Appendix L CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

Vancouver Shipyards
Outfitting Pier Extension

10 Pemberton Avenue, North Vancouver, BC

Construction Environmental Management Plan

PER No. 20-034

Seaspan ULC

November 18, 2020

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APPENDICES

ABBREVIATIONS

AOA	Archaeological Overview Assessment
BC	British Columbia
BMP	Best Management Practice
CCME	Canadian Council of Ministers of the Environment
CD	Chart Datum
CEMP	Construction Environmental Management Plan
CWTS	Coal Water Treatment System
DAS	Disposal at Sea
DBWTS	Dry Bulk Water Treatment system
DFO	Fisheries and Oceans Canada
DNV	District of North Vancouver
EMA	*Environmental Management Act*
EM	Environmental Monitor
EMS	Environmental Management System
ESC	Erosion and Sediment Control
FIGQG	Federal Interim Groundwater Quality Guidelines
GVSDD	Greater Vancouver Sewerage and Drainage District
HCA	British Columbia *Heritage Conservation Act*
IAA	*Impact Assessment Act*
IL	Industrial Land Use
MMMP	Marine Mammal Management Plan
MOECCS	Ministry of the Environment and Climate Change Strategy
NRDE	Non-Road Diesel Emissions
NTU	Nephelometric Turbidity Units
PER	Project and Environmental Review
QEP	Qualified Environmental Professional
VFPA	Vancouver Fraser Port Authority
WQ	Water Quality

GLOSSARY

Contractor	The organization or its representative tasked with the planning and execution of construction activities to complete the Project
Deleterious Substance	Any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water such that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by people or fish that frequent that water
Environmental Monitor	The staff engaged in environmental monitoring on behalf of the permit holder for the purposes of compliance, due diligence and guidance on implementing mitigation measures (VFPA 2018)
Hazardous Materials	Dangerous goods that are no longer used for their intended purpose and meet the criteria for Class 2, 3, 4, 5, 6, 8 or 9 of the federal dangerous goods regulations, and other chemical or demolition wastes as defined in the British Columbia *Hazardous Waste Regulations* under the *Environmental Management Act* (e.g. containing dioxins, tetrachloroethylene, or polycyclic aromatic hydrocarbons, oils, asbestos and leachable toxic waste)
Project Manager	The person responsible for leading and overseeing the planning and execution of parts of the Project that have been delegated to their organization by the Owner of the Project
Qualified Environmental Professional	An applied scientist or technologist who is registered and in good standing with an appropriate BC professional organization or who, through demonstrated suitable education, experience and knowledge relevant to the matter, may be reasonably relied on to provide advice within their area of expertise. A qualified environmental professional could be a biologist, agrologist, forester, geoscientist, engineer, or technologist (VFPA 2018)
Regulator	An agency of the Federal, Provincial or Municipal Government that is responsible for enforcement of regulations by provisions of legislation or by-laws
Spill	A release or discharge into the environment, not authorized under the *Environmental Management Act*, of a substance in an amount equal to or greater than the prescribed amount (see Section 5.1 and Appendix G)
Waste Materials	General construction debris and office-related garbage such as, but not limited to plastics, paper, polystyrene foam, metals, glass, and empty containers which held controlled or hazardous substances

1.0 INTRODUCTION

Seaspan ULC (Seaspan) has developed the following Construction Environmental Management Plan (CEMP) version 1 (v.1) as guidance for construction of an outfitting pier extension at their Vancouver Shipyard facility at 10 Pemberton Avenue in North Vancouver. This CEMP has been prepared to provide guidance on best management practices (BMPs) and regulatory compliance to avoid and limit potential project-related adverse environmental effects associated with the proposed construction of the Vancouver Shipyard Outfitting Pier Extension Project.

The objectives of the Seaspan Outfitting Pier Extension CEMP are:

- Protect valued ecological features within and adjacent to the Project site within the Seaspan basin during construction
- Comply with:
  - Vancouver Fraser Port Authority (VFPA) and Project Environmental Review (PER) permit conditions, and
  - Approvals and legislative requirements and regulations associated with Project construction
- Mitigate risk to Seaspan's environmental permits as a result of construction activities

The CEMP will be reviewed and updated as required to address revisions to the Project and conditions throughout design and construction. General requirements, environmental mitigation measures and controls are included in the body of text within the CEMP. Additionally, operations environmental effects are considered and mitigated by the policies of the Seaspan's Environmental Management System (EMS).

1.1 SEASPAN OUTFITTING PIER LOCATION

The Seaspan Outfitting Pier (the pier) is located at 10 Pemberton Avenue in the District of North Vancouver (DNV), British Columbia (BC) (Figure 1) within VFPA managed federal waters that are operated under the tenancy of Seaspan (coordinates 49.3135028, -123.1055362). The upland areas are private Seaspan lands outside of federal jurisdiction within the DNV. The pier is located entirely within the Seaspan site with areas to the west and east used for parking, administrative facilities and ship docking/maintenance, respectively. The foreshore to the north is occupied by property dedicated to Seaspan's operations. Only the area directly south is connected via open water to Burrard Inlet.

Figure 1: Seaspan Vancouver Shipyard Location

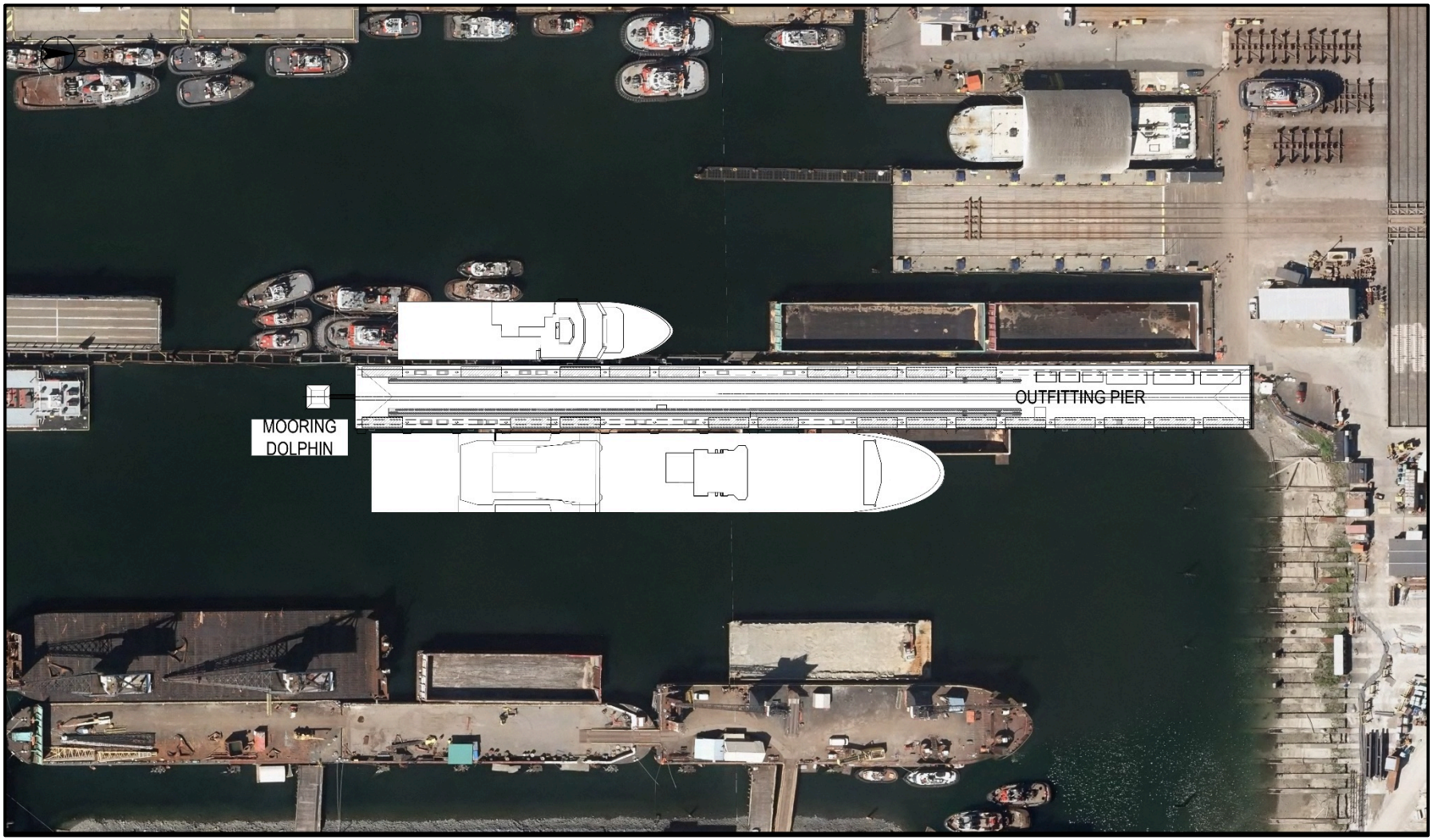

Figure 2 Seaspan Outfitting Pier Extension Site

1.2 SEASPAN SHIPYARD BASIN DESCRIPTION

The Seaspan facility is an active industrial site used for barge and ship building and repair and transportation operations (tug, barge). The water lot includes piers and docks for vessel mooring, outfitting, maintenance, and loading/offloading. An active tugboat fleet operates out of the facility. The land based facility site is largely paved for site access to product storage buildings, services buildings (sub-assembly, panel, forming, block assembly, pre-outfitting, repair blast and paint, rigging and machine shops), administrative offices, and a 300 tonne Gantry crane.

1.3 PROJECT COMPONENTS

Seaspan is undertaking replacement of the existing outfitting pier. The components of the project will consist of the following:

- Demolition of the existing timber outfitting pier, 155 m in length and 10 m in width (shading 1,550 m^2) including:
  - removal of 590 wood creosote treated piles and 4 steel piles (pile footprint 28.9 m^2 + 0.52 m^2 [total 29.4 m^2]) and supporting timber pile caps
  - removal of existing timber pier surface, stringers and decking trestle
  - removal and repurposing of the existing floating walkways from opposing sides of the existing outfitting pier (combined footprint of shading 589 m^2)
  - removal and reuse of 9 existing floating steel camels (shading), reduced from removal of 17 existing floats
  - removal of 8 multi-timber pile dolphins securing the existing floating steel camels, reduced from 18 multi-timber pile dolphins and 6 steel pipe piles
- Construction of a new outfitting pier above the water surface with an area of approximately 272 m in length and 19.2 m in width (shading footprint 5,222 m^2) including:
  - Installation of 126 X 1.1 m diameter vertical piles supporting pile caps and piers for total footprint in-water of 119.7 m^2
  - Installation of 19 concrete pile caps (including the abutment) at bents from the shoreline to the outer mooring dolphin
  - Installation of concrete or composite spans between bents
  - Installation concrete cast in place deck slabs
  - Installation of ancillary deck infrastructure including rail mounted traveling portal crane, fenders and mooring bollards
  - Installation of a mooring dolphin consisting of 4 X 1.2 m diameter steel piles (area - 4.8 m^2) connected to the new outfitting pier via a dolphin catwalk
- Dredging ahead of new pier construction to a depth of -8.8 m CD consistent with the depths and methodologies applied during past dredging programs.

Construction activities are expected to adhere to the guidance of the CEMP. The Project and associated activities include project-specific timing, equipment, activities and specific mitigation measures and controls. Project specific permits, conditions and regulatory approvals will be provided prior to construction and updated within this CEMP.

1.4 PROJECT SCHEDULE

The Project is expected to begin construction on March 1, 2021 and be completed by August 1, 2022. During this timeframe, Seaspan will attempt to minimize the requirement for in-water work conducted

outside of the Fisheries and Oceans Canada window of least risk for the south coast and Fraser areas (Area 28, Vancouver – Burrard Inlet) of August 16 to February 28 to the extent possible.

1.5 SITE DESCRIPTION AND SETTING

The site is located on the north shore of the Inner Harbour in the industrialized waterfront of Burrard Inlet. The site had been developed for industrial activity prior to 1968 when it was acquired by Seaspan from Domtar. The shoreline has been heavily modified for industrial use with much of site developed on reclaimed land extending out into Burrard Inlet from the original shoreline.

Natural habitat features are generally lacking at the site. However, the western property line is paralleled by a back channel inlet connected to Burrard Inlet. Mackay Creek discharges to Burrard Inlet immediately east of the site. Both these aquatic habitat features also support terrestrial vegetation which likely support wildlife species adapted to urban environments.

An archaeological overview assessment has indicated the risk of impact to archaeological or protected historical resources is considered to be very low. Additional detailed archaeological studies or permitting is not recommended for the outfitting pier construction area.

Given the industrial history of the site, contaminated sediments are expected to be located within and adjacent to the area proposed for dredging to accommodate the new outfitting pier extension. To date, contaminated surface sediments have been identified in the northwestern corner of the proposed dredge area. Additional investigations are planned prior to the initiation of dredging to further delineate potential sediment contamination. Additional sediment sampling will be conducted in consultation with Environment and Climate Change Canada (ECCC). Contaminated material will be appropriately disposed in either an upland licensed landfill facility per the requirements of BC's Contaminated Site Regulations, or at-sea under the Disposable At Sea (DAS) Regulations through ECCC approval, based on sediment geochemistry. Past dredging has identified both clean sediment for DAS, and some historic presence of contaminated materials classified as Industry Landfill, not hazardous waste.

The Seaspan water lot is bounded to the north, east and west by existing Seaspan lands and facilities. These areas are used for service building and docking facilities (east), administrative buildings and a parking lot (west) and the Vancouver Shipyard to the north. The bulk of the site is located to the north and has been developed for industrial purposes.

The marine seafloor area within the Seaspan water lot is comprised of areas of fine, sand, gravel and cobble sediment. The sections of gravel and cobble located intermittently throughout the water lot within the central sections adjacent and around the existing outfitting pier and areas of aggregate barge moorage. Anthropogenic debris is also common in the subtidal and near shore northern areas. The site is subject to disturbance from periodic maintenance dredging, propeller wash, and ongoing shoreline sediment movement and sedimentation. As a result, the site exhibits limited species diversity and low density as confirmed by underwater surveys conducted in 2018 and 2020.

A total of 33 invertebrate taxa, 4 algae taxa, and 10 fish taxa were observed during the dive survey conducted around the pier site in 2020. Of these, the majority with either considered rare (1 individual per transect/<5% areal coverage) or sparse (2-5 individuals/5-25% cover) in abundance. Only 8 marine fish and invertebrate species exhibited higher levels of presence (>30 individuals/>75% coverage) and these typically along one or two transects or located in either soft or hard substrate areas. There was some difference in the species assemblages depending on the substrate. Dungeness crab (*Metacarcinus magister*), red rock crab (*Cancer productus*), and horse clams (*Tresus* spp.) were observed on the soft bottom habitat. Plumose anemones (*Metridium farcimen*), ochre stars *(Pisaster ochraceus*), shiner perch (*Cymatogaster aggregata*) and striped perch (*Embiotoca lateralis*) were observed on, or around, the dolphin/pile structures supporting the pier. The species most observed throughout the survey area was the mottled star (*Evasterias troschelii*). Algae had a limited abundance at the site with sugar wrack kelp being the primary species observed.

Diversity and abundance of marine mammals in the Inner Harbour of Burrard Inlet are generally low. None were observed during either the 2018 or 2020 surveys. Harbour seal (*Phoca vitulina)* is the most abundant and frequently sighted species and is observed year-round (Butler et al. 2015). Few other marine mammal species are observed regularly in the Inner Harbour of Burrard Inlet (Stantec 2017).

2.0 RELEVANT ENVIRONMENTAL LEGISLATION

The Seaspan water lot and the site of the planned outfitting pier extension is located on federal lands within VFPA. Environmental review and regulatory approvals for projects at the shipyard are legislated under the federal regulatory jurisdiction through VFPA under the *Canada Marine Act* and the *Impact Assessment Act* (IAA 2019). A list of environmental legislation and requirements applicable to the outfitting pier site are listed in Table 1.

Table 1 Environmental Regulations, Legislation and Guidelines

Act, Regulation or Bylaw	Description	Applicability	Management
Federal			
Impact Assessment Act 2019 (IAA), Section 82 Projects carried out on Federal Lands	The legislative environmental assessment process on federal lands under *Section 82* of *IAA*.	VFPA: environmental review process to permit all projects occurring on federal lands.	Applications are submitted for Project and Environmental Review (PER) and when approved, VFPA provides a letter of approval and project conditions. Regulatory permitting is completed by Seaspan on VFPA owned lands. The VFPA posts the applications to the Canadian Impact Assessment Registry (CIAR)
Canada Marine Act	VFPA authority established through *Marine Act* under Transport Canada.	Assess protection for the environment and safeguard the economic objectives of local, regional and national governments.	Applications for PER review and Project approval are submitted to by Seaspan to VFPA for projects on federal lands or waters.
Canadian Navigable Waters Act 2019	Establishes protection for vessel operation and navigation under Transport Canada.	VFPA operations to mitigate potential effects on vessel navigation.	Navigation Protection Program and VFPA operations - Notice of Works for marine construction and mitigation measures.
Canadian Environmental Protection Act (CEPA), 1999	Pollution prevention and the protection of the environment and human health.	Disposal at sea (DAS), if applicable, fueling, emissions, and potential spills from construction equipment and vehicles have the potential to release pollution and wastes into the environment.	DAS permit requirements for disposal of dredge materials. Fuel Management and Emergency Response Plans are found in Section 5 / 6 of this CEMP. Discharges that meet CCME Water Quality Guidelines for protection of Aquatic Life will not normally be considered to be deleterious (CCME 2003).

Table 1 Environmental Regulations, Legislation and Guidelines

Act, Regulation or Bylaw	Description	Applicability	Management
Fisheries Act 2019	Provisions for the conservation and protection of fish and fish habitat, including by preventing pollution.	Marine construction within the high-water mark, surface and storm water conveyance, and spills from construction equipment have the potential to cause harm or deposit deleterious substances.	Fisheries and Oceans Canada (DFO) has been consulted at the planning stage of the Project through submission of a Project Request for Review. Mitigation measures consistent with DFO protocols and guidelines are included within this CEMP.
Migratory Birds Convention Act	Prohibits inadvertent harming, killing, disturbance or destruction of migratory birds, nests, and eggs. Also prohibits discharges of deleterious substances to waters frequented by migratory birds	Construction has potential to disturb and or entrap wildlife.	Environmental monitoring will confirm that mitigation measures are appropriate to protect migratory birds within federal lands and waters.
Transportation of Dangerous Goods Act and Regulations	Handling and transportation of dangerous goods.	Construction activities will require use and transport of controlled substances.	Requirements related to documentation, safety markings, means of containment, training and reporting are outlined in the CEMP.
Disposal at Sea Regulations	Requirements for a permit to dispose of materials at sea. Only substances listed in CEPA may be considered for disposal at sea, including dredged material, in the case of this project.	Construction and dredging have the potential to affect water quality, that could impact human health and aquatic life with industrial land use (IL).	Contaminated site mitigation measures and soil management standards are outlined in the CEMP.

Table 1 Environmental Regulations, Legislation and Guidelines

Act, Regulation or Bylaw	Description	Applicability	Management
Provincial			
British Columbia *Environmental Management Act* (EMA)	Protections for the environment regarding disposal and management of contaminants.	Known sediment contamination at the site will be disturbed and subject to the Contaminated Sites Regulation and Hazardous Waste Regulation.	Wastewater discharge permitting under EMA as discussed below.
British Columbia *EMA* Spill Reporting Regulation	Sets out requirements for spill reporting and environmental emergencies.	The regulation sets out the thresholds for spill reporting that will apply to construction activities that involve regulated	Details of Spill Response Plan and mitigation measures are set out in the Emergency Response section below
Regional/Municipal			
Greater Vancouver Regional District Non-Road Diesel Engine Emission Regulation Bylaw	Protections for public health regulating the level of air contaminants.	Construction activities discharging particulate matter that exceeds applicable thresholds.	Mitigation measures are set out in the Air Quality section below.
District of North Vancouver Noise Regulation Bylaw No. 7188	Governs the level of noise generated by construction	Limits construction noise based on zone, time of day, and level of noise	Mitigation measures are set out in the Noise and Vibration section below.

3.0 ENVIRONMENTAL MANAGEMENT

Seaspan staff contact information is listed in Table 3.

Table 2 Seaspan Contacts

Role/Title	Contact	Phone	Email
Manager, Special Projects	George Geatros Seaspan ULC, 10 Pemberton Avenue, North Vancouver, BC, V7P2R1	604-990-1847	ggeatros@seaspan.com

Environmental Manager, Seaspan ULC	Daryl Lawes Seaspan ULC, 10 Pemberton Avenue, North Vancouver, BC, V7P2R1	604-984-1067	dlawes@seaspan.com
Environmental Manager, Stantec	Mark Johannes Stantec 500-4730 Kingsway, Burnaby BC V5H 0C6	604-418-1095	mjohannes@stantec.com
Design Manager, Stantec	Chuck Rosner Stantec 500-4730 Kingsway, Burnaby BC V5H 0C6	604 235-1877	crosner@stantec.com
Contractor	TBD		
Environmental Monitors	TBD		

3.1 ROLES AND RESPONSIBILITIES

3.1.1 RESPONSIBILITIES OF SEASPAN'S ENVIRONMENTAL MANAGER

Seaspan's Environmental Manager will maintain compliance during construction with the VFPA PER permit conditions, regulations and guidelines, authorizations and permits, contract documents, this Project CEMP, and industry and company BMPs and standards.

Seaspan's Environmental Manager will assess potential risks during planning and construction, and will review, observe, and report on environmental issues and mitigation related to construction activities. Reporting will be a component of environmental compliance and will be used to document construction mitigation measures and controls. The Environmental Manager has the authority and the responsibility to cease any construction activities that are deemed unsafe, environmentally unsound or non-compliant to any permit conditions and/or Seaspan standards.

Tasks and responsibilities associated with the Environmental Manager will include, but are not limited to, the following:

- Monitor compliance with the VFPA PER permit conditions and CEMP
- Review environmental monitoring reports submitted by the Seaspan Environmental Monitor
- Verify that Contractor staff are updated on the environmental conditions, approvals, and regulatory requirements as required
- Serve as a point of contact with all regulatory authorities regarding permit and CEMP compliance.

3.1.2 RESPONSIBILITIES OF SEASPAN'S PROJECT MANAGER

Tasks and responsibilities associated with the Seaspan Project Manager include, but are not limited to, the following:

- Update and communicate updates of this CEMP, or other applicable Standards and BMPs, including review of mitigation measures and controls to adaptively manage implementation, maintenance and function of controls to the construction staff
- Verify required permits, licenses, and approvals are in place prior to the start of the construction activities
- Review construction schedules and environmental procedures

3.1.3 RESPONSIBILITIES OF THE ENVIRONMENTAL MONITOR

Tasks and responsibilities associated with Environmental Monitor (EM) include, but are not limited to, the following:

- Provide leadership to the Contractor's construction staff about the importance of meeting regulatory requirements and complying with industry and company BMPs and standards
- Review, complete and submit environmental monitoring reports to the Environmental Manager and report any unanticipated adverse effects to the environment that indicate non-compliance
- Inspect activities during construction to verify compliance with terms and conditions of this CEMP and applicable permits and approvals
- Assess the effectiveness of the mitigation measures being applied and report to the Environmental Manager
- Assess compliance with the environmental control strategies and mitigation measures specified in this CEMP, Seaspan's EMS, and related environmental standards and procedures, and with terms and conditions specified by applicable legislation, guidelines and BMPs
- Provide recommendations to the Contractor on work practices to improve compliance with measures specified in this CEMP, Seaspan's EMS and related environmental standards and procedures, and with terms and conditions specified by applicable legislation, guidelines and BMPs
- Monitor for and identify fish, wildlife, marine mammals that may be affected by construction activities

3.1.4 RESPONSIBILITIES OF THE CONTRACTOR

The Contractor(s) and their delegates shall comply with the following requirements during planning and construction as appropriate.

Contractor's Project Manager

Tasks and responsibilities associated with the Contractor's Project Manager include, but are not limited to, the following:

- Review of construction schedules and procedures for potential implications on worker health and safety, site security and environmental effects
- Developing project-specific Work Procedures that comply with requirements of appropriate regulatory authorities and recognized best-practices in construction safety
- Restricting access to the construction zone for its authorized personnel and subcontractors
- Reviewing this CEMP with their staff and subcontractors prior to commencing construction
- Verifying required permits, licenses, and approvals are in place prior to the start of the construction activities
- Complying with the Project permits and agency permits, or licenses issued for the Project as well as other applicable laws, and Seaspan's CEMP, and applicable policies and standards
- Correcting deficiencies and any non-compliance issues identified by Seaspan or Contractor staff whether written or verbal as soon as possible or by the start of the following work shift
- Taking responsibility to report environmental incidents to the EM in a timely manner and preventing a re-occurrence of those incidents
- Conducting tailgate meetings at the beginning of each work day that will include a review of environmental controls and required BMPs

Contractor's Qualified Environmental Professional

Where the scope of construction warrants the Contractor's direct environmental supervision of activities, the Contractor will appoint a Qualified Environmental Professional(s) (QEP) or EM(s) to evaluate and report on compliance of the Contractor's work procedures and practices (CEMP management and component plans) with the environmental requirements established by:

- Contract to construct the Project
- VFPA PER permit conditions
- Project CEMP
- Approvals and permits received for Project construction

The QEP will report to the Contractor Construction Project Manager and to Seaspan's EM and Environmental Manager.

The QEP will inform field crews, Contractors and subcontractors of the environmental requirements, including levels of training and competence required to undertake the work. The Monitor will actively monitor the on-site Project works to verify compliance to VFPA PER permit conditions, this CEMP, construction approvals & permits, and construction-specific plans.

Monitoring frequency will be determined by Seaspan's Environmental Manager, VFPA PER permit conditions, and the schedule of construction activities with potential effects on the environment.

Environmental reporting is an integral part of the environmental monitoring process. The monitoring reports are used to facilitate the transfer of information between the Contractor, Seaspan and shareholders, the owner's engineer and Environmental Manager, VFPA, and other regulatory agencies as required. The EM will implement an environmental reporting and communication process and structure with the guidance and approval of the Environmental Manager that is applicable to the schedule and Project activities, for the following reports:

- Weekly environmental monitoring reports
- Environmental incident and corrective action reports for each environmental incident, if any
- Topic-specific reports (e.g., spill, waste management)

The QEP, with support from the EM, will also be responsible for verifying compliance with the VFPA PER permit conditions, approval and permit requirements, and the CEMP through ongoing field monitoring. The QEP responsibilities will include, at a minimum, the following duties:

- Awareness training for Contractor staff as required in the implementation and maintenance of mitigation measures used to avoid and limit potential environment effects
- Setting a prescribed monitoring schedule prior to Project start. Remaining on-call during noncritical work activities and able to respond to environmental issues in a timely manner
- Advising Project team members (listed in Appendix L) if Project activities have caused or are likely to cause an environmental incident and make recommendations for proactive corrective actions and maintenance of mitigation measures
- Communicating directly with Project team members and provide technical advice to proactively resolve or address immediate environmental issues to maintain compliance with applicable permits, licenses, and this CEMP
- Checking equipment and vehicles on site for hydrocarbon leaks, including for fuel delivery and refueling procedures
- Checking that emergency spill and fire equipment caches are adequately supplied
- Checking the condition and operational efficiency of water and sediment retention measures and controls and water treatment
- Reporting construction activities in weekly environmental compliance reports, supplementing with field notes and photographs
- Exercising the authority to enforce modifying or stop work orders to comply with appropriate mitigation measures and controls to avoid and limit potential environment effects from construction activities

4.0 MITIGATION MEASURES AND ENVIRONMENTAL SPECIFICATIONS

4.1 GENERAL PRACTICES

The information in Table 4 and the following sections describes the environmental mitigation measures proposed for construction activities. Applicable mitigation measures will be implemented based on construction activities based on the discretion of the Environmental Manager and the EM.

Table 3 General Mitigation Measures

Category	Mitigation Measure
Permits	1. Copies of issued permits will be on site and readily available. 2. Construction-related restrictions, conditions, or mitigation measures that are part of the regulatory permits will be communicated to the field crew by the Contractor's QEP and/or the EM. 3. Work shall comply with requirements of applicable laws, legislation and BMPs 4. Construction activities may not interfere with permitted discharges or the monitoring programs associated with these permits
CEMP	5. Copy of this CEMP will be on site and readily available. 6. CEMP will be updated as required to address current site conditions and components of construction.
Timing	7. In-water pile installation will occur during DFO's least risk timing window for fish and fish habitat (Burrard Inlet: August 16–February 28), in-water work will be limited to, and conducted during low tide where possible 8. All in-water piling activities occurring outside DFO's least risk timing window have been appropriately discussed and agreed with DFO and the VFPA and are within a VFPA and DFO approved work window 9. Timing of works will be chosen appropriately (weather conditions, species at risk regional timing windows) and contingency plans will be designed and in place to address unforeseen weather events.
Training	10. Personnel will be adequately trained and will use appropriate personal protective equipment. 11. Contractor will confirm they understand proper installation of mitigation measures. 12. Contractor will review the CEMP regularly throughout construction.
Tailgate meetings	13. The VFPA permit conditions, CEMP, and environmental regulatory permit requirements will be reviewed by the Contractor and EM, followed by a briefing to crews.

Table 3 General Mitigation Measures

Category	Mitigation Measure
Stop work	14. EM will have authority to issue a Stop Work Order where activities are adversely affecting, or will adversely affect, the environment or archaeological resources. The EM will also make recommendations in the field for avoiding and mitigating effects. 15. For activities that may pose an environmental or archaeological risk but are not described in the CEMP and this list of mitigation measures, crews will stop work and contact the EM for assistance prior to commencing or continuing these activities.
Site Cleanliness	16. Construction and staging areas will be kept in good order, tidy during activities, and left the same condition or better at the end of the Project.
Concrete Management	17. Work involving the use or demolition of concrete, cement, mortars, grout and other construction materials containing Portland cement or lime will be conducted so that direct or indirect deposit of sediment, debris, concrete (cured or uncured), and concrete fines into the marine environment are avoided. 18. Water that has contacted uncured or partly cured concrete or Portland cement or lime-containing construction materials shall not be permitted to enter the marine environment. Containment facilities shall be provided at the site for the wash-down water from concrete delivery, concrete pouring, and other equipment and activities as required. 19. Land-based runoff of concrete, cement, mortars, grout and other construction materials containing Portland cement or lime will be contained to prevent discharge into undesignated drainage and treatment facilities. Extra cover will be provided during rainfall for materials onsite not in use.
Material safety data sheets	20. Chemical products will have their applicable material safety data sheets onsite and readily available.
Complaints	21. Complaints will be immediately forwarded to the Environmental Manager and notification and a response summary will be sent to VFPA within two days of the complaint.

4.2 SITE ACCESS

Outfitting pier construction will include in-water and over-water construction activities within the existing Vancouver shipyards site. It is expected that marine equipment (barges, clamshell, pile drivers, tugs, cranes, drill rig, excavators, loaders, vibratory and impact hammer, air compressor and welder etc.).

In-water demolition and construction activities will be isolated and monitored to ensure the protection of local environmental resources. The isolated work areas will constrain activities during the construction period within the shipyard basin. The construction works however do not impact local marine traffic or adjacent port tenants. The Seaspan basin is enclosed on three sides and only open to Burrard Inlet to the south and construction activities can be isolated to avoid and limit impacts to areas outside the Seaspan basin (Figure 1).

4.3 AIR QUALITY

Air emissions from vehicular/equipment exhaust and dust associated with construction related activities will be limited and managed to avoid nuisance and environmental effects during construction.

Requirements to reduce emissions and general measures related to air quality are as follows:

- Material loads entering or exiting the site that could create dust will be covered, as appropriate
- Stationary emission sources such as diesel generators will only be used as necessary and will be shut off when not in use
- There will be no idling of vehicles and construction equipment when not in use and idling is allowed for a period of 3 minutes when equipment is in use. Some exemptions to this can be referenced in the VFPA Non-Road Diesel Emissions (NRDE) policy if reviewed and approved by Seaspan
- Equipment, vehicles and stationary emission sources will be maintained properly prior to use
- Non-road diesel equipment must be tier 3 or above and use low-sulphur diesel
- Discharge of air contaminants from non-road diesel engines will not exceed 20% opacity
- Fugitive dust will be controlled such that it is not visible beyond the property line and not tracked out beyond 8 m on roadways
- Contractors responsible for overseeing non-road diesel equipment usage will follow the VFPA NRDE program guidelines
- Where traffic as a result of the Project creates a hazardous or irritating level of dust to nearby receptors, dust control on existing access roads will be achieved through the application of water, as practicable or via sweeper truck. The use of chemical dust suppressants will not be permitted.

4.4 NOISE AND VIBRATION

Construction noise and vibration can be a nuisance to nearby residents. To manage noise and vibration, construction activities will occur within standard VFPA construction hours unless otherwise identified by the VFPA permit.

In addition to compliance with the permitted working hours, the following mitigation measures will be implemented during construction to manage noise and vibration:

- Equipment will be properly maintained and fitted with exhaust and muffler systems
- Engines will be turned off when not in use for a period of 3 minutes or more
- Where possible, the dominant sound path will be blocked between the source and the receptor
- Noise monitoring will be conducted during particularly noisy activities or if required by permit conditions (e.g., impact pile driving) to confirm effectiveness of mitigation measures
- The Environmental Manager will be notified of any particularly noisy activities forthcoming to advise the affected community
- Noise complaints will be reviewed by Seaspan's Environmental Manager to check effectiveness of mitigation measures and establish corrective measures

4.5 MACHINERY AND EQUIPMENT

Onsite machinery may include excavators, cranes, loaders, dump trucks, fork lifts, generators, pickup trucks, barges, and/or mobile lighting systems.

Mitigation measures to reduce the frequency and severity of incidents include the following:

- Equipment will be inspected prior to the commencement of work to confirm it is in good operating condition, free of fluid leaks, and invasive species.
- Leaks will be repaired if observed. Invasive species and hydrocarbons will be cleaned from equipment prior to delivery to the site. Wash water containing contaminated material will be disposed of at an approved upland facility licenced to receive the contaminant in question
- Fuel-filled machinery will carry spill containment kits as define in Section 5.2
- Machinery will be operated efficiently, to limit noise and air quality issues
- Temporary wheel wash stations will be operated for trucks and equipment accessing roads

outside the Seaspan site

- Washing, refueling and/or maintenance during construction will be limited and shall be conducted away from water conveyances and the shore where possible (i.e., 30 m away) to prevent potential contaminants of concern entering the aquatic environment
- Preventative maintenance shall be performed regularly (every 250–500 hours of operation) by a professionally trained technician
- Temporary construction lighting will reduce light-spill by pointing lights downward (90° to the vertical where possible) and placing task lighting close to the work area
- No deep-sea vessels shall be berthed or un-berthed at the pier while marine construction equipment is staged or working on the pier
- Marine equipment operators will exhibit appropriate lights and day shapes, monitor VHF channel used for marine communications and traffic services, be familiar with vessel movements and not obstruct line of sight to navigational aids
- While not working, marine equipment will be moored outside of the navigation channel and lit in accordance with applicable regulations
- Equipment will not block egress from the site or internal roadways without planning and permission by Seaspan
- All non-road diesel equipment in use by the Contractor within VFPA jurisdiction shall be reported by the Contractor as required under the Non-Road Diesel Equipment Program through the use of the VFPA declaration form

4.6 EROSION AND SEDIMENT CONTROL

The removal and installation of in-water infrastructure (piles and dolphins) is expected to generate sediment within the water column in the vicinity of the pier. In addition, site access may serve as a source of sediment on local roads. The Contractor is to provide and maintain an Erosion and Sediment Control Plan for review and approval by Seaspan if requested or if it is required by permit conditions. Construction activities that generate sediments will be managed through planning and use of local erosion control measures including the following:

- Erosion and sediment control (ESC) measures will be developed as part of work planning, consistent with the scale of the disturbance and anticipated weather conditions; they will be in place and functional prior to construction and left in place until local construction works are complete
- Sufficient ESC repair and replacement materials will be readily available during construction
- A floating silt curtain will be placed around the pier to contain sediment that will be generated by instream work. The curtain will be anchored to the shore to minimize movement. The toe of the curtain will be weighted to hold it in place near the subsurface.
- If ingress or egress is required by boats to or from the curtained off area, the curtain will be removed and reinstated as soon as the boat has passed. Opening of the curtain will only be conducted at times of low sediment load within the water column.
- Ideally, in-water work will only be conducted during low tides or slack/incoming tides. Work with the potential to generate sediment should be limited during outgoing tides

4.7 CONTAMINATED SOIL AND GROUNDWATER MANAGEMENT

Contractors will proactively manage on-land contaminated soil and groundwater issues during construction by:

- Avoiding areas of soil contamination through design where feasible
- Limiting the area of excavation to the extent possible
- Continually observing the water column for signs of contamination

If suspected contaminated dredgate is encountered (e.g., visual or olfactory evidence of contamination, unexpected structures), the work is to cease, and the Contractor will contain, test, and if, required, remove and dispose of the material at appropriate off-site facilities using standards, practices, methods and procedures outlined in the project-specific Material Management Plan, and in accordance with the provincial *Environmental Management Act* including the Contaminated Sites Regulation and Hazardous Waste Regulation.

4.8 VEGETATION AND TERRESTRIAL WILDLIFE MANAGEMENT

The site is fully developed and industrialized, with no significant vegetation and wildlife habitat present immediately adjacent to the existing and planned outfitting pier. The following mitigation measures will be applied to any land-based activities, as appropriate:

- Limit vegetation clearing to the extent required for access.
- Dispose of invasive plant species at a facility equipped to handle invasive plant waste
- Clean equipment exposed to invasive species (including seeds) prior to moving equipment offsite
- Inspect structures to be demolished for presence of active nests, if removal is to occur during the breeding bird season (March 25 to August 10)
- Maintain the active work site free of wildlife attractants (e.g., garbage, food, and odorous materials), potential nesting materials, and potential nesting sites (e.g., infrequently disturbed areas, open-ended pipes or culverts)
- Disturbance of wildlife (e.g. scaring, physical contact, feeding) is not permitted. The EM must first be contacted if wildlife is found obstructing construction activities
- Bird nests discovered onsite may not be disturbed. The Contractor must contact the EM if nests are discovered
- Any provincially or federally protected species discovered onsite must be reported to the EM.

4.9 PILE INSTALLATION

Pile installation will follow conditions provided by VFPA and DFO. Peak pressure sound levels will be monitored as required by a qualified individual using a hydrophone. If peak pressures exceed 20 kilopascals (kPa) or dead or injured fish are observed, pile installation activities will be halted, and further mitigation measures employed to reduce peak pressures.

The underwater acoustic energy output of the impact pile driving will commence from a lower energy level (approximately 1/3 equipment output) and build steadily and gradually to full output over a period of 20 to 40 minutes (length of driving exceeds this amount).

A marine mammal exclusion zone will be established based on acoustic thresholds for marine mammal species that may occur in the Project area (pinnipeds) as outlined in the marine mammal management plan (MMMP), referenced in section 4.10 and provided as Appendix D. Pile driving will not start if marine mammals are sighted within the marine mammal exclusion zone up to 30 minutes prior to the commencement of impact pile driving. The Contractor will not start operations until after the animal(s) has been observed to leave the exclusion zone or has not been re-sighted within the exclusion zone for 30 minutes.

Please see the following sections for pile driving works outside of the least risk fisheries window (March 1 to August 14).

4.10 FISH PROTECTION

For activities located on, over or adjacent to water; the following mitigation measures will be applied to protect fish and fish habitat:

- Works will be conducted in accordance with a Letter of Advice from DFO, or *Fisheries Act* Authorization, if applicable
- In-water pile driving will occur within the VFPA approved work window, and avoid interfering with vessel traffic within the water lot; in-water work will be limited and conducted during low tide

where possible

- Works shall be carried out in such a manner as to avoid any adverse impacts on fish and fish habitats to the extent possible
- In-water activities or associated in-water structures will not interfere with fish passage or result in the stranding or death of fish. A QEP will confirm appropriate protocols are applied and applicable permits are obtained to capture and safely relocate fish, if necessary
- Potential deleterious substances (e.g., fine sediments, hydrocarbons, contaminants) will not be deposited into fish habitat
- Work will be conducted such that no contaminated water or other effluent potentially harmful to aquatic life enters the marine environment. Contaminated water or effluent may include silt laden water, concrete wash water, site run off, oil/fuel spills, sewage, etc.
- Environmental monitoring will be full time when works are under way that have the potential to adversely affect fish or fish habitat as required by permits issued for the project
- Sediment contained within piles after driving will be left in place unless authorized by VFPA environmental programs
- Water Quality (WQ): WQ monitoring will be completed at a reference site to determine if background WQ is below or above 50 nephelometric turbidity units (NTU). When below 50 NTU, induced turbidity at the site may not exceed 5 NTU above background. When above 50 NTU, induced turbidity may not exceed background by more than 10%
- Dredging activities will be managed to protect fish and fish habitat according to a VFPA-approved Dredge Environmental Management Plan (DEMP) provided by the Contractor

4.11 MARINE MAMMAL PROTECTION

Marine construction activities will include use of in-water vibratory hammer construction methods for steel pile installation where practical. The Contractor will develop and provide to Seaspan for review, a marine mammal management plan (MMMP) which describes:

- Marine mammals that may be present in the Inner Harbour
- Sound pressure thresholds relevant to behavioural disruption of marine mammals
- Marine mammal exclusion zones
- Monitoring during pile driving activities

Seaspan's construction Contractor will implement the monitoring program to reduce potential effects on marine mammals. Seaspan will continue to consult with DFO and VFPA in the development of the MMMP. Regardless, work will cease in the event that marine mammals are observed to be in distress within the vicinity of construction.

4.12 WORKS OUTSIDE LEAST RISK FISHERIES WINDOW

Least-risk fisheries windows are periods of time specified by DFO, when work in and about Burrard Inlet can be conducted with reduced risk to marine fish and fish habitats. For works between March 1 to August 15, 2021 or 2022, which fall outside of the least risk fisheries window, Seaspan or their Contractor will implement the following specific mitigation measures for the proposed pier work including:

- A QEP will be onsite full-time during impact piling activities, concrete pouring and any other construction activity as requested by Seaspan or as required by environmental permits to visually monitor the presence of fish (e.g. spawning herring, young salmon or schooled fish) at the site. Daily QEP observations will be conducted by Seaspan and provided in monitoring reports.
- Access to and survey of work areas offshore will be completed by boat or proximate to the work area. Reporting for the presence of marine species will be relayed to the construction team in the morning of each daytime shift
- In the event spawning herring, eulachon, surf smelt, or salmon are noted as present in the marine work area, the QEP will use their discretion to issue a stop work order based on fish

distribution, disturbance, life stage and behaviour (spawning)

- Pile driving activities will be monitored and will adhere to a conservative threshold for underwater peak sound pressure level of 20kPa (206 dB re 1 µPa) to prevent injury to marine fish at a distance of 10 m from pile driving
- Marine mammals will be visually monitored throughout construction activities with adherence to a defined marine mammal exclusion zone developed in consultation with DFO and VFPA. While working outside of the least-risk fisheries window, the thresholds noted for peak sound pressure level (peak sound pressure level of 20kPa [206 dB re 1 µPa])to prevent injury to marine fish at a distance of 10 m from pile driving noted) will supersede the thresholds noted within the Marine Mammal Management Plan (MMMP), i.e. the lower of the two thresholds will be used
- Crab salvage and relocation and reporting will be completed in work areas when opportunity permits based on the extent of pile driving or dredging activities to be undertaken, and the visual observation of fish in the pier construction area. The salvage will be confirmed with VFPA and the Contractor. Survey and salvage results will be reported in accordance with any permit or approval conditions

4.13 DREDGING ACTIVITIES

Seaspan has conducted dredging within the basin since acquiring the site in 1968. Dredging has been undertaken in 1968-69, 1975, 1989-1993, 2013 and most recently from 2016 to 2018. The proposed construction activities have to potential to increase turbidity levels in the water during construction, injure or kill invertebrate species potentially present on the seabed, and disturb contaminated sediment.

Seaspan, or their Contractor, will implement the following mitigation measures for dredging activities.

- Development of a dredging execution plan and dredge management plan for implementation of mitigation measures
- Monitoring of turbidity levels during construction based on the location of the equipment and the tidal current
- Use of a silt curtain within the basin and outfitting pier construction area to maintain turbidity levels within applicable CCME guidelines at 100 m from the construction area
- Use of an environmental clamshell bucket, except where alternatives are required and approved for use by the VFPA
- Handling procedures for barges that capture and separate process water from dredgeate, test process water for water quality, and treat if necessary prior to disposal.

4.14 ARCHAEOLOGICAL RESOURCES

An Archaeological Overview Assessment (AOA) was completed in 2020. The AOA noted that there are no risks to archaeological or historical resources within the Seaspan Project area.

Prior to development, the proposed Seaspan Outfitting Pier Project location would likely have been a focal activity area for resourcing gathering by Indigenous communities in the region, which is reflected in both proximity of recorded archaeological sites along Mackay Creek and by the ethnographically named places. However, the extensive development, including dredging and removal of the tidal mud flats would have displaced any physical evidence of past land use and occupation. Accordingly, the risk of impact to archaeological or protected historical resources is considered to be very low. Additional detailed archaeological studies or permitting is not recommended.

If a potential archaeological or heritage resource is encountered during construction, the work must be stopped in the vicinity of the find and the EM will notify the Project Manager. The Project Manager or their delegate will contact the BC Archaeological Branch and/or a professional archaeologist immediately. Should human remains be found, the Royal Canadian Mounted Police will also be contacted.

4.15 FUEL MANAGEMENT PLAN

The Fuel Management Plan shall include mitigation measures intended to provide for adequate protection of the environment from construction-related fuels and products at the terminal and as part of marine work methods. The mitigation measures described in Table 6 will be implemented for the Project. The Contractor will provide and maintain a Fuel Management Plan to be reviewed and approved by Seaspan for construction activities.

Table 4 Fuel Management Mitigation Measures

Category	Mitigation Measure
Spill coordinator	1. The Contractor will appoint a spill coordinator who has knowledge of spill mitigation, containment, and reporting procedures.
	2. The spill coordinator will keep an inventory of hazardous materials on site.
Training	3. The Contractor will provide on-site staff with training in the use of hazardous materials and the location and use of spill kits and containment booms.
	4. The Contractor will confirm on-site personnel know the location of spill kits, containment berms, and other spill control materials and that they are readily accessible.
Fuel handling guide	5. Fuel handling, storage, and labelling procedures shall be consistent with *A Field Guide to Fuel Handling, Transportation and Storage* (MWLAP 2002). If there are discrepancies between this CEMP and the Fuel Handling Guide (MWLAP 2002), the Project will err on the side of more stringent unless approved by the VFPA. 6. The Contractor will follow the guidance of the Seaspan procedure, Storage and Handling of Hazardous Wastes related to fuel handling.
Fuel	7. Where possible, fuel storage and equipment or machinery refueling, and servicing will occur a minimum of 30 m from Burrard Inlet. Where operational constraints require fuel storage, equipment or machinery re-fueling and servicing within 30 m of or on marine waters (e.g., on a barge/vessel), measures to prevent the release or spill of hazardous materials will be discussed with Seaspan and approved by the EM. Refueling procedures specific to marine equipment will be provided by the marine subcontractor(s) for the Fuel Management Plan.
	8. Storage of fuels and petroleum products will comply with safe operating procedures, including containment facilities in case of a spill.
	9. Portable fuel tanks (e.g., jerry cans) will be stored within leak-proof secondary containment with absorbent pads with a capacity of 110% of its volume. 10. Portable fuel tanks will be inspected for wear and leaks prior to be delivered to the site.
	11. Secondary containment will be placed under all fuel-bearing vehicles and equipment when non in-use
	12. Fuel storage, including secondary containment, shall be kept free and clear of collected rainwater and snowfall. Accumulated water in the containment shall be removed regularly, to not to diminish the capacity of the containment.
	13. While refueling, the operator will stay with the fuel nozzle. Smoking will not be permitted during refueling activities.

Table 4 Fuel Management Mitigation Measures

Category	Mitigation Measure
	14. Vehicles and equipment will be shut off while refueling.
	15. The Contractor's Fuel Management Plan will meet or exceed the standard of care of Seaspan's fueling procedure.
	16. Contractor may not fuel equipment in the 'No-Go' and 'Refuel with caution' areas unless approved in advance by the Environmental Manager.
Environmentally sensitive oil	17. Where possible, environmentally sensitive (e.g., biodegradable/food-grade/ environmentally friendly) oils, hydraulic fluids and lubricants that are non-toxic to aquatic life and that are readily or inherently biodegradable will be used in equipment and machines unless the Contractor can demonstrate to the VFPA that it is not feasible because of: a) Unavailability of biodegradable/food-grade/environmentally friendly oils and lubricants b) Technical performance issues/constraints c) Negative impacts on equipment d) Other reasons deemed acceptable to the VFPA

4.16 WASTE MANAGEMENT

Waste from Project activities has the potential to adversely affect the aquatic and terrestrial environments; to reduce this risk, the mitigation measures outlined in Table 7 will be implemented. The Contractor will provide and maintain a waste management plan to be reviewed and approved by Seaspan for construction activities. Copies of Seaspan's Hazardous materials reuse, removal, recycling and disposal plan will be appended to the CEMP.

Table 5 Waste Control Mitigation Measures

Category	Mitigation Measure
Waste	1. Waste or any miscellaneous unused materials will be recovered for either disposal in a designated facility or placed in storage. Under no circumstances will materials be deliberately thrown into the aquatic or terrestrial environment.
	2. On-site personnel will make best efforts to prevent debris from entering the aquatic environment.
	3. Litter in the form of coffee cups, lunch wrappers, cigarette butts, and other such items will be placed in covered trash containers.
	4. Construction debris/waste will be collected, transported, and disposed of off-site and in accordance with applicable legislation, guidelines, and best management practices.
Portable toilets	5. Portable toilets will be located a minimum of 30 m from any waterbody. Sewage from portable toilets will be disposed of in an approved sewage disposal facility on an as-needed basis.

Hazardous waste	6. Sorbent materials or soils saturated with hydrocarbons (greater than or equal to 3% by weight) are classified as hazardous waste under the British Columbia *Environmental Management Act* and will be managed by the Contractor accordingly.
	7. Used petroleum products, including their empty containers, will be collected by the Contractor and transported to a licensed recycling facility in approved storage containers following applicable regulations.
	8. Planning for demolition will consider the Seaspan EMS and the Hazardous materials reuse, removal, recycling and disposal plan. Generation and disposal of hazardous waste will be the Contractor's responsibility and meet or exceed the standard of care of Seaspan's hazardous waste procedures storage and handling, and disposal.

4.17 CONCRETE MANAGEMENT

Concrete pours will be required over water to install the piles and complete the deck slabs. Concrete wash water has the potential to raise the pH of water to levels that can be lethal or sub-lethal to fish and other marine organisms. To reduce this risk, the mitigation measures outlined in Table 8 will be implemented. The Contractor will provide and maintain a concrete management plan to be reviewed and approved by Seaspan for construction activities.

Table 6 Concrete Management Measures

Category	Mitigation Measure
Pours	1. Concrete will be carefully poured and distributed to minimize the potential spillage.
	2. Proper housekeeping and appropriate work site isolation techniques will be employed to minimize the potential for spills.
	3. Recently poured concrete will be kept covered for a minimum period of 72 hours if in contact with water or if precipitation is anticipated
Monitoring	4. An Environmental Monitor will take pH readings immediately adjacent to all areas of recent concrete pours to determine if pH remains in compliance with Canadian Water Quality Guidelines for the protection of Aquatic Life (marine).
Spill Response	5. Appropriate spill cleanup materials will be readily available, easily accessible, and in sufficient quantity on-site at all times during construction and deploy mitigation actions (such as CO_2 bubbler if necessary due to an increase in pH from background conditions due to recently poured concrete)
	6. Water that has contacted uncured or partly cured concrete or Portland cement or lime-containing construction materials shall not be permitted to enter the marine environment. Containment facilities shall be provided at the site for the wash-down water from concrete delivery, concrete pouring, and other equipment and activities as required.

5.0 EMERGENCY RESPONSE

A comprehensive Emergency Response Plan allows for the rapid response of emergency services and/or containment and clean-up of environmental emergencies. The following section provides an outline of the Emergency Response Plan that the Contractor is to provide and maintain during construction for Seaspan's review and approval.

The Project will also be required to undertake no less than two environment drills for every year of construction. These will be organized by the QEP with approval and coordination assistance from the Environmental Manager and the EM.

5.1 EMERGENCY COMMUNICATION

Efficient and concise communication reduces potential risk to crews, the public, property, and the environment in the event of emergencies. In the event of a release of dangerous goods (as defined by the BC *Spill Reporting Regulation*) to water or to land that is over the volume for the listed schedule of BC *Spill Reporting Regulation*, the VFPA will be contacted.

The Seaspan emergency contact list will be developed and kept up to date. The project-specific emergency and key contact list will be updated when a construction Contractor has been confirmed and will continually updated by the Environmental Manager. It is anticipated that the contact list will include the Project personnel listed in Table 3: Seaspan Contacts.

5.2 SPILL RESPONSE PLAN

A Seaspan-approved, appropriate spill prevention, containment, and clean up contingency plan for hydrocarbon products, sediment and other deleterious substances shall be put in place by the Contractor prior to construction commencing. Personnel working on the Project will be familiar with implementing the spill response plan and deployment of spill response materials.

In the event of a spill, the mitigation measures presented in Table 5 will be implemented.

Table 7 Spill Response and Reporting Mitigation Measures

Category	Mitigation Measures
Spill Response Materials	1. Spill response materials are required to be readily available when working on the Project. These materials include, but are not limited to: a. Spill kits b. Containment booms c. Personal protective equipment (e.g., nitrile gloves, safety glasses, suits) d. Fire extinguishers e. Shovels
	2. The Contractor will provide an appropriate number of spill kits on site. The suggested contents of a spill kit working on or near water is as follows: a. 100 sorbent pads (oil, gas and diesel) b. 100 universal sorbent pads suitable for water-based fluids (e.g., coolant) c. 25 kg of dry oil sorbent d. 4 x 4' (~1.2 m) sorbent linkable socks (oil, gas and diesel) e. 4 x 4' (~1.2 m) universal sorbent linkable socks (e.g., coolant) f. 4 x 10' (3 m) sorbent linkable floating booms g. 1 roll of 25 x 4 m polyethylene sheeting (for underlay) h. 10 heavy-duty plastic garbage bags i. Personal protective gear as required

Table 7 Spill Response and Reporting Mitigation Measures

Category	Mitigation Measures
	3. In addition to the spill kits on site, each piece of mobile equipment (e.g., cranes, concrete trucks) will have a spill kit. The suggested contents of the spill kit are as follows: a. Round-nose shovel or equivalent b. 2 x 4' (~1.2 m) sorbent sock/roll c. 20 sorbent pads (oil, gas and diesel) d. Heavy-duty plastic garbage bags e. Personal protective gear as required
	4. Spill kits will be inspected on a regular basis and refilled immediately after use.
	5. Appropriate spill containment and clean-up supplies shall be kept available on site whenever the works are underway. A large spill kit will be on site during marine operations and will contain enough booms to contain a major spill. Biodegradable hydraulic fluid will be used, where possible, in marine-based machinery.
Backup supplies	6. The Contractor will have adequate spill response supplies to maintain their spill kits.
Response	7. The EM and Contractor will provide immediate response to emergencies and incidents. 8. Initial response to the spill may include the following: a. Stop work b. Maintain your own safety and the safety of others c. Wear personal protective equipment, such as nitrile gloves and safety glasses d. Identify the spilled materials and refer to the material data safety sheet to determine if human health or ignition hazards exist e. If possible and safe to do so, contain the spill by any safe means possible (e.g., plug leak, close/isolate leaking valve) f. Obtain assistance of others g. Begin containment of the spill and stop it from spreading h. Clean up the spilled substance using available supplies from the on-site spill kits i. If the spill is to water, use measures such as installing sorbent rolls as floating booms to contain the spill and sorbent pads to soak up the material j. Report the spill to the EM, who will notify the VFPA k. The VFPA, Seaspan and the EM will determine if notification to regulatory agencies is required
Reporting	9. The EM is responsible for notifying regulatory agencies, including VFPA, of hazardous spills and to confirm the spill reporting meets provincial and federal requirements. The EM will report spills to water to the Port of Vancouver Operations Centre
	10. The *Spill Reporting Regulation* under the British Columbia *Environmental Management Act* identifies externally reportable quantities for certain substances. Refer to Appendix G for reportable quantities.

Table 7 Spill Response and Reporting Mitigation Measures

Category	Mitigation Measures
Environmental Incident/Non-Compliance	11. The Contractors EM will prepare an Environmental Incident/Non-Compliance Report in the event of a spill.
Compliance Report	12. The following information will be collected as it may be required when reporting a spill to regulatory agencies and will be included in the Environmental Incident/Non-Compliance Report: a. Reporting person's name and telephone number b. Name of the owner of the product that spilled or leaked and phone number c. Name and phone number of the person who caused the spill or leak d. Date and time of the spill or leak e. Description of the spill or leak f. Location of the spill or leak g. Receiving environment description h. Type of material spilled and quantity i. Source of spill or leak j. If the spill or leaked product is contained, and if not, where is it flowing k. Description of the response and when it occurred l. Percent of material recovered m. Details of further action required n. Recommendations for preventative/mitigation measures o. Names of other persons or agencies advised concerning the spill or leak

6.0 REFERENCES

British Columbia Marine and Pile Driving Contractors Association. March 2003. Best Management Practices for Pile Driving and Related Operations. Accessed December 2017 at: https://projects.eao.gov.bc.ca/api/document/5887e34fad20ac134d916367/fetch

British Columbia Water Quality Guidelines. Accessed April 2018 at: https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines

Butler, R.W., A.R. Couturier, and E. Dickson. 2015. Status and distribution of marine birds and mammals in Burrard Inlet and Indian Arm, British Columbia: 2011-2013. Bird Studies Canada and the Pacific Wildlife Foundation. Accessed January 2018 at: http://www.pwlf.org/mbbi.pdf.

Canadian Council of Ministers of the Environment. 1999. Canadian water quality guidelines for the protection of aquatic life. Accessed April 2018 at: http://st-ts.ccme.ca/en/index.html

MWLAP (Ministry of Water, Land and Air Protection). 2002. A Field Guide to Fuel Handling, Transportation and Storage. 3rd Edition. Accessed April 2018 at: http://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/oilandgas/fuel_handle_guide.pdf Accessed November 2015.

Vancouver Fraser Port Authority. 2018. Project & Environmental Review Guidelines—Construction Environmental Management Plan (CEMP). Vancouver, British Columbia. Accessed April 2018 at: https://www.portvancouver.com/wp-content/uploads/2018/04/PER-Construction-Environmental-Management-Plan-CEMP-Guideline-UPDATE.pdf

A. CCME GUIDELINES, BC CSR STANDARDS AND BC WATER QUALITY GUIDELINES FOR MARINE AND ESTUARINE ENVIRONMENT

CEMP Appendix A

CCME and BCWQG Marine Water Quality Guidelines and BC CSR groundwater standards for Reference

		Aquatic Marine Guidelines and Standards				
Parameter	**Unit**	**CSR Schedule 3.2 AQ Marine** [csr1]	**CCME Marine Aquatic Life - Long Term**[SN]	**CCME Marine Aquatic Life - Short Term**[SN]	**BCMOE-WQG-A-M-MEAL Long Term**	**BCMOE-WQG-A-M-MEAL Short Term**
pH	pH units		7.0 to 8.7		7.0 to 8.7	
Benzene	ug/L	1000	110		110 [bc11]	
Toluene	ug/L	2000		215		
Ethylbenzene	ug/L	2500	25		250 [bc12]	
Xylenes, Total	ug/L	300				
Suspended sediments [SS]	mg/L		Δ 25mg/L	Δ 25mg/L		
Turbidity [T]	NTU		Δ 8 NTU	Δ 8 NTU		
Total arsenic	ug/L	125	12.5		12.5 [bc13]	
Total boron	ug/L	12000			1200	
Total cadmium	ug/L	15	0.12		0.12	
Total chromium, hexavalent (Cr(VI))	ug/L	15	1.5			
Total chromium, trivalent (Cr(III))	ug/L	560	56			
Total cobalt	ug/L	40				
Total copper	ug/L	20			3	2
Total inorganic mercury	ug/L	0.25	0.016			
Total lead	ug/L	20			140	≤ 2
Total molybdenum	ug/L	10000				
Total nickel	ug/L	83				
Total selenium	ug/L	20			2	
Total silver	ug/L	15		7.5	3	1.5
Total thallium	ug/L	3				
Total uranium	ug/L	85				
Total zinc	ug/L	100			55	
1,2,4-Trichlorobenzene	ug/L	54	5.4			
Acenaphthene	ug/L	60			6	
Acridine	ug/L	0.5				
Anthracene	ug/L	1				
Benzo(a)anthracene	ug/L	1				
Benzo(a)pyrene	ug/L	0.1			0.01	
Chrysene	ug/L	1			0.1	
Di(2-ethylhexyl) phthalate	ug/L	160				
Fluoranthene	ug/L	2				
Fluorene	ug/L	120			12	
Hexachlorobutadiene	ug/L	15				
Methylnaphthalene, 2-	ug/L				1	
Naphthalene	ug/L	10			1	
Phenanthrene	ug/L	3				
Pyrene	ug/L	0.2				

CEMP Appendix A

Notes:

csr1	British Columbia Contaminated Sites Regulation Schedule 3.2 Generic Water Quality Standards for the protection of marine and estuarine aquatic life
CCME Marine	Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Marine Aquatics
BCMOE-WQG-A-M-MEAL	British Columbia Ministry of Environment Interim and Approved Water Quality Guidelines for the protection of Marine and Estuarine Aquatic Life
	Measurements of pH, Temperature, and salinity as well as analysis of hardness (mg/L CaCO3) are required for application of standards
SN	see narritive on CCME website, Short term exposures are considered limited events while long term exposures are of indefinate length.
bc11	Interim CCME guideline.
bc12	Revised interim BC guidelines based on review of CCME Water Quality Guidelines for Ethylbenzene.
bc13	Interim guideline
SS	**Suspended sediments** ***clear flow*** Maximum increase of 25 mg/L from background levels for any short-term exposure (e.g., 24-h period). Maximum average increase of 5 mg/L from background levels for longer term exposures (e.g., inputs lasting between 24 h and 30 d). ***high flow*** Maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L. Should not increase more than 10% of background levels when background is ≥ 250 mg/L.
T	**Turbidity** ***clear flow*** Maximum increase of 8 NTUs from background levels for a short-term exposure (e.g., 24-h period). Maximum average increase of 2 NTUs from background levels for a longer term exposure (e.g., 30-d period). ***high flow or turbid waters*** Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs. Should not increase more than 10% of background levels when background is > 80 NTUs.

References:

BC Ministry of the Environment and Climate Change Strategy. 2018. British Columbia Water Quality Guidelines. Accessed April 2018 at: https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-

Canadian Council of Ministers of the Environment. 2018. Canadian water quality guidelines for the protection of aquatic life. Accessed April 2018 at: http://st-ts.ccme.ca/en/index.html

Contaminated Sites Regulation Schedule 3.2 Generic Numerical Water Standards accessed April 2018 at: http://www.bclaws.ca/civix/document/id/lc/statreg/375_96_08#Schedule3.2

B. SPILL RESPONSE PROCEDURES AND REPORTING FORM

CEMP Appendix B

ACTIVITIES FOR SPILLS TO LAND

Activity	Responsibility
Take immediate action to stop or reduce the spill and contain it, without endangering the health and safety of workers or local populations (e.g. right tipped or fallen containers, plug holes or leaks, replace stoppers or lids, etc.). Never attempt to handle unknown chemicals.	Subcontractor Workers and Line Supervisor
Immediately notify Contractor's Environmental Monitor	Subcontractor Line Management
Immediately notify Seaspan Environmental Monitor by cell phone/radio	Contractor's Environmental Monitor
Immediately Contractor's Environmental Monitor with details including: ♦ Approximate volume and fluid type ♦ Area of incident ♦ Type of equipment ♦ Cause of spill ♦ Subcontractor and contact person ♦ Is incident under control?	Subcontractor Line Management
Initiate chain of notification, call Seaspan Environmental Manager	Contractor's Environmental Monitor
Depending on the volume and material spilled, report the spill to Emergency Management BC by telephoning 1-800-663-3456.	Seaspan Environmental Monitor
Contain spill by constructing earthen berms, or by using sand bags or response materials. Apply absorbent materials to minimize impact to surface soil. Photograph and document the scene.	Subcontractor after consultation with Contractor's Environmental Monitor
Observe incident response on behalf of Seaspan, advise Contractors Monitor of any suggestions	Seaspan Environmental Monitor
Barricade the area until corrective actions are complete	Subcontractor Line Management
Remove the spilled material, including any contaminated soil. Remove any free liquid through absorption, bailing, vacuuming, pumping etc. Spills > 100 L will require confirmatory sampling. Mark the location of the spill so followup monitoring can occur	Subcontractor Line Supervision, after consultation with Contractor's Environmental Monitor
Contain and dispose of the waste as described in the Contractor Waste Management Plan. Re-stock used equipment. Clean or properly dispose of all machinery, tools and/or supplies used to pick up material.	Subcontractor Site Management
Initial Written Notification (electronic within 4 hours) sent to Contactor's HSE and Contractor's Environmental Monitor	Subcontractor Site Management
Within 48 hours, complete an *Incident Investigation Report*	Subcontractor Site Management

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ACTIVITIES FOR SPILLS TO WATER

Activity	Responsibility
Take immediate action to stop or reduce the spill and contain it, without endangering the health and safety of personnel or local populations (e.g. right fallen containers, plug holes or leaks, replace stoppers or lids, prevent downstream migration etc.). Never attempt to handle unknown chemicals.	Subcontractor Workers and Line Supervisor
Immediately notify Seaspan's Environmental Monitor	Contractor's Environmental Monitor
Immediately notify Marine Spill Response Contractor (TBD) from Monday to Friday 9:00 am to 5:00 pm. Emergency After Hours (TBD) ♦ Approximate volume and fluid type ♦ Area of incident ♦ Type of equipment ♦ Cause of spill ♦ Contractor and contact person Is incident under control?	Contractor's Environmental Monitor
Initiate chain of notification, call Seaspan Environmental Manager	Contractor's Environmental Monitor
Report the spill to Emergency Management BC by telephoning 1-800-663-3456.	Seaspan Environmental Monitor
Apply absorbent booms or deploy marine containment booms to prevent further contamination or migration of surface water. Block culverts, ditches, and drains. Use scare tactics if spill is in close proximity to marine birds.	Subcontractor after consultation with Contractor's Environmental Monitor
Observe incident response on behalf of Seaspan, advise Contractor's Environmental Monitor of any suggestions	Seaspan Environmental Monitor
Barricade the area until corrective actions are complete.	Subcontractor Line Management
Remove the spilled material, including any contaminated soil. Remove any floating liquid through absorption, bailing, vacuuming, pumping etc. Clean up downstream shorelines. Confirmatory samples will need to be taken by Contractor's Environmental Monitor	Subcontractor Line Supervision, after consultation with Contractor's Environmental Monitor
Contact Western Canada Marine Response if assistance is needed. (1-855-294-9116)	Subcontractor Site Management
Contain and dispose of waste as described in the Contractor Waste Management Plan.	Subcontractor Site Management
Initial Written Notification (electronic within 4 hours) sent to Contractor's Environmental Monitor	Subcontractor Site Management
Complete and submit *Incident Investigation Report* within 48 hours.	Subcontractor Workers and Line Supervisor

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REPORTABLE VOLUMES FOR SPILLS TO THE ENVIRONMENT

Fluid	Active Ingredient	Packaging	Spill Threshold Notes 3 & 4	Possible Locations
1. Deleterious Substance [Note 1]	Any	none	Any amount	Burrard Inlet
2. "Listed substance" [Note 2]	Any	Various	Any amount	Burrard Inlet
3. Antifreeze [Note 4]	90-99% ethanediol (ethylene glycol)	205 Litre Drum	5 L	Heavy Duty Shop
4. R-134A, R-22, R- 410 A	Refrigerant	Unit reservoirs	10 kg	HVAC units
5. Gasoline or Diesel Fuel (Class 3)	Fuel	tanks	100 L	Mobile equipment
6. Varsol (Class 3)	70-100% Mineral Spirits	205 Litre Drum	100 L	Lube Shed
7. Waste Oil	Oil	5000 Litre Drum	100 L	Lube Shed Tank
8. New Oil (e.g. Automatic Transmission Fluid, XD3 0W – 40 Oil, Essa Trans 30 Oil, Univis Bio 40 Oil, Mobilgear SGC – 150 Oil	Oil	205 Litre Drum to 2400 Litre Totes	100 L	Lube Shed
9. Fluid Film Liquid A	Oil	205 Litre Drum	100 L	Oil Storage Facility (OSF)
10. Soil-Cement	Acrylic & Vinyl Acetate polymer	1000 Litre Tote	200 L	Near Gas Fueling Station
11. Aersol Paint (Class 2.1)	Light Hydrocarbons	12 to 16 oz cans	10 kgs	Stores
12. Flammable Paint (Class 3)	Solvents	Open Pail, etc	100 L	Outside Construction
13. Corrosive Resins (Class 8)	Expoxy Resin	500ml to 38 L containers	5 kg or 5 L	Stores
14. Lead Acid Battery (Class 8)	Lead and Sulphuric Acid	Size of battery	5 kg or 5 L	Stores

Note 1: per *Fisheries Act*: A deleterious substance is substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water, so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water.

Note 2: per *BC Spill Reporting Regulation*: A substance listed in the Schedule of the *BC Spill Reporting Regulation* identified as Items 1 to 24 (in the schedule) but not including item 25 natural gas. This may include but not limited o dangerous goods from Class 1 to Class 9, hazardeous wastes as defined in the Hazardeous Waste Regulation such as waste oil, PCBs, and leachable toxic waste, or other substances which can cause pollution or are deleterious as described in Note 1.

Note 3: Limits are based on the definition of deleterious substance in the *Fisheries Act, the Transportation of Dangerous Goods Regulations*, and the *BC Spill Reporting Regulation* (187/2017), as amended or replaced from time to time.

Note 4: At this time, there is no limit for ethanediol – however before the federal classification change in 2010, the limit was 5 L. BC MoE is considering reclassifying waste ethanediol solutions as hazardous waste, so 5 litres is the reportable volume at Seaspan.

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SPILL REPORT FORM

Once the spill is contained, complete this form and submit to Manager of Engineering & Environment.

Date/Time: _____

Reported by (name/position/phone): _____

Spill Information (Location, Substance, etc...):

_____

_____

_____

Quantity: _____

Cause & Effect of Spill: _____

Measures Taken to Stop/Contain/Minimize Spill: _____

_____

_____

Clean-up Plan:

_____

_____

Clean-up Team:

_____

_____

Seaspan Personnel First Notified:

Director of Engineering & Environment_____o

Head Foreman_____o

Guard House Security_____o

Other_____o

Signature:_____**Date**