



## **ENVIRONMENTAL MANAGEMENT PLAN**

### **Esquimalt Graving Dock South Jetty Reconstruction Project Esquimalt, BC**

**Prepared for:**

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## LIST OF ACRONYMS

BCMPDCA	British Columbia Marine and Pile Driving Contractors Association
BMP	Best Management Practices
DFO	Fisheries and Oceans Canada
DND	Department of National Defence
<del>DPM</del>	<del>Deputy Project Manager</del>
DR	Departmental Representative
EC	Environment Canada
EEE	Environmental Effects Evaluation
EGD	Esquimalt Graving Dock
EIR	Environmental Incident Report
<del>EM</del>	<del>Environmental Monitor</del>
EMBC	Emergency Management BC
EMIP	Environmental Monitoring Implementation Plan
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
ESCP	Erosion and Sediment Control Plan
H <sub>2</sub> S	Hydrogen sulphide
HWM	High Water Mark
MWLAP	Ministry of Water, Land and Air Protection
MOE	Ministry of Environment
MSDS	Material Safety Data Sheets
PAH	Polycyclic Aromatic Hydrocarbon
PCO	Project Coordination Officer
PPE	Personal Protective Equipment
PSPC	Public Services and Procurement Canada
PWGSC	Public Works and Government Services Canada
QEP	Qualified Environmental Professional <b>hired by the Contractor</b>
QAEM	<b>Quality Assurance Environmental Monitor</b>
QHM	Queens Harbour Master
SBPISW	Standards and Best Management Practices for Instream Works
<del>SPM-O</del>	<del>Senior Project Manager — Operational (also acts as the DR)</del>
<del>SPM-T</del>	<del>Senior Project Manager — Technical</del>
TC	Transport Canada
<del>TRB</del>	<del>Temporary Resuspension Barrier</del>
VNHS	Victoria Natural History Society
WHMIS	Workplace Hazardous Materials Information System
WQMP	Water Quality Monitoring Plan

## UNITS

cm	Centimetre
dB	Decibel
kPA	Kilo Pascal
m	Metre
m <sup>2</sup>	Square metre
m <sup>3</sup>	Cubic metre
NTU	Nephelometric Turbidity Units
µg/m <sup>3</sup>	Micrograms per cubic meter

## 1. INTRODUCTION

This Environmental Management Plan (EMP) was prepared by Keystone Environmental Ltd. (Keystone Environmental) on behalf of Public Works and Government Services and Procurement Canada (PWGSC/PSPC) for the Esquimalt Graving Dock (EGD) South Jetty Reconstruction Project (the Project), located on the north shore of Constance Cove, in Esquimalt Harbour, Vancouver Island (Appendix A, Figure A1). The EMP was adapted in part from the EGD Phase 2 South Jetty Under-Pier Sediment Remediation Project EMP prepared by G3 Consulting Ltd. (G3, 2014) for PWGSC/PSPC Public Works Government Services Canada (PWGSC).

The Contractor will be responsible for compliance with all applicable environmental protection measures. Regardless of company affiliation or source, all subcontractors are subject to the same rules and regulations as the Contractor and must abide by the conditions of regulatory approvals obtained for the reconstruction works. This EMP applies to all Contractors involved in the Project and any personnel, whether working for the Contractor or observing/monitoring on-Site during reconstruction works. Thus, where the word “Contractor” is used, it applies to any company or personnel as described above.

### 1.1 Project Description and Schedule

The EGD is located at 825 Admirals Road in Constance Cove, in Esquimalt Harbour, Esquimalt BC. The South Jetty is located at Universal Transverse Mercator (UTM) coordinates 10U 0468483E 5364805N (Latitude 48.435640, Longitude 123.425891). The Project works will occur within the Project Area as shown in the Herold (2016) Site Plan (Appendix A).

The objective of the Project is to reconstruct the South Jetty wharf structure that was demolished in 2015/2016 as part of the Phase 2 waterlot remediation works recent completed at the Site. Construction of the new South Jetty will involve driving new steel piles in a grid pattern, the construction of a new deck out of pre-cast and cast-in-place concrete, and the integration of the various mechanical, electrical and water services (Herold, 2016). The tug boat wharf in the southeast corner of the Project Area and the east end approach will be redesigned and rebuilt to suit the EGD facility’s current and future needs.

The South Jetty structure will be supported by steel pipe piles (installation method to be determined by the Contractor). Piles will be driven through the remediated area with the capping material either conserved or replaced. Formwork, rebar and tremie concrete (for displacement pile caps next to the timber crib) will be placed underwater by divers (Golder, 2012). Reinforced concrete pile plugs (connection of piles to cap beams), pre-cast concrete cap beams, pre-cast utilidor sections, and pre-cast fender panels (includes grouting) will be installed in the intertidal area. Installation of pre-cast concrete beams (for deck support, includes grouting), formwork, rebar and concrete for cast-in-place deck slab above the High Water Mark (HWM).

Based on preliminary design drawings and information provided in Appendix A by Herold (2016), the Project Area encompasses an area of approximately 23,850 m<sup>2</sup> with two work areas defined within the Project Area: the south jetty section (approximately 95 m by 56 m and 5,320 m<sup>2</sup>) and the west jetty section (approximately 24.5 m by 220 m and 5,390 m<sup>2</sup>). The substrate elevation

within the Project Area ranged from approximately -12.0 m to 5.0 m chart datum prior to dredging and capping works as shown in Appendix A (Herold, 2016).

Herold (2016) outlined the following Project works; **however, the contractor should refer to specifications issued for tender:**

- Driving 67 (+/- 3) – 914 mm diameter steel piles.
- Driving 140 (+/- 3) – 762 mm diameter steel piles.
- Precast concrete pile caps fabricated offsite to be installed on piles, including seven precast caps installed at the mud line with cast in place securements.
- Precast concrete deck panels fabricated offsite to be installed on pile caps.
- Cast in place concrete topping slab to be poured above deck panels.
- Construction of cast in place concrete retaining wall at east end within upper intertidal zone.

In the intertidal area at east approach, granular sub-base foundation will be placed and compacted for concrete retaining wall, as well as formwork, rebar and concrete for cast-in-place retaining wall (Golder, 2012a; G3, 2014c; PWGSC, 2014). Under-deck stormwater drainage pipework, fenders, mooring bollards, wharf ladders, utility kiosks, and miscellaneous deck hardware will be installed (Golder, 2012a; PWGSC, 2014).

Minor earthworks will also occur within the upper intertidal zone to tie in the new East Approach retaining wall with the existing retaining wall with the in the northeast corner of the Project Area (see Appendix A). From these works, approximately ~~900 m<sup>3</sup> of excavated material will be stockpiled on site, tested for potential contaminants and disposed accordingly~~ 925 m<sup>3</sup> (refer to issued for tender specifications) of material will need to be characterized, excavated, and transported off-site for disposal at authorized facilities.

In addition to these works, the tug boat facility (i.e., float) at the east approach of the South Jetty will be ~~reinstalled with new piles~~ **reconstructed (new)**.

The reconstruction of the South Jetty is scheduled to begin in ~~October, 2016~~ **2017** and continue for approximately year and a half (refer to specifications issued for tender) until ~~April 2018~~.

## 1.2 Review, Permitting and Applicable Legislation

The following federal, provincial and municipal regulatory requirements have been considered during the preparation of this EMP.

### 1.2.1 Federal Acts

Construction activities shall be conducted in accordance with federal Acts and Regulation, including the following:



**Table 1-1 Federal Acts**

Federal Act	Regulation/Schedule
<i>Canada Marine Act</i> , 1998 (amended 2014)	Natural and Man-made Harbour Navigation and Use Regulations
<i>Canada Shipping Act</i> , 2001 (amended 2013)	Collision Regulations
<i>Canadian Environmental Assessment Act</i> , 2012 (amended 2013)	Regulations Designating Physical Activities
<i>Canadian Environmental Protection Act</i> , 1999	
<i>Constitution Act</i> 1982	
<i>Fisheries Act</i> , 1985 (amended 2013)	Marine Mammals Regulations
<i>Migratory Birds Convention Act</i> , 1994	Migratory Birds Regulations
<i>Navigation Protection Act</i> , 2014 (formerly the <i>Navigable Waters Protection Act</i> , 1985)	Navigable Water Works Regulations
<i>Species At Risk Act</i> , 2003 (amended 2013)	Schedule 1 – List of Wildlife Species at Risk
<i>Transportation of Dangerous Goods Act</i> , 1992 (amended 2009)	

### 1.2.2 Provincial Acts

While works are being conducted on a federally-managed site, provincial acts and regulations may apply to aspects of the work depending on the Contractor's methodology. The Contractor will be responsible for complying with any applicable provincial requirements, which may include the following:

**Table 1-2 Provincial Acts**

Provincial Act	Regulation/Code
<i>Environmental Management Act</i> , 2003	Contaminated Sites Regulation
	Spill Reporting Regulations
	Hazardous Waste Regulation
	Industrial Non-hazardous Waste Landfills Code of Practice
<i>Heritage Conservation Act</i> , 1996	
<i>Wildlife Act</i> , 1996	

### 1.2.3 Regional & Municipal Bylaws

Construction activities must be carried out using methods that comply with regional and municipal bylaws (where applicable). The following bylaws have been considered in the EEE: **These include but are not limited to:**

**Table 1-3 Regional and Municipal Bylaws**

<b>Bylaw</b>
Capital Regional District (CRD). 2006. Capital Regional District (CRD) Sewer Use Bylaw No. 2922 (Consolidated).
City of Colwood. 1986 (amended 1992). Bylaw No. 38 – A Bylaw to Regulate Noise within the City of Colwood.
Corporation of the Township of Esquimalt (Township of Esquimalt). 2005. Streets and Traffic Regulation Bylaw, 2005, No. 2607 (Consolidated)
Corporation of the Township of Esquimalt (Township of Esquimalt). 2007. Official Community Plan.
Corporation of the Township of Esquimalt (Township of Esquimalt). 2014. Maintenance of Property and Nuisance Regulation, 2014, No. 2686.

*1.2.4 Permits and Approvals*

Permits and/or approvals for the Project will be included in Appendix B as they become available.

**1.3 Objectives of the EMP Environmental Management Plan**

The main objectives of this EMP are the protection of environmental resources that could be potentially impacted during the works. The EMP provides a framework through which potential environmental risks will be managed during the reconstruction of the South Jetty (G3, 2014). Specifically, the EMP identifies:

- Regulatory obligations that will govern Project implementation;
- Roles and responsibilities of PWGSC/PSPC and its agents and Contractors that will undertake the work;
- Mitigation measures, Best Management Practices (BMPs), established protocols and measurable environmental requirements to be applied; and
- Monitoring to be undertaken to verify that the work is being carried out in accordance with regulatory and contractual obligations.

This EMP addresses risks identified for the Project works as well as those identified through the engineering design process. Additionally, the EMP is a living document, which provides for adaptive management should subsequent risks be identified.

#### 1.4 Environmental Protection Plan (from G3, 2014)

Prior to commencement of the Project, an Environmental Protection Plan (EPP) is to be prepared by the Contractor(s) implementing the work to document Site and activity-specific details of planned work procedures and mitigation actions (including methods, equipment and approaches) to be implemented during the work to achieve compliance with regulatory approvals for the Project, contract requirements, and this EMP. The EPP will provide the following general information:

- Organization chart and names of persons responsible for EPP implementation and compliance;
- Names and qualifications of persons responsible for manifesting waste to be removed from site;
- Contingency procedures in the event that environmental protection goals are not being met;
- Methods for monitoring vessels and barges for leakage; and
- Site layout figures and supporting schematics (e.g., showing work and laydown areas).

The Contractor will be responsible for preparing an EPP specific to their assigned activities, which may include, but not be limited to, the following components:

- Wastewater Management and Disposal Plan, including management and/or discharge of wastewater derived from construction activities and personal hygiene and decontamination facilities on-site;
- Pollution Control Plan;
- Stormwater Pollution Prevention Plan;
- Temporary Erosion and Sedimentation Control Plan;
- Sustainable Remediation Efforts (e.g., equipment management, energy and air emissions, Waste Management Plan, energy reduction);
- Noise/Light Control;
- Water Quality Control Plan, including proposed working practices and Temporary Re-suspension Barrier Control Plan (if applicable);
- Waste Reduction Work Plan;

A Water Quality Monitoring Plan (WQMP) has also been incorporated into Section 6.1.5. The WQMP provides water quality monitoring criteria for implementation of management action, decision frameworks and identifies monitoring locations and rationale.

## 2. ENVIRONMENTAL SETTING

This section provides a summary of the resources and uses at the Project Area.

### 2.1 Aquatic Resources

As a result of historic shoreline modifications and contamination, biological communities demonstrate low abundance and diversity of macroalgae and benthic invertebrates (Golder, 2012a). No kelp beds, eelgrass or clam beds were observed within the Project Area.

Rockfish (*Sebastes* spp.), Pacific herring (*Clupea pallasii*) and Pacific salmon species (*Oncorhynchus* spp.) have been observed in the EGD and surrounding Waterlot; however, finfish observations have been infrequent and dominated by flounders and sculpins (Archipelago, 2009; unpublished EGD records).

Harbour seals (*Phoca vitulina richardsi*), northern river otter (*Lontra canadensis*) and California (*Zalophus californianus*) and Steller sea lions (*Eumetopias jubatus*) have been observed in Esquimalt Harbour; however, use of the Work Site appears to be transitory. Cetaceans such as resident and transient (*Bigg's*) killer whales (*Orcinus orca*), harbour porpoise (*Phocoena phocoena*) and Dall's porpoise (*Phocoenoides dalli*) are known to occur in coastal regions of southern Vancouver Island; however, they are unlikely to occur in Esquimalt Harbour (G3, 2014).

### 2.2 Terrestrial Resources

Project works will be primarily marine-based, with terrestrial ecological resources potentially affected confined to birds and small vertebrates (G3, 2014). Birds observed in, and adjacent to, Esquimalt Harbour included loons, grebes, cormorants, herons, swans, geese, ducks, gulls and passerines, among others (VNHS, 2013). These birds may traverse and forage in the Work Site; however, most are unlikely to nest due to limited habitat.

Passerine birds may nest adjacent to the Project Area in trees and shrubs along the foreshore. Barn swallows (*Hirundo rustica*), a provincially blue-listed species, may nest under the South Jetty; however, as indicated below, no old or active nests were observed during a field assessment in 2010 (Golder, 2010).

Terrestrial wildlife species including deer, raccoons and mink have been observed within the EGD property (G3, 2014). The area may be used as breeding or foraging grounds or for passage to other areas. Intertidal areas are often used by raccoons and other small vertebrates for foraging; however, the Phase 2 Project Area would provide a small portion of their diet given that the intertidal area is of low quality and highly disturbed (G3, 2014).

### 2.3 Species at Risk

Federally or provincially listed aquatic species that could occur within the Project Area (G3, 2014) include:

- Northern abalone (*Haliotis kamtschatkana*);

- Olympia oyster (*Ostrea conchaphila*)
- Steller sea lion (*Eumetopia jubatus*);
- Harbour porpoise (*Phocoena phocoena*); and,
- Killer whale (*Orcinus orca*; Northeast Pacific southern resident population and West Coast transient [Bigg's] population).

Terrestrial species listed as at risk that could possibly occur in the Project Area (G3, 2014) include:

- Barn swallow (*Hirundo rustica*);
- Brandt's (*Phalacrocorax penicillatus*) and double-crested (*P. auritus*) cormorants;
- Caspian tern (*Hydroprogne caspia*);
- Common murre (*Uria aalge*);
- Great blue heron (*Ardea herodias fannini*);
- Marbled murrelet (*Brachyramphus marmoratus*); and,
- Purple martin (*Progne subis*).

## 2.4 Archaeological Resources

Based on an archaeological overview assessment (Golder, 2012b), and Archaeological Impact Assessment (AIA) conducted in November 2014 (Golder, 2015), no historically significant material was identified at the Project Area. It is unlikely archaeological resources may be uncovered during the works; however, chance find procedures should be implemented. Under such protocols, work will be suspended if suspected archaeological resources are encountered, the Department of National Defence (DND) and other appropriate authorities will be notified, and a management plan will be developed for protection of the resources. If human remains are found, the local Royal Canadian Mounted Police (RCMP) detachment should be notified.

## 2.5 Navigation Resources

Esquimalt Harbour is administered by DND and governed by the *Canada Marine Act*, Natural and Man Made Harbour Regulations (pursuant to the *Canada Marine Act*) and local Practices and Procedures (Government of Canada, 2014). The harbour is open to the public within the limitations set out in an Order in Council with respect to Controlled Access Zones that provide for security zones around warships berthed or moving in the harbour. Vessels entering or departing Esquimalt Harbour are requested to contact Queens Harbour Master (QHM) Operations. Given that ship repair may take place at all times, ships frequently navigate in and out of the Project Area, and emergency docking of ships at the graving dock may need to occur during the Project (G3, 2014).

### 3. ROLES AND RESPONSIBILITIES

#### 3.1 ~~Public Works and Government Services Canada~~ **PSPC Department Representative**

As the proponent of the Project, ~~PWGSC~~ **PSPC** has the overall responsibility for the Project and the following obligations:

- Administration of contracts;
- Construction management and confirmation of Contractor compliance with plans and contract requirements, including those related to environmental protection;
- Verifying compliance with terms and conditions of regulatory permits, approvals and Authorizations as mandated under federal and provincial legislation;
- Managing communications and relations with EGD Operations and tenants, public stakeholders, regulatory agencies and First Nations; and
- Coordinating review of the Contractor's EPP.

~~EGD staff, the contractors designated Environmental Monitor, and Contractor implementing, inspecting and reporting on the effectiveness of the environmental protection and mitigation measures will follow directions and correspondence through PWGSC representative:~~

The PSPC Department Representative (DR) for this project will be confirmed by the PSPC Contracting Officer following contract award and may be the senior project manager (as below) or another designated person.

Mr. Patrick V. Truong, P. Eng., **Alex Taheri**  
Senior Project Manager  
Public Works and Government Services and Procurement Canada  
219 – 800 Burrard Street, Vancouver, BC V6Z 0B9  
E-Mail [Alex.Taheri@tpsgc-pwgsc.gc.ca](mailto:Alex.Taheri@tpsgc-pwgsc.gc.ca)

#### 3.2 **PSPC Environmental Services**

PSPC Environmental Services will report to the DR and provide environmental support for the project. PSPC Environmental Services will be responsible for securing the services of a qualified professional to act as their Quality Assurance Environmental Monitor (QAEM).

The PSPC Environmental Services contact for PSPC for this project will be:

Mr. Andrew Mylly  
Senior Environmental Specialist  
Public Services and Procurement Canada  
219 – 800 Burrard Street, Vancouver, BC V6Z 0B9  
E-Mail [Andrew.Mylly@tpsgc-pwgsc.gc.ca](mailto:Andrew.Mylly@tpsgc-pwgsc.gc.ca)

### 3.3 Contractors

The Contractor will be responsible for the actions of their agents, employees and sub-contractors and will undertake all reasonable actions to have environmental protection measures in place and working effectively throughout construction, staging, and laydown areas. The Contractor is responsible for:

- Adhering to requirements set forth in any regulatory document (e.g., legislation), and all contract requirements, including this EMP **to ensure the contractors work activities are in compliance with the environmental requirements of the contract and applicable legislation.**
- Undertaking effective communication with work crews and sub-contractors such that environmental responsibilities and requirements are understood prior to the commencement of work, and are implemented during the work. This will include disseminating information from orientation and other meetings to personnel not in attendance at those meetings.
- Retaining an appropriately ~~qualified person~~ **qualified environmental professional (QEP)** to prepare the EPP and evaluate performance against the requirements outlined in regulatory documents and BMPs, as well as environmental protection goals provided in this EMP and contract requirements. **The Contractor's QEP will also be responsible for environmental monitoring during the work.**
- ~~Retaining an appropriately qualified environmental monitor to the satisfaction of PWGSC.~~
- Implementing and conducting work activities in a manner that adheres to the water quality criteria detailed in the WQMP (Section 6.1.5).
- Using equipment and implementing work procedures and controls to prevent and/or reduce work-related disturbance to environmental, social, heritage, archaeological and cultural resources.
- Implementing General and Activity Specific BMPs as defined in Section 6 and Appendix C, Appendix D and Appendix E of this EMP.
- Implementing preventative and corrective measures in response to non-conformance with stated criteria (i.e., WQMP criteria), regulatory documents and the contract requirements including this EMP.
- Responding immediately to emergencies and incidents as defined in Section 4 of this document.
- Reporting and documenting all environmental incidents, as outlined in this EMP.
- Incorporating environmental protection strategies into the design and planned work practices.
- Correcting deficiencies and non-compliance upon direction from the DR.
- Conducting routine visual checks on vehicles, fuels storage areas, and equipment at the start of each day to identify potential equipment leaks.
- Remaining on call to respond to environmental issues.
- Providing individuals that are appropriately trained and equipped to respond to environmental incidents, such as spills.
- Conducting quality assurance sampling when required.

- Reporting all water quality data collected in weekly reports to ~~PWGSC~~**PSPC** (daily reports in the event of exceedances of the acceptable criteria, such as water quality or underwater pressure during pile driving).

The Contractor has yet to be determined.

### 3.4 ~~Environmental Monitor~~ **Contractor's Qualified Environmental Professional**

~~In addition to the Contractor's appropriately qualified person~~ The Contractor will retain an ~~Environmental Monitor~~ **the services of a QEP to act as part of their team. The QEP will report directly to the Contractor, and the Contractor will report directly to PSPC DR.**

**The QEP will be responsible for assisting the Contractor with environmental planning and compliance throughout the project. This includes confirming to confirm that environmental management measures and controls are implemented in accordance with regulatory documents, environmental components of the contract requirements, including this EMP and WQMP water quality criteria, as well as the EPP prepared by the Contractor's QEP. Environmental monitoring tasks are to be conducted by, or under the supervision of, a Qualified Environmental Professional (QEP) The QEP will conduct environmental monitoring following procedures outlined in the Environmental Monitoring Implementation Plan (EMIP) in Section 5.**

For the purposes of this EMP, ~~a~~ **the Contractor's** QEP is defined as an applied scientist specializing in the area of biology or engineering, who:

- Is registered in British Columbia and in good standing with an appropriate professional organization constituted under an Act; and,
- Through suitable education, experience, accreditation and knowledge, may reasonably be relied upon to provide advice regarding environmental management of the Project.

~~It is anticipated that various~~ **The Contractor's QEP** personnel ~~may be necessary to~~ **will be required to** undertake ~~different~~ **a number of** monitoring components for the Project (e.g., water quality, aquatic mammals) and the experience of the **QEP** personnel used should reflect those needs.

The ~~Environmental Monitor~~ **Contractor's QEP** will:

- Prepare an EMIP that outlines the type and frequency of observations and data collection that will be made (including quality control sampling).
- Prepare and deliver environmental orientation sessions to work crews.
- **Conduct full-time environmental monitoring during in-water works.**
- Document work activities and evaluate them against regulatory documents, environmental components of the Contractor's Contract, this EMP and the WQMP provided in Section 6.1.5.
- The ~~EM~~ **QEP** will advise the ~~PWGSC-DR~~ **Contractor** when work practices may need to be modified or improved to achieve the established environmental protection goals of the Project. **The Contractor will notify the DR as required.**



- Compile and maintain environmental monitoring data, including visual observations, and related documentation (including environmental monitoring reports).
- Assist in responding to emergencies and environmental incidents as defined in Section 4.

### **3.5 PSPC Quality Assurance Environmental Monitor**

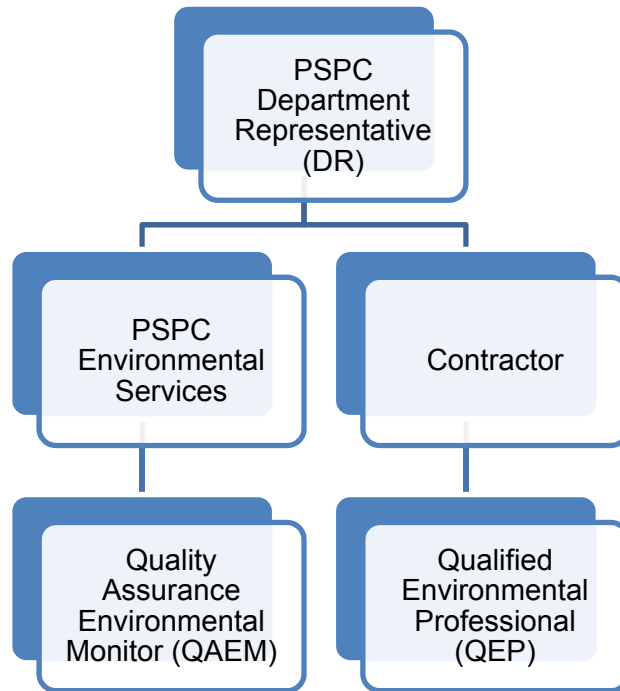
PSPC Environmental Services will conduct Quality Assurance and Compliance (QA/QC) audits throughout the project to ensure the requirements of the contract documents, environmental approvals and practices, and this EMP are being followed by the Contractor. PSPC Environmental Services will secure the services of a qualified professional to act as their PSPC Quality Assurance Environmental Monitor (QAEM) to conduct these tasks. The QAEM Monitor will report directly to PSPC Environmental Services, who will report to the DR.

The QAEM will be responsible for:

- Reviewing the Contractor's EPP and providing comments to PSPC Environmental Services.
- Responding to technical inquiries from the Contractor related to environmental compliance.
- Attending the Contractor's environmental orientation sessions
- Auditing the Contractor's activities for environmental compliance during construction and reporting to PSPC Environmental Services.
- Auditing the Contractor's QEP's data for compliance (e.g., noise, water quality).
- Collect additional light, and noise, water quality and other monitoring data for PSPC as required by PSPC Environmental Services.
- Reviewing environmental monitoring reports from the Contractor (prepared by the Contractor's QEP).
- Assisting PSPC Environmental Services with regulatory consultation and compliance.

### **3.6 Communication Pathway Summary**

The following summarizes the communication pathways that will be utilized for the Project (see Figure 3.1). The QAEM will communicate directly with PSPC Environmental Services, who will communicate with the DR. The QEP will communicate with the Contractor, who will communicate with the DR. The QEP and the Contractor will not communicate directly with the QAEM or PSPC Environmental Services; all communications will go through the DR.



**Figure 3.1** Communication Pathway

#### 4. ENVIRONMENTAL INCIDENTS

Environmental incidents should be fully understood by all Contractors conducting activities in the Project Area. An environmental incident is defined as an event that has caused, or has the potential to cause, one or more of the following:

- Damage to aquatic or terrestrial habitat that has not been approved by regulatory authorities.
- Adverse/harmful effects to human health, fish, wildlife or other environmental resources.
- Adverse publicity associated with impacts on the environment.
- Violation of statutes, conditions of permits, regulations or environmental damage.

Examples of environmental incidents include, but are not limited to:

- Spills of oil, fuel, or other potentially hazardous chemicals.
- Discharges of deleterious substances into the marine environment and/or fish-bearing watercourses.
- Water coming into contact with curing concrete and entering a watercourse.
- Landslides, erosion, or floods with the potential to adversely affect environmental quality.
- “Serious harm to fish,” which is the death of fish or any permanent alteration to, or destruction of, fish habitat.

All environmental incidents are to be reported to the DR immediately. An Environmental Incident Report (EIR) is to then be prepared and submitted by the Contractor, sub-contractor, **Contractor's QEP or PWGSC's designated Environmental Monitor QAEM** to provide a timely and accurate **internal** written notification of environmental incidents to **PWGSC/PSPC**. The deadline for submission of the EIR is within 24 hours following an incident. The EIR, an example of which is provided in Appendix F, is to include the following:

- Date and time of the incident
- Who or what activity generated the incident
- Who reported and responded to the incident
- Agencies notified or on-scene
- Safety and/or environmental concerns
- Substance spilled (if unknown describe appearance, odour)
- Estimated quantity spilled, the duration of the release and the basis for estimate
- Location of spill
- Polluter and/or source of spill
- Location and estimates of size and media affected environment (marine, land, etc.)
- Consequences (fish kill, spill contained, evacuation, etc.)
- Actions taken to mitigate the incident and estimate of effectiveness

- Preventative measures implemented following the incident

The written EIR is not intended to take the place of verbal notification of an incident requiring immediate action or further notification of regulatory agencies (e.g., a spill that affects neighbouring properties or requires assistance in the supply or deployment of containment equipment). In addition to formal EIR written reporting and Emergency Management BC (EMBC) reporting (where required), the DR will be notified when an incident occurs. As well as internal reporting to PWGSC/PSPC it may be necessary in some situations for PWGSC/PSPC to notify regulatory agencies (Environment Canada [EC], DFO, MOE), local municipal environmental representatives (Township of Esquimalt, City of Colwood), owners of neighbouring properties (e.g., DND, QHM) of the environmental incidents. PWGSC/PSPC will determine what reporting is warranted and undertake these actions as deemed necessary.

In the event that the incident is considered an emergency and the DR is unavailable, or where a delay in notification could result in environmental damage or risk to human health, PWGSC's Environmental Monitor/PSPC's QAEM will provide these notifications. Notification of corrective measures and closure of the incident may also be reported, as per direction from the DR.

Contractors must be familiar with EGD's spill prevention and response procedures (EGD Spill Contingency Plan; Appendix G).

## 5. ENVIRONMENTAL MONITORING

Environmental monitoring describes the processes and activities that will assist the Contractors in the implementation of environmental commitments detailed in regulatory documents and BMPs to maintain the quality of the environment and protect ecological and human health.

### 5.1 Environmental Monitoring Implementation Plan

An Environmental Monitoring Implementation Plan (EMIP) outlines the protocols to be followed by the Environmental Monitor Contractor's QEP to confirm and document Project compliance with applicable regulations, the EMP, and the acceptable water quality criteria. The following activity specific EMIP has been developed for the Project, as indicated previously the Contractor must develop an EMIP as part of the EPP. The Contractor's QEP shall review this EMIP content and either include it in the EMIP prepared as part of the Contractor's EPP, or propose modifications to the EMIP for DR/PSPC review.

#### 5.1.1 Water Quality Monitoring Component

Water quality monitoring will be conducted by the Contractor's QEP, as required by the site-specific conditions and activities. The QEP is required to ensure all monitoring equipment is properly maintained and calibrated prior to sampling.

##### 5.1.1.1 Early Warning Station

The early warning stations should be 25 m perpendicular to the work area (see Figure 5.1). These stations will be evenly spaced from each other as shown in Figure 5.1. Water quality samples will be collected at three (3) times daily during times in-water works are actively occurring and have the potential to affect water quality, first thing in the morning, midday, and at the end of each day. Additional sampling should be conducted if a visual turbidity plume is observed.

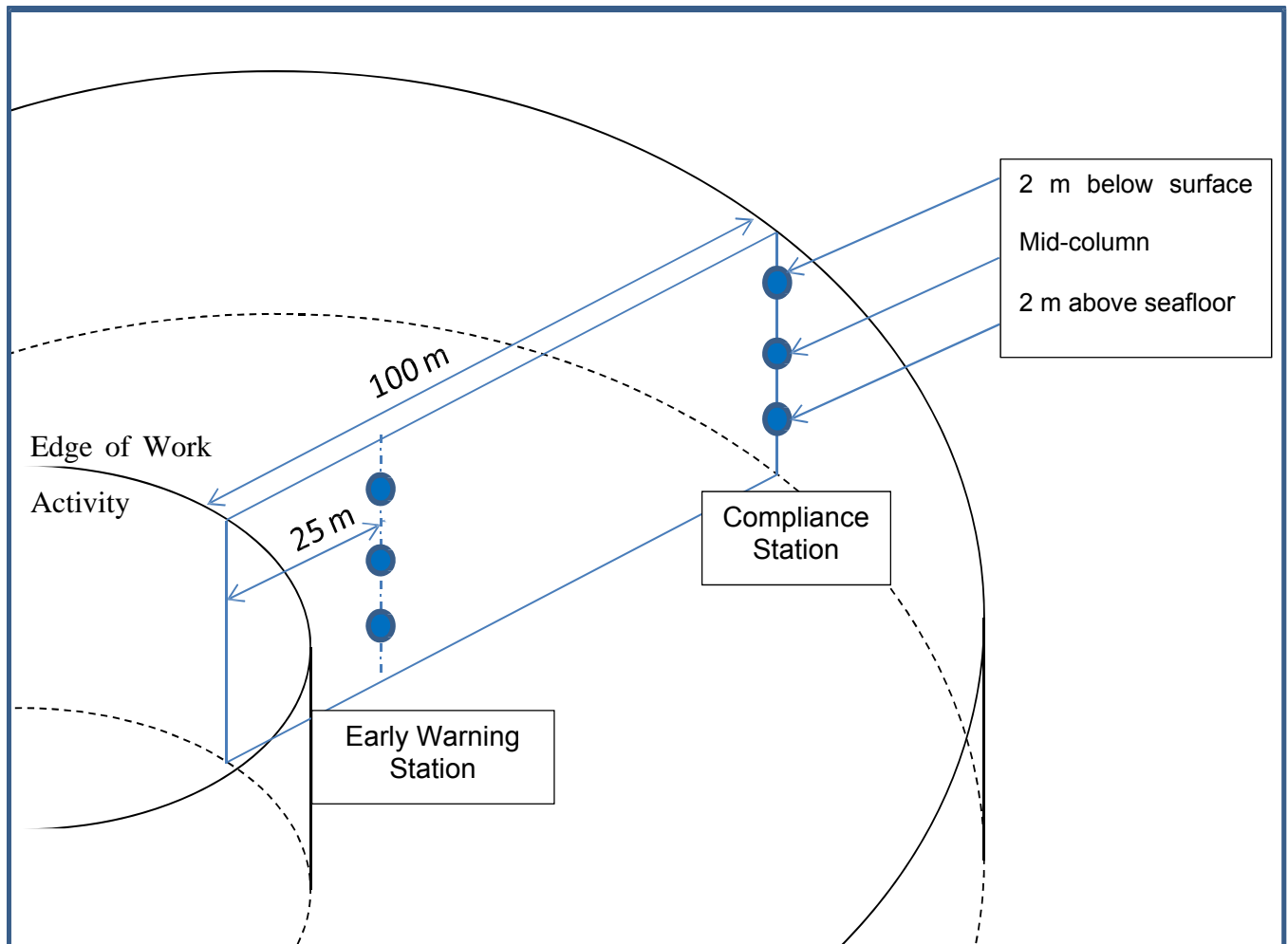
Samples will be collected at the following depths at each station:

- Two metres (2 m) below the water surface
- Mid-water column
- Two metres (2 m) above the seabed

The QEP will also be required to collect a background water quality sample elsewhere in the harbour up-current or a distance away from the works that is not influenced by the Project. The background water quality sampling location must be approved by the DR.

##### In-Situ Analysis

Each sample will be tested for *in situ* parameter measurements, such as dissolved oxygen, pH and turbidity that are commonly used to evaluate potential localized effects on water quality. The PSPC QAEM may conduct in-situ monitoring at the discretion of PSPC.



**Figure 5.1 Conceptual Layout of Location of Turbidity Measurements in the Water Column**

Water quality criteria are provided in Table 6.1. If water quality criteria at the early warning station are exceeded these criteria, relative to background:

- First exceedance: the QEP will notify the Contractor and the QEP will re-sample water quality again in 30 minutes. The Contractor shall inform the DR.
- Second exceedance: the QEP will notify the Contractor and the QEP will re-sample water quality again in 30 minutes. The Contractor shall notify the DR and take corrective action to reduce the risks.
- Third exceedance: the QEP will notify the Contractor and the QEP will re-sample water quality again in 30 minutes. The Contractor shall notify the DR and take further corrective action to mitigate water quality.

- **Fourth exceedance:** the QEP will notify the Contractor and the Contractor shall inform the DR. The DR will issue a stop work order. The contractor shall take corrective action to mitigate the issue and work shall resume. Any work stoppage directed by the DR as a result for water-quality non-compliance cannot be claimed against the contract for additional costs or schedule extension.

Frequency and duration of monitoring events can be modified at the discretion of the DR. Full-time monitoring is required during in-water works.

When and where applicable and appropriate, the *British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture* (MOE, 2016) will-may be used for comparison to *in situ* measurements.

#### Laboratory Analysis

Initially, the sample with the highest daily turbidity value will be submitted to an analytical laboratory for analysis and comparison to the water quality criteria outlined in Section 6.1.5, Table 6-2. If results do not report exceedances or increasing trend, the Contractor can request a change to the sampling requirements for DR approval. Water quality criteria to be tested for by the laboratory are:

- Total Metals
- Total Polycyclic Aromatic Hydrocarbons (PAH)

Results will be tabulated by the Contractor's QEP and provided to the DR for review within seven (7) working days. Results will be compared to the water quality criteria provided in Section 6.1.5, Table 6-2, and included in the QEP's monitoring reports. Exceedances will be brought to the attention of the DR by the Contractor.

The QAEM may also collect and submit samples for laboratory analysis on a random basis for QA/QC.

#### *5.1.1.2 Compliance Station*

In addition to the early warning stations that will be set up at 25 m from the silt curtain, an additional three (3) sampling stations will be set up at 100 m away from the work area or silt curtain. These stations will be evenly spaced from each other as shown in Figure 5.1 Water quality samples will be collected three (3) times per day during in-water works that have the potential to affect water quality. Samples will be collected at the following depths at each station:

- At 2 m from the surface
- Mid-water column
- At 2 m above the seabed

The QEP will also be required to collect a background water quality sample elsewhere in the harbour up-current of the works that is not influenced by the Project. The background water quality sampling location must be approved by the DR.

### In-Situ Analysis

Each sample will be tested for *in situ* parameter measurements, such as dissolved oxygen, pH and turbidity that are commonly used to evaluate potential localized effects on water quality.

Water quality criteria are provided in Table 6.1. Any exceedance of the water quality criteria recorded at a compliance location shall be reported to the DR and Contractor, and a stop work order will be issued by the DR. The Contractor shall take corrective action to mitigate the issue prior to Contractor work resuming.

Frequency and duration of monitoring events can be modified at the discretion of the DR. Full-time monitoring is required during in-water works.

When and where applicable and appropriate, the *British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture* (MOE, 2016) ~~will~~ may be used for comparison to *in situ* measurements. The PSPC QAEM may conduct in-situ monitoring at the discretion of PSPC.

### Laboratory Analysis

~~Where in-situ data at the Compliance Station exceeds criteria for a given work activity, the Contractor's QEP shall submit (at minimum) the sample with the highest levels for laboratory analysis. Not required at the compliance station, since the worst sample will be submitted for laboratory analysis from the early warning station.~~

#### 5.1.2 *Hydrophone Monitoring Component*

The Contractor's QEP will be required to monitor for underwater noise generated during in-water works. Monitoring stations will be set up based on Contractor safety areas, which must be confirmed during the kick off meeting with the DR. ~~Measurements~~ Measurements, should be taken within 10m of the pile and on various sides of the pile, if possible, and at various depths, including at a minimum:

- Two metres (2 m) below the water surface
- Mid-water column
- Two metres (2 m) above the seabed

Noise levels must not exceed 206 dB re 1  $\mu$ Pa and a SEL<sub>cum</sub> of 187 dB re 1  $\mu$ Pa<sup>2</sup>-s within 10 m of the source in order to comply with requirements from the Fisheries Protection Program for the Project for the protection of fish.



In-water pile-driving activities will be monitored with a hydrophone when the potential for over-pressurization may occur, as per the BMPs for Pile Driving (DFO, undated; BC Marine and Pile Driving Contractors Association, 2006; Appendix D. Monitoring will allow assessing the effectiveness of mitigation measures in place, and/or implementing further measures, should the impact pressure approach the recommended threshold [i.e., upper maximum pressure] of 30 kPa). Sound impact pressure is measured with a hydrophone, attached to a blast- or seismic-monitoring device, with internal memory and storage (e.g., Blast-Mate III Seismograph).

“Ramp-up” (or “soft-start”) at the commencement of hammer pile driving is recommended: at start-up, the hammer is dropped two or three times at less than full capacity. This protocol allows marine mammals in the vicinity to leave, as well as assessing whether mitigation measures are required (given previous experience with the equipment to be used and various pile sizes, those first impacts should be well below 30 kPa). If mitigation measures are in place and the registered pressure is at, or exceeds the threshold, the hammer can be stopped and corrective action taken, such as ensuring that the bubble curtain is distributing bubbles evenly. Additional curtains may be required up current and at different water depths, if tidal flow is pushing the bubbles away from the pile.

### 5.1.3 Marine Mammal and Migratory Bird Monitoring Component

The presence of marine mammals and birds observed in the vicinity of the works will be documented **by the QEP** (i.e., species, number of individuals, estimated distance and observed behaviour). When possible, identifying features will be noted. Behaviour will be noted, and if the behaviour appears to be altered in a negative manner due to the work-related activities, work will cease until the animal moves out of the zone of influence. Any such interactions will be noted. Marine mammal action procedures will follow the safety zones and reporting protocols outlined in Section 6.1.6 of this EMP.

## 5.2 Environmental Monitoring Reporting Procedure

Reporting will involve submission of ~~daily and weekly~~ environmental monitoring reports **prepared by the Contractor’s QEP and shall be incorporated into the Contractor’s daily and weekly construction reports.** ~~Weekly r~~Reports will be of a quality suitable for **the DR to provide details submission** to regulatory agencies, First Nations and public stakeholders, as required during the course of the Project. Monitoring reports are to be prepared by the ~~Environmental Monitor~~**QEP** and include, at a minimum, the following information:

- A description of construction activities undertaken during the reporting period.
- A description of environmental issues and corresponding mitigation measures implemented.
- Tracking of emerging and outstanding environmental issues.
- Results of monitoring and testing (e.g., water quality data, noise data, observations of aquatic mammals).
- Photos documenting construction activities, environmental issues, corresponding mitigation measures and any adopted lessons learned.

The ~~Environmental Monitor~~**PSPC QAEM** will also prepare an Environmental Completion Report one month following completion of the work. This report will provide an overall summary of the

Project including, representative site photographs, a summary of monitoring data collected, a summary of construction activities, environmental management and issues during construction, how these issues were managed, mitigation measures and additive measures in response to lessons learned and recommendations.

### 5.3 Orientation and Meetings

Environmental requirements of the Project will be addressed in regular meetings to provide Contractor and their crews with information to carry out the obligations of regulatory documents and the environmental requirements of the contract, including this EMP.

#### 5.3.1 Pre-construction meetings

The ~~A~~ pre-construction meeting ~~will be~~ held between the Contractor, ~~their QEP, PWGSC~~ **PSPC**, and **PSPC's QAEM**. The **QAEM** will include an environmental agenda item that addresses, at a minimum, the following:

- A review of environmental requirements of the contract
- Transfer of further relevant information or precautions that ~~PWGSC~~ **PSPC** is aware of, and which pertain to the contract
- Consequences of non-compliance with environmental law and other regulatory guidance and contract specific environmental requirements
- Reporting and response procedures for environmental incidents and emergencies

#### 5.3.2 Pre-work Orientation meetings

The ~~Environmental Monitor~~ **QEP** will attend and document pre-work orientation meetings (which may be conducted in association with regular Contractor meetings) with field crews prior to the initiation of work to advise them of the site-specific environmental requirements of work at that location. Additional orientation meetings will be undertaken as necessary, for example when project conditions and/or activities change or new Contractors enter the site.

Contractors' staff will sign and date a Pre-Work Orientation Record confirming that they have received an orientation. The ~~Environmental Monitor~~ **QEP** will maintain a registry of Contractors' employees who have attended pre-work orientation meetings, together with copies of meeting records. These records will be kept on file for auditing by ~~PWGSC~~ **PSPC**.

#### 5.3.3 Tailgate Meetings

Daily tailgate meetings are required for the Contractor staff to ensure they are appropriately aware and prepared for the day's activities and associated health, safety and environmental risks. Tailgate meetings will be documented, signed by each employee involved and retained at the start of each project activity. On days that are scheduled to be near or associated with environmentally sensitive areas or impact environmental values, the ~~Environmental Monitor~~ **QEP** will attend to identify the location of, outline mitigative strategies for site-specific environmental

requirements. The Contractor will keep a record of environmental requirements addressed in daily tailgate meetings, which can be provided to PWGSC/PSPC upon request.

## 6. ENVIRONMENTAL REQUIREMENTS AND BEST MANAGEMENT PRACTICES

The following sections present an overview of the environmental requirements of the Project. These requirements, along with applicable legislation, guidance documents, contract requirements, and permits and approvals, will form the basis for environmental mitigation and protection strategies to be implemented during reconstruction of the EGD South Jetty.

General and activity-specific BMPs are detailed in these sections. It is the responsibility of the Contractor, sub-contractors and ~~Environmental Monitors~~ **the QEP** to be familiar with the requirements and BMPs included herein. The Contractor is responsible for compliance with BMPs, legislation and other environmental requirements. The contractor's ~~Environmental Monitor~~ **QEP** will be responsible for confirming that construction activities are conducted in accordance with all environmental requirements and BMPs, and will provide guidance to correct deficiencies where observed. **The QEP will report to the Contractor and conduct environmental monitoring throughout the project. PSPC will also hire a consultant to act as the QAEM that will be responsible for conducting QA/QC audits throughout the project.**

### 6.1 General BMPs

The following are general BMPs to be followed during Project activities undertaken in and about the EGD facility. They are a broad set of BMPs identifying a range of environmental goals and as such, should be used in conjunction with Activity Specific BMPs where applicable. These BMPs should be consulted at all times as to their application to a given activity. It is the responsibility of the individual conducting work activity at the EGD site to ensure compliance with all BMPs detailed below in addition to any additional Activity Specific BMPs that may apply.

The General BMPs apply to all Contractors conducting activities at the EGD site and are divided into the following categories:

- Environmental Monitoring
- Regulations
- Working In or About Water
- ~~In-water Works~~ Outside Timing Windows
- Water Quality Management Plan
- Marine Animal Interactions
- Terrestrial Animal Interactions (excluding birds)
- Bird Interactions
- Noise & Lighting Control
- Spill Prevention
- Erosion & Sedimentation Control
- Air Quality Management
- Waste Management (Including Hazardous Waste)

- Site Access

### 6.1.1 *Environmental Monitoring by the Contractor's QEP*

Environmental monitoring associated with this section (General BMPs) will be undertaken by the Contractor's ~~Environmental Monitor~~ **QEP** to ensure compliance with all relevant BMPs, the WQMP and assessment criteria to verify that performance objectives are being met and enable management decisions in the event that the performance objectives are not met. It is the responsibility of the individual conducting the activity to ensure the application of all applicable BMPs are implemented in accordance with this EMP.

It is the responsibility of the individual conducting the activity to ensure the application of all applicable BMPs are implemented in accordance with this EMP.

### 6.1.2 *Regulations*

The following regulations apply to the project:

- All local bylaws, rules, and regulations, including provincial and municipal legislation, which are enforced in the EGD Project Area shall be complied with by the Contractor
- The Contractor shall meet or exceed requirements of the contract documents, specified standards, codes, and referenced documents, and shall maintain records to demonstrate compliance
- In the event of any conflict or discrepancy between requirements, the more stringent standards/criteria shall apply
- Workplace Hazardous Materials Information System (WHMIS; Health Canada 2015) guidelines and procedures must be followed by all workers. Material Safety Data Sheets (MSDS) must be available to all workers for all products used on-site.

### 6.1.3 *Working in or About Water*

For works in and around water the following BMPs should be implemented to mitigate potential effects of construction activities:

- Equipment (e.g., heavy machinery) used in and around water will be kept clean and in good working condition (i.e., free of leaks, excess oil, and grease).
- Equipment washing, refuelling and servicing will be conducted away from the water (i.e., no closer than 30 m), unless the contractor prepares a refuelling plan that is approved by ~~PWGSC~~ **PSPC**.
- Any hydraulic machinery used in water will use environmentally-friendly hydraulic fluids (i.e., non-toxic to aquatic life, and biodegradable).
- Construction-affected run-off water (e.g., water in contact with uncured concrete) must not be discharged to the EGD on-site sewer systems.

- Wastewater discharge from personnel hygiene/decontamination facility or toilet facilities is not permitted on-site. These wastewaters are to be disposed off-site at a permitted Wastewater Treatment and Disposal Facility.
- Wastewater produced at the Work Site (e.g., equipment decontamination wastewater) should be tested prior to discharge in the EGD Project Area to ensure compliance with applicable water quality performance objectives for where it is intended to be released (i.e., water quality outside isolated sediment containment areas must meet acceptable criteria).
- Waste material or debris must not be dumped in or near any waterways, and must be disposed of in the appropriate manner.
- Silt fences or other appropriate control measures shall be used, where needed, to minimize soil or intertidal sediment transport into marine or freshwater environment.
- The Contractor shall thoroughly investigate and understand the implications of the tide, current, wind, and sea state in Esquimalt Harbour when installing, removing, adjusting, moving and monitoring the effectiveness of any silt curtains or sediment barriers if required for the Project.

#### 6.1.4 ~~In-water Works outside~~ Timing Windows

In-water works are to be performed during the DFO least-risk Timing Windows for impacts to fish in Esquimalt Harbour (July 1 to October 1 and December 1 to February 15). If any works are planned to be conducted by the Contractor outside of the Timing Windows their QEP shall identify the mitigative measures to prevent serious harm to fish within the EPP.

~~In addition to measures already identified throughout this report, the following BMPs shall be implemented during works with the potential to adversely affect the marine environment during works conducted outside the Timing Windows for least impact to fish (i.e., July 1 to October 1 and December 1 to February 15):~~

- ~~Monitoring by a qualified environmental monitor, on site during all in-water activities, to specifically monitor for the presence of salmonids and/or Pacific Herring during respective sensitive periods;~~
- ~~If salmonids and/or Pacific Herring are observed near the Site during respective sensitive periods, additional measures will be implemented to reduce the risk to these fishes. Measures may include, but may not be limited to:~~
  - ~~Increased water quality sampling~~
  - ~~Increased sound pressure testing (i.e., during pile driving)~~
  - ~~The installation of additional bubble curtain, silt curtain and/or other exclusion devices~~
- ~~Should the EM consider the above measures inefficient at protecting fish from serious harm, temporary cessation of in-water work may be recommended, until the risk is diminished or additional mitigation measures are implemented.~~
- ~~The Contractor shall thoroughly investigate and understand the implications of the tide, current, wind, and sea state in Esquimalt Harbour when installing, removing, adjusting,~~

~~moving and monitoring the effectiveness of any silt curtains or sediment barriers if required for the Project.~~

### 6.1.5 Water Quality Management Plan

Implementation of the following BMPs within this WQMP will mitigate the risk of construction activities to ambient water quality in the Project area during South Jetty reconstruction.

- ~~At the commencement of~~ **During all** in-water works, such as pile driving, *in situ* water turbidity will be monitored against the water quality guidelines for aquatic life (MOE, 2016), as shown in Table 6-1. **Samples to be collected as described in Section 5.1.**

**Table 6-1 Water Quality Guidelines for Turbidity and Suspended Sediments**

Water Use	Turbidity	Non-filterable Residue (Total Suspended Solids)
Aquatic Life (Fresh, Marine, Estuarine)	<ul style="list-style-type: none"> <li>• Change from background of 8 NTU at any one time <del>for a duration of</del> <b>in a 24 h period</b> in all waters during clear flows or in clear waters</li> <li>• Change from background of 2 NTU at any one time for a duration of 30 d in all waters during clear flows or in clear waters</li> <li>• Change from background of 5 NTU at any time when background is 8–50 NTU during high flows or in turbid waters</li> <li>• Change from background of 10% when background is &gt; 50 NTU at any time during high flows or in turbid waters</li> </ul>	<ul style="list-style-type: none"> <li>• Change from background of 25 mg/L at any one time <del>for a duration of</del> <b>in a 24 h period</b> in all waters during clear flows or in clear waters</li> <li>• Change from background of 5 mg/L at any one time for a duration of 30 d in all waters during clear flows or in clear waters</li> <li>• Change from background of 10 mg/L at any time when background is 2–100 mg/L during high flows or in turbid waters</li> <li>• Change from background of 10% when background is &gt; 100 mg/L at any time during high flows or in turbid waters</li> </ul>

- ***In-situ* water samples will also be tested for oxygen content and pH. The acceptable range for these are:**
  - Oxygen: > 8 mg/L for 30-day average, and > 5 mg/L for instantaneous minimum (BCWQG)
  - pH: 7.0–8.7 (MOE, 2016)
- **Water samples shall also be analyzed for additional constituents, which will require submission to an analytical laboratory for metals and PAH. Results will be screened against the water quality criteria presented in Table 6-2, from the EGD Phase 2 South Jetty Under-Pier Sediment Remediation Project EMP (G3, 2014).**

**Table 6-2 Water Quality Performance Criteria for Analytical Samples**

Parameter	Early Warning Station (25 m from work area)	Compliance Station (100 m from work area)
<b>Total Metals</b>		
Arsenic (µg/L)	125	12.5
Copper (µg/L)	30	3
Zinc (µg/L)	100	10
<b>PAH Congeners</b>		
Acenaphthene (µg/L)	510	51
Anthracene (µg/L)	5	0.5
Benzo(a)anthracene (µg/L)	1.8	0.18
Benzo(a)fluoranthene	8.6	0.86
Benzo(a)pyrene (µg/L)	5.6	0.56
Benzo(g,h,i)perylene (µg/L)	1	0.1
Chrysene (µg/L)	8.6	0.86
2-Methylnaphthalene (µg/L)	58	5.8
Naphthalene (µg/L)	100	10
Phenanthrene (µg/L)	40	4
Pyrene (µg/L)	12.8	1.28

- ~~Should the turbidity values exceed the guidelines, a~~ A silt curtain will be deployed around in-water works during excavation activities as per the specification to mitigate sediment transport. The silt curtain may also serve as fish exclusion device.
- Equipment (e.g., heavy machinery) used in and around water will be kept clean and in good working condition (i.e., free of leaks, excess oil, and grease).
- Any hydraulic machinery used in water will use environmentally-friendly hydraulic fluids (i.e., non-toxic to aquatic life, and biodegradable).
- If storage of fuels is to occur on site, a 'Fuels, Chemicals and Materials Storage and Handling Plan' will be developed, in compliance to Ministry guidelines (Ministry of Water, Land and Air Protection; MWLAP, 2002).
- Equipment washing, refuelling and servicing will be conducted away from the water (i.e., no closer than 30 m), unless the contractor prepares a refuelling plan that is approved by PWGSC.
- A spill containment kit will be accessible onsite and a Spill Response Plan prepared by the Contractor and approved by PWGSC PSPC will be developed and communicated to the construction crew.
- Any concrete works in or near water will follow measures recommended in Subsections 41(e) and 42(d) of the MOE, 2004. Standards and Best Management Practices for Instream Works (SBPISW; MOE, 2004), as well as the following:



- Concrete will not be poured directly into the water **unless approved by PSPC.**
- Where appropriate, fast-curing concrete intended/formulated specifically for marine applications will be used.
- Poly sheets/tarps will be used during pouring to prevent splashing of concrete over the forms and into water, where practical.
- Immediate clean-up of excess/spilled concrete.
  - Contractor will keep cylinders of CO<sub>2</sub> equipped with regulators, hoses, and a gas diffuser on site to deploy into the ocean water should spilled concrete cause pH levels to become more alkaline than the permitted levels of 7.0–8.7 (MOE, 2016)
- Equipment and tools will be washed in location such that concrete does not enter the water.
- Grounding of equipment/ machinery on the harbour bottom will be avoided to prevent sediment mobilization; barges will be tied to the existing wharf or held in place with spuds.
- For upland construction works, the following measures are recommended:
  - Covering any stockpiles to prevent erosion during periods of rain and/or wind
- Directing any suspect waters away from the marine environment

#### 6.1.6 Marine Animal Interactions

Marine animals present in the Project Area with the potential to be adversely impacted by Project activities include finfish, aquatic invertebrates and marine mammals, and include Species at Risk (SAR), which are protected under the *Species at Risk Act*.

The following BMPs should be implemented to mitigate the risk of interactions with marine animals during construction:

- Interactions with fish and aquatic wildlife are to be avoided.
- Should any SAR be observed within isolated or contained work areas during construction, the DR will be notified immediately and management actions will be taken (e.g., suspend work, notify DFO, and adhere to DFO protocols for species recovery).
- A ~~Discretionary~~ Cetacean Safety Zone shall be established 500 m from the edge of any in-water construction activities, and a Pinniped Safety Zone shall be established 25 m from the edge of the Project boundary (Appendix A, Figure A3). If marine mammals enter the respective safety zones, the DR is to be notified immediately. ~~The DR shall make the decision to suspend or continue works based on observations and construction activities.~~ **The protocols described in Section 5.1.2 will be followed for marine mammal monitoring by the QEP.**
- If work is suspended, activities will not resume until the ~~Environmental Monitor~~ **Contractor** has confirmed to the DR that the marine mammal is outside the applicable safety zone, or if a minimum of ~~20~~ **30** minutes has elapsed since the animal was last sighted within the safety zone **by the QEP.**
- The Contractor and all staff are responsible for immediately notifying the ~~Environmental Monitor~~ **DR** of any cetacean observations, and any pinniped observations within the pinniped safety zone.

- If aggregations of Pacific herring or salmon are observed anytime within or in close proximity to the Work Area, the DR must be notified immediately. The DR or their QAEM will assess the potential for activities to disturb or interfere with the fish, decide on appropriate management actions and notify the Contractor and EMQEP. The DR or their QAEM may also contact DFO at their discretion.
- Observations of Pacific herring spawn, which may attach to equipment or marine structures, should be communicated to the DR as soon as possible. The Contractor and their QEP should be familiar with the appearance of herring spawn. Unattended structures and equipment shall be inspected prior to removal or use should removal or use coincide with Fisheries Timing Windows.
- The DRQAEM will assess/confirm any herring spawn identified by the Contractor or Environmental MonitorQEP. Management actions or a stop-work-order may be enacted with operations not re-commencing until the eggs have hatched and detached from equipment.

#### 6.1.7 Terrestrial Animal Interactions (excluding birds)

Terrestrial wildlife, including deer, raccoons, and mink, have the potential to be present in the Project Area at the time of works. The following BMPs shall be followed for the protection of terrestrial wildlife:

- Interactions with terrestrial wildlife are to be avoided.
- If injured or abandoned wildlife are observed, the DR is to be immediately contacted. The DRPSPC will contact EGD Environmental Services to decide on appropriate management actions. Injured or abandoned wildlife must not be handled by anyone without proper experience, equipment and authorization to do so.
- Approval from EGD Environmental Services and appropriate government authorities (e.g., DFO, EC, MOE) must be obtained prior to relocation or removal of wildlife.
- If any change in behaviour of any terrestrial organisms is observed, the DR shall be notified as soon as possible.

#### 6.1.8 Bird Interactions

Although no known bird nests are located in the Project Area, there is potential for birds to be perching, foraging or nesting in the area at the time of construction. The following BMPs for the protection of birds shall be followed:

- Open-top pilings should be covered with a temporary seal to prevent perching birds from entering the column. A conical cover would restrict birds from nesting atop pilings.
- All works are to be conducted in compliance with the federal *Migratory Birds Convention Act*, *Migratory Birds Regulations* and the *BC Wildlife Act*.
- If any nesting bird, nest or eggs are identified within the EGD Project Area, they must not be disturbed and the DR is to be notified immediately. The DRQAEM will advise the DR on determine the appropriate management actions will be taken.

- A permit will be required if a nest or eggs are to be moved.

#### 6.1.9 Noise and Lighting Control

The EGD Environmental Policy (2014) makes a commitment to follow all applicable municipal laws and regulations. Daily operations at the EGD Project Area must therefore adhere to criteria of the Corporation of the Township of Esquimalt Maintenance of Property and Nuisance Regulation (2014, No. 2826) and City of Colwood Noise Bylaw (1986, No. 38).

The following BMPs shall be followed to meet noise and light objectives:

- Spotlights will be directed away from residential areas or fitted with shrouds to direct light to the immediate Work Area
- Unnecessary lighting or interim lighting should be shut off when not in use.
- A maximum allowable noise level of 85 dBA for the EGD Work Site shall constitute a working guideline, subject to change dependent on receipt of any residential noise complaints. In this event, work activities must be modified to reduce noise generated.
- Complaints regarding noise are to be directed, through the DR, to EGD Security, Health and Safety Department, where a Concern Document will be filed.
- When possible, noisier work activities shall be performed during daylight hours
- Construction activities and scheduling may be modified based on resident feedback and the results of noise monitoring
- All construction equipment shall be maintained in good working order and operated with exhaust systems in good repair to minimize noise and in accordance to the machines specification.
- Noise barriers shall be used where practicable if required.
- Equipment should be shut down when not in use.
- ~~If required,~~ **The QAEM will** shall monitor noise during construction activities at the Project boundary and EGD property boundary.
- Induced underwater noise levels during construction should not exceed 30 kPa **or the noise requirements discussed in Section 5.1.2.** The Contractor's ~~appropriately qualified person~~ **QEP** will be required to monitor underwater noise levels during ~~impact driving of piles~~ **pile driving and any other works (if any) that have the potential to generate underwater noise.** The **PSPC QAEM Environmental Monitor** may also conduct **QA/QC** underwater noise monitoring.
- Exceedances of the ~~30 kPa limit~~ **requirements discussed in Section 5.1.2** will be reported to the DR immediately and measures to reduce noise must be implemented **by the Contractor.**

#### 6.1.10 Spill Prevention

An environmental spill is the release of any deleterious substance(s) which is dangerous to health or environmentally unfriendly. Spill response procedures shall be completed in accordance with the EGD Spill Contingency Plan.

The following BMPs shall be followed to reduce potential for environmental spills and associated adverse effects:

- All workers on-site must be familiar with WHMIS procedures and guidelines. Any handling, transport or storage of WHMIS “controlled products” must follow appropriate WHMIS guidelines.
- Contractors shall be fully aware of the spill prevention and response procedures.
- The DR shall be immediately informed of all spills that occur at the EGD Project Area ~~and at the Contractor’s Off-Site Offload Facility.~~
- An Environmental Incident Report shall be prepared for any spills.
- In the event of a spill, the Contractor shall immediately notify the DR, contain and assess the spill, and take necessary steps to prevent further discharge.
- The Contractor is responsible for immediate cleanup of spills and restoration of the area to the satisfaction of DR or other regulatory agencies, when involved.
- Spill kits including grey absorbents to clean up both water based fluids and hydrocarbons, white absorbents that repel water and float on water to clean up hydrocarbons only (e.g., motor oil, jet fuel, diesel, gasoline, hydraulic oil), yellow absorbents to clean up aggressive fluids such as acids and solvents, must be kept at the EGD Project Area.
- The Contractor shall take due care to ensure no deleterious materials, including sediment- or concrete- laden runoff, paints, coatings or preservatives and fuel or oil, leave the EGD Project Area or Contractor’s Off-Site Offload Facility or enter any surface water or stormwater at or near the EGD Project Area or Contractor Off-Site Offload Facility.
- Do not refuel or service equipment within 30 m of any watercourse or surface water drainage unless appropriate spill prevention and control measures are in place.
- Equipment shall not be washed within the Project Area without proper containment.
- Equipment and machinery must be regularly inspected by the Contractor to confirm they are free of leaks, excess oil and grease.
- The EGD Fuelling and Oil Transfer Policy and Checklist must be followed (Appendix H).
- EGD Fuel and Waste Oil Transfer Checklist must be submitted to the EGD Pumphouse and signed off before any fuelling or transfer operations occur.
- All berthed vessels receiving fuel from a truck or a barge or transferring greater than 10 tonnes of oil per day require a containment boom. The specification of such a boom requires review and approval by the DR.
- If the Contractor is planning to discharge any deleterious materials, including water discharge (effluent) or sediment-laden or concrete-laden runoff, leaving the EGD Project Area ~~or Contractor’s Off-Site Offload Facility~~, they are responsible for ensuring that appropriate discharge permits are obtained and remain on-site at all times, and that discharge meets permit requirements and applicable water quality criteria.

- Use of any paints, corrosion protective coatings, wood preservatives or any other potentially deleterious substances that may be applied to surfaces that could have potential contact with the marine environment, shall be applied in accordance with the EGD BMPs and appropriate environmental protection measures.
- Any equipment remaining on-site overnight shall have appropriately placed drip pans or other spill/leak containment measures and must be placed as far away from the marine environment as possible.
- Measures for the containment of potentially harmful substances due to rinses, cleaning water, solvents, wood preservatives and other potentially harmful or toxic substances shall be identified and implemented by Contractor in a manner to prevent leakage, loss or discharge into the sewers, storm drain system or marine environment.
- Any waste materials should be collected, stored and disposed of in an appropriate manner.
- Application of fog seals, tack coats or other coatings should be avoided during periods when rainfall is likely.
- During the purging of tanks and associated lines, appropriate procedures must be followed to prevent the release of any fuels or other deleterious substances to the surface, surface water, catch basins or soils within.
- All stored materials that have the potential to negatively impact the environment, infrastructure or workers must be appropriately labelled following WHMIS protocols, including the product name, first aid information and personal protective equipment (PPE) requirements.
- Materials must be stored in storage areas that are suitable for the materials (e.g., protected from the weather, ventilated if necessary).
- For long-term storage, appropriate secondary containment suitable for the quantity and nature of the product being stored must be present.
- Short-term storage and working areas must be clearly labelled and located away from pathways to any watercourse on impervious surfaces protected from the weather.
- All materials must be secured appropriately during transport.

#### *6.1.11 Erosion and Sediment Control*

Sedimentation of the marine environment can have adverse impacts on fish and fish habitat through smothering of substrate or marine vegetation, interference with light penetration, and gill abrasion or clogging. The following general BMPs shall be implemented to reduce the probability and impacts of sedimentation resulting from erosion.

- The Contractor shall be responsible for preparation and submission of an Erosion and Sediment Control Plan (ESCP) as part of the EPP. The ESCP shall include drawings showing locations and positioning of Erosion and Sediment Control measures, such as silt fencing, interceptor ditches or stormwater conveyances, and gravel berms or check-dams.
- Work should be performed in a manner to control surface drainage from any cuts, fills, borrow or waste disposal areas, stockpiles, and staging or construction areas.

- Minimize amount of bare soil exposed at one time that may migrate to the marine environment.
- Stabilize disturbed soils as quickly as practical. Remove accumulated sediment resulting from construction activity from adjoining surfaces, drainage systems, and watercourses and repair damage caused by soil erosion and sedimentation as directed by the DR.
- Provide and maintain temporary measures which may include concrete blocks, silt fencing, hay or straw bales, geotextiles, drains, berms, terracing, riprap, temporary drainage piping, dikes, and other construction, required to prevent erosion and migration of silt, mud, sediment, and other debris to the marine environment, or to other areas of site where damage might result, or that might otherwise be required by laws and regulations.
- Hay or straw bales should be wire-bound or string-tied; securely anchored by stakes or rebar driven through bale 300 mm to 450 mm into ground; filled with hay or straw to prevent water from escaping between bales; and entrenched minimum of 100 mm into ground. Repair or replace damaged bales, end runs and undercutting beneath bales.
- Silt fences should be assembled as a ready to install unit consisting of geotextile attached to drivable posts. Water escaping from silt fences should not be allowed enter the marine environment and should be treated and disposed of accordingly. Conditions may dictate that a heavy duty fence (with net backing) is required.
- Geotextile should be uniform in texture and appearance, having no defects, flaws, or tears that would affect physical properties and containing sufficient ultraviolet ray inhibitors and stabilizers to provide minimum 2-year service life from outdoor exposure in a saline environment. If necessary, net backing should be industrial polypropylene mesh joined to geotextile at both top and bottom with double stitching of heavy-duty cord, with minimum width of 750 mm.
- Install temporary barriers in and around storm sewers.
- Plan construction procedures to avoid equipment encroachment onto marine environment or drainage ditch banks which may deposit into the marine environment. In event of damage, promptly notify the DR and take action to mitigate impacts; restore affected bank or water body to existing condition.
- Check erosion and sediment control measures daily and after each rainfall to ensure operational integrity, and promptly correct deficiencies.
- Remove temporary erosion and sediment control devices upon completion of work unless otherwise directed by the DR. Spread accumulated sediments to form a suitable surface for seeding or dispose of and shape area to permit natural drainage to satisfaction of the DR. Materials, once removed, become the property and responsibility of the Contractor.
- Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- Existing embankments or embankment protection shall not be disturbed unless approved by the DR.
- Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

- If sediment and/or debris from work areas accumulate in low areas, storm sewers, roadways, gutters, ditches, or other areas where it has the potential to migrate to the marine environment, the Contractor must remove accumulation and restore area to original condition.

#### 6.1.12 Air Quality Management

The following BMPs shall be implemented to reduce the probability of impacts resulting from emissions and particulate matter associated with Project construction:

- Dust and airborne particulate containment should be large enough to adequately enclose or segregate the working area. To reduce potential dust emissions during hot, dry weather, if being left overnight or if there are strong winds, sediment on barges, in trucks, or stockpiled on land will be covered or wetted as required.
- Ensure that dust generated from all Contractor operations, such as barge or truck transportation, material stockpiling and demolition work, is controlled by dust screens and/or water application if necessary.
- Apply water as required for dust control. Dust control methods shall be chosen such that a minimal amount of water is required. Apply water with distributors equipped with spray system to ensure uniform application and with means of shut off.
- Runoff from water used for dust control shall be collected and handled as other Project wastewater.
- Temporary dust tight screens or partitions must be provided to localize dust generating activities, and for protection of workers, finished areas of work, marine environment and public.
- Maintain and relocate dust screens as necessary and remove dust screens at completion of those portions of the work that may generate airborne dust.
- Secure and cover material in open trucks hauling excavated material and re-use the covers.
- If Contractor's dust and particulate control is not sufficient for controlling dust and particulates into atmosphere a stop-work-order may be enacted by the DR or other Project authorities. The Contractor shall consult with the DR to determine procedures to resolve the problem. Necessary changes will be made to operations prior to resuming excavation, handling, processing, or other work that may cause release of dust or particulates.
- Spray coatings (e.g., paint, sealants) must not be applied under conditions that render containment ineffective.
- The QEP will be required to monitor airborne particulate levels using a hand-held monitor when airborne particulate is generated. EGD has a hand held particulate monitor used in the event of a large or nuisance airborne discharge. If particulate matter levels in the air exceed 100 µg/m<sup>3</sup> corrective actions must be taken.
- Nuisance-level hydrogen sulfide (H<sub>2</sub>S), such as those that may be detected by sense of smell may occur during dredging activities. The Contractor should evaluate the potential for H<sub>2</sub>S in their Health and Safety Plan. If H<sub>2</sub>S concentrations in air exceed guidelines (10 parts per million, ceiling short-term exposure level 1) then appropriate safety equipment (e.g., respirators with applicable filters) will be issued to workers.

- In the event that odours are noted or complaints are received, H<sub>2</sub>S monitoring should be undertaken in and around work areas where personnel are or need to be actively working.
- Contact the DR in the event of a nuisance odour or airborne discharge.
- Vehicle idling should be avoided whenever possible, especially near building doorways or air intakes.
- The Contractor should maintain equipment and vessels in good working order and use environmentally considerate fuels wherever possible.
- Perform routine checks of exhaust systems to identify actual or potential deficiencies and correct them in a timely manner. Repair or change out chronically deficient or severely defective equipment.

#### 6.1.13 Waste Management (including Hazardous Waste)

Wastewater is defined as waters produced from construction activities and personal hygiene and decontamination facilities on-site and excludes barge dewatering effluent. The following general BMPs should be implemented to limit probability of waste related impacts:

- Disposal/recycling of waste generated during the project shall be done in compliance with federal, provincial and municipal legislation, regulations, and bylaws, as applicable. The facilities to be used must be reviewed and approved by the DR.
- Regularly inspect the Site for unidentified or improperly stored materials.
- Ensure all containers (i.e., drums, totes, etc.) are in good condition and have a clean exterior at all times.
- Store equipment decontamination facility wastewater in separate tanks from those used for wastewater from personnel hygiene/decontamination facility.
- Provide, operate and maintain wastewater storage tanks when and where appropriate.
- Store batteries in a manner that prevents leakage of acid to the environment. Dispose of dead batteries at an appropriate facility.
- Ensure waste accumulation areas are organized and covered to reduce exposure to environment and wildlife.
- Recycle solid waste such as plastic, glass, aluminum, mixed paper and cardboard. Recycling areas should be conveniently located and easily identifiable.
- Encourage the use of recyclable products to reduce the solid waste impact on the environment.
- Segregate other solid waste, such as scrap metal, wood, electronics, polystyrene foam and soft plastics for recycling at an approved facility.
- Clean debris from work areas immediately after any maintenance activity. Dispose of collected material appropriately.
- Rubbish and/or waste materials shall not be buried on the EGD Project Area. Rubbish or waste generated on-site should be disposed of in appropriate manner and at an appropriate facility.



- Waste or volatile materials, such as mineral spirits, oil, or paint thinner shall not be disposed of into waterways, storm sewers or sanitary sewers. Generated waste should be placed in waste specific containers and disposed of appropriately.
- Wastewater from personnel hygiene/decontamination facility or toilet facilities shall not be discharged on-site. Disposal of these wastewaters must be conducted at an off-site permitted Wastewater Treatment Facility.
- Wastewater produced at the Work Site (e.g., equipment decontamination wastewater) should be tested prior to discharge in the EGD Project Area to ensure compliance with applicable water quality performance objectives for where it is intended to be released.
- If barge dewatering is required, barge effluent or discharge must meet the applicable water quality criteria for the receiving area.
- Connect pumps, piping, valves, miscellaneous items and necessary utilities as required for operation of facilities; and protect tanks, valves, pumps, piping and miscellaneous items from freezing, leaks or systemic failure. Check items and utilities regularly to confirm they are free of leaks.
- Hazardous waste should be segregated into separate containers. Ensure designated hazardous waste storage areas are away from active work areas.
- Hazardous waste/materials shall be transported in compliance with the Transportation of Dangerous Goods Act and BC Hazardous Waste Regulation.
- All means of containment and transport of hazardous waste must comply with the safety standards of the Transportation of Dangerous Goods Act and display all applicable prescribed safety marks and labels.
- Hazardous waste shall not be diluted or mixed with other hazardous or non-hazardous wastes.

#### 6.1.14 Site Access

The following BMPs shall be implemented to prevent environmental impacts resulting from vehicle access to the site:

- Prevent sediment or debris migration on access roads. Clean access roads at least once per shift to a level which removes dust and fines and limits dust and air pollution.
- Vehicle idling should be avoided especially near building doorways or air intakes.
- Any large deliveries by truck must be approved by the DR and EGD Operations before arriving on-site.
- The Contractor shall establish minimally-intrusive and well-designed traffic patterns for on-site activities and plans to minimize on-site impacts and reduce off-site traffic congestion. This plan should be reviewed and approved by the DR.
- Traffic management measures (such as 'flag person') approved by the DR prior to implementation shall be in place if required at site access points to direct traffic.
- Contractor shall clean all equipment prior to arrival at the EGD Project Area to ensure that no invasive vegetative species are present on the equipment and to prevent the introduction of deleterious material into the surrounding environment.

## 6.2 Activity Specific BMPs

In addition to General BMPs identified, specific BMPs for individual activities are detailed in this section. Where appropriate, the BMPs may be further divided by activity within a given activity. This list should not be considered exhaustive and the Contractor is required to implement all industry standards surrounding specific activities. In addition, the Contractor must also implement all permitting and regulatory requirements associated with the activity. It is the responsibility of all Contractors to identify and implement all BMPs applicable to their activity.

The Contractor shall ensure that all personnel acting on behalf of the Contractor are also aware and have the necessary experience, training and resources to appropriately implement the BMPs. The Contractor's ~~Environmental Monitor~~ **QEP** shall conduct monitoring and ensure compliance with applicable BMPs relating to specific activities detailed in this section. **Environmental compliance by the Contractor will also be audited by the QAEM selected by PSPC to conduct QA/QC audits.**

### 6.2.1 Piling Installation General Requirements

- BMPs for Pile Driving (DFO, undated; BC Marine and Pile Driving Contractors Association, 2006; Appendix D) will be followed during pile installation, including the following measures:
  - Underwater sound pressure levels will be monitored (~~via hydrophone~~) **<510 m** from the pile being driven by a ~~qualified EM~~ **QEP** ~~at the commencement of works~~ to ensure thresholds (~~i.e., 30 kPa and 160dB~~ as described in Section 5.1.2) are not exceeded.
  - Should the measured pressure levels exceed thresholds, the exceedances will be noted and reported to the DR immediately, at which point work ~~may~~ **will** be suspended immediately to allow for implementation of additional mitigation measures **by the Contractor**. ~~Any change in methods and/or ground conditions may require further hydrophone monitoring.~~
  - Deployment of a **full height bubble curtain of sufficient capacity to attenuate pressure waves to comply with Section 5.1.2 is recommended during pile driving** ~~is recommended should an impact hammer be utilized for driving steel piles (as per BMPs; BCMPDCA/DFO 2006).~~
  - Mitigation measures (e.g., avoiding multiple piles been driven at one time, deployment of a bubble curtain over the length of the wetted pile to reduce the shock waves, etc.) should be implemented as appropriate to mitigate effects of underwater noise on the surrounding environment.
  - A 25 metre pinniped safety zone and a 500 metre cetacean safety zone will be established (Appendix A, Figure A3). If a marine mammal is observed within these respective zones, works shall be suspended until the animal has left the safety zone **as described in Section 5.1.2.**
  - In the event that pile installation causes a fish kill, the DR shall issue a stop-work-order. The Contractor will be responsible for introducing effective means to reduce the level of shock waves or similar measures that will prevent fish from entering the potentially harmful shock wave area.

- Water quality during all pile driving or extraction activities must comply with the criteria provided in the WQMP (Section 6.1.5).
- Pile cut-offs, waste or any miscellaneous unused materials will be recovered for disposal in a designated facility or placed in storage. Under no circumstances will materials be returned to the marine environment or stockpiled on-site.
- The use of vibratory pile driving and removal methods, where practical and feasible, is preferred over impact pile driving to minimize noise and sound pressure effects on aquatic life.

### 6.2.2 Concrete Works

- Ensure that all works involving use of concrete, cement, mortars and/or other cement or lime-containing construction materials will not deposit (directly or indirectly) sediments, debris, concrete, leachate, concrete fines or wash water into or about any watercourse.
- Immediately report to the DR spills of sediment, debris, concrete fines, wash or contact water of reportable quantities and begin clean-up. DR may contact EMBC Environmental Emergency Management Plan Incident Reporting Hotline 1-800-663-3456 and Department of Fisheries and Oceans (DFO) Observe, Record and Report Hotline 1-800-465-4336.
- When grinding, cutting or demolishing cured concrete, dust and fines should be prevented from entering the water and water quality performance criteria in the WQMP must not be exceeded.
- Monitoring of pH should be measured to an accuracy of +/- 0.2 pH units from the background level to ensure allowable ranges are maintained when performing any concrete works about water (e.g., grinding concrete where dust or fines may enter the water, pouring concrete, washing equipment). In the event that the levels are outside the acceptable ranges (7.0 to 8.7 [MOE, 2016]) the DR must be notified and preventative measures are to be introduced (e.g., catch basins to recover the runoff and neutralizing prior to disposal).
- All equipment for concrete work must be properly sealed and have locked connections where present. Crews will ensure that concrete forms are not filled to overflowing. Excess or spilled concrete must be collected immediately and disposed of in an appropriate location.
- Barriers will be used as appropriate to prevent splashing of the concrete over the forms and into the water or intertidal area during pouring.
- Concrete washout water and solids will be collected and retained in leak proof containers, so that this caustic material does not reach the soil surface then migrate to surface waters, groundwater or adjacent watercourses. Collected water must be monitored for acceptable pH levels (as per EMIP). If the pH levels are outside the allowable limits then the runoff water must be contained until the pH is between 7.0 and 8.7 pH units and turbidity is <25 nephelometric turbidity units (NTU), measured to an accuracy of +/- 2 NTU **must comply with Table 6-1.**
- Equipment and tools that have come into contact with concrete will be washed down in a designated area away from the intertidal and drainages (e.g., streams and municipal drains) to prevent concrete products from entering watercourses (tidal waters, streams, drains).

### 6.2.3 *Selective Site Demolition*

- Any jetty attachments selected for re-use on-site (e.g., cable trays, safety ladders, chains, bolting materials, bull rails) must be cleaned and/or decontaminated at the designated on-site decontamination area prior to storage and reinstallation.

### 6.2.4 *Structure Relocation*

- Temporary location of the tug boat wharf, between relocation and reinstallation, should be within the Project Boundary and is subject to approval by DR.

### 6.2.5 *Wood, Plastic and Composites BMPs*

In addition to the General BMPs stated in Section 6.1 the following BMPs may apply:

#### Wood Treatment

- Any wood or timbers to be treated shall be cut to final length prior to treatment.
- Field treatment of newly exposed timber components for re-use (e.g., cutting, cracking, holes) is to be done in a manner to prevent preservative from entering any watercourse.
- Do not apply field treatment in conditions that render containment ineffective (i.e., raining).
- Dispose of any unused preservative at a Hazardous Waste Facility and any treated timber waste (including sawdust) at a facility approved to dispose of treated timber material.

#### Timber

- All structures for re-use (e.g., designated bull rails, timber chocks, dolphin and fender piles) shall be decontaminated prior to re-installation.
- Any treated timber waste must be disposed of in accordance with federal, provincial and municipal laws and policies.
- Timbers to be treated shall be cut to final length prior to treatment.

### 6.2.6 *Finishes BMPs*

In addition to the General BMPs stated in Section 6.1 the following BMPs may apply:

#### Painting Exterior Metal Surfaces

- Use containment such as tarps, shrouds or portable structures to prevent airborne particles from entering the atmosphere and depositing on surface waters or surfaces leading to watercourse.
- Airborne particle containment should be large enough to adequately enclose or segregate working areas.

- Place containment beneath and around structures being painted to ensure overspray or runoff does not reach waters or surfaces leading to watercourse.
- Do not paint during conditions that render containment ineffective (e.g., windy).
- Ensure paint, solvents and other applicable materials are stored securely when working alongside structure and water edges.
- Ensure any floor grates are covered to prevent spills from reaching waters or surfaces leading to watercourses.
- Waste generated from grinding and hand tooling must be prevented from entering any watercourse.
- Ensure empty paint cans and other associated wastes from painting are stored properly, protected from the weather and removed as soon as possible.
- Left over paint and paint derived materials should be disposed of appropriately in accordance with manufactures guidelines and, where appropriate, at a registered facility.

#### 6.2.7 Earthworks BMPs

In addition to the General BMPs stated in Section 6.1 the following BMPs may apply:

##### Excavating, Trenching & Backfilling

- Design open excavations to protect against flooding and damage due to surface water run-off.
- Dispose of water generated from earthworks activity in a manner not detrimental to any portion of work completed or under construction.
- Work will be conducted in a manner that does not result in the deposit of a toxic or deleterious substance into waters. Water quality will be assessed in accordance with the relevant WQMP criteria.
- Isolate work areas from all water (including flowing and standing) that can contact the ocean to inhibit water transport of materials into the surrounding environment.

##### General Fill

- Select appropriate fill material and placing methods, provide suitable equipment and sequence the work so that the specified quality of fill is produced.
- Information regarding the source (e.g., supplier, location, environmental quality) of imported materials (e.g., aggregate for concrete) and appropriate certificates are to be provided by the supplier to ~~PWGSC~~ **PSPC**.
- General fill used ~~at the Phase 2 work area~~ shall consist of durable, natural granular material, free of organics, with no more than 8% by weight passing the 75 µm (No. 200) sieve. Recycled materials from off-site sources, including but not limited to concrete, asphalt pavement and glass, shall not be used as fill. The maximum particle size shall not exceed 150 mm.

- The presence of fines within imported armour rock material will be minimized. This may require pre-washing of the material.
- Conduct ongoing quality control sampling and testing at the loading conveyor to confirm that the general fill materials conform to the Project requirements. The material gradation testing rate for general fill shall be not less than one test for every 1,000 m<sup>3</sup> placed in the work. All quality control test reports shall be submitted to DR for review and approval prior to placement of that material.
- All general fill and sand fill shall be imported by road transport and unloaded directly within the Project Area.
- The road must be swept at the end of each day, or more frequently if required, to remove any loose materials.
- Contractor shall provide adequate flag-persons and/or traffic signal devices to prevent interference with emergency vehicles or traffic of other dock users and Contractors when transporting fill materials.

#### 6.2.8 Exterior Improvement BMPs

In addition to the General BMPs stated in Section 6.1 the following BMPs may apply:

##### Aggregate Material Recovery

- At the end of each working day, roadways shall be swept and made clear of debris, fallen rock and dust arising from rock and concrete deliveries to DR's satisfaction.

##### Asphalt Paving

- Prevent discharge containing asphalt, grout, concrete or other waste materials from reaching storm drains, watercourse and/or marine environment. During rain events, portable asphalt mixing equipment should be covered by an awning or other simple structure to avoid direct contact with rainfall to inhibit mobilization of materials in rainwater.
- Prevent the application of fog seals, tack coats or other coatings, if required, during periods when rainfall is likely.
- Minimizing washing of sand or gravel from new asphalt, debris from drilling or cutting or other materials into storm drains watercourse and/or marine environment by sweeping or washing.

##### During Construction

- Use drip pans, ground cloths, heavy cardboard or plywood wherever concrete, asphalt, or asphalt emulsion chunks and drips are likely to fall unintentionally from mixing equipment (e.g., beneath extraction points) to minimize asphalt runoff into the surrounding environment.
- Accumulations of concrete runoff, aggregate chunks, and other solids must be collected for proper disposal prior to removing the containment or cover devices to prevent contamination of the surrounding environment.

- Provide catch basin covers, inlet protection or similarly effective containment devices over all nearby catch basins such that runoff from the construction activity does not enter the stormwater drainage system surface runoff or marine waters.
- Direct wash water exposed to aggregate to areas where sediments will be filtered and not drain to stormwater, watercourse or marine areas.
- If wastewater cannot be directed to suitable areas on-site, it should be contained, collected and disposed of in an approved manner.

#### Clean-up

- Designate a wash out area on-site where application and mixing equipment cleaning should be conducted. This washout area should also be used to contain excess material and slurry. The area should be designed to appropriately contain all waste generated.
- Clean equipment off-site when practical and avoid any silt-laden discharge directly or indirectly into the watercourse. This includes trucks and equipment that can return to the batch plant for washing.
- Sweep the pouring area at the end of each day, or more frequently as needed, to collect loose aggregate chunks and dust. Do not hose down the area to stormwater drains or intertidal area.

#### Saw Cutting

- Slurry and sediment from saw cutting operations should be confined to the immediate work area by using temporary berms or diversion structures. Cover or barricade all nearby stormwater drains during saw cutting to prevent any materials from entering the stormwater drainage system.
- Residue from cutting or grinding operations should be picked up and contained using a vacuum attached to the cutting machine. Residue should not flow across pavement or be left on the pavement surface. Street sweeping or washing down the area that collects and treats the water may be required.
- Avoid saw cutting operations during rainfall events unless cuttings, sediment and wash water can be contained and disposed of appropriately.
- Spills of chemicals used to expose aggregate, should be contained to prevent them from draining to streets, lanes or other areas where it may reach the marine environment or stormwater drainage system. Any spill of reportable quantities must be reported to DR immediately.

#### 6.2.9 *Waterways and Marine Construction BMPs*

In addition to the General BMPs stated in Section 6.1 the following BMPs may apply:

- All work must abide by the conditions of all applicable legislation and regulations.
- Vessels and equipment will be well maintained and kept in good working order.

- Contractors operating marine vessels within the Project area should minimize re-suspension of sediments resulting from prop wash or thrusters by operating at minimal speed whenever possible.
- Grounding of barges may need to occur; however, this shall only occur in areas where excavation/dredging and replacement of surficial substrate (engineered capping) has been authorized and completed to prevent disturbance of established sessile marine organisms.
- Contractor shall be responsible for the safe overwater and terrestrial transport of all waste materials (including all construction debris, and associated stormwater runoff containing potentially deleterious substances) in accordance with federal, provincial, regional/municipal laws and regulations and all Project specific documents.
- Ensure hydraulic machinery, if required, uses environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.
- Wastewater produced at the Work Site (e.g., equipment decontamination wastewater) should be tested prior to discharge in the EGD Project Area to ensure compliance with applicable water quality performance objectives for where it is intended to be released.
  - If criteria cannot be met wastewater shall be treated at an authorized Wastewater Treatment Facility. No deleterious substances may be released into any watercourse.
- Work will be conducted in a manner that minimizes induced turbidity such that it does not result in exceedance of water quality criteria (Section 6.1.5).

#### DFO Marine/Estuarine Fisheries Timing Windows (DFO, 2014b)

The least risk work windows **Timing Windows** for Esquimalt Harbour are:

- December 1 to February 15 (winter window)
- July 1 to October 1 (summer window)

~~Project related activities are expected to occur year round. Works conducted out of the least risk windows have an increased risk to fish. In most cases, this can be mitigated with appropriate best management practices such that no serious harm to fish occurs.~~ In-water works are to be performed during the DFO least-risk Timing Windows for impacts to fish in Esquimalt Harbour (July 1 to October 1 and December 1 to February 15). If any works are planned to be conducted by the Contractor outside of the Timing Windows their QEP shall identify the mitigative measures to prevent serious harm to fish within the EPP.

~~In-water works are expected to be conducted within these least risk Timing Windows.~~

#### ~~In-water Transportation~~

- ~~Contractors shall be responsible for the safe transport of all waste materials (e.g., construction debris) in accordance with federal, provincial and regional/municipal laws and regulations and conditions as set forth in the permits and contract terms.~~
- ~~Contractor shall assume liability for misplaced waste and debris material arising out of their activities, and is required to notify and coordinate with appropriate authorities if material is~~



~~misplaced or lost during transport to the certified Off-Site Offload Facility or during completion of offloading, transport and disposal activities.~~

- ~~• Transport of any debris shall be performed using a watertight barge with sidewalls of sufficient height to fully contain the debris.~~
- ~~• Contractor is responsible for detailing the methods for monitoring haul barges for leakage during transport of material and contingency actions should a leak be observed. If leakage is observed, however minor, barge transport operations shall be halted and not restarted until repairs are made and approved. The DR must be notified of any leaks.~~
- ~~• Provide registration, licencing and certificates of seaworthiness for each haul barge to be used on the Project. In addition, material transportation by barge will require the Contractor to obtain an Authorization from Transport Canada Harbour Master pursuant to the Canada Marine Act and from DND-QHM. If vessels undergo any repairs certificates must be re-submitted.~~

### Off-Site Stockpiling

- In general, stockpiling of excavated materials is not allowed at the EGD work site. Provisions for any such activity specified herein are for information purposes only.
- Any material stockpiled off-Site shall be contained to prevent any loss or run-off to the surrounding environment.
- The operation of an Upland Staging Area will consider the need for containment, coverage of stockpiles, use of erosion and sedimentation controls, and management of water runoff.
- Stockpiles, where practicable and feasible, must be located 30 m or greater away from watercourses (the space available is limited and constrained by operational requirements).
- Construct stockpile areas using berms or other barrier devices to prevent uncontrolled spreading of debris and/or contaminated sediment.
- Cover stockpiles to prevent erosion during periods of rain and/or wind. ~~BMP1-1~~
- Collect and treat/dispose of water draining from stockpile areas.
- Stockpiled material should be prevented from freezing.
- Materials must not be stockpiled for extended periods of time unless approved by DR.
- Upon completion of work, Contractor will return the Off-Site Stockpiling area to pre-project condition.

### Upland Transportation

- Waste transported to/from the ~~Contractor's Off-Site Offload Facility~~ **site** will be covered with a tarp and adequately secured in watertight containers to minimize release of odours and dust and ensure no spillage.
- Haulers must use only designated routes for transport of the material (e.g., designated truck routes; Appendix I for Esquimalt Truck Routes).

- Contractor is responsible for all misplaced waste and debris material and is required to notify and coordinate with appropriate authorities if material is misplaced during transport to the Off-Site Offload Facility or during completion of offloading, transport, and disposal activities.

## 7. PROFESSIONAL STATEMENT

Findings presented in this assessment are based upon (i) reviews of available documentation and discussions with available personnel and regulatory representatives, (ii) review of available records and the terms and conditions for the planned activities. Consequently, while conclusions and recommendations documented in this report have been prepared in a manner consistent with that level of care and skill normally exercised by other members of the environmental science and engineering profession, practising under similar circumstances in the area at the time of the performance of the work, this report is intended to provide information and to suggest mitigation strategies to reduce, but not necessarily eliminate, the potential for environmental impacts to occur as a result of planned activities in the Study Area. This management plan is meant to be a living and flexible document that can be used to provide guidance regarding appropriate management of species.

This environmental assessment has been prepared solely for the use of PSPC and federal agencies providing expert advice to the project pursuant to the agreement between Keystone Environmental Ltd. and PSPC. Any use which other parties make of this report, or any reliance on or decisions made based on it, are the responsibility of such parties. Keystone Environmental Ltd. accepts no responsibility for damages, if any suffered by other parties as a result of decisions made, or actions based, on this report.

June 23, 2017

\_\_\_\_\_  
Date

\_\_\_\_\_  
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Marine /Aquatic Field Technician

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Warren Appleton, B.Sc., R.P.Bio  
Marine Biologist / Project Manager

\_\_\_\_\_  
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Senior Marine Biologist / Department Head, Biological Services

## 8. REFERENCES

- Archipelago Marine Research Ltd. (Archipelago). 2009. Esquimalt Graving Dock and Marine Habitat Assessments – Esquimalt Harbour. Rev B (Final).
- BCMPDCA/ DFO (BC Marine and Pile Driving Contractors Association and Fisheries and Oceans Canada). 2006. Best Management Practices for Pile Driving and Related Operations. November 2006.
- DFO (Fisheries and Oceans Canada). 2014. Letter from Adam Silverstein, Manager, Regulatory Reviews, Fisheries Protection Program to Cliff Rhodes, Portfolio Director, Public Works and Government Services Canada – Implementation of Mitigation Measures to Avoid and Mitigate Serious Harm to Fish. File: 14-HAPAC-00210. May 13, 2014.
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- Golder Associates Ltd. (Golder). 2015. PWGSC Esquimalt Graving Dock Phase 2 Waterlot Remediation – Archaeological Impact Assessment, South Jetty, Esquimalt, BC (Non-Permit Report).
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PWGSC (Public Works and Government Services Canada). 2014. Request for Review – Esquimalt Graving Dock South Jetty Redevelopment/ Waterlot Underpier Phase 2 Remediation Project. Prepared by Andrew Mylly, PWGSC. February 12, 2014.

PWGSC. 2010a. Esquimalt Graving Dock Environmental Best Management Practices. Version 04. Prepared by Public Works and Government Services Canada, October 6, 2010.

Victoria Natural History Society (VNHS). 2013. Victoria Christmas Bird Count Maps and Lists: Area 8 – Esquimalt Harbour. [online] Available at: <http://www.vicnhs.bc.ca/cbc/HistoryArea8.mht>.

Public Works and Government Services Canada (PWGSC). 2010a. Esquimalt Graving Dock Environmental Best Management Practices. Version 04. Prepared by Public Works and Government Services Canada, October 6, 2010.

BC Environmental Management Act.

## 8.1 Legislation and Bylaws

### 8.1.1 Federal Acts and Regulations

- Canada Marine Act, 1998 (amended 2014)
  - Natural and Man-made Harbour Navigation and Use Regulations
- Canada Shipping Act, 2001 (amended 2013)
  - Collision Regulations
- Canadian Environmental Assessment Act, 2012 (amended 2013)
  - Regulations Designating Physical Activities
- Canadian Environmental Protection Act, 1999
- Fisheries Act, 1985 (amended 2013)
  - Marine Mammals Regulations
- Migratory Birds Convention Act, 1994
  - Migratory Birds Regulations
- Navigable Waters Protection Act, 1985
- Navigation Protection Act, 2014
- Species At Risk Act, 2003
- Transportation of Dangerous Goods Act, 1992 (amended 2009)
  - Transportation of Dangerous Goods Regulations

### 8.1.2 Provincial Acts and Regulations

- Environmental Management Act, 2003
  - Contaminated Sites Regulation

- Hazardous Waste Regulation
- Spill Reporting Regulation
- Industrial Non-hazardous Waste Landfills Code of Practice
- Heritage Conservation Act, 1996
- Wildlife Act, 1996

### 8.1.3 *Regional and Municipal Bylaws*

- Capital Regional District (CRD). 2006. Capital Regional District (CRD) Sewer Use Bylaw No. 2922 (Consolidated). [online] Available at: <https://www.crd.bc.ca/docs/default-source/source-control-pdf/regional-source-control-bylaw---crd-bylaw-2922.pdf?sfvrsn=4>.
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- Corporation of the Township of Esquimalt (Township of Esquimalt). 2005 (amended to 2014). Streets and Traffic Regulation Bylaw, 2005, No. 2678. [online] Available at: [http://www.esquimalt.ca/files/PDF/Bylaws/Bylaw\\_2607\\_-\\_Streets\\_and\\_Traffic\\_Regulation\\_2014.pdf](http://www.esquimalt.ca/files/PDF/Bylaws/Bylaw_2607_-_Streets_and_Traffic_Regulation_2014.pdf).

# APPENDIX A

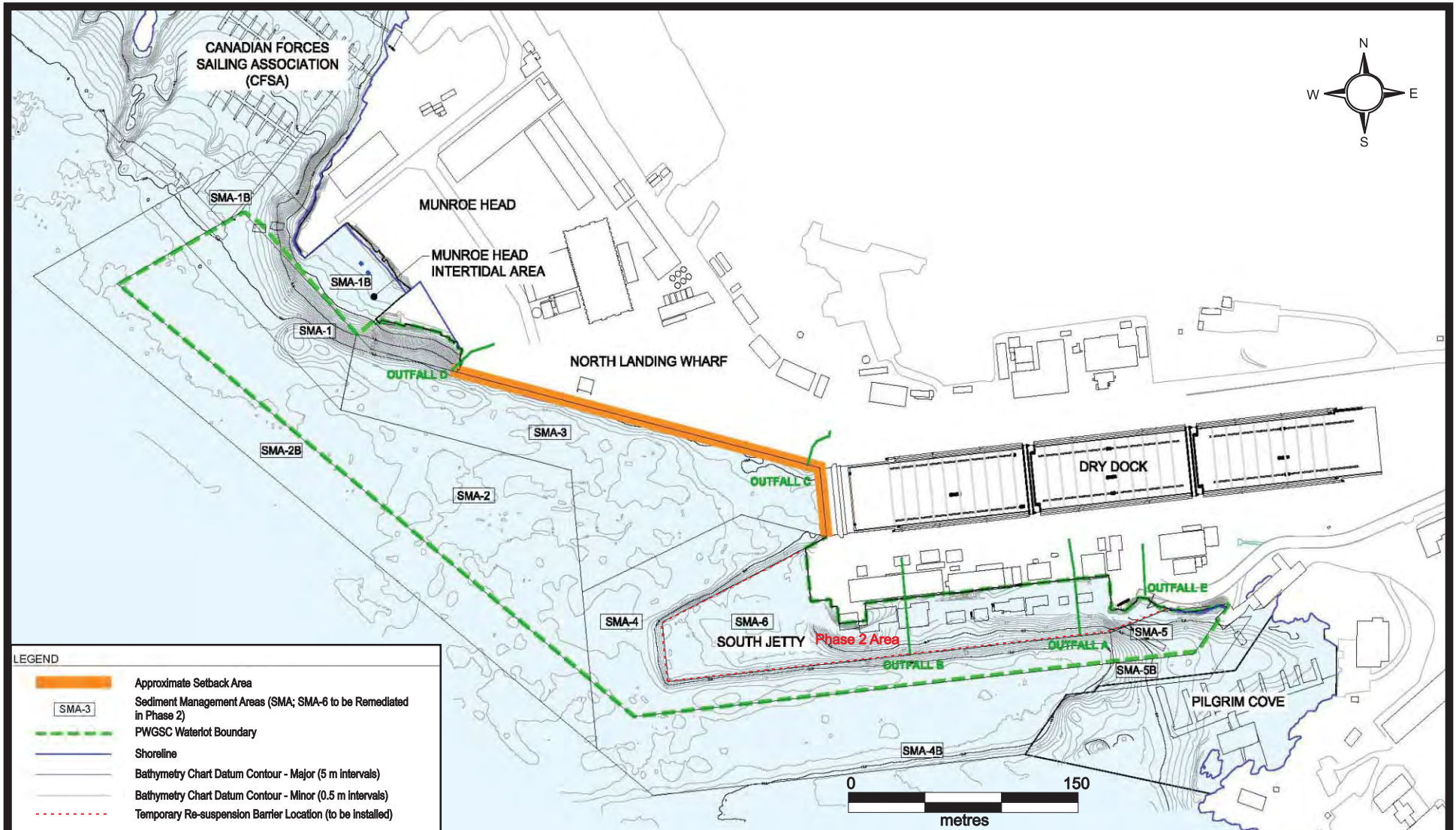
## FIGURES

Figure A1: Esquimalt Graving Dock Waterlot Sediment Remediation Project Area Map





Figure A2: Site Boundaries and Adjacent Properties



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in Environmental Science

G3 CONSULTING LTD.

Bathymetry contours supplied by CRA Surveys 2010, shown in chart datum.

Coordinate System: NAD83 UTM Zone 10  
 Adapted from AQ/KCB/Golder/PWGSC, South Jetty Wharf Development Project  
 R.026729.002/R.018400.002 Plan Sheets C3, C9 and C21.  
 Basemap adapted from Golder/PWGSC (PAC-#269014-v1-PWGSC-EGD-FINAL-BASE\_MAP-ACAD-10-11-GOLDER-20110726).

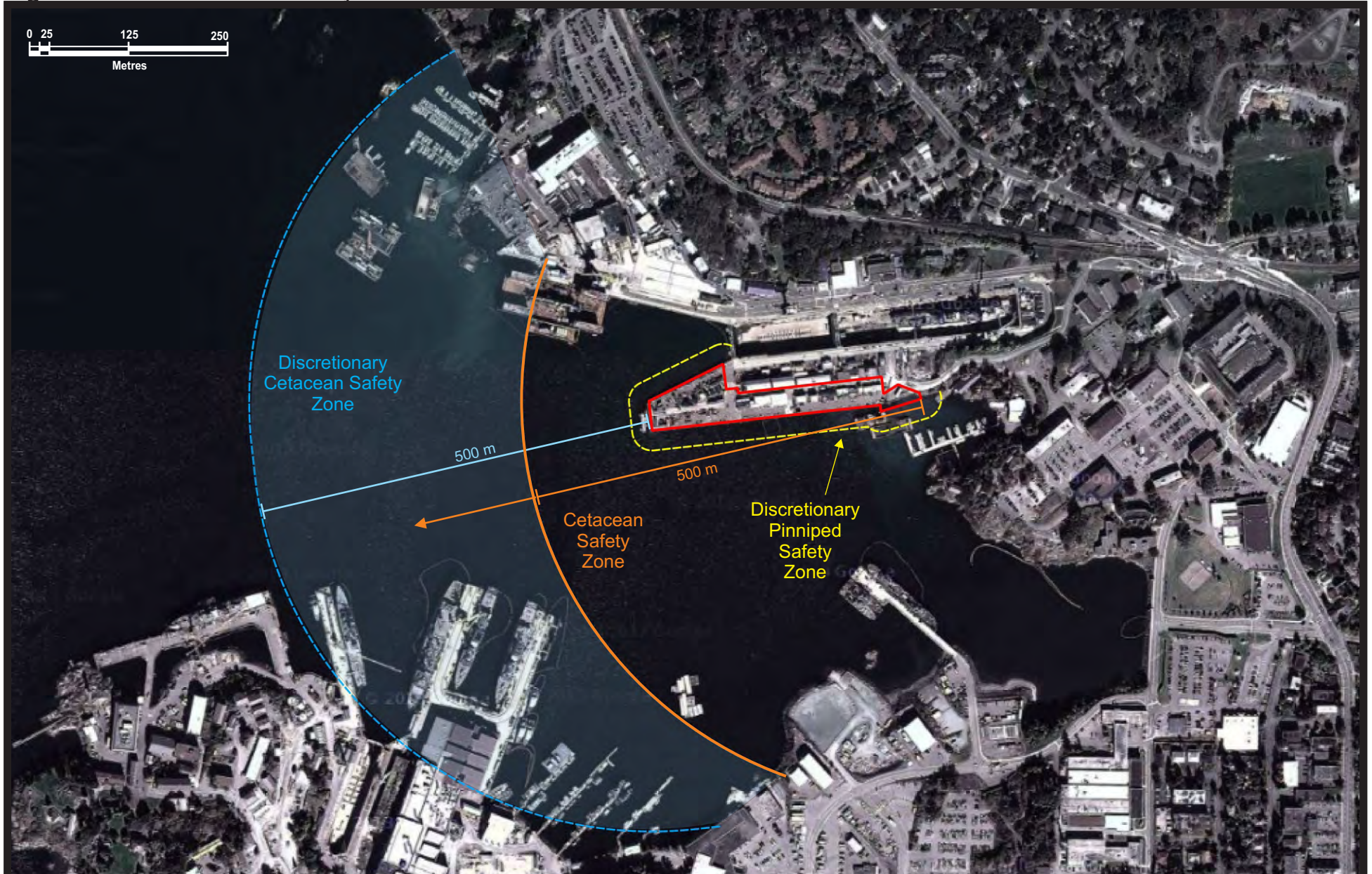
Adapted from:

SITE BOUNDARIES AND ADJACENT PROPERTIES			
PROJECT No.	10-1175-001	FILE No.	10-1175-001
DESIGN	10	11 NOV 10	SCALE: AS SHOWN
DRAWN	AM	25 MAR 11	
CHECKED	VC	03 AUG 11	
REVIEW	TR	03 AUG 11	

**FIGURE 2**



Figure A3: Marine Mammal Safety Zones



**G3 CONSULTING LTD.**  
*Innovation & Excellence  
 in Environmental Science*

Coordinate System: WGS84 Web Mercator  
 Project Boundary Source: PWGSC Real Property Services  
 South Jetty Wharf Development Dredging Work Sequence Plan  
 Project R.026729.002/R.018400.002 Sheet C9  
 Imagery Source: DigitalGlobe, Google, Parks Canada 2014

- Project Boundary
- Discretionary Pinniped Safety Zone (25 m)
- Discretionary Cetacean Safety Zone (500 m from edge of Project Boundary)
- Cetacean Safety Zone (500 m from in-water activities)



## APPENDIX B

### PERMITS AND APPROVALS



Pacific Biological Station  
3190 Hammond Bay Road  
Nanaimo, BC, V9T 6N7

May 13, 2014

*Your file            Votre référence*

*Our file            Notre référence*  
14-HPAC-00210

Cliff Rhodes, Portfolio Director  
Public Works and Government Services Canada  
219-800 Burrard Street  
Vancouver, BC, V6C 0B9

VIA E-MAIL: [Cliff.Rhodes@pwgsc-tpsgc.gc.ca](mailto:Cliff.Rhodes@pwgsc-tpsgc.gc.ca)

Dear Mr. Rhodes:

**Subject: Implementation of mitigation measures to avoid and mitigate serious harm to fish.**

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on February 26, 2014.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Our review consisted of:

- Request for Review form and attached Figures and Photos

We understand that you propose to:

- Demolish the existing South Jetty pier
- Dredge and remediate contaminated sediments
  - 5,225 m<sup>2</sup> intertidal coarse sediment and bedrock
  - 6,893 m<sup>2</sup> subtidal unconsolidated sediment
- Construct a new South Jetty pier
- Remove existing sheet pile containment wall

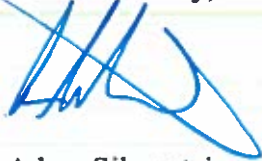
Provided that the mitigation measures identified in your Request for Review form are incorporated into your plans, the Program is of the view that your proposal will not result in serious harm to fish. No formal approval is required from the Program under the *Fisheries Act* in order to proceed with your proposal.

If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please notify this office at least 10 days before starting your project. A copy of this letter should be kept on site while the work is in progress.

If you have any questions, please contact Byron Nutton at our Nanaimo office at 250-756-7221, by fax at 250-756-7229, or by email at [byron.nutton@dfo-mpo.gc.ca](mailto:byron.nutton@dfo-mpo.gc.ca). Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Adam Silverstein  
Manager, Regulatory Reviews  
Fisheries Protection Program

## APPENDIX C

### EGD ENVIRONMENTAL BEST MANAGEMENT PRACTICES



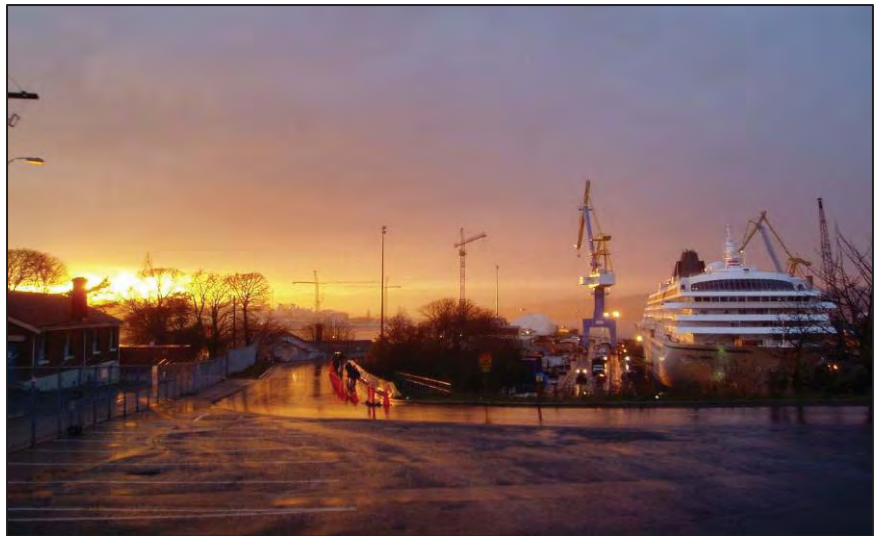
# Esquimalt Graving Dock

## Environmental Best Management Practices



**Prepared By:**  
Public Works and Government Services Canada  
Environmental Services

**Date:** October 6, 2010  
**Version:** 04



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## Overview

The **Esquimalt Graving Dock (EGD)** is a federal-government-operated, multi-user ship repair and maintenance facility located in Esquimalt, British Columbia. The facility has been in operation since 1925, and provides service to local, Federal, and international vessels. The vessel repair and maintenance work at the EGD is carried out by privately owned shipyards that rent the required sections of the drydock and lease upland work space from the government, and pay a fee for services such as cranes, compressed air, water and power.

Industrial ship maintenance and repair operations have the potential to result in significant environmental issues and impacts. To help identify and manage these potential impacts, the EGD has implemented an **Environmental Management System (EMS)** certified under the internationally recognized standard **ISO 14001**. The EMS provides the framework for identifying potential impacts, and ensures adequate controls are in place to effectively manage them.

This manual contains a series of recommended **Environmental Best Management Practices (EBMPs)** to reduce potential environmental impacts of common activities and operations at the Esquimalt Graving Dock. The manual contains guidance for those operating at the EGD, and is intended to complement existing environmental legislation. It does not remove the responsibility of all contractors and companies operating at the facility to abide by all applicable regulatory requirements and industry standards. All users of the facility are expected to follow the EBMPs.



**For further information on environmental rules and standards contact the EGD Environmental Department.**

# Environmental Policy



It is the goal of the Esquimalt Graving Dock, in partnership with the ship repair industry, to be the premier ship repair, construction and maintenance facility on the west coast of North America.

The Esquimalt Graving Dock and its Users realize that environmental management is an integral part of attaining that goal. Through the implementation of an ISO 14001 Environmental Management System, we are committed to managing the actual and potential environmental impacts of our operations.

## To meet our commitment we will:

- Protect the natural environment and prevent pollution.
- Meet or exceed applicable federal, provincial and municipal legislation and regulations; uphold departmental policies; and abide by industry standards, practices and other requirements related to our identified environmental aspects.
- Establish and review our programs, objectives and targets to ensure we are meeting our environmental commitments.
- Communicate openly with our employees, Users, tenants, contractors, suppliers, neighbours and other stakeholders regarding our Environmental Management System and the nature of our operations.
- Educate our employees and the Users of our facility to ensure they are aware of and understand their roles and responsibilities in protecting the environment.
- Meet the evolving needs and expectations of our industry and community through the continual improvement of our systems, programs and procedures.



Bonnie MacKenzie Director General Engineering Assets Strategy Sector	Jim Milne Director Esquimalt Graving Dock Engineering Assets Strategy Sector	David Latycki Operations Manager Esquimalt Graving Dock Engineering Assets Strategy Sector
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JULY 2009



 Public Works  
Gouvernement Services Canada

Travaux publics et Services  
gouvernementaux Canada

ISO 14001  
EMS-011  
CGSB



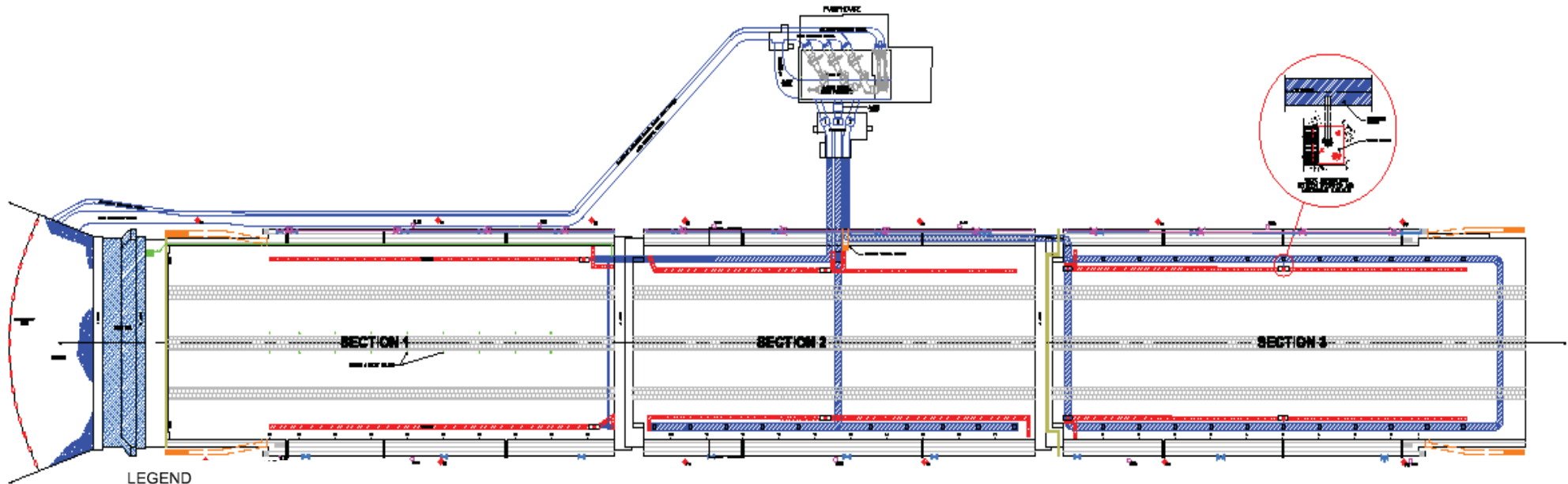


# Esquimalt Graving Dock



# ESQUIMALT GRAVING DOCK DRAINAGE PLAN

Note: It is intended that this drawing be printed in colour.  
If printed in black and white some detail will be lost.



**LEGEND**

LADDER	
STAIR	
FIRE ACCESS	
ELECTRICAL CONN.	
AIR CONNECTION	
WATER CONNECTION	
WATER PIPE	
TRENCH GRATE	
TUNNEL GRATE	
TUNNEL MANHOLE	
NET CAGE- MAIN TUNNEL ACCESS	
TRENCH DRAIN	
DE-WATERING TUNNEL	
SILL PUMP & PIPE	
MOON POOL	

**ESQUIMALT GRAVING DOCK**  
1178' (361.8m) LONG  
128' (41.2m) WIDE  
48.5' (16m) DEEP

THIS DRAWING IS NOT TO SCALE

## High Pressure/ Ultrahigh Pressure Washing

One of the first activities to occur on a dry-docked vessel is the high pressure washing of the vessel hull to remove salts and marine growth prior to surface preparation or painting. This typically involves pressure washing the hull and/or super structure with water at 2,000 – 3,500 psi, which may produce large volumes of paint contaminated wastewater. Shipyards may use an Ultra High Pressure (UHP) washing process (from 40,000 – 55,000 psi) to completely remove all paints, eliminating the need for further surface preparation prior to painting. This operation generates even larger volumes of wastewater and solids, which will need to be managed.

### Management of Wastewater on the Graving Dock Floor

- Ensure all wastes and wastewater discharges resulting from hull washing activities are collected and disposed properly.
- Coordinate high pressure washing operations to ensure effective collection of wastewater.
- Close all sump well valves in the floor collection system prior to and during high pressure washing operations.
- Divert contaminated wastewater that falls outside of the dock floor containment area away from the tunnel drains.
- Direct non-contaminated water (i.e. ballast water, cooling water) away from contaminants on the dock floor.
- Collect and dispose of stormwater that comes into contact with contaminants.
- Do not use environmentally harmful detergents or additives in wash water.

**All wastewater containing paint contaminants must be directed to the collection drains and sumps on the drydock floor, collected, and sent for treatment.**



Antifoulant contaminated wash water entering the trench drain sump wells on dock bottom.

<b>Issue Date:</b> October 6, 2010	<b>Version:</b> 4
<b>Approved By:</b> Environmental Coordinator	<b>Last printed:</b> 06/10/2010 10:06:00 AM
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## Section 1 Considerations – Caisson Leakage and Sediment

### **Diversion of sill water away from pressure washing areas**

Water leaking into Section 1 of the graving dock from the caisson can be diverted from the work area by using a sump pump hooked to the PVC pipe installed along the north wall of the graving dock (Section 1).

### **Managing Entrained Sediment**

Harbour sediment may become trapped in section 1, and accumulate in the corners, trenches and sumps. The users of the section will need to be aware of this. This sediment will have to be removed if it becomes contaminated with pressure washing wastewater, sandblast grit, paint chips, paint overspray, or other contaminants.



The sill diversion pump removes clean saltwater from the pool at the front of Section 1 (moon pool) and discharges to the tunnel drains through a hard pipe on the dock wall.



Sediment from the harbour often settles on dock bottom after dewatering. This may become contaminated with paint, etc. and must be disposed of.

## **Ultra High Pressure (UHP) Washing**

Ultra high pressure washing generates significant volumes of wastewater and sludge that may pose a challenge for collection and disposal.

- Prepare in advance for the management of the UHP waste.
- Remove all water, sludge and debris generated from UHP washing from the dock.
- Ensure the sludge is disposed of at an appropriately permitted facility.



The hull of a cruise ship being ultra high pressure washed. Inset: sludge produced during ultra high pressure washing.

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## Management of Small Vessel High Pressure Wastewater in the Upland Areas

- Perform pressure washing only in designated areas where wastewater management can be effectively achieved.
- Completely block off all drains prior to use for collecting wastewater from pressure washing.
- Ensure sufficient equipment is available for the timely collection and removal of wash water.
- Clean up work area and drains prior to removal of collection equipment. (i.e. filter cloth, plugs, tarps)



A small vessel is power washed on the North Landing Wharf (NLW).



The trench drain is blocked and a sump pump is installed to collect wash water into a tote.



Example of styrofoam blocks used as a drain blocker on the NLW.



Example of a pump set up used to collect wash water on the NLW.

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<b>Page 3</b>	



## BMP #2

### Abrasive Blasting

---

Abrasive blasting is a common operation performed at the Esquimalt Graving Dock (EGD) to prepare vessel surfaces for painting. However, this operation creates challenges with respect to controlling air emissions and the waste materials generated.

Fugitive emissions from blasting operations have the potential to negatively affect employees, facility users, neighbours, equipment and infrastructure. The dust from blasting may contain harmful environmental pollutants which may enter the harbour directly or via stormwater runoff.

Waste grit may be contaminated with antifouling paint which poses a risk to marine life if not handled properly.

#### Dust Control

- Cover all blast media (new and used) during transport.
- Use containment such as tarps, shrouds or portable structures to prevent airborne particles from entering the atmosphere and surface waters.
  - Containment should be large enough to adequately enclose or segregate the working area.
  - Ensure containment devices are connected so there are no gaps.
  - Ensure that containment reaches the dock floor or walls



- Where physical containment techniques are not sufficient to prevent fugitive emissions water curtains may be used to mitigate dust emissions in problem areas.
- Do not abrasive blast during conditions that render containment ineffective (i.e. during windy conditions)
- Minimize dust emissions by ensuring blast nozzles are angled close to perpendicular and aimed slightly downward during blasting.
- No abrasive blasting of vessels shall be performed while vessels are docked at the North Landing Wharf or South Jetty

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### Air Quality Alarm

The Esquimalt Graving Dock has an onsite PM<sub>10</sub> monitor in partnership with the Ministry of Environment.

If particulate matter levels in the air exceed 100µg/m<sup>3</sup> an alarm sounds in the Pumphouse, at which time corrective actions must be taken.

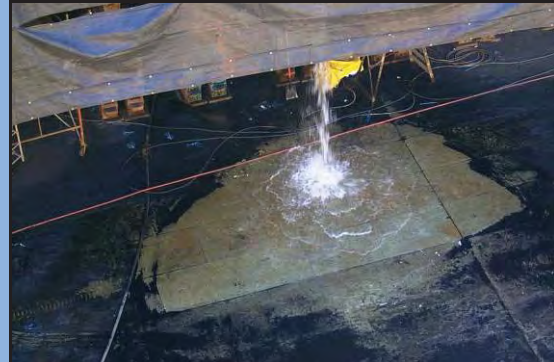


### Waste Grit Management

- Remove waste grit from work areas as soon as possible.
- Store all waste grit in appropriate containers to prevent stormwater and wind impacts.
- Cover all skips, storage bins, tanks, and hoppers to prevent dust emissions.
- Dispose of waste grit in accordance with applicable provincial regulations.



Store all waste grit away from drains, to prevent contaminated water migrating into the marine environment.



Sweep waste grit under the vessel to prevent it from being washed down the drain.



Store waste grit in appropriate containers, protected from inclement weather.



Remove waste grit from work areas as soon as possible.

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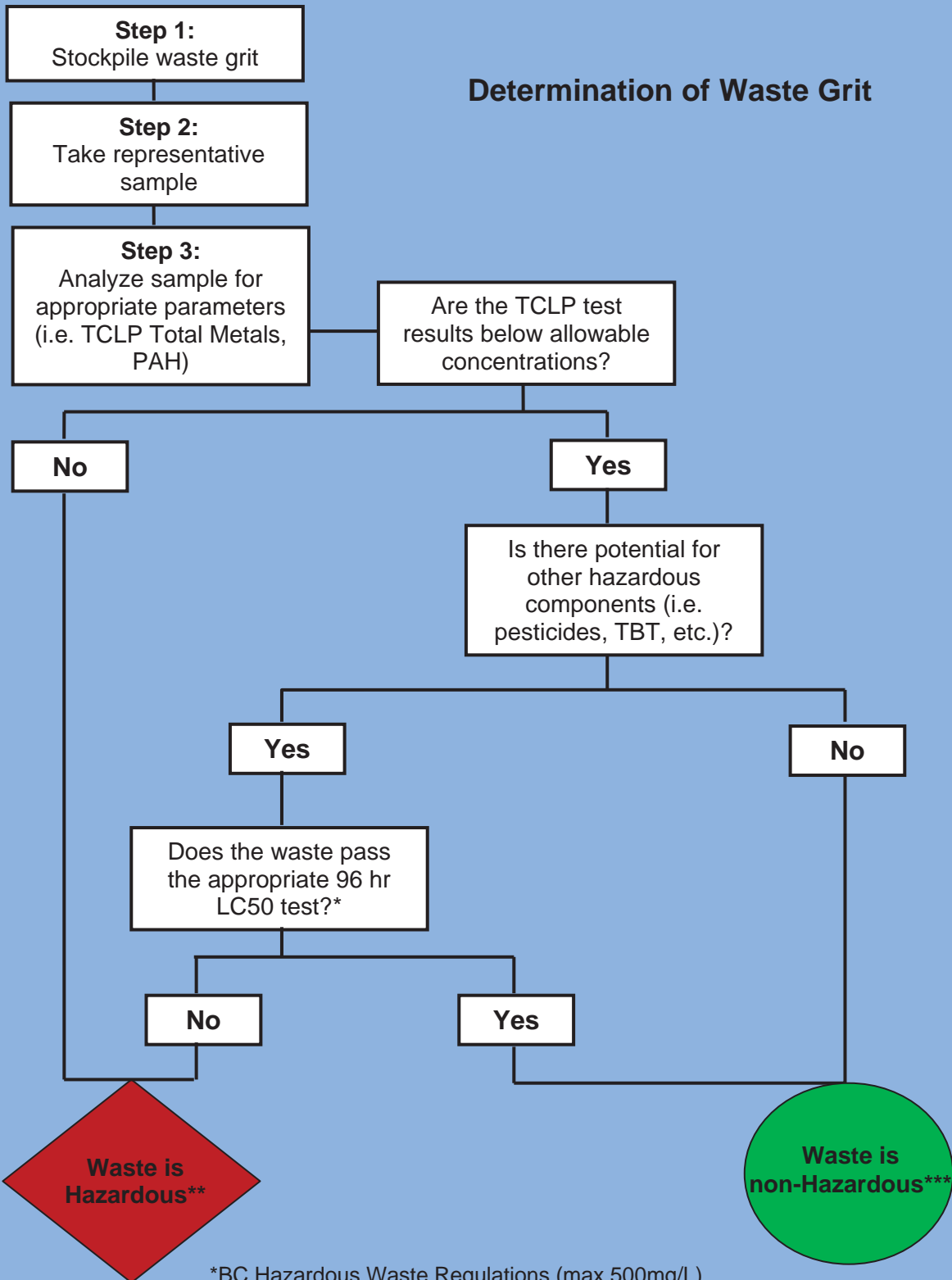
## Keel/Bilge Blocks

Keel and bilge blocks on dock bottom present a challenge for clean up of spent waste grit.

Excess blocks stored in dock bottom may be moved prior to sandblasting, or covered to prevent grit from collecting between the blocks.



## Determination of Waste Grit



\*BC Hazardous Waste Regulations (max 500mg/L).

\*\*Waste must be disposed of at a permitted facility.

\*\*\*non-Hazardous waste may be considered "Controlled" and must be disposed of at an approved facility.

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## BMP #3

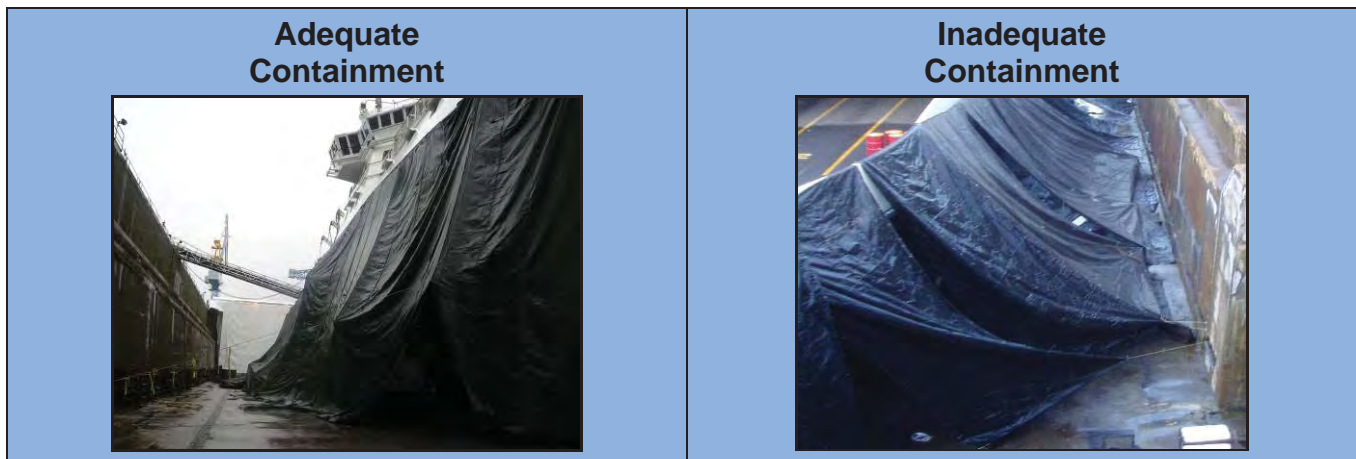
### Painting and Coating

Ship repair and maintenance often requires painting and coating of vessel surfaces to protect from corrosion or to inhibit growth of marine life. The industrial nature of marine paints, in particular antifouling paints, may result in negative impacts to the environment and surrounding infrastructure if not properly managed.

#### Paint Overspray

Paint overspray has the potential to impact the marine environment, soils, neighbouring residences, and nearby equipment and infrastructure.

- Use containment such as tarps, shrouds or portable structures to prevent airborne particles from entering the atmosphere and surface waters.
  - Containment should be large enough to adequately enclose or segregate the working area.
  - Ensure containment is secured so there are no gaps.
  - Ensure that containment reaches the dock floor or walls.



- Do not spray paint during conditions that render containment ineffective (i.e. windy).
- Place containment beneath and around structures being painted on dock floor and in work areas to ensure overspray does not reach the surrounding area (i.e. during painting of anchor chains, grates, etc.).
- Manage overspray on the graving dock floor to prevent safety hazards (e.g. slippage).



For vessels docked in **Section 1** ensure that overspray does not reach the sill water. Avoid docking vessels so they extend over sill area.

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## Painting Dockside

- Do not spray paint vessels docked at the North Landing Wharf or South Jetty.
- Use rollers and brushes to paint vessels dockside
- Ensure tarps are in place below work areas, as well as in between the vessel and the dock to prevent spills and drips from entering the water.
- Ensure paint cans are stored securely when working alongside vessel edges.
- Ensure floor grates of manlifts are covered to prevent spills to the marine environment
- Waste generated from grinding and hand tooling must be prevented from entering the marine environment.



Ensure tarps are in place to prevent overspray impacting the surrounding work area.



While painting vessels berthed at the North Landing Wharf and the South Jetty do not spray paint, and take measures to prevent paint from entering the marine environment.

## Temporary Paint Storage/Mixing Areas

- Must be under cover to protect from inclement weather
- Only in designated areas
- Must be on secondary containment (a tarp at minimum)
- Ensure empty paint cans and other associated wastes from painting are stored properly, protected from the weather, and removed from dock bottom as soon as possible.



In **rare** situations (i.e. shape of the vessel combined with ideal weather conditions) containment may not be necessary to prevent overspray from escaping the area.

In this situation, the User must notify PWGSC **prior** to beginning the work, and obtain approval, **in writing**, to paint without completely enclosing the vessel. Restrictions and monitoring requirements will be applied.

To this date this has only been allowed in three situations:

- painting underneath a flat bottom barge
- painting the underwater hull portion of the midsection of a cruise ship
- painting of a C-class ferry underwater hull area during calm wind conditions

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## BMP #4

### Dry Dock Floor Management and Cleanup

#### Drain Management

- All sump well valves must be closed prior to and during power washing operations.
- Cover all tunnel drains and net cages during sandblasting, painting and power washing to prevent contaminants from entering the marine environment.
- In the case of a spill or release on dock bottom all sump well valves must be closed and all contaminated material contained and removed from dock bottom.
- Direct all contaminated water to the trench drain system, to avoid entering the tunnel drains.
- Collect and properly dispose of all contaminated water. Ensure sufficient equipment is available for contaminated water collection.
- Ensure all non-contaminated water is directed away from work areas and into the tunnel drain system. (i.e. ballast water, cooling water, caisson sill water).



#### Sediment Management



- Segregate any marine sediment which may enter the dock during vessel transfer from pollutants generated from vessel repair in order to reduce the amount of wastes requiring disposal.
- Collect and properly dispose of marine sediment that becomes contaminated with waste generated from vessel repair.
- Remove all contaminants and residues from the trench drains and sump wells prior to flooding at the end of work period.

#### Hazardous Materials Management

- Store hazardous materials (i.e. fuel, paint, waste oils) away from the drains on dock bottom.
- Store hazardous materials to the inside of the trench drains so that any spills or releases can be captured.
- Store hazardous materials in areas protected from the weather, water curtains and other water sources.
- Ensure adequate spill response equipment is in close proximity to hazardous material transfer operations. At a minimum one spill kit is required per section of the graving dock.

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## Housekeeping

- Remove waste sandblast grit from the work area as soon as possible to prevent migration of grit contaminants into tunnel drain system.
- Store wastes collected from the dock floor in appropriate secondary containment and removed from dock bottom as soon as possible.



Residual paint in the cans, may drip out of the skip and enter the marine environment through the drain systems.



Leaving garbage around the work site attracts wildlife such as seagulls, racoons, and rats.



When cleaning dock bottom, skips of waste sandblast grit may leak contaminated water and should be removed as soon as possible.



All hazardous materials must be stored in appropriate containment and away from tunnel drain system.

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## Inspection and Cleanliness

- Prior to flooding, the drydock must be cleaned to meet the Esquimalt Graving Dock (EGD) Standard of Cleanliness, as determined by the EGD undocking supervisor.
- Users must ensure that the dock floor is free of deleterious substances prior to flooding.
- Water may be used to clean the dock floor; however, any wastewater generated must be collected and disposed of properly.
- If a vessel occupies a shared portion of a dock section each User must clean the trench drains up to and including the section sump well.



Example of a dock floor that would pass inspection.



Example of a dock floor that would not pass inspection.

### EGD Standard of Cleanliness

Due to the importance of drydock cleanliness prior to flooding, and since quantitative testing is impractical due to time and cost restrictions, the following guidelines will be used to assess cleanliness of drydock surfaces.

- All drydock surfaces, including stairwells and sills must meet the standard for **“residue free”** prior to flooding of the drydock. **“Residue free”** is considered met when a person of normal visual acuity, while standing, is unable to detect visible accumulations of potential pollutants.
- This includes, but is not restricted to, the removal of abrasive grit, paint residues, cutting and grinding wastes, oil and grease, food and drink containers, ear plugs, dust masks, rope, cigarette packs, or any other refuse that may have been deposited during the work period.
- Debris of natural origin that may have been deposited during the previous flooding of the drydock, such as wood, sand, silt, seaweed, or marine life may be exempt from these requirements, as long as it will not contaminate the environment upon reintroduction.

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Important Locations	Acceptable	Not Acceptable
Ramps		
Sills		
Keel Blocks		
Trench Drains		
Sump Wells		

## BMP #5

# Hazardous Materials Handling and Storage

A variety of materials are used, stored and transported by the Users at the Esquimalt Graving Dock (EGD). If not handled appropriately, these materials have the potential to negatively impact worker health and safety, infrastructure or the environment.

### Long Term Storage

Users must have designated storage areas suitable for the materials they use on site. These areas must:

- Have appropriate secondary containment suitable to the quantity and nature of the material in that area
- Ensure materials are stored in accordance with compatibility requirements
- Be protected from the weather
- Have placards and ventilation (where applicable)
- Have controlled access



### Short Term Storage and Working Areas

These areas must be:

- Clearly identified and labelled
- Located away from pathways to the marine environment
- Located on impervious surfaces (i.e. concrete, asphalt)
- Protected from the weather



### Materials must be:

- Stored in containers appropriate for the nature of the material
- Labelled appropriately with product name, first aid information, and PPE requirements.
- Secured appropriately during transport



MSDS for all products stored on site must be available to all employees.



Empty containers must be labelled "Empty".



Inspect all valves and storage containers for rust or damage before use.

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### Federal Regulation for Fuel Storage Tanks

As the EGD is a Federal facility, any storage tanks onsite may fall under the Petroleum and Allied Petroleum Products *Storage Tanks Regulations* (2008). Tenants may be required to register their tanks with Environment Canada.

### National Fire Code

This code outlines the containment, labelling and location requirements for flammable liquid storage.

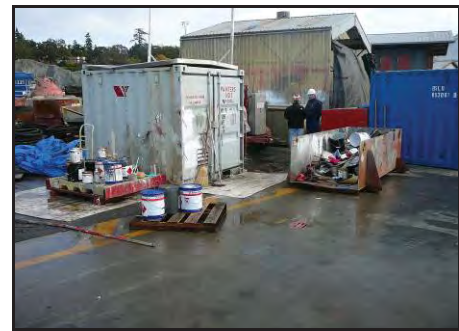


### Areas to Avoid Storing Containers of Hazardous Materials

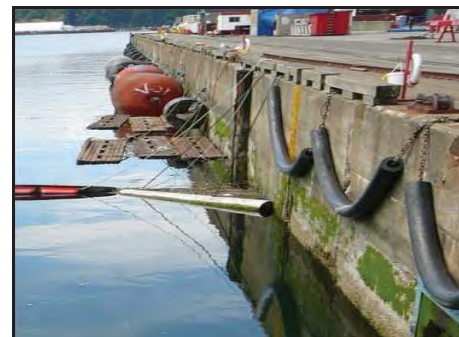
**Drains:** Although the trench drains provide the opportunity to collect accidentally released materials, if a tote or drum is placed directly over top or beside a drain the material will flow directly into it and the spill may not be noticed until it is too late.



**Fire Holes:** On the South Jetty the fire holes flow directly into the harbour. If any containers fail near the fire holes, the material will not be able to be recovered once it is in the harbour..



**South Jetty and North Landing Wharf Edges:** Any containers placed near the edge of the jetties have the potential to spill directly into the harbour as there are no berms or secondary containment available.



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## Waste Management and Recycling

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Operations at the Esquimalt Graving Dock (EGD) generate a variety of waste streams including hazardous waste, international wastes, and general refuse and recyclables.

### Hazardous Waste

Hazardous wastes generated at the EGD may include waste oil and oil filters, antifreeze, batteries, paint and solvents, oily rags and absorbent materials, spent grit, solids generated during power washing, and asbestos. Appropriate management of hazardous waste will reduce environmental liability associated with inappropriate disposal and storage as well as reduce the risk of human injury and environmental impact.

Hazardous waste storage shall be segregated from new product storage.

- Ensure designated storage areas are away from active work areas.
- Ensure areas are covered to reduce exposure to environment and wildlife.
- Ensure that waste accumulation areas are organized.

Hazardous waste should be segregated into separate containers.

- Ensure containers used are appropriate for the type of waste (i.e. separate drums for waste oil, oil filters, antifreeze, batteries, paint and solvents, oily rags and absorbent material, spent grit)
- Store batteries in a manner that prevents leakage of acid to the environment.
- Properly dispose of contaminated clean-up materials (i.e. absorbents, rags, etc.)
- Do not dilute or mix hazardous waste other hazardous or non-hazardous wastes.
- Cover waste containers to prevent exposure to weather (i.e. rain)

Clearly label all hazardous waste containers.

- Labels should include: type of waste, generator/company name, and contact information

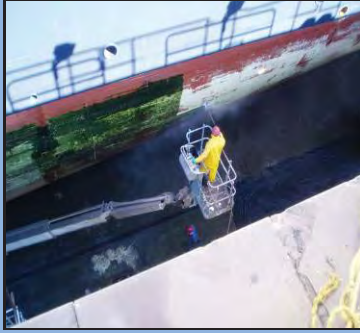
### Asbestos

All asbestos containers and asbestos-containing materials must be identified by signage and labelling in accordance with applicable legislation.

Companies which engage in asbestos related work at the EGD must be qualified to do so.



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### Biological Waste

Marine life removed from vessel hulls may contain paint contaminants. This waste may be considered a controlled or hazardous waste and would need to be handled and disposed of accordingly.



### Recycling

All Users of the EGD are responsible for collecting and disposing of the solid waste they generate from their activities, properties and vessels they are responsible for.

- Recycle solid waste such as plastic, glass, aluminum, mixed paper and cardboard. Recycling areas should be conveniently located and easily identifiable.
- Segregate other solid waste, such as scrap metal, wood, electronics, polystyrene foam and soft plastics for recycling at an approved facility.
- Leaf and yard waste collected on property should be composted at designated sites located on dock property.
- Construction and demolition waste should be reused or recycled wherever cost effective and technically feasible.
- Encourage the use of recyclable products to reduce the solid waste impact on the environment.

### International Waste

Like hazardous waste, International Wastes may pose a threat to human health and the environment.

**Dunnage** from vessels has been known to carry invasive insects to local areas. Foreign dunnage must be identified, stored, and disposed of at an approved facility.

**Food wastes** may carry pathogenic organisms that could cause illness to those handling it. Food wastes shall be kept in separate, closed containers. The Canadian Food Inspection Agency (CFIA) will inspect foreign vessels and issue directions on disposal.



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## Fuelling and Oil Transfer

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At the Esquimalt Graving Dock (EGD) the transfer of oil and fuel is a common activity. An accidental release during these operations has the potential to negatively impact the environment, and health and safety of those at the facility.

- Prior to any fuelling or oil transfer operations an emergency plan must be in place, adequate spill response equipment must be available, and employees aware of spill response procedures must be on hand.
- All transfer and storage equipment must be in good condition, tested, and properly connected.
- Do not place storage and transfer equipment near pathways to the marine environment (i.e. storm drains, edge of the dock).
- Berthed vessel fuelling operations involving trucks and barges as well as bulk oil transfers exceeding 10 tonnes (10,000 L) per day must comply with the **EGD Fuelling and Oil Transfer Policy and Checklist**.

### Vessel Fuelling and Bulk Oil Transfer

**Definition of Oil: as described in the Canada Shipping Act oil is considered petroleum in any form, including: crude oil, fuel oil, sludge, oil refuse, and refined products.**

- All berthed vessels receiving fuel from a truck or a barge require a containment boom.
- Transfers of greater than 10 tonnes of oil per day to/from a berthed vessel require a containment boom.
- An **EGD Oil Transfer Checklist** must be filled out and signed by representatives from the truck and the vessel and submitted to EGD representatives in the pumphouse prior to fuelling or oil transfer operations.
- Transfer operations must comply with the *Canada Shipping Act, Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals Subdivision 5*.

#### Containment Boom Rental

The Esquimalt Graving Dock has a boom and deployment equipment available for rent. To arrange for booking or rental contact the EGD Operations Manager.



An orange containment boom surrounds the vessel while being fuelled



The EGD boom reel and containment boom

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## Example Scenario Requirements

### Scenario 1: Fuelling a berthed vessel



- Completed and signed EGD Oil Transfer Checklist submitted to EGD Pumphouse
- Containment boom adequately secured at both ends.
- Emergency response plan in place.
- Adequate spill response equipment and qualified personnel available.

### Scenario 2: Fuelling a vessel or bulk oil transfer (greater than 10 tonnes a day) in the drydock



- Completed and signed EGD Oil Transfer Checklist submitted to EGD Pumphouse.
- Pumphouse operator on site prepared to shut down auxiliary pumps in case of an emergency.
- Receiving containers located away from pathways to the harbour (i.e. tunnel drains).
- Adequate spill response equipment and qualified personnel available.
- Emergency response plan in place.

### Scenario 3: Bulk oil transfer from berthed vessel (greater than 10 tonnes a day)



- Completed and signed EGD Oil Transfer Checklist submitted to EGD Pumphouse.
- Containment boom adequately secured at both ends.
- Receiving containers located away from pathways to the harbour (i.e. storm drains, edge of dock).
- Emergency response plan in place.
- Adequate spill response equipment and qualified personnel available.

### Scenario 4: Onshore oil transfer between containers



- All containers located away from pathways to the harbour (i.e. storm drains, edge of dock).
- Emergency response plan in place.
- Adequate spill response equipment and qualified personnel available.

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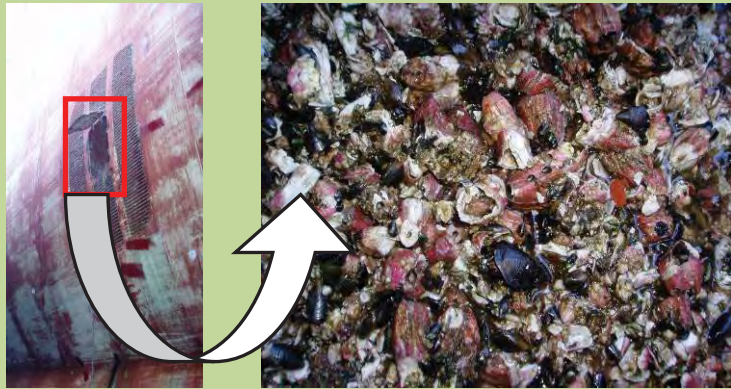
## Invasive Species (Ballast Tanks and Hulls)

Invasive species are a significant threat to the marine ecosystems of British Columbia and Esquimalt Harbour. In 2000 a Fisheries and Oceans sponsored study of invasive species found that Esquimalt Harbour had a disproportionately high number of non-indigenous species. It has been widely recognized that the primary source of non-indigenous marine species in local waters are the ballast tanks and hull surfaces of transoceanic vessels.

### **Marine growth removed from vessel hulls must not be allowed to enter the harbour through the graving dock drainage system.**

- Ballast Water
  - Vessels must follow Transport Canada Ballast Water Control and Management Regulations
- Ballast Tank Sediment
  - Shipyards must follow Transport Canada Ballast Water Control and Management Regulations
  - Sediments removed from the ballast tanks at the EGD must be contained, collected and disposed of at an authorized facility.
  - **Sediments must not be allowed to enter the harbour.**
- Anchor chain-growth
  - All biological material removed from anchor chains must be contained, collected and disposed of appropriately.
- Sea chests
  - All biological material removed from sea chests must be contained, collected and disposed of appropriately.





Sea chests such as this one from a cruise ship docked at the EGD often contain a significant amount of marine life. If not managed appropriately this marine life has the potential to negatively impact the local ecosystem of the harbour

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## Fish and Wildlife Management

The daily operations and activities of the Esquimalt Graving Dock (EGD) have the potential to negatively impact wildlife which frequents the property.

### Fish

Fish and other marine life have the potential to become stranded in the graving dock during normal vessel docking/undocking operations. This may include, but is not limited to: salmon, octopus, other fish species, and seals.

- The bubble curtain must be employed during vessel transfer into and out of the graving dock.
- EGD employees must monitor the graving dock for stranded fish and/or other marine life during dewatering.
- Whenever possible, EGD employees must retrieve fish and marine life and safely return them to the Esquimalt Harbour.
- Users are prohibited from removing fish and marine life from the graving dock.



**Report all instances of fish and marine life interaction with the Graving Dock to EGD Environmental Services**

#### Authorization for the Destruction of Fish (Section 32)

The EGD has received authorization for the destruction of fish associated with normal operation of the graving dock from the Department of Fisheries and Oceans.

#### Conditions of the Authorization:

- ▶ Take all reasonable precautions to prevent the trapping and mortality of fish
- ▶ Monitor the success of preventative measures and retrieval success
- ▶ Report to the DFO annually

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## Wildlife

A variety of wildlife is known to occupy areas of the EGD property. In some cases wildlife may use the facility as a nesting/breeding ground, while others are present for short periods of time to pass to another location or to feed. Activities and operations at the EGD have the potential to impact the well being of wildlife at the facility.

Such wildlife includes: deer, raccoon, mink, river otter, great blue heron, osprey, raven, cormorants and a variety of other common nesting and song birds.

- All wildlife must be left alone
- Injured or orphaned wildlife must not be handled without proper experience and equipment.
- Dispose of dead wildlife appropriately.
- Prior approval from EGD Environmental Services is required for the relocation or removal of nesting wildlife.

**In all cases, call EGD Environmental Services for wildlife related incidents**

### EGD Wildlife Management Plan Contact Information

#### Conservation Officer

T: (250) 391-2225 (daytime)  
1-800-663-9453 (after hours call centre-will take messages and pass along to the Conservation Officer)

#### BC SPCA Wild ARC (Animal Rehabilitation Centre)

T: (250) 478-9453

#### Vancouver Aquarium Rehabilitation/Rescue

T: (604) 258-7325



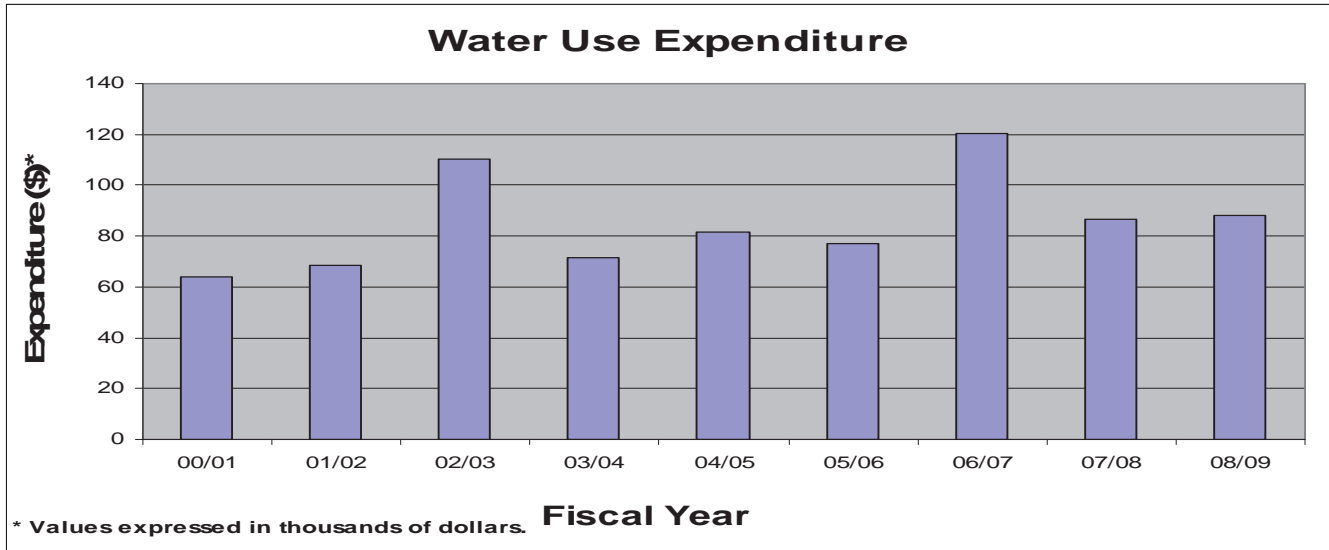
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## BMP #10 Water Use

Water consumption and the quality of water are considerations of the environmental management system at the Esquimalt Graving Dock (EGD).

### Water Consumption

Large volumes of water are used during normal operations at the facility; because of this the EGD is considered a high volume user of fresh water in the Capital Region.



### Significant Water Consuming Activities



**Water Curtains**

Water curtains are used to mitigate the escape of dust from sandblasting operations in dock bottom



**Ultra High Pressure Washing**

Ultra high pressure washing uses large amounts of water at high pressure to scour paint and biological material from the hulls of ships

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**In order to reduce the amount of water consumed onsite:**

- Only use water curtains when all other attempts to contain particulate emissions from sandblasting have failed.
- Avoid use of freshwater to clean work areas (e.g. graving dock bottom, wharves, jetties).
- Maintain fittings in buildings and on equipment to prevent leakages.

**Metered Water Use at the Esquimalt Graving Dock**

- Users must ensure that water is accessed from a metered line when connecting to the water distribution system
- Portable meters are to be used where necessary.
- Pumphouse must be contacted for proper access to the water distribution system.



The EGD maintains the water distribution system.

- Flushing of the entire system is conducted on an annual basis.
- Collection and analysis of water in comparison to drinking water quality guidelines is conducted regularly.

The water distribution system at the EGD was originally designed as a firefighting system; therefore, the water in certain areas of the system may not be considered potable.

- Users are responsible for ensuring that the water they use meets guidelines for the purpose intended.



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## BMP #11

### Energy Conservation

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The Esquimalt Graving Dock (EGD), as a facility, is a major energy consumer. Inefficient energy use may result in a negative economical and environmental impact. Economical impacts are associated with inefficient electrical usage (i.e. cost). Environmental impacts include those associated with the consumption of fuel (i.e. air emissions).

#### Electrical Consumption

There are a number of opportunities to increase the efficiency of electrical usage at the EGD:

- Turn off lights when not in use (flood lights, office buildings)
- Turn off equipment when not in use
- Use energy efficient equipment whenever possible
- Stagger equipment start-up to decrease load on electrical system



#### Fuel Consumption and Emissions

The second largest source of greenhouse gas emissions from the dock is employee commuting and fuel consumption. Some opportunities to decrease the amount of fuel consumed by day to day activities are:

- Use energy efficient vehicles
- Use alternative fuels/energy sources if possible
- Avoid idling vehicles
- Use shore power whenever possible
- Encourage staff to find alternative means for commuting to work (i.e. carpool, public transit, cycling)

#### Idling Vehicles

Idling Vehicles produce unnecessary air emissions and noise.

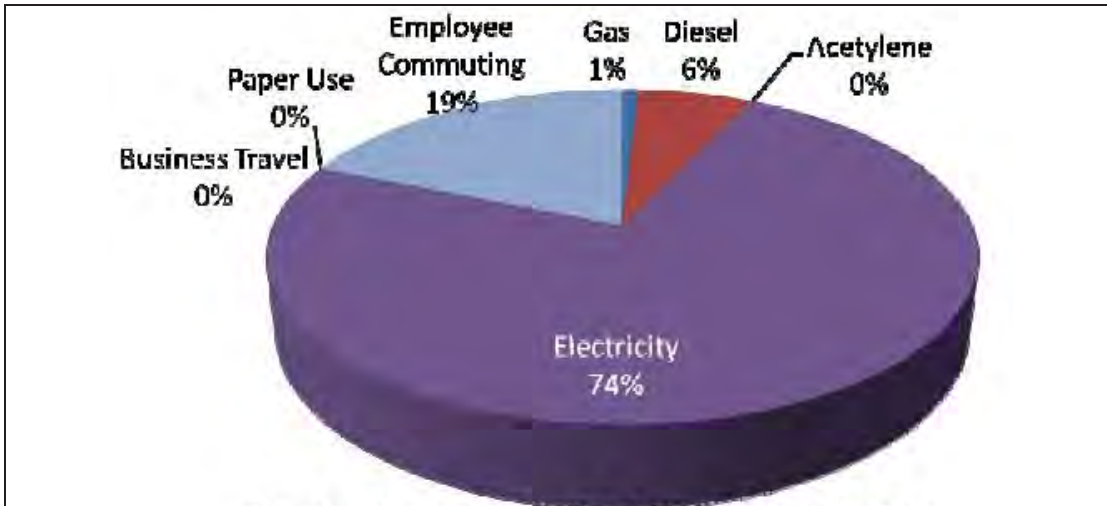
- Do not idle vehicles near building doorways or air intakes
- Vehicles must be turned off if idling for more than 3 minutes in a 60 minute period



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**Greenhouse Gas Emissions:**

Energy consumption results in the production and release of greenhouse gas emissions through the combustion of fossil fuels. Every aspect of work at the EGD results in the release of greenhouse gases whether it is running the cranes or printing a report. It is important to minimize energy consumption wherever possible to mitigate the release of harmful greenhouse gases.



**Figure 1: Emissions Source Contributions 2006/2007**

The Royal Roads University (RRU) Greenhouse Gas Audit determined that the largest source of carbon emissions at the EGD was electricity use. Employee commuting was the second largest greenhouse gas producer.



**Shore Power**

When vessels are moored at the North Landing Wharf or the South Jetty it is important that they utilize shore power. With shore power the generator can be turned off thereby saving fuel and preventing the release of harmful air pollutants.

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## BMP #12

### Nuisance Pollution (Noise/Odour/Light)

The daily operations of the Esquimalt Graving Dock (EGD) tenants have the potential to negatively impact the work and living environment of neighbouring businesses and homes. Nuisance pollution is often created by noise, odour and light.

#### Noise

- The main sources of noise at the EGD include sandblasting, drilling, hammering, compressors, generators and the crane warning bell. Even general shop repair activities generate large amounts of noise.
- Whenever possible schedule noisy activities for daytime hours 0700 hrs to 2300 hrs on weekdays, and from 0700 hrs to 1900 hrs on weekends and holidays. Through worker education and good practice the generation of high-level intermittent or non-continuous noises can be minimized.
- The EGD Environmental Policy makes a commitment to follow all applicable municipal laws and regulations, therefore it is expected that the daily operations at the EGD will meet the Esquimalt Noise Control Bylaw (2677).



The EGD is considered an “Activity Zone” and the neighbouring area is considered a “Quiet Zone”. Building and infrastructure related projects at the EGD may fall under the definition of a “Construction Zone” as per the Esquimalt Noise Control Bylaw.

Esquimalt Noise Control Bylaw		Noise Receiver Zone	
		Quiet	
		Day	Night
Noise Source Zone	Activity	60 dBA	55 dBA

#### Construction Zone

Building and infrastructure related projects at the EGD may fall under the definition of a “Construction Zone” as per the Esquimalt Noise Control Bylaw. The definition of a construction zone according to the Esquimalt Noise Control Bylaw is:

- a) the erection, alteration, repair, relocation, dismantling, demolition and removal of a building;
- b) structural maintenance, power-washing, painting, land clearing, earth moving, grading excavating, the laying of pipe and conduit, concrete placement, and the installation, or removal of construction equipment, components and materials in any form or for any purpose;
- c) any work being done in connection with any of the work listed in paragraphs (a) or (b);

The noise level limit for a “Construction Zone” is **85 dBA** day and night.

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## Odour

- Daily dock operations often create strong and unpleasant odours whether from the release of VOCs, H<sub>2</sub>S, organic materials, or chemicals an offensive smell can reduce the quality of the work environment for neighbouring tenants and home owners.
- In the event that odours are negatively affecting other tenants or stakeholders odour mitigating measures may be required.
- Contact EGD Environmental Services in the event of a nuisance odour from an unknown source.



### H<sub>2</sub>S Meter

The EGD utilizes an H<sub>2</sub>S meter to ensure that any emissions released from the sanitary sewer system that create nuisance odours are not hazardous to adjacent work areas.

## Light

- Night time dock operations require spotlights to provide a safe work environment. However for residential neighbours strong spotlights can be a significant intrusion.
- Utilizing spotlights only when absolutely necessary will help prevent disturbing the neighbours as well as provide a more energy efficient work environment.
- Changing the direction of the lights may reduce the effect they have on the neighbours.
- Turn off or report to your supervisor any unnecessary lights left on.



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## BMP #13

### Sanitary Waste Management and Sewer Use

The Esquimalt Graving Dock is authorized by the Capital Regional District (CRD) as a ship and boat waste disposal facility.

**Discharge to the sanitary sewer at any location other than at the LS#15, LS#11 or the four vessel connections at the Graving Dock is prohibited.**



The EGD is authorized to discharge to the sanitary sewer at the:

- Lift Station #15 (LS#15),
- Lift Station #11 (LS#11) and
- And the four vessel connections in the graving dock.

#### Permitted wastes include:

- sanitary waste
- grey water
- treated superchlorinated water\*

#### Prohibited wastes include:

- bilge and ballast water
- wastewater sludge
- fuel and oil, paint, paint thinner, solvents, and products containing toxic chemicals

\***Superchlorinated Water:** must not be discharged to the sanitary sewer unless it has been dechlorinated to less than 5 ppm chlorine.

- Users must notify the Pumphouse before conducting any discharges to the sanitary sewer. Typical methods of discharge are: large (connection to a vessel), and small (portable discharges from totes).
- Users must complete a Sanitary Sewage Discharge Form and provide it to the Pumphouse prior to discharging to the sanitary sewer.
- Pumphouse Operators will ensure that sanitary sewer discharges are in accordance with applicable regulations and authorizations.
- Pumphouse Operators will provide all completed Sanitary Sewer Discharge Forms to EGD Environmental Services, who will submit quarterly reports to the CRD.
- Users must ensure a sample collection point is accessible at the point of discharge.

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## BMP #14

### Spill Preparedness and Response

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The Esquimalt Graving Dock (EGD) is committed to the protection of human health and the environment. Safety and environmental management programs have been implemented at the EGD to reduce the potential for accidents and spills. Emphasis is placed on the prevention of spills, and although the potential for spills can be reduced through these programs, spills do happen.

**All Users operating at the EGD must have the capability to effectively manage spills resulting from their activities and operations.**

- User employees must have adequate training in spill response
- User employees must have access to appropriate spill response equipment and materials
- Users must have plans and procedures in place to respond to spills



For spills which are beyond the capability of the User or are not being effectively responded to by the User, the EGD will provide assistance. The EGD has additional resources available, including:

- Spill kits and response materials for land and water based spills
- Spill response boom, deployment reels and boat
- Staff trained to deal with land and water based spills

**For access to the EGD spill response resources, contact EGD Management or Commissionaires.**

For spills beyond the capability of the facility to manage, the DND, Port Operations and Emergency Services Branch (DND POESB) will provide support for response to land and water based spills.

**ALL Spills Must Be Reported to  
EGD Management**

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**Trench Drains:** The EGD has installed trench drains throughout the site. These drains are easily accessible and allow for rapid containment and recovery of materials spilled on the property or in the drydock.



### Environmental Emergency Contacts (24 Hours):

EGD Commissionaires	250-363-3784
Provincial Emergency Program (PEP)	1-800-663-3456
DND POESB/QHM	250-363-2160 or VHF Channel 10
Canadian Coast Guard	1- 800-889-8852 or VHF Channel 12
Environment Canada	604-666-6100

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## BMP #15

### In-water Hull Cleaning and Maintenance

The cleaning of the underwater hull in water has the potential to release harmful contaminants into the marine environment.

#### In-water Hull Cleaning

- In-water hull cleaning of vessel hulls that are coated with antifouling paint is prohibited at the Esquimalt Graving Dock.
- Vessels coated in non-biocide containing paints (such as silicone based), may be considered on a case by case basis and must be approved by EGD Management prior to the commencement of hull cleaning activities.



Vessel berthed at the North Landing Wharf for in-water hull washing. In-water hull washing must not release antifouling paint. Discoloured water is an indication that you may be harming the environment.

#### Did you know?

**Antifouling paints and their residues contain heavy metals, such as copper, that are toxic to aquatic organisms, including salmon and shellfish. Wash water and solid residues from the washing, scraping, sanding, and blasting of antifouling paints from boat hulls are considered “deleterious substances” under the *Fisheries Act*. Releasing these wastes to fish bearing waters is a violation of the Act.**

#### In-water Hull Maintenance

- Users must receive approval from EGD Management prior to commencement of hull maintenance.
- Cleaning of the anodes, inlets, props, transducers, etc.
- Underwater maintenance required for operational and inspection purposes is permitted at the Esquimalt Graving Dock.

**For inquiries regarding in-water hull washing please contact the Esquimalt Graving Dock Management at (250) 363-8056**

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## BMP #16 Housekeeping

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An organized, clean facility provides an environment that reduces the potential for pollutants to enter surface and ground water through spills and accidents. General cleanliness will lead to more organized and consistent handling of hazardous materials and waste products.

### Clean-Up

- Clean debris from work areas immediately after any maintenance activity. Dispose of collected material appropriately.
- Ensure garbage and recycling containers are available in all leased areas and are emptied regularly.
- Do not use running water to clean the work areas where the contaminated water could enter the storm drainage system.
- Ensure trench and storm drains within designated leased areas are kept clean and free of debris.
- Sweep and/or clean the active working area of the yard on a regular basis.



### Storage

- Do not store material/equipment outside of identified boundaries of leased areas.
- Regularly inspect the lease areas for unidentified or improperly stored materials.
- Place a drip pan underneath vehicles and equipment when performing maintenance. Promptly transfer the used fluids to the proper waste or recycling drums.
- Ensure all containers (i.e. drums, totes, etc.) are in good condition and have a clean exterior at all times.



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## BMP #17

### Stormwater Management

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Stormwater has been identified as one of the primary pathways of contaminant loading to the harbour from daily Esquimalt Graving Dock (EGD) operations. Common contaminants found in stormwater samples include cadmium, copper, chromium, arsenic, tributyltin (TBT), extractable petroleum hydrocarbons (LEPH/HEPH), and total suspended solids (TSS). Five stormwater catchment areas terminate into the harbour from the EGD property.

A stormwater monitoring program has been implemented at the EGD. The stormwater outfalls will be sampled semi-annually in the spring and fall. Waste grit separators have been installed upstream of the five stormwater outfalls. These help to remove contaminants or debris that enter the storm drain system from daily operations at the EGD, in particular they remove: fuel or oil, paint, sandblast grit, general debris.

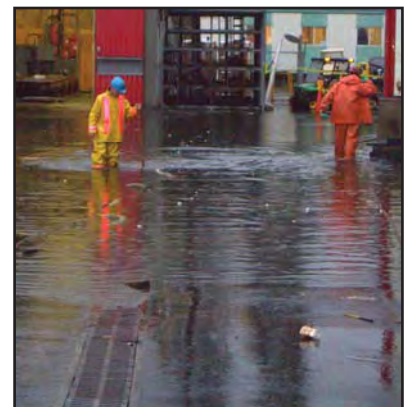
#### Materials Storage:

- Store hazardous materials away from storm drains and trenches.
- Store hazardous materials away from the South Jetty fire holes. These holes lead directly to the marine environment.
- Ensure totes, drums and pails containing hazardous materials are protected from the weather.



#### Storm Drains:

- Ensure storm drains are kept clear of debris to prevent flooding during heavy stormwater events.
- When using trench drains for secondary containment, ensure the containment system is monitored and removed in a stormwater event. A blocked trench drain may cause flooding of the area.
- Conduct regular inspections of trench drains in lease areas to ensure they are kept clear of debris.



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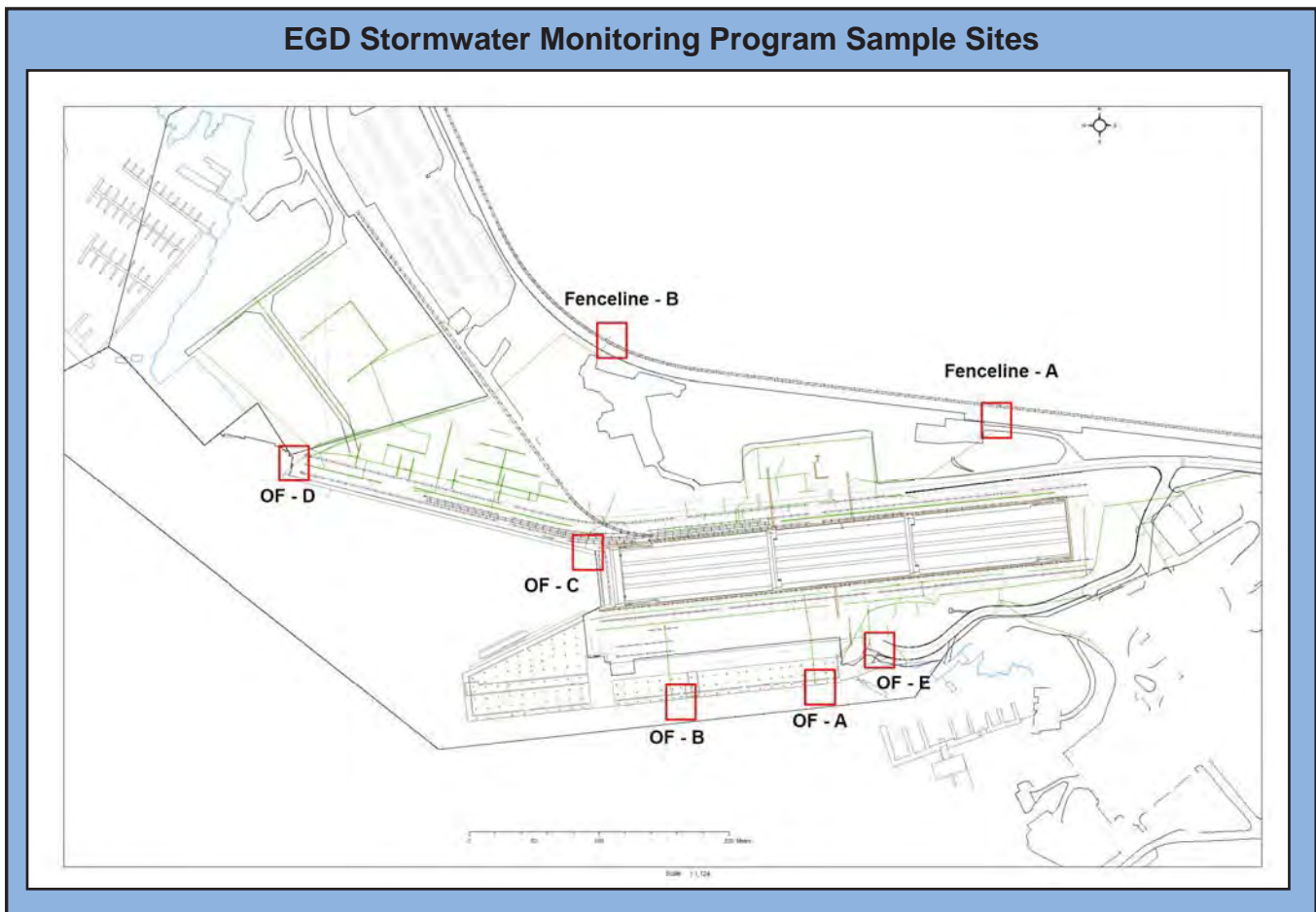
**During heavy rain events in dock bottom:**

Stormwater has the potential to mix with wash water during power washing operations in dock bottom. To reduce the amount of wash water requiring treatment it is good practice to stop power washing operations until storm water can be controlled.

- Sump well valves may be opened to allow storm water to drain in to the tunnel drains if the area is clear of contaminants and debris.
- Sump wells containing visibly contaminated material must be pumped out and cleaned prior to opening the valves.
- Ensure there is capacity in the trench drain/sump well system to manage the expected stormwater volume to prevent flooding of the dock floor.

**Stormwater Monitoring Program**

- Stormwater sampling is conducted semi-annually in the spring and fall by EGD Environmental Services.
- Stormwater samples are tested for: total metals, total suspended solids, tributytin, LEPH/HEPH and microbiological parameters.



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## BMP #18

### Property and Infrastructure Maintenance, Modifications and Construction

There are significant environmental issues and potential impacts related to the management of Esquimalt Graving Dock properties and infrastructure. Any new construction or modifications to the infrastructure at the EGD must consider environmental issues in the project planning.

#### Infrastructure Maintenance

Maintenance and repair of the aging EGD infrastructure often results in waste generation and other environmental issues which need to be addressed.

##### *Minor Concrete Work*

- Contain dust from cutting and drilling.
- Prevent runoff to the storm drains.

##### *Use of Preserved Wood*

- Avoid use of creosote preserved timbers where possible.
- Follow applicable guideline for use of preserved wood products.
- Creosote wood waste may be considered a hazardous, restricted or controlled waste.



##### *Demolition/Renovation*

- Ensure structures are assessed for the presence of hazardous materials (i.e. lead paint, asbestos) prior demolition or renovation.

#### Infrastructure Modification and Construction

All construction projects taking place at the EGD need to be assessed for environmental impacts, and plans put in place to mitigate these impacts.

#### **Environmental Impact Assessment**

- Any significant changes to infrastructure, changes to an existing lease or application for a new lease, must be approved by EGD Management.
- Prior to the approval of an infrastructure project, a CEEA Environmental Impact Assessment may be required.
- An Environmental Approval Form must be filled out for new lease applications and changes to existing leases.

***\*\*The Environmental Impact Assessment and Environmental Approval Form outlines specific environmental protection and mitigation measures required\*\****

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Common project related aspects that require management include: noise, dust, hazardous materials, storm water runoff, and prevention and management of accidental releases and spills. Requirements for the operational aspects are identified in previous sections of these EBMPs.

Significant non-operational aspects related to construction projects may include:

- Loss of Green Space and Vegetation
- Management of Archaeological Impacts
- Soil Management



### Loss of Green Space and Vegetation

The EGD property includes an area of vegetation that provides many benefits. It is home to a number of sensitive native plant species, provides habitat for wildlife, and acts as a buffer between the industrial operations of the drydock and ship repair operations and the neighbouring residential area.

**All projects which have the potential to impact vegetation must be reviewed and approved by EGD Management.**



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## Archaeological Considerations

The EGD property and surrounding area has a rich First Nations history. There are four Provincially Registered Archaeological Sites listed within the property boundaries of the EGD.

- All excavation projects must be reviewed and approved by EGD management prior to work beginning
- Depending on the scale of the project a detailed Archaeological Impact Assessment may be required.

### Esquimalt Graving Dock Archaeological Overview Assessment

An Archaeological Overview Assessment was carried out in 2010 which outlines the archaeologically sensitive areas on the EGD property and identifies areas of high archaeological potential. Archaeological significant materials found during excavation projects at the facility include artefacts, shell midden, faunal and human remains.



## Soil Management

The EGD has undergone significant capital and operation and maintenance projects in recent years. Extensive investigations into the soil conditions (chemical contamination and structure), utility mapping and identification of archaeological conditions have taken place. The industrial history of the facility has resulted in the contamination of the soil and in-fill material used on site. The primary contaminants commonly found at levels exceeding industrial soil standards include: arsenic, cadmium, copper, lead, mercury, zinc, and polycyclic aromatic hydrocarbons (PAH).

## Requirements for Excavations at the EGD

### Planning Excavation

1. Consult with EGD Facility Management to identify:
  - Project area and excavation boundaries.
  - Known utilities, structures, and historical information regarding the proposed excavation area.
  - Known contaminated soil locations, the nature and level of contaminants potentially in the soils to be excavated.
  - Archaeologically significant areas, requirements for mitigation archaeological impacts, and dealing with unanticipated archaeological finds.

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2. Prepare a plan for management, stockpiling, and sampling of soils to be excavated. Key issues to be identified include:
  - Turnaround times for samples may be up to 2 weeks.
  - Parameters to be sampled may vary depending area of excavation. Common parameters include total metals, leachable metals, PAHS, and hydrocarbons (LEPH, HEPH).
  - Stockpile areas must be approved by EGD Management.
  - Soils which exceed the CCME Industrial Levels or BC CSR Industrial levels must be disposed of off site at an approved location.
  - Soils which are below industrial standards may remain on site if geotechnically suitable, approved by EGD Management, and there is an identified use for the soil.
3. Ensure contractors and employees are aware of the health and environmental risks associated with the suspected contaminated soils and have procedures in place to mitigate these risks. This includes adequate Personal Protective Equipment (PPE) and hygiene practices (i.e. no smoking, wear gloves)

Conducting Excavation

1. Ensure appropriate PPE and hygienic precautions are in place to prevent exposure to contaminants in the soils.
2. Monitor all excavations for visible soil contamination or archaeologically significant material.
3. Ensure soil is stockpiled, sampled and analysed in accordance with the BC MOE Technical Guidance on Contaminated Sites (January 2009).
4. Ensure soils suspected of contamination are stockpiled on an impervious surface and covered with a minimum 6 mil PVC or plastic liner to prevent exposure to wind, storm water runoff or people.
5. Imported fill material must be certified clean by the supplier.



After Excavation

1. Ensure all soil is disposed of at approved facilities.
2. Obtain disposal certificates from the receivers of contaminated soils.
3. Report to EGD Management on the volume, analysis of results, excavation details and dimensions.
4. Provide all as-builts and project drawings to EGD management in the format compatible with the EGD drawing standards.

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Requirements for Small Excavations (less than 10m<sup>3</sup>)

**In areas of suspect contamination:** soil must be removed, stockpiled and sampled. Soil cannot go back into the excavation or used elsewhere on site until it is determined through analysis to contain contaminants less than industrial soil standards. The EGD management must give approval for any reuse of excavated soil on site.

**In areas of non-suspect contamination:** soil may go back into the excavation if geotechnical suitable. The EGD management must give approval for any reuse of excavated soil on site.

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## **APPENDIX D**

### **PILE DRIVING BEST MANAGEMENT PRACTICES**

# **Best Management Practices for Pile Driving and Related Operations – BC Marine and Pile Driving Contractors Association - November, 2006**

The BC Marine and Pile Driving Contractors Association and Fisheries and Oceans Canada (DFO) have developed a Best Management Practices Policy for pile driving operations and related activities when working on the water within the province of British Columbia.

The Pile Driving Industry utilizes many different construction methods, equipment and materials in order to complete the contractual obligations for its client. Hammers; including drop, diesel, air, vibratory and hydraulic, vibroflot, and rotary, air and churn drills are the primary instruments in a pile driving operation. These hammers and drills are supported by a wide variety of heavy equipment, including a range of conventional cranes (truck mounted, crawler and pedestal mounted), spud scows, support barges and other water borne equipment. The piling types include treated timber (primarily creosote), concrete and steel (pipe, h-beam and sheet). Construction projects have the potential to utilize a number of different combinations of equipment and materials. It is the purpose of this document to examine the characteristics of each potential combination and develop a Best Management Practices Policy that will meet the following criteria:

- Maximize environmental protection
- Avoid contravention of the Fisheries Act
- Provide construction services economically

## 1)- Basic Rules of Operation

When in an aquatic environment, contractors will employ the following BASIC Best Management Practices:

- All equipment will be maintained in good proper running order to prevent leaking or spilling of potentially hazardous or toxic products. This includes hydraulic fluid, diesel, gasoline and other petroleum products.
- Storage of fuels and petroleum products will comply with safe operating procedures, including containment facilities in case of a spill.
- Pile cut-offs, 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 overboard.
- Contractors will have emergency spill equipment available whenever working near or on the water.
- Contractors, where possible, will position their water-borne equipment in a manner that will prevent damage to identified fish habitat (eg: eelgrass, kelp beds, shellfish beds, salt marshes, etc.). Where possible, alternative methods

- will be employed (eg. Use of anchors instead of spuds). In the event that, despite precautions, the contractor is aware that fish habitat has been inadvertently damaged, the incident must be reported to and discussed with the DFO assessor to ensure that appropriate remedial action is taken.
- Prior to the commencement of any work, the contractor will complete and forward the attached “Notice of Project” to the Department of Fisheries and Oceans. Letters of advice or Habitat Authorizations may be required, depending on the scope of work proposed.
- If contractors are working and a herring (or other fish) spawning occurs, the work will be temporarily suspended and the appropriate DFO contact notified.
- There will be no restriction of work during closure periods (the only exception being when spawning is present – all work must cease and the DFO habitat assessor must be contacted for further instructions), provided the contractors employ an exclusion device (protective netting or geotextile material suspended in the water column around pile driving area) around the work area to prevent fish access or when required, an effective method of mitigating shock waves (bubble curtain).
- Whenever shock wave monitoring (hydrophone) is performed at a marine construction site and the findings are available to the contractor, the data will be forwarded to the BC Marine and Pile Driving Contractors Association and Svein Vagle at the Institute of Ocean Sciences in Sidney, BC. It is hoped that a database can be built that will more precisely define work procedures and reflect the safest and most economical approach to protecting the fish and their habitat.

## 2)-Timber Piling (creosote):

When driving timber piling, the following Best Management Practices will be employed to prevent impact to marine fish and their habitat:

- Where possible, new timber piles will comply with the best Management Practices for the use of treated wood in aquatic environments as developed by the Canadian Institute of Treated Wood and the Western Wood Preservers Institute and the DFO document “Guidelines to Protect Fish and Fish Habitat from Treated Wood Used in Aquatic Environments in the Pacific Region”.
- Where the above is not possible, creosote piling will stand (weather) for a period of 45 days prior to installation.
- These requirements are for new piling only. Re-used piling will not normally be subject to any additional treatments (timberfume is a provincially licensed preservative that is available for treatment of used piles), however, pilings with excessive creosote should be avoided. Reuse of suitable piles should be encouraged. In the case of mooring piles exposed to significant wear, the contractor should encourage the owner to protect the piling with rub strips as per the “Guidelines for use of Treated Wood”.



- Timber piling is normally driven using a drop hammer, a diesel/air impact hammer or a small vibratory hammer. Because of the relative small diameter of the timber pile, and its excellent energy absorbing quality, there is little threat of sound pressure impacts to fish and their habitat when driving timber piles.
- Environmental monitoring of sound pressure impacts is not required.
- An attempt should be made to determine whether least impact means full extraction of the piling or if leaving a stub that would interfere with navigation is acceptable. If complete demolition is required on timber piles structures, the contractor will remove the piling by mechanical means and avoid breaking the piling at the mud line or below. It may be appropriate to cut off the piling flush with the mud line. All demolition operations should be monitored in order to control construction debris and determine whether there are any effects on fish or fish habitat.

### 3)-Concrete Piles

When driving concrete piles, regardless of which hammer is being used, the following Best Management Practices will be employed to minimize/prevent impacts to fish habitat:

#### Concrete Piles 24 inch diameter and less

- The physical design of 24 inch concrete pile dictates that: 1/ the energy required must be controlled in order to prevent the pile from breaking and 2/ the concrete construction of the pile will absorb the energy. These two factors are expected to result in low level shock wave emission (less than 30 kPa.) and minimal or no effects to fish and their habitat should result.
- Environmental monitoring of sound pressure levels is generally not required.

#### Piles Larger than 24 inch diameter

- When driving concrete piles with a diameter greater than 24 inches using an impact or hydraulic hammer, the following Best Management Practice will be employed to minimize the impact on fish habitat:
- Visual and hydrophone monitoring of the impact on fish by the sound waves emitted will be required. If sound pressures over 30 kPa are measured or a fish kill occurs, the contractor will introduce effective means of reducing the level of the shock waves. Appropriate mitigating measures would be the deployment of a bubble curtain over the full length of the wetted pile. This should reduce the shock waves to an acceptable level.
- If, despite the introduction of preventative measures, further visual/hydrophone monitoring reveals unacceptable conditions (fish kill or

sound pressure over 30 kPa), the work will stop immediately, the DFO assessor will be contacted, and the methods will be reviewed and corrected

#### 4)-Steel Pipe Piles

##### Piles smaller than 24 inch diameter

When driving steel piles 24 inches in diameter and less, regardless of the type of hammer being used, the following Best Management Practices will be employed to prevent impacts to fish habitat:

- Because of the small diameter of the pile it is assumed that the energy required to drive the pile to the final point of installation will not result in shock waves in excess of 30 kPa, therefore, protective measures to reduce shock waves are not expected to be required.
- If, however, ground conditions during pile installation cause a fish kill, work will cease and contractors will be responsible for introducing effective means of reducing the level of shock waves or will introduce measures that will prevent fish from entering the potentially harmful shock wave area. Appropriate mitigating measures would include the deployment a bubble curtain over the full length of the wetted pile. This technique should reduce the shock waves to an acceptable level.
- If, despite the introduction of preventive measures, further visual/hydrophone monitoring reveals unacceptable conditions (fish kill or sound pressure over 30 kPa), then the work will stop immediately and the methods will be reviewed and corrected (in consultation with DFO).

##### Piles larger than 24 inches in diameter

When driving steel pipe piles with a diameter greater than 24 inches using impact or hydraulic hammers, the following Best Management Practices will be employed to prevent impacts to fish habitat:

- Hydrophone and visual monitoring of the effects of the shock waves on fish will be required. If a fish kill occurs, the contractor will introduce effective means of reducing the level of the shockwave. Appropriate mitigating measures would be the deployment of a bubble curtain over the full length of the wetted pile.
- If, despite the introduction of preventative measures, further visual/hydrophone monitoring reveals unacceptable conditions (fish kill or sound pressure over 30 kPa), then the work must stop immediately and the work methods will be reviewed and corrected (in consultation with DFO).

### 5)-Steel Sheet Piles and H-piles

When driving steel sheet piles and H-piles with a drop hammer, an impact hammer or a vibratory hammer, the following Best Management Practices will be employed to minimize the impact on fish habitat:

- It is anticipated that the driving of these types of piles will not generate shock waves in excess of 30kPa, therefore, mitigating measures are not expected to be required.
- If, however, ground conditions during pile installation cause a fish kill, work will cease and contractors will be responsible for introducing effective means of reducing the level of shock waves or will introduce measures that will prevent fish from entering the potentially harmful shock wave area. Appropriate mitigating measures would include the deployment a bubble curtain over the full length of the wetted pile. This technique should reduce the shock waves to an acceptable level.
- If, despite the introduction of preventive measures, further visual/hydrophone monitoring reveals unacceptable conditions (fish kill or sound pressure over 30 kPa), then the work will stop immediately and the methods will be reviewed and corrected (in consultation with DFO).

### 6)-Stone Column Construction

When installing stone column using a vibroflot, the following Best Management Practices will be employed to prevent impacts to fish habitat:

- The vibrating action and air flush associated with the operation of the probe results in a high degree of turbidity. When this level exceeds the criteria as outlined in the British Columbia Approved Water Quality Guidelines, the contractor will introduce containment methods that are designed to isolate the contaminated area and to prevent fish from entering the contaminated area. Silt curtains and netting are two methods that can provide the necessary protection.
- When supplying the aggregate to the probe, the contractor will ensure that spillage is prevented, thereby providing additional protection to fish habitat.
- An independent environmental consultant will be used to monitor turbidity levels.

### 7)-Underwater Drilling and Blasting

When performing underwater drilling and blasting the following Best Management Practices will be employed to prevent impacts to fish habitat:

### Underwater Drilling

- Generally, drilling underwater is a process that has very little impact on fish or fish habitat. The procedure does not generate shock waves.
- Contractors will ensure that all attachments (hydraulic connections and couplings) are in good operating order and inspected prior to the start of every day. Spill kits and containment booms must be maintained on-site in case of spills.
- Depending on soil conditions and the potential for turbidity, drill cuttings will be deposited adjacent to the operation, contained on the sea bed or pumped to the surface for deposit into containment skiffs or scows for land disposal when it is determined that the drill cuttings are unsuitable for return to the environment.

### Underwater Blasting

Contractors required to perform blasting underwater will provide the following protection to prevent impacts to fish habitat:

- Because of the potential for harmful shock waves resulting from a blast, a protection shield will surround the immediate blast area. This would be in the form of an air-induced bubble curtain, which has the primary purpose of absorbing the shock wave and a secondary purpose of preventing fish from entering the blast area.
- In order to protect against flying rock, mats (rubber) will be placed over the blasting area. The placement of the mats may also provide protection for any fish swimming in the immediate area.
- Monitoring of fish movement and concentrations will be conducted using a sonar to determine if fish herding or scaring techniques (seal bombs) can be utilized to reduce the presence of fish in the blast area. If fish scaring techniques are deemed necessary, the DFO habitat biologist or technician responsible for reviewing the project must be consulted to determine a method that will present the lowest risk to fish mortality.

### 8)-Cleaning out Pipe Piles:

When cleaning out pipe piles (i.e.: air lifting) the following Best Management Practices will be employed to prevent impacts to fish habitat:

- Generally, sediment contained in the pipe will be pumped to the surface and processed through an approved containment system and disposed of at an approved landfill site.
- If the contractor knows that the sediment is toxic, the sediment must not be redistributed in the area. If sediment is non-toxic, and if fish are not present in

the area, and adjacent fish habitats are not a concern (contact DFO), it may be acceptable to:

1. Pump the sediment through a discharge tube and allow it to settle in the immediate area with or without a silt curtain to contain the sediment.
2. Pump the sediment through a discharge tube and additional flex hosing and redirect it back to the base of the pile.

#### 9) Containment of Concrete Residue and Water Run Off

When placing concrete in form work over or in water, the following Best Management Practices will be employed to prevent the impacts to fish habitat:

##### Pouring concrete

- Spills: When pouring concrete all spills of fresh concrete must be prevented. Concrete is toxic to fish due its high pH. If concrete is discharged from the transit mixer directly to the formwork or placed by wheelbarrow, proper sealed chutes must be constructed to avoid spillage.
- If the concrete is being placed with a concrete pump, all hose and pipe connections must be sealed and locked properly to ensure the lines will not leak or uncouple. Crews will ensure that concrete forms are not filled to overflowing.
- Sealing forms: All concrete forms will be constructed in a manner which will prevent fresh concrete or cement-laden water from leaking into the surrounding water.

##### Curing concrete

- When fresh water is used to cure concrete, the run off must be monitored for acceptable pH levels. If the pH levels are outside the allowable limits then the run off water must be contained and neutralized.

##### Grinding concrete

- When grinding cured concrete, the dust and fines entering the water must not exceed the allowable limits for suspended solids. When grinding green or incompletely cured concrete and the dust or fines are entering the water, pH monitoring will be conducted to ensure allowable ranges are maintained. In the event that the levels are outside the acceptable ranges, preventative measures will be introduced. This may include introducing silt curtains to contain the solids and prevent fish from entering a contaminated area or constructing catch basins to recover the run off and neutralizing it prior to disposal.

##### Patching concrete

- Spills: When patching concrete, all spills must be contained and prevented from entering the water.

Washing hand tools, pumps and transit mixer

- All tools, pumps, pipes, hoses and trucks used for finishing, placing or transporting fresh concrete must be washed off in such a way as to prevent the wash water and excess concrete from entering the marine environment. The wash water will be contained and disposed of upland in an environmentally acceptable manner.

Whenever there is the possibility of contaminants entering water, the contractor will monitor pH levels to ensure acceptable levels.

## **NOTICE OF PROJECT**

Project Location:

To: Fisheries and Oceans Canada      Attention:

Telephone/Fax/email: \_\_\_\_\_

From: "Contractor"

Telephone/Fax/email: \_\_\_\_\_

Representative:

Please be advised of the following marine/pile driving project:

Project Name:

Project Location:

Project Manager/Superintendent:

Project Telephone/Fax/email: \_\_\_\_\_

Project commencement date:

Project Information:

Type:            Bearing                      Fender                      Mooring

Number of Piles:

Pile Diameter (if steel)

Type of Driving:    Vibro Drop Hammer      \_\_\_\_\_

Special Conditions at the Bottom (use of pins, sockets, epoxy, concrete, other)

\_\_\_\_\_

General Equipment On-Site (barge, truck, crane, etc.) \_\_\_\_\_

Signature of Contractor: \_\_\_\_\_

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

## APPENDIX E

### FIRE PREVENTION BEST MANAGEMENT PRACTICES



Best Management Practices  
for  
Fire Prevention

For Works, Buildings, and Vessels within the Esquimalt Graving Dock

***Prepared for:***

Public Works and Government Services Canada  
Esquimalt Graving Dock

Date: Revised January 26, 2009

**PUBLIC WORKS AND GOVERNMENT SERVICES CANADA  
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1. Introduction

Best Management Practices (BMP) are ways of lowering the Fire Risk/Fire losses through good Fire Prevention Practices, Fire and Building Code Compliance of the National, Provincial, Municipal Bylaws, NFPA Standards, and the Fire Commissioner of Canada Standards. BMP also include Indoor and Outdoor Storage of Combustible Products and Dangerous Goods the Storage and Handling of Flammable and Combustible Liquids, Hazardous Processes and Spray Operations

The benefits derived from implementing BMPs include:

Code Compliance  
Safer working environment  
Lower the Risk of Loss of Life due to Fire and Explosion  
Lower the Risk of Fire losses due to Fire or Explosion

1.a Authority Having Jurisdiction

The Authority Having Jurisdiction for The Esquimalt Graving Dock is the General Manager of the Dock or his/her designate.

Note. Authority Having Jurisdiction (AHJ) (Definition by National Fire Protection Association)

*The phrase "authority having jurisdiction" used in this document is in a broad manner, since jurisdictions and approval agencies vary, as to their responsibilities. Where public safety is primary, the authority having jurisdiction may be federal, provincial, municipal, or other regional department or individual such as a fire chief; chief of a fire prevention bureau, or other having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurers company representative may be the authority having jurisdiction. In many circumstances, the property owner or his/her designated agent assumes the role of authority having jurisdiction; at government installations; the commanding officer or department official may be the authority having jurisdiction.*

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## 1.0 Scope

This document shall apply to all contractor facilities and equipment used to repair, service, construct, store, haul, and fuel vessels and small craft within the property owned or managed by the Esquimalt Graving Dock (PWGSC).

These Best Management Practices are for the Fire Prevention in Works, Buildings, and Vessels in the Esquimalt Graving Dock (PWGSC) area. The Esquimalt Graving Dock (PWGSC) provides specific guidelines that shall be followed by all individuals who conduct activities on property owned or managed by the Esquimalt Graving Dock (PWGSC). The purpose of this Best Management Practice document is to compliment existing Codes, Standards, Lease Agreements, Municipal Bylaws, Public Works Act, Occupation Health & Safety Regulation (BC), Canada Labour Code Part II, and WCB Regulations.

### 1.0.1 Purpose

This document is intended to provide a minimum acceptable level of safety to life and property from fire and other hazards at the Esquimalt Graving Dock (PWGSC).

Every reasonable means of preventing fire shall be provided and supplemented by means of detection, protection equipment that permits the prompt discovery, retard the spread, and permit extinguishment of any fire before it has passed the incipient stage. These fire-fighting methods shall include fire watching, fire extinguisher training, co-ordination and co-operation with the Esquimalt Graving Dock (PWGSC) primary emergency responder.

Nothing in this document shall be construed as prohibiting the immediate dry docking of a vessel whose safety is imperil, as by sinking condition or by being seriously damaged. In such cases, all necessary precautionary measures shall be taken as soon as practical.

### 1.0.2 Abbreviations/Acronyms

FC	Fire Commissioner of Canada Standards adopted by the Treasury Board of Canada
BCFC	British Columbia Fire Code 1998
NFC	National Fire Code of Canada 1995
NFPA	National Fire Protection Association
CEC	Canadian Electrical Code
BCEC	British Columbia Electrical Code
BCBC	British Columbia Building Code 1998
NBC	National Building Code of Canada
CSA	Canadian Standards Association
ULC	Underwriters Laboratories of Canada
TC	Transport Canada
ISPS	International Ship & Port Security Code
EGD	Esquimalt Graving Dock
PWGSC	Public Works and Government Services Canada

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**1.0.3 Definitions**

- “Approved”* - acceptable to the authority having jurisdiction. (As applied to the Esquimalt Graving Dock (PWGSC) see 1.a page 3)
- “Authority Having Jurisdiction”* - the organization, office, or individual responsible for approving equipment, installation, or a procedure
- “Contractor”* - any company, firm, shipyard, corporation, government department, vessel using/ leasing the Esquimalt Graving Dock (PWGSC) or areas within the Esquimalt Graving Dock (PWGSC) for repairs, construction, conversion, lay-up of vessels, or a shiprepair related business.
- “Building”* - any structure used or intended for supporting or sheltering any use or occupancy.
- “Combustible Liquid”* - a liquid that has a close-cup flash point at or above 37.8 degrees C.
- “Flammable Liquid”* - a liquid that has a close-cup flash point that is below 37.8 degrees C. and the maximum of vapor pressure of 40 psi (2068mm Hg) at 37.8 degrees C.
- “Hot Work”* - the use of any equipment involving open flames or producing heat or sparks, including, without being limited to, cutting, welding, soldering, brazing, grinding, gouging, adhesive bonding, thermal spraying and thawing pipes.
- “Shall”* - a mandatory requirement
- “Should”* - a recommendation or that which is advised but not a mandatory requirement.

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### 1.1 Fire and Emergency Response Plans

All contractors within the Esquimalt Graving Dock (PWGSC) area shall have Fire, Emergency, and Earthquake Response Plans in place. A copy of these plans shall be given to the Esquimalt Graving Dock (PWGSC) Best Practices Coordinator for review. These plans are to be reviewed on an annual basis by the contractor and Esquimalt Graving Dock (PWGSC) Best Practices Coordinator or his/her representative.

### 1.2 Emergency Response Drills

All contractors will participate in emergency response drills on an annual basis in accordance with Occupational Health & Safety Regulation (BC) Emergency Procedures Training and Drills. Drills will be held at the least disruptive times to minimize the impact of work stoppage to the contractor.

### 1.3 Hot Work Permits

All contractors within the Esquimalt Graving Dock (PWGSC) area shall have written hot work procedures and permits in place. A copy of the procedures and permits shall be given to the Esquimalt Graving Dock (PWGSC) Best Practices Coordinator. These procedures and permits are to be reviewed on an annual basis by the contractor and Esquimalt Graving Dock Best (PWGSC) Practices Coordinator or his/her representative. If any contractor does not have written hot work procedures and permits in place, the contractor shall be subject to article 1.3.a of this document. Contractors written hot work procedures and permits do not apply to common areas of the yard. All contractors shall obtain a hot work permit issued by the Esquimalt Graving Dock (PWGSC) Best Practices Coordinator, or his/her representative for all common areas within the Esquimalt Graving Dock areas

1.3.a. Hot work permits will be issued by Esquimalt Graving Dock (PWGSC) Best Practices Coordinator or his/her representative for all areas other than shipboard work and work on leased property. Permits shall be posted in the area of hot work. All hot work shall comply with the National Fire Code of Canada, British Columbia Fire Code 1998, CSA W117.2, "Safety in Welding, Cutting, and Allied Processes", NFPA 51B Standard for Fire Prevention in Use of Cutting and Welding Processes. 2003 Edition. FC 302 Standard for Welding and Cutting June 1982.

### 1.4 Flammable and Combustible Liquids

All contractors, sub-contractors, and agents shall comply with Part 4 of the National Fire Code of Canada, British Columbia Fire Code 1998.

### 1.5 Spray Coating Operations

All contractors who are involved in spray coating operations other than on board a ship in the dry dock or a ship berthed alongside, the contractor shall comply with Section 5.4. Spray Coating Operations in the British Columbia Fire Code 1998, and the National Fire Code of Canada 1995.

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1.6 Fire Protection

All contractors shall comply the following:

- British Columbia Fire Code Part 2 Section 2.16. Part 3, Part 4, Part5, and Part 6 2005
- National Fire Code of Canada Part 3, Part4, Part 6, 2006
- NFPA Standard 1 Uniform Fire Code 2003 Edition
- NFPA Standard 10 Standard for Portable Fire Extinguishers 2006 Edition
- NFPA Standard 51 B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work 2006 Edition
- NFPA Standard 101 Life Safety Code 2003 Edition
- NFPA 303 Standard for Fire Protection of Marinas and Boatyards 2006 Edition
- NFPA Standard 306 Standard for the Control of Gas Hazards on Vessels 2006 Edition
- NFPA Standard 307 Standard for the Construction and Fire Protection of Marine Terminals, Piers and Wharves 2006 Edition
- NFPA Standard 312 Standard for Fire Protection of Vessels During Construction, Repair, and Lay-up 2006 Edition
- CSA C22.1 Electrical Installations, British Columbia Electrical Act and pursuant Regulations
- CSA W117.2 Safety in Welding, Cutting, and Allied Processes
- FC 302 Standard for Welding and Cutting June 1982
- Transport Canada TP3177E Standard for the Control of Gas Hazards in Vessels to be Repaired or Altered
- Workers` Compensation Board of British Columbia Occupational Health Safety Regulation

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1.6. Continued

All contractors in conjunction with the Esquimalt Graving Dock (PWGSC) Best Practices Coordinator or his/her representative, shall do a post docking inspection of the vessel if the vessel is over 30.5M (100ft). The contractor or their representative shall complete a post docking inspection form along with the vessels fire control plans and crew list within 24 hours of the vessels arrival at the Esquimalt Graving Dock (PWGSC) facility. These forms and fire control plans will be given to Esquimalt Graving Dock (PWGSC) Best Practices Coordinator to be kept in the Esquimalt Graving Dock (PWGSC) Incident Command Post in the Esquimalt Graving Dock (PWGSC) administration building.

All contractors shall comply with NFPA Standard 312 Fire Protection of Vessels during Construction, Repair and Lay-up 2006 Edition and shall apply to all vessels, with the exceptions of vessels 30.5M (100ft) or less in length.

While vessels are at berths or in dry dock, temporary fire hoses supplied from shore connections to Esquimalt Graving Dock (PWGSC) Fire Equipment Boxes and a Portable Foam Units, shall be placed aboard the vessel and shall be connected and ready for use. The ratio shall be at least one hose for each 200 ft (62 m) of vessel length. This shall apply to all vessels, with the exceptions of vessels 30.5M (100ft) or less in length. Vessels 30.5M (100ft) or less in length and deemed vulnerable by the AHJ, may be required to have readily available, a temporary fire hose supplied from a shore connection to an Esquimalt Graving Dock (PWGSC) Fire Equipment Box and a Portable Foam Unit.

All contractors shall sign out the required fire equipment from the Esquimalt Graving Dock (PWGSC) stores person in the operation building.

If the contractor is unable to place the fire equipment onboard the vessel, the contractor or their representative shall inform an EGD representative the rationale and sign a non-compliance form. A copy of the non-compliance form shall be given to the Esquimalt Graving Dock (PWGSC) Best Practices Coordinator kept on file with the post docking inspection reports.

(A non-compliance form can be obtained from the Esquimalt Graving Dock stores person in the operations building)

On vessels under repair, the vessel's fire system piping, where the system is intact and capable of being used, shall be connected to water supplies from the yard by means of temporary shore-to-ship connections.

All contractors engaged in the breaking-up of vessels shall comply, to all required codes and regulations.

**Smoking** is permitted in contractors designated smoking areas only. Smoking is not permitted on board vessels in for repair or refit. All contractors shall post no smoking signs on all gangways to vessels in the EGD area.

1.7 Building Construction

All building construction whether permanent or temporary shall be built and located in accordance with the British Columbia Building Code 1998, British Columbia Fire Code 1998, National Building Code of Canada 2006, National Fire Code of Canada 2006, Municipal by-laws & Permits, plus any other applicable codes and standards.

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**1.7.1 Building Construction Compliance**

All structures built, erected, or relocated on property owned or managed by Esquimalt Graving Dock (PWGSC) shall comply with Article 1.7 of this document.

**1.8 Building Construction**

Prior to any type of construction, major renovation, placement of trailers or temporary buildings, permits must be obtained from the Municipality of Esquimalt. The plans and copies of the permits shall be by submitted the contractor to the Operations Coordinator of the dock or his/her representative for approval. Plans and permits should be submitted well in advance of the planned project as this would expedite the approval process.

**1.9 Building /Site Inspections by AHJ or Emergency Responder**

As per the signed lease agreement Art. 11.02 the tenant agrees to comply with all requests and orders from the AHJ , primary emergency responder or Esquimalt Graving Docks (PWGSC) Representative

**1.10 Compliance with Laws, Rules, and Regulations**

Pursuant to any signed lease agreement the tenant shall comply with this document.

**1.11 Marine Transportation Security Act / International Ship & Port Facility Security Code**

All contractors shall be compliant to the Marine Transportation Security Act / International Ship & Port Security Code Codes when required.

**1.12 Orientation of Subcontractors**

Contractors are required to give to all visitors, or sub-trades/contractors hired by them to perform work within the Esquimalt Graving Dock (PWGSC) area, or on vessels within the Esquimalt Graving Dock (PWGSC) area, an orientation in the Esquimalt Graving Dock (PWGSC) Safety Regulations, and Emergency Procedures.

**NOTE:** For all 911 emergency calls the caller must state to the operator that you are calling from the Esquimalt Graving Dock and give your exact location in the dock area. Then the caller must call the main gate at 363-3784 and inform them that emergency services are on their way to the Esquimalt Graving Dock and give them you exact location in the dock area.

**1.13 Flammable Material, and Dangerous Cargo Vessels**

All work on vessels, barges, rigs and similar floating structures shall comply with Transport Canada TP3177E Standards for the Control of Gas Hazards in Vessels to be Repaired or Altered.

Vessels that carry explosives or other dangerous cargo such as flammable gases, hazardous chemicals, and flammable liquids, but excluding fuel and storage in specifically designated spaces, shall not be permitted to enter

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the EGD until materials are removed and spaces have been certified as gas free. The gas free certificates are to be posted and a copy given to the Esquimalt Graving Dock (PWGSC) Best Practices Coordinator

**1.14 Code Compliance**

All contractors working and leasing space within the Esquimalt Graving Dock (PWGSC) areas shall comply with all required codes in this document, all contractors shall supply their own copies of all required codes and regulations pertaining to this document. Failure to comply with the Esquimalt Graving Dock (PWGSC) Best Management Practices for fire prevention and all required codes could mean immediate denial of dock services.

**1.15 Reporting of Fires.**

All fire regardless of size once extinguished shall be reported to the responding fire department and to the Esquimalt Graving Dock (PWGSC) Best Practices Coordinator immediately.

**Reference Publications**

This document or portions thereof, are referenced within this document and shall be considered part of the requirements of this document.

- NFPA Standard 1 Uniform Fire Code 2003 Edition
- NFPA Standard 10 Standard for Portable Fire Extinguishers
- NFPA Standard 51 B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work 2006 Edition
- NFPA Standard 101 Life Safety Code 2003 Edition
- NFPA 303 Standard for Fire Protection of Marinas and Boatyards 2006 Edition
- NFPA Standard 306 Standard for the Control of Gas Hazards on Vessels 2006 Edition
- NFPA Standard 307 Standard for the Construction and Fire Protection of Marine Terminals, Piers and Wharves 2006 Edition
- NFPA Standard 312 Standard for Fire Protection of Vessels During Construction, Repair, and Lay-up 2006 Edition
- CSA C22.1 Electrical Installations, British Columbia Electrical Act and pursuant Regulations
- CSA W117.2 Safety in Welding, Cutting, and Allied Processes
- FC 302 Standard for Welding and Cutting June 1982
- Transport Canada TP3177E Standard for the Control of Gas Hazards in Vessels to be Repaired or Altered

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- Workers` Compensation Board of British Columbia Occupational Health Safety Regulation
- NFPA 303 Standard for Fire Protection of Marinas and Boatyards 2006 Edition
- NFPA Standard 306 Standard for the Control of Gas Hazards on Vessels 2006 Edition
- Transport Canada TP3177E Standard for the Control of Gas Hazards in Vessels to be Repaired or Altered
- Workers` Compensation Board of British Columbia Occupational Health Safety Regulation
- National Fire Code of Canada 2006
- British Columbia Fire Code 1998

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## APPENDIX F

### EXAMPLE REPORTING TEMPLATES

<b>Form A Environmental Incident Report Form</b>	<b>Public Works and Government Services Canada Esquimalt Graving Dock</b>  <i>Environmental Management System Manual</i>	
--	--	--

IR #:

<b>LOCATION OF INCIDENT:</b>	
Attached: <input type="checkbox"/> Photographs <input type="checkbox"/> Supporting Information	
<b>BRIEF DESCRIPTION OF INCIDENT:</b>	
<b>Date:</b>	
<b>Time:</b>	
<b>CAUSE OF INCIDENT:</b>	
<i>User/Contractor:</i>	<i>Vessel:</i>
<i>Spilled or Released Materials:</i>	<i>Quantity of Spilled or Released Materials:</i>
<b>AFFECTED ENVIRONMENT:</b>	
<input type="checkbox"/> Marine	<input type="checkbox"/> Atmosphere
<input type="checkbox"/> Ground	<input type="checkbox"/> Groundwater <input type="checkbox"/> Other (specify) _____
<b>INCIDENT REPORTED BY:</b>	
<b>Name/Organization:</b>	<b>Contact Information:</b>
<b>PERSONNEL RESPONDING TO INCIDENT:</b>	
<b>ACTIONS TAKEN TO MITIGATE INCIDENT:</b>	
<b>ACTIONS TAKEN FOR PREVENTATIVE MEASURES:</b>	

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<b>Form A Environmental Incident Report Form</b>	<b>Public Works and Government Services Canada Esquimalt Graving Dock</b>  <i>Environmental Management System Manual</i>	
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<b><i>This Section For Environmental Services Office Use Only</i></b>	
<b>NOTIFICATION:</b>	
Notified User/Agent/Vessel: <input type="checkbox"/> yes <input type="checkbox"/> no    if yes, indicate which:	
Notified External Agency: <input type="checkbox"/> yes <input type="checkbox"/> no    if yes, indicate which Agency:	
Any changes in the documented procedures resulting from the corrective and preventative action? <input type="checkbox"/> yes <input type="checkbox"/> no    if yes, provide details:	
Is follow up required? <input type="checkbox"/> yes <input type="checkbox"/> no If yes, provide details of follow-up actions required:	
<b>REPORT FORM COMPLETED BY:</b>	
Name:	
Date:	

<b>PHOTOGRAPHS:</b>	
<b>Photo #:</b>	<b>Photo #:</b>
<b>Photo #:</b>	<b>Photo #:</b>
<b>Photo #:</b>	<b>Photo #:</b>
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**ENVIRONMENTAL MONITORING REPORT – NOISE MONITORING**

Date:	General Site Conditions (weather, vessel traffic):
Monitor:	
Work being undertaken:	

Noise Measurements				
Date	Time	Location	Sound Level (dBA)	Action Required (Y/N)*

\* Note in issues tracking table

Summary of noise monitoring data as applicable:
---







## APPENDIX G

### EGD SPILL CONTINGENCY PLAN

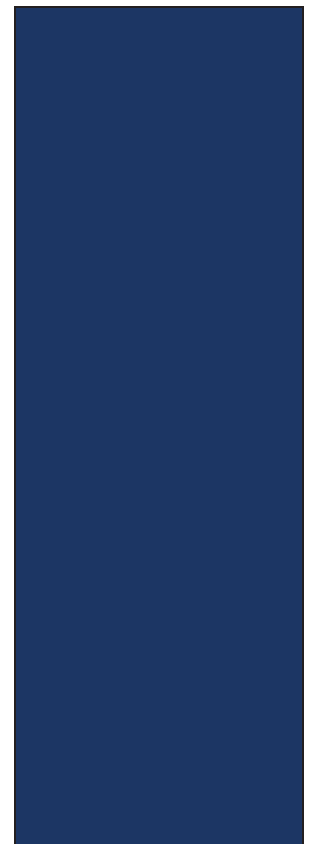


# Esquimalt Graving Dock Spill Contingency Plan



**Prepared By:**  
Public Works and Government Services Canada  
Environmental Services

**Date:** February 2010  
**Version:** 03



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## **1.0 Introduction**

### **1.1 Purpose**

The Esquimalt Graving Dock (EGD) is committed to the protection of human health and the environment. Extensive safety and environmental management programs have been implemented at the EGD to reduce the potential for accidents and spills. Although the potential for spills can be reduced through these programs, spills do happen. The EGD Spill Contingency Plan was developed for those occasions when spills occur.

Specifically, the purpose of the EGD Spill Contingency Plan is to act as both policy and as a resource guide during spill events that occur within the Esquimalt Graving Dock and adjacent waters.

### **1.2 Scope**

The EGD Spill Contingency Plan is intended to provide guidance to PWGSC Employees, EGD Users, and can be used as a resource for external spill response teams, in the event of a spill on land and/or the marine environment, generated at the Esquimalt Graving Dock property or water lot. The scope is intended primarily for 1<sup>st</sup> and 2<sup>nd</sup> level response, but provides notification requirements in the event that a 3<sup>rd</sup> level spill occurs.

## **2.0 Roles and Responsibilities**

### **2.1 PWGSC Employees**

PWGSC employees are responsible for understanding the information provided in both the EGD Spill Contingency Plan and the EGD Emergency Response Plan Handbook. PWGSC employees are expected to be able to appropriately respond to all PWGSC generated Level 1 and 2 spills.

Communication with external stakeholders, including the media, will be handled in accordance with the Public Works and Government Services Canada's protocol including Departmental Policy - 009, Critical Incident Reporting.

### **2.2 Esquimalt Graving Dock Users**

Users are responsible for understanding the information provided in the EGD Spill Contingency Plan and the EGD Emergency Response Plan Handbook. In addition, each of the Users are responsible

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for developing Level 1 spill contingency plans, practicing those plans, and having the appropriate spill kits on site.

In the event of a spill, Users are responsible for reporting spills in accordance with applicable legislation as well as to PWGSC Environmental Services.

### 3.0 Spill Response Procedures

#### 3.1 Definition of a Spill

For the purposes of the EGD Spill Contingency Plan, a spill can be defined as the abandonment, deposition, discharge, dumping, emission, escape, exhaust, throwing, injection, leakage, pouring, placement, release seepage, and/or spraying of a deleterious or hazardous material. This can occur during storage, handling, use, and/or transport.

#### 3.2 Six Steps to Spill Response

There are six steps to follow when responding to a spill:

1. Assess the Risk
2. Protect Yourself and Others
3. Stop the Source/Contain the Spill
4. Clean the Spill
5. Dispose of Waste
6. Report the Spill

##### 1. Assessing the Risk

Determine what hazards associated with the product that has spilled. Gather as much information as possible about the product and how it should be handled and cleaned up. Specific product information can be obtained from the product label, hazard symbol, or the Material Data Safety Sheet (MSDS) located on the site and location map in appendix IV. Once the product information is assessed, the level of response required can be determined. There are 3 levels of response, depending on the nature of a spill. The level is determined during the first step to responding to a spill: assessing the risk.

##### a) Level 1 Response – Generator/Discoverer Responds

A level 1 response is where the generator or discoverer of the spill is capable of adequately responding to the spill himself or herself. This applies to both PWGSC staff and EGD Users.

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**b) Level 2 Response – PWGSC Response Team and Resources Deployed**

A level 2 response is a where the generator or discoverer of a spill does not have the capability for responding to the spill and/or assistance is required.

**c) Level 3 Response – External Agencies Call in for Assistance**

A level 3 response is required when the spill is assessed to be out of the capability of the generator or discoverer and external response organizations, are required to assist or manage the incident.

**2. Protecting Yourself and Others**

It is important to protect yourself and others in the event of a spill. Notifications should be made to a number of personnel including employees, supervisors, safety representatives, tenants of the facility and the site commissionaires, who may be affected by the incident. Use of proper personal protective equipment (PPE) is also required. There are 4 levels of PPE:

- A** – full membrane and respiratory protection
- B** – full respiratory and limited membrane protection
- C** – limited respiratory and membrane protection
- D** – normal work safety gear (hard hat, safety glasses, etc.)

Most spills at the Esquimalt Graving Dock require level D protection.

**3. Stopping the Source and Containing the Spill**

It is important to ensure that the risk has been assessed prior to attempting to stop the source and contain the spill. For example, products may be flammable; therefore, need to be handled in an appropriate manner (e.g. no smoking in the immediate area). There are a number of ways to stop the source and contain a spill.

**4. Cleaning the Spill**

There are three types of spill supplies that can be found at the Esquimalt Graving Dock: oil only, universal, and hazardous material. The oil only products are meant for use in aqueous environments as well as on land (with the exception of loose absorbent type products). The oil only pads and absorbent socks will float on water and should be used for any oil based marine spills in the harbour.

The universal pads will pick up both oil and water based products, but are meant to be used for land based spills only. As the universal pads and absorbent socks absorb water based products, these supplies would sink if used in the marine environment.

There are spill supplies designed for chemical spills such as acids, bases, and oxidizers. These response supplies are specially designed to be inert and not react chemically with the product being cleaned up.

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Three large yellow spill kits are available; one in the fuel storage area, one in the pump house, and one in front of the operations center compound. These spill kits contain both oil only and universal spill response supplies.

A spill supply shed is located adjacent to the Operations Centre building, and contains a large variety and quantity of spill supplies. Personnel should become familiar with the contents of the spill supply shed, and the uses of the various types of supplies.

Refer to Appendix IV for site and location map with specific spill kit locations.

**5. Disposing of Waste**

Waste generated from the cleanup of a spill needs to be disposed of properly. Open top drums and hazardous materials bags are available for disposal of waste. Waste of different origins should not be mixed for disposal. All waste containers need to be labeled prior to filling. Waste containers should be visibly stored in designated areas with secondary containment, such as the EGD hazardous materials storage vault located adjacent to the Operations Centre building.

**6. Notification and Reporting the Spill**

Notification of a spill to the proper authorities will depend on the severity of the spill, once the risk has been assessed.

For example:

- In the event of the discovery of a minor spill or sheen on water, the alert may be made by two way VHF radio on Channel 4. Dock employees will stand by and await further direction from the Incident Commander
- If a spill occurs on water that is not within the capability of the generator/discoverer or EGD personnel and resources, the Provincial Emergency Program (PEP), DND Pollution Control, the Canadian Coast Guard, or an external contractor will be contacted immediately.
- In the event of the discovery of a major spill (land or water), the general alarm can be activated at one of the stations indicated on the site plan (Appendix IV). This will ensure that all available resources are made available to respond to the spill.
- If a spill occurs after hours, the discoverer will contact the Incident Commander. The Incident Commander will activate a recall of key personnel as required. Emergency contact numbers are located in Section 4.0.
- Internal emergency alerting procedures are also described in the EGD Emergency Response Plan Handbook.

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All spills are reportable to PWGSC EGD Environmental Services. Any spills on land that exceed the limits outlined in Appendix I, shall be immediately reported to the Provincial Emergency Program (PEP). All marine spills will immediately be reported to PEP.

Environmental Incident Reports will be documented for all spills. These reports will be maintained by EGD Environmental Services location of the incident.

Notification and Reporting requirements are illustrated in the Environmental Spill or Incident Flow Chart in Appendix III.

## 4.0 Emergency Contact Numbers

### PWGSC Esquimalt Graving Dock Contacts

Contact Person	Company/Organization	Phone Number
Dave Latoski	EGD Operations Manager	(250) 889-5808 (c)
Bob Desmarais	EGD Yard Supervisor	(250) 888-0141 (c)
Wyatt Wright	EGD Pumphouse Supervisor	(250) 213-5154 (c)
Jack Gale	EGD Crane Supervisor	(250) 213-9683 (c)
Kim Wilson	EGD Risk Management	(250) 213-6540 (c)
Daryl Lawes	EGD Environmental Coordinator	(250) 213-7242 (c)
Melissa Piasta	EGD Environmental Officer	(250) 888-7357 (c)
Alanna Morbin	EGD Environmental Officer	(250) 889-3566 (c)

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## User Contacts

Company	Office #	After Hrs. Contact	After Hrs. #
Victoria Shipyards Ltd.	(250) 380-1602	Malcolm Barker	(250) 727-2912 (h)
Jenkins Marine	(250) 383-6440	John Jenkins	(250) 478-2605 (h)
Esquimalt Drydock Company	(250) 386-4172	Joe Sansalone	(604) 202-5454 (c)
Hazco (formerly PWWS)	(250) 380-0436	Peter Lehman	(250) 380-8143 (h)
Intercon Marine	(250) 389-0391	Tom Whyte	(250) 480-8064 (c)
Nanaimo Shipyard	(250) 753-1151	Ron Van Wachem	(250) 753-4751 (h)

## Other Stakeholder Contacts

Organization	Phone Number
DND Emergency Response (Call for all level 3 land and waterborne spills)	911 (from PWGSC government phones)
Port Operations and Emergency Services Branch – DND	Working Hrs: 363-2160 or VHF Channel 10 After Working Hrs: 911 or VHF Channel 10
QHM Pollution Control – Office Only	Bob Pope: 363-5428 (Pollution Control Officer) Lyle Fairly: 363-2911 (A/Pollution Control Officer) Dave Buchanan: 363-5429 (A/ Pollution Control Officer)
Environment Canada Spill Reporting line	(604) 666-6100
Canadian Coast Guard Emergency Line	24 hr Emergency 1-800-889-8852  (604) 666-6011 or Maritime Communication and Traffic Services (MCTS) VHF Channel 12

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	Senior Response Officer (Victoria) (250) 363-3806
BC Provincial Emergency Program (PEP) Spill Reporting/Emergency Coordination Line	(800) 663-3456
Burrard Clean	24 hr Emergency (604) 294-9116  Non-Emergency (604) 294-6001  Fax (604) 294-6003
Canadian Forces Sailing Association	(250) 385-2646
Songhees First Nations Office	(250) 386-1043

## 5.0 Training

PWGSC EGD employees will receive appropriate spill response training. Training will include, but is not limited to:

- Policy, Legislation and Liabilities
- Basics of Spill Response
- Spill Prevention Strategies
- Resources Available at the EGD
- Hands on Exercises

Users of the Esquimalt Graving Dock will ensure that their employees receive appropriate spill response training.

## 6.0 Records

The controlled copy of this plan is held with the EGD Environmental Services. Uncontrolled copies will be distributed as requested.

Spill response training records for EGD personnel will be documented and retained on file with EGD Environmental Services.

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***Appendix I***  
***Responding to a Spill on Land***



## **Responding to a Spill on Land**

For all spills on land (including the wharves or in the Graving Dock), every effort shall be made to prevent the spill from reaching the marine environment. This can be achieved by placing absorbent material (e.g. sock/boom, pad, bagged universal absorbent) on the spill and also between the spill and the water.

### **Level 1:**

If there is a land based spill, and it is within the capability of the generator or discoverer to respond to the spill, the generator/discoverer will proceed to clean up the spill using the appropriate PPE and spill supplies. The waste shall be properly labeled and disposed of in accordance with EGD policy. The waste shall not be abandoned or disposed of in the garbage or a dumpster. Once the spill has been cleaned up, the responder will immediately report the spill to their supervisor and to PEP if applicable (refer to Appendix I for reportable quantities on land). An Environmental Incident Report, or information for a report, will also be submitted to Environmental Services for tracking purposes.

### **Level 2:**

If there is a land based spill and the generator/discoverer requires assistance with clean up, the generator/discoverer will immediately notify the Incident Commander and Environmental Services. The Incident Commander or Environmental Services will determine if the spill is within the capability of PWGSC staff and resources. Dock employees will stand by and await further direction from the Incident Commander or Environmental Services. If within PWGSC capability clean up will commence using appropriate PPE and spill supplies. The waste will be properly labeled and disposed of in accordance with EGD policy. The waste shall not be abandoned or disposed of in the garbage or a dumpster. Once the spill has been cleaned up, the responder will report the spill to PEP if applicable (refer to Appendix I for reportable quantities on land). An Environmental Incident Report, or information for a report, will also be submitted to Environmental Services for tracking purposes.

### **Level 3:**

If there is a land based spill, and the Incident Commander and/or Environmental Services have deemed the spill not within the capability of PWGSC staff/resources, the DND Fire Department will be called in to assist or manage the spill. PWGSC personnel and resources may still be utilized during cleanup, therefore; dock employees will stand by and await further direction from the Incident Commander or Environmental Services. Once the spill has been cleaned up, PWGSC Environmental Services will report the spill to PEP if applicable (refer to Appendix I for reportable quantities on land). Environmental Services for tracking purposes will also file a report. An Environmental Incident Report, or information for a report, will also be submitted to Environmental Services for tracking purposes.

## Reportable Quantities for Land Spills

### Federal Regulations for the Transportation of Dangerous Goods

<b><i>Substance Spilled</i></b>	<b><i>Reportable Limit</i></b>
Explosives of Class 1 as defined in section 2.9 of the Federal Regulations	Any amount that could pose a danger to public safety or is greater than 50kg
Gases of Class 2 as defined in section 2.13 of the Federal Regulations	Any quantity that could pose a danger to public safety or any sustained release of 10 minutes or more
Flammable liquids of Class 3 as defined in section 2.18 of the Federal Regulations	200 L
Flammable solids of Class 4 as defined in section 2.20 of the Federal Regulations	25 kg
Products or substances that are oxidizing substances of Division 1 of Class 5 as defined in section 2.23 and 2.24 (a) of the Federal Regulations	50 kg or 50 L
Products or substances that are organic peroxides that contain the bivalent "-O-O-" structure of Division 2 of Class 5 as defined in sections 2.23 and 2.24 (b) of the Federal Regulations	1 kg or 1 L
Products or substances that are toxic and substances of Division 1 of Class 6 as defined in section 2.26 and 2.27 (a) of the Federal Regulations	5 kg or 5L
Infectious Substances defined in sections 2.26 and 2.27 (b) of the Federal Regulations	Any amount
Radioactive materials of Class 7 as defined by section 2.37 of the Federal Regulations and section 20 of the Packaging and Transport of Nuclear Substances Regulations	Any amount or any emission that is:  (a) 10 mSv/h on the external surface of a package that is being transported under exclusive use, 2 mSv/h on the surface of the conveyance, and 0.1 mSv/h at a distance of 2 m from the surface of the conveyance; and  (b) 2 mSv/h on the external surface of a package that is not being transported under exclusive use, 0.1 mSv/h at a distance of 1 m from the package, 2 mSv/h on the surface of the conveyance, and 0.1 mSv/h at a distance of 2 m from the surface of the conveyance.
Corrosive products or substances of Class 8 as defined by section 2.40 of the Federal Regulations	5 kg or 5 L

Miscellaneous products or substances of Class 9 as defined by section 2.43 of the Federal Regulations	25 kg or 25 L
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***Appendix II***  
***Responding to a Spill on Water***

## **Responding to a Spill on Water**

For spills on water it is often difficult to determine the source. The priority is to determine the size of the spill and the direction it is moving. A solid boom is the most effective means of containing a spill on water. The only readily available boom material at EGD is permanently in the water providing containment for the Dock main discharge port. If necessary, this boom may be disconnected and moved to contain a spill on the water as an interim measure. In addition, absorbent booms and pads may be placed on the water to absorb oil.

In the event of the discovery of a minor spill or sheen on the water, the alert will be made by two-way VHF radio on Channel 4 and Channel 10. Dock employees will stand-by and await further direction from the Incident Commander or Environmental Services.

### **Level 1:**

If there is a spill that reached the marine environment, and it is within the capability of the generator or discoverer to respond to the spill, the generator/discoverer will proceed to clean up the spill using the appropriate PPE and Spill Kits (Hydrocarbon). The waste shall be properly labeled and disposed of in accordance with EGD policy. The waste shall not be abandoned or disposed of in the garbage or a dumpster. Once the spill has been cleaned up, the responder will immediately report the spill to their supervisor and to Environmental Services regardless of size. Environmental Services will report the spill to PEP. An Environmental Incident Report will also be submitted by the generator/discoverer to Environmental Services for tracking purposes. An Environmental Incident Report template can be located in Appendix II.

### **Level 2:**

If there is a spill that reaches the marine environment, and the generator/discoverer requires assistance with clean up, the generator/discoverer will immediately notify the Incident Commander and Environmental Services (Contact numbers are located in Appendix III). The Incident Commander or Environmental Services will determine if the spill is within the capability of PWGSC staff and resources. If within PWGSC capability, clean up will commence using appropriate PPE, permanent boom, and spill response resources. The waste will be properly labeled and disposed of in accordance with EGD policy. The waste shall not be abandoned or disposed of in the garbage or a dumpster. Once the spill has been cleaned up, the responder will immediately report the spill to Environmental Services (if not previously notified). Environmental Services will report the spill to PEP. An Environmental Incident Report will also be submitted by the generator/discoverer to Environmental Services for tracking purposes. An Environmental Incident Report template can be located in Appendix II.

### **Level 3:**

If there is a spill that reaches the marine environment and the Incident Commander and/or Environmental Services have deemed the spill not within the capability of PWGSC staff/resources,

DND Pollution Control, the Canadian Coast Guard, or an external contractor will be immediately notified and brought in to assist or manage the spill. PWGSC personnel and resources may still be utilized during cleanup. Once the spill has been cleaned up, PWGSC Environmental Services will report the spill to PEP. Environmental Services will also file a report internally for tracking purposes. Environmental Services, the Incident Commander, or Environment Canada may investigate the incident.

## **Oil Spills on Water**

### ***Environmental Impacts***

The environmental implications of an oil spill are dependent on a number of variables including the product spilled, the quantity spilled, the location of the spill, and the habitat or wildlife impacted.

Spilled oil and certain cleanup operations can threaten different types of marine habitats and animals in different ways. For example, exposed sandy, gravel or cobble beaches are usually cleaned by manual techniques. Although oil can soak into sand and gravel, few organisms live full-time in this habitat, so the risk to animal life or the food chain is less than in other habitats, such as tidal flats.

Sheltered beaches have very little wave action to encourage natural dispersion. If the cleanup effort is not timely, oil may remain stranded on these beaches for years. Tidal flats are broad, low-tide zones, usually containing rich plant, animal, and bird communities. Deposited oil may seep into the muddy bottoms of these flats, creating potentially harmful effects on the ecology of the area. Finally, salt marshes host a variety of plants, bird and mammal life. Marsh vegetation; especially the root systems are easily damaged by fresh light oils.

In open water, marine organisms such as fish and whales have the ability to swim away from a spill by going deeper in the water or further out to sea. However, marine animals that live close to shore have a higher risk of being adversely affected as a result of an oil spill. Further, if one species in a food chain is adversely affected as a result of contamination, the entire food chain suffers.

## Properties of Various Oil Types

<b>Oil Type</b>	<b>Representative Oils</b>	<b>Diagnostic Properties</b>	<b>Physical/Chemical Properties</b>
Light volatile oils	Distillate fuel, and most light crude oils	Highly fluid, usually transparent but can be opaque, strong odour, rapid spreading, can be rinsed from plant sample by simple agitation	<ul style="list-style-type: none"> <li>• May be flammable</li> <li>• High rate of evaporative loss of volatile components</li> <li>• Assumed to be highly toxic to marine biota when fresh</li> <li>• Tend to form unstable emulsions</li> <li>• May penetrate sediments</li> </ul>
Non-sticky oils	Medium to heavy paraffin-based refined and crude oils	Moderate to high viscosity, waxy or oily feel, can be rinsed from surfaces by low pressure water flushing	<ul style="list-style-type: none"> <li>• Generally removable from surfaces</li> <li>• Penetration of substrates variable</li> <li>• Toxicity variable</li> <li>• Includes water in oil emulsions</li> </ul>
Heavy sticky oils	Residual fuel oil; medium to heavy asphalt and mixed base crudes	Typically opaque brown or black, sticky or tarry, viscous, cannot be rinsed from plant by agitation	<ul style="list-style-type: none"> <li>• High viscosity</li> <li>• Hard to remove from surfaces</li> <li>• Tend to form stable emulsions</li> <li>• High specific gravity and potential for sinking after weathering</li> <li>• Low substrate penetration</li> <li>• Low toxicity (biological effects due to smothering)</li> <li>• Will interfere with many types of recovery equipment</li> </ul>
Non-fluid oils (at ambient temperature)	Residual and heavy crude oils (all types); asphalt	Tarry or waxy lumps	<ul style="list-style-type: none"> <li>• Non-spreading</li> <li>• Cannot be recovered from water surfaces using most conventional clean-up equipment</li> <li>• Cannot be pumped without preheating or slurring</li> <li>• Initially relatively nontoxic</li> <li>• May melt and flow when stranded in sun</li> </ul>

Reference: QHM Pollution Contingency Plan, Department of National Defence, December 2000.

Note: One of the most common substances spilled is dirty bilge water, which can be spilled during pumping operations. Bilge water is composed of a wide variety of substances, the majority of which include seawater, freshwater and numerous petroleum products (e.g. lubricants and fuels).

### Estimating the Size of a Spill

When oil is spilled a working estimate of the volume of a spill on the water surface can be made by visual assessment of its surface area and thickness. When making a visual estimate of quantity, consideration should be given to slick thickness which can vary considerably even in a single slick. In general, dark brown or black patches indicate higher concentrations of oil, while coloured or silvery bands, such as those often seen at slick edges indicate extremely thin areas. The following table summarizes the appearance of oil on water as it is related to thickness.

Thickness ( $\mu\text{m}$ )*	Quantity ( $\text{L}/\text{km}^2$ )	Appearance
0.04	40	Barely visible under very good light conditions
0.08	90	Visible as a silvery sheen on water
0.15	175	First trace of colour may be observed
0.3	350	Bright bands of colour
1.0	1200	Colours begin to turn dull
2.0	2300	Colours are much darker
1000	$10 \times 10^6$	Dark brown, black; emulsions may be present

Reference: QHM Pollution Contingency Plan, Department of National Defence, December 2000.

\*1000  $\mu\text{m}$  = 1.0 mm

### ***Fate of Spilled Oil***

When oil is spilled on water, the slick itself can be affected by a number of weathering processes including oxidation, evaporation, spreading, emulsification, dissolution, biodegradation, and sedimentation. Weathering is a series of chemical and physical changes that cause spilled oil to break down and become heavier than water. Winds, waves, and currents may result in natural dispersion, breaking a slick into droplets which are then distributed throughout the water.

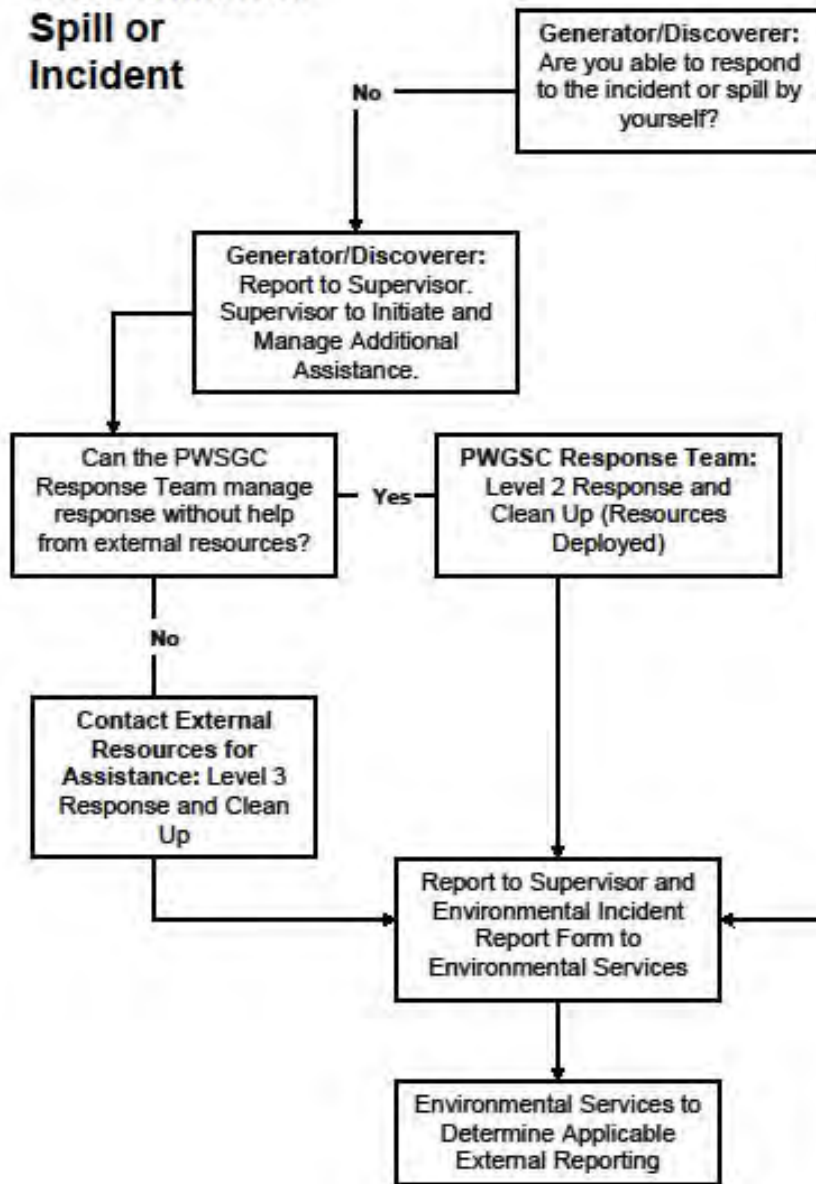


## ***Appendix III***

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### ***Environmental Spill or Incident Flow Chart***

# Environmental Spill or Incident



## CONTACTS

Level 1:  
Supervisor  
Environmental Services

Level 2:  
Supervisor  
Environmental Services

Level 3:  
EGD Commissionaires  
(250) 363-3874

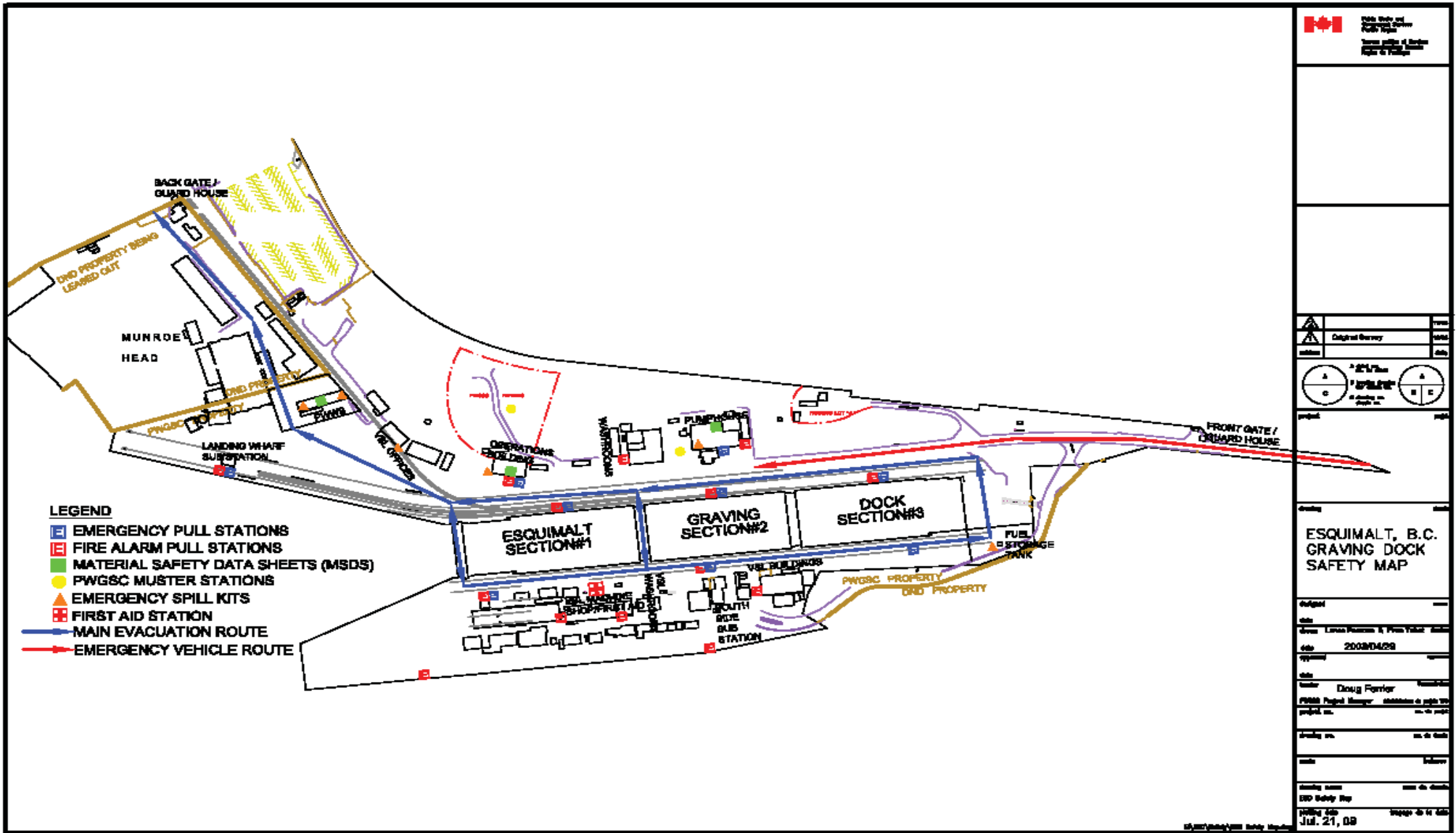
DND POESB/QHM  
(250) 250-363-2160  
VHF Channel 10

Provincial Emergency Program  
(800) 663-3456

Canadian Coast Guard  
(800) 889-8852  
VHF Channel 12

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***Appendix IV***  
***Site and Location Map***



- LEGEND**
- EMERGENCY PULL STATIONS
  - FIRE ALARM PULL STATIONS
  - MATERIAL SAFETY DATA SHEETS (MSDS)
  - PWGSC MUSTER STATIONS
  - EMERGENCY SPILL KITS
  - FIRST AID STATION
  - MAIN EVACUATION ROUTE
  - EMERGENCY VEHICLE ROUTE

This work was prepared under the authority of the Government of Canada.

	North
	Scale
	North
	Scale

**ESQUIMALT, B.C. GRAVING DOCK SAFETY MAP**

Project	ESQUIMALT, B.C. GRAVING DOCK SAFETY MAP
Date	2008/04/29
Author	Doug Forrier
Project Manager	...
Project No.	...
Revision No.	...
Scale	...
Sheet No.	...
Sheet Title	...
Project No.	...
Sheet No.	...
Sheet Title	...

## **APPENDIX H**

### **FUELLING AND OIL TRANSFER POLICY**

## **Esquimalt Graving Dock Fueling and Oil Transfer Policy**

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From time to time, bulk transfer of oil and fuel to or from vessels takes place at the Esquimalt Graving Dock (EGD) facility. Oil spills pose a significant risk to the environment, economy, and infrastructure at the EGD.

**Scope:** This policy applies to all vessel fueling operations involving trucks and barges, as well as bulk oil transfers of greater than 10 tonnes (10,000 litres) per day involving vessels berthed at the EGD. It applies to fueling of vessels in the drydock, but not bulk oil transfers involving dry-docked ships.

**Oil,** as described in the *Canada Shipping Act*, is considered petroleum in any form, including crude oil, fuel oil, sludge, oil refuse and refined products.

**Requirements:** The following must be adhered to when transferring bulk fuel/oil to or from vessels at the EGD:

1. Transfer operations must comply with the requirements outlined in the *Canada Shipping Act, Oil Pollution Prevention Regulations Part IV – Transfer Operations*.
2. An **Oil Transfer Checklist** must be completed and signed by both the representatives from the transfer vehicle (tank, truck or barge) and the vessel. This checklist must be received and signed by an EGD Representative prior to fuel/oil transfer.
3. For berthed vessels, a containment boom must be securely in place so that the areas of operations involved in the oil transfer process are completely surrounded. The containment boom must be structurally sound and have a minimum stand off of 5 feet from the sides of the vessel (this standoff may be adjusted to meet short term needs as long as potential spills from the dock, transfer hoses, decks and vents can be contained). *Users may deploy their own containment boom, have boom provided by a third party, or rent the Esquimalt Graving Dock boom.*
4. For transfers involving vessels in the Graving Dock, there must be a Pumphouse Operator present to shut down the auxiliary drydock pumps if a spill occurs. If no operator is on site, the drains and trenches on the dock floor should be covered, blocked or otherwise isolated from the tunnels leading to the auxiliary pumps.

Fuel transfer will not be allowed to commence without the permission of an Esquimalt Graving Dock Supervisor and completion of the **Oil Transfer Checklist**. The **Oil Transfer Checklist** can be obtained from the Front Gate Commissionaires or Pumphouse Operator. It must be filled out and submitted to the Pumphouse Operator or Front Gate Commissionaires prior to transfer.

Further details on safe transfer procedures can be found in the **Tank Truck to Marine Vessel-Oil Transfer Manual** ([http://www.pacific.ccg-gcc.gc.ca/er/oiltransfer/index\\_e.htm](http://www.pacific.ccg-gcc.gc.ca/er/oiltransfer/index_e.htm)).

## Example Scenarios

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### Fuelling a Vessel at a Jetty

1. Agent/User arranges fuel for vessel.
2. Agent/User notifies Esquimalt Graving Dock Supervisor of fuelling plan.
3. A containment boom is secured around the vessel.
4. Fuel truck arrives at Front Gate.
5. Front Gate Commissionaire provides Oil Transfer Checklist. Commissionaire notifies the Pumphouse Operator of the operation, and to expect a submitted checklist.
6. Truck meets with the responsible vessel representative.
7. The checklist is filled out and signed by both parties.
8. Checklist is taken to the Pumphouse, signed as received by Pumphouse Operator, and filed. Copy is provided to the vessel or truck representative if requested.
9. Transfer takes place.
10. Truck leaves property.
11. Containment boom is retrieved.



**Containment boom around vessel during fuelling operations**

### Transfer of Lube Oil (> 10,000 litres) from a Berthed Vessel.

1. Shipyard prepares to transfer 10,000 litres of lube oil from a vessel to dockside tanks/totes.
2. Shipyard notifies Esquimalt Graving Dock Supervisor of transfer.
3. A containment boom is secured around the vessel.
4. The responsible personnel on the vessel and the shore fill out the Oil Transfer Checklist (this may be the same company if they are responsible for both ends of transfer).
5. Checklist is taken to the Pumphouse, signed as received by Pumphouse Operator, and filed. Copy is provided to the vessel or truck representative if requested.
6. Transfer takes place.
7. Containment boom is retrieved.

## ESQUIMALT GRAVING DOCK OIL TRANSFER CHECKLIST

OIL TRANSFER LOCATION (circle):    South Jetty            North Landing Wharf    Graving Dock ( Section 1 2 3 )  
 TANK/TRUCK/BARGE COMPANY NAME: \_\_\_\_\_  
 VESSEL NAME: \_\_\_\_\_

**RESPONSE PERSONNEL INFORMATION:**

Vessel (Name, Phone): \_\_\_\_\_  
 Tank, Truck or Barge (Name, phone): \_\_\_\_\_

**INSTRUCTIONS FOR COMPLETION:** No vessel berthed at the Esquimalt Graving Dock is to begin loading or discharging oil until this form is completed in its entirety, and submitted to the Pumphouse Operator. For dry-docked vessels, this checklist needs to be completed for fuelling operations only. Transfer must not proceed unless affirmative answers are provided for each applicable checklist question. If the Pumphouse Operator is not on Duty, please provide the completed form to the Front Gate Commissionaires.

QUESTIONS	VESSEL		TANK, TRUCK or BARGE	
	Yes	No	Yes	No
Is there a written spill procedure plan?				
Is there immediately available cleanup and containment material?				
Are sufficient/qualified personnel available to deal with an emergency?				
Is there an effective deck watch and adequate supervision ashore?				
Have procedures for <i>oil</i> transfer handling been agreed to?				
Is there an agreed upon communication system?				
Agree on units of volume measure (gallons, litres)				
Have emergency shutdown procedures been agreed to?				
Are transfer hoses in good condition, tested and properly rigged?				
Are scuppers plugged and drip tray positioned?				
Are unused connections blanked?				
Are safety/smoking requirements being observed?				
<b>Berthed Vessels</b>				
Is the vessel securely moored? (Vessel at a Jetty)				
Is there a sufficient containment boom in place to contain a spill or release? (Vessel at a Jetty)				

DATE/TIME	PRODUCT	QUANTITY TO BE LOADED	DESCRIPTION OF RECEIVING TANK	CAPACITY OF RECEIVING TANK	RATE	PUMPING PRESSURE (psi)

**DECLARATION**

We have checked all the items on this checklist and have satisfied ourselves that the entries we have made are correct to the best of our knowledge.

<b>VESSEL REPRESENTATIVE</b> NAME: _____ SIGNATURE: _____ DATE: _____	<b>TANK, TRUCK, BARGE REPRESENTATIVE</b> NAME: _____ SIGNATURE: _____ DATE: _____
--	--

**EGD REPRESENTATIVE**    SIGNATURE: \_\_\_\_\_    DATE: \_\_\_\_\_

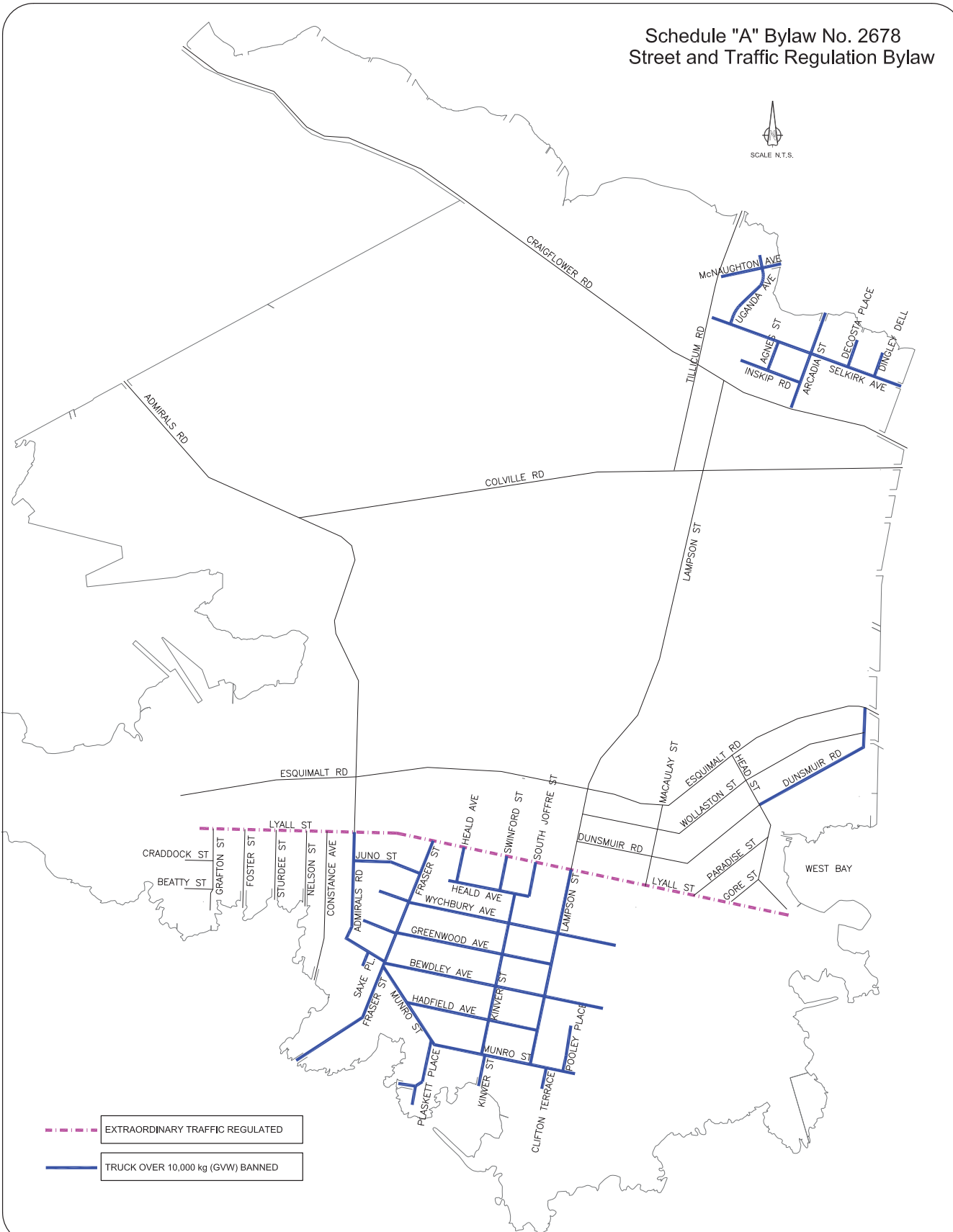
In case of emergency contact the Commissionaires immediately  
 (250) 363-3784



## APPENDIX I

### TOWNSHIP OF ESQUIMALT TRUCK ROUTES

# Schedule "A" Bylaw No. 2678 Street and Traffic Regulation Bylaw



- EXTRAORDINARY TRAFFIC REGULATED
- TRUCK OVER 10,000 kg (GVW) BANNED

## SECTION 4

### A CONNECTED COMMUNITY — TRANSPORTATION

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Transportation issues, whether within Esquimalt or as part of the regional network are critical to our community's ongoing sustainability. This section sets out a variety of transportation issues within our community, including roads, parking, public transit, cycling and walking, and how we connect to the regional network.

- To improve mobility and access for local travel and to adjacent municipalities.
- To minimize intrusion of major traffic flows into neighbourhoods.
- To promote the safe use of the road network by pedestrians and bicyclists.
- To improve the network and infrastructure for safe cycling;
- To provide convenient routing for transit service, together with good local access routes for pedestrians to transit service, particularly in higher density areas, parks and recreation facilities.
- To avoid or mitigate the negative impacts of parking on aesthetics, livability, and the environment.
- To ensure the continued availability of sufficient parking.

#### 4.1 Roads

Esquimalt's road system serves a variety of purposes and users. In addition to allowing residents to move between their homes, places of work, shopping and recreational facilities, it is also part of a larger regional network, which provides for the movement of private and commercial vehicles, as well as DND traffic.

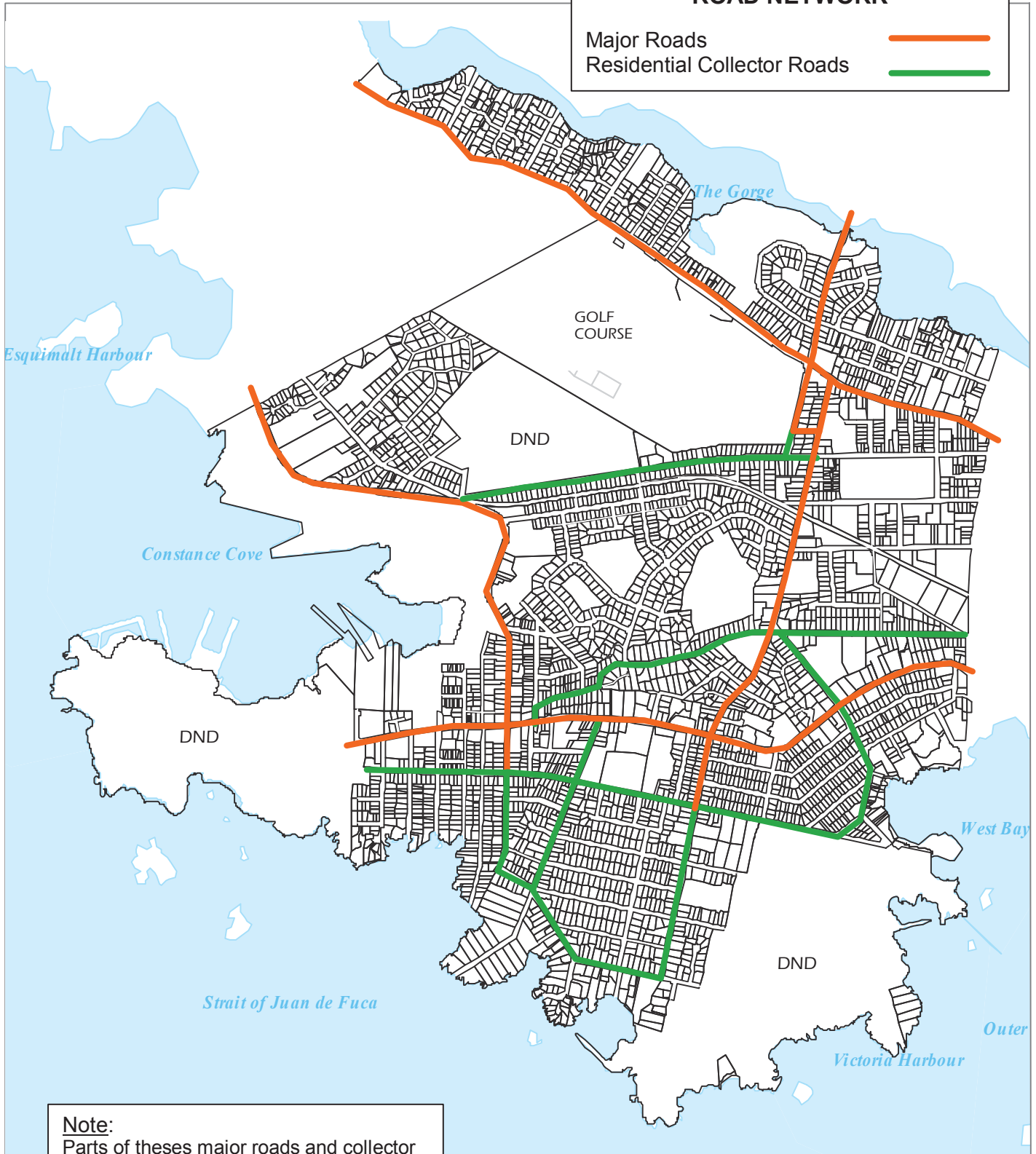
##### 4.1.2 Roads Policies

- a) Major Roads and Residential Collector Roads are shown on "Schedule B". All roads not highlighted on "Schedule B" are designed to serve local traffic only.
- b) Craigflower Road and Esquimalt Road will continue to serve as the municipality's principal east/west through-traffic routes. Through-traffic will be encouraged to use these routes rather than local streets.
- c) Encourage multi-modal street design and accessibility for pedestrians, cyclists, transit users and motorists.
- d) All roads, including all major collector roads, should become bicycle-accommodating.
- e) The Township is pursuing potential funding from other levels of government in order to assist with improvements to Craigflower Road.
- f) Major and local roads within Esquimalt are considered to be a "community resource" for the benefit of all users of the road. They increase opportunities for personal

Corporation of the Township of Esquimalt  
**OFFICIAL COMMUNITY PLAN**

Schedule B<sub>1</sub>  
**ROAD NETWORK**

Major Roads   
Residential Collector Roads 



**Note:**

Parts of these major roads and collector roads are also part of the Bicycle Network [see Cycling Routes map]. Cycling is a recognized form of transportation and is permitted on all municipal roads.