Construction Environmental Management Plan

Sterling Shipyard Remediation and Infill
Impact Assessment and Community Engagement

Prepared for:

Vancouver Fraser Port Authority

June 2, 2021

Revision Index

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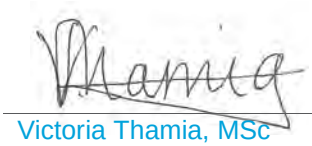
Prepared By:

Vitaly Ostroumov, RPBio
Environmental Assessment Professional
Environment & Geoscience
Engineering, Design & Project Management

Reviewed By:

Brian Lynch, MSc, RPBio
Senior Aquatic Biologist
Environment & Geoscience
Engineering, Design & Project Management

Jag Bilkhu, M.E.Des., ENV SP, EP(EMSLA)
Project Manager / Sr. Environmental Assessment Specialist
Environment & Geoscience
Engineering, Design & Project Management



Victoria Thamia, MSc
Environmental Scientist
Environment & Geoscience
Engineering, Design & Project Management

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Acronyms

Acronym	Definition
BC	British Columbia
BMP	Best Management Practice
CEMP	Construction Environmental Management Plan
CEPA	Canadian *Environmental Protection Act*
DEWMP	Dredge and Excavation Water Management Plan
DFO	Fisheries and Oceans Canada
EM	Environmental Monitor
EMA	BC *Environmental Management Act*
ESC	Erosion and Sediment Control
FLNRORD	BC Ministry of Forests, Land, Natural Resource Operations and Rural Development
IBA	Important Bird Area
MBCA	Migratory Birds Convention Act
MMO	Marine Mammal Observer
PAH	Polyaromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCOC	Potential Contaminant of Concern
PER	Project Environmental Review
QEP	Qualified Environmental Professional
SARA	*Species at Risk Act*
SMP	Soil/Substrate Management Plan
SPERNP	Spill Prevention and Emergency Response Notification Plan
SPERP	Spill Prevention and Emergency Response Plan
TBD	To be determined (i.e., CEMP to be updated with this information when it becomes available)
The Port	Vancouver-Fraser Port Authority
TDGA	*Transportation of Dangerous Goods Act*
VFPA	Vancouver-Fraser Port Authority
WQMP	Water Quality Management Plan

1 Environmental Sensitivities

The following table summarizes the issues associated with construction activities, including potential impacts, risk value associated with the impacts, and the relevant sections within the Construction Environmental Management Plan (CEMP). For the purposes of the CEMP, the following areas are defined:

- The "Site" – the entirety of the former Sterling Shipyard facility.
- The "Project Area" – The vicinity of the Project location, defined as an approximate 1 km radius around the Site.
- The "excavation area" – The footprint of sediment remediation within the intertidal and high subtidal zones of the Site.
- The "beach area" or "work area" – the lower elevation area of the Site in which sediment remediation and the construction of the rock berm will take place. This portion of the site is bound by a timber retaining wall to the west, a rock berm to the east, concrete dividers, and a parking area to the south and Burrard Inlet to the north. Includes marine riparian vegetation on the southern portion of the beach.
- The "waterlot" – the legally defined waterlot associated with the Site.
- The "upland area" – The entirety of the Site, excluding the beach area and waterlot, currently containing paved and gravel-covered parking facilities.

Table 1: Summary of Potential Environmental Impacts

Environmental Concern	Potential Impact	Relevant CEMP Section
Erosion and Sediment Control	› Impacts to water quality in Burrard Inlet from dredging activities, rock berm installation and barge movement. › Erosion/sloughing of soil from movement of machinery, equipment, and personnel. › Sediment or sediment-laden water flowing from the Site into Burrard Inlet.	Section 6.1.1
Soil and Water Management	› Sediment-laden or contaminated water entering Burrard Inlet or catch basins along Commissioner Street. › Potential for unauthorized movement of contaminated soil. › Dredge material and water falling from barges into Burrard Inlet. › Cross-contamination of Site, neighbouring properties, or off-site locations from transportation of contaminated soil and water. › Improper handling and management of on-site materials and/or stockpiling without adequate containment leading to contaminated runoff	Section 6.1.3

Table 1 (Cont'd): Summary of Potential Environmental Impacts

Environmental Concern	Potential Impact	Relevant CEMP Section
Fish and Wildlife	› Loss or alteration of fish habitat from marine works. › Death of fish from marine works. › Burial/crushing of marine wildlife, including fish, crabs, and benthic organisms from use of machinery, excavation, dredging and infilling. › Sediment-laden or contaminated water entering Burrard Inlet. › Impact to species at risk from construction. › Mortality of small animals from vegetation clearing and construction activity. › Impacts to songbirds and raptors during nesting seasons. › Impacts to marine mammals from noise-generating construction activity.	Section 6.1.9 Section 6.1.7 Section 6.1.10 Section 6.1.11
Vegetation	› Establishment of invasive species and/or noxious weeds in disturbed areas. › Spreading of noxious weeds outside of the Site by machinery. › Impacts to aquatic vegetation from marine works.	Section 6.1.8 Section 6.2.1.2
Waste Management	› Waste materials have potential to attract wildlife. › Hazardous waste may be stored on site.	Section 6.1.14
Spill Prevention Emergency Response	› Impacts to water quality from spills of deleterious substances from barges, stored hazardous materials, and construction equipment.	Section 6.1.12 Section 6.1.13
Air Quality	› Impacts to air quality from vehicle and machinery emissions. › Impacts to air quality from fugitive dust generated from excavation, backfilling and vehicle access.	Section 6.1.4
Archaeology	› Impacts to archaeological resources during ground disturbance works.	Section 6.1.15

1.1 Sensitive Areas

The following sensitive areas have been identified for the Project:

› Burrard Inlet, which supports fish and aquatic life, marine aquatic vegetation, and marine mammals;

› Four (4) catch basins located along Commissioner Street, adjacent to the southern boundary of the Site;

› Eagle nesting/perching platform located on eastern adjacent lot (unused);

› Marine riparian area containing trees that may be used for nesting by songbirds and raptors, as well as for foraging by bat species; and

› Intertidal zone containing contaminated sediment, which may pose a risk of releasing contaminants into Burrard Inlet if not adequately managed.

Please refer to **Drawing 3 – Site Plan II** for the above-listed sensitive areas.

2 Introduction

This Construction Environmental Management Plan (CEMP) has been prepared by SNC-Lavalin Inc. (SNC-Lavalin) for Vancouver Fraser Port Authority (the 'Port Authority') in order to provide guidance, mitigations, and best practices to be followed and undertaken for the planned remedial excavation and backfilling works at the Former Sterling Shipyard. This CEMP has been prepared in accordance with *Project & Environmental Review Guidelines - Construction Management Plan* (VFPA, 2018), provincial and federal best management practices (BMPs), as well as SNC-Lavalin's knowledge of environmental mitigations and understanding of the proposed Project scope.

A detailed list of Project contact information is included in **Section 4.1** and emergency contact information is provided in **Section 6.1.12.2**.

This CEMP has been prepared on behalf of the Port as the Project proponent. This CEMP will be reviewed by a separate designated team within the Port as part of the Project and Environmental Review (PER) permitting process. The PER review team is dedicated to the review of PER applications and is distinct from the Project proponent. Once approved by the Port PER team and finalized, the Project Contractor, including any subcontractors, will be responsible for ensuring that all on-site personnel review and fully understand this CEMP prior to commencement of works.

All on-site personnel, contractors, and subcontractors must adhere to this CEMP in order to conduct works while avoiding and minimizing adverse environmental impacts and, where impacts cannot be avoided, to confirm appropriate mitigation measures are implemented.

The Project Contractor will confirm that this CEMP is made available to all on-Site personnel for the duration of Project works. Throughout the construction phase, this CEMP will serve as the primary on-Site environmental guidance document. This CEMP document is a "living" document which may be revisited and revised as determined by the Port and the Project Environmental Monitor (Project EM) in order to accommodate change of scope, scheduling, and local conditions. A revision number will identify the subsequent CEMP, with the initial version being Revision 0. The CEMP will be taken from Revision 0 in consultation with the Client and the Contractor(s). This CEMP will be updated with task-specific environmental management plans prepared by Contractors once they are available (please refer to **Section 6.4**), and if additional concerns are identified before and during construction.

3 Project Information

3.1 Project Location

The Project is located at 2089 to 2095 Commissioner Street, Vancouver, BC, on the southern shoreline of the Central Vancouver Harbour, within the Burrard Inlet, at the Former Sterling Shipyard (please refer to **Drawing 1 – Project Location**). The Site is located within Port Authority jurisdiction in the City of Vancouver, BC. The Site comprises an upland terrestrial area, an intertidal area and a subtidal water lot (Please refer to **Drawing 2 – Site Plan**). The coordinates of the Site are presented in **Table 2** below.

Table 2: Project Coordinates

Latitude	Longitude
49° 17' 12.5" N	123° 03' 52.7" W

The Project is located with the Grandview-Woodland neighbourhood. **Table 3** presents the features and properties that are adjacent to and bound the Site.

Table 3: Features and properties neighboring the Site

Direction	Feature or Property
North	Vancouver Harbour, Burrard Inlet
East	Lafarge North America
South	Port Authority Jurisdiction, Commissioner Street, CP Railway
West	Former Macro Site, Parking area

3.1.1 Site Access

The Site is accessible via Commissioner Street. To access the site from the west, the Site is accessible by driving eastward from the Clark Drive entrance into Port grounds and turning left (north) on North Victoria Drive. Alternatively, the Site can be accessed from the east by driving Commissioner Street by driving westward from the McGill Street entrance into Port grounds and turning right (north) on North Victoria Drive.

Access to the work area within the Site is provided by an unpaved entrance ramp located at the southern boundary of the beach area. Additional access points may be established during construction and prior to infilling. Existing work area access is identified in **Drawing 3 – Site Plan II**.

3.2 Project Description

3.2.1 Project Background and Scope

The Project aims to undertake a brownfield redevelopment to create new port industrial land within the intertidal beach area of the Site. The majority of Project works will take place within the Site's intertidal zone, of which approximately 80% is considered to be contaminated. The Site substrate is contaminated with industrial woodwaste, metals, poly-aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) up to approximately 4 m in depth (below existing intertidal surface). The redevelopment of the Site

will include sediment remediation of contaminated sediment to address current unacceptable ecological risks, followed by infilling with clean engineered fill material.

A rock berm will be installed in the low intertidal/shallow subtidal area of the Site in order to provide revetment for the development. The sediment remediation will occur at an average depth of 3.5 m in the intertidal area consisting of approximately 11,840 m^3 by shored excavation and at an average depth of 1.7 m in the subtidal area consisting of approximately 5,475 m^3 by dredging.

The scope outlined in this section is considered to be in development. Based on information available as of the date of this report, the following Project scope is anticipated:

1: Site Preparation.

2: Dredging.

3: Rock Berm Construction.

4: Sediment Remediation

5: Backfilling and Grading.

6: Repairs to Western Retaining Wall.

7: Habitat Offsetting.

SNC-Lavalin understands that the Project scope is subject to change based on the Port's needs and engineering design considerations. Details of the above scope are presented in the following sections.

3.2.1.1 Site Preparation

The following tasks are anticipated for Site preparation:

- Establishment of Site access points and routes;
- Removal of trees and other vegetation, including management of noxious weeds, on the southern portion of the Site;
- Establishment of the laydown area, stockpiling location, equipment storage and any other areas required for Project works;
- Installation of erosion and sediment control measures (ESC) on the upland area of the Site (refer to **Section 6.2.1.1**);
- Installation of a silt curtain between the rock berm footprint and Burrard Inlet;
- Removal of wood and metal debris and other waste materials in the beach area of the Site; and
- Mobilization of machinery, materials, and equipment onto the Site.

Laydown areas, Site access and water quality monitoring locations are identified in **Drawing 3 – Site Plan II**. The location of the silt curtain is identified in **Drawing 2 – Site Plan**. Please refer to **Section 6.2.1** for mitigations specific to Site Preparation.

3.2.1.2 Dredging of Rock Berm Footprint

The following tasks are anticipated for Dredging of the Rock Berm Footprint:

- Dredging of the rock berm footprint to remove a liquefiable sand layer in order to provide rock berm stability:
  - Dredging to an average depth of 1.7 m in the subtidal area, removing approximately 5,475 m^3 of subtidal material.
  - Dredging to be conducted using a barge-mounted clamshell dredge. Dredge material to be loaded onto a barge into water-proof containment.
- Dredge material to be offloaded on-site or transported to a permitted disposal facility:
  - Dredge material destined for the Site will be decanted via settling tanks and/or basins; and
  - Dredge material destined for off-site disposal will be disposed as contaminated material.

Please refer to **Section 6.2.2** for mitigations specific to this scope item.

3.2.1.3 Rock Berm Construction

The following tasks are anticipated for Site isolation:

- Placement of rock and rip-rap materials onto seabed:
  - Materials to be lowered into berm footprint from barge via clamshell bucket or grapple from a barge-mounted crane.

Refer to **Drawing 2 – Site Plan** for the location and design of the rock berm. Please refer to **Section 6.2.3** for mitigations specific to Rock Berm Construction.

3.2.1.4 Sediment Remediation

The following tasks are anticipated for sediment remediation:

- Excavation and dredging to an average depth of 3.5 m in the intertidal area consisting of approximately 11,840 m^3 by shored excavation and dredging;
- Excavation within wetted areas (between beach and rock berm) will be conducted in water via dredging. Dredging will take place via land-based clamshell dredger operating from the shore:
  - Dredge material to be moved over the rock berm and placed onto barges lined with waterproof containment;
  - Dredge material will be offloaded on Site and stockpiled or transported to a permitted off-site disposal facility to be disposed of as contaminated material;
  - Dredged material offloaded to the Site will be left to dewater in separation tanks and/or basins;
  - After dewatering, separated water will be tested and confirmed to meet analytical parameters (refer to **Table 18**) prior to being discharged into Burrard Inlet;
  - Water not meeting regulatory parameters will be transported to a permitted off-site disposal facility as contaminated water.
- Excavation within dry areas (e.g., beach area during low tide, marine riparian area) will be conducted via excavators:
  - Excavated material to be stockpiled in designated stockpiling area (please refer to **Section 6.1.2**);

- Sampling and testing of the dewatered dredging material;
  - Excavated material and decanted dredge material to be disposed of appropriately based on analytical testing;
  - Material not meeting analytical parameters as per the Contractor's Soil/Substrate Management Plan (SMP) will be disposed off-site as contaminated material;
  - Material meeting analytical parameters (as per the Contractor's SMP) will be disposed off-site as non-contaminated material.
- Please refer to **Section 6.1.3** for analytical testing, contaminated soil, and water management.

The currently proposed area of excavation is identified in **Drawing 2 – Site Plan**. Please refer to **Section 6.2.4** for mitigations for sediment remediation.

3.2.1.5 Backfilling and Grading

The following tasks are anticipated for backfilling and grading:

- Placement of engineered fill on-Site:
  - Backfilling the excavation site with engineered fill; and
  - Placement of additional engineered fill to elevate Site grade and create new industrial land.
- Grading and vibro-compaction of the newly placed industrial fill.

Refer to **Drawing 2 – Site Plan** for the location of backfilling and grading. Refer to **Section 6.2.5** backfilling and grading mitigations.

3.2.1.6 Repairs to Western Retaining Wall

Repairs to a retaining wall running north to south along the western boundary of the Site will take place as part of the Project scope. The need for repairs has been determined by SNC-Lavalin in a pre-construction assessment provided to the Port in December 2020 (Document No. 677011-0000-4PER-0001). The pre-construction assessment determined that the timber retaining wall along the west boundary of the Site's intertidal zone is in poor condition with an estimated one to three years of functional structure life remaining. The extent and specifications of potential repairs are currently in development at the time of this CEMP, and will be discussed and provided in subsequent engineering and design documents. This CEMP will be updated if further details relating to the repairs become known.

3.2.1.7 Habitat Offsetting

A Habitat Offsetting Plan will be implemented after construction is completed. The Project FAA Application (Document No. 677011-0000-4EER-0003) outlines offsetting measures, their specifications, and their methodology of implementation. Additionally, a comprehensive monitoring program has been developed and will be implemented in order to manage the inherent uncertainties associated with habitat restoration and establishment after offsetting measures have been implemented. Please refer to **Section 8** for further context. Mitigation measures to be followed by the Contractor during the implementation of habitat offsetting measures are outlined in **Section 6.2.6**.

3.3 Project Schedule

The Project construction timeline is expected to start in Q2 2022 and conclude by Q1 2023. At the present time, a detailed Project schedule is not available. When details on Project timelines and the timing of specific activities become available, this CEMP will be updated accordingly.

The least-risk work dates applicable to the Project are presented in **Table 4** and **Table 5** below.

Table 4: Project Least-Risk Timing Windows

Least-Risk Period	Start Date	End Date
Fisheries and Oceans Canada (DFO) Least-Risk work window for Burrard Inlet[1]	August 16	February 28
Outside of the General Bird Nesting Period for Nesting Zone A1[2]	August 16	March 14
Outside of the Raptor Nesting Season[3]	September 1	January 4

[1] DFO. 2014. British Columbia Marine/Estuarine Timing Windows for the Protection of Fish and Fish Habitat - South Coast and Lower Fraser Areas.
[2] Government of Canada. 2018. Nesting Periods.
[3] BC Ministry of Environment and Climate Change Strategy. 2013. Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia

Table 5: Gantt Chart for Least-Risk Project Construction Periods

Period	Dec		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov	
DFO Least-risk window																								
General Bird Nesting period																								
Raptor Nesting Season																								

Unshaded areas represent least-risk periods

At the time of writing this CEMP, a detailed schedule of construction phases is not known. This CEMP will be updated with a detailed construction schedule once it is available.

Initial Site preparation and construction activities are planned start outside of least-risk periods (Q2, 2022). Ground disturbance activities (E.g., vegetation removal, wood debris removal) may also occur outside of the above-listed least-risk periods, but will not commence until a silt curtain has been installed around the work area (refer to **Section 6.1.1**). Vegetation/tree removal activities will not commence within the general nesting period until a a songbird nesting survey has been conducted by a Qualified Environmental Professional. Additionally, if raptors are observed within 200 m of the Site, appropriate no-disturbance buffers will be established (refer to Section **6.1.9.2.2**).

In-water works will be kept within the DFO least-risk work window for Burrard Inlet as much as possible. Due to the long-term nature of the Project, in-water works outside the least-risk window may occur. In-water works will not occur until a fish salvage has been completed by a Qualified Environmental Professional (refer to Section 6.1.10). If in-water works are planned outside of the DFO least-risk period, additional monitoring and mitigation measures will be implemented to prevent impacts to species during sensitive life stages, at the discretion of the Project Environmental Monitor. Vegetation clearing and noise-generating activity will be coordinated to take place outside of bird and raptor nesting seasons as much as feasible. In the event that nesting periods cannot be accommodated, additional mitigation measures will be implemented to minimize impacts.

It is recognized that construction activity will need to occur when the tidal conditions are appropriate. Where possible, all construction activity is anticipated to take place during standard construction hours, in adherence to the Port Authority's noise guidelines, between 7:00 AM and 8:00 PM during weekdays that are not holidays, and between 10:00 AM and 8:00 PM on any Saturday that is not a holiday. Construction is not anticipated to occur on Sundays or during holidays. The Contractor will confirm that approval for deviations from the noise guidelines are granted by the Port Authority prior to the start of construction.

3.4 Site Description

The Site is located at the former Sterling shipyard, on the southern shore of the Central Vancouver Harbour, within Burrard Inlet. The majority of the Site surface is intertidal in nature, being re-submerged on a daily basis. DFO Tide Station 7735 (Vancouver), located approximately 3.4 km east of the Site, indicates that the average daily mean water level between October 1, 2015 and October 1, 2020 was 3.13 m CD. Between October 1, 2019 and October 1, 2020, the highest recorded water level was 5.25 m CD on January 16, 2020, at 10:00 AM. The lowest recorded water level was 0.22 m CD in February 8, 2020, at 11:00 PM (DFO, 2020).

The Site surface is sloped down to the north, towards Burrard Inlet. A steep and densely vegetated slope, sloping down towards the site from the parking area south of the Site, runs along the southern boundary of the beach. A wooden log retaining wall runs north to south along the western boundary of the Site, on the upper (western) side of which is vegetated with Himalayan blackberry (*Rubus armeniacus*). A stone-covered slope (sloping down towards the Site) with blackberry bushes runs north to south along the eastern portion of the Site. The Site is topographically depressed from the west, south and east sides. The Site's beach substrate is comprised of stones approximately three to five centimetres in length, along with sand and gravel. The shoreline water was observed to be turbid and silty at the time of the assessment. Please refer to **Drawing 2 – Site Plan** for an overview of the Site.

In general, the entire surface of the site is covered by historic and recently deposited debris and refuse. Rusted metal components of the former shipyard are abundant on the surface of the entire Site, as well as old line (rope) and wooden remnants. Numerous cut-off decaying wooden posts (i.e., remains of pilings) are present on the northwest portion of the Site, along with other embedded wooden remnants of the Site's former infrastructure. Logs and large items of waste timber are abundant on the upper limits of the intertidal zone, forming a linear feature running east to west. Previous reviews conducted by SNC-Lavalin indicate that the Site surface is covered by fine gravel and hosts a marine riparian vegetation along its southern boundary (SNC-Lavalin, 2014).

4 Contacts and Responsibilities

The following subsections describe and identify Project contacts, roles, and responsibilities.

4.1 Key Project Personnel

The following personnel and contacts, listed in **Table 6** below, have been identified as having key roles in the management of this Project:

Table 6: Key Project Personnel and Contacts

Name	Organization	Role	Contact Information
TBD	VFPA	Environmental Manager	Tel: 000-000-0000 Email: email@email.com
Anika Calder	VFPA	Compliance, Monitoring and Enforcement (CME)	Tel: 604-665-9253 Email: Anika.Calder@portvancouver.com
TBD	TBD	Contractor Representative	Tel: 000-000-0000 Email: email@email.com
John Kitson	SNC-Lavalin	Project Manager	Tel: 604-785-5797 Email: John.Kitson@snclavalin.com
Vitaly Ostroumov	SNC-Lavalin	Project EM	Tel: 236-334-8779 Email: Vitaly.Ostroumov@snclavalin.com
TBD	Contractor (TBD)	Contractor EM	Tel: 000-000-0000 Email: email@email.com
TBD	TBD (independent)	Independent EM (if required)	Tel: 000-000-0000 Email: email@email.com
TBD	Contractor (TBD)	Qualified Professional (fish salvage)	Tel: 000-000-0000 Email: email@email.com
TBD	TBD	Marine Mammal Observer	Tel: 000-000-0000 Email: email@email.com
Deborah Renn	VFPA	PER Lead	Tel: 604-665-9561 Email: Deborah.Renn@portvancouver.com
Rebecca Barrick	DFO	Fish and Fish Habitat Protection Program	Tel: 236-330-3053 Email: Rebecca.Barrick@dfo-mpo.gc.ca

4.2 Roles and Responsibilities

Roles and responsibilities for the Project must be adhered to by all specified parties. The following parties are identified as having responsibilities for the Project during construction:

- The Project Environmental Monitor;
- The Applicant (the Port); and

- The Contractor.

4.2.1 Environmental Monitors

Two (2) dedicated Environmental Monitors are anticipated to be required for the Project, in addition to a Marine Mammal Observer (MMO), as defined in **Table 7** below.

Table 7: Project Environmental Monitors

Role	Provided By	Description	Reference Subsection
Project EM	SNC-Lavalin	Carry out oversight, quality assurance and due-diligence environmental monitoring duties in order to confirm Contractor adherence and compliance to this CEMP, Contractor EPPs (**Section 6.4**), permit conditions, environmental contract specifications and environmental best practices, as described in the subsections below and throughout this CEMP. The Project EM will serve as the primary point of contact for environmental monitoring for the Port and have the highest authority in relation to environmental monitoring, stop-work orders, and implementation of mitigation measures.	**Section 4.2.2**
Contractor EM	Contractor (TBD)	Carry out comprehensive environmental monitoring duties as described in the subsections below, **Section 6.4** and throughout this CEMP. The Contractor EM is required to comply with the recommendations and stop-work orders from the Project EM and MMO.	**Section 4.2.4.1**
MMO	TBD	Carry out Marine Mammal Observer duties in accordance with **Section 6.1.11** during dredging activities.	**Section 6.1.11**
Independent EM (if required)	TBD	The need for an independent EM for the Project has not been established at this time. If required, this CEMP will be updated with appropriate responsibilities.	N/A

4.2.2 Project EM

The Project Environmental Monitor will be aiding the Contractor in their compliance with this CEMP and to regulatory requirements during Project construction. The Project EM will be responsible for the following:

- Due diligence Environmental Monitoring and Reporting (please refer to **Section 6.3**);
- Providing oversight and quality assurance checking and inspection of the Contractor's Environmental Monitoring program(s).
- Exercising the authority to halt works if a construction activity is causing unacceptable environmental damage or risk;
- Communicating all environmental requirements for the Project with Port and Contractor staff;
- Preparing and reviewing Environmental Orientation with Contractor staff;

- Through routine site inspections, measurement of key environmental indicators to determine compliance and non-compliance with the CEMP, any provincial and federal permits, approvals, guidelines, and regulations and monitor any other environmental issues or potential issues;
- Providing technical advice and recommendations to the Port and the Contractor regarding any environmental component of the Project (i.e., erosion and sediment control, transportation of dangerous goods, etc.);
- Working proactively with the construction team to promptly correct environmental deficiencies or non-compliance;
- Communicating environmental incidents as per this CEMP;
- Maintaining presence on-site and remaining on call during relevant periods of increased potential environmental impacts or sensitive works;
- Liaison with regulators as part of ongoing permitting, authorization and approval processes; and
- Acting as the first point of contact for environmental emergencies or Contractor environmental inquiries.

4.2.3 Applicant Responsibilities

The Port, as the applicant, will undertake the following responsibilities:

- Update the Project EM on any changes to the Project design, specifications or workplans;
- As authorized, provide the information necessary for the Project EM to effectively fulfill their responsibilities;
- Identify a dedicated Environmental Manager for the Project who will be the primary point of contact for the Project EM for coordination of environmental requirements, receipt of environmental deliverables and response to environmental issues;
- Confirm Project and construction planning are in compliance of this CEMP and regulatory requirements; and
- Coordinate, plan, and schedule construction activity.

4.2.4 Contractor Responsibilities

All Contractor personnel, including any sub-contractors, must undertake the following responsibilities during construction.

- Prior to the start of works, review and understand:
  - The environmental sensitivities, roles and responsibilities and mitigation measures outlined in this CEMP;
  - The conditions of Project permits and approvals; and
  - Any relevant Port environmental requirements.
- All staff that will conduct on-site work must undergo the environmental orientation and sign the environmental orientation document prior to the start of works;

- The Contractor will be responsible for:
  - Implementing contract specifications
  - Implementing the mitigations and procedures outlined in this CEMP;
  - Adherence to all permitting and approval requirements;
  - Compliance with the contractor documents, including this CEMP; and
  - Compliance with the recommendations, requests, and stop-work orders of the Project EM, Contractor EM and MMO.
- Report any suspect archaeological or heritage materials encountered during construction (please refer to **Section 6.1.15**);
- Retain a qualified Environmental Monitor to act as the Contractor EM;
- Retain a Qualified Environmental Professional (QEP) to conduct a fish salvage within the work area after the installation of the silt curtain and prior dredging and installation of the rock berm;
- Confirm the Project EM is contacted and made aware of high-sensitivity works in advance (e.g., dredging, in-water works). The Contractor is responsible for identifying stages of work with high sensitivity and/or environmental risk potential;
- Confirm the MMO is contacted and on-site prior to any dredging activities;
- Correct any deficiencies identified by the Project EM or the Port in a timely manner;
- Report and document all environmental incidents;
- Have all ESC and spill response materials on-site prior to the start of construction:
  - Including ensuring that a second back-up silt curtain is available for the duration of the Project.
- Provide photographs of the Site, briefings on daily construction activities and any other information relating to on-site activities to the Project EM upon request;
- Routinely inspect and maintain all vehicles and equipment used on-site;
- Keep a copy of this CEMP on site and accessible to all personnel at all times;
- Keep spill response procedures posted in a visible and accessible location;
- Provide all on-site personnel with adequate spill prevention and emergency response training;
- Provide records including, but not limited to, vehicle inspection records and staff environmental training records to the Project EM upon request;
- Practice due diligence during construction and minimize environmental disturbances to the minimum necessary to accomplish the planned work;
- Handle all wastes, surplus materials, and contaminated materials appropriately and transport dispose of them in accordance to all applicable laws and regulations;
- Update the Project EM on any changes to the Project design, specifications and workplans;
- Notify the Project EM of any changes required to this CEMP;

- Confirm the Site is clean, environmentally stable, and safe prior to demobilization;
- Utilizing personnel (including subcontractors) who are adequately trained (i.e., competent) in the tasks they are involved in and the relevant environmental protection measures related to those tasks. Training should include, but not be limited to:
  - All workers must be given an Environmental Orientation prior to commencing work on site (refer to **Section 6.3.1.2**);
  - All workers must have adequate spill prevention and response training; and
  - All workers must be trained in reporting spills, incidents and/or near-misses (refer to **Section 6.1.12**).
- Conduct Environmental Monitoring throughout various Project stages (please refer to **Section 4.2.4.1**);
- Develop and implement the following Environmental Protection Plans (EPPs) and component plants (please refer to **Section 6.4**):
  - Soil/Substrate Management Plan (SMP);
  - Spill Prevention and Emergency Response Notification Plan (SPERNP);
  - Water Quality Management Plan (WQMP);
  - Dredge and Excavation Water Management Plan (DEWMP);
  - Fish Salvaging Plan; and
  - Invasive Vegetation Management Plan.
- Obtain approval for Contractor EPPs and component plans from the Port prior to the start of works; and
- Develop and implement a vegetation management plan, including management of invasive species and noxious weeds (refer to **Section 6.1.8.3.1**).

4.2.4.1 Contractor EM Responsibilities

The Contractor is required to provide a Qualified Environmental Monitor (Contractor EM) to implement environmental monitoring throughout the works. The Contractor EM will undertake the following responsibilities throughout the Project:

- Adhere to any recommendations and stop-work orders issued by the Project EM and MMO;
- Environmental monitoring duties outlined in Contractor EPPs and component plans (refer to **Section 6.4**);
- Environmental monitoring duties outlined in **Section 6.3.1**;
- Identification of high-sensitivity Project stages or stages with high environmental risk;
- Communication with the Contractor and Project EM on matters of environmental significance;
- Documentation of all EM activities for every day of works (refer to **Section 6.3.2**);
- Provide all field notes, EM reports and inspection records to the Project EM upon request;

- Exercising the authority to halt works if a construction activity is causing unacceptable environmental damage or risk;
- Communicate with the Project EM in order to rectify environmental issues;
- Report all environmental incidents as per the procedures outlined in Section **6.1.12.2** and **Section 6.3.2.6**;
- Maintain regular communication with the Contractor about construction schedule in order to be present of all works of high sensitivity or works with high environmental risk; and
- Inform the Project EM of any deficiencies in Contractor compliance with this CEMP, Contractor EPPs and component plans, permit conditions and contract specifications.

The specific duties of the Contractor EM relating to on-site environmental sensitivities and Project stages are further outlined throughout Project Mitigation Measures (**Section 6**).

5 Relevant Environmental Legislation

This section describes the environmental legislation and legal requirements applicable to the Project. Approvals, permits, and licenses relating to environment protection must be in place prior to construction. Permits must be physically located on-Site and easily accessible to all Site personnel. **Table 8** below summarizes the Acts, Regulations and Bylaws that are considered to be applicable to the project, the regulatory body(ies) responsible for enforcement, a determination of whether the permits/approvals were required for the project and notes that provide rationale or support for the determination.

Table 8: Federal, Provincial, Regional District and Municipal Legislation and legal Requirements for the Project

Act, Regulation or Bylaw	Description	Applicability	Permit	Status/Notes
Federal				
Fisheries Act	Administered by Fisheries and Oceans Canada (DFO), this act governs fisheries in Canada, protects fish from death by means other than fishing and protects fish habitat from harmful alteration, disruption, or destruction (HADD) without DFO's authorization.	The Project will cause HADD to fish habitat.	Request for Project Review (RfR) Fisheries Act Authorization (FAA)	SNC-Lavalin submitted an RfR to DFO and received a response indicating that an FAA will be required for the Project. An FAA will be prepared and submitted to the DFO by SNC-Lavalin after approval by the Port Authority. A Habitat Offsetting plan has been included into the FAA Application (Document No. 677011-0000-4EER-0003). Conditions from the FAA permit will be implemented into this CEMP prior to construction, where applicable.
Species at Risk Act (SARA)	Protects species designated as Endangered, Threatened or Special Concern. Aims to prevent the extinction of species that are Threatened or Endangered due to human activities and to prevent species that are of Special Concern from becoming Threatened or Endangered.	Several species designated as Endangered, Threatened or Special Concern on Schedule 1 of SARA have the potential to occur in the Project area.	None	The Project and Project CEMP have been designed to incorporate mitigations and best practices to protect species at risk.
Migratory Birds Convention Act (MCBA)	Prohibits the killing of migratory birds except under permit, the disturbance or destruction of migratory bird nests, and contamination of migratory bird habitat.	Bird species protected under MCBA are likely to occur in the Project area.	None	The Project and Project CEMP have been designed to incorporate mitigations and best practices to protect migratory birds.
Canadian Environmental Protection Act (CEPA)	Regulates the release of polluting substances to the environment.	Excavation of contaminated Site fill may result in contamination of the local marine environment.	None	The Project and Project CEMP have been designed to incorporate mitigations and best practices to control and prevent the release of contaminating substances into the environment.

Table 8 (Cont'd): Federal, Provincial, Regional District and Municipal Legislation and legal Requirements for the Project

Act, Regulation or Bylaw	Description	Applicability	Permit	Status/Notes
Federal (Cont'd)				
Transportation of Dangerous Goods Act (TDGA)	Regulates the transportation of Dangerous Goods as defined in Schedule of the Act, which includes flammable and combustible liquids.	Hazardous waste generated from potential cleanup of on-site spills will be transported to off-site disposal facilities	TDGA Equivalency Certificate	A TDGA Equivalency Certificate will be required prior to transporting contaminated soil off-site for disposal.
Fisheries (General) Regulations, part of the *Fisheries Act*	Regulations relating to fish and fish habitat, payments, and penalties under the *Fisheries Act.*	Fish salvaging will be required prior to the start of works.	License to Fish for Scientific, Experimental or Educational Purposes in Marine Waters	Prior to the start of works the Contractor will acquire the license in order to conduct fish salvaging, to be implemented via the Contractor's Fish Salvaging Plan.
Provincial				
BC Environmental Management Act (EMA) and its associated regulations	The *Contaminated Sites Regulation* (CSR) of the EMA regulates the investigation, remediation, and management of contaminated sites under numeric standards. The *Spill Reporting Regulation*, *Waste Discharge Regulation*, and *Hazardous Waste Regulation* provide requirements for reporting, preventing, and managing releases of hazardous substances or environmental contaminants into the environment.	The Project is remedial in nature. Spills and releases of hazardous substances or environmental contaminants may occur as a result of Project works.	None	The Project and Project CEMP have been designed to incorporate mitigations and best practices to control and prevent the release of contaminating substances into the environment, to establish proper spill reporting protocols and to establish proper procedures for handling contaminated materials.
BC *Wildlife Act*	Protects native vertebrate wildlife species from being killed, disturbed, or captured without permit. Protects the nests of birds, such as raptors or herons, from disturbance and destruction.	Raptor bird species occur within the Project area.	None	The Project and CEMP have been designed to incorporate mitigations and best practices to protect bird and wildlife species.

Table 8 (Cont'd): Federal, Provincial, Regional District and Municipal Legislation and legal Requirements for the Project

Act, Regulation or Bylaw	Description	Applicability	Permit	Status/Notes
Provincial (Cont'd)				
BC *Weed Control Act*	Regulates the control of noxious weeds growing or located on land with the aim of preventing the spread of noxious weeds.	Noxious weed species are present on-Site.	None	The Project and CEMP have been designed to incorporate measures and mitigations to remove noxious weeds from the Site and prevent the spread of Noxious weeds.
Municipal				
City of Vancouver *Noise Control By-law 6555*	Construction noise permitted between 7:30 AM to 8:00 PM on any weekday that is not a holiday and between 10:00 AM and 8:00 PM on any Saturday that is not a holiday.	The Port Authority's Noise Regulations will be adhered to for the duration of the Project. Port Authority Guidelines permit construction between 7:00 AM to 8:00 PM Monday through Saturday, with no construction permitted on Sundays or holidays.	None	The Project CEMP includes adherence to regulated construction times. The Project requires working within preferable tidal conditions in order to minimize the amount of water handling to reduce environmental risk. Therefore, work outside of regulated construction times may be required. The Contractor is responsible for ensuring that any deviations from the permitted construction times are approved by the Port prior to construction. The Contractor will follow the Port Authority's noise guidelines (VFPA, 2021b). A noise assessment screening worksheet has been completed as part of the Project PER application.
City of Vancouver *Motor Vehicle Noise and Emission Abatement Bylaw 9344*	Vehicle idling is not permitted for longer than three consecutive minutes in a 60-minute period, or while the vehicle is unattended unless the vehicle is required to idle in order to power construction equipment.	Vehicle idling bylaw regulations will be adhered to for the duration of the Project.	None	The Project CEMP includes adherence to regulated idling prohibitions.

Table 8 (Cont'd): Federal, Provincial, Regional District and Municipal Legislation and legal Requirements for the Project

Act, Regulation or Bylaw	Description	Applicability	Permit	Status/Notes
City of Vancouver *Sewer and Watercourse Bylaw No. 8093*	Regulates contaminated groundwater discharge to the City of Vancouver sanitary sewer during remediation and construction projects. Implements the requirements of Metro Vancouver *Sewer Use Bylaw 299, 2007*.	Only applicable if discharge into the municipal sanitary sewer system is planned.	Waste Discharge Permit or Groundwater Remediation and Construction Excavation Sites	The Project CEMP requires the Contractor to confirm this permit is in place if discharge into the municipal sanitary sewer system is planned.
VFPA-Specific				
Project Environmental Review (PER) Process	Project review and approval by the Port Authority	The Project is subject to the PER process due to being located within Port Authority jurisdiction.	PER Permit	All conditions of the PER permit shall be followed by the Contractor. Once issued, the conditions and requirements of the PER permit will be implemented into this CEMP, where applicable.

6 Project Mitigation Measures

This section outlines measures to avoid, mitigate, and minimize various impacts to sensitive receptors from Project works. All mitigations outlined in the following subsections must be followed by the Contractor.

6.1 General Practices

This section outlines mitigation measures that are expected to be applicable to all stages of construction. The Contractor is responsible for implementing the mitigations within this section throughout the Project.

6.1.1 Erosion and Sediment Control

Sedimentation resulting from Project works may affect the following sensitive receptors:

- Water quality in Burrard Inlet;
- Fish and fish habitat within Burrard inlet;
- Marine vegetation; and
- Sedimentation runoff into neighbouring properties.

Sedimentation resulting from Project works may have the following adverse environmental effects:

- Increase in turbidity within Burrard Inlet;
- Death of fish by means other than fishing;
- Impact to marine vegetation within Burrard Inlet; and
- Sediment-laden runoff flow onto catch basins along Commissioner Street or onto neighbouring properties;

Erosion and Sediment Control (ESC) measures will be implemented for the Project in order to prevent entry of sediment-laden water into Burrard Inlet and affecting local water quality. Additionally, ESC measures will be in place to prevent Site runoff from affecting neighbouring properties and locations.

6.1.1.1 General ESC Mitigations

The Contractor will confirm all ESC measures are installed prior to works taking place in consult the Project EM will assist with recommendations for appropriate ESC measures based on site conditions (e.g., tide level, weather) at the time of Project execution, and will monitor ESC controls throughout the duration of the Project.

ESC measures include a silt curtain within Burrard Inlet, silt fencing and sand bag berms where appropriate (in consultation with the Project EM) and catch basin protection. The Contractor is responsible for having all ESC materials installed prior to Project works.

The Contractor will implement the following general ESC practices for the Project:

- Runoff from construction areas will be controlled to confirm that sediment-laden runoff does not enter the marine environment;

- Water resulting from Project works must not be discharged directly into Burrard Inlet, catch basins, or on any surfaces that have the potential to carry water into Burrard Inlet or outside of the Site;
- Isolate any water generated by the Project:
  - Management of sediment laden water must be outlined in the contractor's Water Quality Control Plan and Water Management Plan (refer to **Section 6.4**).
- ESC measures will be installed in consultation with the Project EM;
- Avoid work during high-precipitation periods whenever possible:
  - The Project EM and Contractor EM may issue a stop-work order during heavy precipitation if the risk of sedimentation to marine waters exists; and
  - Stop work if there is any risk of turbid water entering the marine environment or any risk of excessive erosion of disturbed soil/substrate.
- The Contractor EM will monitor water quality and ESC effectiveness throughout Project works:
  - Please refer to **Section 6.3** for details of environmental monitoring.
- Limit equipment works and access in water or wetted areas wherever possible;
- Establish and use machinery movement routes to limit machinery traversing across the Site;
- Works shall be completed as soon as feasibly and safely possible once they are started to avoid prolonged periods of time during which sediment is exposed;
- All areas beyond the Site that are disturbed (e.g., by machinery access) must be stabilized appropriately; and
- Follow the mitigations outlined in **Section 6.2** to limit sedimentation impacts during specific Project stages.

6.1.1.2 Burrard Inlet ESC Mitigations

The following ESC mitigations will be implemented by the Contractor to protect water quality within Burrard Inlet during construction:

- Confirm any material placed into the water (e.g., rock berm material) is imported clean material free of organics, silts of fines; and
- Prior to the start of construction, a silt curtain will be installed between the footprint of the rock berm and the rest of Burrard Inlet (refer to **Section 6.2.1.1.1**).

6.1.1.3 Upland Area

The upland area of the Site is flat and covered by fill material. Four (4) catch basins exist along Commissioner Street, adjacent to the southern boundary of the Site (please refer to **Drawing 3** for catch basin locations).

Upland works (e.g., grading, backfilling, vehicle movement south of the beach area) may impact neighbouring sites or catch basins via flow of sediment-laden water or tracking of sediment by machinery. The upland area of the Site is flat, but a risk of sediment tracking and surface runoff exists, especially during high-precipitation periods. Catch basins and neighbouring properties must be protected during all works on the upland area of the Site.

The following measures will be implemented by the Contractor during upland works:

- Prevent site runoff or tracking of sediment towards catch basins or neighbouring properties;
- Install ESC measures (e.g., silt fencing, impermeable berms) along the perimeter of upland works if there is a risk of sediment-laden water flow or sediment tracking to neighbouring properties:
  - The Project EM will inspect the site prior to construction and recommend ESC measures as needed; and
  - The Project EM and Contractor EM may recommend additional ESC to be installed during construction.
- Install catch basin protection on catch basins adjacent to the Site entrance along Commissioner Street. Catch basin protection can entail filter cloth, impermeable berms and/or specifically designed protection materials (e.g., catch basin "donut" – refer to **Figure 1**).

Figure 1: Catch Basin "Donut" (Photo credit: BMP Supplies)

6.1.2 Stockpiling

During construction, stockpiled materials may be subject to erosion by runoff, wind, and precipitation, or may otherwise contribute to sedimentation. The Contractor will implement the following measures to mitigate sedimentation associated with stockpiles during construction:

- Stockpile only in locations determined in consultation with the Project EM:
  - A potential stockpiling location for contaminated material has been identified approximately 60 m south of the beach area, with an area of approximately 1,000 m^2. Please refer to **Drawing 3 – Site Plan II** for the location of the stockpiling area. The Contractor is responsible for identifying stockpiling areas for contaminated material in the SMP (please refer to **Section 6.4.1**).
- Stockpiles must be placed on even terrain without the possibility of generating sediment-laden runoff directed towards Burrard Inlet or outside of the Site;

- Additional stockpiling areas may be required for the storage of imported fill material and excavated Site material:
  - The Contractor is responsible for identifying all stockpiling areas for Site or imported material in the SMP (please refer to **Section 6.4.1**);
  - Any additional stockpiling areas must be determined in consultation with and approval from the Project EM; and
  - Any additional stockpiling areas will be located a minimum of 30 m from the beach area of the Site.
- Place all stockpiled materials on top of poly liner;
- Cover all stockpiled materials with poly liner whenever they are not in use:
  - Securing poly covering with stones, sand bags or other inert objects; and
  - Confirm all stockpiles left on-site overnight are covered and secured.

6.1.3 Soil and Water Management

The Project is anticipated to generate significant quantities of dredged material from initial dredging of the rock berm footprint and dredging undertaken within wetted areas of the intertidal area of the Site (between the beach and the rock berm) during sediment remediation. Additionally, material excavated in dry areas of the beach via excavator will also require management. Water Management will be required to manage water resulting from the dewatering of dredge material.

Contaminated materials and water generated from Project works have the potential to cause the following adverse effects:

- Cross-contamination of neighbouring sites;
- Off-site contamination events resulting from transportation of contaminated materials;
- Cross-contamination of non-contaminated sections of the Site;
- Impacts to water quality within Burrard Inlet from release of contaminants;
- Impacts to adjacent shorelines from release of contaminants into Burrard Inlet;
- Release of contaminants into catch basins along Commissioner Street;
- Impacts to terrestrial wildlife from open storage of contaminated materials; and
- Impacts to human life from handling and open storage of contaminated materials.

All water and excavated materials will be tested prior to disposal. Water meeting analytical parameters (as per Contractor's DEWMP) will be treated as non-contaminated and discharged into Burrard Inlet. Water which exceeds analytical parameters will be disposed of as contaminated at a permitted facility. Excavated and dredged material that tests within regulatory requirements (as per Contractor's SMP) will be disposed of as non-contaminated at a facility licensed to receive sediment. All receiving disposal facilities, whether for contaminated or non-contaminated material, must be approved by the Port.

Management of contaminated excavated material, dredge material and water generated from Project works will be described by the Contractor in the following EPPs:

- Soil/Substrate Management Plan; and

- Water Management Plan.

Please refer to **Section 6.4** for EPP requirements.

6.1.4 Air Quality

According to provincial BC Air Quality data, air quality within the Project area can be considered of good quality (Province of BC, 2021):

- The closest Air Quality Health Index (AQHI) air quality monitoring station is Metro Vancouver Northwest, located approximately 6 km southwest of the Site. AQHI values for health risk at this station are rated as “Low”, measured at 3 on a scale of 1 to 10;
- The closest air quality monitoring station measuring fine inhalable particles below 2.5 micrometres (µm) in diameter ($PM_{2.5}$) is Vancouver Clarke Drive, located approximately 3 km south of the Site. 24-hour $PM_{2.5}$ measurements at the station were 3.5 µg/m^3, well-within the 25 µg/m^3 threshold of BC Air Quality Objectives (BCAQO); and
- The closest air quality monitoring station measuring inhalable particles below 10 µm in diameter (PM_{10}) is Burnaby North Eton, located approximately 4 km east of the Site. 24-hour PM_{10} measurements at the station were 7.6 µg/m^3, well-within the 50 µg/m^3 threshold of BCAQOs.

The following impacts to air quality are anticipated during Project works:

- Excessive vehicle or equipment emissions; and
- Fugitive dust emissions from excavation and handling of materials.

It is anticipated that quantitative air quality monitoring will not be required for the Project and that impacts to air quality can be adequately controlling using the following protection and mitigation measures. If visual observations and/or complaints indicate that monitoring is required, such provisions will be made and this CEMP will be revised.

6.1.4.1 General Mitigations

The Contractor will:

- Minimize the area of ground disturbance required to Fugitive conduct Project works;
- Use water or environmentally acceptable dust suppressant. Contact the Project EM prior to using a dust suppressant to determine acceptability:
  - Water must not be used to suppress dust from surfaces if it presents a risk of sediment-laden runoff towards Burrard Inlet.
- Prohibit burning as a means of disposal of any organic or construction debris; and
- Monitor the need for and the effectiveness of dust suppression measures. If measures are found to be inadequate, contact the Project EM to assist in adjusting air quality controls.

6.1.4.2 Vehicles and Machinery

Vehicles and Machinery may impact local air quality through the release of exhaust. Air emissions associated with construction are anticipated to be of short and intermittent duration. However, vehicle exhaust emissions may still affect local air quality. The Contractor will implement the following mitigations for the Project:

- Turn off equipment and vehicles when not in use;
- Adhere to the City of Vancouver's *Motor Vehicle Noise and Emission Abatement Bylaw 9344*:
  - Do not idle vehicles for longer than three consecutive minutes in a 60-minute period;
  - Do not idle vehicles while unattended and unlocked; and
  - Vehicle idling is permitted if the vehicle is powering construction equipment.
- Optimize loads to reduce number of trips made by vehicles;
- Maintain all equipment in good working order, follow equipment manufacturer maintenance specifications, conduct routine inspections, and keep a maintenance logbook:
  - Inspection and maintenance records will be made available by the Contractor to the Project EM upon request.
- Perform routine checks of exhaust systems to identify actual or potential deficiencies and correct them in a timely manner;
- Equipment will be fitted with standard emission control devices appropriate to the equipment and in compliance with federal and provincial regulation and standards; and
- Eliminate unnecessary idling on site when not otherwise required for operational or safety reasons.

6.1.4.3 Soil and Sediment

Soil and sediment handling during Project works may impact air quality through generating fugitive dust, particularly during dry and windy periods. The Contractor will implement the following mitigations to control impacts to air quality from soil and sediment during the Project:

- Minimize the handling of soils and aggregates by avoiding double handling of soil;
- Minimize drop height at material transfer locations (e.g., when loading excavated material onto haul trucks);
- Cover all truck loads of fine-grained materials during hauling;
- Cover all stockpiled materials with poly sheeting and confirm all stockpiles are covered and secured overnight;
- Undertake dust suppression during dry days and periods of high wind;
- Use water to control dust emissions. Do not use oil or chemical dust suppressants unless specifically authorized by the Port;
- Cover or wet down surfaces susceptible to generating dust, such as disturbed dry surfaces that are exposed for extended periods of time; and

- Wash truck and vehicle wheels prior to the vehicle leaving the site to prevent tracking of sediment onto paved surfaces.

6.1.5 Water Quality

The following adverse effects to water quality may occur during construction:

- Releases of sediment or sediment-laden water into Burrard Inlet;
- Spills or releases of deleterious substances into Burrard Inlet; and
- Disturbance of seabed sediments during dredging activities.

The following water quality monitoring will be implemented for the Project on behalf of the Project EM and Contractor EM:

- The Project EM will act as the primary water quality monitoring point of contact for the Client and conduct due-diligence water quality sampling and analytical sampling throughout entire duration of the Project:
  - Days which do not require water quality monitoring (e.g., during low-risk activities on the upland area of the Site) will be left at the Project EM's discretion;
  - The Project EM has the authority to issue stop-work orders;
  - The Project EM will conduct routine spot-checks to confirm the Contractor's water quality monitoring program remains effective; and
  - The Project EM will have the highest authority on water quality monitoring and stop-work orders. Please refer to **Section 6.3.1.4** for water quality monitoring.
- The Contractor EM will monitor water quality within Burrard Inlet as part of a comprehensive water quality monitoring plan, to be outlined in the Contractor WQMP (please refer to **Section 6.4.3** and **Section 6.3.1.4**). The Contractor EM will conduct water quality sampling and monitoring for parameters and at frequencies that will be outlined in the Contractor's WQMP:
  - The Contractor EM has the authority to issue stop-work orders; and
  - The Contractor EM must adhere to any recommendations and stop-work orders issued by the Project EM.

The Contractor will implement the following mitigations to protect water quality within Burrard Inlet:

- A silt curtain will be installed around the work area (please refer to **Section 6.2.1.1.1**);
- Additional ESC measures will be implemented, where necessary, in order to prevent the release of sediments into Burrard Inlet or any catch basins located on Commissioner Street (please refer to **Section 6.1.1**);
- The Project EM and Contractor EM will implement stop-work procedure and work with the contractor to establish corrective measures if any exceedances are identified during water quality monitoring;
- The Contractor EM will implement a water quality monitoring program and monitor water quality up-current and down-current of the Site in order to screen for exceedances in water quality parameters; and

- The Contractor will implement and follow a SPERNP during works which should include the requirements in **Section 6.1.12** and **Section 6.1.13** (please refer to **Section 6.4.2**);

6.1.6 Noise and Vibration

The Site is located within an industrial area and is isolated from residential neighbourhoods to the south of the Project by a Canadian Pacific Railway located approximately 100 m southeast of the Site. The following information on ambient background noise within the Project area was available:

- According to the Port's Noise Monitoring Program (VFPA, 2021a), the closest sound level monitoring station is VAN Semlin, located approximately 100 m southeast of the Site, adjacent to the nearest residential area. Noise levels at this station are considered to be very similar to those experienced at the nearest residential areas; and
- Dominant noise sources originate from activities associated with the Canadian Pacific rail line and truck traffic along Commissioner Street.

The following noise and vibration impacts may occur during the Project:

- Disturbance of nearby residential areas;
- Impacts to local wildlife, including songbirds and raptors and their nests;
- Impacts to local fish and marine mammals; and
- Disturbance of nearby businesses and facilities.

6.1.6.1 General Mitigations

The following general practices will be implemented by the Contractor to manage and mitigate impacts from construction noise and vibration:

- All construction will adhere to the Port Authority's Noise Guidelines:
  - Construction noise is permitted between 7:00 AM and 8:00 PM Monday through Saturday; and
  - Work is not permitted on Sundays or during holidays.
- The Project requires working within preferable tidal conditions in order to minimize the amount of water handling to reduce environmental risk. Therefore, work outside of the city-regulated construction times may be required:
  - The Contractor is responsible for ensuring that any deviations from The Port Authority's Noise Guidelines are approved by the Port prior to construction; and
  - Follow the Port Authority's *Project & Environmental Review Guidelines – Construction Outside of Regular Work Hours* (VFPA, 2021b) when seeking approval from the Port.
- Avoid unnecessary use of air brakes, banging of truck tailgates and other vehicle-related noise;
- Use equipment with noise-control features, such as mufflers designed for high performance; and
- Confirm vehicles and equipment are adequately lubricated and not emitting controllable mechanical noise.

6.1.6.2 Underwater Noise Mitigations

Dredging is anticipated to occur prior to the installation of the rock berm and during sediment remediation of the intertidal area of the Site. Dredging activities have the potential to cause adverse effects to marine mammal species by causing barotrauma from exceeding underwater noise thresholds.

If additional activities with potential to generate underwater pressure and noise (e.g., pile driving) are implemented into the Project design, contact the EM immediately. Additional mitigations and updates to this CEMP may be required.

The following mitigations will be implemented by the Contractor for dredging activities:

- Confirm a Marine Mammal Observer (MMO) is present on-site to monitor dredging activities full-time; and
- Please refer to **Section 6.1.11** for procedures to mitigate impacts to marine mammals from underwater noise.

6.1.7 Marine Works

The Project involves marine works for the following components:

- Initial dredging of rock berm footprint;
- Installation of rock berm;
- Sediment remediation within intertidal zone; and
- Backfilling and grading within intertidal zone.

Marine works have the potential to cause adverse environmental impacts to water quality and life within Burrard Inlet by:

- Death of fish by means other than fishing and burial/crushing of crabs, mollusks, and benthic organisms from use of machinery, dredging, rock berm construction and infilling;
- Releases of deleterious substances into Burrard Inlet;
- Releases of sediment or sediment-laden water into Burrard Inlet;
- Releases of contaminated material and water into Burrard Inlet during dredge material handling;
- Harm to marine mammals from noise generated by dredging activities; and
- Disturbance of seabed causing suspension of seabed silts and sediments within Burrard Inlet.

6.1.7.1 Marine Equipment

Marine construction activities will take place within the Site's intertidal and subtidal zone from marine-based equipment as well as from land. The following subsections identify marine construction-related equipment is anticipated to be used during the Project.

6.1.7.1.1 Marine-Based Equipment

The following equipment will operate within water:

- Transportation barges (minimum of 2):

- A minimum of one (1) barge to be loaded with dredge material throughout initial dredging and intertidal excavation; and
- One (1) barge to be loaded with rocks for the construction of the rock berm.

› Barge with mounted clamshell dredger (1):

- For the Initial dredging of rock berm footprint and intertidal dredging.

› Barge with mounted crane (1):

- For lowering of rocks into rock berm footprint.

› Boat (1):

- For the installation of the silt curtain between the work area and Burrard Inlet;
- For water quality sampling; and
- For maintenance of the silt curtain.

6.1.7.1.2 Land-based Equipment

The following equipment will operate from land:

› Clamshell dredger (1):

- Land-based dredging of wetted portion of intertidal zone.

› Excavator (minimum of 1):

- Sediment remediation within dry portions of intertidal zone;
- Sediment remediation of wetted portions of intertidal zone; and
- Backfilling.

6.1.7.2 Marine Works Mitigation Measures

The following measures will be implemented by the Contractor to protect marine resources during all marine works:

› All in-water works must be monitored by the Contractor EM:

- The Contractor EM must report all observations, findings and emerging issues to the Project EM; and
- The Project EM will conduct periodical monitoring of in-water works at their own discretion.

› Barge spudding shall be kept to a minimum and only applied where necessary, no barge spudding will take place on sensitive habitat, such as eelgrass or kelp beds;

› Marine construction-related activities must be kept within the DFO least-risk work window (August 16 - February 28) as much as possible:

- If works outside of the least-risk window are planned, contact the Project EM; and
- Additional mitigations will be implemented by the Project EM to protect species in sensitive life stages (e.g., survey for fish spawning within the work area).

- Project noise effects on Marine Mammals must be mitigated by following the mitigations outlined in **Section 6.1.11**;
- All measures to protect water quality in Burrard Inlet will be implemented:
  - Refer to **Section 6.3.1.4** for water quality monitoring procedures;
  - Refer to **Section 6.1.1** for erosion and sediment control;
  - Refer to **Section 6.1.12** and **Section 6.1.13** for management of hazardous substances, fuels, spill prevention and emergency response; and
  - Refer to **Section 6.1.3** for management of contaminated site material and water.
- Implement all applicable measures to protect marine wildlife outlined in **Section 6.1.10**;
- Implement all applicable measures to avoid, mitigate and minimize environmental impacts from use of machinery outlined in **Section 6.2**; and
- Develop and implement EPPs to monitor and protect water quality (refer to **Section 6.4**).

6.1.8 Vegetation Management

6.1.8.1 General Vegetation

The marine riparian area of the Site along the high-water mark is covered by a densely vegetated space with an area of approximately 1,100 m^2. This area is dominated by black cottonwood trees along the southern edge of the Site, under which are many species of native and invasive vegetation. Blackberry shrubs and smaller herbaceous plants are abundant along the slope on the southern edge, with vegetation becoming sparse towards the intertidal zone.

Aquatic vegetation may be present within the subtidal portion of the work area. Aquatic vegetation, such as eel grass and kelp, can be impacted during construction from dredging, barge spudding and impacts to water quality.

Please refer to **Section 6.1.10.1.1** for aquatic vegetation conditions on the Site.

Vegetation removal is anticipated in the following locations:

- The southern portion of the beach area, containing 13 mature black cottonwood trees, 11 small-to-medium black cottonwood trees, approximately 15 small black cottonwood trees and two small paper birch trees; and
- The upland area, containing a strip of 16 decorative cedar and pine trees.

Construction activities have the potential to impact vegetation by the following:

- Mechanical destruction from dredging, rock berm installation, barge movement and barge spudding; and
- Release of deleterious substances into Burrard Inlet.

The following adverse effects may occur from construction activities:

- Increase in turbidity from sedimentation of Burrard Inlet;
- Spread of invasive plants and noxious weeds beyond the Site;
- Harm to or death of wildlife; and

- Please refer to **Drawing 2 – Site Plan** for vegetation removal locations. The following subsections outline mitigations that will be implemented for vegetation and tree removal activities and to protect marine aquatic vegetation.

6.1.8.2 Vegetation General Mitigation Measures

Vegetation clearing (i.e., removal of shrubbery and young small trees **that are not invasive plants or noxious weeds**) is anticipated to occur via grubbing by machinery and, where feasible, by hand. The following mitigations will be implemented by the Contractor during vegetation clearing **not involving invasive plants or noxious weeds**:

- The Project EM will delineate the vegetation clearing area to prevent excessive machinery movement through disturbed areas;
- The Contractor will confirm the following:
  - No on-site burning to dispose of vegetation.
- Silt fencing and/or berms will be placed around disturbed areas with the potential to release of silt, soil, or sediment:
  - Refer to **Section 6.1.1** for erosion and sediment control:
    - If any sediment or soil begins sloughing from the Site due to disturbance related to vegetation removal, stop work and consult the Project EM or Contractor EM;
    - Adjust ESC controls as necessary, with consultation with the Project EM or Contractor EM;
    - Use manual and by-hand methods of vegetation removal wherever feasible; and
    - Load grubbed vegetation directly onto a truck or stockpile appropriately (please refer to **Section 6.1.2**).
- Refer to **Section 6.2.1.2** for mitigations related to the removal of trees;
- Avoid tree removal within songbird and raptor nesting seasons:
  - The Raptor Breeding Season in Metro Vancouver occurs between January 5 and August 31;
  - The general nesting season in Metro Vancouver occurs between March 15 and August 1; and
  - Refer to Section **6.1.9.2.2** for survey requirements.

6.1.8.2.1 Aquatic Vegetation

The following measures will be taken by the Contractor to avoid, mitigate and minimize loss of aquatic vegetation during construction:

- Delineate the footprint of dredging and rock berm installation clearly prior to construction;
- Take all care to avoid disturbances by barge movement, spudding or machinery use beyond the footprints of dredging and rock berm installation;
- Keep barge spudding to a minimum, only employing spudding when necessary for safety and adequate containment of dredge material loads on barges:
  - Barge spudding will not be employed over areas with known presence of aquatic vegetation beds.

- The Contractor EM will monitor all in-water works at all times:
  - The Contractor EM must report all observations, findings and emerging issues to the Project EM; and
  - The Project EM will conduct periodical monitoring of in-water works at their own discretion.
- All measures to protect water quality in Burrard Inlet will be implemented;
- Refer to **Section 6.3.1.4** for water quality monitoring procedures;
- Refer to **Section 6.1.1** for erosion and sediment control;
- Refer to **Section 6.1.12** and **Section 6.1.13** for management of hazardous substances, fuels, spill prevention and emergency response; and
- Refer to **Section 6.1.3** for management of contaminated Site material and water.

6.1.8.3 Invasive Vegetation

A number of invasive plant species were observed to inhabit the Site. Most prominently, Bohemian knotweed (*Fallopia x bohemica*), designated as a noxious weed under the BC *Weed Control Act*, was found in the southern portion of the Site (**Figure 2** and **Figure 3**). Invasive plants identified on the Site are listed in **Table 9** below.

Table 9: Invasive Vegetation Occurring on the Site

English Name	Scientific Name	Notes
Butterfly-bush	*Buddleja davidii*	One small bush observed on the southern portion of the western retaining wall, one large bush observed on the northern portion of the western retaining wall.
Bohemian knotweed	*Fallopia* x *bohemica*	Abundantly growing within the marine riparian area of the Site
English ivy	*Hedera helix*	Observed on the southern central portion of the Site
Himalayan blackberry	*Rubus armeniacus*	Abundant along the western, eastern, and southern property boundary
Bindweed	*Convolvulus* sp.	One plant observed on the central southern portion of the Site
Tree-of-heaven	*Ailanthus altissima*	One tree observed in the southwest corner of the Site
Scotch broom	*Cytisus scoparius*	Observed on the south eastern portion of the Site
White sweetclover	*Melilotus albus*	Abundant within the southern portion of the Site
Red clover	*Trifolium pratense*	Observed sporadically throughout the southern portion of the Site
Nightshade	*Solanum* sp.	One plant observed on the central southern portion of the Site
Ribwort plantain	*Plantago lanceolata*	Observed sporadically throughout the southern portion of the Site
Curled dock	*Rumex crispus*	One plant observed on the southwest portion of the Site

Based on observations made during a terrestrial field visit conducted by SNC-Lavalin professional biologists on October 26, 2020.

In general, the Site's marine riparian area is abundant in invasive vegetation, with Himalayan blackberry of greatest abundance. The Project includes clearing of the twelve invasive species listed in **Table 9** as part of the vegetation removal shown in **Drawing 3 – Site Plan II**.

6.1.8.3.1 Invasive Vegetation Management

Invasive Vegetation Management Plan

The Vegetation Clearing Contractor is responsible for the development and implementation of an Invasive Vegetation Management Plan in order to provide methods and protocols for management of invasive species on the Site. The Pan should include at a minimum:

- General mitigations as detailed in **General Mitigations** below;
- Methodology for identifying any additional species not listed in **Table 9**;
- Specific management methods for the removal of the 12 identified invasive species in **Table 9** (common best-practices used across British Columbia for invasive species can be found on the Invasive Species Council of BC's website: bcinvasives.ca);
- Least-risk schedule to remove invasive species (e.g., avoiding removal during life cycle period of seed dispersal);
- Excavation depths and widths recommended to successfully extract root systems where applicable for each species, based on known best-practices;
- Procedure for identifying and marking invasive species on-site prior to removal (e.g., marking with stakes);
- Procedure for removal of invasive species,
- Requirements for on-site segregation and/or packing of removed invasive plant material, roots and soil containing invasive plant material;
- Requirements, for disposal of invasive plant material;
- Mitigation measures to be taken during construction to avoid the dispersal and propagation of invasive plants; and
- The Invasive Vegetation Management Plan must prioritize mechanical methods due to the Site's close proximity to Burrard Inlet.

General Mitigations

The Contractor will implement the following controls for invasive vegetation on the Site:

- The contractor will be responsible for removing and disposing of all invasive species on-site:
  - The Contractor will outline the specific removal methodology planned to be employed for each specific invasive plant located on the Site.
- Avoid dispersing any material throughout the Site;
- Transport all invasive plant materials to a permitted facility that accepts invasive plants. The disposal facility must be arranged prior to construction start;
- Burning of plants on-site is prohibited;
- Use of herbicides to control weeds on-Site is prohibited;

- All vehicles are to be thoroughly washed and clean of mud prior to entering and leaving the Project area:
  - A dedicated vehicle washing area will be identified by the Contractor prior to the start of works.
- All vehicles are to be inspected for plant materials prior to leaving the Project area;
- All loads of soil and invasive plant materials transferred away from the Site are to be covered and secured to prevent any spillage outside of the Site;
- All areas of disturbed/exposed soil are to be restored/seeded:
  - Re-seeding/restoration is to consist of a local blend of plant species and certified to be free of invasive species and weeds.
- Imported soil obtained for the Project should be certified weed-free;
- All site personnel are to remove any plant material from clothing (including footwear) and equipment prior to mobilizing to the site, when moving between Site locations, and before leaving the Site;
- The Project EM and Contractor EM will monitor Project footprints and neighbouring locations (e.g., neighbouring properties, any open soil along Commissioner Street adjacent to the Site) for any establishment of invasive plant species and coordinate treatment of any infestations to eradicate the plants and prevent their spread;
- The Project EM must be contacted and the Client notified prior to any removal of invasive plants; and
- Stockpiles of vegetation and material excavated from vegetated areas must be inspected by the Project EM or Contractor EM for invasive plants.

Bohemian Knotweed (*Fallopia x bohemica*)

Bohemian knotweed grows aggressively and is difficult to eradicate. It is classified as a Noxious Weed under the *BC Weed Control Act*, which legally requires land owners to control and remove noxious weeds from their property. This plant grows abundantly within the marine riparian area of the Site, located among the cottonwood trees on the southern portion of the beach area.

Bohemian knotweed is identified by its broad heart-shaped leaves and small white-to-green flowers (refer to Figure 2 and Figure 3 below).

Figure 2: Bohemian knotweed
(Photo credit: purperlibel, via iNaturalist, under CC BY-SA 4.0[1] license – no changes made)

Figure 3: Bohemian knotweed flowers
(Photo credit: Andreas Rockstein, via iNaturalist, under CC BY-SA 4.0[1] license – no changes made)

Mechanical control of Bohemian Knotweed is not considered to be as effective as chemical treatment (herbicide) due to their large root systems (ISCBC, 2017). However, since the Site is in close proximity to water, mechanical control is the preferred treatment.

The Contractor will implement the following measures for removal and disposal of Bohemian knotweed:

- Control measures based on known best-practices (e.g., Invasive Species Council of BC recommendations);
- All control measures to be in full compliance of federal and provincial legislation;
- Mechanical removal of knotweed requires excavation of its root system, up to a recommended 3 m depth and 20 m width;
- All Bohemian knotweed plants and soil contaminated with knotweed removed from the Site are to be disposed of only at a permitted facility, which must be contacted and agree to receive knotweed plant material prior to construction start;
- All knotweed plants removed from the Site must be tightly secured in plastic bags before being transported, or otherwise secured as per instructions from the receiving permitted disposal facility; and
- All care to avoid dispersing plant material and fragments must be taken.

6.1.9 Terrestrial Wildlife Management

6.1.9.1 Wildlife Resources

The Project Habitat Assessment (SNC-Lavalin, 2021; 677011-0000-4ERA-0001) assesses and describes the terrestrial habitat found on-site. In general, the Site contains habitat usable by birds. The limited and

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isolated vegetation on the Site is believed to be adequate for nesting of small numbers of songbirds, waterfowl such as Canada Geese and smaller raptor species, and may provide foraging and roosting habitat for bats. No connectivity via corridors of trees and shrubs to any nearby potential habitats exists on the Site. The vegetation present on the Site is itself surrounded by heavily-travelled roadways, fully paved parking areas and industrial properties. It is not believed that the Site is suitable for terrestrial mammal use, aside from occasional sporadic use.

The following common wildlife species have been observed on the Site during a field visit conducted by Qualified Environmental Professionals as part of the terrestrial habitat assessment on October 26, 2020:

- Bald Eagle (*Haliaeetus leucocephalus*): A nesting platform was observed on the lot neighboring the Site to the east during field assessment;
- Rock Pigeons (*Columba livia*): Observed on-site during field assessment;
- Mallard Duck (Anas platyrhynchos): Observed on-site during field assessment;
- Canada Geese (*Branta canadensis*): Observed on-site during field assessment; and
- Northwestern Crows (*Corvus caurinus*): Observed on-site during field assessment.

6.1.9.1.1 Species at Risk

Several species at risk have been identified to occur within Vancouver Harbour or in locations that are nearby and share habitat similarities with the Site. This section details species at risk that have reasonable likelihood to occur on the Site in some capacity, based on literature review. All potential for use by wildlife species at risk is considered to be temporary and transient in nature, with no permanent nesting or residence on the Site.

Several bird species at risk have the potential to occur on the Site. The identified species are listed in **Table 10** below.

Table 10: Bird Species at Risk with Potential to Occur on the Site

English Name	Scientific Name	SARA Schedule 1 Designation	BC List
Barn Swallow	*Hirundo rustica*	Threatened	Blue
California Gull	*Larus californicus*	No Status	Blue
Double-crested Cormorant	*Phalacrocorax auritus*	No Status	Blue
Great Blue Heron	*Ardea herodias fannini*	Special Concern	Blue
Horned Grebe	*Podiceps auritus*	Special Concern	Yellow
Long-tailed Duck	*Clangula hyemalis*	No Status	Blue
Surf Scoter	*Melanitta perspicillata*	No Status	Blue
Western Grebe	*Aechmophorus occidentalis*	Special Concern	Red

Based on Information from: Butler, 1995; Butler *et al*, 2015; BC CDC, 2020; IBA, 2020; and Stanley Park Ecology Society, 2014

Seabird species at risk may utilize the waterlot of the site for foraging activity and Barn swallow may nest on the industrial structures surrounding the Site and forage aerially over the Site. **Figure 4** through **Figure 11** below identify the bird species at risk which have the potential to occur on the Site.

Project activities such as vegetation clearing, tree removal, sediment remediation, infilling, rock berm construction, dredging and the use of machinery can have potential adverse effects to local wildlife, including:

- Harm to or death of wildlife;
- Destruction of nests; and
- Disturbance to terrestrial wildlife from construction-related activity and noise.

The following subsections detail mitigations that will be adhered to in order to avoid, mitigate and minimize harm to or death of wildlife during the Project.

6.1.9.2 Mitigation Measures

6.1.9.2.1 General Wildlife Mitigations

The Contractor will implement the following mitigation measures in respect to wildlife on the Site:

- The Contractor(s) and other project personnel are prohibited from feeding, hunting, harming, harassing, and capturing any wildlife;
- All waste must be kept in secure storage containers and removed from site at the end of each day;
- Vehicle-related incidents with wildlife must be reported immediately to the Contractor EM or Project EM;
- Where feasible, minimize the time that excavations are left open. If feasible, cover open excavations that are left overnight to avoid entrapping wildlife;
- If, at any time, any bats are encountered in the on-site trees, all work must be stopped and the Contractor EM or Project EM must be contacted;
- If, at any time, a wildlife species at risk is thought to exist or is identified within the Project footprint, the Project EM and Contractor EM have the authority to suspend work and enact emergency measures in order to protect the species, in the event that practical means cannot be found to achieve protection whilst operations continue:
  - The Contractor EM must report all such instances to the Project EM.

6.1.9.2.2 Songbirds and Raptors

Bird nests may potentially be found at and around Site at the following locations:

- On the trees at the southern portion of the Site;
- On the eagle nesting platform on the neighbouring lot to the east of the Site; and
- On the ground surface of the Site;

The following measures must be taken by the Contractor during construction activity to limit harm to birds, their nests, and their habitat:

- Mortality of birds, as well as the destruction or disturbance of active bird nests (and some inactive nests) are prohibited by the *Migratory Bird Convention Act*[2] (MBCA) and Regulations and the *BC Wildlife Act*[3] (WLA).
- Where possible, work will occur outside of the nesting seasons:
  - The raptor breeding season in Metro Vancouver occurs between January 5 and August 31; and
  - The general nesting season in Metro Vancouver occurs between March 15 and August 15.
- If raptor nesting is observed within 200 m of construction activity, a professional biologist will be consulted to determine the most appropriate buffer distances required;
- If Project activity will be taking place during the general nesting season, a nest survey must be undertaken by a QEP to locate any active nests that may be affected by the proposed work. Work must then begin within a maximum of 3 days after a non-resultant nest survey (this period may be extended for work planned for the end of the nesting season at the discretion of the qualified professional);
- Any work involving vegetation clearing and tree removal must be assessed by the Project EM prior to the activity taking place when working within the songbird and raptor nesting periods;
- If active nests are discovered during nest surveys or during the course of work, a no-disturbance buffer or setback distance around the nest must be established and maintained until the young birds have fledged and left the area:
  - Buffer distances should be determined by a qualified professional in consideration of the bird species involved, the type of habitat surrounding the nest, the activity stage of the nest, and the type and duration of disturbance that is planned.
- If any nests are required to be moved or destroyed, a WLA or MBCA Permit may be required. Contact the Project EM prior to disturbing any nests or suspected nesting areas.

6.1.9.2.3 Species at Risk

Barn Swallow

Barn Swallows are listed as Threatened under the federal *Species at Risk Act*[4] (SARA) and are provincially Blue-Listed. Barn swallow are common in urban environments and may utilize the vertical surfaces of nearby structures and man-made features, such as dock and railyard infrastructure, for nesting (COSEWIC, 2011). Due to the lack of or man-made structures on the Site, Barn Swallow nests are unlikely to be encountered. However, Barn Swallows travel significant distances from nesting areas to forage (COSEWIC, 2011) and may therefore occur on the Site to forage.

- If Barn Swallows are observed in the construction area during Project works, stop work and contact the Project EM immediately. Construction can continue only after Barn Swallows are observed to leave the area or construction is cleared to start by the Project EM or Contractor EM.

[2] *Migratory Birds Convention Act* (MBCA), S.C. 1994, c. 22, last amended on December 12, 2017.
[3] *Wildlife Act* (WLA) [RSBC 1996] Chapter 488.
[4] *Species at Risk Act* (SARA), S.C. 2002, c. 29, last amended on October 6, 2020.

Figure 4: Barn Swallow (Photo credit: Patrice Bouchard, Public Domain)

California Gull

The California Gull is a provincially Blue-listed seabird known to occur within Burrard Inlet. Individual gulls have been observed foraging within 10 km of the Site (Butler et al., 2015). California Gulls are known to forage up to 17.4 km from nesting colonies (BC CDC, 1994) and may therefore occur within the Site's waterlot to forage. Colonies of California Gulls have not been documented within Burrard Inlet (BC Breeding Bird Atlas, 2021), therefore, it is considered unlikely that California Gull colonies exist on the Site.

› If any California Gulls are observed in the Project area during Project works, contact the Project EM immediately. Construction can continue only after California Gull are observed to leave the area or construction is cleared to start by the Project EM or Contractor EM.

Figure 5: California Gull (Photo credit: Robin Spielmann, Public Domain)

Double-crested Cormorant

The Double-crested Cormorant is provincially Blue-listed and forage by diving into marine waters up to 20 km from their roost site (BC CDC, 1995). They nest on small rocky islands, man-made structures

overhanging water (such as bridges) and on steep rocky cliffs, generally between 4 metres and 17 metres above the high-tide line (Zevit, 2010). Double-crested Cormorant foraging habitat has been identified within 2 km of the Site (Butler et al., 2015). Double-crested Cormorants have also been observed to nest on Iron Workers Memorial Bridge, located 2 km east of the Site (Butler et al., 2015).

Due to the lack of man-made overhanging structures and exposed rocky surfaces four metres above the high-tide line on the Site, Double-crested Cormorant nesting is considered unlikely to occur on the Site. However, Double-crested Cormorant may occur to forage within the waterlot of the Site.

- If Double-crested Cormorant are observed on the Site, contact the Project EM immediately. Construction can continue only after Double Crested Cormorant are observed to leave the area or construction is cleared to start by the Project EM or Contractor EM.

Figure 6: Double-crested Cormorant (Photo credit: Charles Jackson, Public Domain)

Great Blue Heron

The Great Blue Heron is listed as Special Concern under the federal SARA and is BC Blue-listed. The project is within 5 km of a Great Blue Heron breeding colony (Great Blue Heron Atlas, n.d.; Stanley Park Ecology Society, 2014). Great Blue Heron may forage up to 10 km from their colonies (Stanley Park Ecology Society, 2014) and may therefore forage within the waterlot of the Site.

- If any Great Blue Heron are observed in the construction area during Project works, stop work immediately and contact the Project EM. Construction can continue only after Great Blue Heron are observed to leave the area or construction is cleared to start by the Project EM or Contractor EM.

Figure 7: Great Blue Heron (Photo credit: Joshua J. cotton, Public Domain)

Horned Grebe

The Horned Grebe is listed as Special Concern under the federal SARA. Horned Grebe primarily nest in freshwater environments (Butler et al., 2015; COSEWIC, 2009), therefore nesting is considered unlikely to occur on the Site. Horned Grebes are known to overwinter in coastal areas of BC and individuals have been identified within 1 km of the Site (Butler et al., 2015). Therefore, Horned Grebes may overwinter near the Site and forage within the Site's waterlot.

- If any Horned Grebes are observed during construction, contact the Project EM immediately. Construction can continue only after Horned Grebes are observed to leave the area or construction is cleared to start by the Project EM or Contractor EM.

Figure 8: Horned Grebe (Photo credit: Donna A. Dewhurst, Public Domain)

Long-tailed Duck

Long-tailed Ducks are provincially Blue-listed and have been documented to occur within Burrard Inlet (Butler et al., 2015). The closest occurrence has been recorded on the western coast of Stanley Park, approximately 6 km west of the Site (Butler et al., 2015). Long-tailed Ducks are known to overwinter within coastal areas in BC and breed in the Arctic region (Butler et al., 2015), therefore, nesting is not likely to occur on the Site. However, Long-tailed Ducks may overwinter in areas close to the Site and occur to forage within the Site's waterlot.

- If Long-tailed Duck are observed on the Site, contact the Project EM immediately. Construction can continue only after Long-tailed Duck are observed to leave the area or construction is cleared to start by the Project EM or Contractor EM.

Figure 9: Long-tailed duck (Photo credit: Amanda Boyd, USFWS, Public Domain)

Surf Scoter

Surf Scoters are provincially Blue-listed and commonly overwinter within coastal regions of BC (Buter et al., 2015). Surf Scoter commonly migrate north to reproduce within inland areas, away from the coast (Butler et al., 2015), therefore nesting is unlikely to occur on the Site. During autumn and winter seasons, overwintering Surf Scoters can occur within Burrard Inlet in large numbers to forage within shallow marine coastlines characteristic of the Site. The Surf Scoter is also one of the most commonly occurring waterfowl in Burrard Inlet (Buter et al., 2015) and is therefore considered likely to occur within the Site's waterlot or intertidal zone.

- If Surf Scoter are encountered on the Site, contact the Project EM immediately. Construction can continue only after Surf Scoter are observed to leave the area or construction is cleared to start by the Project EM or Contractor EM.

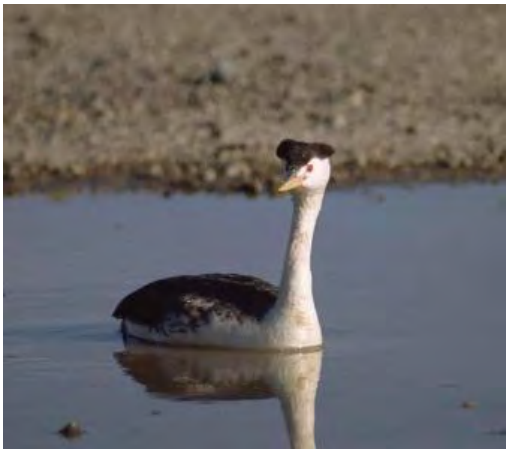
Figure 10: Surf Scoter (Photo credit: Gary Kramer, USFWS, Public Domain)

Western Grebe

Western Grebes are listed as Special Concern within the federal SARA and are BC Red-listed. Western Grebe breeding habitat occurs within inland freshwater environments away from the marine coast (COSEWIC, 2014), therefore Western Grebe nesting is considered unlikely to occur on the Site. However, Western Grebe overwinter within BC coasts (COSEWIC, 2014) and have been observed to forage in dense numbers within the Site's waterlot (Butler et al., 2015). Therefore, overwintering Western Grebes are considered likely to occur to forage within the Site's waterlot during construction.

› If Western Grebes are observed on the Site, contact the Project EM immediately. Construction can continue only after Western Grebes are observed to leave the area or construction is cleared to start by the Project EM or Contractor EM.

Figure 11: Western Grebe (Photo credit: Marytherese One Bear, USFWS, Public Domain)



6.1.10 Fish and Aquatic Life Management

6.1.10.1 Aquatic Resources

A detailed marine habitat assessment is presented in the Project Habitat Assessment Report (677011-0000-4ERA-0001). An intertidal survey was conducted on May 13, 2021 and a subtidal dive survey was conducted by Foreshore Marine & Environmental Services on May 17, 2021.

During a 2014 field survey conducted by SNC-Lavalin professional biologists, the intertidal habitat of the Site was observed to be an armoured shoreline with a gently sloping beach comprised mainly of cobble and pebble in middle intertidal, transitioning into mud in the lower intertidal and shallow subtidal areas. Barnacles, rockweed (*Fucus vesiculosus*) and sea lettuce (*Ulva* sp.) were observed to dominate the mid intertidal, with an abundance of shore crabs. Rip-rap extending into the shallow subtidal was observed to be covered with small brown kelp species, sea stars and crabs (SNC-Lavalin, 2014).

During recent field visits, (October 10, 2020, May 13, 2021 and May 17, 2021), the following aquatic wildlife was observed on the Site:

› Earwig species (likely *Anisolabis maritima*) and sandhoppers (unidentified marine amphipods) on the upper limits of the intertidal zone;

- Acorn barnacles (*Balanus glandula*), Pacific Oyster (*Crassostrea gigas*), Blue mussels (*Mytilus edulis*) periwinkles (*Littorina* spp.), Shore crabs (*Hemigrapsus nudus* and *H. oregonensis*) and limpets (*Lottia spp.* and *Tectura spp*.) within the middle and lower intertidal zone; and
- Green urchins (*Strongylocentrotus droebachiensis*), hermit crabs (*Pagarus spp*.) and ochre seastars (*Pisaster ochraceous*) within the lower intertidal zone.

Please refer to the Project Habitat Assessment Report (677011-0000-4ERA-0001) for a detailed overview of fish habitat and species presence on the Site.

6.1.10.1.1 Aquatic Vegetation

Aquatic vegetation observed during the intertidal survey on May 13, 2021, included Rockweed, Turkish washcloth leafy and crustose phases (*Mastocarpus papillatus*) and sea lettuce were observed. During the subtidal dive survey conducted on May 17, 2021, seaweeds observed in the subtidal area included sugar kelp (*Laminaria* spp.), *Sargassum*, sea lettuce (*Ulva* sp.), seersucker kelp (*Costaria costata*), broad acid weed (*Desmarestia herbacea*), rockweed (*Fucus* sp.), and unidentified red filamentous algae. Please refer to the Project Habitat Assessment Report (677011-0000-4ERA-0001) for a detailed overview of intertidal and subtidal aquatic vegetation.

6.1.10.1.2 Species at Risk

A review of DFO's Aquatic Species at Risk map (DFO, 2019a) indicated 15 Species at Risk with potential to occur in the marine habitat of the Burrard Inlet, including eight fish species.

Fish Species at Risk

The identified fish species at risk are listed in **Table 11** below.

Table 11: Federally-Listed Fish Species at Risk with Potential to Occur in the Project Area

English Name	Scientific Name	SARA Schedule 1 Designation	BC List
Northern Abalone	*Haliotis kamtschatkana*	Endangered	Red
Basking Shark (Pacific)	*Cetorhinus maximus*	Endangered	No Status
Bluntnose Sixgill Shark	*Hexanchus griseus*	Special Concern	No Status
Tope	*Galeorhinus galeus*	Special Concern	No Status
Yelloweye Rockfish	*Sebastes ruberrimus*	Special Concern	No Status
Longspine Thornyhead	*Sebastolobus altivelis*	Special Concern	No Status
Rougheye Rockfish Type I	*Sebastes sp.* type I	Special Concern	No Status
Rougheye Rockfish Type II	*Sebastes sp.* type II	Special Concern	No Status

Fish species at risk are considered unlikely to occur within the Site due to the silt-covered nature of the intertidal and shallow subtidal seabed and a lack of complex habitat structures.

6.1.10.2 Mitigation Measures

Project activities such as vegetation clearing, tree removal, sediment remediation, infilling, rock berm construction, dredging and the use of machinery can have potential adverse effects to local wildlife, including:

- Death of fish by means other than fishing;

- Burial/crushing of intertidal and subtidal benthic organisms, including crabs, mollusks, macrofauna, microfauna and infauna from excavation, dredging and infilling;
- Destruction of marine aquatic vegetation; and
- Avoidant behavior of marine wildlife from construction-related activity and noise.

It is anticipated that unavoidable death of fish by means other than fishing and burial/crushing of crabs, mollusks and benthic organisms will occur as a result of intertidal and subtidal works. SNC-Lavalin will prepare and submit a *Fisheries Act Authorization* to DFO, including a Habitat Offsetting Plan outlining new habitat creation on the Site in order to offset the reduction of existing marine and riparian habitat. In addition, these anticipated adverse effects will be minimized to the fullest possible extent with the application of the following mitigation measures.

The following measures will be implemented by the Contractor during construction to avoid, mitigate, and minimize adverse effects to fish and fish habitat. The Contractor will:

- Be responsible for retaining a QEP to conduct a fish salvage within the work area after the installation of the silt curtain and prior dredging and installation of the rock berm:
  - The Contractor QEP will compose a fish salvaging plan prior to fish salvaging activities. The fish salvaging plan must be approved by the Port prior to implementation.
- Fish salvaging must be completed a maximum of seven (7) days prior to the start of construction;
- Fish Salvaging may involve the following:
  - Fish could be planned to be salvaged from the work area via seine net; and
  - Large crustaceans could be planned to be salvaged from the work area via trapping.
- For fish salvaging, the Contractor is responsible for:
  - Applying for and acquiring the DFO scientific license prior to fish salvaging activities;
  - Developing a Fish Salvaging Plan; and
  - Fish Salvaging Plan requirements outlined in **Section 6.4.5**.
- Keep Barge spudding to a minimum;
- As much as possible, limit in-water works to within the DFO least-risk Window (please refer to **Section 3.3**);
- Confirm the Project EM is on-site to monitor all in-water works:
  - The Contractor EM must report all observations, findings and emerging issues to the Project EM; and
  - The Project EM will conduct periodical monitoring of in-water works at their own discretion.
- Protect aquatic vegetation by adhering to the mitigations in **Section 6.1.5**; and
- Implement all measures to protect water quality in Burrard Inlet:
  - Refer to **Section 6.3.1.4** for water quality monitoring procedures;
  - Refer to **Section 6.1.1** for erosion and sediment control;

- Refer to **Section 6.1.12** and **Section 6.1.13** for management of hazardous substances, fuels, spill prevention and emergency response; and
- Refer to **Section 6.1.3** for management of contaminated Site material and water.

6.1.11 Marine Mammal Management

Marine mammals that are likely to occur within Burrard Inlet include the Harbour Seal, commonly found throughout Vancouver Harbour. The following marine mammal species at risk have the potential to occur on-Site (DFO, 2019a):

Table 12: Federally-Listed Marine Mammal Species at Risk with Potential to Occur in the Project Area

English Name	Scientific Name	SARA Schedule 1 Designation	BC List
Harbour Porpoise	*Phocoena vomerina*	Special Concern	Blue
Steller Sea Lion	*Eumetopias jubatus*	Special Concern	Blue
Grey Whale	*Eschrichtius robustus*	Special Concern	Blue
Humpback Whale	*Megaptera novaeangliae*	Special Concern	Blue
Killer Whale (Transient)	*Orcinus orca*	Threatened	Red
Killer Whale (Resident)	*Orcinus orca*	Endangered	Red

Harbour Seal (*Phoca vitulina*), which are not protected species, were also observed on-site during field assessment.

Based on available information on marine mammal occurrence within Burrard Inlet and Vancouver Harbour, there is a potential for marine mammal species at risk to occur within or in proximity to the Site's marine environment. Project activities such as vegetation clearing, tree removal, sediment remediation, infilling, rock berm construction, dredging and the use of machinery can have potential adverse effects to local wildlife, including:

- Barotrauma to marine mammals; and
- Avoidant behavior of marine mammals from construction-related activity and noise.

Under the *Species at Risk Act*, it is prohibited to kill, harm, harass, capture, or take an individual of a species listed as extirpated, endangered, or threatened under Schedule 1 of SARA.

6.1.11.1 Mitigation Measures

During dredging activities, the Contractor must adhere to the following requirements:

- If, at any time, a marine mammal is observed approaching the work area without the presence of a Marine Mammal Observer (MMO), contact the Project EM or Contractor EM immediately; and
- Stop all in-water works if marine mammal species at risk (refer to **Table 12**) enters the work area. Work must not resume until the animal(s) have left the area.

6.1.11.1.1 Marine Mammal Observation

During all dredging activities (dredging of rock berm footprint and dredging for sediment remediation within the intertidal zone), the following measures will be implemented by the Contractor:

- Retain an MMO for the Project by to monitor all dredging activities full-time:
  - The Contractor is required to confirm that the MMO is present on-site prior to dredging activities;
  - The MMO must be trained in identifying marine mammal species and be knowledgeable of standard MMO procedures listed below;
  - The MMO will carry out marine mammal observation as per the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment*;
  - The Contractor must provide the MMO with a way to reliably communicate with dredging operators in a timely manner (e.g., direct radio communication); and
  - The MMO will have the authority to stop works at their discretion if dredging activities have the potential to impact marine mammals species at risk.
- A 1,000 m exclusion zone will be established by the MMO around the dredging footprint within work area prior to works commencing;
- The 1,000 m exclusion zone will be estimated by the MMO using distance estimating techniques (e.g., using a rangestick);
- If, at any time, a marine mamma species at risk is observed entering the exclusion zone, the MMO will issue a stop-work order and dredging activity must cease immediately;
- Prior to the start of any dredging, a pre-watch procedure must be conducted by the MMO:
  - The pre-watch will take place for 30 minutes, during which time no noise-generating activity may take place (dredging);
  - If the MMO observes a marine mammal species at risk entering the 1,000 m exclusion zone during the pre-watch procedure, the mammal must be observed to leave, and the pre-watch restarted until a 30-minute period without marine mammals being observed within the exclusion zone passes;
  - If 30 minutes pass without the MMO observing marine mammal species at risk within the exclusion zone, dredging activity may proceed; and
  - After the mammal is observed to leave the exclusion zone, a new pre-watch procedure must take place for 30 minutes prior to resuming noise-generating activity.
- Once the pre-watch as been completed, dredging activities must start by following a ramp-up procedure:
  - Ramp-up must take place for a minimum of 20 minutes prior to full-intensity dredging;
  - Dredging will begin at low intensity (e.g., pausing for three minutes between unloading clamshell onto barge before resuming dredging within the first 10 minutes, then pausing for two minutes within the latter 10 minutes).

- If, at any time, a marine mammal species at risk is observed to enter the 1,000 m exclusion zone while dredging is taking place, the MMO will contact the dredging operators via radio and stop work. After the mammal is observed to leave, a new 30-minute pre-watch procedure must be conducted;
- If noise-generating activities are paused, for any reason:
  - For any period of time: A 20-minute ramp-up procedure is required before activities may resume at full intensity; and
  - For longer than 30 minutes: A 30-minute pre-watch is required before activities may resume.

MMO Reporting

The MMO must maintain marine mammal recording forms ("deckforms") to the standards of MMO certification. Every observation of a marine mammal must be recorded in the deckforms and compiled into spreadsheets of total observations for the Project.

- Deckforms will record, at a minimum:
  - Observer's name;
  - Date and of observation;
  - Bearing and range to observed mammal;
  - Start and end time of observation;
  - Species and number of individuals;
  - Position coordinates of observed mammal(s);
  - Description of mammal(s) aiding in identification (size, morphology, characteristics);
  - Observed behaviour; and
  - Direction of travel.
- Observations will be compiled into operational and effort recording forms to outline all observations and key information collected during the Project.
  - All deckforms and compiled observations will be sent to the Port within 48 hours of the end of each work day that any occurrences are recorded.

6.1.12 Emergency Response

Accidental release of deleterious substances may occur on-site during works. Additionally, spills may arise from on-site storage of fuels and other deleterious substances. Spill size could vary from small quantities (e.g., drips from equipment leaks and loose fittings, spills resulting from fueling overflow) to larger volumes (e.g., spills resulting from ruptured fuel tanks or hydraulic lines).

The extent of damage, or impact, caused by a spill is proportional to the quantity of material, the toxicity of the spilled substance, the sensitivity of the receiving environment, and the amount of time required to identify the spill and respond with containment and clean-up measures. Spills may contaminate soil, paved surfaces as well as Burrard Inlet. Exposure to contaminants can be lethal or sub-lethal to aquatic and terrestrial wildlife.

The following hazardous materials are anticipated to be stored on-Site:

- Fuel and other vehicle-related fluids;
- Used spill response materials (if a spill had occurred); and
- Excavated contaminated material (stockpiles) containing PAHs and PCBs.

The Contractor and subcontractors will be required to develop and implement a Spill Prevention, Emergency Response & Notification Plan that addresses regulatory and institutional requirements relating to spill reporting and other spill/emergency management requirements. The SPERNP will describe:

- Spill abatement materials and equipment to be stored on the Site;
- Work personnel responsible for spill response; and
- External contacts, education procedures, and incident response procedures including communications, containment, clean-up, debriefing and follow-up reporting.

This section is intended to guide Contractors and Subcontractors in the preparation of their own spill and emergency response plan specific to their particular scope of work.

6.1.12.1 General Mitigations

The Contractor will implement the following mitigations throughout the Project:

- Inspect all machinery to confirm all machinery is in full working order and free of leaks and/or drips prior to the start of each work day:
  - Vehicle inspection forms must be presented to the Project EM upon request.
- All hose connections of machinery must be wrapped in sorbent material;
- All fuel-filled equipment and tanks, as well as any containers holding hazardous materials will be placed in secondary containment when not in use. Secondary containment must be capable of containing 110% of all fluid within the equipment or tank it is containing;
- Spill kits will be available and present on all machinery, and be capable of absorbing the largest possible spill associated with its respective machinery;
- A large central spill kit, containing absorbing booms and other materials for spills to water, must be available on-Site and accessible to all on-Site personnel, who must be trained in its use;
- Hydraulic oil used in machinery must be biodegradable, where possible;
- Hydraulic hoses and couplings will be inspected and be free of leaks and/or excess hydrocarbons prior to use near the marine environment;
- Impervious materials, such as tarps, drip pans or spill trays, will be placed underneath equipment and machinery during servicing when there is a potential for accidental drips or spills;
- Any machinery left on-site overnight must be:
  - At least 30 m from the beach area of the Site; and
  - Placed atop of drip pans and/or sorbent material.

- Refuelling and/or lubricating of vehicles must be conducted in a designated area located at least 30 m from the Delineate beach area of the Site:
  - Please refer to **Drawing 3 – Site Plan II** for designated refueling locations:
    - At the time of writing this CEMP, the location of designated refueling area(s) have not been determined. This drawing will be updated once this information becomes known during subsequent Project planning stages.
  - Please refer to **Section 6.1.13** for fuel management.
- All refuelling and/or lubricating of vehicles must take place atop of absorbent sheets/pads or within an impermeable lined basin; and
- Confirm all on-Site personnel are trained and knowledgeable in the Project SPERNP and are able to adequately respond to spills and emergencies on Site.

6.1.12.2 Emergency Communication

The Contractor shall confirm that all on-site personnel are familiar with emergency reporting procedures and outline such procedures in the SPERNP. The following personnel and agencies shall be contacted in case of environmental emergencies:

Table 13: Project emergency contacts

Contact	Phone Number	Notes
Project EM	TBD	For reporting any spill, regardless of volume
Contractor EM	TBD	For reporting any spill, regardless of volume.
Emergency Services	911	For all emergencies posing a hazard to human health
VFPA Operations Centre	604-665-9086	For all on-Site emergencies
Non-emergency Police (VPD)	604-717-3321	For non-emergencies requiring police assistance
Non-emergency Fire	604-873-7000	For non-emergencies requiring fire department assistance
St. Paul's Hospital	604-806-9090	For non-emergency contact to the nearest hospital
Emergency Management BC	604-586-4390	For reporting major spills
BC Emergency Spill Reporting Line	1-800-663-3456	For reporting major spills
Canadian Coast Guard	Marine Pollution: 1-800-889-8852 Search and Rescue: 1-800-567-5111	For reporting major spills For emergency search and rescue

6.1.12.2.1 Spill Response Plan

All spill response activities shall be carried out by the Contractor in accordance with the following priorities, in the order listed below:

- Protection of Human Life;
- Protection of the Environment; and
- Protection of Assets.

Contractor spill response should adhere to the following management procedures, at a minimum:

- Assess safety:
  - Confirm unnecessary people are kept clear of the area and that only people with proper training and equipment deal with the spill;
  - Confirm required personal protective equipment is worn before responding to a spill; and
  - Consult Material Safety Data Sheets prior to responding to the spill.
- Stop the source:
  - Only attempt stopping a spill when it is safe to do so; and
  - Proceed to stop the spill, which may be in the form of righting an overturned container or sealing a hole.
- Contain and control the spill:
  - The spill should be prevented from infiltrating into the ground or entering a waterbody; and
  - If the spill occurs on water, booms should be immediately deployed to prevent its spread.
- Clean up the spill:
  - Utilize appropriate absorbent pads and/or other materials, based on the type of substance spilled; and
  - The method of disposing of the waste is dependent on the amount and type of the released deleterious substance.
- Notify appropriate authority:
  - Spills of a reportable quantity must be reported to the appropriate agency;
  - Minor spills should be reported to the Project EM, regardless of volume; and
  - Refer to **Section 6.1.12.2.5**.
- Record the incident:
  - Detail what, how and where the incident happened;
  - Detail the corrective response actions taken to control and clean up the spill; and
  - Depending on the nature of the spill, further assessment of the spill's impacts and additional cleanup may be required.

Locations of hazardous material storage, as well as spill response equipment and material must be identified on a Site map posted in a visible and accessible place on the worksite. This information shall be communicated and discussed in pre-construction meetings and during environmental training delivered to on-Site crews.

6.1.12.2.2 Containment Response Procedure

When a spill is detected, immediate action shall be carried out by the Contractor in order to:

- Stop the discharge of the spilled material (where possible);
- Contain the spill to the smallest possible area;
- Prevent spills from entering watercourses, ditches, or drainage features;
- Limit the spread of oil across water (if applicable);
- Maximize the thickness of the spilled oil to facilitate recovery; and
- Prevent shoreline oiling and contamination.

The Contractor shall contain and commence manual recovery of a spill, using all the equipment available at the scene. Equipment will include absorbent and containment booms deployed from the site.

6.1.12.2.3 Spill Response on Land Procedure

Land-based spills may occur from machinery and storage tanks/drums located on the upland portion of the Site. Land-based spills have the potential to flow downslope and be absorbed into the intertidal zone substrate or directly flow downslope into Burrard Inlet, causing adverse effects to Burrard Inlet and its marine wildlife. Land-based spills can also cause adverse effects to terrestrial wildlife and human health.

Thee following measures are to be followed by the Contractor in the event of a land-based spill:

- Follow emergency notification and reporting procedures:
  - If a spill is of less than the reportable quantity (refer to **Section 6.1.12.2.5**), the first observer of the spill reports the spill to the Project EM; and
  - If a spill is of or greater than the reportable quantity, the first observer of the spill reports the spill to the BC Emergency Spill Reporting Line, and then the Project EM;
- The Contractor will identify source of the spill, estimate the volume of spill, identify shoreline and land at risk (including Burrard Inlet and properties neighbouring the Site), identify physical assets at risk and assess method of clean up with assistance from the Project EM;
- The Contractor will identify and eliminate sources of ignition, secure access to the affected area, and warn people in the immediate vicinity. Caution will be taken to not walk/drive through the spill;
- The Contractor will confirm that appropriate PPE is used during spill response;
- The Contractor will implement measures to protect the intertidal zone and Burrard Inlet, including measures that are not limited to absorbent booms and impermeable barriers;
- The Contractor will cover any storm and sewage drains that may be affected (e.g., on the upland area of the Site, adjacent to Commissioner Street);
- Measures will be taken to direct spills away from the Beach area of the Site and Burrard Inlet;

- If safe to do so, close valves, spouts, or pumps;
- If safe to do so, plug hole(s) using a non-sparking tool (wooden or plastic plug, putty), or catch the spill using a drip tray. Transfer spill into a pail or other compatible, spill-proof container, label and transfer it to the Hazardous Waste storage area (refer to **Drawing 3 – Site Plan II** for location of hazardous waste storage area):
  - At the time of writing this CEMP, the location of hazardous materials storage area(s) has not been determined. This drawing will be updated once this information becomes known during subsequent Project planning stages.
- Use universal absorbent booms, sand, or dirt to contain the spill. Spread loose absorbent from the spill kit to soak up the spill;
- Do not flush (i.e., hose down) the spill with water; and
- Dispose of as Hazardous Waste using approved disposal facility or service:
  - The Project EM will assist the Contractor in disposal of hazardous waste and used spill control equipment.

6.1.12.2.4 Spill Response in Water Procedure

Spills into water have the potential to occur during work within the intertidal and subtidal zones of the Site, including spills from barges and machinery. Land-based spills have the potential to become spills into water in the event that a substance spilled to land flows towards Burrard Inlet. Spills of deleterious substances into water have the potential to cause adverse effects to the marine life in Burrard Inlet and affect the shorelines of other properties.

The following steps are to be followed by the Contractor in the event of a water-based spill:

- Follow emergency notification and reporting procedures;
  - If a spill is of less than the reportable quantity (refer to **Section 6.1.12.2.5**), the first observer of the spill reports the spill to the Project EM; and
  - If a spill is of or greater than the reportable quantity, the first observer of the spill reports the spill to the BC Emergency Spill Reporting Line, and then the Project EM.
- The Contractor will identify the source of the spill;
- In consultation with the Project EM, the Contractor will estimate the volume of the spill, and identify shoreline at risk, environmentally sensitivities (e.g., fish, aquatic vegetation) and assess method of shoreline protection.

Shoreline protection actions or techniques will be used to prevent oil or other contaminants from reaching the shoreline or a particularly sensitive shoreline area, and to minimize the impact of any oil that reaches the shore. The primary types of shoreline protection activity are:

- Offshore: Containment and recovery of oil in open waters;
- Onshore: Protective barriers along the inter-tidal zone of a sensitive shoreline area (e.g., berms, sorbent barriers); and
- Near-shore: Deflection or diversion of oil away from sensitive shoreline areas to pre-planned recovery points using boom deployment techniques.

Types of booming techniques used to protect near-shore regions are:

- Exclusion Booming (preventing the oil from approaching a sensitive shoreline area or resource);
- Deflection Booming (directing the oil away from the shore to protect a sensitive shoreline resource); and
- Diversion Booming (directing the oil towards the shore to a pre-selected collection point).

In the event of a general spill on water, these steps should be followed by the Contractor:

- Eliminate sources of ignition. Secure access to the affected area. Warn people in the immediate vicinity. Do not move through the spill;
- Use appropriate PPE during spill response;
- Protect potentially affected shorelines and known environmentally sensitive areas using absorbent booms;
- If the source of the spill is known and if safe to do so, close valves, spouts, or pumps;
- If safe to do so, plug hole(s) using a non-sparking tool (wooden or plastic plug, putty), or catch the spill using a drip tray. Transfer spill into a pail or other compatible, spill-proof container, label and transfer it to the Hazardous Waste storage area (refer to **Drawing 3 – Site Plan II** for location of hazardous waste storage area):
  - At the time of writing this CEMP, the location of hazardous materials storage area(s) has not been determined. This drawing will be updated once this information becomes known during subsequent Project planning stages.
- Collect absorbent booms if they were used to protect the shoreline. Place them into heavy-duty plastic bags or other leak-proof containers and label;
- Store the containers with waste material in the designated hazardous waste area. If a hazardous waste disposal area is not available then dispose of them in a secure, contained area. Dispose of as Hazardous Waste using an approved disposal company:
  - The Project EM will assist the Contractor in disposal of hazardous waste and used spill control equipment.

6.1.12.2.5 Spill Reporting

All spills, regardless of volume, must be reported by the Contractor to the Contractor EM and Project EM. The Project EM and Contractor EM, depending on who is on Site at the time, shall assess and record all incidents, prescribing appropriate follow-up actions:

- If the Contractor EM is responding to a spill, all spill reporting documentation must be approved by the EM.

The Project EM and Contractor EM shall follow the incident reporting procedures outlined in **Section 6.3.2.6** for any environmental spill observed on-site. The Contractor's SPERNP will include procedures for reporting spills to the Project EM. All significant emergencies and/or spills should be reported to Emergency Management BC and the Port's Operations Centre. Please refer to **Table 13** for emergency contact information.

When reporting a spill to Emergency Management BC, the BC Emergency Spill Reporting Line and/or the Port's Operations Centre, the reporting party should be prepared to provide the dispatcher with the following information:

- Name and contact phone number of the person initiating the call;
- Name and telephone number of the person who caused the spill;
- Location and time of the spill;
- Type and quantity of the substance spilled;
- Cause and effect of the spill;
- Details of action taken or proposed;
- Description of the spill location and surrounding area;
- Names of agencies/responders on scene; and
- Names of other persons or agencies advised or to be advised concerning the spill.

External Spill Reporting

In the event of releases of significant quantity, the spill must be reported to provincial authorities (via the BC Emergency Spill Reporting Line, refer to **Table 12**) as per the *Spill Reporting Regulation* of the BC *Environmental Management Act*. Spill quantities that must be reported to provincial authorities are included in **Table 13** below.

Table 14: Reportable Spill Quantity List

Product	Quantity
Class 1 – Explosives	50 kg, or less if the substance poses a danger to public safety
Class 2.1 – flammable gas (e.g., propane)	10 kg or 10 mL
Class 2.2 – non flammable gas (e.g., SF_6, CO_2)	10 kg or 10 mL
Class 2.3 – toxic gases	10 kg
Class 3 – flammable liquids	100 L
Class 4 – flammable solids	25 kg
Class 5.1 – oxidizing substances	50 kg or L
Class 5.2 – organic peroxides	1 kg or L
Class 6.1 – toxic substances	5 kg or L
Class 8 – corrosive liquid acids and caustics (e.g., battery acid)	5 kg or L
Class 9 – miscellaneous dangerous goods (e.g., friable asbestos)	1 kg or L
Waste containing dioxin	1 kg or 1 L or less if the waste poses a danger to the public safety or the environment

Table 14 (Cont'd): Reportable Spill Quantity List

Product	Quantity
Oil, 2 or more ppm PCBs, **from** in-service equipment	containing 1 g pure PCB
Oil, 2 or more ppm PCBs, **not from** in-service equipment	Any quantity
Solids, 50 or more ppm PCBs, **not from** in-service equipment	Any quantity
Oil & Waste Oil (less than 2 ppm PCBs)	100 L
Leachable toxic waste (e.g., abrasive blasting material, used antifreeze)	25 kg or L
Pesticides & Herbicides	5 kg or L
Other Substances (e.g., new antifreeze, power-wash water)	200 kg or L

Spills of or exceeding the quantities outlined in **Table 13** must first be reported to the BC Emergency Spill Reporting Line (refer to **Table 12**) as soon as possible. If the Project EM is not on-site, report the spill to the Project EM immediately after reporting to the Province of BC.

6.1.13 Fuel Management Plan

It is anticipated that fuel will be stored on-Site during Project works. The storage, handling and transfer of fuels has the potential to result in spills and adverse impacts to the quarter quality of Burrard Inlet.

The Contractor will implement fuel management practices into the SPERNP. The following requirements are to be followed at all times when handling, storing, and transferring fuel:

- All fuel management will be conducted in accordance to the Contractor SPERNP;
- Designated refueling areas will be established a minimum of 30 m away from the beach area of the Site or any catch basins along Commissioner Street:
  - Locations of designated fueling area(s) are identified in **Drawing 3 – Site Plan II**.
    - At the time of writing this CEMP, the location of designated fueling area(s) have not been determined. This drawing will be updated once this information becomes known during subsequent Project planning stages.
- Re-fuelling and/or lubricating of vehicles will be conducted on absorbent sheets/pads or within an impermeable lined basin;
- All hose connections must be wrapped with sorbent pads during refueling and drip trays utilized where appropriate;
- Hazardous materials, including Dangerous Goods as defined under the *Transportation and Dangerous Goods Act*[5] (TDGA), used during the Project will be stored and handled to avoid spills and to allow for containment and recovery of spills in accordance with all applicable legislation and regulations;

[5] *Transportation of Dangerous Goods Act* (TDGA), S.C. 1992, c. 34, last amended on August 28, 2019.

- All fuel storage tanks must be stored within industry-standard secondary containment capable of holding 110% of the storage tank contents:
  - Double-walled storage tanks and sit-in containers may be used;
  - All secondary containment must be constructed from rigid impermeable material, such as aluminum or plastic; and
  - All secondary containment vessels must be clean and in in good working order.
- Fuel containers shall be CSA or ULC approved, no more than 5 years old if made of plastic, and properly identified using WHMIS labels;
- Industry standard spill containment, capable of containing 110% of all fluids onboard must be in place under all parked equipment (e.g., trailer generators, compressors, etc.) while in operation;
- Equipment must be inspected daily upon arrival at the worksite and before departure from the Site:
  - Records of inspection will be provided to the Project EM upon request; and
  - Any vehicles/equipment found to be leaking shall not be used on the Site until it is repaired and evaluated to be in good working order.
- Fully stocked spill kits will be available on all mobile equipment and machinery;
- A large central spill kit capable of handling the largest potential spill is to be available on site and accessible at all times:
  - All on-site personnel are to be trained in spill response procedures and the use of on-site spill kits.
- A list detailing the contents of each spill kit will be kept in all spill kits;
- Personnel on site will be knowledgeable in the procedures of the Contractor's SPERNP and the measures outlined in this CEMP;
- Personnel must be adequately trained to respond to hazardous material spills and emergencies on site;
- A copy of the SPERNP will be present in the site office (or equivalent) and in each spill kit;
- Minimize the number of fuels and hazardous materials stored on site through pre-emptive scheduling; and
- The original (Materials) Safety Data Sheet (SDS) for all hazardous materials used on site will be provided to the Project EM prior to use on the Project. (M)SDSs will be kept in the site office or equivalent and updated accordingly.

6.1.14 Waste Management

Waste Management will follow the "Reduce, Reuse and Recycle" principle (i.e., where possible, contractor should apply this principle during construction activities to minimize the amount of waste generated). Potentially adverse impacts of construction waste include but are not limited to the following:

- Cross-contamination of neighbouring sites from on-site storage and handling of hazardous materials;
- Cross-contamination of non-contaminated portions of the site from storage and handling of hazardous materials;

- Local air quality impacts from waste generate fugitive dust or odours;
- Impacts to wildlife from animal consumption of waste and/or animals attracted by waste being harmed by construction activity;
- Worker safety impacts from waste debris posing safety hazards; and
- Potential vandalism from accumulated waste attracting scavengers, thieves, or vandals.

6.1.14.1 Non-Hazardous Solid Waste Management

Project personnel will be responsible for collecting, sorting, and temporarily storing non-hazardous solid waste until it can be removed from site. The following best practices will be followed by the Contractor for non-hazardous waste management:

- Maintain general site cleanliness (i.e., “good housekeeping”) by removing construction debris, garbage, and other non-hazardous solid waste materials on a regular basis;
- Remove food and/or domestic waste from the construction site on a daily basis and store in animal-resistant waste receptacles separate from construction waste;
- Do not store waste material in or adjacent to Burrard Inlet or any catch basins along Commissioner Street;
- The Contractor shall not dump and/or allow subcontractors to dump garbage or any other construction waste associated with construction of the Project;
- Regular clean-up and disposal programs should be established, as well as arrangements for disposal of construction-related wastes in a manner acceptable to the applicable government agency;
- Costs of removal and clean-up of construction waste will be the responsibility of the Contractor;
- Sanitary facilities in the form of portable toilets shall be provided and maintained by the Contractor. Sanitary facilities shall be secured so they do not fall over, and shall be located as far away as possible from the beach area of the Site or any catch basins on Commissioner Street; and
- Upon completion of construction activity, the Project site will be cleaned to the satisfaction of the Port.

6.1.14.2 Hazardous Waste Management

Hazardous Waste substances generated during construction may include, but are not limited to: surplus or waste fuels, absorbent materials used for spill containment that include more than 3% of oil, contaminated soil, soil contaminated as a result of accidental spill that contain more than 3% of oil, used oil, oil filters and lubricants, and solvents or cleaners.

The following section describes the measures for management of waste hazardous substances to be followed by the Contractor during the Project:

- The Contractor will adhere to all applicable legislation relating to handling, transportation and/or disposal of all waste materials related to this project (e.g., BC *Hazardous Waste Regulation*[6] (HWR), BC *Spill Reporting Regulation*, Canada *TDGA*, BC *Environmental Management Act*[7] [EMA]);
- All waste Hazardous Substances will be handled in accordance with WHMIS;
- Contaminated soil will be handled in accordance with the Contractor's SMP;
- Additional, material-specific procedures for handling and disposal may be required, depending on the type of hazardous waste;
- Maintain an up-to-date (Materials) Safety Data Sheet (SDS) system. Confirm the (M)SDS information is stored in a secure location that is easily accessible to construction personnel (e.g., Site office);
- Efforts will be made to minimize the storage of hazardous waste on-site. On-site storage of hazardous waste substances will be kept to the shortest possible duration;
- All hazardous waste substances will be disposed of in accordance with the BC EMA and the HWR (if applicable);
- Hazardous Substances must be segregated to avoid combining incompatible materials that would prevent maximizing recycle options; and
- Hazardous Waste Substances will be transported, with appropriate manifest documentation, and disposed off site by appropriately qualified or licensed waste transporters, and in accordance with applicable legislation/regulation. The Contractor will be responsible for distributing manifest copies to the appropriate parties (including the Port).

6.1.14.2.1 Hazardous Waste Storage

Hazardous wastes shall be stored with the following conditions as a minimum. Additional measures may be required to be undertaken by the Contractor depending on the specific type of hazardous waste:

- If necessary, hazardous waste stores on-site will be located in a designated hazardous materials storage area located a minimum of 30 m from the beach area of the Site and any catch basins along Commissioner Street. Please refer to **Drawing 3 – Site Plan II** for the location of the hazardous materials storage area:
  - At the time of writing this CEMP, the location of hazardous materials storage area(s) has not been determined. This drawing will be updated once this information becomes known during subsequent Project planning stages.
- Stored hazardous waste must be clearly marked with the corresponding type of waste and their associated hazards;
- Hazardous waste must be covered to prevent the accumulation of precipitation (e.g., rain, snow);
- Liquids shall be located in secondary containment designed to contain 110% of volume of the largest container; and

[6] *Hazardous Waste Regulation* (HWR), B.C. Reg. 63/88, includes amendments up to B.C. Reg. 243/2016, November 1, 2017.
[7] *Environmental Management Act* (EMA), B.C. Reg. 161/2020 / effective February 1, 2021.

- The hazardous waste storage areas are to be equipped with a fire extinguisher, a spill kit(s) appropriate to the type of material and amount of hazardous substances waste stored, and with posted spill response and reporting procedures.

6.1.15 Archaeological Resources

Archaeological Management describes a protocol to manage possible encounters with previously unknown or undisclosed archaeological materials during construction. The following chance find procedure will be implemented throughout the Project to manage incidental finds.

The Project includes disturbance to pre-existing fill and removal of trees and vegetation entailing soil disturbance. Vegetation removal and excavation can potentially encounter, damage, or destroy archaeological and/or other heritage resources. All workers shall review the Archaeological Chance Find Procedure prior to the start of construction.

The Port Authority may provide an updated chance find procedure for Contractors to review. All Contractor staff shall adhere to the Port Authority as the foremost authority on Archaeological matters. If additional information related to archaeology becomes available, this CEMP will be updated accordingly.

6.1.15.1 Legal Framework

All works within Port Authority jurisdiction must adhere to the following:

- *Parks Canada Agency Act* (1998);
- *Impact Assessment Act* (2019);
- Government of Canada's Archaeological Heritage Policy Framework (1990); and
- Parks Canada Guidelines for the Management of Archaeological Resources (2005).

Additionally, the Port Authority supports the requirements outlined in *Heritage Conservation Act*[8] (1998) (HCA) as best practices to use when managing potential archaeological finds.

6.1.15.2 Archaeological Chance Find Procedure

The following procedure will be implemented by the Contractor as a contingency to manage possible encounter(s) with previously unknown archaeological materials or other cultural materials.

6.1.15.2.1 Suspected Archaeological Remains

If you believe you may have encountered archaeological materials follow the procedure outlined below:

- Immediately cease/stop all activity within 20 m of the find;
- Leave all potential archaeological materials in place, do not touch or disturb, do not back fill open excavations;
- Put up a flag or cone buffer 20m around the find to protect the area until it can be assessed by an archaeologist or the port authority Project & Environmental Review (PER) representative;

[8] *Heritage Conservation Act* (HCA) [RSBC 1996] Chapter 187.

- Alert the site superintendent/supervisor that suspected archaeological materials have been located. Refer to Appendix I of this guide to help identify what the materials may be;
- Site superintendent/supervisor to notify the port authority's PER team (as stated on the respective authorization or permit) of a potential archaeological find:
  - Call the PER hotline at 604-665-9047;
  - Email the PER Team at per@portvancouver.com; and/or, if you don't; and
  - Call/email the Planning Department representative indicated on your authorization or permit.
- Await further instructions from the port authority representative, do not begin any ground disturbing work until cleared to do so by the port authority representative; and
- Prepare and submit an incident report to the port authority to assess compliance against project permit conditions and associated authorizations.

6.1.15.2.2 Suspected Human Remains

If the Contractor conducting Project activities on a port site comes upon suspected human remains, the person shall:

- Cease/stop all activity at the site immediately;
- Contact the Site superintendent/supervisor right away who will contact the local police via their non-emergency line (refer to **Table 13**);
- Stake or flag off affected location to prevent additional disturbance;
- Do not allow bystanders (including site employees) to take photographs or video of the remains;
- Confirm that the remains are treated with dignity and respect by all those at the site; and
- Cover any exposed bones with plastic sheeting, a clean garbage bin liner, blanket or other clean covering (not back fill) until the police are present. The police will contact the coroner and the coroner will make the determination if the remains are human, and, if human, if they are of forensic or archaeological concern.

6.1.15.2.3 Contact List

Please refer to **Table 15** for the contact list.

Table 15: Port Authority Contact List for Archaeology-Related Inquiries

Name	Phone	Email
Vancouver Fraser Port Authority Reception* *ask for Planning & Development Department	604-665-9000	reception@portvancouver.com
Vancouver Fraser Port Authority PER Hotline	604-665-9047	per@portvancouver.com

6.2 Mitigations for Construction Activities

6.2.1 Site Preparation

6.2.1.1 Erosion and Sediment Control

Prior to the start of construction, ESC controls will be implemented to protect water quality within Burrard Inlet during construction.

- The Contractor is responsible for having all necessary ESC on the Site prior to construction;
- The Contractor is responsible for having a back-up silt curtain on-site and ready to use;
- Prior to the start of works, the Project EM Contractor's EM and Contractor representative will overview the Site and establish locations where ESC is required; and
- The Contractor will install and implement ESC measures with consultation with the Contractor's EM and Project EM.

6.2.1.1.1 Silt Curtain

- Prior to the start of construction, the Contractor will install a silt curtain between the footprint of the rock berm and the rest of Burrard Inlet. The silt curtain is to remain in place for the Project duration:
  - The silt curtain will be, at a minimum, a Type II silt barrier of adequate specification to perform in tidal conditions;
  - The Contractor will confirm that the Project EM is contacted and on-site prior to the installation of the silt curtain;
  - Installation of the silt curtain will be monitored by the Project EM;
  - The Project EM will inspect the silt curtain after installation and must approve it as being adequate prior to works proceeding; and
  - The silt curtain must be inspected by the Project EM at the start of the workday and periodically throughout the work day during works involving dredging and work within the intertidal zone (e.g., sediment remediation, infilling).
- The Project EM will conduct routine spot-checks and due-diligence water quality monitoring to Confirm the silt curtain remains effective throughout construction (please refer to **Section 6.3.1.4)**:
  - The Project EM will serve as the primary Client point of contact for water quality and have the authority to issue stop work orders; and
  - The Project EM will take water quality samples with the Contractor EM during the initial stages of the Project and the initial stages of new in-water activities (e.g., when the Project progresses from dredging to rock berm installation).
- The Contractor EM will carry out water quality monitoring according to the specifications provided in the Contractor's WQMP (please refer to **Section 6.4.3**) and the water quality monitoring requirements outlined in **Section 6.3.1.4**:
  - The Contractor EM will have the authority to issue stop work orders; and

- The Contractor EM will comply with the Project EM's recommendations and stop-work orders.

- The Contractor will work with the Project EM to correct any deficiencies in the silt curtain's function, including complying stop-work orders;
- If the silt curtain is found to be inadequate and failing to contain sediment within the work area, the Project EM may request additional silt curtains to be installed by the Contractor:
  - The Contractor will keep on-site and use a back-up silt curtain of the same specifications in this scenario.

Please refer to **Drawing 2 – Site Plan** for the location of the silt curtain.

6.2.1.2 Vegetation and Tree Removal

It is anticipated that tree removal will take place at the southern portion of the Site. Approximately 24 small-to-medium and large black cottonwood trees will be removed, including 13 large mature trees. Additionally, approximately 15 small (under 6 m in height with a diameter of under 7 cm) cottonwood trees are anticipated to be removed by grubbing.

The Contractor must confirm the below measures are followed throughout construction:

- Contact the Project EM prior to any tree removal to determine monitoring requirements;
- Confirm the Contractor EM or Project EM are on-Site to monitor vegetation removal activities;
- Avoid tree removal during heavy precipitation;
- Confirm ESC measures are set up in consultation with the Project EM prior to any vegetation clearing or tree removal;
- Avoid tree removal within songbird and raptor nesting seasons:
  - The Raptor Breeding Season in Metro Vancouver occurs between January 5 and August 31; and
  - The general nesting season in Metro Vancouver occurs between March 15 and August 15.
- If tree removal is required during the songbird or raptor nesting seasons, a nest survey must be undertaken to locate any active nests that may be affected by the Project. Tree removal must occur a maximum of 3 days after a non-resultant nest survey;
- If tree removal requires that identified nests are moved or destroyed, a WLA or MBCA Permit may be required.
  - Contact the Project EM prior to disturbing any nests or suspected nesting areas.
- Felled trees must be stockpiled in the upland area of the Site and disposed of appropriately (to be determined with consultation with the Project EM);
- Restrict equipment access only to those areas necessary to feasibly complete Project tasks; and
- All invasive vegetation and noxious weeds must be managed in accordance with **Section 6.1.8.3.1**.

6.2.2 Dredging of Rock Berm Footprint

The footprint of the berm will be dredged prior to berm installation in order to remove a layer of liquefiable sand and provide geotechnical stability for the berm. Please refer to **Drawing 2 – Site Plan** for the dredging footprint.

The Contractor will implement the following mitigations during dredging of the rock berm footprint:

- Confirm that a silt curtain is in place prior to any dredging taking place (refer to **Section 6.2.1.1.1**);
- Conform the Project EM or Contractor EM, as well as the MMO, are present on-site to monitor all dredging activities (refer to **Section 6.3.1** and **Section 6.1.11**);
- Prior to any work in water, confirm that a fish salvage has been conducted by the Contractor QEP (refer to **Section 6.1.10**);
- All dredging must be undertaken behind the silt curtain;
- All dredging must be undertaken with water quality monitoring in place (refer to **Section 6.3.1.4**);
- Delineate the area of dredging specifically prior to dredging to minimize underwater seabed disturbance;
- Minimize dredging and loading time as much as feasible and safe;
- Confirm all barges and barge-mounted machinery are in good working condition and free of spills and leaks;
- Confirm all personnel are trained in spill prevention and response (refer to **Section 6.1.12**);
- Limit the use of barge spudding to minimize the disturbance of seabed sediment;
- Implement additional mitigation measures, adjust existing mitigation measures, and stop dredging activities as instructed by the Project EM or Contractor EM;
- Raise clamshell bucket slowly out from the water column to avoid dispersing sediment underwater;
- Grab sediment from the seabed using single grabs, avoid subsequent grabs;
- All handling of contaminated or suspect contaminated materials must be carried out in accordance with **Section 6.1.3** of the Project CEMP, the Contractor's SMP, the BC *Contaminated Sites Regulation*[9] (CSR), and the EMA;
- Dredge material loading onto barges:
  - Load dredging materials into the barge avoiding loss of sediment over barge side rails;
  - Confirm barges are lined with waterproof containment and do not leak any material or water back into Burrard Inlet; and
  - After unloading clamshell bucket, prior to moving the bucket back over water, confirm the bucket is fully empty of sediment and water.
- Stockpile materials only in locations determined in consultation with the Project EM:

[9] *Contaminated Sites Regulation* (CSR), B.C. Reg. 375/96, including amendments up to B.C. Reg. 161/2020, February 1, 2021.

- A stockpiling location for contaminated material has been identified approximately 60 m south of the beach area, with an area of approximately 1,000 m^2. Please refer to **Drawing 3 – Site Plan II** for the location of the stockpiling area; and
- Refer to **Section 6.1.2** for stockpiling requirements.

6.2.3 Rock Berm Construction

The Contractor must implement the following measures during rock berm construction:

- Confirm the Contractor EM is present on-site to monitor rock berm installation activities full time (refer to **Section 6.3.1**):
  - The Contractor EM must report all observations, findings and emerging issues to the Project EM; and
  - The Project EM will conduct periodical monitoring of in-water works at their own discretion.
- Confirm an MMO is on-site to implement the relevant mitigations if marine mammals are observed in the area (refer to **Section 6.1.11**);
- Rock berm installation must be undertaken behind the silt curtain;
- Rock berm installation must be undertaken with water quality monitoring in place (refer to **Section 6.3.1.4**);
- Confirm the material used to construct the rock berm is imported clean material free of organics, silts of fines;
- Confirm all barges and barge-mounted machinery are in good working condition and free of spills and leaks;
- Confirm all personnel are trained in spill prevention and response (refer to **Section 6.1.12**);
- Lower rocks into the berm footprint slowly to minimize disturbing seabed sediments;
- Avoid dumping large quantities of rip-rap into the rock berm footprint – place riprap in a controlled manner;
- Confirm barges carrying rock materials to the berm footprint are loaded according to weight specifications; and
- Limit the use of barge spudding to minimize the disturbance of seabed sediment.

6.2.4 Sediment remediation

Sediment remediation within the intertidal zone, behind the rock berm, is expected to take place via the following:

- Within dry areas, excavator(s) depositing excavated material into stockpiles within dry areas; and
- Within wetted areas, clamshell dredger(s) loading dredge material onto barges outside of the rock berm.

The following potential adverse effects have been identified for this activity:

- Ground disturbance within the beach area resulting in sediment-laden runoff towards Burrard Inlet;

- Burial/crushing of benthic organisms during dredging;
- Adverse effects on marine mammals, including species at risk, from noise-generating activity (e.g., dredging);
- Harm to or death of wildlife occurring on the Site; and
- Impacts to air quality, noise and vibration affecting environmental and human sensitive receptors.

The following mitigations will be implemented by the Contractor during sediment remediation:

6.2.4.1 General Mitigations

The Contractor will implement the following mitigations:

- Confirm the Contractor EM is present on-site to monitor all intertidal excavation activities, the effectiveness of ESC measures and water quality parameters:
  - The Contractor EM must report all observations, findings and emerging issues to the Project EM; and
  - The Project EM will conduct periodical monitoring of in-water works at their own discretion.
- Confirm measures to protect air quality are in place (refer to **Section 6.1.4**);
- All excavation of intertidal materials must be conducted after the silt curtain is installed;
- As much as possible, intertidal excavation will be conducted during low-tide periods;
- All handling of contaminated or suspect contaminated materials must be carried out in accordance with **Section 6.1.3** of the Project CEMP, the Contractor's SMP, the BC CSR, and the EMA;
- Confirm all ESC measures are in place prior to any ground disturbance (please refer to **Section 6.1.1** for Erosion and Sediment Control);
- All water generated from dredging and/or excavation must follow the Contractor's Dredge and Excavation Water Management Plan (**Section 6.4.4**);
- Stockpile materials only in locations determined in consultation with the Project EM:
  - A stockpiling location for contaminated material has been identified approximately 60 m south of the beach area, with an area of approximately 1,000 m^2. Please refer to **Drawing 3 – Site Plan II** for the location of the stockpiling area; and
  - Refer to **Section 6.1.2** for stockpiling requirements.

6.2.4.2 Excavation Within Dry Areas

The Contractor will implement the following mitigations:

- All disturbance within the intertidal zone must take place behind the silt curtain;
- Restrict equipment access only to those areas necessary to feasibly complete excavation;
- Confirm ESC measures are in place prior to the start of works;

- Confirm all measures to prevent spills of deleterious substances and emergency response protocols are in place;
- Confirm all vehicles are in adequate working conditions and free of leaks;
- Stop excavation immediately if wildlife (e.g., mammals) are identified on the Site; and
- Confirm excavated material with potential to contain fragments or seeds from noxious weeds is managed according to **Section 6.1.8.3.1**.

6.2.4.3 Dredging Within Wetted Areas

Materials from the wetted portion of the intertidal zone are anticipated to be excavated from a land-based barge loading dredge material onto barges for transport. The Contractor will implement the following mitigations:

- Confirm an MMO is on-site to implement the relevant mitigations if marine mammals are observed in the area (refer to **Section 6.1.11**);
- All disturbance within the intertidal zone must take place behind the silt curtain;
- Load dredging materials while avoiding loss of sediment over barge side rails;
- Confirm barges used for loading dredge material are lined with waterproof containment and do not leak any material or water back into Burrard Inlet;
- Minimize loading excavated materials from the ground onto barges as much as feasible and safe;
- Confirm all barges and barge-mounted machinery are in good working condition and free of spills and leaks; and
- Confirm all personnel are trained in spill prevention and response (refer to **Section 6.1.12**).

6.2.5 Backfilling and Grading

The Contractor will implement the following mitigations:

- All backfilling within the intertidal zone must be conducted with the silt curtain remaining installed and effective, as well as any additional ESC implemented in consultation with the Project EM and Contractor EM;
- All backfilling within the upland area of the Site must be conducted with ESC in place:
  - ESC must be installed on catch basins on Commissioner Street (refer to **Figure 1** in **Section 6.1.1.3**);
  - Follow the ESC requirements outlined in **Section 6.1.1.3**; and
  - The Project EM or Contractor EM will make recommendations for additional ESC where the risk of sedimentation and runoff to Burrard Inlet, catch basins or neighbouring properties exists.
- Conduct backfilling during low-tide periods where feasible;
- Infilling material will only be newly sourced material, do not reuse Site material for backfilling:
  - Imported fill will be free of fines, silt, and organic material; and

- If fill material is not visibly clean, it must be prewashed with water prior to being transported to the Site.

6.2.6 Habitat Offsetting

Habitat offsetting measures will be implemented as part of Project construction and will be implemented in accordance with the Habitat Offsetting Plan outlined within the Project FAA Application (Document No. 677011-0000-4EER-0003). Habitat offsetting measures include:

- Construction of two subtidal reefs; and
- Marine riparian planting along the upper limits of the newly constructed revetment.

The Contractor will adhere to the following mitigations during subtidal reef installation:

- An EM will be present on-site to monitor reef installation activities (refer to **Section 6.3.1**):
  - The Contractor EM must report all observations, findings and emerging issues to the Project EM; and
  - The Project EM will conduct periodical monitoring of in-water works at their own discretion.
- If dredging is required prior to reef installation, an MMO will be on-site to implement the relevant mitigations if marine mammals are observed in the area (refer to **Section 6.1.11**);
- Subtidal reef installation must be undertaken within the silt curtain installed prior to construction (refer to **Section 6.2.1.1.1**);
- A water quality monitoring plan must be in place during reef installation (refer to **Section 6.3.1.4**);
- The material used to construct the reefs will be imported clean material free of organics, silts of fines and be non-acid-generating (non-photoacid-generating [PAG]);
- All barges and barge-mounted machinery will be in good working condition and free of spills and leaks;
- All personnel will be trained in spill prevention and response (refer to **Section 6.1.12**);
- Rocks will be placed into the reef footprints slowly to minimize disturbing seabed sediments (i.e., not dropped from height or dumped);
- Avoid dumping large quantities of rip-rap into the reef footprints – place riprap in a controlled manner;
- Barges carrying rock materials to the reef footprint will be loaded according to weight specifications; and
- Avoid barge spudding in sensitive areas (i.e., kelp forests, shellfish beds, or eelgrass beds etc).

The Contractor will adhere to the following mitigations during riparian planting:

- All soil imported to the Site must be handled and transported in accordance with the BC EMA;
- All soil imported to the Site must meet CCME guidelines for the protection of aquatic life;
- All activities related to marine riparian planting must take place behind a silt curtain installed prior to construction (refer to **Section 6.2.1.1.1**);
- Marine riparian planting activities will be monitored by the Contractor EM, as needed;

- The Project EM will determine the need for additional ESC during offsetting implementation (E.g., additional silt fencing along the rock berm);
- All seeds used for replanting must be approved by the Port Authority prior to being used; and
- All shrubs and trees planted will adhere to the revegetation plan outlined in the FAA Application (Document No. 677011-0000-4EER-0003).

6.3 Environmental Monitoring and Reporting

6.3.1 Environmental Monitoring

This section outlines the environmental monitoring responsibilities to be undertaken by the Contractor EM and Project EM throughout the Project. The Project EM shall be responsible for oversight of all EM activities and serve as the primary point of contact for the Port. The Contractor EM will implement comprehensive environmental monitoring through the project, with the oversight, inspection, and routine spot-checking by the Project EM. All inspection results, observations and communications taking place during environmental monitoring activities will be incorporated into EM reports and submitted to the Port.

6.3.1.1 Environmental Monitoring Schedule

6.3.1.1.1 Project EM

The Project EM will be on-site periodically throughout the entire duration of the Project to conduct environmental monitoring. The Project EM will be on-site to conduct spot-checking and inspections during high-sensitivity activities or activities with a high environmental risk, as well as during climate events (e.g., heavy precipitation), and in response to any issues or concerns.

The Project EM will conduct environmental monitoring at their own discretion and as stated throughout this CEMP, with higher intensity monitoring as needed. The Project EM will conduct monitoring in the following capacity:

- Conducting surveys prior to clearing taking place during the general nesting period and Raptor Breeding Season;
- Conducting initial Site walkthrough and providing ESC recommendations to the Contractor;
- During the installation of the silt curtain;
- During initial Project stages;
- During the start of new activities;
- Periodic monitoring during in-water works;
- Periodic monitoring during works in sensitive locations (e.g., during vegetation clearing); and
- The Contractor and Contractor EM will be responsible for identifying all Project stages of high sensitivity, high environmental risk or taking place in sensitive areas and informing the Project EM prior to their initiation.

The Project EM will base their level of environmental monitoring on:

- Up to 50 hours per month, for a Project duration of nine (9) months;
- The Project EM will allot hours based on their discretion, utilizing higher intensity monitoring during high-sensitivity works and utilizing less intensity during low-risk works; and
- Based on Project requirements and the Port's discretion, the above is subject to change. If environmental monitoring requirements change, this CEMP will be updated accordingly.

6.3.1.1.2 Contractor EM

The Contractor EM will be present on-site full time for all in-water works in order to monitor for adverse effects and do conduct water quality monitoring. During Project activities of lower environmental risk (e.g., work within upland area with little environmental risk), the Contractor EM may utilize lower-intensity monitoring:

- The Contractor EM is required to notify the Project EM on their planned monitoring activities; and
- The Contractor EM is required to request approval from the Project EM when any discretion on lower-intensity monitoring (i.e., reduction of environmental monitoring) is used.

Please refer to **Table 16** for anticipated Contractor EM schedule requirements.

Table 16: Contractor EM Schedule

Stage	Activity	EM Schedule	Minimum Requirements
Site Preparation	Vegetation Clearing and Removal	Full time	› Monitoring for adverse effects.
	ESC Installation	Full time	› Monitoring for adverse effects. › ESC Recommendations to Contractor.
Dredging	Dredging of rock berm footprint	Full time	› Monitoring for adverse effects. › Monitoring of in-water works. › Water quality monitoring. › Sampling and management of dredge water. › Monitoring of dredge water discharge.
Rock Berm Construction	Rock Berm Construction	Full time	› Monitoring for adverse effects. › Monitoring of in-water works. › Water quality monitoring.

Table 16 (Cont'd): Contractor EM Schedule

Stage	Activity	EM Schedule	Minimum Requirements
Sediment remediation	Dredging of wet sediment	Full time	› Monitoring for adverse effects. › Monitoring of in-water works. › Water quality monitoring. › Sampling and management of dredge water. › Monitoring of dredge water discharge.
	Excavation of dry sediment	Full time	› Monitoring for adverse effects. › Water quality monitoring. › Sampling and management of excavated water. › Monitoring of excavation water discharge.
Backfilling and Grading	Backfilling	At discretion	› Monitoring for adverse effects. › Less intensity required during works away from water (e.g., on upland area of the Site).
	Vibro-compaction	At discretion	› Monitoring for adverse effects. › Less intensity required during works away from water (e.g., on upland area of the Site).
	Grading	At discretion	› Monitoring for adverse effects. › Less intensity required during works away from water (e.g., on upland area of the Site).
Repairs to Western Retaining Wall	Retaining Wall Repairs	At discretion	› Monitoring for adverse effects. Where the repairs take place in water: › Monitoring of in-water works › Water quality monitoring

6.3.1.2 Environmental Orientation

On the first day of works, prior to the start of works, the Project EM will conduct an environmental orientation for all on-site crews to communicate the workplan and necessary mitigation measures outlined in this CEMP. The environmental orientation will be documented to confirm that all Contractor personnel undertaking works on-site have undergone the orientation. Personnel in attendance of the environmental orientation, their acknowledgement of the training and their signatures will be documented (please refer to **Section 6.3.2.2**).

Additional environmental orientations are required as new Contractor crew members join the on-site team throughout the duration of the Project. No Contractor personnel may proceed to work on the Site without receiving an environmental orientation from the Project EM, unless otherwise authorized by the Port.

6.3.1.3 On-site Construction Monitoring and Inspection

6.3.1.3.1 Contractor EM

The Contractor EM will be responsible for monitoring of construction activities taking place on-site, including the following:

- Monitoring of all Project activities:
  - The Contractor EM may determine that full-time monitoring is not required on days with low-risk activities (e.g., limited works not involving ground disturbance within the upland area of the Site):
    - Such determinations must be approved by Project EM; and
    - The Project EM will communicate with the Contractor on construction progress and schedule in order to determine any days where such determinations can be made.
- The Contractor EM will inspect, at a minimum:
  - Equipment inspections and daily Contractor inspection logs;
  - General worksite housekeeping;
  - The presence of spill kits and their contents;
  - Environmental Management Plan and Permit being present on site;
  - Outstanding incidents or non-conformances;
  - The effectiveness and maintenance of ESC controls in place;
  - Compliance with permits and applicable environmental legislation, including:
    - FAA permit conditions;
    - PER permit conditions;
  - Water Quality Monitoring;
  - Visual survey for marine wildlife including fish, birds, and mammals;
  - If vegetation clearing and tree removal are to take place during the songbird and/or raptor nesting seasons (Please refer to **Section 3.3** for the applicable nesting season periods):
    - If the Contractor EM is qualified, they will conduct a pre-clearing songbird and raptor nest survey within three (3) days of vegetation impacts (Please refer to **Section 6.2.1.2**);
    - If the Contractor EM is not qualified to do so, they must contact the Project EM to arrange a survey within the appropriate time; and
    - Full-time monitoring of vegetation removal activities by the Contractor EM.

6.3.1.3.2 Project EM

The Project EM will have the same inspection requirements as the Contractor EM, to be conducted at the Project EM's schedule and discretion. The Project EM will undertake the following additional inspection requirements:

- The Project EM will conduct routine inspections, spot-checks and verification of the Contractor's environmental monitoring program for the following:

- Water quality monitoring (refer to **Section 6.3.1.4**):
  - The Project EM will be present during the initial stages of water quality monitoring in order to confirm and verify the effectiveness of the Contractor's implementation of the WQMP; and
  - The Project EM will conduct verification sampling of water quality parameters, including spot-checking turbidity readings and analytical sampling for contaminants of concern.

- EM recommendations:
  - The Project EM will inspect the construction site for any instances of non-compliance with this CEMP, the Contractor's EPPs and component plans, contract specifications and environmental best-practices; and
  - The Project EM will verify that the Contractor EM has issued the necessary corrective and preventative actions to the Contractor, where necessary (e.g., additional ESC where needed).

- Soil/sediment and dredge/excavated water management:
  - The Project EM will spot-check the Contractor's implementation of the SMP and DEWMP in order to verify sampling results and regulatory compliance.

- EM Reporting (refer to **Section 6.3.2**):
  - The Project EM will review all reporting documentation from the Contractor EM, including daily inspection notes, weekly EM reports, records of recommendations, analytical sampling results and water quality sampling results.

6.3.1.4 Water Quality Monitoring

6.3.1.4.1 Contractor EM

Water quality will be monitored by the Contractor EM throughout the entire Project and outlined in the Contractor's Water Quality Management Plan (please refer to **Section 6.4.3**).

Water quality monitoring will be conducted with a hand-held YSI ProDSS (or equivalent) meter to monitor the following parameters:

- Turbidity measured in Nephelometric Turbidity Units (NTU); and
- Turbidity monitoring must follow BC Approved Water Quality guidelines for Freshwater Aquatic Life (**Table 17**).

Table 17: BC Approved Water Quality Guidelines (WQG) – Fresh Water Aquatic Life

Parameter	Criteria
Turbidity (NTU)	› Change from background of 8 NTU at any one time for duration of 24 hours in all waters during clear flows or in clear waters. › Change from background of 2 NTU at any one time for duration of 30 days in all waters during clear flows or in clear waters. › Change from background of 5 NTU at any time when background is 8 50 NTU during high flow or in turbid waters. › Change from background of 10% when background is greater than 50 NTU at any time during high flows or in turbid waters.

Analytical sampling will be conducted in order to screen water quality for contaminants of concern, including:

- Heavy metals;
- PAHs; and
- PCBs.

The Contractor is responsible for outlining specific parameters and regulatory thresholds as part of the WQMP and DEWMP (please refer to **Section 6.4**).

The following water quality monitoring plan will be implemented:

- The Contractor EM will utilize a number of water quality sampling stations to provide a representative water quality monitoring program to be implemented into the Contractor WQMP (please refer **Table 18**).

Table 18: Contractor EM Water Quality Sampling Requirements

Sampling Location[1]	Description[1]	Sampling Depths	Sampling Frequency	Schedule
Up-current far-field	100 m up-current of the silt curtain	**Turbidity:** Each location will be sampled at the following depths during each instance of sampling: › One (1) sample from surface › One (1) sample mid-depth between surface and seabed › One (1) sample at seabed level **Analytical:** › Between surface and seabed, OR › From depths of visible plumes, OR › As instructed by Project EM	**Turbidity:** › Hourly sampling during the first week of in-water works. › Hourly sampling at the start of new activities (e.g., when the Project progresses from initial dredging to rock berm installation), until instructed to reduce frequency by the Project EM. › A minimum of four (4) samples per day during in-water works, when instructed to lower intensity by the Project EM. › A minimum of four (4) samples per day during intertidal works outside of water. › A minimum of two (2) samples per day during upland works. **Analytical:** Two (2) samples per day during in-water works from: › Two (2) stations chosen at random, OR › Locations of visible plumes; OR › Where instructed by the Project EM All sampling frequency may be modified by the Project EM based on Site conditions and ongoing activities.	For the entire duration of construction and at the discretion of the Project EM. › The Project EM may determine that water quality monitoring is not required on days of low-risk activities (e.g., limited works within the upland area of the Site). Such determinations are fully within the discretion of the Project EM.
Up-current mid-field	25 m up-current of the silt curtain			
Up-current near-field	5 m up-current of the silt curtain			
Downcurrent near-field	5 m down-current of the silt curtain			
Downcurrent mid-field	25 m down-current of the silt curtain			
Downcurrent far-field	100 m down-current of the silt curtain			
Within silt curtain	Within 5 m of the interior of the silt curtain, on the down-current side			

[1] The direction of up-current and down-current sampling stations will change based on tidal activity. During lowering of tide, current in Burrard Inlet runs east to west and, during rising tide, current runs west to east.

- Please refer to **Drawing 3 – Site Plan II** for the locations of the water quality monitoring sampling:
  - At the time of writing this CEMP, exact water quality monitoring locations have not been specified. This drawing will be updated once Project EM water quality monitoring specifications have been determined.
- Samples may be taken during any construction activity at a frequency determined necessary by the Project EM, depending on the nature of construction activity and Site conditions; and
- Samples will be collected from three (3) depths during each instance of sampling at each location: at surface level, between the surface and seabed and at the seabed.

In the event that water quality parameters exceed the guidelines provided in **Table 17** or the Contractor's WQMP are exceeded, or visual indicators of exceedances are observed (e.g., plume of turbidity originating from the work area or observed spill into Burrard inlet), the following measures will be implemented:

- The Contractor EM will immediately inform the Contractor;
- The Contractor EM may issue a stop-work order depending on the nature of the exceedance;
- The Contractor EM will notify the Project EM;
- The Contractor EM will work with the contractor to identify the source of the exceedance and implement additional mitigation measures or adjust existing measures;
- The Contractor EM will document the occurrence;
- If a stop-work order was issued, the Contractor EM will confirm that newly installed and/or modified mitigations appear adequate to prevent further exceedance prior to resuming of work; and
- The Contractor EM will follow environmental incident reporting procedures outlined in **Section 6.3.2.6**.

6.3.1.5 Stop-work Order

The Project EM and Contractor EM will be responsible for issuing stop-work orders during construction, if necessary, to minimize controllable environmental harm and reduce the potential for environmental incidents during Project works. Stop-work orders will be issued when ongoing construction activities are observed to be causing or to have the potential to cause an environmental incident.

Stop-work orders may be issued by the Project EM and Contractor EM during events that include, but not limited to, the following:

- Spills of fuel or other hazardous materials;
- Release of deleterious substances into water;
- Unauthorized death of fish by means other than fishing;
- Unauthorized harm or death of wildlife;
- Entry of a species at risk into the Site;
- Unauthorized harmful alteration, disruption, or destruction of habitat; and
- Non-compliance with this CEMP, permit, and approval conditions and/or the Port's environmental policies.

The following stop-work order procedure will be followed for the Project:

- If construction activities or Site conditions are observed to cause or to have the potential to cause an environmental incident are observed, the Project EM and Contractor EM will immediately notify the Contractor and request that work activity is stopped;
- The Project EM and Contractor EM will follow the emergency communication and response procedure outlined in **Section 6.1.12**;
- The Project EM and Contractor EM will work with the contractor to implement additional mitigation measures or adjust existing measures to prevent the risk of the environmental incident recurring;
- The Project EM and Contractor EM will confirm that newly installed and/or modified mitigations appear adequate prior to resuming of work; and
- The Project EM and Contractor EM will proceed to fill out an environmental incident report (please refer to **Section 6.3.2.6**).

Please refer to **Section 6.3.2** below for EM reporting and communication requirements.

6.3.2 Environmental Monitoring Reporting and Communication

The Project EM and Contractor EM will provide documentation and reporting of all environmental activities to the Port. All environmental monitoring reporting must be presented to the Port in a timely manner, as per the monitoring periods agreed upon during construction kick-off. The following reporting will be undertaken by the Contractor EM:

- Weekly EM Reporting;
- Post-Construction Completion Reporting; and
- Environmental Incident Reporting.

The following reporting will be undertaken by the Project EM:

- Pre-Construction Reporting;
- Environmental Orientation Document;
- Weekly EM Reporting;
- Post-Construction Completion Reporting;
- Environmental Incident Reporting; and
- General Communication.

Environmental reporting responsibilities on behalf of the Project EM and Contractor EM are described below.

6.3.2.1 Pre-Construction Reporting

A pre-construction EM visit will be conducted by the Project EM 14 days prior to the start of construction and a pre-construction EM report will be produced, containing the following:

- Baseline conditions at the Site immediately prior to construction;

- Recommendations for additional surveys and/or studies, if any, based on observed Site conditions and scheduling of proposed works; and
- Confirmation of proposed ESC measures needed for the Project, including any additional mitigations needed based on observed Site conditions.

The pre-construction EM report will be submitted to the Port a minimum of seven (7) days prior to the start of construction.

6.3.2.2 Environmental Orientation Document

On the first day of works, prior to the start of works, the Project EM will conduct an environmental orientation for all on-site crews to communicate the workplan and necessary mitigation measures outlined in this CEMP. The environmental orientation document will contain the following at the time it is submitted to the Port:

- An overview of mitigation measures discussed with those in attendance;
- Any environmental issues or concerns raised by those in attendance and recommendations/mitigations provided by the Project EM;
- The date of the orientation; and
- The names and signatures of all crew members in attendance.

The environmental orientation document will be submitted to the Port within 48 hours of the delivery of the environmental orientation. Additional environmental orientations may be necessary as new Contractor crew members join the on-site team throughout the duration of the Project, in which case additional environmental orientation documents will be provided to the Port Authority.

6.3.2.3 Daily EM Field Notes

During each day environmental monitoring, the Project EM and Contractor EM will keep detailed field notes, which will contain the following:

- Description, including photographic documentation, of construction and environmental monitoring activities occurring during the EM visit;
- Any environmental issues observed by the Project EM, mitigation measures recommended by the Project EM and the status of their implementation;
- Any parameter testing results from in situ testing on-site, if applicable;
- An overview of the day's activities and their compliance with the CEMP, permit conditions and environmental best practices; and
- Any instances of non-compliance with the CEMP, permit conditions and environmental best practices.

Daily EM field notes will be submitted to the Port upon request.

6.3.2.4 Weekly EM Reporting

After each seven (7) day period of construction activities (reporting period), the Project EM and Contractor EM will compose a weekly EM report, which will contain the following:

- Description, including photographic documentation, of construction and environmental monitoring activities occurring during the reporting period;
- The results of any surveys, fish salvaging or emerging assessment activities;
- Any environmental issues observed, mitigation measures recommended and the status of their implementation during the reporting period;
- Any parameter testing results from in situ testing on-site, if applicable, taken during the reporting period;
- An overview of the week's activities and their compliance with the CEMP, permit conditions and environmental best practices;
- Any instances of non-compliance with the CEMP, permit conditions and environmental best practices observed during the week; and
- An overall comment on the week of work in relation to environmental issues, compliance, and consideration.

The weekly EM report will be submitted to the Port within five (5) days of the end of each reporting period.

6.3.2.5 Post-Construction Completion Reporting

The Project EM will complete post-construction completion reporting will include the following:

- A comprehensive summary, including timelines and photographic documentation, of all Project construction and environmental monitoring activities undertaken;
- A summary of any environmental incidents encountered during the work period;
- A list of mitigations measures implemented throughout the Project and their observed effectiveness;
- Confirmation that all deficiencies, environmental incidents, and near-miss events observed during the Project have been rectified and mitigated;
- Confirmation that all disturbed portions of the Site or adjacent properties have been stabilized as necessary (e.g., disturbed soil seeded, disturbed surfaces fully infilled and compacted) before work crews demobilized from the Site; and
- A summary of relevant permits and approvals and their conditions, and a description of how construction activity met and/or was mitigated to meet those conditions.

The post-construction completion report will be submitted to the Port within thirty (30) days after all on-site work, including post-construction stabilization (where required), has been completed. A separate Confirmation of Remediation Report will be provided to the Port Authority to summarize the results of sediment remediation (refer to **Section 7**).

6.3.2.6 Environmental Incident Reporting

In the event of an environmental incident (e.g., spill of deleterious substances, escape of Site sediment into Burrard Inlet, unauthorized harm to wildlife habitat, etc.) or near-miss event (conditions or an event at the Site nearly resulting in an environmental incident), the Project EM and Contractor EM will prepare an environmental incident report to the Port. Each environmental incident report will contain the following:

- Photo documentation;
- Written documentation of the following:
  - The cause and nature of the incident;
  - The parameters and environmental resources affected by the incident (e.g., the deleterious substances involved and their impact on measured water quality parameters);
  - The magnitude and duration of the incident, including quantities;
  - The location and/or habitat affected by the incident;
  - Results of analytical sampling related to the incident, if applicable;
  - An overview of the relevant mitigations that were in place prior to the incident;
  - Corrective actions recommended and taken to mitigate the incident;
  - An overview of communications with project personnel and third parties relating to the incident;
  - Any communication undertaken with regulatory agencies; and
  - Comment on the status of the incident, whether it has been resolved or if effective resolution is pending.

Environmental incident reports will be submitted to the Port within 48 hours (5) business days of an environmental incident or near-miss event occurring:

- Spills with regulatory reporting requirements will be reported to the Port within a maximum of 48 hours.

6.3.2.7 General Communication

The Project EM will be responsible for communication with the Port, the Contractor, Contractor EM, and regulatory agencies in the following capacity:

- Provision of updates on the effectiveness of implemented mitigation measures;
- Communication of environmental concerns and environmental incidents via EM reports and incident reporting;
- Organization and documenting of on-site environmental meetings;
- Response to environmental concerns on behalf of the Port and regulatory agencies; and
- Acting as the primary point of contact for environmental incidents and inquiries for the Contractor.

6.4 Environmental Protection Plans and Component Plans

The Contractor is responsible for developing EPPs in order to address site- and activity-specific environmental risks associated with the Project. The Contractor is responsible for developing the following EPPs and component plans for the Project:

Table 19: EPPs and Component Plans to be Developed by the Contractor

Plan	Description
Environmental Protection Plans	
Soil/Substrate Management Plan	For management and disposal of excavated and dredged materials.
Spill Prevention and Emergency Response Plan	For identification of risks and procedures associated with prevention of and response to spills of deleterious substances and hazardous materials.
Water Quality Management Plan	For water quality monitoring undertaken by the Contractor EM.
Water Management Plan	For management and disposal of contaminated and non-contaminated water generated during the Project
Component Plans	
Fish Salvaging Plan	For fish salvaging activities to be undertaken by a QEP prior to construction.
Invasive Vegetation Management Plan	For management, removal, and disposal of invasive plants on the Site.

The Contractor is responsible for:

- Ensuring that all EPPs and component plans are reviewed and approved by the Port prior to implementation:
  - the Port may delegate review and approval of EPPs to SNC-Lavalin, where appropriate.
- Ensuring all on-site staff have reviewed and are knowledgeable of EPP procedures prior to the start of the Project.

The following subsections provide requirements and references for the EPPs and component plans to be developed and implemented by the Contractor.

6.4.1 Soil/Substrate Management Plan (SMP)

The SMP will address all excavated material, including dredged materials. The purpose of the SMP is to identify procedures related to the handling and transportation of all excavated and dredged materials, including those excavated from the dry portions of the intertidal zone and those excavated or dredged from the wet portions of the intertidal and subtidal zones. The SMP will provide measures to minimize the spread of potential contaminants of concern (PCOCs) from the handling, storage, and transportation of excavated and dredged materials.

The SMP must outline procedures that are in full adherence to the following:

- BC Environmental Management Act;
- BC Contaminated Sites Regulation;
- Federal Environmental Protection Act;
- Any other applicable legislation; and
- Relevant Best Management Practices (BMPs).

The SMP must include the following general information, at a minimum:

- Regulatory framework for handling, transportation and disposal of all excavated materials being moved off-site, including:
  - Identification of regulatory parameters;
  - Field screening methodology;
  - Confirmatory sampling plan;
  - Identification of permitted disposal facility that will receive excavated material; and
  - Outline of proposed tracking and record keeping, including submission of manifest forms.
- Background understanding of Site conditions (e.g., PCOCs, existing analytical results, figures);
- Stockpile management, including:
  - Stockpile locations (indicated in drawings);
  - Stockpile sampling procedures; and
  - Stockpile containment measures.
- Measures to prevent the spread of PCOCs from excavated material;
- Disposal plan for all excavated materials being moved off-site;
- Volumes and truckloads of material expected to be generated;
- Procedure for loading and offloading site material;
- Emergency response procedures; and
- Backfilling procedure, including:
  - Anticipated volumes and truckloads of backfill material;
  - Identification of source of backfill material; and
  - Confirmation procedure for verifying that imported fill material is non-contaminated.

The SMP must include the following in relation to excavation:

- Methodology of excavation including equipment used;
- If required, procedure for separating excavated solids from water (e.g., if excavator used in wetted sediment);

- Permitted disposal facility that will receive excavated material;
- Procedure for transporting excavated material to permitted facility; and
- Procedure for analytical sampling required.

The SMP must include the following in relation to dredging:

- Dredging methodology, including equipment to be used;
- Containment plan for dredge material and water on barges;
- Procedure for offloading dredge material and water from barges onto the Site and/or hotloading to disposal facility;
- Procedure for separating dredge solids from water;
- Permitted disposal facility that will receive dredge material from the Site or hotloaded dredge material;
- Procedure for transporting dredge material to permitted facility; and
- Procedure for analytical sampling required.

6.4.2 Spill Prevention and Emergency Response and Notification Plan (SPERNP)

The Contractor will develop and implement a plan to prevent spills of hazardous and deleterious substances during the Project, as well as a spill response and notification procedure. The SPERNP must follow the requirements outlined in **Section 6.1.12** and include fuel management as outlined in **Section 6.1.13** and waste management as outlined in **Section 6.1.14**.

6.4.3 Water Quality Management Plan (WQMP)

The Contractor will be responsible for conducting water quality monitoring throughout the Project to prevent water quality impacts within Burrard Inlet. The Contractor will provide a Contractor EM to carry out water quality monitoring duties as outlined in **Section 6.3.1.4**. Prior to the start of works, a WQMP will be prepared by the Contractor and include the following information:

- Identification of relevant analytical parameters (e.g., total suspended solids, turbidity, PCOCs);
- Identification of Contractor EM responsibilities relating to water quality monitoring;
- Water quality monitoring plan, including:
  - Frequency of water quality sampling at various project stages;
  - Location of water quality sampling locations;
  - Procedures for field screening and analytical testing;
  - Response procedures for regulatory threshold exceedances; and
  - Water quality monitoring reporting procedure.

The Project EM will conduct quality assurance sampling concurrent to water quality monitoring undertaken by the Contractor EM.

6.4.4 Dredge and Excavation Water Management Plan (DEWMP)

It is anticipated that water will be generated during excavation and dredging, requiring dewatering and management of the resultant water. The Contractor will develop a plan for the management of all water resulting from the Project. The DEWMP must include the following information:

- Dewatering plan for excavated/dredged material;
- Identification of on-site settlement tanks and/or basins;
- Identification of discharge locations in Burrard Inlet;
- Anticipated volumes of water to be discharged;
- Anticipated rates of discharge;
- Anticipated volumes of water to be disposed off site;
- Regulatory thresholds to be met prior to discharging water into Burrard Inlet;
- Disposal plan for water exceeding regulatory parameters;
- The facility to which contaminated water will be transported; and
- Transport plan for water taken off-site for disposal.

6.4.4.1 General DEWMP Requirements

The following general requirements will be followed throughout the Project and must be incorporated into the Contractor's DEWMP:

- During dredging, dredge operators will hold filled clamshell bucket over water for between 60-120 seconds to minimize the amount of water being loaded onto barges;
- All barges used for loading of dredge material will be lined with waterproof containment;
- Water resulting from dredging material **must not be discharged to Burrard Inlet prior to analytical testing**; and
- The Contractor must implement mitigation measures to minimize the risk of spills or cross-contamination during water management.

6.4.4.2 Dewatering

The Contractor is responsible for outlining a dewatering procedure for dredged and/or excavated material in the DEWMP, including:

- Methods of dewatering (e.g., on-site tanks or basins);
- Locations of on-site dewatering; and
- Protection of dewatering locations (e.g., covering of basins to protect from precipitation, restricting crew access around basins).

6.4.4.3 Analytical Testing

The Contractor is responsible for analytical testing of all Project water resulting from dredging and/or excavation. The Contractor will implement the following measures throughout the Project and incorporate them into the DEWMP:

- All dredged water must be analytically tested against relevant CCME Guidelines for Protection of Aquatic Life (WQG_{AL});
- All analytical results must be provided to the Port and the Project EM;
- The Contractor will outline an analytical sampling plan as part of the DEWMP, including the following:
  - Specific WQG_{AL} parameters and thresholds to be used during testing;
  - Timelines and frequencies of analytical testing:
    - All water resulting from dredging must be analytically tested to the parameters identified in the DEWMP; and
    - The Contractor may include considerations for changing the frequency of sampling if Project water consistently tests as non-contaminated – this determination may only be made with the approval of the Project EM.
  - The analytical laboratory that will process Site samples;
  - The procedure used for recording and reporting of daily results to the Project EM and the Port.
- All dredged water must be securely contained on barges or transferred into on-site industry standard containment tanks as the water awaits analytical results;
  - Isolated water on barges or within tanks must not be mixed with any other water as it awaits results; and
  - Water not meeting CCME guidelines as per the Contractor's identified parameters must not be discharged into Burrard Inlet and must undergo on-site treatment or disposed of appropriately off site.
- The Contractor will outline a water treatment plan for water not meeting identified WQG_{AL} guidelines, including:
  - Identification of on-site water treatment locations;
  - Identification of on-site water treatment methods; and
  - Protocols for confirmatory analytical testing to confirm treated water meets identified parameters.
- Water in quantities and volumes exceeding that which can be reasonably treated on-site can be shipped off-Site to a permitted disposal facility. All disposal facilities must be arranged by the Contractor prior to the start of construction.

6.4.4.4 Discharging

The Contractor is responsible to adhering to and implementing the following requirements into the DEWMP:

- Water meeting WQG_{AL} guidelines may be discharged into Burrard Inlet. The Contractor will:
  - Identify the exact location of discharge;
  - Identify specifications of discharge, including methods and rate of flow; and
  - Identify techniques to discharge water in a way that causes the least amount of disturbance to sediments (e.g., measures to reduce the maximum rate of flow).
- The Contractor will confirm that water resulting from dredging is:
  - Analytically tested to meet CCME guidelines for aquatic life prior to being discharged; and
  - Not a 'deleterious substance' as defined by the *Fisheries Act*[10] (FA).
- The Contractor will confirm that all discharging activity is approved by the Port and the Project EM prior to proceeding; and
- The Contractor will confirm that all discharging activity is monitored by the Project EM.

6.4.4.4.1 Discharging into Municipal Sanitary Sewer

Alternatively, discharging of Project water may potentially occur into the City of Vancouver's municipal sanitary sewer. In order to utilize this option, a Waste Discharge Permit or Groundwater Remediation and Construction Excavation Sties is required under the City of Vancouver *Sewer and Watercourse Bylaw No. 8093* and the Greater Vancouver Sewerage and Drainage District (GVS&DD) *Sewer Use Bylaw No. 299, 2007*.

This permit application requires a detailed plan identifying water treatment, estimated flow rates and volumes, proposed discharge timelines, spill response procedures and other information. Upon review and approval of the permit, the City of Vancouver's Environmental Protection department will provide specific water quality parameters that are to be met prior to discharging Project water into the municipal sanitary sewer system.

If the Contractor plans to utilize this option for discharge, the Contractor is responsible for ensuring all plans, documents and contingencies are in place in order to satisfy the requirements of the application. Specific details can be found on the City of Vancouver's Website: https://vancouver.ca/home-property-development/wastewater-discharge-permit-for-construction-at-contaminated-sites.aspx

6.4.5 Fish Salvaging Plan

Fish salvaging will be conducted prior to in-water works. The Contractor will be responsible for developing a fish salvaging plan and obtaining the associated permits. A License to Fish for Scientific, Experimental or Educational Purposes in Marine Waters (DFO scientific license) is anticipated to be required for these activities.

The Fish Salvaging Plan may involve the following:

- Fish could be planned to be salvaged from the work area via seine net; and

[10] *Fisheries Act* (FA), RSC 1985, c.F-14, last amended on August 28, 2019.

- Large crustaceans could be planned to be salvaged from the work area via trapping.

The Contractor is responsible for:

- Applying for and acquiring the DFO scientific license prior to fish salvaging activities;
- Developing a Fish Salvaging Plan;
- Retaining a QEP in order to implement the Fish Salvaging Plan and carry out fish salvaging activities in full adherence to the conditions of the DFO scientific license;
- Ensuring that the Fish Salvaging Plan is submitted to the Port for review a minimum of 30 days prior to the start of construction:
  - the Port may opt to have the Fish Salvaging Plan reviewed by SNC-Lavalin, if appropriate, at their discretion.
- Implementing any edits requested on behalf of the reviewer to address deficiencies;
- Ensuring that the Fish Salvaging Plan is fully approved to the satisfaction of the Port prior to the start of construction; and
- Carrying out fish salvaging activities a maximum of seven (7) days prior to the start of works.

An application for a License to Fish for Scientific, Experimental or Educational Purposes in Marine Waters may require approximately three (3) months to be reviewed and approved by DFO and may therefore impact Project schedule. The Contractor is responsible for submitting the application in a timely manner to confirm fish salvaging and construction activities can proceed as per the planned timeline (please refer to **Section 3.3** for Project schedule).

6.4.6 Invasive Vegetation Management Plan

The Contractor will develop and implement an Invasive Vegetation Management Plan for the Project in order to control, remove and dispose of invasive plants, including noxious weeds, located on the Site. The Contractor will confirm that the Vegetation Management Plan is developed in adherence to the requirements outlined in **Section 6.1.8.3.1**.

7 Post-Remediation Confirmatory Sampling

After Project completion, post-remediation confirmatory sampling will be undertaken by SNC-Lavalin in order to demonstrate that the water quality has improved to meet applicable provincial and/or federal numerical standards and guidelines, or are at an acceptable level that results in sufficient attenuation of porewater discharge at the foreshore to be considered protective of ecological receptors from chronic toxicity.

A Draft Post-Remediation Confirmatory Sampling Plan has been developed by SNC-Lavalin (please refer to **Appendix I**). It is recommended that three rounds of sampling, collected seasonally, are implemented after construction completion within the intertidal and subtidal areas of the newly constructed Site.

7.1 Confirmation of Remediation Sampling

SNC-Lavalin will collect confirmatory samples with the assistance of the contractor, from the final limits of remediation. The samples will be analyzed by an independent laboratory to confirm if constituent concentrations greater than the remedial targets remain present. The confirmatory sampling will be limited to pre-established locations where previous investigations did not 'delineate' the contamination, or areas where significant sediment resuspension were observed to occur. A location plan of the proposed confirmatory samples for the intertidal and subtidal areas is included in Dwg. No. 508211-604 in **Appendix I**. The sampling plan describes how remediation confirmation sampling will be conducted; i.e., sampling density and locations, chemical analyses; and contingency for further removal.

7.2 Post Remedial Performance Monitoring

Post remedial performance monitoring of groundwater within the infilled intertidal area and porewater from the newly formed intertidal area (i.e., the north face of the rock berm seawall) will be required. The monitoring results will be used to demonstrate that the water quality has improved to meet applicable provincial/federal numerical standards and guidelines or to an acceptable level that results in sufficient attenuation of porewater discharge at the foreshore to be considered protective of ecological receptors from chronic toxicity. Three rounds of sampling, collected seasonally, are recommended as the initial sampling program.

8 Habitat Offsetting

After Project completion, a Habitat Offsetting Plan will be implemented for the Project. The Habitat offsetting plan is presented in the *Fisheries Act* Authorization Application (Document No. 677011-0000-4EER-0003). The Habitat Offsetting Plan has been prepared and will be implemented as part of permit application under the federal *Fisheries Act* and the Port Authority's PER process. Habitat offsetting will follow guidelines from Fisheries and Oceans Canada (DFO) and input from the Port in order to create new fish habitat off-Site, to compensate for fish habitat lost as a result of the Project as well as riparian vegetation loss resulting from the Project.

The DFO provides guidance on offsetting to support FAAs via the *Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the Fisheries Act* (DFO, 2019b). This guidance document was updated in December 2019 to reflect recent changes to the *Fisheries Act* and is intended to provide guidance on undertaking effective measures to offset the death of fish and HADD, consistent with the fish and fish habitat protection provisions of the *Fisheries Act*.

Habitat offsetting will take place on-site in the form of Habitat Restoration and Enhancement (DFO, 2019b). The Habitat Offsetting Plan includes specific offsetting measures, their specifications, and their methodology of implementation. In addition, a comprehensive monitoring program has been developed and will be implemented in order to manage the inherent uncertainties associated with habitat restoration and establishment.

Mitigation measures to be followed by the Contractor during the implementation of habitat offsetting measures are outlined in **Section 6.2.6**.

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Drawings

- Drawing 1 – Location Plan
- Drawing 2 – Site Plan
- Drawing 3 – Site Plan II

Legend

- Site Location
- Site Boundary (Approximate)

REFERENCES:

1. Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

NOTES:

1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.
4. Site boundary is approximate and may be subject to change.

REVISIONS:

0 - AM - 2021-04-01 - DRAFT - BL

0 25 50 100 150 200 Metres

PORT of vancouver | Vancouver Fraser Port Authority

CLIENT: Vancouver-Fraser Port Authority

PROJECT LOCATION: Former Sterling Shipyard Site, Vancouver, BC

SNC·LAVALIN

Site Location

BY:	SCALE:	DATE:	REF No:	REV:
AM	1:5,000	2021-04-01	677011-001	0
CHK'D: BL	Proj Coord Sys: NAD 1983 UTM Zone 10N			

MXD Path: \\Sli2606\projects\Current Projects\VFPA\677011 Sterling Shipyard R&R\40_Execution\45_GIS_Dwgs\GIS\Mxds\CEMP\677011-001-SiteLocation.mxd

Project Path: P:\Current Projects\VFPA\677011 Sterling Shipyard R&R\40_Execution\45_GIS_Dwgs\Exports

Legend

- Site Boundary (Approximate)
- Rock Berm
- Intertidal Excavation Area
- Infilling Area
- Dredging Footprint
- Silt Curtain
- West Retaining Wall
- Catch Basin

REFERENCES:

1. Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NOTES:
1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.
4. Site boundary is approximate and may be subject to change.

REVISIONS:
0 - AM - 2021-04-01 - DRAFT - BL

0 12.5 25 50 Metres

PORT of vancouver | Vancouver Fraser Port Authority

CLIENT: Vancouver-Fraser Port Authority

PROJECT LOCATION: Former Sterling Shipyard Site, Vancouver, BC

SNC·LAVALIN

Site Plan

BY: AM	SCALE: 1:1,500	DATE: 2021-04-01	REF No: 677011-002	REV: 0
CHK'D: BL	Proj Coord Sys: NAD 1983 UTM Zone 10N			

MXD Path: \\Sli2606\projects\Current Projects\VFPA\677011 Sterling Shipyard R&R\40_Execution\45_GIS_Dwgs\GIS\Mxds\CEMP\677011-002-SitePlan.mxd

Project Path: P:\Current Projects\VFPA\677011 Sterling Shipyard R&R\40_Execution\45_GIS_Dwgs\Exports

Legend

- Site Boundary (Approximate)
- Rock Berm
- Contaminated Material Stockpiling Area
- Dredging Footprint
- Intertidal Excavation Area
- Infilling Area
- Site Access Ramp (Unpaved)
- Vegetation/Tree Removal
- Silt Curtain
- West Retaining Wall
- Artificial Nesting Platform (Lafarge)
- Catch Basin

REFERENCES:

1. Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NOTES:
1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.
4. Site boundary is approximate and may be subject to change.
5. Laydown areas, site access points, spill kit locations, locations of water quality sampling, refueling areas, fuel storage areas, hazardous material storage areas are to be determined and will be included in a later revision.

REVISIONS:
0 - AM - 2021-04-01 - DRAFT - BL

0 12.5 25 50 Metres

PORT of vancouver | Vancouver Fraser Port Authority

CLIENT: Vancouver-Fraser Port Authority

PROJECT LOCATION: Former Sterling Shipyard Site, Vancouver, BC

SNC·LAVALIN

Potential Contaminated Material Stockpiling Area

BY:	SCALE:	DATE:	REF No:	REV:
AM	1:1,500	2021-05-28	677011-003	0
CHK'D: BL	Proj Coord Sys: NAD 1983 UTM Zone 10N			

Project Path: P:\Current Projects\VFPA\677011 Sterling Shipyard R&R\40_Execution\45_GIS_Dwgs\Exports

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Appendix I

Draft Confirmatory Sampling Plan

CONFIRMATORY SAMPLE NOTES

The following notes pertain to the current intertidal and subtidal areas proposed for excavation and dredging.

1. **CONFIRMATORY STANDARDS/GUIDELINES**
   a) Regulatory Standards/Guidelines Definitions:
      i. CSR IL standards: BC Contaminated Sites Regulation Industrial Land Use Standards for Soil. Pathways applied to CSR IL standards are intake of contaminated soil, toxicity to soil invertebrates and plants and groundwater flow to surface water used by marine aquatic life. The intake and toxicity mandatory pathways have been included, but risk assessors may disregard in locations where the depth of samples negates the pathway.
      ii. CSR Sediment Marine Sensitive standards: BC Contaminated Sites Regulatio Sediment Standards for marine sensitive sediment use.
      iii. CSR Sediment Marine Typical standards: BC Contaminated Sites Regulation Sediment Standards for marine typical sediment use.
      iv. CCME CEQG PEL Sediment Guidelines: Canadian Council of Ministers of the Environment Canadian Environmental Quality Guidelines Probable Effect Level for Marine Sediment Use.
   b) Intertidal Area: Investigation was completed to CSR Sediment Marine Typical standards and CCME CEQG PEL Sediment guidelines. Confirmatory sampling is proposed based on CSR IL soil standards as this land will become upland once filled.
   c) Subtidal Area Investigation was completed to CSR Sediment Marine Sensitive and Typical standards and CCME CEQG PEL Sediment guidelines.
      v. Under Rock Berm: Confirmatory sampling is proposed based on CSR IL soil standards as this area will be under the rock berm
      vi. Beyond Rock Berm: Any confirmatory sampling that may take please past the toe of the rock berm in support of dredging requirements is proposed based on CSR Sediment Marine Sensitive and Typical standards and CCME CEQG PEL Sediment guidelines.
2. **USE OF EXISTING CHARACTERIZATION RESULTS FROM PREVIOUS INVESTIGATIONS** (analytical data obtained from boreholes that vertically delineated the contamination)
   a) Intertidal Area
      i. PAH and Metals: Existing locations shown in Blue are being used as confirmatory sample locations for PAH and Metals. Excavation is expected to range between 2.0 and 5.0 m. Samples in that depth range were identified as confirmatory samples that are less than CSR IL standards.
      ii. PCB: All PCB samples in the intertidal zone were less than the CSR IL standards. Depths ranged from 0.0 to 3.1 m and cover the area with a density of greater than 1 sample/400m^2.
   b) Subtidal Area: Existing locations shown in Blue are being used as confirmatory sample locations. These locations have till (or till-like) samples identified that are less than CSR IL standards for PAH, Metals and PCB. The existing samples are sufficient for the area extending out to the rock berm toe (density of greater than 1 sample/400 m^2).
3. **PROPOSED SAMPLE LOCATIONS**
   a) Intertidal Area: To provide sufficient coverage in the north and southeast areas of the intertidal area (1 sample/400 m^2), 4 additional confirmatory samples are proposed. Proposed samples are based on a vertical cut along the east side of the excavation area.
   b) Subtidal Area: If additional dredging occurs beyond this area for construction of the rock berm, additional samples will be collected. These 4 contingency samples are shown in the Subtidal Area in red. This provides a sampling density of 1 sample/400 m2.
4. **PROPOSED CONFIRMATORY SAMPLE DEPTHS / ANTICIPATED MATERIAL TYPE**
   a) Intertidal Area: Proposed sample depths are shown on the drawing based on anticipated excavation depth. Materials encountered are expected to be SILT and SAND and possible SAND and GRAVEL.
   b) Subtidal Area: If dredging occurs beyond the proposed rock berm toe, samples will be collected from the floor of the dredged surface. If the dredging contacts the till surface, material would be expected to be a SAND and GRAVEL TILL or a TILL-LIKE SILT and SAND. If dredging does not contact the till surface, material is expected to be SAND and GRAVEL.
5. **PROPOSED CONFIRMATORY SAMPLE ANALYSIS**
   a) Intertidal Area: Based on CSR IL standards, the 3 northern confirmatory samples are proposed for analysis for PAH, METALS and PCB. The southeast confirmatory sample is proposed for analysis of PAH and METALS.
   b) Subtidal Area: Based on comparison to sediment standards/guidelines, any confirmatory samples beyond the proposed rock berm toe are proposed for analysis for PAH, METALS and PCB.
6. **PROPOSED SAMPLE METHODOLOGY**
   a) All samples will be collected via grab sample method during excavation or dredging.
7. **EXCEEDANCES IN CONFIRMATORY SAMPLES**
   a) Intertidal Area: Any exceedances identified in confirmatory samples will be dealt with through risk assessment, as will any previously identified exceedances left in place. If the scenario occurs where the excavation has not been backfilled, additional excavation and re-sampling could be completed at the client's discretion.
   b) Subtidal Area: Any exceedances identified in confirmatory samples will be dealt with through risk assessment, as will any previously identified exceedances left in place.

DRAFT

LEGEND

NOTES

REFERENCE DRAWINGS

	2021–03–10	ESRI AERIAL IMAGERY
FIGURE 2	2008–01–24	GOLDER ASSOCIATES (06–1412–013)
DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2021–04–22	ISSUED TO CLIENT AS DRAFT	PES	BH

0 5 METRES 25

CLIENT NAME:
VANCOUVER FRASER PORT AUTHORITY

PROJECT LOCATION:
FORMER STERLING SHIPYARD SITE
2089–2095 COMMISSIONER ST.,VAN.,BC

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TITLE:
PROPOSED CONFIRMATORY SAMPLING PLAN - NOTES

DWN BY: PES	SCALE: 1:500	DATE: 2021–04–21	DWG No: 509211-603 REV.: 0
CHK'D: NS	PLOT: 20210428.1759	CADFILE: 509211–R10	

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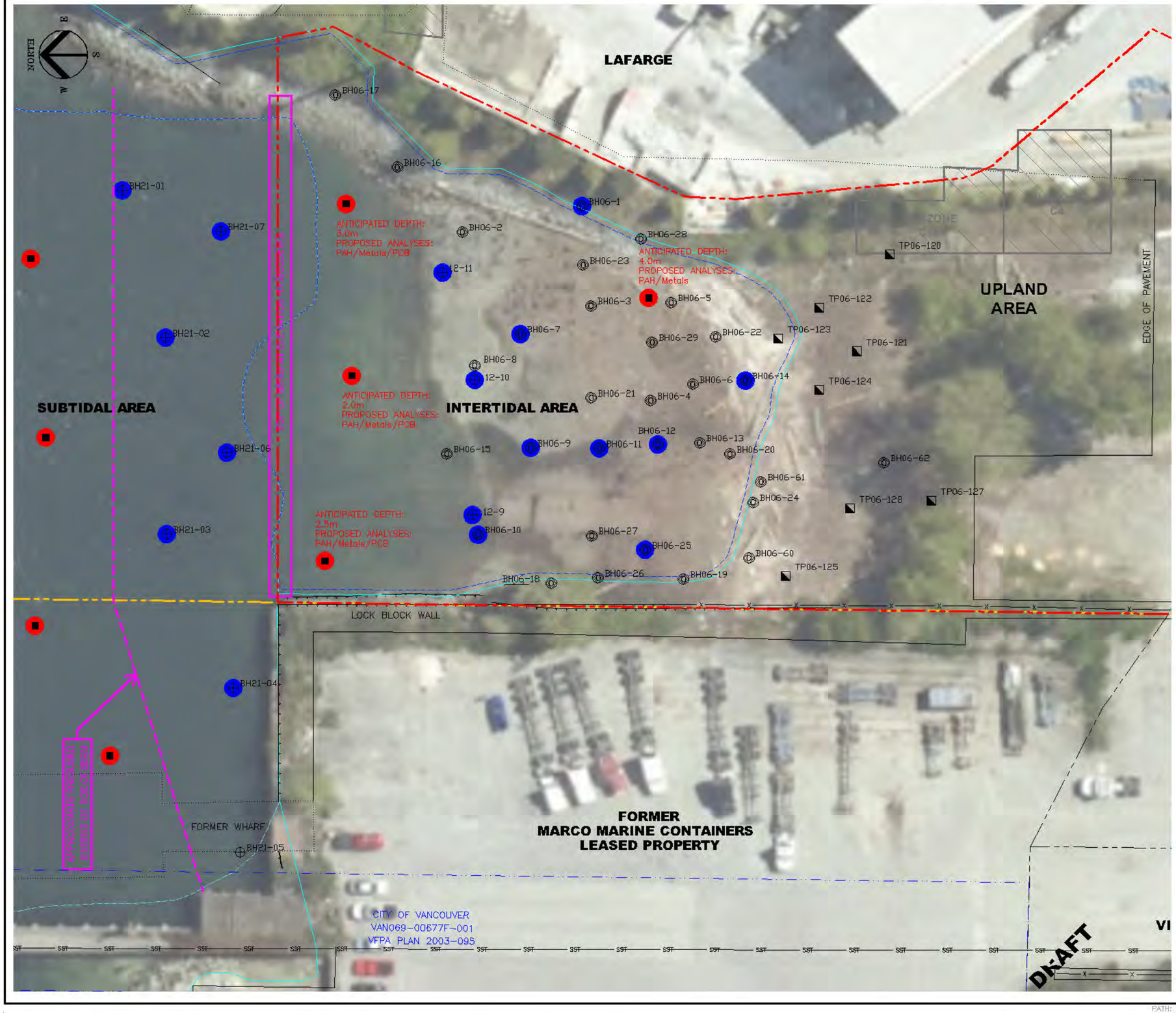

LEGEND

- SITE BOUNDARY
- FORMER STERLING SHIPYARD SITE
- CITY OF VANCOUVER SEWER OUTFALL RIGHT-OF-WAY LICENSE BOUNDARY
- LOT BOUNDARY
- FENCE
- FORMER STRUCTURE
- HIGH WATER MARK
- INTERTIDAL AREA
- REMEDIAL EXCAVATION (GOLDER 2008)
- BOREHOLE
- BOREHOLE (OTHERS)
- MONITORING WELL (OTHERS)
- TESTPIT (OTHERS)
- EXISTING CONFIRMATORY SAMPLE
- PROPOSED CONFIRMATORY SAMPLE

NOTES

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

REFERENCE DRAWINGS

	2021-03-10	ESRI AERIAL IMAGERY
FIGURE 2	2008-01-24	GOLDER ASSOCIATES (06-1412-013)
DWG. NO.	DATE	DESCRIPTION

REVISIONS

0	2021-04-22	ISSUED TO CLIENT AS DRAFT	PES	BH
REV.	DATE	DESCRIPTION	BY	CHK

0 5 METRES 25

CLIENT NAME:
VANCOUVER FRASER PORT AUTHORITY

PROJECT LOCATION:
FORMER STERLING SHIPYARD SITE
2089-2095 COMMISSIONER ST.,VAN.,BC

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TITLE:
PROPOSED CONFIRMATORY SAMPLING PLAN

DWN BY: PES	SCALE: 1:500	DATE: 2021-04-21	DWG No: 509211-604 REV.: 0
CHK'D: NS	PLOT: 20210423.1128	CADFILE: 509211-R10	

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SNC·LAVALIN

SNC-Lavalin Inc.
Suite 500, 745 Thurlow Street
Vancouver, British Columbia, Canada V6E 0C5
604.662.3555 604.515.5150
www.snclavalin.com