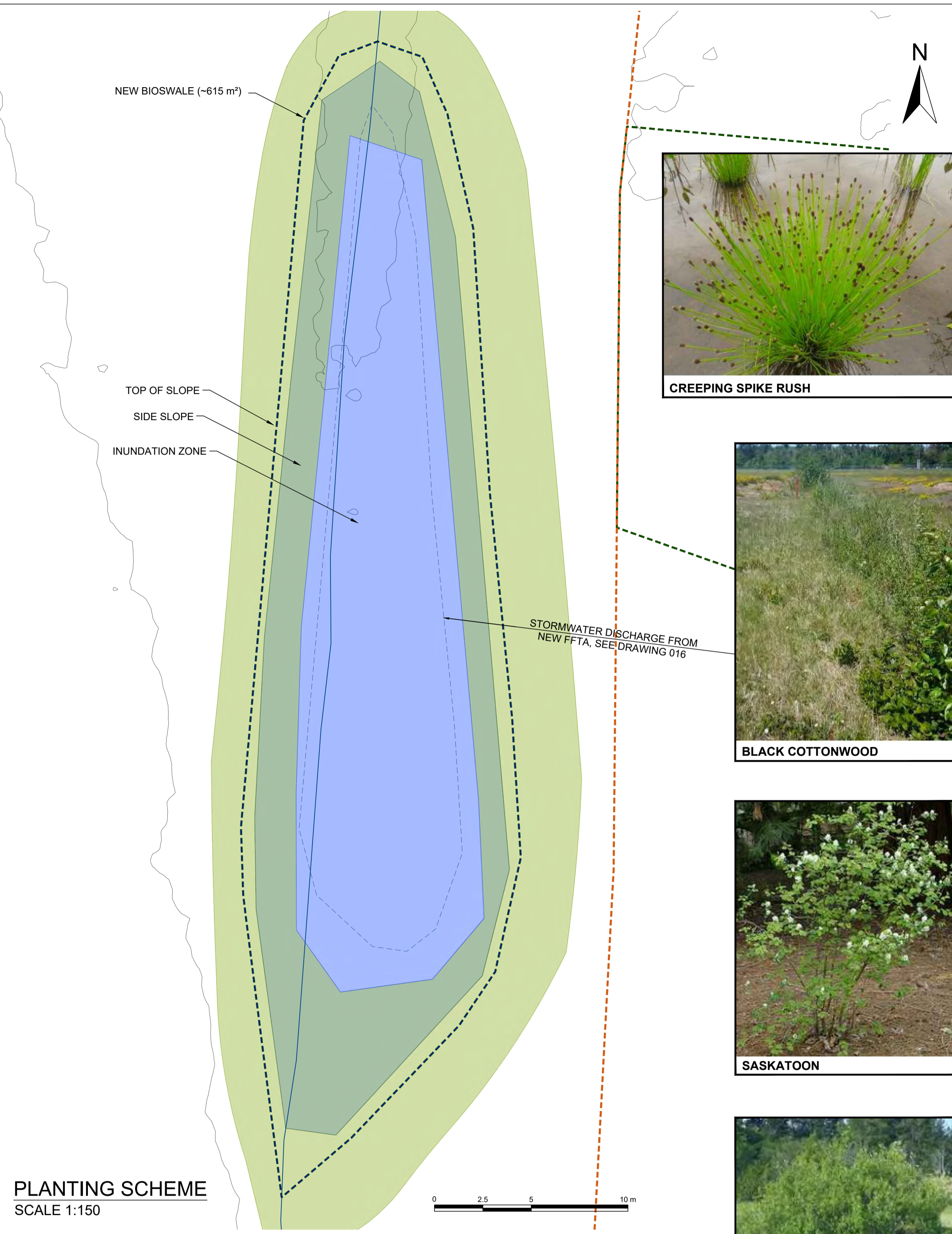
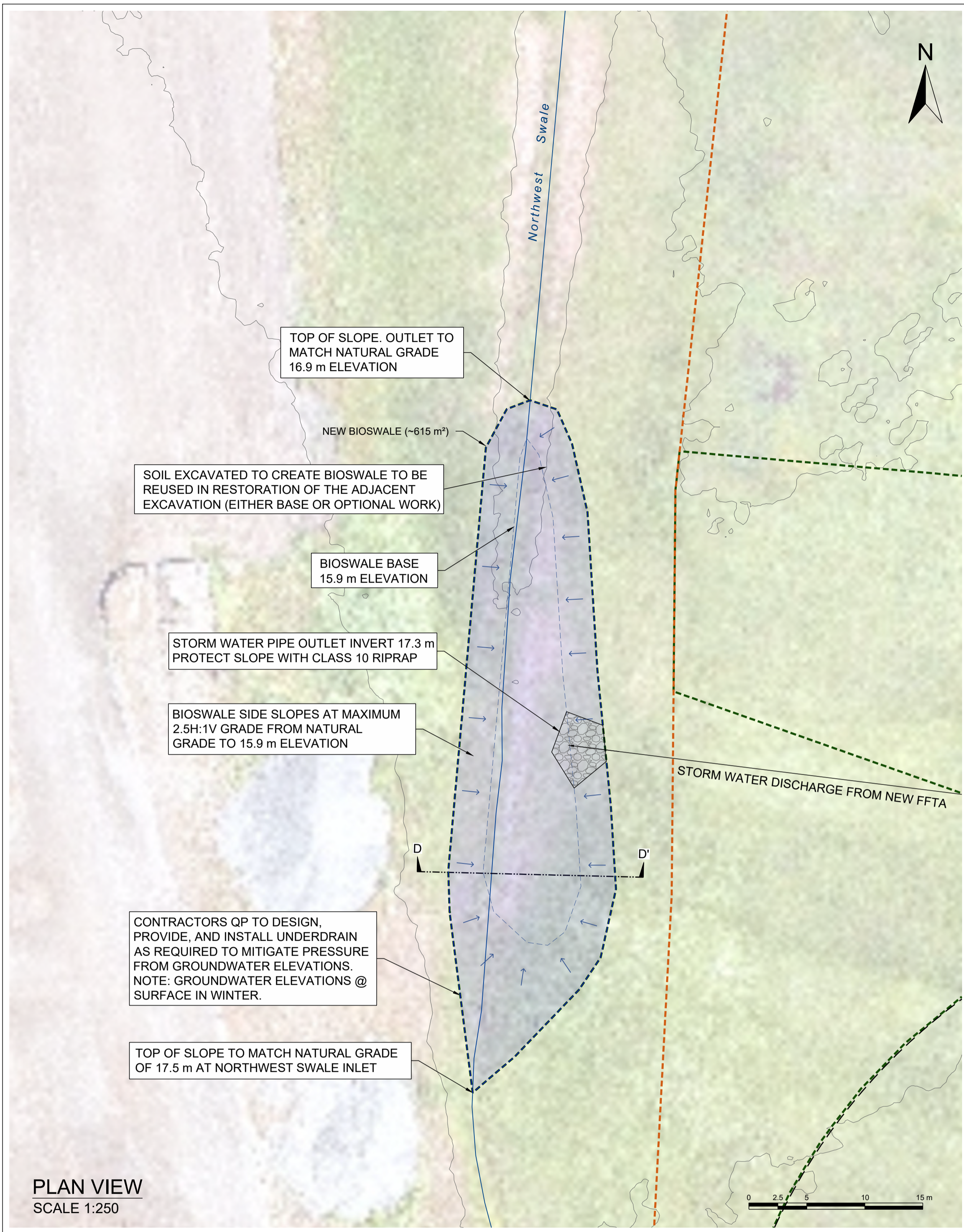
MÉTIER | TRADE: - DATE: 2020/06/15

SUJET | SUBJECT  
**HABITAT RESTORATION CONCEPT**

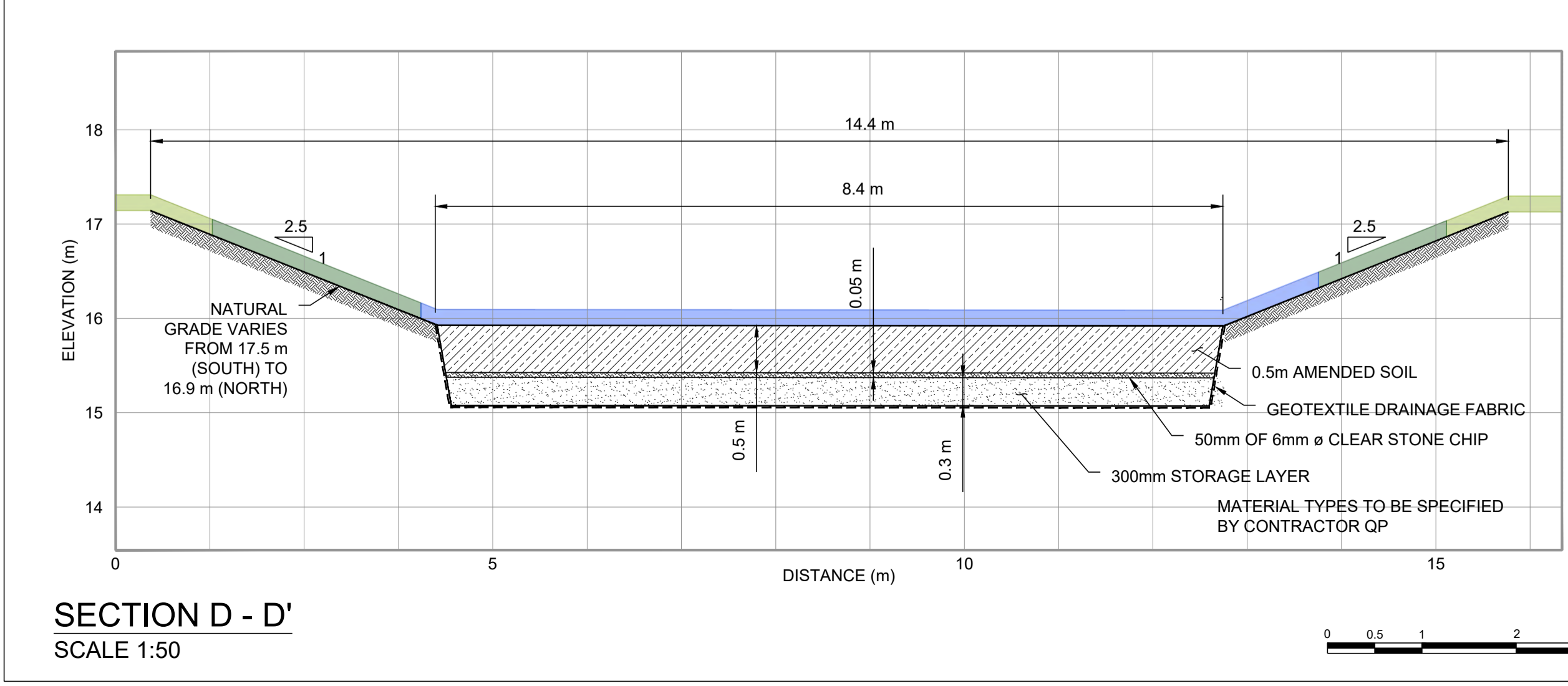
PRODUCTION		REVU   REVIEWED	
ÉTUDE   DESIGNED	COMMS   COMMS	AGENT CONC   DES O	-
DESSINÉ   DRAWN	-	GEST PROJ   PROJ MGR	-
VÉRIFIÉ   CHECKED	-	GEST CONC   DES MGR	-
COORDINATION	-	INCENDIE   FIRE	-

NO. SRT | WBS NO. - NO. DP | PF NO. -

NO. DESSIN | DWG. NO. 019



- PROPOSED NATIVE PLANTING ZONE DETAILS**
- TOP OF SLOPE** Plant via hydroseeding with native grass mix per CFB Comox Specifications
- SIDE SLOPE** Locate above 0.5 m from bioswale constructed soil base; designed to be periodically submerged. Plant a combination of mature (~60%) and seedlings (~40%) of the following types at closest recommended spacing or as recommended by QP.
- willows (*Salix* sp.), pacific or sitka
  - black hawthorn (*Crataegus douglasii*),
  - saskatoon (*Amelanchier alnifolia*),
- INUNDATION ZONE** Area will be seasonally submerged. Plant a combination of mature (~60%) and seedlings (~40%) of the following types at closest recommended spacing or as recommended by QP.
- water smartweed (*Persicaria amphibia*)
  - sitka sedge (*Carex sitchensis*),
  - slough sedge (*obunupta*)
  - water sedge (*aquatilis*)
  - creeping spike-rush (*Eleocharis palustris*),



Dernière mise à jour du fichier: 2011-08-15  
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 **BIOPHYSICAL ASSESSMENT LETTER****CFB Comox FFTA Source Control Project**

PSPC

CFB Comox, Lazo, BC

Requisition No.: R.111173.004

October 8, 2020

Mr. Dave Osguthorpe, B.Sc., EP.  
Senior Environmental Specialist, Environmental Services  
Public Services and Procurement Canada  
1230 Government Street, Suite 401  
Victoria, BC V8W 3X4

SLR Project No.: 219.05444.00000

Client Reference: CFB Comox FFTA Source Control Project

Dear Mr. Osguthorpe,

**RE: BIOPHYSICAL ASSESSMENT TO SUPPORT DEVELOPMENT OF THE *ECOLOGICAL HABITAT COMPENSATION / RESTORATION PLAN- CFB COMOX FIRE FIGHTING TRAINING AREA (FFTA), COMOX, BC***

## 1.0 INTRODUCTION

Public Services and Procurement Canada (PSPC), on behalf of Department of National Defence (DND), retained SLR Consulting (Canada) Ltd. (SLR) to provide consulting services in support of remediation of the Canadian Forces Base (CFB) Comox Fire Fighting Training Area (FFTA) in Comox, BC. The remediation is scheduled for fiscal year 2021/2022. As part of the consulting services, SLR conducted a biophysical assessment to support the ecological habitat compensation/restoration plan.

The work is was completed under the Remediation Services CTA # EZ897-192499/001/VAN Project #: R.111173.001 between SLR and PSPC.

## 2.0 OBJECTIVE

The remediation within the FFTA will include excavation of a retention pond and the northwestern swale. Furthermore, remediation equipment and personnel will be crossing Scales Creek using an existing culvert crossing to access the FFTA (the site) (See Figure 1).

The objective of the biophysical assessment was to determine if the future remediation areas are currently providing wildlife habitat, including species at risk (SAR) (wildlife and vegetation), that may be impacted by the temporary removal and replacement of the retention pond and swale, and could be disturbed during use of the access road by remediation equipment. The biophysical assessment included both desktop and site visit components and was also designed to provide information on whether permits and/or mitigation measures would be required prior to and during remediation, thus avoiding potential delays to the remediation project. Finally, this information will also be used to support the restoration plan development.

### 2.1 METHODS

Prior to field work, SLR conducted a desktop assessment of all publicly available and DND information, including previous studies, and reviewed available current and historical air photographs.

To determine what species are present and using the retention pond and northwestern swale, a 'presence/not detected' survey design was selected to be applied in the field. This method is described in the Resources Inventory Committee (RIC), Survey Inventory Fundamentals document developed by the Government of British Columbia (1998). This survey type allows for obtaining a species list for the subject area and to determine species/habitat associations. Appropriate weather / field season, sampling technique, and skilled observers were selected for this field program to ensure that all data was collected without omission in accordance with RIC guidance (Government of British Columbia 1998).

As the size of the project area is relatively small (2.13 ha), with the majority occurring within an open, mowed portion of the CFB Comox Airport, a Search Area design was applied (Government of British Columbia 1998). This method allowed for a focused search of specific areas for focal species. All observations made within the specific areas and those incidentally observed moving around the site were recorded. A pre-loaded tablet with the site boundaries was used to collect location-specific information, including spatial data and photographic evidence.

## 2.2 RESULTS

### 2.2.1 Desktop Assessment

#### Previous Studies

To assist with identifying sensitive or threatened species and habitat at the site which may be directly influenced by the remedial activities, a search of the federal *Species at Risk Act* Registry (Government of Canada, 2019) and the BC Ministry of Environment Conservation Data Centre (CDC) online resources was conducted (Government of British Columbia, 2020). This included searching the BC Species and Ecosystems Explorer by filtering for red and blue listed species within the Comox Valley Regional District; and, reviewing the CDC iMap tool that maps all known locations of federally listed species under the *Species at Risk Act* and the Committee on the Status of Endangered Wildlife in Canada COSEWIC species listed as endangered, threatened or special concern.

In addition, SLR reviewed all applicable species at risk assessments that have been completed at the CFB Comox site, including:

- EBB Environmental Consulting Inc. Inventory of Species at Risk, 19 Wing Comox, Lazo, BC (Aldos *et. al* 2012);
- Stantec Consulting Ltd. 2017. Natural Resource Inventory at CFB Comox, British Columbia: Background Information Review. DCC Project Number: CXA46092. March 30, 2017 (Stantec 2017); and
- Golder Associates Ltd. 2020 (DRAFT). Environmental Effects Determination. Project: Remediation of PFAS Contamination at Fire Fighting Training Area – CFB Comox. Option A: Excavation and Containment in on Site Engineered Storage Facility. Version: 19133527-002-R-RevB (Golder 2020).

Based on previous assessment reviews it was determined that the following species at risk could be present within the area of FFTA:

- The EBB report identified 9 federally listed species at risk within the area of CFB Comox during 2012 field assessments:
  - Sand-verbena moth (*Copablepharon fuscum*),
  - Northern red-legged frog (*Rana aurora*),
  - Great-blue heron (*Ardea herodias fannini*),
  - Peregrine falcon (*Falco peregrinus pealei*),

- Barn owl (*Tyto alba*),
- Western screech owl (*Megascops kennicottii*),
- Common nighthawk (*Chordeiles minor*),
- Band-tailed pigeon (*Patagioenas fasciata*), and
- Barn swallow (*Hirundo rustica*).
- An additional 4 species were inventoried for based on potential to be present, but were not identified in 2012 including:
  - Vancouver Island beggarticks (*Bidens amplissima*),
  - Northern goshawk (*Accipiter gentilis laingi*),
  - Olive-sided flycatcher (*Contopus cooperi*), and
  - Painted turtle (*Chrysemys picta*).
- Stantec conducted site work 5 years later (in 2017) and identified the following potential occurrences including the additional species at risk:
  - Short-eared owl (*Asio flammeus*) – observed foraging; however, not known to breed on Vancouver Island,
  - Western meadowlark (*Sturnella neglecta*) – breeding pair observed historically,
  - Island tiger moth (*Grammia complicata*),
  - Cutthroat trout (*Oncorhynchus clarkii*) – spawning, and
  - Western toad (*Anaxyrus boreas*).

A number of other species were identified within the Comox Valley area and through previous assessments; however, these species are more specific to other areas of the base and suitable habitat for these species was not expected in the FFTA (i.e., marine foreshore species).

### Historical Air Photos

Available historical air photos dated 1946, 1957, 1964, 1968, 1975, 1991, 1996, and present day were reviewed for the presence and changes to habitat types, watercourses, and wetlands within the key remediation areas. These areas included: the retention pond, northwestern swale, and the proposed crossing location across Scales Creek to access the remedial works area. The following information was obtained through air photo interpretation:

**Retention Pond** – in the 1964 air photo it appears that the retention pond was present within an already cleared area of the FFTA. In subsequent available historical air photos, the retention pond can also be seen; however, in some years the pond is observed to be dry. Earlier (pre-disturbance) photo was not available.

**Northwestern Swale** – in 1975 air photo, it appears that removal of trees and shrubs has occurred on the west side of the FFTA and north end of the airport. The swale is now visible, although no obvious riparian vegetation such as trees and shrubs were retained following the vegetation removal.

**Crossing of Scales Creek** – it was noted that the crossing over Scales Creek has been present since 1946. This is the earliest available historical air photo and therefore, it is possible that the crossing has been installed when the base was originally constructed in 1942.

### Review of Listed Species at Risk

Prior to field visit, on April 29, 2020 SLR conducted a BC Species and Ecosystems Explorer (Government of British Columbia 2020) search for the Comox Valley Regional District (CXRD) and compared the current data to the previous searches (Aldos *et al.* 2012, Stantec 2017).

It was noted that no new additional species were listed within the area of CFB Comox within last 3 years since the Stantec assessment; however, a few status changes were identified as noted below in Table 1 by an asterisk. Based on the Table 1 below, SLR prepared a checklist to guide field work.

**Table 1: Federally Listed Species at Risk Which May be Present within the FFTA**

Species	Scientific Name	COSEWIC Status <sup>1</sup>	SARA Status <sup>1</sup>	BC Status <sup>2</sup>	Occurrences from document review or observations <sup>3</sup>
Band-tailed pigeon	<i>Patagioenas fasciata</i>	Special Concern	Special Concern	Blue	Yes
Barn owl	<i>Tyto alba</i>	Threatened	Special Concern	Red	Yes
Western screech owl, kennicottii subspecies	<i>Megascops kennicottii</i>	Threatened	Threatened	Blue	Yes
Short-eared owl	<i>Asio flammeus</i>	Special Concern	Special Concern	Blue	Yes
Common nighthawk	<i>Chordeiles minor</i>	Threatened	Threatened	Yellow	Yes
Peregrine falcon, pealei subspecies	<i>Falco peregrinus pealei</i>	Special Concern	Special Concern	Blue	Yes
Olive-sided flycatcher	<i>Contopus cooperi</i>	Special Concern (2018)	Threatened	Blue	Yes
Barn swallow	<i>Hirundo rustica</i>	Threatened	Threatened (2017)*	Blue	Yes
Evening grosbeak	<i>Coccothraustes vespertinus</i>	Special Concern	Special Concern (2019)*	Yellow	Yes
Great blue heron, fannini subspecies	<i>Ardea herodias fannini</i>	Special Concern	Special Concern	Blue	Yes
Northern goshawk, laingi subspecies	<i>Accipiter gentilis laingi</i>	Threatened	Threatened	Red	Yes
Little brown myotis	<i>Myotis lucifugus</i>	Endangered	Endangered	Yellow	No
Wandering salamander	<i>Aneides vagrans</i>	Special Concern	Special Concern	Blue	Yes
Western toad	<i>Anaxyrus boreas</i>	Special Concern	Special Concern	Yellow	Yes
Northern red-legged Frog	<i>Rana aurora</i>	Special Concern	Special Concern	Blue	Yes

Species	Scientific Name	COSEWIC Status <sup>1</sup>	SARA Status <sup>1</sup>	BC Status <sup>2</sup>	Occurrences from document review or observations <sup>3</sup>
Painted turtle, pacific coast population	<i>Chrysemys picta</i>	Threatened	Endangered	Red	Possible

## Notes:

1 SARA Registry – last update 2019

2 BC CDC 2020

3 Occurrence records from within the Review Area

\*Status update since 2017 Stantec Report.

### 2.2.2 Field Assessment Findings

Two SLR Terrestrial Ecologists conducted field assessment on May 14, 2020. This survey was conducted on foot using a Samsung Galaxy tablet pre-loaded with an air photo to allow for collection of data at recorded Universal Transverse Mercator (UTM) locations. In addition, with approval from Ruby Pennell, PSPC Environmental Specialist, a handheld, point and shoot camera was used to record site condition. A full species list can be found in Appendix A. Photos accompanying text below can be found in the attached Photo Plates.

The following areas, in addition to the remediation works areas, within the FFTA were assessed (refer to Figure 1 for locations):

- Retention pond,
- Northeastern mapped drainage,
- Northwestern swale,
- Crossing area at Scales Creek,
- Soil treatment area dugout, and
- Disturbed area within the extent of the new FFTA.

#### Retention Pond

As identified through the available historical air photo review, the retention pond appears to have not been constructed over an existing wetland. If this is the case, it is therefore estimated from the air photo review that the retention pond was likely constructed in the early 1960s. As the pond has been present within the FFTA for close to 60 years, it is not unexpected that the pond was presenting as a naturalized wetland at the time of the site assessment (Photos 1 and 2).

Standing water was present at the time of the assessment within the retention pond. Water smartweed (*Persicaria amphibia*) and yellow flag iris (*Iris pseudacorus*) were observed within this area of standing water. Outside of the standing water, sitka sedge (*Carex sitchensis*), creeping spike-rush (*Eleocharis palustris*), bluejoint (*Calamagrostis canadensis*), bluegrass (*Poa sp.*), and bedstraw (*Galium sp.*) were present. A riparian area consisting of willows (*Salix sp.*), black hawthorn (*Crataegus douglasii*), saskatoon (*Amelanchier alnifolia*), and Himalayan blackberry (*Rubus armeniacus*) was present around the edge of the pond. The edge of the riparian area was mowed prior to the assessment; therefore, the full extent of the wetland vegetation outside of the riparian area could not be determined. Based on the species observed, the retention pond could be classified as a naturalized type of marsh wetland.

Invasive species were also observed. As noted above, Himalayan blackberry is present around the pond. In addition, cutleaf blackberry (*Rubus laciniatus*) and Japanese knotweed (*Reynoutria japonica*) were observed. Japanese knotweed is a provincially listed noxious weed in BC.

Wildlife observed using the pond included migratory songbirds such as red-winged blackbirds (*Agelaius phoeniceus*), savannah sparrows (*Passerculus sandwichensis*), and ducks (female mallard (*Anas platyrhynchos*)) (Photo 3). Northern red-legged frog tadpoles, which are listed as Special Concern under the *Species at Risk Act*, were observed within the retention pond. However, no adult frogs were observed at the time of assessment.

### Northeastern Mapped Drainage

The northeast drainage is a mapped, first order stream located east of the FFTA (Photo 4 – looking south, Photo 5 – looking north). Although not included in the remedial works, this drainage was assessed to determine if any species at risk may be present which could be impacted by proposed remediation. Impacts could include impediment to seasonal water movement from the drainage to the treed areas outside of the FFTA.

At the time of the assessment, the drainage was noted to have water present intermittently along its length (Photo 6). Species such as common rush (*Juncus effusus*), Sitka sedge, multiple species of willow, Sitka alder (*Alnus alnobetula sinuata*), Sitka ash (*Sorbus sitchensis*), creeping spike-rush, and common horsetail (*Equisetum arvense*) were observed. Invasive species such as yellow flag iris and gorse (*Ulex europaeus*) were observed. Both are listed as noxious weeds in BC.

Wildlife observed directly using the drainage were western toad, a species listed as Special Concern under the *Species at Risk Act* (Photo 7). Tadpoles were observed within the shallow standing water portions of the stream all the way to the fence line. No adult western toads were observed at the time of assessment.

### Northwestern Swale

The northwest swale was assessed from the north to the south starting from the fence. A small metal culvert is present at the north end which flows into a ditch along Kilmorley Road (Photo 8). This culvert appeared to have been plugged with debris and may need to be cleaned up. The swale was observed to be mechanically constructed with consistent bed and banks (Photo 9 and 10). The vegetation within the swale had been mowed within a day of the site assessment. Although no water was present within the swale at the time of the assessment, evidence of water influence on vegetation within the swale through winter/early spring was observed. This included remnant presence of sedges and water tolerant grasses such as bluegrass. In addition, willows and black cottonwood (*Populus trichocarpa*) were observed (Photo 11). These shrubs were not present along the length as a riparian area; however, were located at non-mowed areas such as culvert crossing areas.

No wildlife was observed within the swale and no standing water was present at the time of assessment to provide breeding habitat for frogs and toads.

### Crossing Area at Scales Creek

SLR assessed the proposed crossing area over Scales Creek that will allow workers and equipment access to the FFTA during remediation (Photo 12 – east section, Photo 13 – west section). Based on air photo interpretation, the access road from Little River Road to the FFTA has been present since at least 1946 (earliest air photo available). The access road crosses Scales creek over two large culverts which allow water flow (Photo 14 – south culverts, Photo 15 – north culverts). A well-established riparian area was observed along the edge of the creek (Photo 16). Open grassed corridors were present on the east and west sides, outside of the riparian area, which are likely fire breaks (Photo 17).

The riparian area was composed of mature trees, shrubs, and dense understory. Some Himalayan blackberry was observed near the access road. At the time of the assessment, water in the area of the



culverts was silty and slow moving (Photo 18). No fish were observed in the area of the culverts. Following the creek, along the east bank walking northward, a widening in the creek was observed (Photo 19). This ponded area was noted to be approximately 50 m in length. Recent beaver (*Castor canadensis*) activity including tree cuttings, beaver tracks within the silty shoreline, and dammed areas at the south and north ends of the pond were observed (Photos 20-22). Although no beavers were observed at the time of the assessment, it is very likely that this ponded area, which can be observed as early as 1991 on the air photo, has been dammed by beavers for a long period of time. Water in the beaver ponded area of the creek was noted to be slow moving and silty. However, north of the beaver dam, the water resumes flow which was observed to be clear, making visible the creek bed composed of small gravels and cobbles (Photo 23). Although this area, north of the beaver dam, could be considered good fish breeding habitat, a potential barrier was observed at the fence line where a private property is located (Photo 24). It is not currently understood if species which are known to be present in Scales Creek could continue upstream past the barrier to spawn.

### Soil Treatment Area Dugout and Disturbed Area of FFTA

A dugout is located within the soil stockpile area to the east within the FFTA. At the time of the assessment the dugout had water present (Photo 25). A poly liner was observed within dugout, however, some naturalization has occurred within the water and along the edges through the poly including presence of sedges, rushes, and shrubs. Within the water, red-legged frog tadpoles were observed in a similar larval stage to those observed in the retention pond (Photo 26). No adult frogs or any other wildlife were observed.

Invasive species such as scotch broom (*Cytisus scoparius*) and Himalayan blackberry were observed.

Within the disturbed area, some storage buildings, a gas hut, garbage and contaminated soil/water containers were observed (Photo 27). The overhangs of the rooves of the buildings were assessed for presence of barn swallow, a species at risk. No obvious mud nests were observed.

## 2.3 MITIGATION AND MONITORING DURING REMEDIAL WORKS

Remedial work is expected to be initiated during late summer/early fall 2021. As such, it is expected that all breeding birds will no longer be nesting in the FFTA area. It is expected that only minor brush clearing will be required, particularly in the area of the access to the FFTA from Little River Road. Prior to conducting minor improvements to the access (from gate at Little River Road to FFTA), SLR recommends that the environmental monitor conducted a rapid nest sweep to ensure that no late nesters or fledglings are remaining which could be impacted by site activities.

Northern red-legged frog and western toad may still be migrating from the retention pond, the dugout, and the northeastern mapped drainage. It is expected that the retention pond will be dry to bottom at the time of the commencement of the remediation; however, frogs may still be in the process of moving between the pond and the adjacent forested areas. It is also expected that there will be no water remaining within the northeastern drainage, and similarly, western toad may be moving towards the forested areas. SLR recommends that during the initial set up and excavation, an environmental monitor is present to monitor for amphibians. Where necessary under permit, these amphibians can then be safely moved to the adjacent forested areas.

## 3.0 RECOMMENDATIONS IN SUPPORT OF THE ECOLOGICAL HABITAT COMPENSATION / RESTORATION PLAN

The following sections provide information obtained from the biophysical assessment to support preparation of the ecological habitat compensation/restoration plans. In particular, information provided below supports

a design to construct wildlife habitat for species at risk, such as the red-legged frog, which was observed to be using the retention pond as breeding habitat. Following completion of remedial works, and referring to the preliminary designs for pond restoration, the information provided in the following sections may be used as a guide to ensure that the final plans provide similar, suitable habitat for ongoing breeding habitat for species at risk.

### 3.1 RETENTION POND

The retention pond was identified to provide breeding habitat for northern red-legged frogs, a federally listed species at risk. The retention pond obtains some of its water through rainfall and overland flow and may at very high-water periods, flow out of the pond and reach the northwestern swale. Vegetation within the pond is limited; however, it provides emergent aquatic vegetation such as creeping spike-rush and water smartweed, which can be used to attach egg masses. In addition, the surrounding vegetation composed of grasses, sedges, shrubs and small trees provides shading and nesting habitat for migratory songbirds such as red-winged blackbirds. As the pond dries out annually, it does not provide overwintering habitat for amphibians. The vegetation that grows in the pond is water tolerant but not water dependent, limiting the potential wetland species which could grow there. Without standing water and a soft substrate, the frogs must migrate to overwintering habitat within adjacent forested areas.

Restoration of a similar sized pond within the area of the FFTA can be deemed of importance due to the use by federally listed northern red-legged frogs as breeding habitat. In addition, the pond provides nesting habitat for migratory songbirds where shrubs and small trees are made available. Pond design will be influenced by many factors such as the size and depth of the final remedial excavation and suitable soil for pond liner and backfill. General considerations for the final design should include the following:

- Design Considerations:
  - Determine if having water within the pond should be all year or only seasonally as it has been for decades. If retention of water all year round is of importance, then:
    - assess the hydrogeology and soil lithology of the proposed constructed pond area for ability to retain water and maintain steady water levels,
    - assess climatological data, such as precipitation and evaporation levels,
    - consider a clay liner to reduce potential for loss through percolation,
    - ensure adequate shading by planted vegetation and/or large boulders to reduce loss of water through evaporation.
  - Limit pond size and develop shallow riparian zones:
    - to reduce use by larger waterfowl which could be hazardous to aircraft.
    - to allow for continued use by northern red-legged frogs, a maximum of 50 cm deep to allow for vegetated area to grow to provide an anchor point for egg masses (Government of British Columbia 2004).
    - to promote wetland vegetation growth by direct planting / transplanting from other areas within the site and developing suitable microsites for natural vegetation establishment.
    - to ensure adequate slopes (1:6 or gentler) are achieved in the riparian zone.
  - Allow for a shoreline for shorebirds and for waterfowl bird nesting:
    - Create island(s) for waterfowl by re-contouring soil with the excavation.
    - Re-vegetate the shoreline to provide habitat and food source for birds.
    - Implement timely weed control program not allowing invasive species to out-compete native vegetation.

- Location:
  - near forested area without obstructions such as paved, active roads to allow for frog and toad migration,
  - away from area of runway to limit access to wildlife,
  - away from areas which may result in overland runoff of contaminated water such as adjacent to active gravelled or paved roads entering the pond,
  - in the location with favourable lithology, hydrology and sufficient catchment area, and
  - in the area close or within the remedial excavation to avoid additional costs related to soil hauling and handling.
- Vegetation:
  - allow to naturally regenerate, or
  - select plantings such as trees and shrubs as identified during the site assessment.  
Consider the following:
    - selection of suitable species that can tolerate annual drying of the pond if the pond is designed for ongoing seasonal water presence, or
    - selection of suitable species that requires presence of water all year round including emergent and submergent vegetation, and
    - consider if water remains all year round, will it freeze to bottom during winter months.
- Substrate:
  - Replacement of substrate if a liner is used for construction of the pond:
    - When planting emergent and submergent vegetation, and
    - to allow for overwintering for frogs if water is present all year round.
  - Assess suitability of natural pond bottom if no liner is selected:
    - Is dense compacted substrate available at the location, or
    - can more suitable substrate be hauled into the site.

### 3.2 NORTHWESTERN SWALE

As identified during the site assessment, the swale did not have water present, similar to the northeastern mapped drainage. The swale was fully vegetated with water tolerant grasses and some sedges and had recently been mowed. No riparian vegetation was observed outside of some smaller shrubs and trees present at two culvert crossings. No wildlife was observed using the swale, which is likely due to the lack of suitable water, forage, and cover habitat.

It is likely due to the consistent constructed bed and banks of the swale, the mowing of all vegetation, and the consistent sloping toward Kilmorley Road, the swale ecological functioning is quite different than the drainage. Within the drainage, intermittent ponds, presence of riparian shrubs and small trees, and no mowing disturbance has contributed to the drainage providing habitat. In particular, the smaller, shallow ponds have provided breeding habitat to federally listed western toads.

As the swale in its current design does not provide any breeding, foraging or roosting habitat, the following should be considered for the final design:

- Re-design the swale to provide additional breeding habitat to western toad by providing:
  - a more meandering path including smaller, shallow pools to provide breeding habitat for western toad,
  - inclusion of riparian vegetation similar to that of the northeastern drainage to provide other habitat to breeding songbirds understanding that this area cannot be continued to be mowed through,

- determining if flow of water through the swale will be increased or reduced depending on the final location and design of the retention pond, and
  - study lithology of soil comprising the swale for permeability and texture.
- Vegetation present within and along the re-designed swale should be similar to that of the northeastern drainage by:
  - Planting of similar species, transplanting or allowing for natural propagation from seeds in the area, and
  - ensuring that adequate water flow can be achieved to support these plantings.
- Ensure that any exposed substrate is supported until vegetation is re-established to ensure no heavy movement of silt occurs downstream, which may flow into the ditch at Kilmorley Road and subsequently into Scales Creek. An erosion and sediment control plan and mitigation measures should be put in place until the vegetation is fully established and erosion risk is low.

### 3.3 DEVELOPMENT OF FINAL RESTORATION DESIGNS

In addition to the preliminary designs for the replacement of the retention pond and swale, the recommendations provided in the previous sections, based on the biophysical assessment, should be considered for the final design. In particular, it was determined that the FFTA provides breeding habitat to red-legged frogs and western toad. Understanding that the proposed remedial works area is based on the potential extent of impact, a final restoration plan cannot be realized until all soil and vegetation removal has been completed and remedial objectives for the site has been achieved.

At the time of preparation of the final drawings, SLR will provide PSPC with a restoration plan including:

- Species type and locations of vegetation plantings (upland, emergent and submergent vegetation for pond),
- Recommendations on pond shoreline contours to support suitable breeding habitat for red-legged frog,
- Erosion and weed control measures following soil works and planting of vegetation, and
- Monitoring plan for plantings to assess survival rates and recommendations for additional plantings where needed.

### 4.0 STATEMENT OF LIMITATIONS

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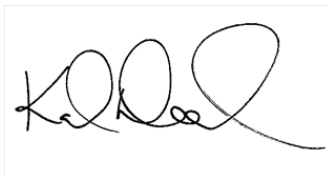
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Yours sincerely

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Enc Drawing 1  
Photoplate  
Appendix A – Species Table

KN/cn

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## **DRAWINGS**

Biophysical Assessment to Support Development of the Ecological Habitat  
Compensation / Restoration Plan  
Comox Fire Fighting Area, Comox, BC  
SLR Project No.: 219.05444.00000



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LEGEND:

	BASE BOUNDARY
	NEW FFTA FOOTPRINT
	EXCAVATION EXTENT
	WATERCOURSE
	ELEVATION CONTOUR (1m INTERVAL)
	UTILITIES
	U/G ELECTRICAL
	U/G SANITARY
	U/G STORM
	U/G WATER

NO.	DATE	REVISION	APPR.
-	2020/09/15	-	-

ÉCHELLE | SCALE  
1:750

EMPLACEMENT | LOCATION  
**CFB COMOX**  
**LAZO**  
**BRITISH COLUMBIA**

PROJET | PROJECT  
**ECOLOGICAL HABITAT COMPENSATION / RESTORATION PLAN**

MÉTIER   TRADE	DATE
-	2020/07/07

SUJET | SUBJECT  
**SITE PLAN**

PRODUCTION	REVISÉ   REVIEWED	AGENT CONC   DES O
ÉTUDE   DESIGNED	COMMS   COMMS	-
DESSINÉ   DRAWN	-	GEST PROJ   PROJ MGR
VÉRIFIÉ   CHECKED	-	GEST CONC   DES MGR
COORDINATION	-	INCENDIE   FIRE

NO. SRT   WBS NO.	NO. DP   PF NO.
-	-
NO. DESSIN   DWG. NO.	
219-05444-00000-A2 001	

Dernière mise à jour du fichier: 2011-08-15  
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## **PHOTOGRAPHS**

Biophysical Assessment to Support Development of the Ecological Habitat  
Compensation / Restoration Plan  
Comox Fire Fighting Area, Comox, BC  
SLR Project No.: 219.05444.00000





**Photo 1:** View of the retention pond within the FFTA, facing northwest.



**Photo 2:** Standing water and emergent aquatic vegetation in the retention pond.



Ecological Habitat Compensation/Restoration Plan  
CFB Comox, Fire Fighting Training Area  
Comox, BC

SITE PHOTOGRAPHS

SLR Project No: 219.05444.00000



**Photo 3:** A female mallard (*A. platyrhynchos*) using the retention pond.



**Photo 4:** View looking south along the northeastern drainage.



Ecological Habitat Compensation/Restoration Plan  
CFB Comox, Fire Fighting Training Area  
Comox, BC

SITE PHOTOGRAPHS

SLR Project No: 219.05444.00000



**Photo 5:** View looking north along the northeastern drainage.



**Photo 6:** Water present in the northeastern drainage.



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CFB Comox, Fire Fighting Training Area  
Comox, BC

SITE PHOTOGRAPHS

SLR Project No: 219.05444.00000



**Photo 7:** Western toad (*A. boreas*) tadpoles in the northeastern drainage.



**Photo 8:** Culvert at the north end of the northwest swale.



Ecological Habitat Compensation/Restoration Plan  
CFB Comox, Fire Fighting Training Area  
Comox, BC

SITE PHOTOGRAPHS

SLR Project No: 219.05444.00000



**Photo 9:** View looking north along the northwest swale.



**Photo 10:** View looking south along the northwest swale.



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CFB Comox, Fire Fighting Training Area  
Comox, BC

SITE PHOTOGRAPHS

SLR Project No: 219.05444.00000



**Photo 11:** Willows (*Salix sp.*) and black cottonwood (*P. trichocarpa*) along the northwest swale.



**Photo 12:** View looking west at the eastern section of the access road.



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CFB Comox, Fire Fighting Training Area  
Comox, BC

SITE PHOTOGRAPHS

SLR Project No: 219.05444.00000



**Photo 13:** View looking west at the western section of the access road that crosses Scales Creek, towards Gate A.



**Photo 14:** View looking south along Scales Creek from the access road crossing.



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CFB Comox, Fire Fighting Training Area  
Comox, BC

SITE PHOTOGRAPHS

SLR Project No: 219.05444.00000



**Photo 15:** View looking north along scales creek from the access road crossing.



**Photo 16:** Riparian area along the edge of Scales Creek.



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Comox, BC

SITE PHOTOGRAPHS

SLR Project No: 219.05444.00000





**Photo 17:** Grass corridor on the west side of the riparian area for Scales Creek.



**Photo 18:** Slow moving, silty water near the culverts for the access road crossing.



Ecological Habitat Compensation/Restoration Plan  
CFB Comox, Fire Fighting Training Area  
Comox, BC

SITE PHOTOGRAPHS

SLR Project No: 219.05444.00000



**Photo 19:** View of the wider, ponded area of Scales Creek.



**Photo 20:** View of beaver (*C. canadensis*) tracks along the shoreline of Scales Creek.



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CFB Comox, Fire Fighting Training Area  
Comox, BC

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**Photo 21:** View of beaver (*C. canadensis*) tracks and cuttings along the shoreline of Scales Creek.



**Photo 22:** View of the dammed area along Scales Creek.

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**Photo 23:** View downstream of the dam, where clearer water enabled view of the creek bed.



**Photo 24:** View of the in-stream barrier along the fence line.



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CFB Comox, Fire Fighting Training Area  
Comox, BC

SITE PHOTOGRAPHS

SLR Project No: 219.05444.00000



**Photo 25:** View of the soil treatment area dugout.



**Photo 26:** View of red-legged frog (*R. aurora*) tadpoles in the standing water of the soil treatment dugout.




Ecological Habitat Compensation/Restoration Plan  
CFB Comox, Fire Fighting Training Area  
Comox, BC

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SLR Project No: 219.05444.00000



**Photo 27:** View of the disturbed area of the FFTA, facing northwest towards the B:276: Gas Hut.

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SITE PHOTOGRAPHS	SLR Project No: 219.05444.00000

**APPENDIX A**  
**Species Table**

Biophysical Assessment to Support Development of the Ecological Habitat  
Compensation / Restoration Plan  
Comox Fire Fighting Area, Comox, BC  
SLR Project No.: 219.05444.00000

## PLANTS

Common name	Scientific name	BC Provincial Listing (Yellow/Red/Blue)	Federal Listing (COSEWIC/SARA)	Notes
American vetch	<i>Vicia americana</i>	Yellow, S5	-	Retention pond
Annual hawkbeard	<i>Crepis tectorum</i>	Exotic	-	Retention pond
Big Leaf Maple	<i>Acer macrophyllum</i>	Yellow, S5	-	Crossing Scales Creek
Black cottonwood	<i>Populus trichocarpa</i>	Yellow, S5	-	Crossing Scales Creek, northwestern swale
Black hawthorn	<i>Crataegus douglasii</i>	Yellow, S5	-	Retention pond
Bluejoint reedgrass	<i>Calamagrostis canadensis</i>	Yellow, S5	-	Retention pond
Bracken fern	<i>Pteridium aquilinum</i>	Yellow, S5, S3S4	-	Crossing Scales Creek
Clover sp.	<i>Trifolium sp.</i>	Exotic	-	Northwest swale, retention pond
Common dandelion	<i>Taraxacum officinale</i>	Exotic	-	Retention pond, crossing Scales Creek
Common horsetail	<i>Equisetum arvense</i>	Yellow, S5	-	Retention pond, northeast drainage
Common rush	<i>Juncus effusus</i>	Yellow, S5	-	Northeastern drainage, dugout
Common snowberry	<i>Symphoricarpos albus</i>	Yellow, S5, S3S4	-	Crossing Scales Creek, northeastern drainage
Common tansy*	<i>Tanacetum vulgare</i>	Exotic	-	Crossing Scales Creek, dugout
Creeping buttercup	<i>Ranunculus repens</i>	Exotic	-	Retention pond, crossing scales creek
Creeping spike-rush	<i>Eleocharis palustris</i>	Yellow, S5	-	Retention pond, northeast drainage, dugout
Cutleaf blackberry	<i>Rubus laciniatus</i>	Exotic	-	Retention pond, crossing Scales Creek
Dockleaf / pale smartweed	<i>Persicaria lapathifolia</i>	Yellow S5	-	Northwestern swale
Douglas Fir	<i>Pseudotsuga menziesii</i>	Yellow, S5	-	Crossing Scales Creek
False lily of the valley	<i>Maianthemum dilatatum</i>	Yellow, S5	-	Crossing Scales Creek
Fowl bluegrass	<i>Poa palustris</i>	Yellow, S5	-	Retention pond, northeast drainage
Gorse**	<i>Ulex europaeus</i>	Exotic	-	Northeastern drainage
Hardhack	<i>Spiraea douglasii</i>	Yellow, S5	-	Crossing Scales Creek
Herb-Robert geranium	<i>Geranium robertianum</i>	Exotic	-	Crossing Scales Creek
Himalayan blackberry	<i>Rubus armeniacus</i>	Exotic	-	Retention pond, crossing Scales Creek, dugout
Japanese knotweed**	<i>Reynoutria japonica</i>	Exotic	-	Retention pond
Kentucky Bluegrass	<i>Poa pratensis</i>	Possibly exotic	-	Northwest swale, retention pond
Kinnikinnick	<i>Arctostaphylos uva-ursi</i>	Yellow, S5	-	Northeastern drainage
Marsh skullcap	<i>Scutellaria galericulata</i>	Yellow, S5	-	Northeastern drainage



Common name	Scientific name	BC Provincial Listing (Yellow/Red/Blue)	Federal Listing (COSEWIC/SARA)	Notes
Field bindweed	<i>Convolvulus arvensis</i>	Exotic	-	Crossing scales Creek
Nootka rose	<i>Rosa nutkana</i>	Yellow, S5	-	Crossing Scales Creek
Orchard grass	<i>Dactylis glomerata</i>	Exotic	-	Retention pond
Pacific Crabapple	<i>Malus fusca</i>	Yellow, S5	-	Crossing Scales Creek
Pacific willow	<i>Salix lucida lasiandra</i>	Yellow, S5	-	Retention pond, northeast drainage
Red alder	<i>Alnus rubra</i>	Yellow, S5	-	Crossing Scales Creek, northeastern drainage
Reed canarygrass	<i>Phalaris arundinacea</i>	Exotic	-	Crossing Scales Creek
Salal	<i>Gaultheria shallon</i>	Yellow, S5	-	Northeastern drainage
Salmonberry	<i>Rubus spectabilis</i>	Yellow, S5	-	Crossing Scales Creek
Saskatoon	<i>Amelanchier alnifolia</i>	Yellow, S5	-	Crossing Scales Creek
Scotch broom	<i>Cytisus scoparius</i>	Exotic	-	Disturbed area, northwestern swale, dugout
Scouler's willow	<i>Salix scouleriana</i>	Yellow, S5	-	Northeastern drainage
Sheep sorrel	<i>Rumex acetosella</i>	Exotic	-	Access, retention pond, dugout
Silverweed	<i>Potentilla anserina</i>	Yellow, S5	-	Crossing Scales Creek
Sitka alder	<i>Alnus alnobetula sinuata</i>	Yellow, S5	-	Northwestern drainage
Sitka mountain-ash	<i>Sorbus sitchensis</i>	Yellow, S5	-	Northeastern drainage
Sitka sedge	<i>Carex sitchensis</i>	Yellow, S5	-	Retention pond, northeast drainage, northwestern swale, dugout
Sitka spruce	<i>Picea sitchensis</i>	Yellow, S5	-	Crossing Scales Creek
Skunk cabbage	<i>Lysichiton americanus</i>	Yellow, S5	-	Crossing Scales Creek
Small bedstraw	<i>Galium trifidum</i>	Yellow, S5	-	Retention pond
Sword fern	<i>Polystichum munitum</i>	Yellow, S5	-	Crossing Scales Creek
Thimbleberry	<i>Rubus parviflorus</i>	Yellow, S5	-	Crossing Scales Creek
Water smartweed	<i>Persicaria amphibia</i>	Yellow, S5	-	Retention pond
Western trumpet honeysuckle	<i>Lonicera ciliosa</i>	Yellow, S5	-	Crossing Scales Creek
Wild strawberry	<i>Fragaria virginiana</i>	Yellow, S5	-	Northeastern drainage
Yellow flag iris**	<i>Iris pseudacorus</i>	Exotic	-	Retention pond, northeastern drainage

**WILDLIFE (BIRDS, AMPHIBIANS, REPTILES & MAMMALS)**

Common name	Scientific name	BC Listing	Federal Listing (COSEWIC/SARA)	Cue	Notes
<b>BIRDS</b>					
American robin	<i>Turdus migratorius</i>	Yellow, S5	-	Auditory & Visual	Within riparian area
Anna's hummingbird	<i>Calypte anna</i>	Yellow, S4S5	-	Visual	In area of access
Bald eagle	<i>Haliaeetus leucocephalus</i>	Yellow, S5B, S5N	NAR	Visual	Soaring
Barn swallow	<i>Hirundo rustica</i>	Blue, S3S4B	Threatened	Visual	Flying in area from offsite
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	Yellow, S5	-	Visual	Within riparian area
Brown creeper	<i>Certhia Americana</i>	Yellow, S5	-	Auditory	Within riparian area
Killdeer	<i>Charadrius vociferus</i>	Yellow, S4S5B	-	Visual	Dry gravel area near disturbance
Mallard	<i>Anas platyrhynchos</i>	Yellow, S5B, S5N	-	Auditory & Visual	Within retention pond
Orange-crowned warbler	<i>Leiothlypis celata</i>	Yellow, S5B	-	Auditory	Within riparian area
Pacific wren	<i>Troglodytes pacificus</i>	Yellow, S5	-	Auditory	Heard past fence into treed area
Red-winged blackbird	<i>Agelaius phoeniceus</i>	Yellow, S5B, S5N	-	Visual	Within retention pond
Savannah sparrow	<i>Passerculus sandwichensis</i>	Yellow, S5B	-	Auditory & Visual	Grassed area between drainage and swale
Song sparrow	<i>Melospiza melodia</i>	Yellow, S5	-	Auditory	Within riparian area
Spotted towhee	<i>Pipilo maculatus</i>	Yellow, S5	-	Auditory	Within riparian area
Western wood-pewee	<i>Contopus sordidulus</i>	Yellow, S5B	-	Auditory	Within riparian area
Yellow warbler	<i>Setophaga petechia</i>	Yellow, S5B	-	Auditory	Within riparian area
<b>AMPHIBIANS/REPTILES</b>					
Common gartersnake	<i>Thamnophis sirtalis</i>	Yellow, S5	-	Visual (anecdotal)	Grassy runway area
Northern red-legged frog	<i>Rana aurora</i>	Blue, S3	Special Concern	Visual	Tadpole – northwestern swale and dugout
Pacific treefrog	<i>Pseudacris regilla</i>	Yellow, S5	-	Visual (anecdotal)	Adult, near water treatment system
Western toad	<i>Anaxyrus boreas</i>	Yellow, S4	Special Concern	Visual	Tadpole – northeast drainage
<b>MAMMALS</b>					
American beaver	<i>Castor canadensis</i>	Yellow, S5	-	Sign	Dam & lodge
Raccoon	<i>Procyon lotor</i>	Yellow, S5	-	Sign	Tracks

\* Regionally noxious (BC)

\*\* Provincially noxious (BC)

BC/PROVINCIAL LIST KEY

Red: Includes any native species or subspecies that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.

Blue: Includes any native species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.

Yellow: Includes species that are apparently secure and not at risk of extinction. Yellow-listed species may have red- or blue-listed subspecies.

Exotic: includes species that have recently come to British Columbia.

X = presumed extirpated

H = historical (species)/possibly extirpated (communities)

1 = critically imperiled

2 = imperiled

3 = special concern, vulnerable to extirpation or extinction

4 = apparently secure

5 = demonstrably widespread, abundant, and secure.

NA = not applicable

NR = unranked

U = unrankable

COSEWIC/SARA FEDERAL LIST KEY

XX = EXTINCT: A species that no longer exists.

XT = EXTIRPATED: A species that no longer exists in the wild in Canada, but occurring elsewhere.

E = ENDANGERED: A species facing imminent extirpation or extinction.

T = THREATENED: A species that is likely to become endangered if limiting factors are not reversed.

SC = SPECIAL CONCERN: A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events.

NAR = NOT AT RISK: A species that has been evaluated and found to be not at risk.

C = CANDIDATE: A species that is on the short-list for upcoming assessment.

DD = DATA DEFICIENT: A species for which there is insufficient scientific information to support status designation.

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# **CFB COMOX SOIL MANAGEMENT PLAN**

## **CFB Comox FFTA Source Control Project**

PSPC

CFB Comox, Lazo, BC

Requisition No.: R.111173.004



global environmental solutions

**Soil Management Plan  
19 Wing Canadian Forces Base Comox  
Lazo, BC**

**Public Services and Procurement Canada  
on behalf of Department of National Defence**

**March 2018  
SLR Project No.: 202.01592.00002**



**SOIL MANAGEMENT PLAN**  
**19 WING CANADIAN FORCES BASE COMOX**  
**LAZO, BC**

**SLR Project No.: 202.01592.00002**


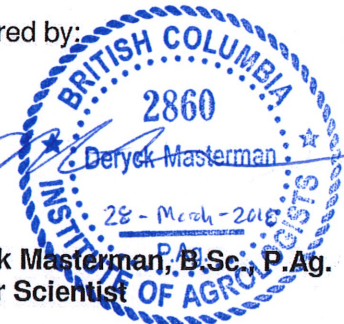
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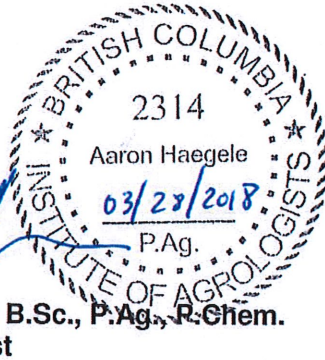
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**CONFIDENTIAL**

Distribution: 1 copy – PSPC  
1 copy – SLR Consulting (Canada) Ltd.

## EXECUTIVE SUMMARY

SLR Consulting (Canada) Ltd. (SLR) has prepared this Soil Management Plan (SMP) at the request of Public Services and Procurement Canada (PSPC) on behalf of the Department of National Defence (DND). This SMP is meant to aid with the management of any known or potentially contaminated soil at 19 Wing Canadian Forces Base (CFB) Comox, Lazo, BC (the 'site').

Projects such as utility replacement and facility upgrades often require earthworks that occur within known contaminated sites or suspected contaminated areas on-site. Wing Environment Office (W Env O) should be consulted when identifying the probable contaminants associated with historic and current land usage.

The purpose of the SMP is to provide information that can be included in National Master Specifications (NMS) for projects that include earthworks, and a decision framework for soil handling depending on the soil analytical data available at the project location.

This SMP is structured to meet on-site federal government guidelines as well as off-site provincial disposal standards for any soil requiring removal from the site.

This SMP will be applied prior to and during any time ground is disturbed and/or excavations are required as part of site operations or construction. This will require that analytical results be reviewed prior to initiating work (where possible) so that health and safety plans, and environmental protection plans can address any potential risks. Potential risks will, in most cases, be addressed via wearing of appropriate personnel protective equipment. In the event that applicable chemistry data is not available, excavated material will be temporarily stockpiled while awaiting analytical testing to classify it for disposal. If the results of analysis indicate the material exceeds the applicable guidelines and/or standards, the material will be sent for off-site disposal by contractors using appropriately licensed vehicles and in accordance with provincial requirements. If the results indicate the material can remain on-site, it may be reused, providing it meets geotechnical requirements.

Post-excavation sampling may be conducted at the excavation limits (walls and floor) for all excavations occurring at CFB Comox to provide detailed information of actual site conditions following excavation.

All fill material imported to CFB Comox is required to have been characterized within the previous three months as per British Columbia Ministry of Environment & Climate Change Strategy, Technical Guidance Document 1 – Site Characterization and Confirmation Testing. Imported backfill must be shown to meet the Canadian Council of Ministers of the Environment (CCME) guidelines prior to importation onto the site.

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
<b>2.0 REGULATORY CONSIDERATIONS .....</b>	<b>1</b>
2.1 Overview of Applicable Regulatory Considerations .....	1
2.2 Applicable Federal Guidelines - On-Site Soil Management .....	2
2.3 Provincial Standards - Delineation and Off-Site Disposal .....	3
<b>3.0 SOIL CHARACTERIZATION .....</b>	<b>3</b>
3.1 Option 1 - Use of Historic In-Situ Data .....	3
3.2 Option 2 - In-Situ Characterization Prior to Excavation .....	4
3.3 Option 3 - Ex-Situ Characterization Post Excavation.....	5
3.4 CCME Guidelines and BC Background Soil Concentrations.....	6
3.4.1 Background Chemistry .....	6
3.5 Stockpiled Soil Management .....	7
3.5.1 Stockpile Siting and Surface Preparation.....	7
3.5.2 Storage Cell Design.....	7
3.5.3 Soil Relocation.....	8
3.6 Off-Site Disposal.....	8
3.7 Soil Tracking Requirements.....	9
3.8 Post-Excavation Sampling.....	9
<b>4.0 IMPORTED MATERIAL .....</b>	<b>10</b>
4.1 Applicable Guidelines for Imported Material .....	11
<b>5.0 HEALTH AND SAFETY REQUIREMENTS.....</b>	<b>11</b>
<b>6.0 STATEMENT OF LIMITATIONS.....</b>	<b>13</b>
<b>7.0 REFERENCES.....</b>	<b>14</b>

## TABLES IN TEXT

Table 1-1 Stockpile Size and Sampling Requirements

## TABLES AFTER TEXT

Table 1: Minimum Soil Concentrations That Trigger TCLP Test and Leachate Quality Standards

Table 2: Vancouver Island Regional Background Soil Quality Estimates for Inorganic Substances

## DRAWINGS

Drawing 1: Site Location Map

Drawing 2: Temporary Soil Storage Cell Schematic Plan / Section

## APPENDICES

Appendix A: 19 Wing CFB Comox - Waste Manifest



## 1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) has prepared this Soil Management Plan (SMP) at the request of Public Services and Procurement Canada (PSPC) on behalf of the Department of National Defence (DND). This SMP is meant to aid with the management of any known or potentially contaminated soil at 19 Wing Canadian Forces Base (CFB) Comox, Lazo, BC (the 'site'). The location of the site in relation to the surrounding area is presented in Drawing 1.

Projects such as utility replacement and facility upgrades often require earthworks that occur within known contaminated sites or suspected contaminated sites within CFB Comox. This SMP is meant to aid in the preparation of National Master Specifications (NMS) for the site.

The SMP is structured to meet on-site federal government regulations as well as off-site provincial disposal standards for any soil requiring removal from the site.

The SMP was prepared under the PSPC's Remediation Services Consultant Task Authorization (CTA) EZ897-170838/001/PWY, Purchase Order Number 700400527.

## 2.0 REGULATORY CONSIDERATIONS

This Section provides a brief overview of applicable legislation, regulations, standards and guidelines for undertaking soil assessment on-site.

### 2.1 Overview of Applicable Regulatory Considerations

The site is crown-owned land under the custodianship of DND and therefore falls under federal jurisdiction. As such, the site must comply with all applicable statutes and requirements regarding environmental management including registration, notifications and reporting; production and storage of certain materials associated with ongoing operations; identification of contamination; and, completion of remediation. Federal and departmental policies and procedures must also be identified and addressed when defining project scopes of work and when developing cost estimates for carrying out work at the site.

In accordance with the Environmental Protection and Resource Conservation (Volume 12, 12-200), DND will ensure that all operations, projects and activities are sustainable and conducted in a manner that protects the environment while achieving operational objectives.

The site is not subject to provincial legislation and regulations, municipal by-laws, or other such requirements for on-site activities. Provincial guidelines and standards are used for evaluating those media without federal guidelines, for evaluating results at locations that are outside of crown-owned lands, evaluating adequacy of delineation based on the proximity of lands under provincial regulatory jurisdiction, and for assessing disposal options onto provincial lands.

For assessment, remediation and management of contaminants, there are two key regulatory benchmarks/guidelines:

- **Federally** – the Canadian Council of Ministers of the Environment (CCME) environmental quality guidelines that provide guidance on acceptable concentrations of contaminants for various land-uses and for the protection of various receptors (further discussed in Section 2.2).
- **Provincially** – the BC Contaminated Sites Regulation (CSR) that provides standards for concentrations of contaminants in soil, sediment, groundwater and vapour (further discussed in Section 2.3).

CFB Comox is an industrial site and will remain an industrial site in the foreseeable future. Therefore, the **CCME Industrial Land Use (IL) guidelines apply**. However, in certain circumstances it might be advisable to consider assessing portions of the site against other more stringent land-use standards and guidelines as well (i.e. Residential Land Use (RL)). Wing Environment Office (W Env O) will provide direction on which guidelines should be considered on a project specific basis.

Registered water wells are situated on and adjacent to CFB Comox and therefore drinking water standards and guidelines should be considered. Furthermore, CFB Comox is adjacent to the Strait of Georgia and therefore marine standards and guidelines should be considered. W Env O will provide direction on the applicability of these guidelines on a project specific basis.

Reference to the provincial legislation, regulations and guidelines and particularly concentrations standards and criteria, is useful in assessing the environmental condition of the property, especially where no federal criteria exists for a given parameter. DND will meet or exceed all applicable federal environmental laws and will adopt and implement federal environmental policies, guidelines and initiatives. Where appropriate, DND operations will be compatible with international, provincial and municipal regulations and standards.

## 2.2 Applicable Federal Guidelines - On-Site Soil Management

For soil use on-site, the following federal guidelines should be followed:

- CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Industrial (CCME IL) (metals).
- CCME Canada-Wide Standards (CWS) for PHCs in Soil, Tier 1 Levels for Industrial (IL) fine and coarse grained soils.
- CCME Canadian Soil Quality Guidelines for PAHs, Industrial, Environmental Health guidelines, Interim Soil Quality Criteria (CCME ILi), Soil Contact (CCME ILsc), Environmental Health (CCME ILe).
- CCME Soil Quality Guidelines for the Protection of Human Health ( $10^{-5}$ ) (CCME SQGhh).
  - Use the  $10^{-5}$  incremental cancer risk for human health guidelines/check values for parameters that are potentially carcinogenic.
  - The Benzo(a)pyrene Total Potency Equivalency (B[a]P TPE), for the protection of direct contact with contaminated soil, is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs. The B[a]P TPE value should be compared against the Industrial guideline: 5.3 B[a]P TPE.
- Federal Contaminated Sites Action Plan - Interim Advice to Federal Departments for the Management of Federal Contaminated Sites Containing Perfluorooctane Sulfonate (PFOS), Version 1.3 – Final Proposed Federal Soil Quality Guideline (FSQG), Industrial (FSQG IL), coarse grained and fine grained soil types.
- Updates to Health Canada Soil Screening Values for Perfluoroalkylated Substances, January 2017, Soil Screening Values (SSVs) for Industrial (IL).

## 2.3 Provincial Standards - Delineation and Off-Site Disposal

For evaluating the adequacy of delineation of soil samples near the boundaries of the DND lands, the following standards may also be considered, in conjunction with the applicable CCME guidelines. W Env O will provide direction on which standards and guidelines should be considered on a project specific basis:

- BC CSR including Schedule 3.1 (Parts 1 and 2), AL and RL land use soil standards.

To determine the appropriate soil contaminant classification for off-site disposal purposes; soils should be compared to the soil standards/guidelines listed above as well as the following provincial standards:

- BC CSR, Schedule 3.1 Soil Standards, Groundwater used for drinking water – Agricultural (AL), Urban Park (PL), Wild Lands (WLN), Residential - Low Density (RLld), Residential - High Density (RLhd), Commercial (CL) and Industrial (IL) combination of the lowest standard from Part 1 - Numerical Soil Standards, Part 2 - Generic Standards to Protect Human Health, Part 3 - Generic Standards to Protect Ecological Health, and the mandatory matrix factors of human intake of contaminated soil and toxicity to soil invertebrates and plants applicable at all sites.
- HWR Leachate Quality standards for leachable metals and leachable PAHs.
- HWR PAH toxicity equivalent for PAHs in soil.

## 3.0 SOIL CHARACTERIZATION

Soil can be characterized through three different methods:

1. Existing historic chemical data, if sufficient for excavation and disposal purposes.
2. In-situ soil characterization prior to excavation.
3. Ex-situ characterization in stockpiles.

For options 2 and 3 the type and number of laboratory analyses should be determined prior to the work being conducted.

Field screening (visual and measuring instrument(s)) of in-situ and ex-situ soil should be conducted to further refine the sample analysis. For example, if there are elevated field measurements of volatiles (by GasTechtor® or Photoionization Detector (PID)), laboratory analysis should be conducted for CWS PHC Fractions F1 to F4, Light/Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH), Benzene, Ethylbenzene, Toluene, and Xylene (BETX), and Volatile Organic Compounds (VOCs). The analysis will be dictated by the consultant or contractors Qualified Environmental Professional (QEP) in consultation with W Env O based on the probable type of contaminant associated with historic and current land usage.

### 3.1 Option 1 - Use of Historic In-Situ Data

If adequate chemical characterization of an area to be excavated has been previously conducted (i.e. historical data is sufficient to satisfy current federal and provincial legislation in the opinion of W Env O and/or consultants/contractors QEP), the soil within the proposed excavation area can be removed, loaded for transport, and disposed of at a permitted facility based on the results of the existing in-situ data.

CFB Comox staff must be careful to review historic data against the current federal and provincial regulations prior to excavation of contaminated material. Both the federal and provincial regulations change based on current science on the toxicological effects of substances to human and ecological receptors. Minimum soil concentrations that trigger Toxicity Characteristic Leaching Procedure (TCLP) analysis are listed in Table 1.

### **3.2 Option 2 - In-Situ Characterization Prior to Excavation**

There is little federal guidance regarding in-situ characterization (type or number of samples) that should occur for soils suspected of being contaminated. Therefore, the BC Ministry of Environment & Climate Change Strategy (ENV) Guidance Document 1 entitled Site Characterization and Confirmation Testing must be applied for this SMP.

In-situ discrete samples should be collected from an area planned for excavation or removal of pavement. BC ENVs definitions of an in-situ discrete sample and what such samples represent is presented below:

#### **Definition of In-Situ Discrete Sample**

An in-situ discrete sample is material:

- Collected from similar in-situ fill or soil at one location.
- Confined to collection within a contiguous volume of one cubic metre.
- Collected over a maximum depth of 0.5 m within the upper 1.0 m from the existing site surface or collected over a maximum depth of 1.0 m at depths greater than one metre below the surface.
- Not collected from two distinct fill or soil zones.
- Not collected on two sides of an air/water interface (or unsaturated/saturated soil zone interface).
- Not made up of a mixture of obviously contaminated material and obviously non-contaminated material as determined by field observations such as sight, smell, gas meters, etc., even if these materials have similar physical characteristics (e.g. both are silty sands).

#### **Volume that an In-Situ Discrete Sample Represents**

One in-situ discrete sample, as long as it is properly collected, prepared and analyzed, and is a part of a sampling and analysis program that is accurate and precise, is considered to represent a volume of:

- 10 m<sup>3</sup> of material designated as waste, industrial or commercial quality.
- 5 m<sup>3</sup> of material designated as hazardous waste.

where volume =  $\pi r^2 d$  and  $d = 0.2$  to 1.0 metre of vertical depth.

Based on the recommended approach outlined by ENV Guidance Document 1, SLR recommends, for lands subject to future excavation, a minimum of three discrete soil samples be collected for small excavations of less than 30 m<sup>3</sup> of soil. If larger excavations up to 250 m<sup>3</sup> are planned, then one in-situ sample should be collected per every 15 m<sup>3</sup> of material planned for removal. In summary, prior to future excavation:

- Collect 1 discrete soil sample when excavating 0 to 10 m<sup>3</sup> soil.
- Collect 3 discrete soil samples when excavating 10 to 30 m<sup>3</sup> soil.
- Collect 1 discrete soil sample per 15 m<sup>3</sup> when excavating 30 to 250 m<sup>3</sup> soil.

Sample numbers for excavations of larger than 250 m<sup>3</sup> should be chosen based on variability of material types and total volume to ensure a statistically significant number of samples is obtained.

The total number of soil samples required to adequately characterize in-situ soil for larger excavations should be determined by the consultants or contractors QEP in consultation with W Env O prior to excavation.

In accordance with Section 5.4 of the CCME Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment (Volume 1 Guidance Manual) the following in-situ sampling methods are acceptable for collection of representative in-situ soil samples:

- Soil samples can be collected directly from test pits, which have been advanced by a backhoe or excavator, or with a shovel, within the proposed excavation area.
- Soil samples can be collected from boreholes, which have been advanced by a truck-mounted drill rig, hand auger or power auger, within a proposed excavation area. Samples can be collected directly from solid stem auger flights after the outer skin of soil on the flights has been removed to reduce potential for cross-contamination. If the hollow-stem auger drilling method is used, samples can be collected from a split spoon. If the sonic method is used, samples can be collected from the core generated.

Select samples exhibiting the highest concentration of volatile hydrocarbons in the field (measured using a GasTector or PID) should be analyzed for petroleum hydrocarbons. These samples should be analysed for CWS PHC Fractions F1 to F4, LEPH/HEPH, BETX, and VOCs. The analysis will be dictated by the probable type of contaminant based on historic and current land usage.

Comparison of analytical results to CWS PHC Fractions is to determine if the material meets federal regulations on-site, and comparison of analytical results to LEPH/HEPH to meet provincial regulations for off-site disposal.

### **3.3 Option 3 - Ex-Situ Characterization Post Excavation**

SLR recognizes that there are instances in which characterization of soils prior to excavation may not be logistically feasible. Consequently, the following guidance is provided for stockpiling soils without in-situ characterization, and for characterizing soil stockpiles. In the absence of federal guidelines on ex-situ soil characterization, the BC ENV Guidance Document 1 entitled Site Characterization and Confirmation Testing is recommended as a guideline.

Soils that are Suspect Hazardous Waste (due to existing data for leachable concentrations (metals, hydrocarbons, or PAH), Suspect Waste (> CCME IL guidelines) and other soil classifications (< CCME IL guidelines) should, where possible, be segregated from each other during excavation and stockpiled separately.

In the absence of any data to estimate the soil quality prior to excavation it should be assumed that the soil is Suspect Waste and placed in a stockpile no larger than 250 m<sup>3</sup>. Note that the presence of liquid hydrocarbon (free product) automatically classifies the material as Hazardous Waste for disposal purposes.

Stockpile size and the number of samples required to characterize a stockpile volume depends on the suspected material quality. The following table, extracted and modified from the BC ENV Guidance Document 1, outlines the requirements for stockpiling and sampling.

**Table 1-1  
Stockpile Size and Sampling Requirements**

	<b>Suspect Hazardous Waste (SHW)</b>	<b>Suspect Waste (&lt;HW and &gt;CSR IL)</b>	<b>Suspect Industrial Quality Material (&lt;CSR IL and &gt;CSR RL)</b>
Maximum stockpile size	50 m <sup>3</sup>	150 m <sup>3</sup>	250 m <sup>3</sup>
Cell volume	10 m <sup>3</sup>	50 m <sup>3</sup>	50 m <sup>3</sup>
Number of representative cell samples	5	3	5
Aliquots per representative cell sample	1	5	5
Sampling method	Collect one representative aliquot for each 10 m <sup>3</sup> of cell volume. Each aliquot forms one representative cell sample.	Collect three representative aliquot for each 50 m <sup>3</sup> of cell volume. Up to five aliquots are combined by equal volume to form one representative cell sample.	Collect five representative aliquots for each 50 m <sup>3</sup> of cell volume. Up to five aliquots are combined by equal volume to form one representative cell sample.

The general rule is collection of one discrete sample (which can be made up of a number of 10 m<sup>3</sup> aliquots) per every 50 m<sup>3</sup> of stockpiled volume. The exception to this will be assessment of Suspect Hazardous Waste material, which requires analytical data for every 10 m<sup>3</sup> of stockpiled volume.

If the analytical data indicates contaminant concentrations that trigger the need for assessment of leachable contaminants (see Table 1, following the text, for reference) then leachable concentrations should be determined using the TCLP analysis.

### 3.4 CCME Guidelines and BC Background Soil Concentrations

#### 3.4.1 Background Chemistry

Some chemicals (especially metals) occur naturally in soils at concentrations in excess of the CCME SQG. In general accordance with DND's policy and in keeping with Best Management Practices:

*“DND will, to the degree possible, screen all contaminated sites against local and/or regional background soil, groundwater and surface water concentrations. Sites with natural levels of metals (and other COCs) that exceed generic guidelines will NOT be considered contaminated.”*

Table 2, following the text, shows the Vancouver Island Regional Background Soil Quality Estimates for inorganic substances. The data are provided in BC ENVs document entitled Protocol for Determining Background Soil Quality (Protocol 4).

### **3.5 Stockpiled Soil Management**

Environmental personnel at CFB Comox will outline an appropriate location for temporary soil storage prior to the commencement of any excavation at CFB Comox. The following provides minimum guidelines for the siting and management of soil stockpiles:

#### **3.5.1 Stockpile Siting and Surface Preparation**

- The location must be pre-approved by W Env O.
- The local topography and hydrology will need to be considered when siting a suitable stockpile location.
- All excavated soils must be stockpiled in a protected area on the site, a recommended minimum distance of 30 m from a surface water body and stormwater drains.
- The location must be free of sharp items that could penetrate the sheeting.
- Filter material must be placed over any drains near the stockpiled soil to ensure that no deleterious materials enter the storm water system.
- Sediment control measures, such as silt fences or sand bags must be placed in areas where there is potential surface runoff to marine receptors. All sediment control measures will be implemented in accordance with the document entitled "Land Development Guidelines for the Protection of Aquatic Habitat (DFO and MWLAP, 1993)".
- Contractors will be responsible for eliminating any residual soil on equipment and roadways and maintaining dust management where applicable or as directed by W Env O.

#### **3.5.2 Storage Cell Design**

The volume of soil needing to be managed along with the characterization of the contaminants and contaminant levels in the soil, and storage duration will need to be considered when designing a storage cell. The following are minimum storage cell design requirements for temporary storage:

- 12-mil Medium Density Polyethylene (MDPE) sheeting serving as an impermeable/low permeable barrier to contain stockpiled contaminated soils. Positive attributes of the MDPE sheeting are that it is stronger than Low Density Polyethylene (LDPE) sheeting and has greater chemical resistance. If more than one section of sheeting is required to line the ground beneath the stockpiled soils, each section of sheeting must overlap by at least 1 m.
- A 30 to 60 cm high berm of bailed straw/hay or clean fill around the perimeter of the storage cell with the 12-mil MDPE sheeting extending over the berm, reaching the exterior ground surface. The ends of the sheeting should be secured using heavy objects (i.e., straw/hay bales, tires, rocks, or logs).
- W Env O will determine whether a protective cover (i.e., layer of sand and/or hay) need to be placed over the MDPE sheeting within the cell prior to the placement of the contaminated soils in order to protect the sheeting and prevent accidental perforations.
- Soils should be limited to a maximum height of 2.0 m within the storage cell.
- At the end of each day, and/or during heavy precipitation events, the contaminated soil stockpiles must be covered with a minimum 10-mil nylon reinforced polyethylene sheeting so they are completely contained in order to minimize interaction of wind and precipitation with potentially contaminated soil. The cover should extend over the berm.

The cover must be secured with tires or other heavy objects, and connected by nylon rope to prevent strong winds from removing the cover.

### **3.5.3 Soil Relocation**

Once the soil has been adequately characterized, it must be excavated and relocated to an appropriate storage or disposal location under the direction of W Env O.

Special considerations may need to be given to the transport and storage of the soils if they are determined to be too wet and water has the potential to leach out during transport and storage. Considerations to the use of disposal liners within the bed of the truck prior to transporting the wet soil to the storage cell may be warranted.

In such circumstances, the storage cell may need to be modified and designed with an optional water collection system (as illustrated on Drawing 2) prior to transport in order to remove and collect any accumulated water from the stockpiled materials and temporary store the water.

Water quality will need to be assessed for contaminants of concern. Depending on the volume generated, the sump may not be sufficient to handle all the water collected, and therefore the water may need to be pumped from the sump. In such cases, appropriate storage, treatment and/or disposal options would need to be considered. The management of wet soils will need to be discussed and approved by W Env O prior to implementation. Options will likely be dependent primarily on the volume and/or quality of the soil and water.

Soils containing free-phase petroleum (NAPL) should be treated as hazardous waste and must be placed directly into a lined, water tight roll-off container and covered. These soils may not be reused on-site and must be disposed off-site as outlined within Section 3.6.

### **3.6 Off-Site Disposal**

Excavated material will be temporarily stockpiled while awaiting analytical testing to classify it for disposal. If the results of analysis indicate the materials exceed regional background concentrations and CCME IL guidelines, the material must be sent for off-site disposal by contractors using appropriately licensed vehicles to provincially permitted treatment or disposal facilities. There are two options for off-site disposal:

1. Disposal at a permitted facility.
2. Transfer to another site if soil quality meets the applicable site specific standards of the BC Contaminated Sites Regulation for the receiving site land use.

*Note: If analytical results indicate the material can remain on-site (i.e. does not exceed applicable CCME guidelines), providing it meets geotechnical requirements, it can be reused on-site at the discretion of W Env O.*



### 3.7 Soil Tracking Requirements

For any soil assessment prior to excavation, W Env O should request that a drawing showing the testing location, type of test (i.e. borehole or test pit) and location within the proposed excavation or Project Site be produced by the consultants or contractors QEP. Analytical results must be appended to the drawing and any parameters that exceed the appropriate regulatory standard/guidelines must be highlighted on the drawing.

The project manager, under guidance of W Env O must ensure the following minimum soil tracking measures are followed for excavations and temporary soil stockpiles at the site:

- A drawing outlining the excavation area and stockpile location must be produced and updated as necessary. Stockpiles must have a number designation that will help identify where the soil originated. The drawing must be all encompassing and show the stockpile location(s) in relation to the excavation and project site.
- Once stockpile analytical results are received, the stockpile should be flagged on the drawing as either passing or failing the applicable CCME guidelines at the site, and also the BC CSR soil quality for offsite disposal.
- A soil tracking manifest should be created for each excavation. At minimum, this should highlight the stockpile number, location, date excavated, approximate soil volume, soil characterization (i.e. pass or fail applicable CCME guidelines at the site, and also the BC CSR soil quality for offsite disposal), date when the stockpiled soil was removed from the site, and the off-site disposal location.
- Analytical results should be organized by stockpile number and attached to the soil tracking manifest.
- When stockpiled soil can remain on site, the final placement location must be tracked and updated on a drawing. W Env O must be consulted by the project manager to ensure that soil is placed on site in a manner consistent with the recommendations provided in this Soil Management Plan.
- If analytical results indicate that excavated soil is classified as Hazardous Waste under the BC CSR or as a Hazardous Substance under the BC HWR or Federal TDG, a Hazardous Waste Manifest must be completed prior to off-site disposal. The Wing Hazardous Materials Officer (WHMO) will review the manifest upon completion and will ensure a copy is forwarded to the BC ENV at PO Box 9341 Stn Prov Govt, Victoria, BC, V8W 9M1.
- A copy of the soil disposal certificates should be maintained with the soil tracking manifest, along with other project related document in the project file. No manifests are required for non-hazardous waste soils.
- If the receiving site is under Provincial jurisdiction, and soil exceeds the applicable CSR land use standard, a Soil Relocation Agreement would be required unless the site is "permitted" to receive such soils.

*Note: A Waste Manifest has been developed for the movement of soils on-Site and a copy provided in Appendix A. The Waste Manifest provides most if not all the information required should the soils need to be relocated to an approved waste disposal facility.*

### 3.8 Post-Excavation Sampling

Excavations at CFB Comox should have post-excavation samples collected at the limits of the excavation (i.e. walls and floor) by W Env O and/or consultants/contractors QEP prior to backfilling or developing on the site to determine residual soil quality. These samples should be collected at the discretion of W Env O.

Suggestions for post excavation sampling are:

- In a grid pattern on the floor of the excavation approximately 10 m apart;
- Horizontally approximately every 10 m along the wall; and
- Vertically on the wall one sample should be collected in the first 0.5 m from the top of the wall and one sample collected every 1 m below thereafter.

The final decision on frequency of post-excavation samples is up to the discretion of W Env O and/or consultants/contractors QEP or on a project specific basis.

A drawing should be produced outlining the excavation area and sample locations, including analytical results of the samples compared to applicable CCME guidelines for the site.

#### 4.0 IMPORTED MATERIAL

The contractor should inform W Env O of the proposed source of imported material and provide necessary documentation two to four weeks minimum before importation. All fill material brought to CFB Comox should comply with the following criteria:

- Sampling of the proposed material should be carried out by a QEP prior to the importation of any materials to the site and, if necessary, for the duration of the project to confirm that all imported fill materials meet the soil quality guidelines applicable for imported material as listed in Section 4.1, below.

Note: A QEP is defined on the BC Ministry of Environment website at

[http://www.env.gov.bc.ca/epd/remediation/policy\\_procedure\\_protocol/procedure/pdf/procedure-08-2014.pdf](http://www.env.gov.bc.ca/epd/remediation/policy_procedure_protocol/procedure/pdf/procedure-08-2014.pdf).

- Testing of the proposed imported material should be done at a Canadian Association for Laboratory Accreditation Inc. (CALA) certified laboratory and Certificates of Analysis for all imported fill materials must be provided certifying that the materials meet the acceptable soil quality guidelines. Analytical results should be submitted to W Env O in a report prepared by a QEP, with data compared to applicable CCME guidelines presented in table format.
- Analytical results should be from samples collected within three months of the date the material is to be imported on-site.
- Environmental characterization of fill material must be conducted in accordance with the British Columbia ENV, Technical Guidance Document #1 – Site Characterization and Confirmation Testing.

Note: Technical Guidance Document #1 can be found on the BC Ministry of Environment website at:

<https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/technical-guidance/tg01.pdf>

- CFB Comox must reserve the right to request additional testing of imported material at the source and at the deposit site to satisfy their requirements. All testing will be done by the contractor's QEP and at the contractor's cost.
- If proposed imported materials do not meet, or cannot reasonably be processed to meet, specified requirements, the contractor must locate an alternative source.
- The contractor should advise W Env O two to four weeks minimum in advance of a proposed change of imported material source.

- Acceptance of material does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.
- All material brought to the site that does not meet the soil quality guidelines applicable for imported material as listed in Section 4.1, below, or does not perform to backfill specification requirements, should be removed from the site immediately at the contractor's cost.

#### **4.1 Applicable Guidelines for Imported Material**

For imported material, the following federal guidelines should be used for comparison:

- CCME Canadian Environmental Quality Guidelines, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Residential (CCME RL) (metals).
- CCME Canadian Soil Quality Guidelines for PAHs, Residential, Environmental Health guidelines, Interim Soil Quality Criteria (CCME RL<sub>i</sub>).
- CCME Canadian Soil Quality Guidelines for PAHs, Residential, Environmental Health guidelines, Soil Contact (CCME RL<sub>sc</sub>).
- CCME Canadian Soil Quality Guidelines for PAHs, Residential, Environmental Health guidelines, Environmental Health (CCME RL<sub>e</sub>).
- CCME Soil Quality Guidelines for the Protection of Human Health ( $10^{-5}$ ) (CCME SQG<sub>hh</sub>).
  - Use the  $10^{-5}$  incremental cancer risk for human health guidelines/check values for parameters that are potentially carcinogenic.
  - The Benzo(a)pyrene Total Potency Equivalency (B[a]P TPE), for the protection of direct contact with contaminated soil, is the sum of estimated cancer potency relative to B[a]P for all potentially carcinogenic unsubstituted PAHs. The B[a]P TPE value should be compared against the Industrial guideline: 5.3 B[a]P TPE.

### **5.0 HEALTH AND SAFETY REQUIREMENTS**

The prime contractor on the site will be responsible for developing a health and safety plan for any excavation, which adequately addresses potential health and safety concerns related to soil contact. The level and type of contamination, if present, in the proposed work area will be provided to the contractor by W Env O prior to initiation of any project. If the type and level of soil contamination is not known prior to soil excavation, the contractor should assume worst case scenario based on known contamination in other areas of CFB Comox and select Personnel Protective Equipment (PPE) appropriately.

It is the responsibility of the contractor to recommend the type of PPE for the specific contaminants of concern and concentrations.

The following PPE and health and safety measures should be considered:

- Workers that will be in direct contact with excavation soils must wear latex (or equivalent) gloves.
- Workers in and around an excavation must wear coveralls.
- Workers must wear protective safety glasses.
- If dusty conditions exist, the soil should be wetted and workers must wear a dust mask.
- No smoking or eating will be permitted without hands first being washed.

Health and Safety meetings will be conducted at the beginning of each workday and potential risks (new or old) should be highlighted.

Any change to conditions and/or contaminant type (i.e. hydrocarbons) then PPE must be changed accordingly to meet health and safety requirements.

## 6.0 STATEMENT OF LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SLR for PSPC on behalf of DND and completed in compliance with Task Authorization Number EZ897-170838/001/PWY, Purchase Order Number 700400527 against the Task Authorization, PSPC has the exclusive right to copy and redistribute this report.

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

The investigation undertaken by SLR with respect to this report and any conclusions or recommendations made in this report reflect SLR's judgment based on the site conditions observed at the time of the site inspection on the date(s) set out in this report, on information available at the time of preparation of this report, on the interpretation of data collected from the field investigation, and on the results of laboratory analyses, which were limited to the quantification in select samples of those substances specifically identified in the report. This report has been prepared for specific application to this site and it is based, in part upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the site; substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken. SLR expresses no warranty with respect to the accuracy of the laboratory analyses, methodologies used, or presentation of analytical results by the laboratory. Actual concentrations of the substances identified in the samples submitted may vary according to the extraction and testing procedures used.

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

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

DM/AH/je

## **7.0 REFERENCES**

CCME (Canadian Council of Ministers of Environment). 1997. Recommended Canadian Soil Quality Guidelines. Updated 2008.

BC CSR (British Columbia Contaminated Sites Regulation). 1997. Updated November 2017.

BC HWR (British Columbia Hazardous Waste Regulation). 1988. Updated October 2016

DFO, 1993. Land Development Guidelines for the Protection of Aquatic Habitat. Produced by the Habitat Management Division of the Department of Fisheries and Oceans and the Integrated Management Branch of the Ministry of Environment, Lands and Parks. September, 1993.

PWGSC (Public Works and Government Services Canada). 2003. Contaminated Sites Risk Management Best Practice. September 18, 2003.

## **TABLES**

Soil Management Plan  
19 Wing CFB Comox, Lazo, BC  
SLR Project No.: 202.01592.00002

**Table 1. Minimum Soil Concentrations That Trigger TCLP Test and Leachate Quality Standards**

Parameter	Minimum Soil Concentration To Trigger TCLP Test (mg/kg)	Leachate Quality Standard (mg/L)
Arsenic	50	2.5
Barium	2000	100.0
Benzene	10	0.5
Benzo(a)pyrene	0.02	0.001
Boron	10000	500.0
Cadmium	10	0.5
Chromium	100	5.0
Copper	2000	100.0
Cyanide (free)	400	20.0
Ethylbenzene	4.8	0.24
Fluoride	3000	150.0
Lead	100	5.0
Mercury	2	0.1
Selenium	20	1.0
Silver	100	5.0
Toluene	48	2.40
Uranium	200	10.00
Xylene	600	30.0
Zinc	10000	500.0

Note:

This list is not inclusive of all parameters that are applicable and only include those that might be reasonably found on the property. If leachate concentration > leachate quality standard, soil is an Environmentally Hazardous Substance, Solid, N.O.S. (UN3077), under the Transportation of Dangerous Goods Act

BC Environmental Management Act (BC, 2004). Hazardous Waste Regulation. Table 1. Leachate Quality Standards.



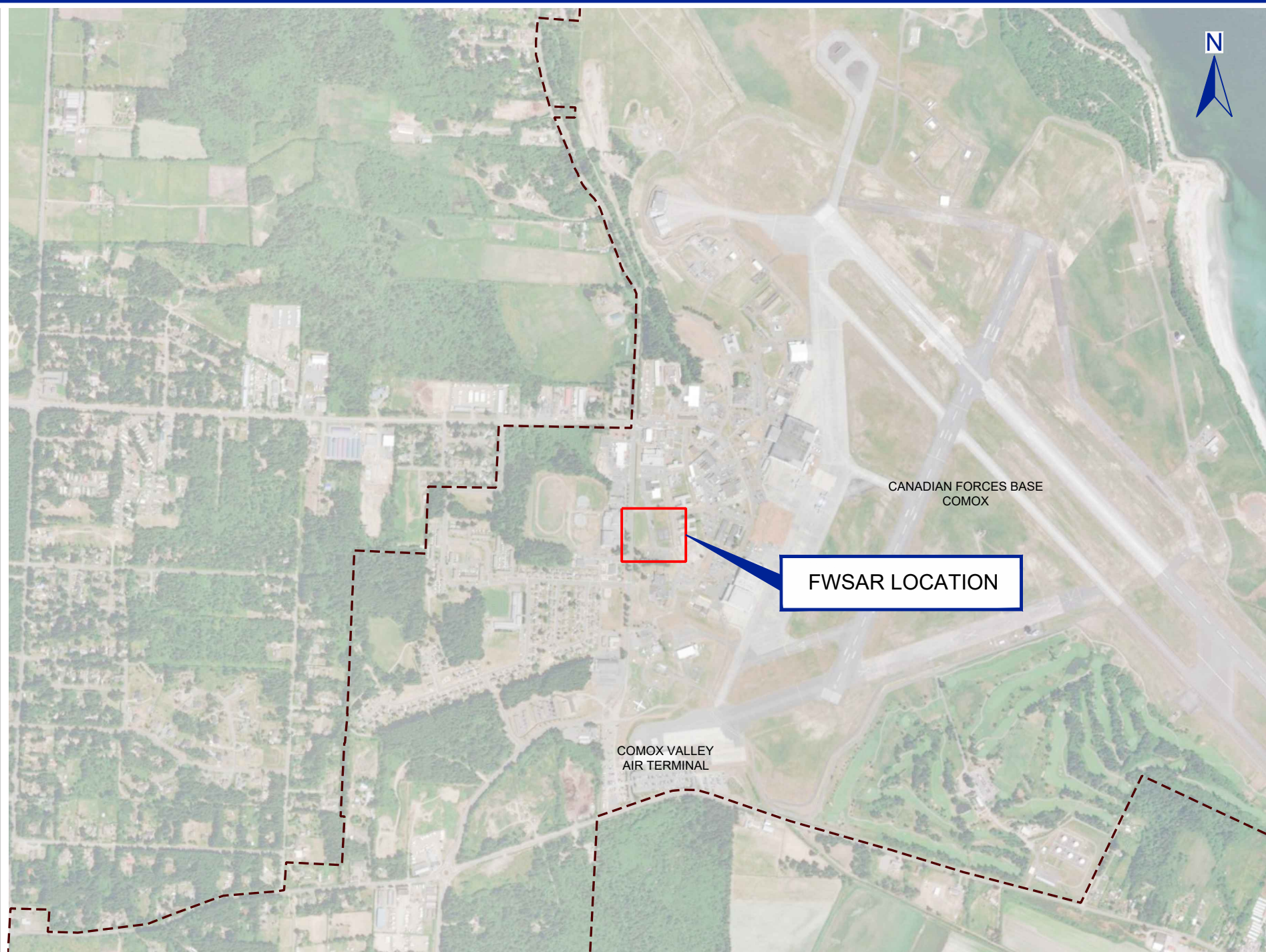
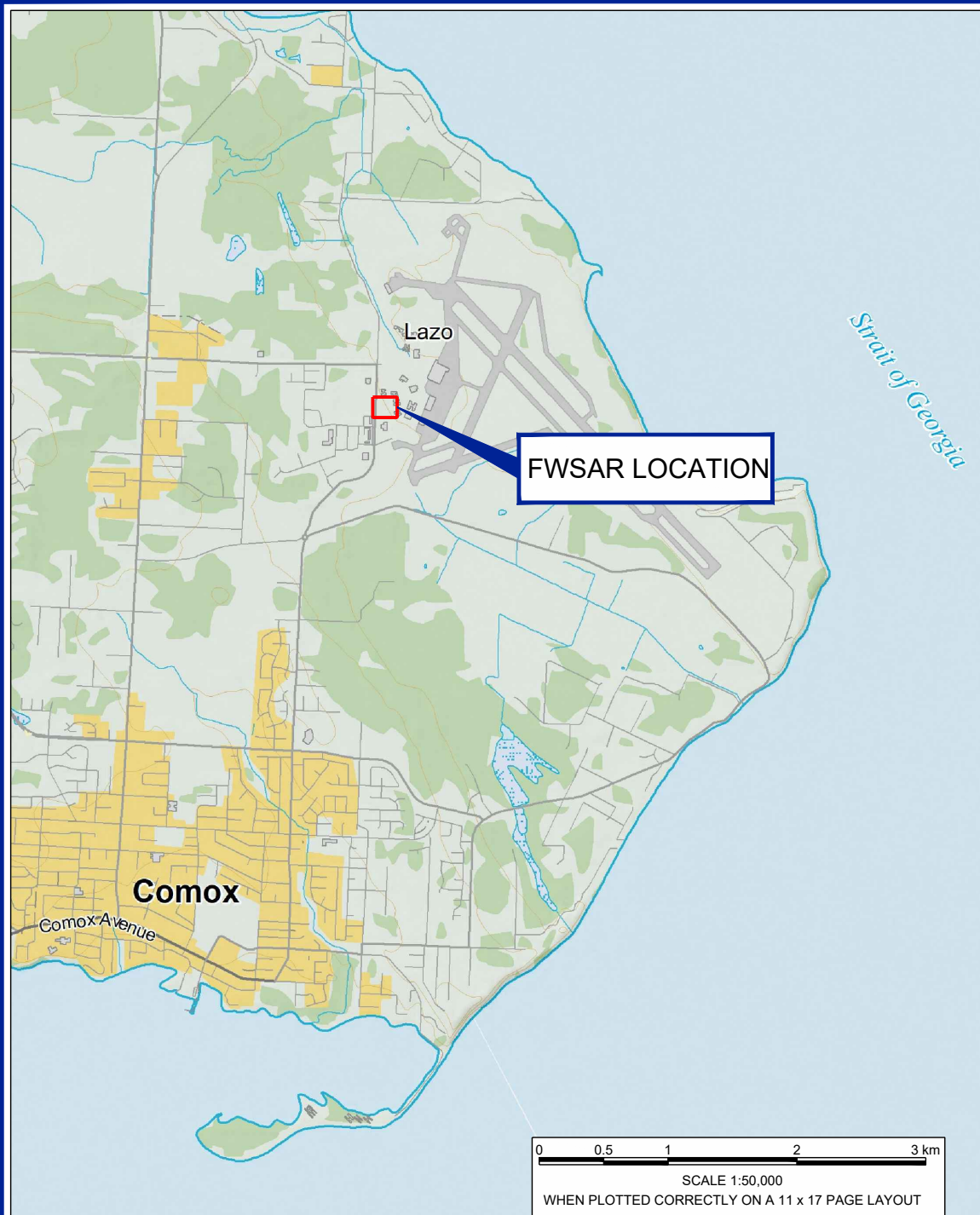
**TABLE 2. VANCOUVER ISLAND REGIONAL BACKGROUND SOIL  
 QUALITY ESTIMATES FOR INORGANIC SUBSTANCES**

<b>Substance</b>	<b>Concentration (µg/g)</b>	<b>Substance</b>	<b>Concentration (µg/g)</b>
Aluminum	55,000	Manganese	5,000
Antimony	4	Mercury	0.15
Arsenic	4	Molybdenum	1.0
Barium	250	Nickel	50
Beryllium	0.7	Selenium	4
Cadmium	0.95	Silver	1
Chromium (total)	65	Strontium	100
Cobalt	30	Sulfur	1,000
Copper	100	Tin	4
Iron	70,000	Vanadium	200
Lead	40	Zinc	150

From BC CSR, Protocol 4, "Table 1. Regional Background Soil Quality Estimates for Inorganic Substances".

## **DRAWINGS**

Soil Management Plan  
19 Wing CFB Comox, Lazo, BC  
SLR Project No.: 202.01592.00002



**NOTES:**  
 NOT A LEGAL SURVEY. DO NOT USE FOR CONSTRUCTION.

REFERENCED FROM SITE RECONNAISSANCE INFORMATION. IMAGERY: ESRI WMS, DIGITAL GLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS COMMUNITY, ACCESSED MARCH 2017

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

- Study Area
- Contour (20m)
- Watercourse
- Wetlands
- Buildings
- Wooded Area
- Developed Area
- Arterial
- Local / Street

**LEGEND:**

STUDY AREA

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

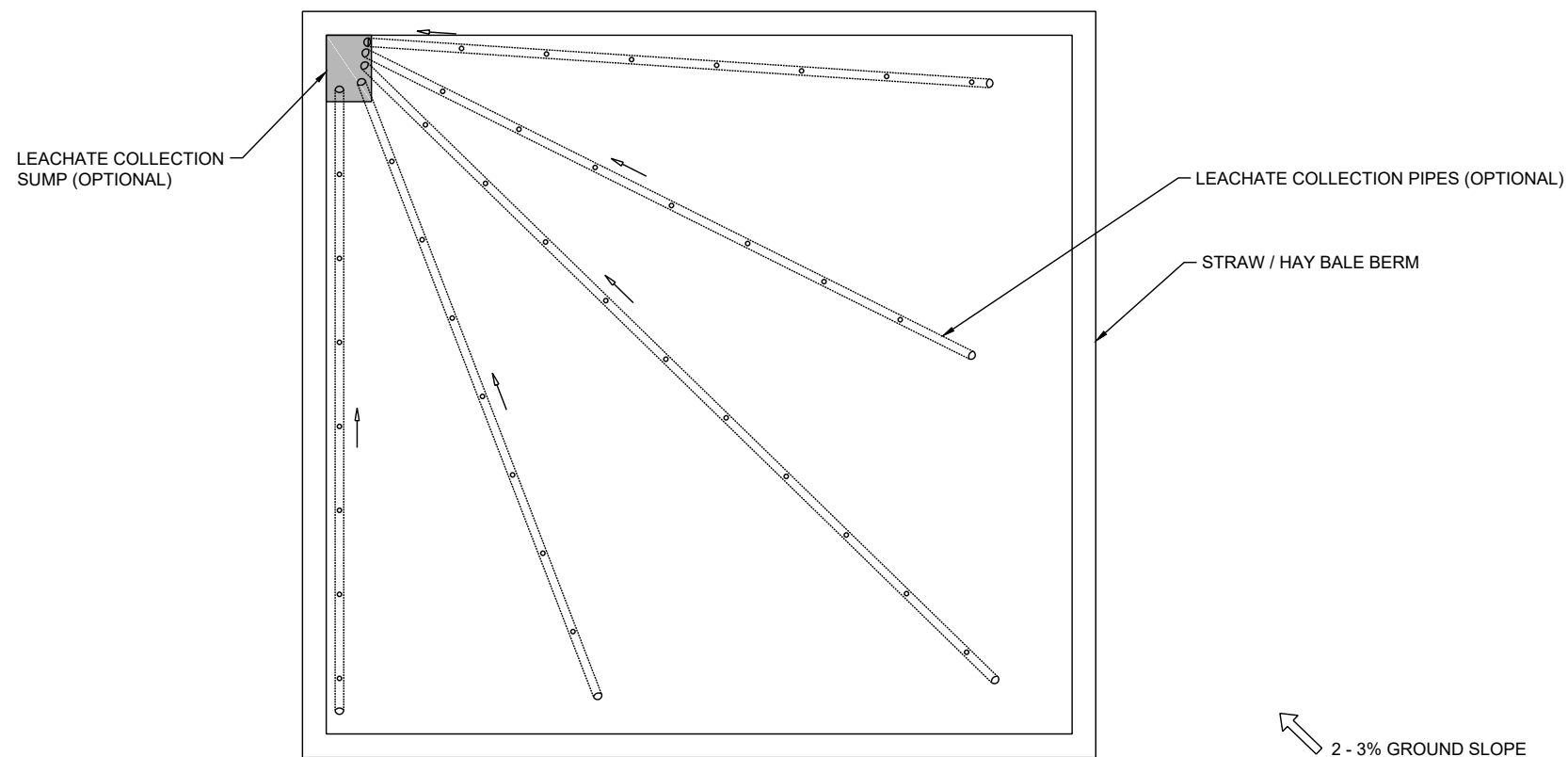
THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

PUBLIC SERVICES AND PROCUREMENT CANADA 19 WING, CFB COMOX LAZO, BC	
SOIL MANAGEMENT PLAN	
<b>SITE LOCATION</b>	
Date: March 3, 2018	Drawing No. 1
Project No. 202.01592.00002	
	

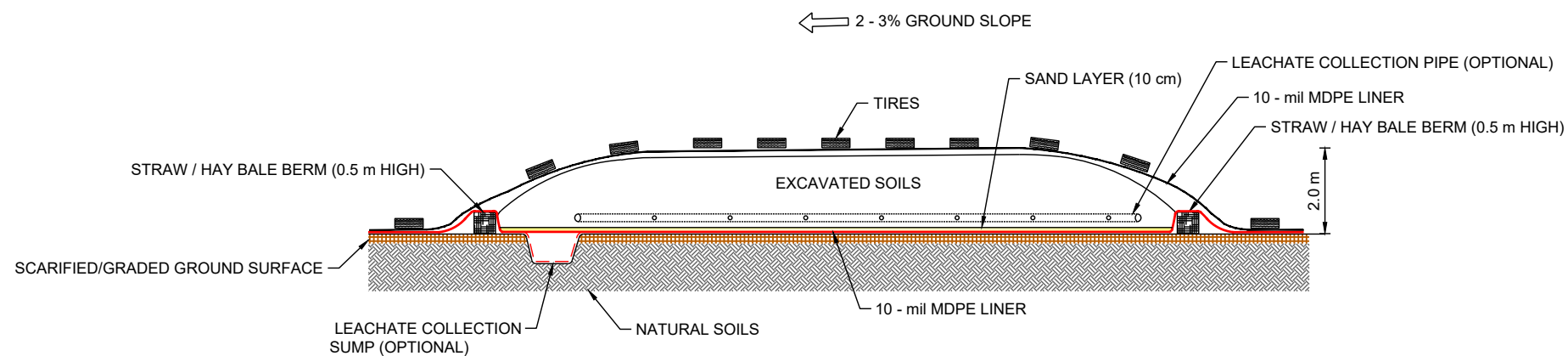
Cadfile name: S\_202-01592-00002-A1.dwg

STORAGE CELL DIMENSIONS AND AREA BASED ON EX-SITU SOIL VOLUMES			
Volume	Inner Dimension of Cell	Outer Dimension of Cell	Minimum Area Required*
10 m <sup>3</sup>	2 m x 3 m	4 m x 5 m	42 m <sup>2</sup>
50 m <sup>3</sup>	5 m x 6 m	7 m x 8 m	90 m <sup>2</sup>
100 m <sup>3</sup>	7 m x 8 m	9 m x 10 m	132 m <sup>2</sup>
250 m <sup>3</sup>	8 m x 17 m	10 m x 19 m	252 m <sup>2</sup>

Notes:  
 m - meters  
 dimensions referenced are for general estimates only. Final dimensions to be determined by contractor.  
 area referenced based on berm thickness of 1m and maximum cell height of 2.0m  
 \* estimated area required based on need to secure the cover and liner in place.



**PLAN**



**SECTION**

0 2.5 5 10 m

SCALE 1:150

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

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

PUBLIC SERVICES AND PROCUREMENT  
 CANADA  
 19 WING, CFB COMOX  
 LAZO, BC

SOIL MANAGEMENT PLAN

**TEMPORARY SOIL STORAGE CELL SCHEMATIC  
 PLAN / SECTION**

Date: March 3, 2018

Project No. 202.01592.00002

Drawing No.

2



**APPENDIX A**  
**19 Wing CFB Comox – Waste Manifest**

Soil Management Plan  
19 Wing CFB Comox, Lazo, BC  
SLR Project No.: 202.01592.00002

# 19 WING CFB COMOX – WASTE MANIFEST

**Important:** This form is to be completed when you have received all of the accredited lab analytical results required by any federal, provincial or municipal laws and regulations. The Waste Generator or Generator's Authorized Representative must complete this form and submit a copy to Wing Environment. Please ensure the Waste Manifest is signed and dated and be sure to include all signed and supporting documents.

## 1. GENERATOR INFORMATION

a) **Generating Location:** \_\_\_\_\_

b) **Generating Source:** \_\_\_\_\_

c) **Generating Contact:** \_\_\_\_\_

## 2. CONTRACTOR / CONSULTANT INFORMATION

a) **Contractor/Consultant** Name: \_\_\_\_\_

b) **Consultant/Company Address** Street: \_\_\_\_\_

City/Town: \_\_\_\_\_ Province: \_\_\_\_\_ Postal Code: \_\_\_\_\_

c) **Consultant/Company Contact** Name: \_\_\_\_\_

Phone: \_\_\_\_\_ Email: \_\_\_\_\_

## 3. ANALYTICAL / ATTACHMENTS

Supporting Analytical Supporting Analytical I.D. #: \_\_\_\_\_

MSDS  Memo/Letter  Other (specify): \_\_\_\_\_

**Contaminants of Concern**  BTEX/VPH  EPH  PAH  Total Metals

TCLP Metals  Other

**Exceeds CCME Guidelines**  YES  NO

**Exceeds BC CSR Standards**  YES  NO

## 4. WASTE STREAM INFORMATION

**a) Waste description: Check only one below**

Construction and demolition debris

(specify): \_\_\_\_\_

Soil with oil

(specify): \_\_\_\_\_

Soil with refined fuel or solvent

(specify): \_\_\_\_\_

Soil with PFAS     Soil with metals

**b) Process generating waste** Clearly explain generating process, use separate sheet if required:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**c) Current/Historical Site Use** Please explain:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**d) Volume (estimated)**

Tonnes

m<sup>3</sup>

**e) Shipping Mode**

Bulk

Bag

Other (describe) \_\_\_\_\_

**f) Frequency**

One Time

Week

Month

Year

**g) Recommended PPE and Special Handling Instructions:** (specify):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 5. WASTE PHYSICAL PROPERTIES

**a) Physical state**

Dry Solid

Damp Solid

Sludge

Describe: \_\_\_\_\_

b) **Odour**                       Strong             Slight             None

Describe: \_\_\_\_\_

c) **Debris in waste**             Yes                 No

Approximate % and Describe: \_\_\_\_\_

d) **Waste Composition**        \_\_\_\_\_% top soil    \_\_\_\_\_% clay    \_\_\_\_\_% gravel    \_\_\_\_\_% sand

## 6. GENERATOR'S CERTIFICATION

I hereby certify that the above and attached description is complete and accurate to the best of my knowledge, tht no deliberate or willful omissions of composition or properties exist, that known or suspected hazards have been disclosed, and that the waste has been characterized as per BC Environment Guidelines, BC hazardous Waste Regulation or equivalent.

### Generator or Generator's Representative Signature

Date: \_\_\_\_\_

Print Name: \_\_\_\_\_                      Signature: \_\_\_\_\_

Title/Position: \_\_\_\_\_

## 7. WING ENVIRONMENT

### Wing Environment's Representative Signature

Date: \_\_\_\_\_

Print Name: \_\_\_\_\_                      Signature: \_\_\_\_\_

Title/Position: \_\_\_\_\_





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 **PRE-DEMOLITION HAZARDOUS BUILDING  
ASSESSMENT – SHED (B273)**

**CFB Comox FFTA Source Control Project**

PSPC

CFB Comox, Lazo, BC

Requisition No.: R.111173.004



Public Services and  
Procurement Canada

Services publics et  
Approvisionnement Canada

**PRE-DEMOLITION HAZARDOUS BUILDING MATERIALS  
ASSESSMENT – SHED (B273) LOCATED AT DND COMOX, IN  
COMOX, BRITISH COLUMBIA**

**SUITE 401 – 1230 GOVERNMENT STREET  
VICTORIA, BRITISH COLUMBIA  
V8W 3X4**

DST Project Number: 2003709

Client Project Number: R.111173.002

Report prepared for:

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## **EXECUTIVE SUMMARY**

DST Consulting Engineers Inc., a Division of Englobe (DST), was retained by Public Services and Procurement Canada (PSPC) on behalf of the Department of National Defense (DND), to conduct a pre-demolition hazardous building materials assessment of Shed (B273) located at DND Comox, in Comox, British Columbia (herein referred to as the Subject Building).

The purpose of the assessment was to conduct destructive sampling to check for potential hazardous building materials in preparation for the demolition of the structure.

All work was performed in accordance with the requirements of the Canada Labour Code, Part II Canada Occupational Health and Safety Regulations (COHSR) and the British Columbia Occupational Health and Safety Regulation (BC Reg. 296/97), as amended to the date of this report.

The hazardous building materials assessment was completed specifically to identify asbestos-containing materials (ACMs), asbestos-containing materials (ACMs), lead including lead-containing paints (LCPs), polychlorinated biphenyls (PCBs), biohazardous materials (mould-impacted materials, rodent droppings, etc.), Ozone-Depleting Substances (ODSs), elemental mercury, and sources of silica and any other hazardous materials in or around the Subject Building.

Based on DST's visual assessment and on the analyses of collected samples, hazardous building materials were identified within the Subject Building. A summary of our findings and recommendations is presented below. It should be noted that this summary is subject to the same restrictions and limitations as presented in Section 5.0 (Assessment Limitations) and Section 8.0 (Closure) of this report. The information provided is to be read in conjunction with the remainder of this report.

**Executive Summary Table 1: Summary of Findings**

<b>Hazardous Building Material</b>	<b>Description</b>
Asbestos-Containing Materials (ACMs)	No ACMs were identified in the Subject Building.
Lead	Coatings and/or paints containing > 600 ppm were not identified within the Subject Building.
Polychlorinated Biphenyls (PCBs)	No sources of PCBs were identified in the Subject Building.
Mercury	No sources of mercury were identified in the Subject Building.
<b>Silica</b>	<b>Sources of silica were identified in the concrete foundation and grade-level walkway leading to the front door of the Subject Building.</b>
Ozone-Depleting Substances (ODSs)	Sources of ODSs were not identified in the Subject Building.
<b>Biohazardous Materials</b>	<b>Biohazardous materials were identified in the Subject Building, in the form of rodent droppings sparsely distributed on the flooring at the East side of the Subject Building.</b>

General findings, and general recommendations are provided in Section 6.0 and Section 7.0 of this report, respectively. Detailed findings and recommendations pertaining to the identified hazardous materials identified within the Subject Building are provided in Appendix 1 of this report.

## Abbreviations

ACGIH – American Conference of Governmental Industrial Hygienists

ACM – Asbestos-containing material

AIHA - American Industrial Hygiene Association

BC - British Columbia

COHSR - Canada Occupational Health and Safety Regulations

DND – Department of National Defense

EMSL – EMSL Canada Inc.

EPA – Environmental Protection Agency

HUD - Housing and Urban Development

HVAC – Heating, ventilation, and air conditioning

LCP – lead-containing paint

mg/Kg – Milligram per Kilogram

NVLAP – National Voluntary Laboratory Accreditation Program

ODS – Ozone-depleting substance

OEL – Occupational Exposure Limit

PPM – Parts Per Million

PCB – Polychlorinated Biphenyl

PLM – Polarized light microscopy

PSPC – Public Services and Procurement Canada

SWP – Safe Work Practice

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>2</b>
<b>1.0 INTRODUCTION .....</b>	<b>6</b>
<b>2.0 BACKGROUND .....</b>	<b>6</b>
2.1 PREVIOUS REPORT(S) .....	6
<b>3.0 SCOPE OF WORK AND METHODOLOGY .....</b>	<b>6</b>
3.1 ASBESTOS-SPECIFIC ANALYSIS AND SAMPLING METHODOLOGIES .....	7
<b>4.0 RISK ASSESSMENT METHODOLOGY .....</b>	<b>8</b>
4.1 EVALUATION OF CONDITION AND ACCESSIBILITY OF IDENTIFIED ASBESTOS-CONTAINING MATERIAL .....	8
4.1.2 <i>Condition</i> .....	8
4.1.3 <i>Accessibility</i> .....	10
4.2 EVALUATION OF CONDITION AND ACCESSIBILITY OF IDENTIFIED LEAD .....	11
4.2.1 <i>Lead-Containing Paint</i> .....	11
4.3 MOULD AND MOISTURE-IMPACTED BUILDING MATERIALS .....	12
4.4 OTHER HAZARDOUS BUILDING MATERIALS .....	13
<b>5.0 LIMITATIONS OF ASSESSMENT .....</b>	<b>13</b>
5.1 ASBESTOS .....	13
5.2 LEAD .....	14
5.3 POLYCHLORINATED BIPHENYLS .....	14
5.4 MERCURY .....	14
5.5 MOULD .....	14
5.6 OZONE DEPLETING SUBSTANCES (ODSs) .....	15
5.7 SILICA .....	15
<b>6.0 RESULTS .....</b>	<b>15</b>
<b>7.0 RECOMMENDATIONS .....</b>	<b>16</b>
7.1 LEAD .....	16
7.2 SILICA .....	16
7.3 BIOHAZARDOUS MATERIALS – RODENT DROPPINGS .....	17
<b>8.0 CLOSURE .....</b>	<b>18</b>
<b>Appendix 1 – Findings and Recommendations</b>	
Plan Drawing Illustrating Sample Point Locations for Asbestos and Lead Sample Point Locations	
Asbestos and Lead Analytical Laboratory Reports	
<b>Appendix 2 – Applicable Regulations and Guidelines</b>	

## **1.0 INTRODUCTION**

DST Consulting Engineers Inc., a Division of Englobe (DST), was retained by Public Services and Procurement Canada (PSPC) on behalf of the Department of National Defense (DND), to conduct a pre-demolition hazardous building materials assessment of Shed (B273) located at DND Comox, in Comox, British Columbia (herein referred to as the Subject Building).

The purpose of the assessment was to conduct destructive sampling to check for potential hazardous building materials in preparation for the demolition of the structure.

All work was performed in accordance with the requirements of the Canada Labour Code, Part II Canada Occupational Health and Safety Regulations (COHSR) and the current version of British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97), as amended during continued operations and maintenance.

The hazardous building materials considered included asbestos-containing materials (ACMs), asbestos-containing materials (ACMs), lead including lead-containing paints (LCPs), polychlorinated biphenyls (PCBs), biohazardous materials (mould-impacted materials, rodent droppings, etc.), Ozone-Depleting Substances (ODSs), elemental mercury, and sources of silica and any other hazardous materials that maybe on site.

The site work was conducted by Lance Pizzariello, M.Sc., C.E.T., A.Sc.T., EP, on August 25, 2020.

## **2.0 BACKGROUND**

DST understands that the Subject Building was constructed during a time when hazardous building materials were commonly or potentially used in construction. As such, and in accordance with the COHSR and Part 20, Section 20.112, *Hazardous Materials* of BC Reg. 296/97, as amended pertaining to the identification of hazardous building materials prior to demolition, PSPC commissioned this assessment.

### **2.1 Previous Report(s)**

No previous reports were available for this project.

## **3.0 SCOPE OF WORK AND METHODOLOGY**

This report has been prepared in preparation for the upcoming demolition of the Subject Building. The survey was destructive in nature.



The structure and finishes of the Subject Building were examined to determine the suspected presence of suspect ACMs, suspect lead (including LCPs), PCBs, mercury, sources of ODSs, biohazardous materials (mould, rodent droppings, etc.), and silica.

Representative samples of suspect ACMs and suspect LCPs were collected and were sent to a qualified laboratory for asbestos and lead content analysis.

Site work was conducted in general compliance with the requirements of the COHSR, BC Occupational Health and Safety Regulation 296/97, and DST's Safe Work Practices (SWPs).

### **3.1 Asbestos-Specific Analysis and Sampling Methodologies**

The presence of asbestos in federal workplaces and pertaining to federally regulated workers is governed by the COHSR. According to the COHSR, ACM means:

- Any article that is manufactured and contains 1% or more asbestos (by weight) at the time of manufacture, or any material that contains 1% or more asbestos when tested in accordance with accepted methods.

The presence of asbestos in the workplace in British Columbia pertaining to provincially regulated workers is governed by BC Reg. 296/97. According to the current version of BC Reg. 296/97, ACM means:

- Any material containing at least 0.5% asbestos, or vermiculite insulation with any asbestos.

As both federally regulated workers and provincially regulated workers (e.g., contractors) are expected to carry out work activities within the Subject Building, and as the provincial regulations have a more stringent definition of ACM, and generally include the requirements noted in the COHSR, this assessment was conducted to meet the requirements of BC Reg. 296/97.

Where observed, samples were collected from each "homogenous application" of suspected ACMs (materials suspected to contain asbestos that are uniform in material type, colour, texture application and estimated installation date) that are anticipated to be impacted through the demolition of the Subject Building.

Samples were submitted to EMSL Canada Inc. (EMSL) in Vancouver, BC for analysis of asbestos content using polarized light microscopy (PLM) with dispersion staining, in accordance with the United States Environmental Protection Agency (EPA) 600/R-93/116 analytical method "Asbestos (bulk) by PLM." EMSL's analytical laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

The number of samples collected for each homogenous application of a suspected ACM was based on the recommendations provided in the BC Asbestos Guide, along with the assessor's experience and understanding of the consistency of the observed building material applications.

When asbestos is detected in concentrations greater than half of one percent in one of the samples within a set that was collected to represent a "homogenous application" of a particular material (or detected in any concentration, in a set of samples collected for applications of vermiculite), the entire sample set, and the entire application of that material is then considered to be an ACM.

In addition to the above, a "positive stop" option was used during the laboratory analysis of the building material samples submitted for asbestos analysis. The "positive stop" option is utilized by the laboratory when asbestos is detected at a concentration of greater than half of one percent in one of the samples within a set that was collected to represent a "homogenous application" of that material (or in any concentration, for vermiculite). At this point, further analysis of subsequent samples within the set is deemed to be unnecessary (as the entire set will be considered an ACM, per above), and the remainder of the samples within the set are not analyzed.

#### **4.0 RISK ASSESSMENT METHODOLOGY**

##### **4.1 Evaluation of Condition and Accessibility of Identified Asbestos-Containing Material**

Through the asbestos exposure risk assessment, DST evaluated the condition and accessibility of ACM based on the PSPC Asbestos Management Standard, effective June 5, 2017. A summary of the applicable criteria is provided in the following subsections.

###### **4.1.2 Condition**

In evaluating the condition of friable ACMs other than mechanical insulation (e.g., spray-applied as fireproofing, thermal insulation, or texture, decorative or acoustic finishes), the following criteria apply:

###### **GOOD**

Surface of material shows no significant signs of damage, deterioration, or delamination. Up to one percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the assessor to be familiar with the irregular surface texture typical of sprayed asbestos products. **GOOD** condition includes un-encapsulated or unpainted fireproofing or texture finishes, where no delamination or damage is observed, and encapsulated fireproofing or texture finishes where the encapsulation has been applied after the damage or fallout occurred.

### **FAIR**

FAIR condition is not utilized or considered as a valid criterion in the evaluation of sprayed fireproofing, sprayed insulation, or texture coat finishes.

### **POOR**

Sprayed materials show signs of damage, delamination, or deterioration. More than 1% damage to surface of hazardous building material spray. In observation areas, where damage exists in isolated locations, both GOOD and POOR condition may be reported. The extent or percentage of each condition will be recorded on the assessor's reassessment form.

The evaluation of ACM spray applied as fireproofing, non-mechanical thermal insulation, or texture, decorative or acoustic finishes that are present above ceilings, may be limited by the number of observations made, and by building components such as ducts or full height walls that obstruct the above ceiling observations. BC Reg. 296/97 requires Moderate Risk operations for the removal of all or part of a false ceiling to obtain access to a work area, if asbestos-containing material is likely to be lying on the surface of the false ceiling.

### **Mechanical Insulation**

In evaluating the condition of ACM mechanical insulation (on boilers, breeching, ductwork, piping, tanks, equipment etc.) the following criteria are used:

#### **GOOD**

Insulation is completely covered in jacketing and exhibits no evidence of damage or deterioration. No insulation is exposed. Includes conditions where the jacketing has minor surface damage (i.e., scuffs or stains), but the jacketing is not penetrated.

#### **FAIR**

Minor penetration damage to jacketed insulation (cuts, tears, nicks, deterioration or delamination) or undamaged insulation that has never been jacketed. Insulation is exposed but not showing surface disintegration. The extent of missing insulation ranges should be minor to none.

#### **POOR**

Original insulation jacket is missing, damaged, deteriorated or delaminated. Insulation is exposed and significant areas have been dislodged. Damage cannot be readily repaired.

The evaluation of ACM mechanical insulation may be limited by the number of observations made and building components such as ducts or full height walls that obstruct observations. In these circumstances, it is not possible to observe each foot of mechanical insulation from all angles.

### **Non-Friable Materials**

Non-friable ACMs generally have little potential to release airborne fibres, even when damaged by mechanical breakage. However, some non-friable materials, i.e., exterior asbestos cement products, may have deteriorated so that the binder no longer effectively contains the asbestos

fibres. In such cases of significantly deteriorated non-friable material, the material will be treated as a friable product.

#### **4.1.3 Accessibility**

The accessibility of building materials known or suspected of being hazardous was rated according to the following criteria:

##### **Access (A)**

Areas of the building within reach of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of hazardous building material not normally within reach from floor level.

##### **Access (B)**

Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, i.e., tops of equipment, mezzanines.

##### **Access (C) Exposed**

Areas of the building above 8 ft. where use of a ladder is required to reach the hazardous building material. Only refers to hazardous building material materials that are exposed to view, from the floor or ladder, without removing or opening other building components such as ceiling tiles, or service access doors or hatches. Does not include infrequently accessed service areas of the building.

##### **Access (C) Concealed**

Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations are limited to the extent visible from the access points.

##### **Access (D)**

Areas of the building behind inaccessible solid ceiling systems, walls, or mechanical equipment, etc. where demolition of the ceiling, wall or equipment, etc., is required to reach the hazardous building material. Evaluation of the condition and extent of hazardous building material is limited or impossible, depending on the assessor's ability to visually examine the materials in Access D.

Given the exposure hazards associated with asbestos, additional categories for ACM debris are provided below.

##### **Debris from Friable ACM**

The presence of fallen friable ACM is noted separately from the friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as debris.

### **Debris from Damaged Non-Friable ACM**

The presence of debris from damaged non-friable ACM, is reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable, is reported as debris.

### **ACM Debris Above Ceilings**

The identification of the exact location or presence of debris on the top of ceiling tiles is limited by the number of observations made and the presence of building components such as ducts or full height walls that obstruct observations. Workers are advised to be watchful for the presence of debris prior to accessing, or working in proximity to, mechanical insulation or above ceiling areas of buildings with hazardous building material, regardless of the reported presence or absence of debris. Industry standard typically require Moderate Risk Asbestos Abatement operations for the removal of all or part of a false ceiling to obtain access to a work area, if asbestos-containing material is likely to be lying on the surface of the false ceiling.

## **4.2 Evaluation of Condition and Accessibility of Identified Lead**

For general lead-containing materials (e.g. solder used on copper domestic pipes; electrical equipment/wiring; batteries [e.g., emergency exit signage batteries]; lead sheeting [e.g., x-ray rooms]; vent and pipe flashings), condition evaluation is based on function. If function is compromised, the material would be considered in “poor” condition and would likely require replacement. Given that the exposure hazards with such replacements are typically low and/or simplistic to control, evaluation pertaining to such material is not conducted or discussed herein.

### **4.2.1 Lead-Containing Paint**

The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluation the conditions of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency.

“**Poor**” surfaces are considered to be a hazard and should be corrected. “**Fair**” surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. “**Good/intact**” surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluation condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to “wear” from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surfaces).

should, for example. The coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in Table 1, below.

**Table 1: Lead-Containing Paint Condition Categories**

Type of Building Component <sup>1</sup>	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair <sup>2</sup>	Poor <sup>3</sup>
Exterior components with large surface areas	Entire surfaces is intact	Less than or equal to 10 ft <sup>2</sup>	More than 10 ft <sup>2</sup>
Interior components with large surface areas (walls, ceilings, floors, doors)	Entire surfaces is intact	Less than or equal to 2 ft <sup>2</sup>	More than 2 ft <sup>2</sup>
Interior and exterior components with small surface areas (window sills, baseboards, soffits, trim)	Entire surfaces is intact	More than 10% of the total surface area of the component	More than 10% of the total surface area of the component
NOTES: <sup>1</sup> Building components in this table refers to each individual components or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact). <sup>2</sup> Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards". <sup>3</sup> Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.			

#### 4.3 Mould and Moisture-Impacted Building Materials

The condition of building materials impacted by moisture or mould is typically considered "poor" or "requiring action". Additional details are provided below:

- Non-porous building materials (e.g., glass, metal) that can be cleaned and dried without losing function would be considered to be in "fair condition" if wet, and "poor condition" only if visible mould growth is present on surfaces (typically indicating the surfaces are covered with a layer of dirt, as mould will not grow on non-porous, inorganic materials).
- Semi-porous and porous materials (e.g., wood framing, gypsum board, carpets, furniture) that are impacted by moisture (without mould contamination) are considered to be in "fair"

condition— representative of a situation that requires moisture intrusion correction and drying of affected surfaces only.

- Depending on the building material, the water impacts may have degraded the material itself to a point where replacement is required (e.g., gypsum, insulation).
- Semi-porous and porous materials that are impacted by moisture (current or previous) and have evidence of mould contamination are considered to be in “poor” condition.

#### **4.4 Other Hazardous Building Materials**

For other hazardous building materials (e.g., equipment with PCBs, equipment with mercury, equipment with ODSs, materials containing silica), condition evaluation is based on function. If the function is compromised, the material would be considered in “poor” condition and would likely require replacement.

Given that the exposure hazards associated with such replacements are typically low, simplistic to control and/or paramount to the removal process (e.g., review of ballasts for PCBs as they are decommissioned; in-tact removal of mercury-containing items; recovery of ODSs; implementation of dust control when disturbing/removing silica-containing materials), condition evaluation pertaining to such materials is not conducted or discussed herein.

### **5.0 LIMITATIONS OF ASSESSMENT**

In preparation of this report, DST used professional judgment based on experience. The work was conducted in accordance with generally accepted professional standards. DST relied on information gathered during the site investigations and laboratory analytical reports.

This report reflects the observations made within accessed portions of the Subject Building and the results of analyses performed on specific materials sampled during the assessment. Analytical results reflect the sampled materials at the specific sample locations.

Sampling was conducted pertaining to suspected ACMs and suspected LCPs only. The assessment for the presence of other hazardous building materials was visual in nature and was conducted pertaining to readily visible surfaces within accessible spaces.

#### **5.1 Asbestos**

If encountered during demolition activities, any suspected ACMs not identified within this report should be presumed to contain asbestos and handled as such until otherwise proven, through analytical testing.

## **5.2 Lead**

If encountered during demolition activities, any suspected LCPs not identified within this report should be presumed to contain lead and handled as such until otherwise proven, through analytical testing.

With respect to paint, samples of suspected LCPs were collected within the Subject Building only from surfaces of major paint applications where visually different paint colours and/or types were identified. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only.

Attempts were made to represent all layers of paint in the samples collected. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour will be presumed to be the same, regardless of differing sub surface paints, if any.

## **5.3 Polychlorinated Biphenyls**

Visual assessment for the presence of PCB-containing equipment within the Subject Building was conducted in accessible areas. All areas of the Subject Building were accessible; as such, limitations to the identification of PCB-containing equipment do not apply.

## **5.4 Mercury**

Visual assessment for the presence of mercury-containing equipment within the Subject Building was conducted in accessible areas. All areas of the Subject Building were accessible; as such, limitations to the identification of mercury-containing equipment do not apply.

## **5.5 Mould**

Visual assessment for the presence of suspected visible mould and/or suitable conditions for mould growth (e.g., moist and/or water-stained building materials) were conducted in accessed portions of the Subject Building. The assessment was not intrusive in nature and included visual assessment of exposed surfaces and closer inspection of known problem areas.

The conclusions made in this report provide description(s) of the potential source(s) of moisture within the subject buildings that may have led to suitable conditions for mould growth, only in those cases where potential source(s) of moisture were identified. These conclusions will not necessarily identify all sources of moisture leading to suitable conditions for mould growth within the Subject Building or within the impacted area(s).



This assessment does not constitute a building envelope/building systems assessment for any of the subject buildings, which would include an intrusive investigation to assess the internal condition, potential moisture sources, and expected remaining service life of the various components and systems comprising the envelope of a building.

## **5.6 Ozone Depleting Substances (ODSs)**

Visual assessment for the presence of potential sources of ODSs within the Subject Building was conducted in accessible areas. All areas of the Subject Building were accessible; as such, limitations to the identification of ODSs do not apply.

## **5.7 Silica**

Visual assessment for the presence of silica-containing materials within the Subject Building was conducted in accessible areas. Additional silica-containing materials may be present in inaccessible areas including, but not limited to, underground installations.

## **6.0 RESULTS**

The results of our assessment are provided in Appendix 1. The Appendix contains the following (where applicable):

- Separate sections with written summaries of findings pertaining to each hazardous building material, including the following:
  - Listing of suspect materials observed
  - Tables that provide summaries of the sample types, locations, and analytical results
  - Interpretations of observations and/or sample analytical results
- Information pertaining to condition evaluation of identified hazardous building materials
- Recommendations for identified hazardous building materials found to be in “non-compliant” condition (e.g., damaged ACMs, mould-impacted materials, etc.), where applicable
- Floor plan drawings for the buildings/structures, which include locations of the samples collected during this assessment, and locations of identified hazardous building materials (where practical).
- Copies of the analytical certificates for suspected ACM samples collected/analyzed.
- Copies of the analytical certificates for all suspected LCP samples collected/analyzed.

## **7.0 RECOMMENDATIONS**

Building-specific recommendations pertaining to the identified hazardous building materials that require action through the demolition of the building are provided in Appendix 1. General recommendations pertaining to management of identified hazardous building materials in their current condition and state are provided below.

### **7.1 Lead**

When lead-containing paints within the Subject Building are to be disturbed and/or removed, including in instances where paint chip debris is removed and/or paint debris is created (e.g., preparing surfaces for re-painting), ensure compliance with the following:

- Exposure protection requirements of the COHSR and BC Reg. 296/97, including the provisions of the Lead Guideline.
- Transportation and disposal requirements of BC Reg. 63/88.
- Transportation requirements of the Federal Transportation of Dangerous Goods Regulation.

Ultimately, the Contractor is responsible to review the work tasks required and the ways in which materials (including those coated with paints that may contain lead in varying concentrations) will be impacted, as well as the individuals that will be present in the immediate vicinity of the work (i.e., potential for high-risk individuals) in order to determine the appropriate personal protective equipment (PPE—including respirators and protective clothing), containment and/or decontamination measures and work procedures that should be followed to protect workers from lead exposure.

### **7.2 Silica**

In their current condition, (i.e., good condition), the identified silica-containing materials can be managed in place.

If silica-containing materials are to be removed or destructively altered (drilled, chipped, abraded, etc.), ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limit as stipulated by the COHSR and BC Reg. 296/97, as amended (0.025 mg/m<sup>3</sup>).

This would include, but not be limited to, the following:

- Providing workers with respiratory protection.
- Wetting the surface of the materials to prevent dust emissions.

- Providing workers with facilities to properly wash prior to exiting the work area.
- Providing dust control to mitigate the potential for demolition dust to escape from the work area into public and/or adjacent areas.

### **7.3 Biohazardous Materials – Rodent Droppings**

In their current condition and state, the rodent dropping present a risk of harmful exposure to biohazardous materials. Access to the Subject Building should be restricted until the rodent droppings are removed. When removing rodent droppings, ensure a site-specific risk assessment and exposure control program are developed appropriate controls are in place. Refer to WorkSafeBC publication entitled, “A Hantavirus Exposure Control Program for Employers and Workers”, dated 2006. Recommendations in this guideline meet the requirements of the COHSR.

## **8.0 CLOSURE**

This report is intended for PSPC and their Client, i.e., DND use only. Any use of this document by a third party, or any reliance on or decisions made based on the findings described in this report, are the sole responsibility of such third parties, and DST Consulting Engineers Inc. accepts no responsibility for damages, suffered by any third party as a result of decisions made or actions conducted based on this report. No other warranties are implied or expressed.

The data, conclusions and recommendations which are presented in this report, and the quality thereof, are based on a scope of work authorized by the client. The sampling program included asbestos bulk sampling and paint chip sampling in select representative areas for laboratory analysis. Note, however, that no scope of work, no matter how exhaustive, can guarantee to identify all contaminants. This report therefore cannot warranty that all building conditions are represented by those identified at specific locations.

Recommendations, when included, are made in good faith, and are based on several successful experiences.

Note also that standards, guidelines, and practices related to environmental investigations may change with time. Those which were applied at the time of this investigation may be obsolete or unacceptable at a later date.

Any comments given in this report on potential remediation problems and possible methods are intended only for the guidance of the designer. The scope of work may not be sufficient to determine all the factors that may affect construction, clean-up methods and/or costs. Contractors bidding on this project or undertaking clean-ups should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the conditions may affect their work.

Any results from an analytical laboratory or other subcontractor reported herein have been carried out by others, and DST Consulting Engineers Inc. cannot warranty their accuracy. Similarly, DST cannot warranty the accuracy of information supplied by the client.

We hope the information presented in this document meets your current requirements. If you have any questions, or require additional information please contact us at your convenience.

Yours truly,

**DST Consulting Engineers Inc.**

Report Prepared By:

Report Reviewed By:



Lance Pizzariello, M.Sc., C.E.T., A.Sc.T., EP  
*Environmental Technologist*



Matthew DesRoches, M.Sc.(A), CIH, ROH  
*Associate, Senior Technical Advisor*

**APPENDIX 1**  
**FINDINGS AND RECOMMENDATIONS**

## Appendix 1

### FINDINGS AND RECOMMENDATIONS SHED B273 – DND COMOX

The results of the assessment for each of the considered hazardous materials within the Subject Building are provided in the following sub-sections. A plan drawing of the Subject Building, which include locations of the samples collected during this assessment and locations of identified hazardous building materials (where practical), is attached to this Appendix.

A copy of the certificate of analysis provided by EMSL Canada Inc. for the suspected ACM samples submitted as part of this assessment is attached at the end of this Appendix.

A copy of the certificate of analysis provided by Bureau Veritas Laboratories for the suspected Lead samples submitted as part of this assessment is attached at the end of this Appendix.

#### ASBESTOS-CONTAINING MATERIALS (ACMs)

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of the results of suspected ACM samples analyzed through the current assessment, **ACMs were not identified within the Subject Building.**

A summary of the materials sampled, sample point locations and analytical results are provided in Table A1, below.

**Table A1 Suspected ACM Sample Collection and Analysis Summary for Shed B273 – DND Comox**

Building Material	Sample Number	Sample Area	Sample Location within Area	Result (% , Type of Asbestos)
Asphalt Roofing Membrane	2003709-1A	Shed Roof - Exterior	Center of Roof, along the South Edge	None Detected
Asphalt Roofing Membrane	2003709-1B	Shed Roof - Exterior	East Extent of Roof, along the South Edge	None Detected
Asphalt Roofing Membrane	2003709-1C	Shed Roof - Exterior	West Extent of Roof, along the South Edge	None Detected
Construction Paper - Black	2003709-2A	Interior	East Wall	None Detected
Construction Paper - Black	2003709-2B	Interior	South Wall	None Detected

Building Material	Sample Number	Sample Area	Sample Location within Area	Result (% , Type of Asbestos)
Construction Paper - Black	2003709-2C	Interior	North Wall	None Detected
Plaster Patch	2003709-3A	Interior	Ceiling	None Detected
Plaster Patch	2003709-3B	Interior	Ceiling	None Detected
Plaster Patch	2003709-3C	Interior	Ceiling	None Detected

## LEAD

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of the results of suspected lead-containing paint samples analyzed through the current assessment, **paints containing > 600 ppm were not identified within the Subject Building.**

A summary of the materials sampled, sample point locations and analytical results are provided in Table A2, below.

**Table A2 Suspected Lead-Containing Paint Sample Collection and Analysis Summary for Shed B273 – DND Comox**

Building Material	Sample Number	Sample Area	Sample Location within Area	Result Lead Parts Per Million (ppm)
Light-Blue Paint	2003709-L1	Exterior	Front Door	14.4
White Paint	2003709-L2	Door Frame	Front Door	8.7

When lead-containing equipment/materials within the Subject Building are to be disturbed and/or removed, including in instances where paint chip debris is removed and/or paint debris is created (e.g., preparing surfaces for re-painting), ensure compliance with the following:

- Exposure protection requirements of the COHSR and BC Reg. 296/97, including the provisions of the Lead Guideline.
- Transportation and disposal requirements of BC Reg. 63/88.
- Transportation requirements of the Federal Transportation of Dangerous Goods Regulation.



Corrective action or remedial work on paint applications containing any concentration of lead should be undertaken in a manner so as to avoid generating fine particulate matter or dust (i.e., avoid sanding).

Airborne lead dust or fumes should not exceed the COHSR and BC Reg. 296/97 eight-hour occupational exposure limit (OEL) of 0.05 mg/m<sup>3</sup> during the removal of paints and products containing any concentration of lead. The use of personal protective equipment is recommended to reduce the potential for over-exposure to lead dust. This can be achieved by:

- Providing workers with protective clothing and personal protective equipment or devices as necessary to protect them against the hazards to which the worker may be exposed.
- Providing workers with adequate training in the care and use of clothing, equipment or device before wearing or using such items.
- Wetting the surface of the materials to prevent dust emissions.
- Providing workers with washing facilities with clean water, soap and individual towels to properly wash prior to exiting the work area.

To avoid the inhalation of lead, it is essential to have the following control methods in place:

- Engineering controls.
- Work practices and hygiene practices.
- Respirators and personal protective equipment.
- Training.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97. In addition, the following information is provided in the BC Lead Guide:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m<sup>3</sup> (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is in the order of 90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless a project-specific or task-specific risk assessment and safe work practices are developed by a qualified person.

Ultimately, the Contractor is responsible to review the work tasks required and the ways in which materials (including those coated with paints that may contain lead in varying concentrations) will be impacted, as well as the individuals that will be present in the immediate vicinity of the work

(i.e., potential for high-risk individuals) in order to determine the appropriate personal protective equipment (PPE—including respirators and protective clothing), containment and/or decontamination measures and work procedures that should be followed to protect workers from lead exposure.

### **POLYCHLORINATED BIPHENYLS (PCBs)**

Sources of PCBs were not identified within the Subject Building.

### **MERCURY**

Sources of mercury were not identified within the Subject Building.

### **MOULD**

Suspect mould or moisture-impacted building materials were not observed at the time of the assessment.

### **RODENT DROPPINGS**

Rodent droppings were observed to be sparsely distributed on the flooring within the Subject Building. A photographic illustration of the rodent droppings is presented below.

Illustration of rodent droppings sparsely distributed throughout the floor of the Subject Building.



When removing rodent droppings, ensure a site-specific risk assessment and exposure control program are developed appropriate controls are in place. Refer to WorkSafeBC publication entitled, “*A Hantavirus Exposure Control Program for Employers and Workers*”, dated 2006.

## **OZONE-DEPLETING SUBSTANCES (ODSs)**

Sources of ODSs were not identified in the Subject Building.

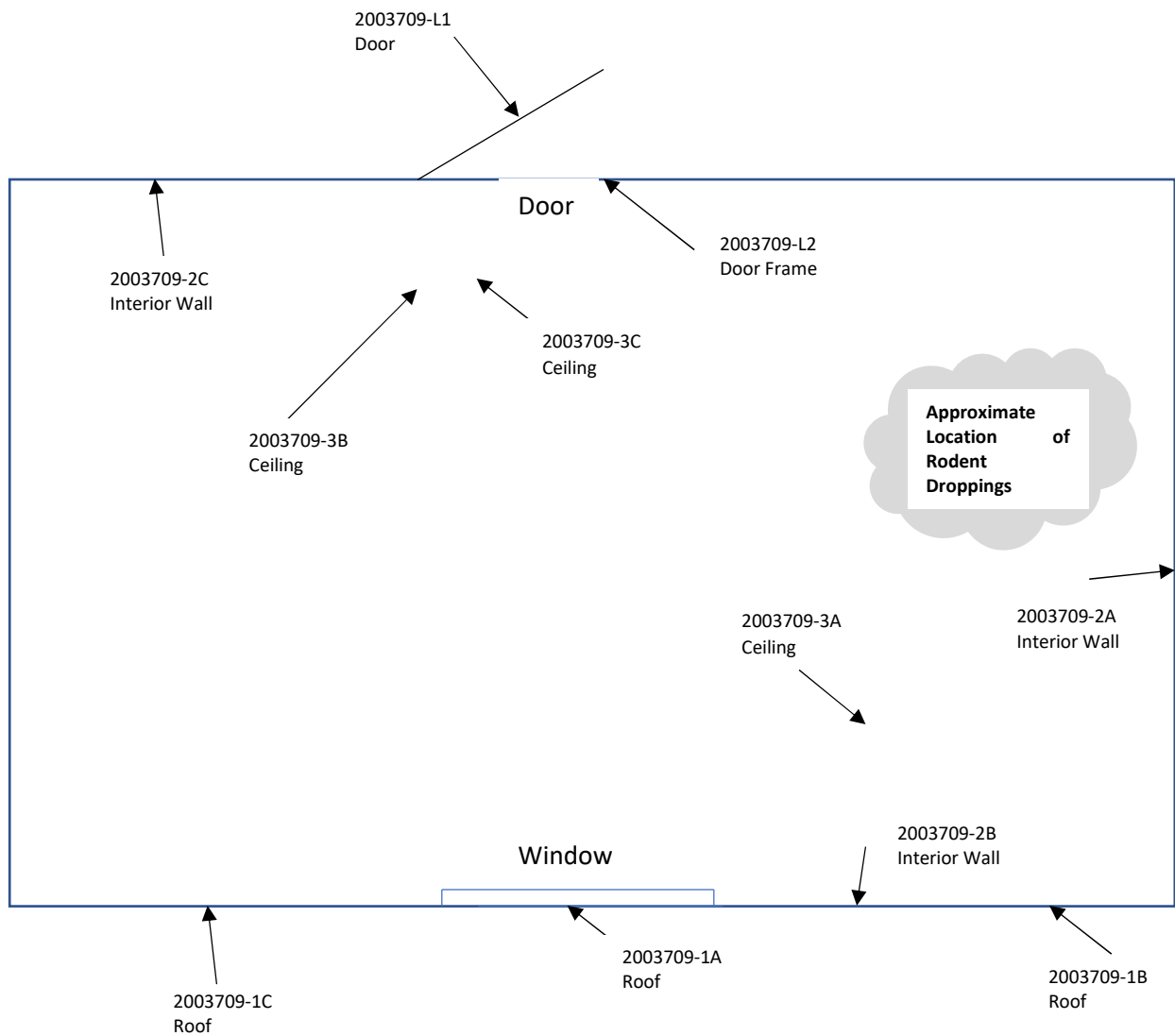
## **SILICA**

Silica is expected to be present in the concrete foundation and walkway leading to the Subject Building). When silica-containing materials are to be removed or destructively altered, ensure a site-specific risk assessment and exposure control program are developed to ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limit as stipulated by the COHSR and BC Reg. 296/97 (0.025 mg/m<sup>3</sup>). This may include, but not be limited to, the following:

- Providing workers with respiratory protection.
- Wetting the surface of the materials to prevent dust emissions.
- Providing workers with facilities to properly wash prior to exiting the work area.
- Providing dust control to mitigate the potential for demolition dust to escape from the work area into public and/or adjacent areas.



**Asbestos and Lead  
Sample Point Locations at SHED 273  
DND COMOX**



**Plan Drawing of Shed 273  
DND Comox, Comox, BC  
September 21, 2020**



# EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1  
 Phone/Fax: (604) 757-3158 / (604) 757-4731  
<http://www.EMSL.com> / [vancouverlab@EMSL.com](mailto:vancouverlab@EMSL.com)

EMSL Canada Order 692002088  
 Customer ID: 55DSTV42  
 Customer PO:  
 Project ID:

**Attn:** Lance Pizzariello Phone: (604) 436-4588  
 DST Consulting Engineers Fax:  
 4125 McConnell Drive Collected: 8/25/2020  
 Unit B Received: 9/02/2020  
 Vancouver, BC V5A 3J7 Analyzed: 9/09/2020  
**Proj:** 2003709 / COMOX, BC

## Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

**Client Sample ID:** 2003709-1A **Lab Sample ID:** 692002088-0001

**Sample Description:** SHED EXTERIOR ROOF - CENTRAL, SOUTH EDGE/ASPHALTIC ROOF MEMBRANE - BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/09/2020	Black	0.0%	100.0%	None Detected	

**Client Sample ID:** 2003709-1B **Lab Sample ID:** 692002088-0002

**Sample Description:** SHED EXTERIOR ROOF - CENTRAL, WEST SIDE/ASPHALTIC ROOF MEMBRANE - BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/09/2020	Black	0.0%	100.0%	None Detected	

**Client Sample ID:** 2003709-1C **Lab Sample ID:** 692002088-0003

**Sample Description:** SHED EXTERIOR ROOF - CENTRAL, EAST SIDE/ASPHALTIC ROOF MEMBRANE - BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/09/2020	Black	0.0%	100.0%	None Detected	

**Client Sample ID:** 2003709-2A **Lab Sample ID:** 692002088-0004

**Sample Description:** INTERIOR OF SHED INTERIOR WALL - EAST WALL/CONSTRUCTION PAPER - BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/09/2020	Gray/Silver	90.0%	10.0%	None Detected	

**Client Sample ID:** 2003709-2B **Lab Sample ID:** 692002088-0005

**Sample Description:** INTERIOR OF SHED INTERIOR WALL - SOUTH WALL/CONSTRUCTION PAPER - BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/09/2020	Gray/Silver	90.0%	10.0%	None Detected	

**Client Sample ID:** 2003709-2C **Lab Sample ID:** 692002088-0006

**Sample Description:** INTERIOR OF SHED INTERIOR WALL - NORTH WALL/CONSTRUCTION PAPER - BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/09/2020	Gray/Silver	90.0%	10.0%	None Detected	

**Client Sample ID:** 2003709-3A **Lab Sample ID:** 692002088-0007

**Sample Description:** INTERIOR OF SHED CEILING/PLASTER/PATCHING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/09/2020	Tan	0.0%	100.0%	None Detected	



# EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1  
Phone/Fax: (604) 757-3158 / (604) 757-4731  
<http://www.EMSL.com> / [vancouverlab@EMSL.com](mailto:vancouverlab@EMSL.com)

EMSL Canada Order 692002088  
Customer ID: 55DSTV42  
Customer PO:  
Project ID:

## Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

**Client Sample ID:** 2003709-3B **Lab Sample ID:** 692002088-0008  
**Sample Description:** INTERIOR OF SHED CEILING/PLASTER/PATCHING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/09/2020	Tan	0.0%	100.0%	None Detected	

**Client Sample ID:** 2003709-3C **Lab Sample ID:** 692002088-0009  
**Sample Description:** INTERIOR OF SHED CEILING/PLASTER/PATCHING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/09/2020	Tan	0.0%	100.0%	None Detected	

**Analyst(s):**  
Margaret Lee PLM (9)

**Reviewed and approved by:**  
  
Nicole Yeo, Laboratory Manager  
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency or the U.S. Government

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Initial report from: 09/10/2020 11:52:10



Your Project #: 2003709  
Site Location: DND COMOX SHED COMOX, BC

**Attention: RESULTSV**

DST CONSULTING ENGINEERS  
Unit B - 4125 McConnell Drive  
Burnaby, BC  
CANADA V5A 3J7

**Report Date: 2020/09/08**  
Report #: R2925770  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BV LABS JOB #: C063289**

**Received: 2020/09/02, 17:25**

Sample Matrix: Paint  
# Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Elements by ICP-AES (acid extr. solid)	2	2020/09/08	2020/09/08	BBY7SOP-00018	EPA 6010d m

**Remarks:**

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key



Bureau Veritas Laboratories  
08 Sep 2020 12:52:26

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Carmen McKay, Project Manager  
Email: Carmen.MCKAY@bvlabs.com  
Phone# (403)219-3683

=====  
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BUREAU  
VERITAS

BV Labs Job #: C063289  
Report Date: 2020/09/08

DST CONSULTING ENGINEERS  
Client Project #: 2003709  
Site Location: DND COMOX SHED COMOX, BC  
Sampler Initials: LP

### ELEMENTS BY ATOMIC SPECTROSCOPY (PAINT)

<b>BV Labs ID</b>		YJ5743	YJ5744		
<b>Sampling Date</b>		2020/08/25	2020/08/25		
	<b>UNITS</b>	<b>2003709-L1 EXTERIOR LIGHT BLUE SHED DOOR</b>	<b>2003709-L2 INTERIOR WHITE SHED DOOR FRAME</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Total Metals by ICP</b>					
Total Lead (Pb)	mg/kg	14.4	8.7	4.0	9990140
RDL = Reportable Detection Limit					





BUREAU  
VERITAS

BV Labs Job #: C063289  
Report Date: 2020/09/08

DST CONSULTING ENGINEERS  
Client Project #: 2003709  
Site Location: DND COMOX SHED COMOX, BC  
Sampler Initials: LP

## GENERAL COMMENTS

### ELEMENTS BY ATOMIC SPECTROSCOPY (PAINT) Comments

Sample YJ5743 [2003709-L1 EXTERIOR LIGHT BLUE SHED DOOR] Elements by ICP-AES (acid extr. solid): Detection limits raised based on sample weight used for analysis.

Sample YJ5744 [2003709-L2 INTERIOR WHITE SHED DOOR FRAME] Elements by ICP-AES (acid extr. solid): Detection limits raised based on sample weight used for analysis.

**Results relate only to the items tested.**



BV Labs Job #: C063289  
 Report Date: 2020/09/08

### QUALITY ASSURANCE REPORT

DST CONSULTING ENGINEERS  
 Client Project #: 2003709  
 Site Location: DND COMOX SHED COMOX, BC  
 Sampler Initials: LP

QC Batch	Parameter	Date	Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9990140	Total Lead (Pb)	2020/09/08	99	75 - 125	<2.0	mg/kg	38	40	467	N/A
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p>										



BUREAU  
VERITAS

BV Labs Job #: C063289  
Report Date: 2020/09/08

DST CONSULTING ENGINEERS  
Client Project #: 2003709  
Site Location: DND COMOX SHED COMOX, BC  
Sampler Initials: LP

### VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

---

David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

---

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



DST Consulting Engineers Inc.  
 Unit B – 4125 McConnell Drive  
 Burnaby, British Columbia  
 V5A 3J7

Chain of Custody			
Date: September 2, 2020	Project #: 2003709	Project Name: DND Comox Shed	
Project Address: Comox, BC		Approver Name / Project Manager Lance Pizzariello:	
Results Requested By: 1 Week From Receipt		Type of Analysis Requested: EPA 6010D-M (Bureau Veritas)	
Send Results To: Results Vancouver - resultsvc@dstgroup.com		Additional Instructions: Choose an item.	
Lab: Bureau Veritas Laboratories - 4606 Canada Way, Burnaby, BC V5G 1K5 403-219-3683		Sampled By: Lance Pizzariello	Date Sampled: August 25, 2020
Relinquished By: Lance Pizzariello - 604-787-6475 - lpizzariello@dstgroup.com		Signature:	
COC Accepted By:  2020/09/02 17:25		Signature:	

### Bulk Samples

Sample #	Area or Room	Building Material and Colour <sup>1</sup>	Sampling Location
2003709-L1	Exterior	Light Blue	Shed Door
2003709-L2	Interior	White	Shed Door Frame



C063289\_COC

<sup>1</sup> DJC-Drywall Joint Compound, VSF-Vinyl Sheet Floor, VFT-Vinyl Floor Tile, FLC-Floor Leveling Compound, ADH-Adhesive, CT-Ceiling Tile

**APPENDIX 2**  
**APPLICABLE LEGISLATION, REGULATIONS, AND GUIDELINES**

## Appendix 2

### APPLICABLE LEGISLATION REGULATIONS AND GUIDELINES

#### FEDERAL LEGISLATION, REGULATIONS AND GUIDELINES

##### Canada Labour Code

In federal jurisdictions, hazardous building materials are regulated under the Canada Labour Code, Part II, Part X, Hazardous Substances.

##### *Asbestos-Containing Materials (ACMs)*

ACMs are regulated under the Canada Occupational Health and Safety Regulations, (SOR/86-304).

##### *Lead-Based Coatings (LBCs)*

The Hazardous Products Act (HPA), Surface Coating Materials Regulation (SOR/2005-109) provides regulatory requirements for the sale and labeling of surface coatings.

In Canada, the Surface Coating Materials Regulations (SOR/2005-109) under the federal Hazardous Products Act provides a concentration of lead that must not be exceeded in surface coatings that are presently sold in this country (90 parts per million, or “ppm”). However, it is important to note that this regulation does not comment on the potential occupational exposure if the material is disturbed.

Under the COHSR, a regulatory limit has been established for occupational exposure to airborne lead that may be present in a workplace. The occupational exposure limit (OEL) for airborne lead dust or fumes per both regulatory instruments should not exceed the time-weighted average value of 0.05 milligram per cubic metre of air (mg/m<sup>3</sup>).

##### *Ozone Depleting Substances (ODS)*

Halocarbon and Ozone Depleting substances are regulated under the Canadian Environmental Protection Act (CEPA), “Federal Halocarbon Regulations, 2003, (SOR/2003-289)”.

### *Polychlorinated Biphenyl's (PCBs)*

PCBs are regulated under the Canadian Environmental Protection Act (CEPA), specifically under the "PCB Regulations" (SOR/2008-273), including amendments to December 8, 2011.

### *Transportation of Dangerous Goods Act*

The Transportation of Dangerous Goods Act provides detailed requirements for the transportation of hazardous materials, including lead-containing wastes.

### *Federal Guidelines*

Public Services and Procurement Canada's (PSPC) **Asbestos Management Standard (AMS)**, dated June 5, 2017. This standard sets out Real Property Service's requirements regarding the operational and technical activities required to be carried out for the management of asbestos-containing material.

**PSPC's Asbestos Management Directive (AMD)**. This directive ensures the safe and efficient operation of buildings and engineering assets where asbestos is deemed to be present, in accordance with the minimum standards of the applicable codes and regulations.

The purpose of this directive is to outline the responsibilities of Asset Managers, Property and Facility Managers, Project Managers, Regional Asbestos Coordinators, and leasing representatives when asbestos-containing materials are present in the building inventory. The purpose of this document is to also provide the operational details of the activities required to be carried out for the management of asbestos-containing materials.

## **PROVINCIAL LEGISLATION, REGULATIONS AND GUIDELINES**

### **BC Workers' Compensation Act**

In British Columbia, the management of hazardous building materials in the work place is regulated by WorkSafeBC under the Workers' Compensation Act (effective April 15, 1998), as amended by the Workers' Compensation (Occupational Health and Safety) Amendment Act (effective October 1, 1999). Specific requirements of the Occupational Health and Safety Amendment Act are prescribed in the British Columbia Occupational Health and Safety (BC OH&S) Regulation.

### **British Columbia Occupational Health and Safety (BC OH&S) Regulation**

#### *Asbestos-Containing Materials (ACMs)*

ACMs are regulated under Part 6 (sections 6.1 to 6.32) of the BC OH&S Regulation. Under Part 6 Section 6.1, an asbestos containing material is defined as “a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the following methods:

- (i) Asbestos, Chrysotile by XRD, Method 9000
- (ii) Asbestos (bulk) by PLM, Method 9002
- (iii) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116)

WorkSafeBC Manual – “Safe Work Practices for Handling Asbestos”

This manual outlines basic information on asbestos and asbestos products, health hazard requirements for worker protection, safe work procedures and principles that should be followed in selecting the most suitable technique for the safe abatement of ACMs. This document provides a guide to current practices that are to be followed in the Province of British Columbia.

#### *Lead-Containing Paints (LCPs)*

Lead is regulated under Part 6 (sections 6.59 to 6.69) of the BC OH&S Regulation. Under the BC OH&S Regulation, a regulatory limit has been established for occupational exposure to airborne lead that may be present in a workplace. The occupational exposure limit (OEL) for airborne lead dust or fumes should not exceed the time-weighted average value of 0.05 milligram per cubic metre of air ( $\text{mg}/\text{m}^3$ ). The OEL represents the time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse health effects.

WorkSafeBC has published the following document, which is intended to provide guidelines for managing lead exposures within applicable limits during renovation or demolition work, and which would meet the requirements of both the COHSR and BC Reg. 296/97:

- WorkSafeBC 2017 publication entitled Safe Work Practices for Handling Lead (BC Lead Guide).

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2011 WorkSafeBC manual titled Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry, indicates the following:



- The improper removal of lead paint containing 600 mg/kg (equivalent to “parts per million” or “ppm”) lead results in airborne lead concentrations that exceed half of the exposure limit.
- This potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children.
- Any risk assessment should include for the presence of high-risk individuals within the workplace.

In addition to the above, the BC Lead Guide indicates the following:

- Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers.
- In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.

Based on the above, and because both federally regulated workers and provincially regulated workers (e.g., contractors) are expected to carry out work activities within the Subject Building, and as the provincial regulations have a more stringent criteria, and generally include the requirements noted in the COHSR, this assessment was conducted to meet the requirements of BC Reg. 296/97. In other words, paints containing 600 mg/kg lead (equivalent to “parts per million” or “ppm”) or greater, are classified as paints that contain hazardous levels, i.e., LCPs.

Additionally, Toxicity Characteristic Leaching Procedure (TCLP) testing should be performed on identified lead-based paint, to facilitate the proper disposal of lead-containing wastes.

#### *Ozone-Depleting Substances (ODSs)*

Provincial regulatory framework providing the requirements for the safe management, storage and disposal of ozone-depleting substances are provided in British Columbia Regulation (BC Reg.) 387/99, as amended from time to time – Ozone-Depleting Substances and Other Halocarbons Regulation respecting the appropriate management of ozone-depleting substances within the province of British Columbia.

### *Elemental Mercury*

Mercury-containing equipment is regulated under Part 5, section 5.49 of the BC OH&S Regulation.

### *Mould Amplification*

Mould-impacted building materials are regulated under Part 4, section 4.79 of the BC OH&S Regulation.

### *Crystalline Silica*

Section 6.111(1) of the OHS Regulation describes specific requirements for workplace exposure to crystalline silica (rock dust).

There is no specific exposure limit for "rock dust". Rather, there are exposure limits for the constituents of rock dust that pose a hazard to a worker's health, for example, crystalline silica. Crystalline silica is a designated substance and, therefore, the requirements of section 5.57 of the Regulation apply.

## **Environmental Protection Act**

In British Columbia, environmental matters pertaining to waste generally fall under the jurisdiction of the British Columbia Ministry of Environment (MoE), pursuant to the Environmental Management Act. The key waste regulation under the Environmental Management Act relating to hazardous building materials is the Hazardous Waste Regulation (HWR), as amended from time to time.

### *Hazardous Waste Regulation*

The HWR provides the requirements for the proper handling, storage, transportation, treatment, recycling and disposal of hazardous wastes in the province. The regulation also outlines the materials and criteria to be used to characterize waste as hazardous.